University of Southern Queensland

Dermatological and musculoskeletal disorders of nursing home workers in Australia, Japan, Korea and Taiwan

A dissertation submitted by

Derek Richard Smith

DipRT, BSc, PGDipHSt, PGDipOH&S, MHSc.

For the award of

Doctor of Philosophy

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Abstract

Although skin disease and musculoskeletal disorders are believed to be common among nursing home workers, to date there have been no coordinated international studies of these occupational issues. Therefore, it was considered appropriate to conduct one of the first cross-cultural investigations of occupational dermatology and ergonomic complaints among nursing home workers in Australia, Japan, South Korea and Taiwan using a standardised methodology.

This thesis documents a 4-year investigation of skin disease and musculoskeletal disorders conducted among 465 nursing home staff in Australia, Japan, South Korea and Taiwan. Skin diseases were diagnosed by specialist physicians during medical examinations, while information on musculoskeletal disorders was collected by means of a self-reported questionnaire. There were major differences in both the location and type of skin disease between the 4 groups. Overall, the Australian group suffered a generally higher prevalence of skin disease than in the other three countries investigated, most likely due to their significantly higher rate of sun-induced skin damage. The high prevalence of cutaneous fungal disease seen within the Taiwanese subjects most probably arose from the comparatively higher temperature and relative humidity of Taiwan. Other potentially important skin disease risk factors included previous skin disease and a history of allergy, both of which are consistent with current knowledge. Although musculoskeletal disorders were found to be most prevalent among the Japanese nursing home staff at almost all body sites, the reasons for this are not clear. It may have related to a generally higher musculoskeletal rate, or a higher degree of self-reporting on their questionnaires. Individual MSD risk factors included moving patients, washing patients, working as an assistant nurse and daily alcohol consumption. Interestingly, MSD was found to be a co-factor for current skin disease.

Overall, this study indicated that certain occupational health issues consistently affect nursing home staff in the 4 countries, but the prevalence and rank order varies from nation to nation. It was also shown that nursing home work incurs a reasonable degree of risk and that skin disease and musculoskeletal disorders are important occupational issues within these facilities.

Certificate of Dissertation

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged. Specifically, there are 2 published papers (listed on Pages 173 and 206) containing multiple authors. The contributions of these authors were as follows: Page 173: The manuscript was devised and written entirely by Derek Richard Smith. The co-authors, Guo YL, Lee YL and Chang SJ, helped design, organise and carry out the field work component, Page 206: The manuscript was devised and written entirely by Derek Richard Smith. The co-authors, Yamagata Z, Atkinson R, Choi JW and Guo YL, helped design, organise and carry out the field work components.

Derek Richard Smith Date

ENDORSEMENT

Ron Atkinson Date

Mike Kotiw Date

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Derek Richard Smith August 9th, 2003.

Pathfinder for the reader

For convenience, this thesis is structured with 5 chapters. Chapter 1 is an introductory chapter providing a background on nursing home demographics. Chapter 2 provides a review of country-specific occupational health issues. Chapter 3 details the results of skin examinations and also incorporates a comparative analysis of skin disease among staff in the 4 countries. Chapter 4 lists the results of musculoskeletal disorder surveys and also provides a comparative analysis of MSD between the 4 countries. Chapter 5 lists the main results and conclusions and finally, the Appendix section contains multi-language versions of the questionnaires and examination forms used throughout this study (English, Japanese, South Korean and Chinese). Chapter references are numbered in order of first appearance and are listed separately at the end of each sub-section. As most data has been previously published by the author of this dissertation, references stating the published work are listed on the title page of each sub-section.

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Chapter 1

Introduction

Purposes of this project

Although skin disease and musculoskeletal disorders (MSD) are believed to be common among nursing home workers the world over, to date there have been no coordinated international studies of these occupational issues. Similarly, the influence of different cultural settings and geographical factors on workplace illness has apparently not been investigated in palliative care situations. Therefore, it was considered appropriate to conduct cross-cultural investigations of occupational dermatology and ergonomic complaints among nursing home workers in both Australia and Asia using a standardised methodology. It was felt that the effects of cultural diversity would be better evaluated if such a study was conducted in both the northern and southern regions of Asia. For these reasons, a typical nursing home was initially selected in an appropriate yet convenient location within Australia. Cooperation was then sought and eventually obtained from equivalent facilities in Japan, South Korea and Taiwan. For these 4 geographically diverse groups, statistically significant differences were sought for demographic factors, disease prevalence rates and occupational risk factors.

This dissertation contains the complete data set and analysis arising from the abovementioned multinational nursing home studies. All results are presented as published papers in two main chapters, covering skin diseases and musculoskeletal disorders. The first data chapter (Chapter 3) deals solely with selected skin diseases in the 4 countries and also includes some comparative analyses. The second data chapter (Chapter 4) covers MSD in the 4 countries, and is also followed by a comparative analysis of the data. Aside from the medical examinations, which for ethical reasons could be undertaken only by specialist medical doctors, all data was collected, analyzed and published in articles for which the candidate was the chief author. For clarity, these research papers are presented in their original formats in the following chapters of this dissertation. In addition, all references to relevant published work of other researchers are included in the individual research papers rather than in a combined literature review. In order to provide sufficient background information on the palliative care industry, the thesis begins with an overview relevant nursing home and population demographics.

An overview of nursing home demographics in Australia, Japan, Korea and Taiwan

Smith DR. A brief overview of the elderly demographic in Australia, Japan, Taiwan and South Korea. ACQWIRE 2001; 10: 22-24.

Abstract

The organisation and demographics of nursing homes generally varies between Australia, Japan, South Korea and Taiwan. Australian nursing homes tend to be larger facilities that specialise in specific types of palliative care. This situation occurs mainly for fiscal reasons as the Australian health care systems focuses less on hospital-based in-patient care (requiring expensive facilities and skilled personnel), and more on community-based outpatient services. Moving palliative care out of the hospital arena has ensured a wider proliferation of specialist nursing homes caring solely for a particular type of patient. On the other hand, a large proportion of Japanese geriatric nursing is provided by long-stay hospitals operating as pseudo-nursing homes. This situation arose primarily as the Japanese health care system slowly adapted to the large gains in life expectancy occurring after World War 2. As the population aged, hospital departments caring for the elderly or infirm became steadily larger. Although Korean population demographics have not yet reached the Japanese level of life expectancy, there is good evidence to suggest that they will in the next 20 years. This has meant that dedicated South Korean palliative care institutes are not widespread at present, although government planning is beginning to take longevity gains into account when making policy decisions. Alternatively, Taiwanese nursing homes tend to be smaller, privately run enterprises, as the life expectancy of Taiwanese, although rapidly climbing, appears unlikely to reach that of Japan for another few years. Furthermore, there remains a strong tendency for Chinese people to provide extended family care to their infirm or elderly relatives, rather than placing them in nursing homes. Such situations are generally less common within Australia and becoming steadily less popular in Japanese and Korean societies.

Introduction

The human population is aging rapidly, with individuals living healthier and longer lives throughout the world. At the present time there are about 580 million people above the age of 60, and this number is expected to increase to 1000 million by the year 2020.[1] Within 20 years the over 60s age group will increase by 75%, despite an overall population expansion of only 50%. The very old age group (75 years and over) will also increase dramatically throughout all industrialized nations

in future years. Although many elderly people currently live in developed nations, by 2020 almost 70% of the world's geriatrics will reside in developing countries. Throughout the last century, major advances in living standards and medical care dramatically improved life expectancy and expanded the geriatric populations of Australia, Japan, South Korea and Taiwan. However, these improvements were not uniform. Steady rises in social welfare and disease prevention afforded early gains within Australian society, while the dramatic effect of the Second World War proved to be a turning point for health care in Japan, South Korea and Taiwan. All four responded to their ageing populations differently, usually incorporating the predominate health care ethos of the day. Contemporary health care and demographic statistics reflect these influences.

Australia

Australia is one of the largest and most sparsely inhabited regions in the world, with a population of 18.1 million and population density of 2.4 people per square kilometer. The national birth rate is currently at its lowest ever level of 14.5 per 1000 population, while the crude death rate is 7 deaths per 1000 population.[2] Although Australians have the sixth longest life expectancy in the world, longevity improvements have not matched the dramatic changes experienced by Japan. A male child's life expectancy rose from 66.5 to 75.9 years between 1950 and 1998, representing an improvement of just over 14%.[3] Female life expectancy was also enhanced 14% from 71.5 to 81.5 years during the same time period. Aged Australians are rapidly increasing in number, with citizens over 65 comprising 12.2% of the national population, an increase of 33% in the past twenty years. Currently, 8.5% of Australia's over-65 age group depend on some form of palliative health support, a figure that rises to 20% by the age of 70. Nursing homes provide the majority of long-term care for older people, with 42 nursing home beds per 10 000 population. Nine percent of Australia's total workforce are employed by the health care sector, while the distribution of acute care hospital beds is 84 per 10 000 population. The prevalence of doctors and nurses is relatively high at 259 and 962 per 100 000 citizens respectively.[4]

Japan

Japan's 126.7 million residents live on four main islands and have a population density of 331 people per square kilometer, making it one of the world's more densely populated regions.[5] Japan has a fairly low crude birth rate of 9.9 live births per year per 1000 residents, and crude death rate of 7.8. deaths per 1000 population. Japanese citizens have the longest life expectancy in the world, and one that has increased significantly during the past 50 years. Between 1947 and 1997 the life expectancy for Japanese males rose from 50.1 to 77.1 years, an increase of 27 years. For females the average life expectancy was elevated from 53.9 to 83.9 years, an improvement of 55%.[5] Japan is currently the most rapidly aging country in the world. By 1994, there were 17.6 million Japanese people aged over 65 years, representing 15.1% of the total population, or a 4.2 fold increase since 1947. Around 90% of geriatrics depend on family care, a traditional resource that is rapidly diminishing throughout Japan. Between 1960 and 1993, the percentage of elderly citizens requiring nursing care quadrupled to 6.5% of those aged over 65 years.[6] A lack of emphasis on independent living has also seen the number of bed-ridden elderly expand to 1.9% of the total population, increasing the demand for high care nursing services.[7] By default, Japanese hospitals have gradually become the major center for palliative nursing where family care is unavailable. This phenomena is reflected in the high proportion of hospital beds per 10 000 citizens (133) and correspondingly low proportion of nursing home beds (only 8 per 10 000 population).[6,7] The prevalence of medical and nursing staff is quite high at 177 and 738 per 100 000 people respectively, despite health care representing only 2.3% of the total labour force.[7]

South Korea

South Korea is the third most densely populated area in the world with 46.8 million people living in an area slightly less than 100 000 square kilometers and a population density of 472 people per square kilometer. The country's birth rate declined from 31.2 in 1970 to 13.2 live births per 1000 population in 1999. South Koreas` crude death rate is presently 5.5 deaths per 1000 people.[8] South Korea experienced dramatic public health improvements following World War 2 and the Korean War. The male life expectancy increased 57% from 45 to 70.6 years between 1945 and

1999. An even greater effect occurred among females, raising their life expectancy over 73% from 45 years in 1945 to 78.1 years in 1999. Recent advances in public health have expanded the elderly demographic to 6.8% of the total population, or a group of 3.2 million people. Between 1960 and 1980 the percentage of elderly increased 76.9%.[9] Among them, 8.3% currently require some degree of nursing care for senile dementia, representing a subgroup of around 280 000 citizens.[10] More than two-thirds of the elderly are now over 80 years of age. However, the percentage of South Korean geriatrics is not expected to reach Australia`s current prevalence rate until the year 2020. Families continue to provide the majority of palliative care for elderly people in South Korea, which probably explains why the distribution of nursing home beds is comparatively low. The proportion of nursing home and acute care beds is currently 1.7 and 55 per 10 000 citizens respectively. When compared to the other 3 countries medical personnel are comparatively scarce in South Korea, with 149 doctors and 250 registered nurses per 100 000 population.[8,11]

Taiwan

With 22.2 million people living predominately on one island and a population density of 613 people per square kilometer, Taiwan is the second most densely populated area in the world. The country's birth rate fluctuated from 38.3 in 1947 to its highest point of 49.9 in 1951, before settling to 12.9 live births per 1000 population in 1999. Taiwan's present death rate of 5.7 deaths per 1000 people has steadily declined from its maximum of 18.5 in 1947.[12] Similar to Japan, Taiwan experienced dramatic public health improvements following World War 2. The male life expectancy increased over 38% from 53.4 to 72.3 years between 1951 and 1999. A parallel effect also occurred among females, raising their life expectancy 35% from 56.3 years in 1951 to 78.0 years in 1999. These recent advances in public health have expanded Taiwan's elderly demographic to 8.5% of the total population. Among them, 5.5% currently require some degree of nursing care, representing a group of around 90 000 citizens.[13] Community nursing homes and families provide the majority of palliative care for elderly people in Taiwan. The proportion of nursing home and acute care beds is 9.5 and 57 per 10 000 citizens respectively. Although 11.5% of the total

workforce are employed by the health and social services sector, medical personnel are comparatively scarce with 140 doctors and 256 registered nurses per 100 000 population.[14]

Conclusion

Australia's consistent standard of living has ensured relatively longevity for its citizens, with the past 50 years adding only moderate life expectancy gains. On the other hand, major public health improvements in Japan, Taiwan and South Korea following World War 2 have resulted in significant life expectancy increases. Although the percentage of elderly Taiwanese and South Koreans lags slightly behind Japan and Australia, palliative care has become increasingly important in these countries due to a decline in family members available for traditional care-giving roles. As their citizens age, public health and social policies must continue to reflect the changing demographic of these nations.

Key points

1) Japan has the longest life expectancy, the most rapidly aging population and highest proportion of elderly citizens.
2) Australia has the highest proportion of nursing home beds, medical practitioners and nurses per general population.
3) Taiwan and South Korea's population is beginning to age at an increasing rate, but has not yet reached the current Japanese or Australian level.
4) For cultural reasons elderly Japanese, South Koreans and Taiwanese depend more heavily on family care than similarly aged Australian citizens.

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Table 1. Selected demographic characteristics of Australia, Japan, South Korea and Taiwan

	Australia	Japan	S. Korea	Taiwan
Demographic items				
Total population (million people)	18.1	126.7	46.8	22.2
Population density (people per km^2)	2.4	331	472	613
Crude birth rate (per 1000 population)	14.5	9.9	13.2	12.9
Crude death rate (per 1000 population)	7.0	7.8	5.2	5.7
General health status				
Female life expectancy (years)	81.5	83.9	78.1	78.0
Male life expectancy (years)	75.9	77.1	70.6	72.3
Elderly population (% aged over 65 years)	12.2	15.1	6.8	8.5
Elderly requiring care (% over 65 years)	8.5	6.5	8.3	5.5
Healthcare system				
Hospital beds (per 10 000 people)	84	133	55	57
Nursing home beds (per 10 000 people)	42	8	1.7	9.5
Practicing doctors (per 100 000 people)	259	177	149	140
Registered nurses (per 100 000 people)	962	738	250	256

(these figures were correct at the time of publication in early 2001)

Chapter 2

An overview of occupational health issues

Introduction

The prevalence and nature of occupational health issues such as skin disease and musculoskeletal disorders are influenced by numerous factors both inside and outside of the nursing home environment. Firstly, the nature of employment conditions, workplace practices and the staff themselves can generate a range of occupational health issues within each country. Since skin disease and musculoskeletal disorders are to a large extent, genuine occupational diseases; their prevalence and nature will also vary between the countries for reasons relating either directly or indirectly to general occupational health issues intrinsic to that particular area. Historical workplace factors, such as poor attention to appropriate protocols, reduced compliance with occupational safety standards and generally unsafe working practices, will influence the prevalence and nature of most occupational issues. Similarly, workplace health traditions such as a climate of underreporting for fear of management influence, the socially unacceptable status of unemployment or disability or even culturally-based superstitions can also affect a country`s intrinsic occupational health culture.

For these reasons, it is appropriate to provide a brief overview of the general status and background factors relating to intrinsic occupational health issues within each of the individual countries. The following sections of this chapter include 4 separate overviews of occupational health issues relevant to Australia, Japan, South Korea and Taiwan, including historical factors, management systems and the current status of general workplace health. An important point addressed in this chapter relates to the differences in management systems between Australian and Asian occupational health. The Australian model contrasts that of north Asia, having less of a medically based ethos. Important historical developments influencing occupational health in each country are also discussed. This is of particular relevance in northern Asia where the most significant gains in worker protection were made after World War 2. In South Korea and Taiwan, the introduction of democratic reforms in the latter half of the last century has also been critical to occupational health and is therefore discussed in full.

Occupational health issues in Australia

Smith DR, Yamagata Z. An overview of occupational health and safety in Australia. J Univ Occup Environ Health 2002; 24: 19-25.

Background

The island continent of Australia comprises a land area of around 7.7 million square kilometres with most of its 19.4 million inhabitants living in metropolitan regions on the east coast.[1] Similar to the United States in physical size, Australia is the 6th largest land mass in the world. Although aboriginal people have existed for at least 60 000 years, the majority of the population comprises British migrants who immigrated in the last 200 years. Asian immigrants are an increasing subpopulation and now constitute 7% of the population. Around 23% of Australians were born overseas. The country has a high per capita income with a Gross Domestic Product (GDP) currently 8th among the OECD countries. Australia is rich in natural resources and for most of its history the economy was dominated by agriculture. Recent changes have now elevated manufacturing to the biggest GDP contributor at 13.2%.[2] Other significant economic activities include mining, agriculture, services and high technology.

There are almost 10 million workers in all occupations, most of whom work in the private sector. Retail trade, manufacturing and business services are the largest national employers, accounting for almost 40% of all workers.[1] When stratified by occupation, professionals and intermediate level workers (clerks, salesmen and service workers) constitute the two largest employment subcategories. The health and community services sector employs about 10% of the active workforce, while health expenditure constitutes around 8% of the national GDP.[2]Australia has a relatively skilled working population, with around 50% all employed persons holding a post school qualification of some description. Furthermore, 14% of all 15 to 64 year old Australians currently hold a bachelor degree. The national unemployment rate is marginally higher for males and currently sits at 7%.[1] Retirement age varies, but is usually between 55 and 60 years.

Occupational health and safety issues

In 1987 the National Occupational Health and Safety Commission (NOHSC) outlined 6 national health and safety priorities: occupational back pain, hazardous chemicals usage, noise-induced hearing loss, occupational skin disorders, occupational cancer and mechanical equipment injury.[3]

Although progress has been made at various levels in the 14 years subsequent to these recommendations, underreporting of workplace injury and disease still occurs and may obscure the true value of current OHS programs.

In the year 2000, 5% of all Australian workers suffered an occupational injury or illness of some description, with more than twice as many males affected as females.[1] The national work-related fatality rate is currently 0.05 cases per 1000 employees, while the incidence rate is 7.5 deaths per 100 000 persons per year.[4] Injuries are far more common than fatalities in Australian workplaces and occur at a rate of 20 injuries per 1000 workers. The national injury incidence rate is 11 injuries per 1000 000 hours worked, with manufacturing having the highest frequency among all occupations (37 cases per 1000 workers). By job description, labourers have the highest incidence of injury with 50 injuries per 1000 employees.[5] Musculoskeletal sprains and strains are the most common injuries suffered by Australian workers, accounting for around half of all reported cases (51%). Nearly 25% of the ailments affect the lower back and are most commonly caused by body stressing (38% of all cases). Non-powered hand tools are currently the most import exogenous cause of occupational injury among Australian workers.[5]

Chronic diseases with a long lead time are also significant. At 15.8 cases per 1000 000 population aged over 20 years, Australia has one of the highest national mesothelioma rates in the world.[6] Furthermore, this rate has continuously risen since 1947. Between 1982 and 1988 for example, the national case rate per 1000 000 population rose from 12.8 to 19.6. This high incidence is commonly attributed to crocidolite mining and asbestos manufacture, particularly in Western Australia between 1943 and 1966. Although production ceased almost 40 years ago, the long lag time between exposure and disease onset continues to provide mesothelioma cases.

Workers` compensation costs

In every country, the financial and personal costs of workplace injury and disease are significant. The health burden from occupational disease is usually much higher than the burden of injury,

both of which are an important component of total public health costs.[7] Around 40% of all Australian workers injured during the year 2000 received workers` compensation of some description.[1] Of the remainder, 55% did not apply for benefits and 5% were refused or otherwise ineligible. The total national cost of workers` compensation in Australia declined somewhat from its peak of 3.7 billion Australian Dollars (AUD) in 1986-1987 to 3.4 billion AUD in 1991-1992.[3] The average cost of individual compensation claims also decreased during this time. Possible explanations for these decreases include tightening of the eligibility criteria, medical difficulty in subscribing injury to work and general underreporting of workplace diseases. When stratified by subcategory, the most expensive industry for Australian workers` compensation is mining, with an average claim cost of 10 700 AUD. By occupation, compensation for professionals is the most expensive at 8 800 AUD per new case. The most significant body site for injury or disease is the psychological system, costing on average 12 800 AUD per claim.[5] Furthermore, mental stress is the most expensive compensable disease in Australian industry, at around 13 000 AUD per new claim lodged. At the time of writing, 1 AUD was roughly equivalent to 62 Japanese yen.

Government management and legislation

Australian governmental OHS management is divided into federal, state and local jurisdictions. Legislation is almost the sole responsibility of the state governments, of which there are 7: New South Wales, Victoria, Queensland, South Australia, Western Australia, Northern Territory and the Australian Capital Territory. Each of these sectors has their own OHS, which although similar, are not identical.[3] Each government also has their own personnel to enforce a rather non-standard legislation that varies between states and individual industries. In recent years however, progress has been made in achieving national uniformity for occupational health and safety law throughout Australia.

The primary body for federal government OHS legislation is the National Occupational Health and Safety Commission (NOHSC), formed in 1986 and otherwise known as Worksafe Australia.[3] The governing board includes members of the 7 states, key employment groups, industry personnel

and representatives from the federal Department of Industrial Relations. Currently, the main function of the NOHSC is to coordinate OHS activities between the state jurisdictions and to manage incoming OHS data. Data is complied, analysed and published by this group, producing not only Australian OHS statistics, but also codes of practice and various workplace exposure limits and standards. Although state governments independently enforce and manage their own OHS legislation, workers` compensation and occupational rehabilitation; many small-scale enterprises with less than 20 employees are exempt from certain aspects of the law.[3] Generally speaking, most OHS inspectors fulfil more of an advisory role rather than law enforcer. When compared to the Japanese system, there appears to be a greater focus on occupational safety in Australia, rather than occupational medicine.[8] Furthermore, the Australian tertiary education system for OHS personnel does not place a heavy emphasis on the training of occupational physicians.

Education, training and registration

Australian occupational health education is open to both medical and non-medical professionals in a wide variety of fields. Historically, training began in 1974 with a Postgraduate Diploma in Occupational Health and later a Master of Public Health at the University of Sydney.[3] Similar courses have since been adopted by many other educational institutions, at both the undergraduate and post-graduate level. Growth in this sector was particularly rapid after 1986, but has slowed down in recent years. Undergraduate courses usually offer initial training to prepare students for a career in occupational health and safety management. Postgraduate courses on the other hand, are often undertaken part-time by professionals already working in their field. A variety of technical schools also offer certificate courses in OHS as a basic qualification.

Licensing requirements for Australian OHS professionals depend on speciality and basic qualification. Physicians wishing to become consultants in occupational medicine are required to join the Australasian Faculty of Occupational Medicine; which is a specialty branch of the Royal Australasian College of Physicians.[9] Entry requirements are distinctively structured and rigorous.

Initial training usually lasts 4 years and is followed by a national licence examination, which consists of two parts, being 3.5 and 3 hours duration. Eligibility to sit for this test is not automatic. An Australian physician must be a medical graduate of at least 7 years standing and have 3 years of general clinical experience. They must have successfully completed a post-graduate program in occupational health and have at least 4 years of supervised, full-time equivalent workplace experience. Candidates must also attend at least 5 review-meetings (having presented at 2) and accrue a minimum number of professional development activities.[9] Achievement of these criteria allows a physician to become a Fellow of the Australasian Faculty of Occupational Medicine (FAFOM) and practice as such.

The Australian College of Occupational Health Nurses is the national registration body for occupational health nurses. Full membership is open to nationally recognised registered nurses who are currently working in the field of occupational health.[10] They must also be working towards a tertiary qualification in this area and be able to demonstrate relevant competencies specified by the Australian College of Occupational Health Nurses. Completion of an occupational health and safety orientation course may be accepted in lieu of formal tertiary qualifications.[10] Maintaining the individuals national nursing licence is also an ongoing requirement for membership.

Non-medical personnel constitute a large proportion of OHS professionals in Australia. One of the largest national institutes for their professional accreditation is the Safety Institute of Australia, which includes safety managers, inspectors, educators and affiliated individuals. Membership is also open to occupational physicians and nurses. Requirements for full membership include the completion of an approved occupational health related tertiary course and 3 years of full-time experience in the field of occupational health.[11] To maintain membership, and individual must also undertake a set amount of professional development over a 5-year period. Other professional institutes such as the Australian Institute of Occupational Hygienists and the Ergonomics Society of Australia also offer additional membership categories for occupational health professionals in their respective subcategories.[3] Both institutes have membership requirements that usually include

academic qualifications and relevant working experience.

Occupational health research

Until it was curtailed by funding cuts in 1995, a large proportion of Australian OHS research was undertaken centrally by the Research and Scientific Division (RSD) of Worksafe Australia.[3] Following these cutbacks, most OHS research dispersed and is now undertaken at universities and other governmental institutions. Attracting local funding and cooperation for OHS projects remains a difficult task, while international research grants are also sparse. State governments are however, a reasonably constant source of funding for minor OHS projects in Australia.

The future of occupational health

The future of OHS in Australia is difficult to predict. On one hand, significant progress has been made in standardising workplace legislation throughout the 7 different municipalities. Similarly, workplace injury and fatalities have both decreased over time.[12] On the other hand however, the number of occupational injuries continues to vary from year to year, while government funding for many aspects of OHS have been severely curtailed. This has led to a decline in job opportunities and a reduction of research activity in most areas. Public misconceptions regarding OHS also exist, and these often carry over to the workplace.[3] As Australia, like many Asian countries, is currently experiencing economic recession, significant OHS improvements may not occur for some time.

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Occupational health issues in Japan

Smith DR, Fujishiro K. Occupational health and safety in Japan.

J Occup Health Sfty (Aust NZ) 2001; 17: 499-502.

Background

The dramatic recovery of Japanese industry and economic status following World War 2 is well known. Although famous for its current expertise in high technology, post-war Japan originally focussed on heavy industries such as steel and shipbuilding during the 1950s, later adding the chemical, machinery and automobile industries to its burgeoning economic machine.[1] Throughout this period new occupational hazards were rapidly added to the workplace, supplementing the various health risks in existence prior to World War 2.

Historical OHS Issues

Lung disease contracted during mining was probably Japan's first large-scale occupational health and safety (OHS) problem, with few miners living beyond 40 years and many women marrying 7-8 times.[2] By the early 20th century women had begun to find employment in the textile industries, working long hours with little food and being confined to small dormitories at night. Tuberculosis spread rapidly in these conditions and subsequently became one of Japan's first transmissible occupational diseases. Following World War 2, the rapid introduction of strong chemicals caused many caustic burns and eye diseases among workers, while radiation injury within the textile industry and thermal burn during manufacturing was also common. Throughout this time mining remained an important source of occupational dust for Japanese men until 1965, when many of the major mines closed. Lower back injury peaked in 1972 after which time the government introduced effective and comprehensive OHS countermeasures.[3]

Current OHS Issues

Accidental fatality due to lack of oxygen was elevated during the 1980s, along with rises in diseases due to 'trauma' such as severe fractures and bleeding.[4] The widespread proliferation of keyboards brought corresponding increases in tendonitis, followed by the ascendancy of complex bouts of neck and shoulder pain among computer workers. By 1995, lower back pain was the most common newly diagnosed occupational disease in Japan, followed by pneumoconiosis and chemical exposure diseases; representing 55.9%, 14.4% and 3.3% of the total respectively.[3] Small

industries now have the highest frequency of accidents. The ratio of accidents between small and large enterprises (6.5:1) is particularly concerning, as 25% of Japan's total workforce are currently employed by organizations with less than 10 staff.

Like many countries, chronic lower back pain is common in Japan, affecting more than 30% of the workforce, particularly males involved in regular, single-handed work.[5] Occupational stress also affects Japanese workers, and may be compounded by a cultural requirement to suppress excessive feelings within the workplace, leading to increased psychological stress.[6] In extreme cases, death from overwork (Karoshi) has also been reported in employees regularly undertaking 3000+ hours per year.[7] Although occupational mortality ratios are known to increase with age, this relative effect may be obscured by Japans` extremely high life expectancy.[8]

OHS Management History

Although mining was recognised as a hazardous Japanese occupation for at least 1000 years, no OHS legislation existed until the introduction of the Mines Act and Factory Act in 1905 and 1911 respectively. These laws regulated many workplace conditions such as the standard of factory dormitories and the minimum age of employment.[1] A focus on employee social security began with the Employees' Health Insurance Act of 1922, and by 1929 the Japanese Society of Industrial Health had also commenced operations. The Ministry of Labour (MOL) was quickly established during the post war occupation of Japan, enforcing the Trade Union Law in 1945 and the Labour Standards Law of 1947. The new Japanese constitution of 1947 also permitted workers to organise and bargain basic workplace rights for the first time. By 1955 the Special Protection Law on Silicosis and Traumatic Spinal Cord Injuries was instigated to help abate the growing number of occupational injuries occurring in these areas.[4]

Japan established the Institute of Labour Hygiene in 1956, which later became the National Institute of Occupational Health. The Pneumoconiosis Law began in 1960 to abate the disease regularly occurring within mines, while The Industrial Homework Law of 1970 was enacted to help

manage occupational health within the growing number of 'cottage industries' now producing electronics and textiles.[1] Between 1960 and 1970 Japan's heavy industry and chemical industry had grown, bringing with it the introduction of many new toxic substances. As no toxicity data existed, the government was overwhelmed with cases and could only respond to the situation ex post-facto. In 1972 Japan enacted its most important OHS legislation, the Industrial Safety and Health Law, with an emphasis on preventive OHS measures.[3] For the first time, many workplace substances, processes and practices were mandated; while the environmental and medical monitoring of employees also commenced. By 1977 this law had been further refined to include toxicity assessments for chemical substances used in the workplace.[9]

Current OHS Management

The Japanese MOL currently emphasises 5 key OHS principles beginning with the establishment of an OHS management team for each workplace. This usually includes OHS professionals such as occupational physicians, nurses, OHS supervisors, OHS consultants, industrial hygiene consultants and working environment analysts. All OHS professionals must pass the national examination, while physicians and nurses must also hold a relevant national licence. Occupational physicians are compulsory in Japan when the number of employees exceeds 50 in a workplace designated as hazardous.[10] The second focus must include control of the working environment, such as regular measurement of dust and the constant monitoring of hazardous agents when they exist. Managing an employee's working conditions is the third area, and usually includes ergonomic assessment, the prevention of vibration injuries and control measures against radiation hazards. The fourth phase involves the protection of workers' health by way of pre-employment medicals, periodic checkups and specific medical examinations. Routine health screening was originally introduced to address the diseases associated with Japans` aging workforce, such as hypertension and cardio vascular disease.[2] As age is a significant risk factor in these conditions, preventive screening was perceived as a cost-effective measure for older employees independent of their specific workplace hazards. The fifth OHS principle relates to the adoption of a 'Total Health Promotion Plan' for employees. Employers must include health education plans,

measurements of current health and continual guidance for workers.

Workers' compensation is a nationally controlled affair in Japan, managed by the MOL and legislated by the Workmen's Accident Compensation Insurance Law of 1947.[1] Although the government acts as the insurer, to afford greater protection for employees some larger companies also insure with commercial organizations. Injured Japanese workers may apply for either worker's compensation or national health insurance compensation, the success of which is decided by a local Labour Standards Bureau director in consultation with relevant health and management professionals. Employee union activity in Japan began primarily as a post-war phenomena and remains largely dominated by company controlled unions.

OHS Professionals in Japan

In 1978 the University of Occupational and Environmental Health (UOEH) was established at Kitakyushu to educate and train OHS personnel such as occupational physicians, occupational health nurses and environmental technicians.[4] Postgraduate medical specialisation for occupational physicians was established with the UOEH residency program in 1989, and later supplemented by the Japanese Medical Association (JMA) qualification in 1990 and the Japan Society for Occupational Health (JSOH) registration program in 1991. Under government legislation occupational physicians may choose either system, and by September 2000 a combined total of 49 679 had successfully done so throughout Japan.[11] Although both registrations are valid for 5 years the JMA course is more basic, requiring only 50 hours of accredited training. The JSOH method on the other hand, takes 5 years and culminates in a 2-day written examination. When compared to the British registration system for occupational physicians, the Japanese model seems to lag behind in its course duration and clinical training aspects. Some authors suggest that improvements in these key areas might become an important facet of future occupational health training reform.[12]

Conclusion

Many OHS issues resulted from Japan's need to rebuild after World War 2 and its subsequent rapid industrialisation throughout the latter half of the 20th century. Significant OHS changes stemmed from post-war constitutional reforms and led to increased worker protection and the formation of effective labour movements. This paper has briefly outlined how and why this transition occurred, in conjunction with some of the more important historical aspects of Japanese OHS.

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Occupational health issues in South Korea

Smith DR, Kim JA. Occupational health and safety in the Republic of Korea. J Occup Health Sfty (Aust NZ) 2001; 17: 607-611.

Background

Located due West of Japan, the Republic of Korea (ROK) or South Korea is home to 47.5 million individuals, of whom 22 million (46.3%) are currently employed.[1] Predominate industries include social and other services (67.6%), mining and manufacturing (20.4%) and agriculture, fishing and forestry (12.0%). Large firms employing 1000 workers or more only account for 0.2% of the national workforce, with the predominate group (86.8%) employed by organizations of 50 staff or less. Around 60% of these employees are regularly exposed to solvents, heavy metals and specifically regulated chemicals at their workplace.[2]

Historical development of OHS

Prior to the Russo-Japanese War of 1904 and the Japanese annexation in 1910, most Korean workers were village-based commoners and servants. Between 1910 and 1945 industrial production was developed predominately for use in the Japanese war machine. Japan's defeat during World War Two (WW2) left the ROK in a perilous situation as most industries had been destroyed and there were no significant natural resources to draw from.[3] Liberation also caused significant political turmoil between the North and South, which eventually led to the Korean War of 1950 – 1953. This situation proved seminal in the development of many future Occupational Health and Safety (OHS) hazards as early economic recovery was almost entirely based on the widespread introduction of unregulated labour-intensive industries. Over the next few decades, many employees within these organizations were exposed to significant workplace hazards.[3] Anticipating an impending OHS crisis, America's post war occupation force introduced the Labour Standards Act of 1953 to regulate machinery, heavy equipment and working conditions. Meanwhile, the first indigenous OHS service began at the Dai-Han Coal Corporation in 1956.[4]

Significant economic progress was made during the 1960s as the export-led light industry sector began to develop. The Federation of Korean Trade Unions was established in 1961, while enforcement of the Labor Standards Act was further strengthened in 1962. An Institute of Occupational Health and Medicine began at the ROK Catholic University in 1962, followed by

regulated analyses of working environments and national health examinations for workers in 1963. This year also heralded the introduction of compulsory OHS education for workplace health managers and the formation of the Dai-Han Occupational Health Association.[5] Workers compensation began with the Industrial Accident Compensation Insurance Act of 1963, followed by the breakaway of the Labor Department from the Ministry of Health in 1964.

In the 1970s the ROK's industrial system changed from light industry to a dependence on heavy chemical production.[3] In 1971 an Industrial Accident Hospital was established at the Catholic University, followed by an Industrial OHS Service Center in the same year. An Institute of Environmental Medicine began at the Korea University in 1972 and was later supplemented by the Korea Labor Welfare Corporation in 1977. A Workplace Health Insurance System also began in 1977 followed by the National Labor Science Institute in 1978. Unfortunately during this period a large number of pollution causing industries were being steadily introduced into the ROK from other, more developed countries such as Japan.[5]

Although the ROK's heavy chemical industry of the 1970's matured throughout the 1980s, OHS and worker protection still lagged far behind. This was exemplified by a large outbreak of carbon disulphide intoxication among employees of an imported Rayon manufacturing facility. At a political level, the Labour Department was promoted to a certified Ministry of Labour in 1980, followed by the enactment of the Industrial Health and Safety Act (IHSA) in 1981.[6] A Special and General Health Examination Council was also established in the same year, although the country's authoritarian military government was continually suppressing trade unions and other labour movements during this time. In 1987 the ROK underwent a radical, political change with the introduction of the 6.29 Declaration of social democracy. In the same year, OHS issues were significantly advanced by establishing the nation's most important worker protection body: the Korea Industrial Safety Corporation (KISCO).[6] The Korean Industrial Medicine Association followed up these groundbreaking developments with its inauguration in 1988.

By the 1990s, international competitiveness had decreased due to a high cost economic structure and the shift from manual labor to technology intensive production.[3] Nonetheless, two important OHS associations were established in 1990, the Korean Industrial Nurse Association and the Korean Industrial Hygiene Association. The country's first postgraduate OHS program began with the Catholic University's Graduate School of Occupational Health in 1991. In the same year a comprehensive OHS plan was finally introduced into the ROK workplace, known as the 'Master Plan for Occupational Disease prevention'. Meanwhile, occupational physicians were first registered with the Occupational Medicine Specialist System established in 1995.[5] Between 1997 and 1999 a national 3 year plan for the advancement of safety and health was enacted to help further reduce the ROK's industrial accident rate.

Contemporary OHS issues

Contemporary OHS issues in the ROK can be divided into 2 categories: 1) occupational disease with approved medical treatment and 2) occupational disease with symptoms related to work following an approved medical examination. Pneumococcosis has remained the most important industrial disease of the first category for over 10 years, although the number of diagnosed cases was almost halved between 1994 and 1996, dropping from 626 to 366 cases.[1] Musculoskeletal disorders (MSD) ranks second with 345 cases in 1996, followed by stroke (252 cases), Noise Induced Hearing Loss (NIHL) with 163 cases and back pain (161 cases). Of the 657 485 workers who underwent a specific workplace medical examination in 1996, NIHL was the most frequent malady; affecting 1736 workers (0.26%). Pneumococcosis was second with 1106 cases (0.16%) followed by solvent poisoning (57 cases), lead poisoning (31) and chrome poisoning (26).[1]

The changing patterns of occupational disease also reflect significant demographic shifts among ROK society within recent years. From a social perspective, there has been the widespread introduction of democracy alongside the decentralization and dilution of authoritarian power. Economic changes have led to growth in personal income and increasing economic freedom.[7] Industrial structures have also changed, with a shift away from labor intensive to technologically

focused production. Sexual emancipation and improvements in gender equality have led to increases in the number of female employees throughout ROK workplaces. Intakes of migrant workers have also increased to fill various manufacturing jobs that local workers find unacceptable. Furthermore, the ROK has experienced significant increases in life expectancy since WW2, which has in turn led to an aging population and subsequently aging workforce in the past 10 years.[7]

Current OHS Management

Almost all current OHS legislation is based on the 1981 IHSA, which has since been revised 3 times in 1990, 1995 and 1996.[8] There are three components, with the first being the health management of workers. Pre-placement health examinations occur in most industries, while the frequency of ongoing medical examinations for workers depends on their category.[9] Employees of non-hazardous workplaces are examined once every year for blue collar workers and once every two years for white collar staff. Specific medical examinations are carried out in hazardous industries such as chemical factories and workplaces with high noise levels 1 to 2 times per year. Another category, the contingency health examinations, are conducted by inspectors following acute workplace injury. Continuing OHS education is required on a monthly basis among industries with 300 or more workers, and is performed by the in-house OHS officer. This specialist is most commonly an occupational nurse, hygienist or physician.

The second facet of contemporary ROK OHS management involves working environment control and is achieved by measurement of the employees' working environment twice per year.[10] In large firms of 300+ employees the compulsory OHS officer completes this analysis. Industries with fewer than 300 staff are visited by technicians from the local Health Service Center. The third component for OHS management is the Vicarious Health Service Organization (VHSO), which was established in 1992 especially for companies of less than 300 workers who are not required to have a full time OHS officer under the IHSA. VHSO officers usually conduct workplace site visits and inspections 1 to 2 times per month to check safety conditions and perform occasional health examinations upon workers.[11]

OHS systems are themselves split into public and private categories. The public systems is managed at its highest level by the Ministry of Labor and KISCO, followed by the Industrial Safety Department and the Industrial Accident Compensation Department.[10] The private sector consists of the employer, head OHS officer, safety manager and health managers. Government administration issues the final authority among private companies for OHS legislative compliance via the IHSA.

Academic Study of OHS

The ROK currently has 49 general medical schools focusing mainly on preventive medicine, while there are 113 nursing schools covering all aspects of nursing. A total of 24 graduate schools also offer specialist OHS master degrees for industrial hygienists, administrators, physicians and nurses. Twenty-three medical schools teach OHS as part of their undergraduate curriculum, while the Korean Society of Occupational Medicine has offered board certification for specialist OHS physicians since 1995.[5] Training courses take 4 years of full-time study following medical school graduation and focus on all aspects of OHS as well as preventive medicine. Regular update courses are required every 2 years for OHS physicians and plant managers. Academic OHS research has significantly increased since the 1980s with assistance from many government and private organizations. The Korean Journal of Preventive Medicine was the country's first academic OHS publication in 1968, followed by the Korean Journal of Occupational Medicine in 1988. Contemporary OHS research generally focuses on epidemiology, cancer, pneumoconiosis, noise, occupational health management, toxicology, ergonomics and magnetic / electronic fields.[5]

Future issues for OHS

Although the ROK's OHS situation has undergone radical changes since WW2, it was only in the last few decades that diagnosis and reporting mechanisms have ensured an overall drop in workplace morbidity. On a broad scale, the nation's industrial accident rate fell from dramatically from 48 to 8 per 1000 workers between 1970 and 1997 despite a ten fold increase in the number of workers.[1] In the same time period the accident frequency rate fell from 15 to 3 accidents per 1

million working hours, while the accident severity rate also declined from 3 to 2 days lost per yearly working hours.[1] Unfortunately small scale enterprise continues to be the predominate system within ROK industry, and one that is known to have the highest rates of occupational disease. As factories with less than 50 employees are not covered by the IHSA, legislative control of workplace hazards remains one of the country's most important areas for OHS improvement.

Conclusion

Although the need for additional OHS funding for small enterprises is recognised by both KISCO and the ROK government, it has always been difficult to direct spending towards the most productive safety reduction schemes for this sector. In conjunction with an incentive-based focus, a more serious financial commitment must also be made by the ROK government 'across the board'. Such protocols would include an overall increase in the number of OHS professionals for small business, more comprehensive OHS educational programs and the more widespread promotion of preventive measures as a cost saving business strategy.

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Occupational health issues in Taiwan

Smith DR, Hsu PC. Occupational health and safety in Taiwan.

J Occup Health Sfty (Aust NZ) 2001; 17: 401-403.

Background

Located in the south eastern sea of Mainland China, Taiwan comprises 86 tropical islands with a total land area of 36,000 square kilometres and population in excess of 22 million.[1] As one of the world's more heavily populated regions, most citizens live and work in high density cities on the western coast of the main island. Although traditionally dominated by mining and agriculture, rapid development transformed the economy late last century to more technology intensive industries such as manufacture and commerce. Taiwan's current unemployment rate is low with more than half of all work-aged citizens involved in productive work. Small-scale industry predominates, with 80% of the workforce presently employed by companies of less than 30 staff.[2]

Historical OHS Issues

During Taiwan's rapid industrialisation period, many new toxic substances were introduced into the workplace without prior safety evaluation or industrial hygiene protocol. Manufacturing processes were established with little concern for employee safety, while recognition of occupational hazards was limited throughout many industries. Consequently, annual workplace morbidity and mortality rose to substantial levels during this period. In 1984 for example, occupational mortality in Taiwan was more than five times that of the United States with 248 deaths per million workers.[3] Common occupational diseases included occupational asthma within the plastics industry, toxic hepatitis from electronics assembly processes, toxic polyneuropathy in colour printing establishments, lead poisoning at lead battery factories and occupational dermatitis within a variety of industries.

Current OHS Issues

Occupational asthma continues to be one of the most significant OHS diseases currently affecting Taiwanese workers. Intoxication from chemical inhalation such as carbon monoxide and hydrogen sulphide frequently occurs, as does occupational liver disease. Sharps injuries among health care workers are particularly important, as the community prevalence of Hepatitis B is very high.[4] Hearing loss resulting from industrial processes also constitutes a significant source of workplace morbidity, and one that remains difficult to prevent.

For a variety of reasons, many of the workplace diseases common last century continue to affect Taiwan in the year 2000. One factor is the lack of recognition of current occupational problems. Large-scale occupational cancer mortality studies are infrequent, while no musculoskeletal disorders had attracted workplace compensation as of 1998. Like many other countries, the under-reporting of certain OHS incidents also occurs in Taiwan.[4] Another factor is a lack of accessibility for inspection and therefore, legislative control. Small business is known to have the highest incidence of work related injuries in Taiwan, and tends to be the least compliant with OHS regulations.[2] Research suggests employers focus more on safety placarding and safety equipment, rather than their responsibility in preventing accidents and providing a duty of care. Less than half of the businesses recently surveyed were concerned with environmental monitoring regulations, and even less with Material Data Safety Sheets.[2] As most Taiwanese industries are small-scale, the extent of this situation presents continual challenges for occupational health professionals.

Social factors are also important as Taiwan remains to a certain extent, a society influenced by Confucian traditions. Respect for elders and authority is valued, ensuring the majority of employees are compliant and hard working. As many workers yearn to become an independent employer themselves, little incentive exists for occupational health promotion in their current situation. The propensity towards self-owned businesses also ensures many Taiwanese work longer hours than their western counterparts. A recent government report for example found more than one fifth of companies working employees beyond the legal limit.[5]

Historical Perspective's of OHS Management

Taiwanese occupational health and safety regulations officially began with the commencement of labour inspections in 1933. Two years after the Roben's Report of 1972, a Taiwanese 'Labour Safety and Health Law' was enacted to ensure workers safety and help reduce occupational hazards. Legislation coverage was expanded by the 'Labour Standards Law' of 1984, which was subsequently amended in 1996.[5] Certification and qualification examinations for industrial

hygienists commenced in 1979, while in the 1990's vocational and trade based schools began mandatory safety education for students.[3]

Current OHS Management

Occupational health and safety is currently managed by the Council of Labour Affairs and the Department of Health, while the major workplace health insurer is the Bureau of Labour Insurance. Although 7.5 million of Taiwan's 9 million workers are presently insured, the annual compensation rate for occupational disease is very low. Between 1987 and 1995 for example, workplace insurance only compensated 513 cases of occupational injury.[6] Furthermore, these insurance payments seriously underestimated and thus under-compensated for the true burden of workplace morbidity in Taiwan.[7] From their inception, workplace labour inspections targeted high risk occupations, but have been continually hampered by manpower shortages and bias towards larger organizations. Consequently, less than 10% of Taiwanese industries are inspected every year.[2] Labour unions only play a minor role in monitoring workplace health and many are at least partially controlled by employers. When compared to its Asian neighbours, Taiwan has fewer registered occupational physicians than Japan and South Korea, while OHS nurses, industrial hygienists and safety officers are also lacking. As of 1998, no hospitals or medical clinics designated solely for patients with occupational disease had been established.[3]

Despite these shortfalls, increased awareness of workplace health issues in the late 20th century did afford some improvements in Taiwan's occupational safety situation. In the ten-year period between 1986 and 1995 workplace hazards were more than halved, falling from 6.18 to 2.87 hazards per 1000 workers. By 1998 the 'Disablement Frequency Ratio' had also decreased from its highest level of 7.35 to 2.22 incidents per million person-work hours.[5] Significant in this improvement was the 1993 implementation of a government surveillance system to elucidate areas of OHS concern.[6]

Academic Study of OHS

Occupational health is continually researched in Taiwan with regular funding from the National

Science Council, the Institute for Occupational Safety and Health, the Department of Health and the National Health Research Institute. Studies often collaborate between funding institutions and universities, while common research topics include epidemiology, toxicology and occupational hygiene. Taiwan presently has 61 tertiary colleges, 44 universities and 9 medical schools, many of which now include occupational and environmental health as part of their curriculum. Although there are 13 teaching hospitals with OHS residency programs, the rate of trainee occupational physicians is limited because occupational medicine is not officially registered as an independent medical specialty.[3] OHS is however emerging as a more popular non-medical graduate program at both the Masters and Doctoral level.

Conclusion

In summary, Taiwan's major occupational health and safety issues were created by a variety of factors including rapid industrial development and the propensity for small scale enterprise. Despite these limitations however, progress has been made in many areas of OHS during recent years. Unfortunately, the size of many businesses prevents adequate workplace inspections, ensuring that governmental enforcement of Taiwan's OHS legislation remains less than complete.

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Chapter 3

Skin disease examinations

Introduction

This chapter contains the results of skin disease examinations conducted within Australian, Japanese, South Korean and Taiwanese nursing homes. Countries are addressed in separate subchapters, each one an abstract, background, methods, results, discussion and conclusion section. Although conducted in four separate countries, the detection methodology and diagnosis criteria were identical throughout and were all coordinated and supervised by the author of this dissertation. For ethical reasons, the author was unable to personally conduct skin examinations. In each country therefore, specialist physicians were employed as examiners during the data collection phase and worked under his direct supervision. All examinations conformed to ethical standards and protocols relevant to each particular country and were cleared by an appropriate ethics committee. The entire process of data entry, data analysis and text writing was then undertaken solely by the author of this dissertation. Results were published as individual manuscripts in peer reviewed journals appropriate to the subject matter. For all of published papers, the author of this dissertation was the primary author.

There were several reasons for the selection of countries included in this project. Firstly, it was considered appropriate to investigate the differences in skin-specific factors between Caucasian and Asian staff employed in similar institutions and similar climates. Secondly, it was also considered necessary to investigate the differences between Asian groups within differing climates and cultural situations. The Taiwanese and Australian cohorts came from similar climatic environments, but differed in racial makeup. The South Korean and Japanese subjects were racially and geographically similar, although Koreans typically have slightly different skin to that of Japanese. This selection increased the diversity of both skin types and geographical influence. Finally, there were the practical issues of cooperation and language. All subjects undergoing examinations were volunteers from the cooperative institutions and had the option of refusing to take part in the physical examination without penalty. This was a particularly important consideration in the selection of institutions and the subsequent recruitment of individual subjects.

Skin diseases among Australian nursing home staff

Smith DR, Atkinson R, Readman K, Scott J. Prevalence of skin disease among staff in an Australian nursing home. Environ Dermatol 2001; 8: 157-162.

Abstract

Background

Although nursing home numbers are increasing in Australia, few studies have investigated the dermatological condition of their workers. This study was undertaken to ascertain the prevalence of common skin diseases among typical Australian nursing home staff.

Methodology

In November 2000 a representative sample of 140 employees from a large nursing home complex in Nambour, Australia responded to a structured skin disease questionnaire. Seventy-five (53.6%) then agreed to participate in a dermatological examination undertaken by a specialist physician. Conditions were diagnosed using standard clinical techniques and common dermatological reference criteria.

Results

Of the skin diseases diagnosed, keratosis showed the highest prevalence at 56.0% followed by fungal conditions at 17.3%. Dermatitis affected 13.3% of all staff while skin cancer was diagnosed in 12.0%. By location, the most common site for skin disease was the head (41.3%), followed by the lower arms and hands (28.0% each). Skin conditions were frequently seen on the lower legs (20.0%), feet (18.7%), upper arms (13.3%), chest and neck (9.3% each). Whether their conditions were partially or entirely work related was difficult to ascertain however, as no significant occupational risk factors could be identified.

Conclusion

For some skin conditions the prevalence and distribution were substantially different from previously published reports. Further research is needed to elucidate the reasons behind the high skin cancer prevalence seen during this study.

Key words: nursing home staff, skin disease, Australia, Queensland, skin cancer

Introduction

Skin disease is an important occupational issue throughout the world, and one that may have significant social and economic consequences for employees.[1] It is also a contentious issue that may remain unrecognised and unmanaged by employers.[2] Although patterns of skin disease vary between countries and regions, health care workers (HCW) represent a group who are frequently exposed to dermal irritants. Among them, the number of HCW employed by nursing homes is gradually increasing as society ages. This is particularly important in high-care environments where almost all of the patient's daily activities must be assisted by palliative care staff. Although Australian nursing homes currently employ around 100 000 people,[3] very few investigations of their dermatological conditions have been undertaken. Therefore, it was considered appropriate to conduct a skin disease investigation among staff within a typical Australian nursing home.

Methodology

This study was reviewed and approved by the university ethical standards committee in November 2000. A representative sample of 140 available staff were selected from a large nursing home complex in Nambour, Australia. Nambour is located in Queensland, around 100 km north of Brisbane city (latitude 26.64°S, longitude 152.93°E) and has a reasonably elderly population of 11 397 citizens. Nambour is south of the Tropic of Capricorn and as such, enjoys a moderately tropical climate. All fieldwork was undertaken in November and December 2000, during which time the average temperature was 25.6°C and relative humidity 66%. Workers initially completed a structured skin disease questionnaire. Questions asked included age, sex, duration of current employment, nature of current employment and the presence of skin diseases within the past 12 months. After returning their questionnaire, employees were asked to be part of the physical examination phase of this study. A total of 75 (53.6%) consented and underwent dermatological examination by a specialist medical practitioner highly experienced in the detection of skin diseases. Because participation was voluntary, all skin examinations were visual with no subsequent histological or laboratory confirmation. All detected skin diseases were classified into four main categories of keratosis, fungal infection, dermatitis and skin cancer. Keratosis was

further divided into actinic keratosis (AK) and seborrhoeic keratosis (SK); fungal conditions were separated into tinea unguium (TU), tinea pedis (TP) and paronychia (PC); dermatitis was divided into contact dermatitis (CD), seborrhoeic dermatitis (SD) and miscellaneous dermatitis (MD); and skin cancer was delineated as either basal cell carcinoma (BCC) or squamous cell carcinoma (SCC).

All data were entered into a standard spreadsheet program (MS Excel 2000) before being statistically analysed by JMP Version 4 statistical analysis software (SAS Institute, 2001). This investigation included descriptive statistics for the prevalence of skin conditions and mathematical analysis to investigate the effect of various staff variables. Gender differences in basic prevalence were investigated using Pearson`s chi square test, with Fisher`s exact test used for items with small cell counts. Logistic regression analysis was also undertaken to derive potential dermatological risk factors. Variables were chosen using the stepwise selection method, with the presence of skin disease used as the dependent variable and demographic items as the independent variables. Odds ratios (OR) were calculated with 95% confidence intervals (95% CI) and adjusted for age, sex and total duration of employment within the nursing home. Probability values (P) above 0.05 were regarded as statistically insignificant throughout the analyses.

Results

Of the 75 staff who volunteered for a dermatological examination, the majority were female (76.0%) and were employed on a part-time basis (77.3%). Their age ranged from 16 to 62 years with a mean of 42.6 years (SD 10.4). Around one-third were under 40 years of age (32.0%) with most aged between 40 and 50 years (46.7%). Their employment duration at this workplace ranged from 0.17 to 40 years with an average duration of 7.2 years (SD 7.0). Most employees worked as health care workers (66.7%), which included personal carers, nurses, diversional therapists and rehabilitation staff. The remainder were divided between outdoor workers (13.3%), food service employees (10.7%) and administrative officers (9.3%). Forty percent of employees were involved in daily patient contact duties, including changing the patient’s bed (36.0%), moving the patient

(34.7%), changing their clothes (34.7% each) and washing the patient (32.0%). Refer to Tables 1 and 2.

Of the skin disease categories identified during this study, keratosis showed the highest prevalence at 56.0% followed by fungal conditions at 17.3%. Dermatitis affected 13.3% of all staff while skin cancer was diagnosed in 12.0%. When divided into their respective subcategories the prevalence of each was as follows: AK (33.3%), SK (28.0%), TU (10.7%), TP (5.3%), PC (1.3%), CD (8.0%), SD (2.7%), MD (2.7%), BCC (9.3%) and SCC (2.7%). Two employees (2.6%) were sunburnt at the time of examination (Table 3). There were statistically significant differences in the presence of TU and TP, with males suffering a higher prevalence in both categories (P = 0.0070 and 0.0141 respectively).

By location, the most common site for skin disease was the head (41.3%), followed by the lower arms and hands (28.0% each). Skin conditions were frequently seen on the lower legs (20.0%), feet (18.7%), upper arms (13.3%), chest and neck (9.3% each). Other sites such as the upper legs and back had prevalence rates lower than 3.0% among the total staff population. By skin disease category, keratosis was seen most frequently on the face (52.4% of all keratosis cases), hands (26.2%) and forearms (23.8%). Dermatitis was diagnosed mainly on the hands (50.0% of all dermatitis cases) and chest (20.0%) during this study. Skin cancer was commonly found on the face (44.4% of all skin cancer cases) and chest (22.2%), while almost all fungal infections involved the feet (92.3% of all fungal infections). By subcategory, AK was most common on the head and neck (68.0% of all AK) followed by the hands and forearms (40.0%). All CD cases (100.0%) were detected on the hands. BCC was found predominately on the face (57.1% of all BCC), chest (28.6%) and neck (14.3%); while SCC was divided evenly between the stomach (50.0% of all SCC) and upper arm (50.0%). Refer to Table 4 and Figure 2.

Age was the only statistical risk factor identified for skin conditions, being inversely related to the presence of AK (adjusted odds ratio 0.04, 95% CI 0.003 - 0.52). No other skin diseases were

related to age nor to any other physical or demographic characteristics of the staff examined during this study.

Discussion

When compared to other research, the prevalence of AK among Australian nursing home staff was higher than among citizens in an English district,[4] but lower than an Australian community study.[5] The location of AK differed from previous research where most cases were diagnosed on the hands and forearm rather than the head and neck.[6] Unlike other reports where the presence of AK was related to increasing age,[4,5] an inverse statistical association between AK and age was found during this study. Why younger workers in the current investigation would have a higher risk of AK is difficult to explain, although it may relate to their comparatively lower acceptance of sun protection behaviour.[7] The lack of association between sun damage and certain occupational factors during this study was in agreement with previous Australian research.[8] It may also have incorporated Green et al`s hypothesis that fair-skinned people probably have a tendency to avoid the sun and therefore, outdoor occupations.[8] This situation might have led to an under-representation of high-risk, outdoor workers during the current research that possibly obscured statistical associations.

Although the TP prevalence during this study was similar to a previous level suggested by Brooks and Bender,[9] other research has reported different fungal infection rates within various populations. A British national survey and research on Danish soldiers have both reported lower TU prevalence rates.[10,11] Conversely, the Danish study found higher levels of TP than were seen during this Australian investigation. The well-known association between TU prevalence and increasing age helps explain why employees from this study (who were slightly older) had higher TU background levels than the military personnel. As the soldiers probably wore enclosed boots for longer time periods than nursing home staff, this would have enhanced fungal growth and subsequent TP infection rates. The close correlation between TP prevalence and a previously reported background level suggests the nursing home subjects suffered this affliction no more often than

would be expected in a general population.[9] Considering the fact that fungal growth is promoted by moist conditions and that enclosed footwear provides such an environment, it was not surprising to find almost all the fungal cases affecting the employees' feet during this study. The PC prevalence rate observed during this investigation was however, lower than expected. As PC is often wet-work related and many of nursing home staff were occupationally exposed to water, it is possible that the single case was possibly a statistical artefact associated with small sample size.

The current investigation revealed a CD prevalence almost identical to a background level of eczema previously described in the Netherlands.[12] Conversely, various occupational studies have revealed much higher CD prevalence rates among Italian hospital workers[13] and Taiwanese hairdressers.[14] Why results from this study were substantially lower than previous workplace research is difficult to say, however it is possible that an increased awareness of preventive measures among nursing home staff may have been a contributory factor. The observation that dermatitis cases in this study mostly involved the hands was consistent with previous reports.[13] With regard to SD, results from the current study were very similar to a background community incidence previously described by Johnson and Nunley.[15] Although other investigations have reported dermatitis levels to be higher in women than in men,[13] no statistical associations between skin disease and gender were found during data analysis.

When the nursing home prevalence of BCC and SCC are converted to a standardised population rate (incidence / 100 000 citizens), the results appear to be higher than other investigations. Previous research in the community where these employees live has revealed lower incidences of both conditions.[8] Australia's national incidence rate for BCC and SCC has also been reported at lower levels.[16] The incidence of these conditions among American citizens appears to be lower still.[17] The fact that all skin cancer cases in the current study were only visually diagnosed and not histologically confirmed suggests that some might have proved benign if laboratory analysis was possible. Without the benefit of histological confirmation, it was not possible to confirm or exclude any borderline cases, which might have reduced the overall prevalence. Alternatively, the high

incidence of BCC and SCC may have been a chance result associated with the small sample size. The high proportion of skin cancer diagnosed on the sun-exposed, facial region during this investigation is in agreement with previous research.[18] Statistical analysis revealed no significant association between occupational sun exposure and skin cancer during this investigation, which also confirms a previous study of the subjects' community by Green et al.[8]

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Table 1. Demographic items of staff

	n	(%) [a]
Gender		
Female	57	(76.0)
Male	18	(24.0)
Characteristics		
Married	50	(66.7)
Single	25	(33.3)
Alcohol	48	(64.0)
Tobacco	19	(25.3)
Work status		
Full-time	58	(77.3)
Part-time	17	(22.7)
Mean ± SD		
Age (yrs)	42.6 ± 10.4	
Working week (hrs)	33.7 ± 11.8	
Total duration (yrs)	7.2 ± 7.0	

[a] percentage of all staff (N=75)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
High school	46	(61.3)
Technical college	20	(26.7)
University	6	(8.0)
Primary school	3	(4.0)
Job description		
Health care worker	50	(66.7)
Outdoor worker	10	(13.3)
Food service	8	(10.7)
Administration	7	(9.3)
Patient handling		
Change bed	27	(36.0)
Move patient	26	(34.7)
Change clothes	26	(34.7)
Wash patient	24	(32.0)

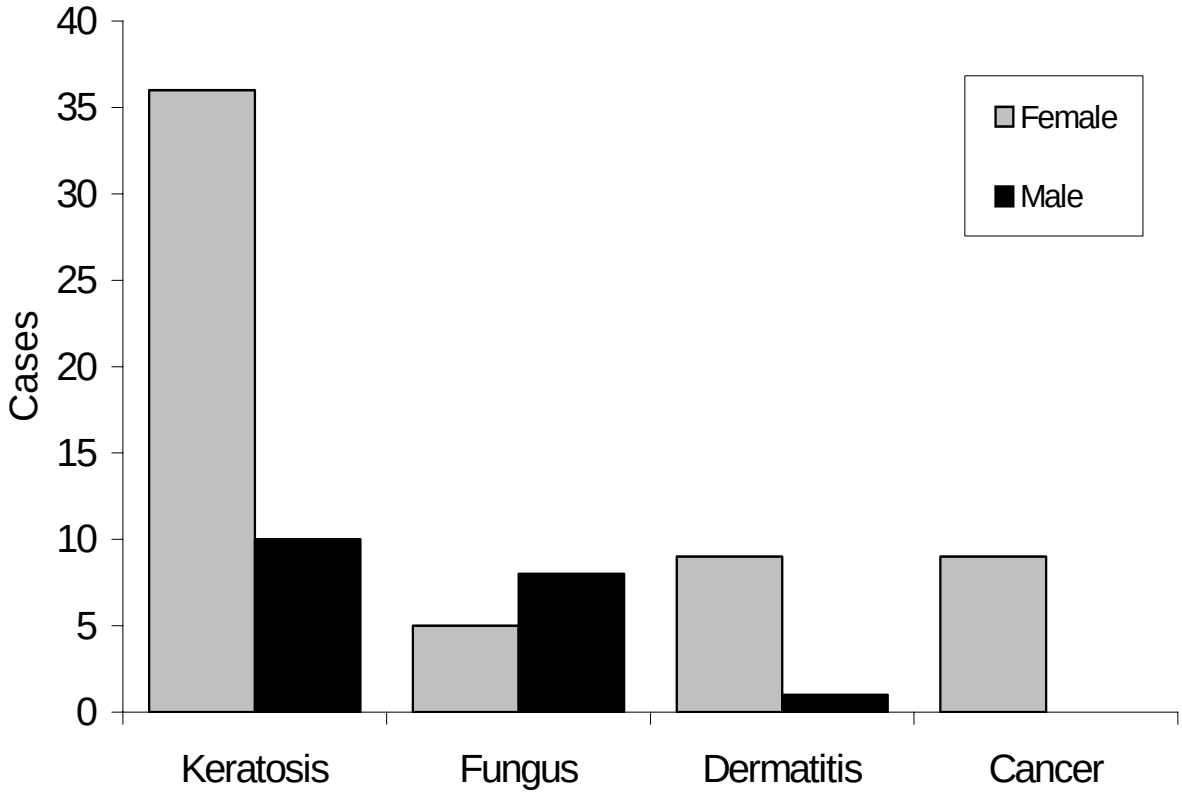
[a] percentage of all staff (N=75)

Table 3. Prevalence of skin disease among Australian nursing home staff

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [b]	**n**	**(%)** [c]	**P value** [d]
Keratosis							
Actinic	25	(33.3)	4	(22.2)	21	(36.8)	0.2513
Seborrhoeic	21	(28.0)	6	(33.3)	15	(26.3)	0.5632
Fungal infections							
Tinea unguium	8	(10.7)	5	(27.8)	3	(5.3)	0.0070
Tinea pedis	4	(5.3)	3	(16.7)	1	(1.8)	0.0141
Paronychia	1	(1.3)	0	(0.0)	1	(1.8)	0.5716
Dermatitis							
Contact	6	(8.0)	0	(0.0)	6	(10.5)	0.1513
Seborrhoeic	2	(2.7)	1	(5.6)	1	(1.8)	0.3828
Miscellaneous	2	(2.7)	0	(0.0)	2	(3.5)	0.4205
Skin cancer							
BCC [e]	7	(9.3)	0	(0.0)	7	(12.3)	0.1184
SCC [f]	2	(2.7)	0	(0.0)	2	(3.5)	0.4205

[a] percentage of all staff (N=75), [b] percentage of all males (n=18), [c] percentage of all females (n=57), [d] gender differences in skin disease prevalence investigated using Pearson`s chi square and Fisher`s exact test, [e] basal cell carcinoma, [f] squamous cell carcinoma

Figure 1. Skin disease cases among Australian nursing home staff



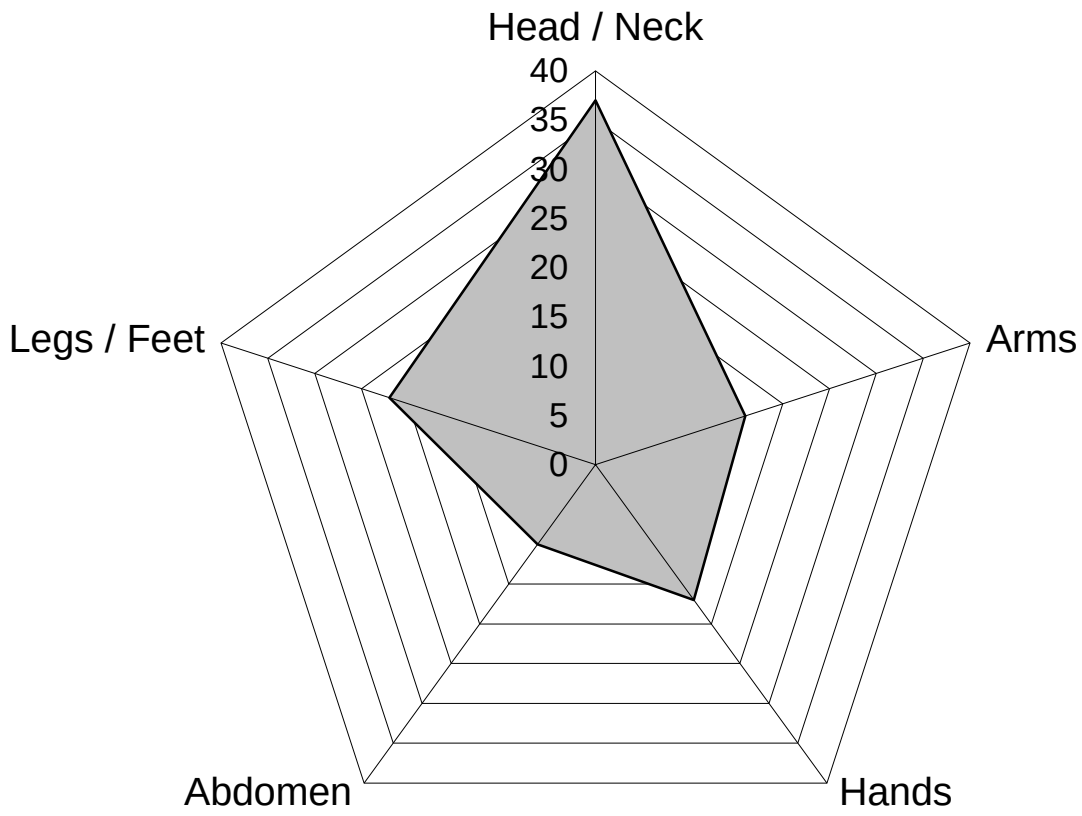
(shaded area represents the total number of cases by gender)

Table 4. Location of skin disease among Australian nursing home staff

	Keratosis		Fungus		Dermatitis		Skin Cancer	
	n	**(%)** [a]	**n**	**(%)** [a]	**N**	**(%)** [a]	**n**	**(%)** [a]
Upper body								
Head	6	(14.3)	0	(0.0)	1	(10.0)	0	(0.0)
Face	22	(52.4)	0	(0.0)	0	(0.0)	4	(44.4)
Neck	2	(4.8)	0	(0.0)	1	10.0	1	(11.1)
Trunk								
Shoulders	2	(4.8)	0	(0.0)	0	(0.0)	0	(0.0)
Chest	3	(7.1)	0	(0.0)	2	(20.0)	2	(22.2)
Back	0	(0.0)	0	(0.0)	0	(0.0)	1	(11.1)
Arms								
Upper arms	5	(11.9)	0	(0.0)	0	(0.0)	1	(11.1)
Forearms	10	(23.8)	0	(0.0)	0	(0.0)	0	(0.0)
Hands	11	(26.2)	1	(7.7)	5	(50.0)	0	(0.0)
Legs								
Upper legs	2	(4.8)	0	(0.0)	0	(0.0)	0	(0.0)
Lower legs	7	(16.7)	0	(0.0)	0	(0.0)	0	(0.0)
Feet	0	(0.0)	12	(92.3)	1	(10.0)	0	(0.0)

[a] figures indicate the number of skin disease cases at that particular site and the percentage of all diseases in that category (n=42, 13, 10, 9 respectively) For example: 14.3% of all staff with any xerosis had it diagnosed on their heads

Figure 2. Skin disease cases by body site among nursing home staff



(shaded area represents the burden of skin disease by body site and number of cases)

Skin diseases among Japanese nursing home staff

Smith DR, Kubo H, Tang S, Yamagata Z. Skin disease among staff in a Japanese nursing home. J Occup Health 2003; 45 60-62.

Abstract

Background

Although Japan has a large elderly population and many nursing homes, few studies have investigated the dermatological condition of their workers. This study was undertaken to ascertain the prevalence of common skin diseases among typical nursing home staff.

Methodology

A typical, medium-sized nursing home was recruited in Kofu city, central Japan and a structured skin disease questionnaire distributed to all staff. Workers were then physically examined by a team of specialist physicians to detect skin diseases. Conditions were diagnosed using standard clinical techniques and common dermatological reference criteria.

Results

Seventy-nine staff (89.2%) successfully completed their questionnaires and skin disease examinations. Around one-quarter of them (22.8%) were diagnosed with at least one skin disease. Contact dermatitis was the most common disease (12.7%), followed by atopic dermatitis (8.9%) and mild xerosis (3.8%). Long working hours were identified as an important predictive variable, increasing the skin disease risk 12.4 fold (95%CI 2.5-88.7, P = 0.0045). Undertaking daily wet-work also increased the risk 4.0 times among these staff (95%CI 1.1-18.8, P = 0.0486), as did regular tobacco smoking (OR 3.5, 95%CI 1.1-12.1, P = 0.0396).

Conclusion

Overall, the Japanese workers suffered both work-related and common skin disease at rates similar to those in previous reports. The identification of certain task-specific risk factors however, prompts further investigation with larger sample sizes and more geographically diverse coverage.

Keywords: nursing home staff, skin disease, Japan, contact dermatitis, fungus

Introduction

Skin disease is one of the most important occupational disorders for workers of industrialised nations.[1] Among them, health care staff are a particularly vulnerable subgroup due to their continuous hand-washing and exposure to skin irritants. Smith *et al* previously reported a high prevalence of skin disease among nursing home staff in Australia and Taiwan.[2,3] However, dermatological investigations of their Japanese counterparts are rare. As such, it was considered appropriate to conduct an epidemiological study of skin disease among typical palliative care staff in central Japan.

Methodology

For this research, a medium-sized nursing home was selected in Kofu city, Yamanashi prefecture, central Japan. Yamanashi Prefecture is located around 100 km West of Tokyo, bordering the South Western face of Mt Fuji and has a total population of 877 794. Its capital city Kofu is located almost in the center, at latitude 35.74° N and longitude 138.56° E. During this study the average temperature was 13.5°C and relative humidity 66%. All employees (N=89) were asked to complete a voluntary skin disease questionnaire and undergo physical examination conducted by specialist medical doctors (dermatologists and occupational physicians). Diagnostic criteria were taken from standardised techniques used in previous studies.[2-6] Briefly, contact dermatitis was diagnosed if one or more of the following symptoms were present following workplace exposure: skin thickening, mild erythema, itching, hyperpigmentation, edema, vesicles, fissures or marked erythema.[4] Atopic dermatitis was defined in accordance with the Japanese Dermatological Association`s Diagnostic Criteria for Atopic Dermatitis; incorporating pruritis, morphology, body distribution and chronic or relapsing course.[5] Xerosis criteria followed a previous study of Asian patients, where the disease was generally defined as dry skin with itching and scales.[6] Fungal infections such tinea pedis and tinea unguium (onychomycosis) were also diagnosed using standard clinical techniques.[7] Skin disease data and questionnaire results were recorded on an anonymous examination sheet.

All data were entered into a standard spreadsheet program (MS Excel 2000) before being

statistically analysed by JMP Version 4 statistical analysis software (SAS Institute, 2001). This investigation included descriptive statistics for the prevalence of skin conditions and mathematical analysis to investigate the effect of various staff variables. Gender differences in basic prevalence were investigated using Pearson's chi square test, with Fisher's exact test for items with small cell counts. Logistic regression analysis was also undertaken to derive potential dermatological risk factors. Variables were chosen using the stepwise selection method, with the presence of skin disease used as the dependent variable and demographic items as the independent variables. Odds ratios (OR) were calculated with 95% confidence intervals (95% CI) and adjusted for age, sex and total duration of employment within the nursing home. Probability values (P) above 0.05 were regarded as statistically insignificant throughout the analyses.

Results

Seventy-nine of the 89 staff recruited for this study (89.2%) successfully completed their questionnaires and skin disease examinations. The excluded workers were similar in characteristic to the examined group with regard to age, sex and job description. Most employees were female (77.2%) health care workers (81.0%), with an average age of 32.1 years (SD 11.8) and total employment duration of 4.5 years (SD 7.4). Refer to Tables 1 and 2. Almost one-quarter of all staff (22.8%) were diagnosed with a skin disease, with 4 having multiple conditions (giving a total count of 22 skin disease cases affecting 18 individuals). There were no statistical associations between demographic items or individual job categories and the presence of dermatologic abnormality. Contact dermatitis was the most commonly diagnosed skin disease during this study, affecting 12.7% of all workers (Table 2 and Figure 1). The prevalence of other skin diseases was as follows: atopic dermatitis (8.9%), tinea pedis (1.3%) and onychomycosis (1.3%). Most dermatitis cases were found on the arms or hands (Table 3 and Figure 2). Atopic dermatitis was concentrated in the antecubital region and behind the knee. Fungal infections were divided evenly between the hands and feet, while most xerosis cases were generalised (all over the body). As the average working week was 41.4 hours during this study, >41 hours was selected as an appropriate cut-off point for risk factor analysis. Long, weekly work-hours were identified as an important predictive variable,

increasing the skin disease risk 12.4 fold (95%CI 2.5-88.7, P = 0.0045). Undertaking daily wet-work increased the risk 4.0 times among the nursing home employees (95%CI 1.1-18.8, P = 0.0486), as did regular tobacco smoking (OR 3.5, 95%CI 1.1-12.1, P = 0.0396). Systemic allergy was not statistically associated with any skin disease during this study (P = 0.2344).

Discussion

Contact dermatitis was the most commonly diagnosed skin disease during this study, affecting over 10% of all workers. This prevalence rate is very similar to previous nursing home research conducted in Australia (13.3%).[2] Alternatively, it is higher than a Taiwanese nursing home investigation (8.0%) [3] but lower than a Swedish hospital study (17 to 41%).[4] As staff with dermatological conditions were significantly more likely to have taken sick leave than those without (P = 0.0028), it is possible this Japanese cohort may have suffered more serious skin diseases than in prior studies, even though their actual prevalence rate was lower. Similarly, previous skin disease was also related to the presence of current conditions (P = 0.0098), suggesting that many were either ongoing afflictions or sporadic relapses. All dermatitis cases were found on the arms or hands, which is consistent with previous research.[2] The prevalence of atopic dermatitis (8.9%), tinea pedis (1.3%) and onychomycosis (1.3%) was also similar to previous community studies (8.1%, 1.7% and 1.7% respectively).[5,6]

Long, weekly work-hours were identified as an important predictive variable for skin disease. This relationship most likely relates to the increasing possibility for dermatological trauma and skin irritant exposure among staff as they work longer hours Alternatively, employees involved in more manually-intensive tasks may choose to work longer weekly hours due to their lower pay rates. Undertaking daily wet-work also increased the skin disease risk among the Japanese nursing home staff, as did regular tobacco smoking. These results are consistent with previous studies implicating wet-work and tobacco smoking as skin disease risk factors among health care workers and the general community.[4,7] Although systemic allergy is also known to be a risk factor for

occupational dermatoses,[4] it was not statistically associated with any skin disease during this study.

Conclusion

Overall, the Japanese nursing home workers suffered both occupationally-related and non occupationally-related skin disease at similar rates to those published in previous studies. The identification of certain task-specific risk factors however, prompts further investigations with larger sample sizes and more geographically diverse coverage.

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Table 1. Demographic items of staff

	n	(%) [a]
Gender		
Female	61	(77.2)
Male	18	(22.8)
Characteristics		
Single	52	(65.8)
Married	27	(34.2)
Alcohol	52	(65.8)
Tobacco	34	(43.0)
Work status		
Full-time	4	(5.1)
Part-time	75	(94.9)
Mean ± SD		
Age (yrs)	32.1 ± 11.8	
Working week (hrs)	41.4 ± 4.0	
Total duration (yrs)	4.5 ± 7.4	

[a] percentage of all staff (N=79)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
University	49	(62.0)
High school	23	(29.1)
Primary school	6	(7.6)
Technical college	1	(1.3)
Job description		
Health care	64	(81.0)
Administration	8	(10.1)
Other duties	4	(5.1)
Cook / laundry	3	(3.8)
Patient handling		
Move patient	52	(65.8)
Feed patient	49	(62.0)
Change clothes	46	(58.2)
Wash patient	45	(57.0)

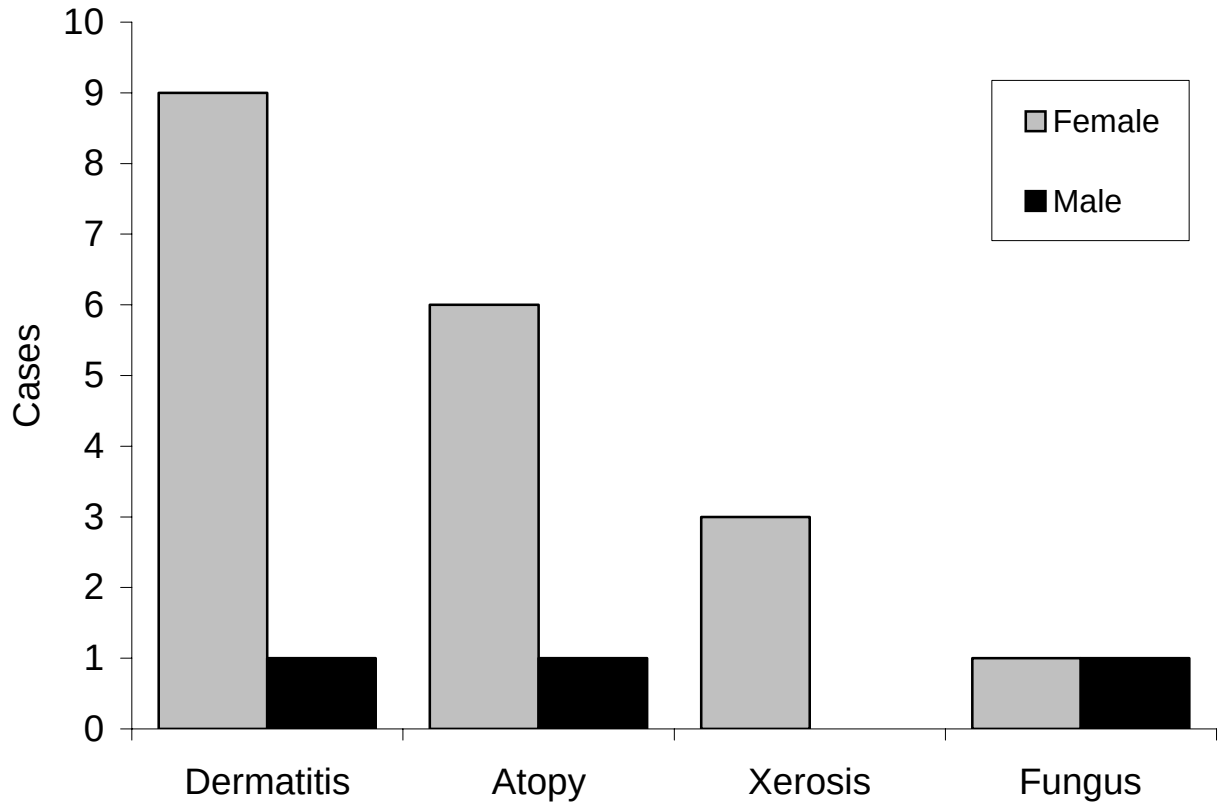
[a] percentage of all staff (N=79)

Table 3. Prevalence of skin disease among Japanese nursing home staff

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [b]	**n**	**(%)** [c]	**P value** [d]
Dermatitis							
Contact dermatitis	10	(12.7)	1	(5.6)	9	(14.8)	0.3024
Atopic dermatitis	7	(8.9)	1	(5.6)	6	(9.8)	0.5744
Other diseases							
Mild xerosis	3	(3.8)	0	(0.0)	3	(4.9)	0.3374
Acne vulgaris	1	(1.3)	0	(0.0)	1	(1.6)	0.5846
Fungal infections							
Tinea unguium	1	(1.3)	0	(0.0)	1	(1.6)	0.5846
Tinea pedis	1	(1.3)	1	(5.6)	0	(0.0)	0.0639

[a] percentage of all staff (N=79), [b] percentage of all males (n=18), [c] percentage of all females (n=61), [d] gender differences in skin disease prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Skin disease cases among Japanese nursing home staff



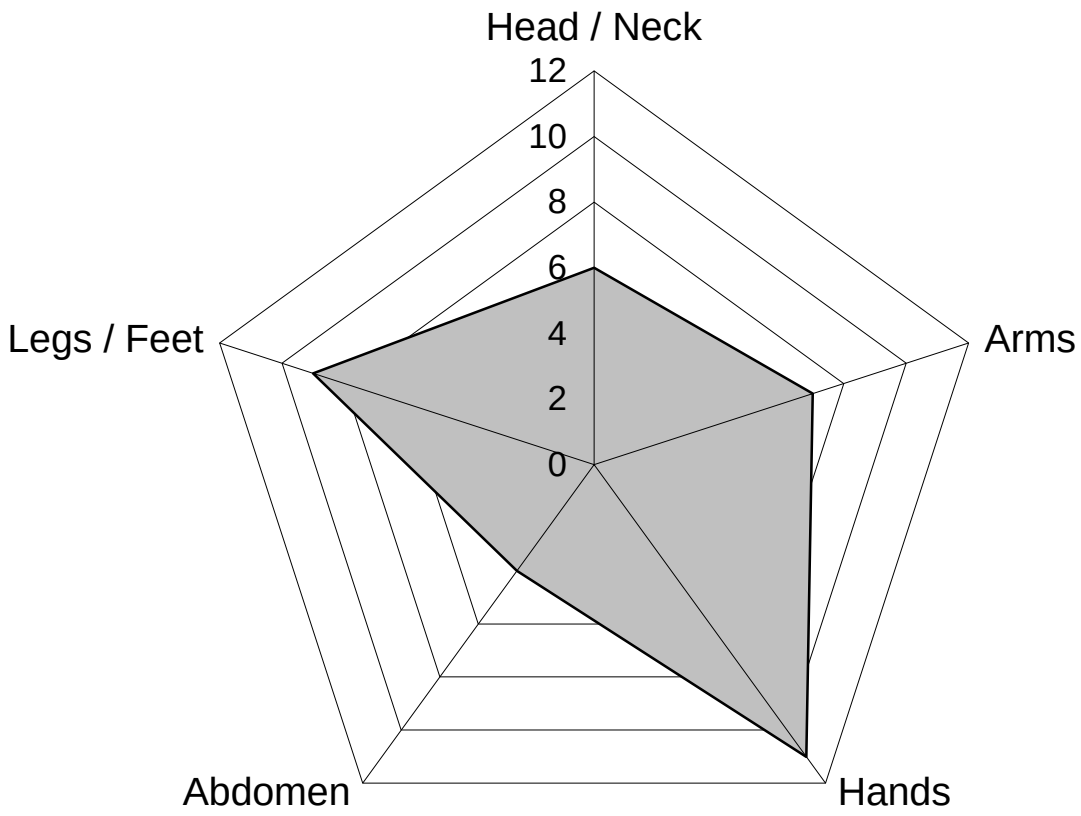
(shaded area represents the total number of cases by gender)

Table 4. Location of skin disease among Japanese nursing home staff

	Dermatitis		Atopy		Xerosis		Fungus	
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]
Upper body								
Head	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Face	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Neck	2	(20.0)	1	(14.3)	1	(33.3)	0	(0.0)
Trunk								
Shoulders	0	(0.0)	0	(0.0)	1	(33.3)	0	(0.0)
Chest	0	(0.0)	1	(14.3)	1	(33.3)	0	(0.0)
Back	0	(0.0)	0	(0.0)	1	(33.3)	0	(0.0)
Arms								
Upper arms	0	(0.0)	0	(0.0)	1	(33.3)	0	(0.0)
Forearms	2	(20.0)	2	(28.6)	2	(66.7)	0	(0.0)
Hands	9	(90.0)	0	(0.0)	1	(33.3)	1	(50.0)
Legs								
Upper legs	1	(10.0)	0	(0.0)	1	(33.3)	0	(0.0)
Lower legs	2	(20.0)	2	(28.6)	1	(33.3)	0	(0.0)
Feet	0	(0.0)	0	(0.0)	1	(33.3)	1	(50.0)

[a] figures indicate the number of skin disease cases at that particular site and the percentage of all diseases in that category (n=10, 7, 3 and 2 respectively) For example: 20.0% of all staff with any xerosis had it diagnosed on their neck

Figure 2. Skin disease cases by body site among nursing home staff



(shaded area represents the burden of skin disease by body site and number of cases)

Skin diseases among South Korean nursing home staff

Smith DR, Choi JW, Yu DS, Ki M, Oh CH, Yamagata Z. Skin disease among staff in a large Korean nursing home. Tohoku J Exp Med 2002; 198: 175-180.

Abstract

Background

Although previous studies have demonstrated reasonably high rates of occupational skin disease among nursing home staff, the prevalence among South Korean workers is less well known. This study was conducted as one of the first dermatological investigations of typical palliative care employees in South Korea.

Methodology

A large nursing home was selected within metropolitan Seoul and a structured skin disease questionnaire distributed to all staff. Workers who indicated either a current or previous dermatological problem on the survey form were then physically examined by a specialist team of occupational physicians and a dermatologist.

Results

Dermatitis was the most common skin disease detected during this study, with 4.8% of staff currently suffering from it and 13.1% reporting it in the previous 1 year period. Fungal infection was the second most common affliction, affecting 4.8% on the day of our examination. Half that number (2.4%), reported a fungal infection occurring in the previous year. *Sarcoptes scabiei* was detected among 2.4% of palliative care workers and reported as a previous infection by 6.0%.

Conclusion

The prevalence of dermatitis and scabies was quite low when compared to previous research, while fungal infection rates were similar to other investigations. As the complicity of workplace factors on skin disease was not clearly elucidated, further research is required in this burgeoning area of health care service.

Key Words: dermatitis, fungus, South Korea, nursing home worker, scabies, skin disease

Introduction

South Korea experienced significant and rapid economic improvement following World War 2 and the Korean War.[1] During this period concurrent health care and nutritional advances also increased the average life expectancy, from 53 to 71 years in males and from 58 to 78 years in females. The percentage of elderly citizens within the community also increased drastically during this time. By the year 2000, around 7% of Koreas` 47 million total population were aged over 65 years, representing a group of around 3 million people.[2] Although caring for elderly family members was traditionally a woman's responsibility, societal and familial changes later in the 20th century have made them less available for this role. As such, nursing homes are emerging as an increasingly important provider of palliative care in modern Korean society.[3] They are also becoming an increasingly important employer, with the number of registered institutions almost doubling in the last 7 years.[4,5]

Skin disease is an important occupational issue throughout the world, and one that may have significant social and economic consequences for employees.[6] It is also a contentious issue that may remain unrecognised and unmanaged by employers.[7] Although patterns of skin disease vary between countries and regions, health care workers (HCW) represent a group who are frequently exposed to dermal irritants. Among them, nursing home HCW are a particularly important group as almost all of the patient's daily activities must be assisted by palliative care staff. Constant wet-work related activities such as bathing, toileting and cleaning must be undertaken on a daily basis, thereby exposing HCW to repeated moisture, cleansers and other dermal irritants. Although previous nursing home studies have demonstrated reasonably high rates of occupational skin disease,[8,9] the prevalence among Korean staff is less well known. Therefore, it was considered appropriate to conduct one of the first epidemiological, skin disease investigations of employees within a typical Korean nursing home. It was also considered necessary to statistically investigate if any workplace risk factors were related to the presence of skin disease.

Methodology

For this research a typical, large nursing home was selected in metropolitan Seoul, South Korea and consent obtained to conduct a skin disease study. Situated at latitude 37.27° N and longitude 126.57° E, metropolitan Seoul has a daytime population of 10 373 234 which accounts for around 25% of Koreas` total. The average temperature during the study was 14°C and relative humidity of 50%. In the initial phase, a structured skin disease questionnaire was distributed to all employees of the facility. Questions included job title, job description, employment history, working hours, education levels, patient contact and description of previous skin diseases occurring in the previous 12-month period. A chart was also included where staff could indicate the anatomical location of their skin diseases. Employees who indicated either a current or previous dermatological problem on the survey form were invited to undergo a physical examination. After obtaining their consent, workers were physically examined by a team of specialist occupational physicians and a dermatologist. Positive skin disease cases were establishing using visual diagnosis criteria and standard dermatological techniques.

Data was recorded on a coded, anonymous sheet before being entered into a standard spreadsheet program (MS Excel 2000) and being statistically analysed by JMP Version 4 statistical analysis software (SAS Institute, 2001). This investigation included descriptive statistics for the prevalence of skin conditions and mathematical analysis to investigate the effect of various patient variables. Gender differences in demographic items and basic prevalence were investigated using Pearson`s chi square test, with Fisher`s exact test used for items with small cell counts. Logistic regression analysis was also undertaken to derive potential dermatological risk factors. Variables were chosen using the stepwise selection method, with the presence of skin disease used as the dependent variable and demographic items as the independent variables. Odds ratios (OR) were calculated with 95% confidence intervals (95% CI) and adjusted for age, sex and total duration of employment within the nursing home. Probability values (P) above 0.05 were regarded as statistically insignificant throughout the analyses.

Results

A total of 91 employees were initially recruited, although 7 did not complete the questionnaire satisfactorily, leaving 84 (92.3%) for the final analysis. The excluded staff were similar in age and sex as the examined group. Subjects consisted of 66 women (78.6%) and 18 men (21.4%), with a mean age of 46.8 years (SD 8.1) and age range from 27 to 62 years. Full-time employees accounted for 57.1% of the total population. Most were single (90.5%) and few regularly drank alcohol (35.7%) or smoked tobacco (15.5%). Their mean working day was 8.2 hours (SD 0.6) and working week 41.8 hours (SD 13.4), while their average length of employment in the nursing home was 4.3 years (SD 3.8). High school (58.3%) and university (23.9%) were the most common education levels achieved by staff, followed by technical college (9.5%) and primary school (8.3%). Health care workers represented almost two-thirds of all employees (61.9%), followed by administrative officers (13.1%) and miscellaneous workers (13.1%). As cooks and laundry workers both undertook `wet work`, they were grouped together and represented 11.9% of the total (Table 1). A total of 52 workers (61.7%) were involved in patient contact every day, 47 females (71.2% of all female staff) and 5 males (27.8% of all male staff). The most frequent patient contact was moving the patient (58.3%), followed by changing their clothes (48.8%), feeding (47.6%) and washing the patient (42.9%). Around half of all employees (54.7%) were involved in daily `wet work` of some description.

Dermatitis was the most common occupational skin disease detected during this study, with 4.8% of staff currently suffering from it and 13.1% having had it in the previous 1-year period. Fungal infection was the second most common affliction, affecting 4.8% on the day of physical examinations. Half that number (2.4%), reported a fungal infection occurring in the previous year. *Sarcoptes scabiei* was detected among 2.4% of palliative care workers and reported as a previous infection by 6.0% of them. Although there was a statistically significant difference (all $p<0.05$) between the point-prevalence and 12-month period-prevalence of all three skin diseases, no demographic items were significantly associated with dermatological conditions. Similarly, no male employees either reported or were diagnosed with a skin disease during this study (Table 2).

Dermatitis was most commonly diagnosed on the thigh (3.6%), upper arms (2.4%), back and abdomen (both 2.4%) during our physical examinations. Body sites most often experiencing dermatitis in the last 12 months were the abdomen (8.3%), forearm (7.1%) and back (6.0%). All fungal infections were diagnosed on the feet (4.8%) as tinea pedis. All previous reports of fungal infection also involved the feet, with 2.4% of staff affected by this disease. Most cases of scabies were located on the thigh, back and abdomen (all sites 2.4%). The 12-month period-prevalence of scabies was most commonly reported at the lower leg region, thigh and abdomen (all sites 6.0%). No staff had any dermatitis diagnosed on the lower legs or feet, while scabies was similarly absent on the hands and feet during this study (Table 3).

Discussion

Occupational dermatitis is an inflammatory skin condition, primarily resulting from workplace exposure to certain substances. It is most commonly a manifestation of allergic contact dermatitis and / or irritant dermatitis.[10,11] Occupational dermatoses usually affect the hands, which when chronic, may require prolonged recovery periods [12] with considerable personal disruption.[13] Relapses are also common amongst material hypersensitive individuals.[14] Predictive factors include a history of childhood atopic disease, female gender and occupational exposure.[15] Exposure to water through constant wet work is an important occupational consideration as its irritancy and ubiquity among health care settings is well known.[16,17] This is particularly relevant in palliative care situations as patients frequently require assistance for water-dependent, daily living activities such as washing and toileting. Many nursing home staff are also required to undertake supplementary wet work such as cleaning and cooking, which may expose them to further risk. Even regular contact with mild domestic cleansers such as dishwashing liquid may cause significant disturbances of the skin, leading to hand dermatitis.[18]

General dermatitis was diagnosed in 4.8% of the staff during this study, which is considerably lower than 2 previous nursing home studies conducted in Taiwan [8] and Australia,[9] where the point-

prevalence among staff was 8.0% and 13.3% respectively. It is however, closer to the 3.4% rate documented during an Australian community study of general skin diseases.[19] The 12-month period-prevalence of dermatitis was more than twice the point-prevalence, affecting more than one in ten workers (13.1%). Current dermatitis occurred mainly on the thigh (3.6%), upper arm, back and abdomen (all 2.4%). Previous dermatitis was commonly reported on the abdomen (8.3%), forearm (7.1%) and back (6.0%). The prevalence of hand dermatitis during this study was quite low, affecting 1.2% of staff currently and 3.6% over the previous 1 year period. Both results are lower than the 11.8% general community prevalence of hand dermatitis previously reported by Meding et al.[20] They are also much lower than some hospital studies of hand dermatitis conducted in Norway (17%),[21] Italy (21.2%) [22] and Finland (44%).[16] Similarly, previous Swedish hospital research has documented hand dermatitis affecting 41% of nurses and 37% of cleaners.[23] A detailed study of Korean printed circuit board assemblers reported various skin symptoms with prevalence rates between 2.4% and 6.3%.[24]

Given the higher amounts of hand dermatitis documented in previous studies, it is difficult to explain why the prevalence levels were so low. Although there was a statistically significant difference between current and previous dermatitis, both results are still considerably lower than other research papers. It is entirely possible therefore, that the staff examined during the Korean research project simply suffered less dermatitis. Even though this condition is known to occur in high levels among cooks and kitchen staff,[6] there was no correlation between job description and the presence of dermatitis during our research. The presence of dermatitis was not statistically associated with common patient-related wet work tasks, such as washing patients. Similarly, there were no statistical associations detected between atopic dermatitis history and current occupational dermatitis. As such, the occupational implications of these findings are difficult to ascertain, particularly considering the condition's minimal prevalence (only 4 staff in total). It is conceivable however, that the few dermatitis cases diagnosed were in fact work-related, with their significance obscured by the overall low case numbers. Alternatively, some irritant cases that were manifestations of atopic or actinic dermatitis may have been identified; skin diseases that are

known to occur among Koreans.[25-27]

Tinea pedis represents one of the most common superficial fungal diseases of human beings.[28] It is often associated with moist conditions of the extremities [29] and may or may not be occupationally related. This study revealed fungal infections affecting 4.8% of the total staff population, all of which were tinea pedis. Such a result is somewhat lower than previous dermatological research conducted among Taiwanese palliative care workers, where it affected 8.0% of staff.[8] Alternatively, an Australian nursing home study documented a similar tinea pedis prevalence rate to the current study (5.3%).[9] As previous investigations have revealed a background level between 2.9% Spain [30] and 5.4% in Australia,[19] these results probably reflect the general community prevalence of tinea pedis in Korea, rather than highlighting a genuine, occupationally-derived condition. This hypothesis is supported by the fact that tinea pedis infection was not statistically related to wet work, job description or any demographic variables during our study. It was also surprising to find no cases of Candida paronychia, which was unexpected considering that this fungal disease is another well-documented occupational skin infection among staff who regularly undertake wet work.[31] Similarly, no cases of onychomycosis were diagnosed despite previous community reports of this disease among Koreans.[32]

Scabies is a reasonably common human skin infection caused by the mite *Sarcoptes scabiei* and one that usually arises from direct contact with an infected person.[33] Nosocomial scabies is an occasional problem for palliative care workers due to their close and repeated contact with patients.[8] The highly contagious ‘crusted’ form of scabies causes the most occupational concern, as affected individuals often harbor millions of mites. Crusted scabies has been previously reported in Korea among immunocompromised,[34] elderly [35] and mentally retarded patients.[36] Case reports of nosocomial transmission from patients to medical staff have also appeared in the Korean literature.[34,35] As with many other countries, the community prevalence of this disease varies from season to season and year to year. Human scabies appears to be decreasing however, with a drop from 10% to below 1% among South Korean dermatology outpatients between 1982

and 1990.[37]

This study revealed scabies among 2.4% of all staff and a 1-year period-prevalence of 6.0%. As such, the rate is lower than a previous report of Taiwanese palliative care workers where 10.7% were clinically diagnosed with scabies.[8] It is possible that some Korean staff remained undiagnosed, as previous research has outlined the difficulty of scabies diagnosis among healthy individuals.[38] Alternatively, the scabies prevalence among South Korean palliative care workers may simply be lower than in other countries. Although there were no signification statistical associations between the presence of scabies and either demographic items or patient contact duties, it is likely that most scabies infections were probably occupationally related.

By location, most scabies was either diagnosed or reported on the abdomen, thigh and lower leg (all 6.0%). The back, buttocks and upper arm were also found to be important body sites (each 4.8% prevalence). This anatomical scabies distribution is similar to a previous report of Taiwanese palliative care workers, where many cases were seen on the upper arm, thigh and abdomen.[8] Unlike their study however, only 60% of the Korean staff with scabies suffered from lower arm lesions. Although scabies infections are often found on the hands and finger-webs during nosocomial outbreaks,[39] no workers in the current study reported any hand involvement. This phenomena may have resulted from the consistent use of protective gloves during patient handling duties and / or constant, prophylactic hand washing practices. Unlike some other studies of palliative care workers,[9] no sun-induced skin disorders were detected among the Korean cohort. This occurrence was most likely due to the differences in skin type between Koreans and Caucasians.[40-42] Similarly, other benign, dermatological conditions such as vitiligo were not detected, despite previous reports indicating their existence within the Korean community.[43]

Conclusion

Overall, this study revealed dermatitis as the most common skin disease, currently affecting 4.8% and previously reported by 13.1% of South Korean palliative care workers. Fungal infections were

also fairly common, being diagnosed among 4.8% of them. Current scabies infection was detected among 2.4%, with 6.0% reporting an infection over the previous 1-year period. As the increasing demand for aged care services appears to be a relatively new social-phenomena, it is anticipated that future elevations of skin disease among South Korean palliative care staff may occur. No statistically significant risk factors could be derived during this study, therefore it is suggested that further research be undertaken to investigate the complicity of workplace factors on nursing home skin disease.

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Table 1. Demographic items of staff

	n	(%) [a]
Gender		
Female	66	(78.6)
Male	18	(21.4)
Characteristics		
Single	76	(90.5)
Married	8	(9.5)
Alcohol	30	(35.7)
Tobacco	13	(15.5)
Work status		
Full-time	48	(57.1)
Part-time	36	(42.9)
Mean ± SD		
Age (yrs)	46.8 ± 8.1	
Working week (hrs)	41.8 ± 13.4	
Total duration (yrs)	4.3 ± 3.8	

[a] percentage of all staff (N=84)

Table 2. Workplace characteristics

	n	(%) [a]
Education level		
High school	49	(58.3)
University	20	(23.9)
Technical college	8	(9.5)
Primary school	7	(8.3)
Job description		
Health care worker	52	(61.9)
Administration	11	(13.1)
Miscellaneous	11	(13.1)
Cook / laundry	10	(11.9)
Patient handling		
Move patient	49	(58.3)
Change clothes	41	(48.8)
Feed patient	40	(47.6)
Wash patient	36	(42.9)

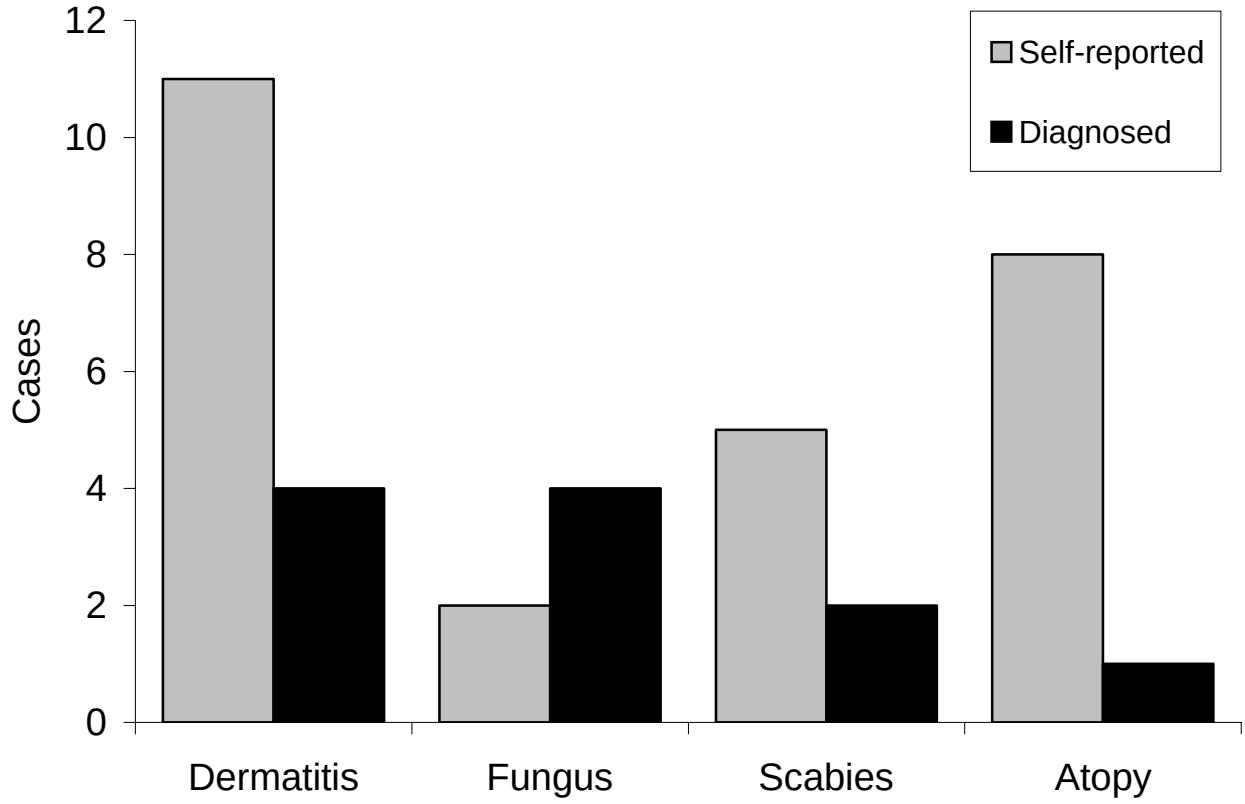
[a] percentage of all staff (N=84)

Table 3. Prevalence of skin disease among South Korean nursing home staff

	All		Male		Female		
	n	**(%) [a]**	**n**	**(%) [b]**	**n**	**(%) [c]**	**P value [d]**
Contact dermatitis							
Self-reported [e]	11	(13.1)	0	(0.0)	11	(16.7)	0.0578
Diagnosed [f]	4	(4.8)	0	(0.0)	4	(6.1)	0.2235
Atopic dermatitis							
Self-reported [e]	7	(8.4)	0	(0.0)	7	(10.6)	0.1719
Diagnosed [f]	1	(1.2)	0	(0.0)	1	(1.5)	0.7857
Fungal infections							
Self-reported [e]	2	(2.4)	0	(0.0)	2	(3.0)	0.6153
Diagnosed [f]	4	(4.8)	0	(0.0)	4	(6.1)	0.3735
Sarcoptes scabiei							
Self-reported [e]	5	(6.0)	0	(0.0)	5	(7.6)	0.2895
Diagnosed [f]	2	(2.4)	0	(0.0)	2	(3.0)	0.6153

[a] percentage of all staff (N=84), [b] percentage of all males (n=18), [c] percentage of all females (n=66), [d] gender differences in skin disease prevalence investigated using Pearson's chi square and Fisher's exact test, [e] percentage of all staff reporting a skin disease in the past 12 months (N=84), [f] percentage of all staff medically diagnosed with a skin disease (N=84)

Figure 1. Skin disease cases among South Korean nursing home staff



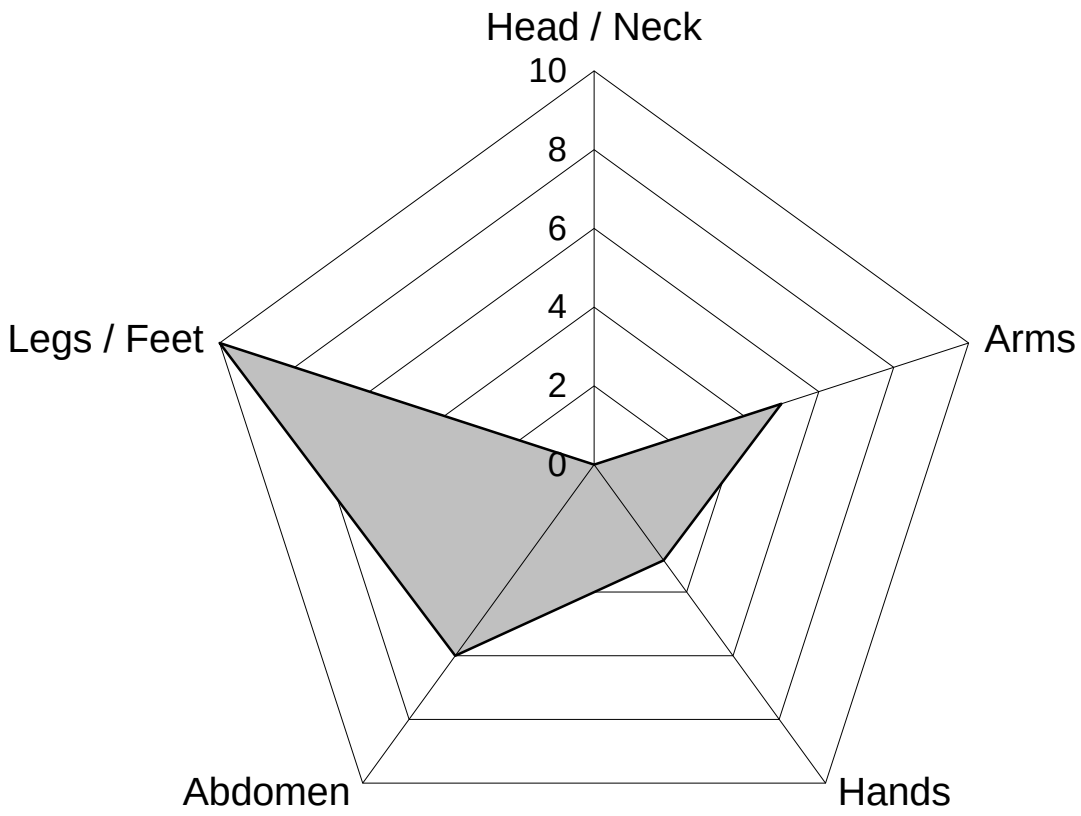
(shaded area represents the total number of self-reported and medically diagnosed cases)

Table 4. Location of skin disease among South Korean nursing home staff

	Dermatitis		Atopy		Fungus		Scabies	
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]
Upper body								
Head	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Face	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Neck	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Trunk								
Shoulders	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Chest	0	(0.0)	0	(0.0)	0	(0.0)	2	(2.4)
Back	2	(2.4)	0	(0.0)	0	(0.0)	2	(2.4)
Arms								
Upper arms	1	(1.2)	0	(0.0)	0	(0.0)	2	(2.4)
Forearms	0	(0.0)	0	(0.0)	0	(0.0)	2	(2.4)
Hands	0	(0.0)	1	(1.2)	0	(0.0)	2	(2.4)
Legs								
Upper legs	2	(2.4)	1	(1.2)	0	(0.0)	2	(2.4)
Lower legs	0	(0.0)	0	(0.0)	0	(0.0)	2	(2.4)
Feet	0	(0.0)	0	(0.0)	3	(3.7)	0	(0.0)

[a] figures indicate the number of skin disease cases at that particular site and the percentage of all diseases in that category (n=5, 3, 7 and 8 respectively) For example: 2.4% of all staff with any dermatitis had it diagnosed on their back

Figure 2. Skin disease cases by body site among nursing home staff



(shaded area represents the burden of skin disease by body site and number of cases)

Skin diseases among Taiwanese nursing home staff

Smith DR, Guo YL, Lee YL, Hsieh FS, Chang SJ, Sheu HM. Prevalence of skin disease among nursing home staff in southern Taiwan. Ind Health 2001; 40: 54-58.

Abstract

Background

Although nursing home-staff often visit the Taiwanese outpatient department with various skin diseases, no specific dermatological investigations of their cohort have been carried out in this region. Therefore, the current study was undertaken to determine the prevalence of skin disease among nursing home workers in southern Taiwan.

Methodology

Dermatological examination was performed on 75 nursing home staff from 11 institutions in Tainan county. Nursing homes were selected using stratified random sampling. Diagnostic criteria were taken from previous studies and utilized standardized techniques such as visual detection and wet-mount KOH microscopic analysis.

Results

Fungal infections were the most common skin diseases identified, affecting 21.4% of all employees. Other conditions included xerosis (13.3%), scabies (10.7%) and dermatitis (8.0%). Fungus was found mainly on the feet and hands (68.7% and 31.3% of all fungal cases respectively). Most xerosis sites were identified on the lower leg (90.0% of all xerosis cases), while all workers with scabies had the disease on their forearm. Dermatitis was diagnosed predominately on the forearm (50.0% of all dermatitis cases).

Conclusion

The prevalence of fungus and scabies was higher than other studies, while dermatitis occurred less frequently than previous reports. Although not statistically significant, wet work and occupational contact with nursing home patients may have been important risk factors for these conditions.

Keywords: Nursing home staff, skin disease, southern Taiwan, fungus, xerosis, scabies

Introduction

Taiwan is presently undergoing a dramatic shift in demographic structure due to rapid public health improvements and subsequent life expectancy gains. With 8.5% of the population now aged over 65 years, at least 90 000 individuals require daily assistance at some level.[1] New demands on health care systems have also evolved as the classical notion of filial piety and extended family care declines. With their relatives unable to assume traditional care-giving roles, nursing home services are emerging as both a significant health care industry and employer. Around 11.5% of the nations` 9 million workers are currently involved in the health and community services sector.[2] Occupational skin disease appears to be reasonably common in southern Taiwan and has been previously reported in hairdressers [3] and fruit farmers.[4] Occupational scabies has also been reported in a hospital environment.[5] Although nursing home staff often visit the outpatient department with various skin diseases, no specific dermatological investigations of their cohort have been carried out in this region. Therefore, the current study was undertaken to determine the prevalence of skin disease among nursing home workers in southern Taiwan.

Methodology

This study was reviewed and approved by the Tainan Health Department in 1999. Tainan city is Taiwans` 4th largest metropolitan centre with a population of 734 650 (3.3% of the national total) and geographical location of 23.00°N latitude / 120.19°E longitude. Being in close proximity to the Tropic of Cancer, the climate is predominately tropical with an average temperature of 27.2°C and 70% relative humidity during this study. Among the 21 nursing homes currently registered in Tainan, the larger institutions (containing more than 5 cared patients) were specifically targeted and then stratified by geographical location. From this group, 11 facilities were selected at random; one from each area of Tainan city. Between 1999 and 2000, each nursing home was sent a detailed questionnaire to be completed by all staff. Questions included job title, job description, employment history, working hours, education levels, patient contact and description of previous skin diseases. A total of 84 employees were recruited, although 9 did not complete the questionnaire satisfactorily, leaving 75 (89.3%) for the final analysis. The excluded staff were

similar in age and sex as the examined group. After obtaining their informed consent, workers were physically examined by dermatologists for the presence of skin diseases. Fungal infection and scabies were visually diagnosed using standard dermatological techniques.[6] Areas clinically positive for fungus and scabies were also scraped and prepared in a 10% KOH solution for microscopic laboratory analysis. Of the other skin diseases, xerosis was defined as skin with dryness, itching and scales. A grade of xerosis severity from 0 to +4 (mild to severe) was also assigned to this condition.[7] Dermatitis was visually diagnosed as previously described.[3]

All data were entered into a standard spreadsheet program (MS Excel 2000) before being statistically analysed by JMP Version 4 statistical analysis software (SAS Institute, 2001). This investigation included descriptive statistics for the prevalence of skin conditions and mathematical analysis to investigate the effect of various patient variables. Gender differences in demographic items and basic prevalence were investigated using Pearson`s chi square test, with Fisher`s exact test used for items with small cell counts. Logistic regression analysis was also undertaken to derive potential dermatological risk factors. Variables were chosen using the stepwise selection method, with the presence of skin disease used as the dependent variable and demographic items as the independent variables. Odds ratios (OR) were calculated with 95% confidence intervals (95% CI) and adjusted for age, sex and total duration of stay within the nursing home. The odds ratios for each job description were derived using the remaining job descriptions as the reference category (i.e. health care worker / not a health care worker). Odds ratios for age and duration of employment were calculated using increasing increments of 1 year in age and 1 year in employment duration respectively. Probability values (P) above 0.05 were regarded as statistically insignificant throughout the analyses.

Results

The final cohort consisted of 67 women (89.4%) and 8 men (10.6%), with a mean age of 40.9 years (S.D.11.9) and median age of 45 years. Their age ranged from 18 to 69 years, with most aged below 40 years (40.0%). Employees working 40 or more hours per week were considered

full-time and accounted for 74.7% of the total population (Table 1). Although the mean employment length was 2.5 years, more than one third of employees (38.7%) had worked in their current job for less than a year. The mean working week was 39.4 hours, but 42.7% of all staff reported working more than 48 hours every week. Senior high school (36.0%) and primary school (29.3%) were the most common education levels achieved by staff. No employees had education beyond the bachelor degree level. Health care workers represented more than three-quarters of all employees (78.7%), followed by administrative officers (9.3%), miscellaneous workers (6.7%), and food service workers (5.3%). More than half of all female staff (56.7%) were employed as patient service workers and one quarter (26.9%) as nurses. By contrast, only 12.5% of the male employees were patient service workers, while there were no male nurses or kitchen staff in our study. Most male staff were categorized ‘miscellaneous’, including managers and owners. Many employees undertook multiple duties involving patient contact regardless of their job description.

Statistical analysis indicated that no demographic items of nursing home workers were significantly associated with the presence of skin disease. A total of 62 workers (82.7%) were involved in patient contact every day, 61 females (91.5% of all female staff) and 1 male (12.5% of all male staff). The most frequent patient contact was moving the patient (61.3%), followed by changing their bed (57.3%), changing their clothes (56.0%) and washing the patient (32.0%). Fungal infections were the most common skin diseases diagnosed during this study, affecting 21.4% of all staff. The prevalence of fungal subcategories were as follows: tinea pedis (8.0%), tinea unguium (6.7%) and candida paronychia (6.7%). Ten workers were diagnosed with xerosis (13.3% of all staff). One staff member had xerosis of both the +1 and +2 grade. The average age of xerosis cases (42.5yrs) was higher than the general staff population (40.9yrs), although this difference was not statistically significant (P = 0.1125). Eight employees (10.7%) were clinically positive for *sarcoptes scabiei*, with one case confirmed by microscopic analysis (1.3%). Dermatitis and papules of unknown etiology were diagnosed in 8.0% and 5.3% of staff respectively. All other dermatological problems affected less than 3.0% of staff (Table 2). Statistical analysis revealed no significant associations between the presence of fungal infections and washing patients (P =

0.1986), xerosis and increasing age (P = 0.2875), scabies and contact with patients (P = 0.8230) and between dermatitis and washing patients (P = 0.9499). Fungal infections predominantly affected the feet (68.7% of all fungal infections) and hands (31.3%). Most xerosis sites occurred on the lower leg (90.0% of all xerosis cases), while all staff with scabies had the disease on their forearm (100%). Dermatitis was diagnosed predominantly on the forearm (50.0% of all dermatitis) and upper arm (33.3%). No staff had dermatitis diagnosed on the legs, nor was fungus witnessed anywhere on the trunk during this study (Table 3).

Discussion

Fungal infections are a common skin disease among human beings and are often associated with moist conditions of the extremities. This study revealed fungal infections affecting 21.4% of the total staff population. Tinea pedis was the most common fungal category affecting 8.0% of all staff, which is higher than a previously reported background level of 2.9% in Spain [8] and 4.1% in eastern Taiwan.[9] Tinea unguium was diagnosed at 6.7%, which is also higher than a previously reported background level of 2.8% in Spain.[8] As the relative humidity averaged 70% during this research, it is possible that Taiwan's tropical climate may have been a contributory factor in these elevated results. Wet work, such as washing patients, cooking and cleaning are common tasks undertaken by nursing home employees. Paronychia is also a well-documented occupational skin infection in staff who regularly undertake wet work.[10] Although fungal infections were not statistically associated with washing patients, the existence of candida paronychia on the hands of these Taiwanese staff (6.7%) suggests that wet work may have been a contributory factor in some cases.

Xerosis is usually an aged related condition resulting from the gradual depletion of stratum corneum lipids [11] and natural moisturizing factors over time.[12] This study revealed thirteen percent of staff with xerosis (10 staff with 11 sites), of which 81.8% were the mild +1 grade. It is possible that Taiwan's high airborne water content helped reduce a certain amount of more severe cases. The average age of xerosis cases was higher than the general staff population, although this association was statistically insignificant. Xerosis was seen most frequently on the anterior aspect

of the lower leg, which is a common feature of aging human skin.[12] Therefore, it is possible the presence of xerosis during this research may simply reflect the beginning of natural skin moisture depletion processes amongst older employees. Although xerosis acerbated by workplace irritants could not be totally excluded, none of the workers with xerosis had any skin exposure to the lower extremities.

Scabies is a common human skin infection caused by the mite *Sarcoptes scabiei* and one that usually results from direct contact with an infected person. Nosocomial scabies is an occasional problem for health care workers due to their close and repeated contact with patients.[5] This study revealed this disease among 10.7% of staff working in 3 out of 11 (27.3%) institutions visited, which suggests that occupational exposure varied from institute to institute. One case was confirmed by microscopic detection, giving a confirmation rate of 12.5%. This low confirmation rate is supported by previous reports of diagnostic difficulty among healthy people suffering scabies.[13] By location, all cases were seen on the forearm (100%) and almost two-thirds also included the upper arm (62.5% of all scabies cases). As such, the body site distribution is similar to a previous report of nosocomial scabies in southern Taiwan where 90% of the affected health care workers had lesions on their arms.[5] Although scabies infections are often found on the hands and finger-webs during nosocomial outbreaks,[5] no staff in the present study had any hand involvement. This phenomena possibly arose due to the consistent use of anti-scabies preparations readily available within some of the nursing homes. Quite possibly some infected workers were only partially treating their infestation rather than totally eradicating it. In these cases, scabies transmission may have occurred between staff, family members and back to nursing home patients. There were no signification statistical associations between the presence of scabies and either demographic items or patient contact duties. Although the community distribution of scabies is not well researched in southern Taiwan, a previous study of eastern Taiwanese has documented a prevalence rate of 1.4%.[9] Therefore, the 10.7% scabies prevalence during this study suggests that nursing home staff in southern Taiwan have higher levels of this disease than in the general population.

Occupational dermatitis may be defined as a pathological skin condition where the major causal or contributory factor is workplace exposure. Three factors are important including contact with irritants, individual physiological factors and environmental influences.[14] The condition most commonly affects the hands. Dermatitis was diagnosed in eight percent of the staff during this study, which is considerably lower than other investigations of Taiwanese hairdressers (83%) [3] and fruit farmers (30%).[4] Dermatitis occurred mainly on the forearm (50.0% of all cases) and upper arm (33.3% of all cases). Interestingly, the hands were relatively unaffected (16.7%), which is unusual for health care workers as they are often exposed to dermal irritants (such as water) during their daily tasks. However, one case of irritant hand dermatitis was diagnosed that appeared to be caused by the repeated and unnecessary application of anti-scabies medication. Although dermatitis is known to occur in high levels among cooks and kitchen staff,[15] only one of the affected employees was a kitchen worker (16.7%). Furthermore, the presence of dermatitis was not statistically associated with washing patients. The occupational implications of these findings are also difficult to ascertain due to the condition's low prevalence (only 6 staff in total).

Conclusion

Overall, this study revealed that fungal infections were the most common skin diseases among nursing home staff, affecting 21.4% of them. Other conditions included xerosis (13.3%), scabies (10.7%), dermatitis (8.0%) and papules (5.3%). When compared to previous research, results suggest that fungus and scabies occur more frequently among nursing home employees in southern Taiwan. Conversely, dermatitis was diagnosed at lower levels than in other studies. As the increasing demand for aged care services is a relatively new social phenomena for this country, future elevations of skin disease are anticipated amongst Taiwanese nursing home workers. No statistically significant risk factors could be derived, therefore it is suggested that further research is required to investigate the complicity of workplace factors on skin disease.

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Table 1. Demographic items of staff

	n	(%) [a]
Gender		
Female	67	(89.4)
Male	8	(10.6)
Characteristics		
Single	24	(32.0)
Married	51	(68.0)
Alcohol	8	(10.7)
Tobacco	3	(4.0)
Work status		
Full-time	56	(74.7)
Part-time	19	(25.3)
Mean ± SD		
Age (yrs)	40.9 ±11.9	
Working week (hrs)	37.9 ± 17.1	
Total duration (yrs)	2.5 ± 2.5	

[a] percentage of all staff (N=75)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
Senior high school	27	(36.0)
Primary school	22	(29.3)
University	17	(22.7)
Junior high school	9	(12.0)
Job description		
Health care worker	59	(78.7)
Administration	7	(9.3)
Miscellaneous	5	(6.7)
Food service	4	(5.3)
Patient handling		
Move patient	46	(61.3)
Change bed	43	(57.3)
Change bed	42	(56.0)
Wash patient	24	(32.0)

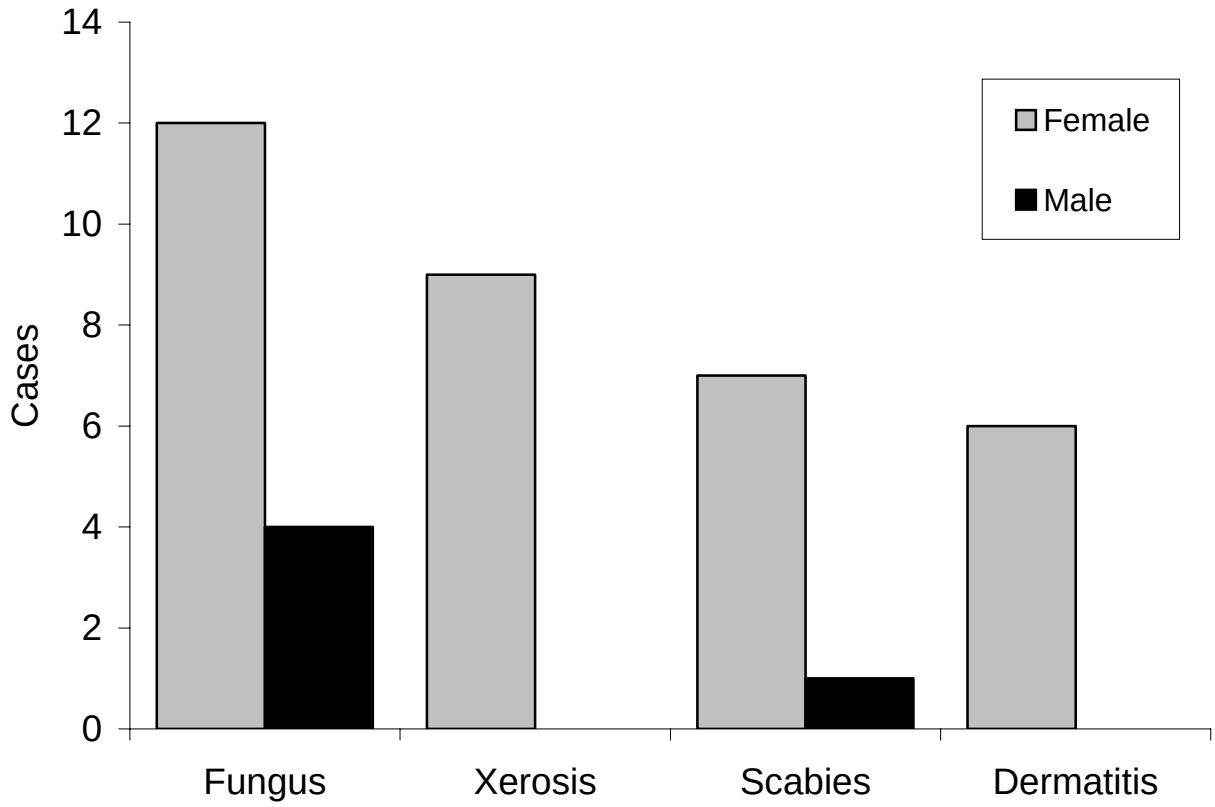
[a] percentage of all staff (N=75)

Table 3. Prevalence of skin disease among Taiwanese nursing home staff

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [b]	**n**	**(%)** [c]	**P value** [d]
Fungal infections							
Tinea pedis	6	(8.0)	2	(25.0)	4	(6.0)	0.0608
Tinea unguium	5	(6.7)	1	(12.5)	4	(6.0)	0.4840
Paronychia	5	(6.7)	1	(12.5)	4	(6.0)	0.4840
Xerosis							
X+1 grade	9	(12.0)	0	(0.0)	9	(13.4)	0.2691
X+2 grade	2	(2.7)	0	(0.0)	2	(3.0)	0.6204
Dermatitis							
Non-defined	4	(5.4)	0	(0.0)	4	(6.0)	0.4775
Contact dermatitis	1	(1.3)	0	(0.0)	1	(1.5)	0.7279
Irritant dermatitis	1	(1.3)	0	(0.0)	1	(1.5)	0.7279
Scabies							
Clinical diagnosis	8	(10.7)	1	(12.5)	7	(10.5)	0.8589
KOH confirmed	1	(1.3)	1	(12.5)	0	(0.0)	0.7279

[a] percentage of all staff (N=75), [b] percentage of all males (n=8), [c] percentage of all females (n=67), [d] gender differences in skin disease prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Skin disease cases among Taiwanese nursing home staff



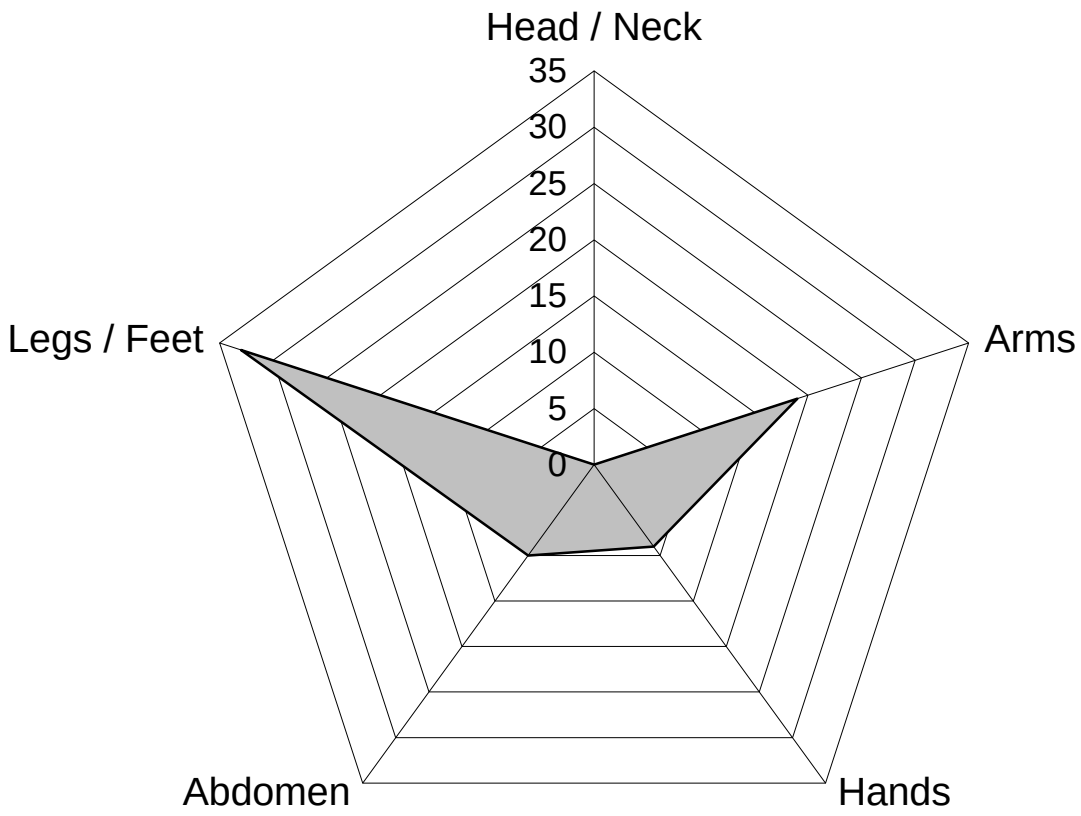
(shaded area represents the total number of cases by gender)

Table 4. Location of skin disease among Taiwanese nursing home staff

	Fungus		Xerosis		Scabies		Dermatitis	
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]
Upper body								
Head	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Face	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Neck	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
Trunk								
Shoulders	0	(0.0)	3	(30.0)	3	(37.5)	1	(16.7)
Chest	0	(0.0)	3	(30.0)	2	(25.0)	1	(16.7)
Back	0	(0.0)	3	(30.0)	1	(12.5)	0	(0.0)
Arms								
Upper arms	0	(0.0)	4	(40.0)	5	(62.5)	2	(33.3)
Forearms	0	(0.0)	5	(50.0)	0	(100)	3	(50.0)
Hands	5	(31.3)	3	(30.0)	0	(0.0)	1	(16.7)
Legs								
Upper legs	0	(0.0)	5	(50.0)	4	(50.0)	0	(0.0)
Lower legs	0	(0.0)	9	(90.0)	1	(12.5)	0	(0.0)
Feet	11	(68.7)	3	(30.0)	0	(0.0)	0	(0.0)

[a] figures indicate the number of skin disease cases at that particular site and the percentage of all diseases in that category (n= 16, 10, 8 and 6 respectively) For example: 68.7% of all staff with any fungus had it diagnosed on their feet

Figure 2. Skin disease cases by body site among nursing home staff



(shaded area represents the burden of skin disease by body site and number of cases)

Skin disease comparisons: Part 1

(Nursing home health-care workers in Australia and Taiwan)

Smith DR, Guo YL, Lee YL, Yamagata Z. Skin disease among nursing home health care workers in Australia and Taiwan. Yamanashi Med J 2002; 17: 75-79.

Abstract

Although skin disease represents a common problem for health care workers (HCW), the prevalence among Australian and Taiwanese nursing home employees is unclear. Furthermore, differences in skin disease rates between these two occupational groups are unknown. Ninety HCW from 12 nursing homes within Queensland, Australia and Tainan county, southern Taiwan were randomly selected and then examined by specialist physicians to detect the presence of skin disease. Keratosis, dermatitis and skin cancer were more common among the Australian HCW (52.8%, 19.4% and 16.7% respectively) than the Taiwanese (0.0%, 9.3% and 0.0% respectively). Conversely, the Taiwanese had more cases of xerosis (13.0% vs. 0.0%) and scabies (9.3% vs. 0.0%). Overall, the Taiwanese HCW in this study had generally lower levels of skin disease (35.2% vs. 83.3%) and experienced only one-tenth the relative skin disease risk (OR 0.1, 95%CI 0.03-0.3 P = 0.0001). These results may be explained by the high presence of sun-induced skin disorders among the predominately fair-skinned Australian group.

Introduction

Skin diseases constitute some of most common occupational disorders in the developed world.[1] Health care workers (HCW) are known to suffer high rates of dermatoses, particularly when compared to other occupations.[2] Within hospital environments, female nurses may present the highest rates of all.[3] Hospital wet work (such as frequent hand washing) often exposes HCW to a large number of irritants when completing their daily tasks.[4] Previous studies have shown how nursing home nurses wash their hands more frequently than in other occupational groups.[5] As society ages, nursing home numbers are increasing; with these facilities employing greater numbers of HCW in recent years. Although skin disease has been well studied in many other parts of the health care industry, the prevalence among Australian and Taiwanese nursing home HCW is unclear. Therefore, a small cross-sectional study was conducted to establish skin disease prevalence among this understudied occupational subgroup and evaluate the need for further research. It was also considered appropriate to investigate whether there were any significant differences between the two groups.

Methodology

For this study a convenient but representative sample of HCW was selected from 12 nursing homes within Taiwan and Australia. Because Taiwanese nursing homes tend to have relatively few staff, all registered facilities in Tainan county were initially stratified by geographical location and then a random selection of institutes taken from each sector. Australian nursing homes on the other hand are generally larger organizations, and as such it was possible to randomly select a single, large facility, which cared for a similar number of patients as the Taiwanese group. All employees within these nursing homes initially completed a preliminary survey with questions regarding age, sex, job description, duration of current employment, whether they undertook wet-work and whether they had suffered from any skin diseases in the past 12 months. Where previous skin disease was reported, HCW were also asked if they had sought medical treatment (physician or specialist) for their condition.

Approximately 1 week after receiving the questionnaire, staff underwent complete physical examination by 2 teams of specialist medical doctors to detect the presence of skin disease. Physicians in both groups used the same examination sheet, detection methodology and diagnostic criteria previously taken from standard dermatological texts. The broad term `keratosis` included both seborrheic and solar keratosis. `Skin cancer` comprised only basal cell and squamous cell carcinoma as no melanomas were detected on staff in either country. `Dermatitis` included redness, itching, scaling or vesicular presentation as previously described by other authors[2,5)]. As time was a limiting factor, skin disease diagnosis was predominantly clinical with no subsequent histological evaluation.

Basic prevalence data from the 2 groups was analysed separately and then compared using Pearson's chi square test of statistical significance. Skin disease risk factors were also analysed separately using logistic regression with results expressed as odds ratios and 95% confidence intervals. Independent variables were initially chosen using the stepwise selection method with the presence of skin disease used as the dependent variable throughout. Each independent category

utilised the logical reference variable (eg. history of skin disease / no history of skin disease). To evaluate the risk of skin disease between these two groups an OR was derived from pooled data (Australia and Taiwan) using Australia as the independent variable. Probability values (P) below 0.05 were considered statistically significant throughout the analysis.

Results and discussion

A total of 90 HCW were involved in this study (36 from Australia and 54 from Taiwan). The percentage of females was slightly higher among the Taiwanese group, although the difference was not significant statistically (Table 1). Fewer Australian HCW (41.7%) had a previous history of skin disease than Taiwanese HCW (50.0%). Skin disease history was more common in both groups than a previous study of Dutch nurses and surgical assistants (between 7.7% and 32.0%).[2] A greater percentage of the Australian subjects had sought medical treatment for skin disease and their mean age was also slightly higher (43.1 versus 38.7 years). The rate of medical treatment among the Australians (25.0%) was also much higher than the Dutch nurses previously mentioned (15.3%).[2] Job descriptions were similarly divided in Australia and Taiwan (nurse aide, nurse, therapist) and none of these differences were statistically different. With a mean of 8.4 years, the Australian HCW in this study had kept their current job for longer periods than the Taiwanese (2.3 years, P = 0.0001). The former result is similar to a previous study of German HCW (7.5 yrs).[1] Significantly more (P = 0.0155) Australian HCW (61.1%) undertook daily wet-work than Taiwanese (35.2%), and their rate was also higher than a previous wet work study conducted in Sweden (40.1%).[4]

Keratosis was the most common skin disease detected among the Australians during this study (52.8%), and was higher than the Taiwanese (P = 0.0001) who had no cases of keratosis (Table 2 and Figure 1). The keratosis prevalence rate was similar to a previous study of Australians, where 46% were diagnosed with at least one solar keratosis.[6] The prevalence of dermatitis among Australian HCW (19.4%) was slightly higher than previous studies of German HCW (15.6%) [1] and Dutch nurses (13.5%).[5] Dermatitis was detected at much lower levels among the Taiwanese group

(9.3%), although this difference was not statistically significant. Skin cancer was significantly more common among Australian HCW when compared to the Taiwanese (P = 0.0019); among whom no cases were found. Conversely, the Taiwanese HCW had more cases of xerosis (13.0%, P = 0.0245) than our Australian staff. Although this particular result was unusual considering their older age, we suspect it may have resulted from a more diligent approach to skin dryness prevention among the Australian group. Around one-tenth (9.3%) of the Taiwanese workers were diagnosed with scabies. A previous report of nosocomial scabies in Taiwan has demonstrated the high infectivity of this disease among HCW.[8] Although the community prevalence of scabies is not known in southern Taiwan, a previous study of eastern Taiwanese has revealed scabies in 1.4%.[9] Therefore, the 9.3% prevalence of scabies in this study suggests that nursing home HCW had higher levels of this disease than the general Taiwanese population.

The location of skin diseases on the body differed between the two groups (Figure 2). Significantly more (P = 0.0001) Australian HCW suffered from skin disease on the head when compared to the Taiwanese (38.9% versus 1.9%). This difference may be attributed to the high percentage of keratosis diagnosed among the Australian group. A previous study of Australians has shown how incident solar keratoses are common on the head and neck[6)]. There was also a significant difference (P = 0.0001) between the prevalence of any skin disease when staff from the two countries were compared. More than three-quarters of the Australian HCW (83.3%) had at least one skin disease. This result is particularly high when compared to a previous study of German HCW (14.9%),[1] Dutch nurses (18.3%) [7] and the Taiwanese HCW within the current study (35.2%). This high result may have been a statistical artefact caused by the unusually high prevalence of keratosis (particularly solar keratosis) among the Australian group. Solar keratosis is known to increase with age and is usually more common among fair skinned people.[10] A previous skin disease study of an Australian community revealed that more than half of them had fair skin and more than three-quarters would usually burn following acute sun exposure.[11]

No statistically significant risk factors were derived for skin disease among either population.

Although the Taiwanese had an elevated OR, undertaking daily wet work was not statistically associated with the presence of skin disease in either group. A previous Swedish study has suggested that endogenous factors and trivial irritants may play a more important role in the development of hand eczema than contact sensitivity.[4] Individual susceptibility may also be a contributory feature among hand dermatitis sufferers.[5] When the two groups were statistically compared, the Taiwanese experienced only one-tenth the risk of skin disease (OR 0.1, 95% CI 0.03-0.3 P = 0.0001) of the Australians. Again, this result may also be explained by the high presence of sun-induced skin disorders within the latter group. The dermatological reaction to solar radiation varies between Asians and Caucasians,[12] and probably accounted for a higher overall skin disease prevalence among the Australian HCW. Alternatively, histological analysis of the keratosis cases might have shown that some clinical diagnoses were artificially high.

Conclusion

Overall, this study revealed that keratosis, dermatitis and skin cancer were more common among the Australian HCW than the Taiwanese. Conversely, the Taiwanese had more cases of xerosis and scabies, while the location of skin diseases on the body differed between the two groups. The Taiwanese HCW had generally lower levels of skin disease and experienced only one-tenth of the relative skin disease risk. These results are most likely explained by the high presence of sun-induced skin disorders among the predominately fair-skinned Australian group. As there was little direct statistical evidence to support an occupationally related skin disease aetiology during the current study, the need for further skin disease research among nursing home HCW is indicated.

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Table 1. Demographic and workplace items

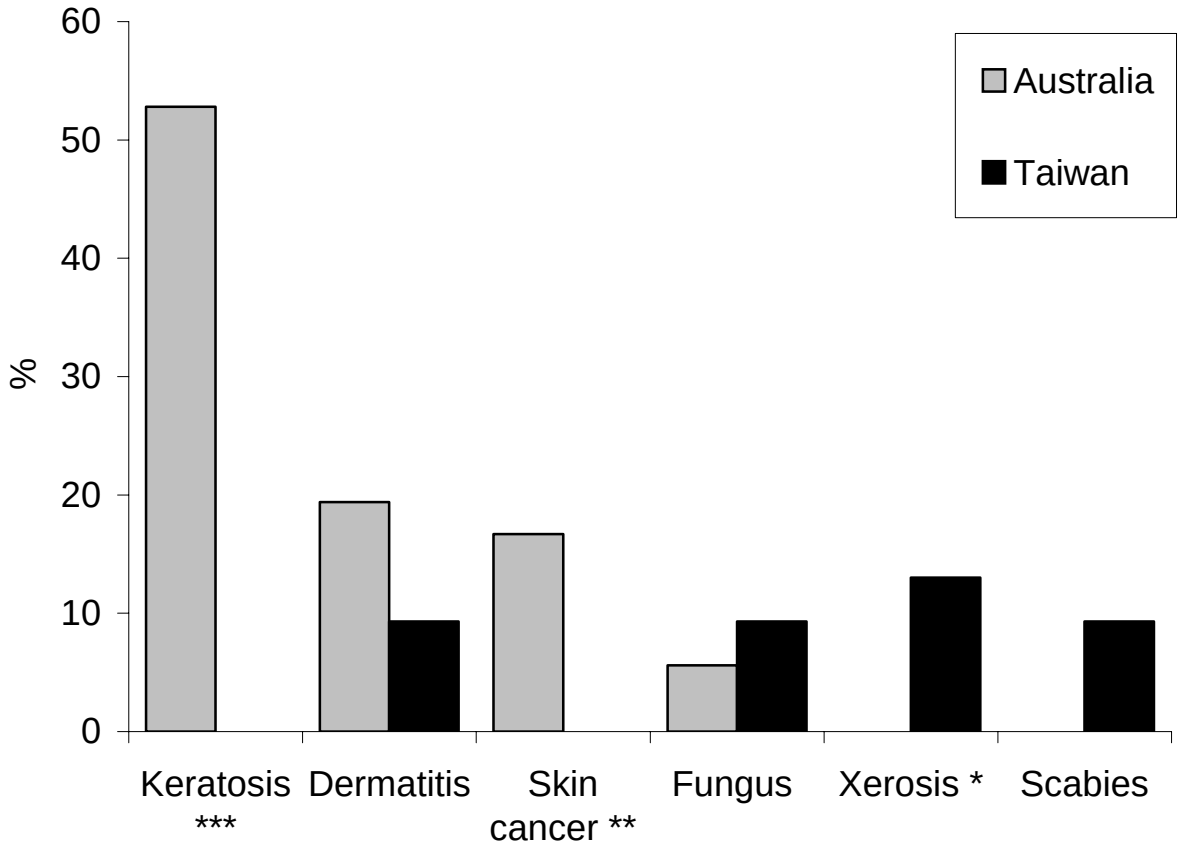
	Australia	**Taiwan**
Demographics	**n (%)** [a]	**n (%)** [a]
Female	33 (91.7)	52 (96.3)
SD history *	15 (41.7)	27 (50.0)
SD treatment	9 (25.0)	10 (18.5)
Daily wet work *	22 (61.1)	19 (35.2)
Job description		
Nurse aide	22 (61.1)	34 (63.0)
Nurse	12 (33.3)	18 (33.3)
Therapist	2 (5.6)	2 (3.7)
Mean ± SD		
Age (yrs)	43.1 ± 8.8	38.7 ± 11.8
Duration (yrs)[b] **	8.4 ± 8.1	2.3 ± 2.4
Sample size	N=36	N=54

[a] number of cases and percentage of cases per group

[b] duration of employment in current job (years)

*P < 0.05, ** P < 0.001

Figure 1. Prevalence of skin disease among nursing home HCW



* P < 0.05, ** P < 0.005, *** P < 0.001

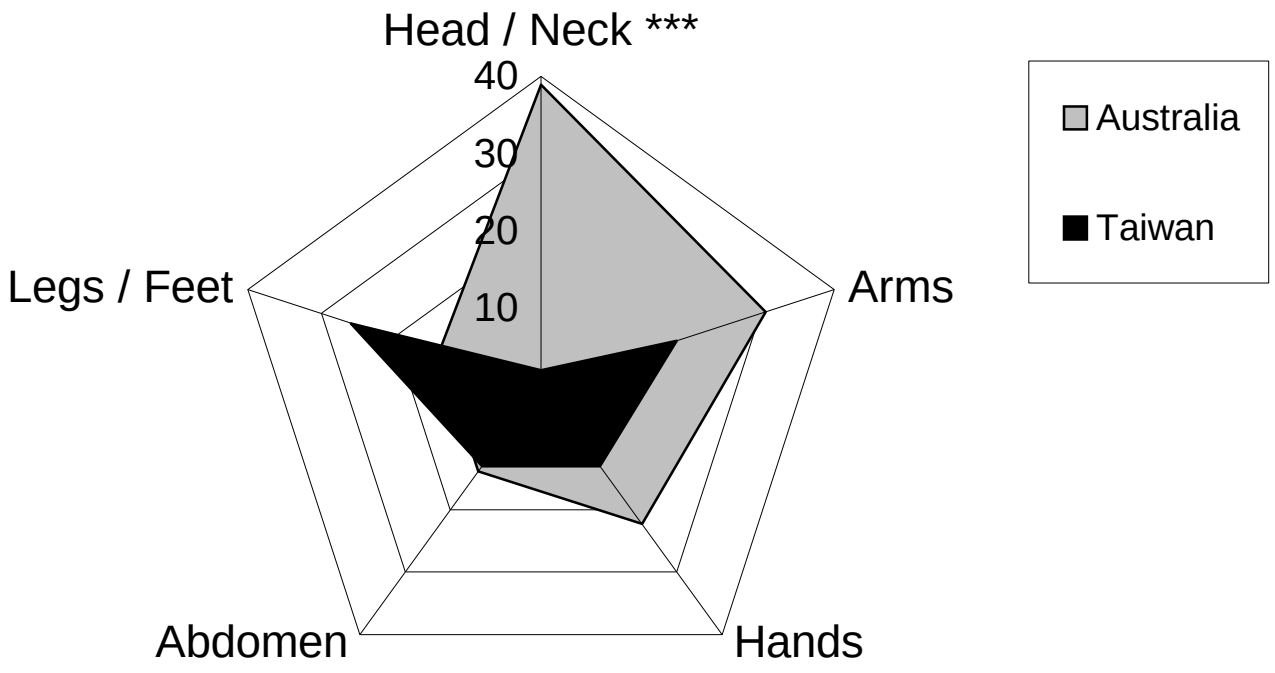
Table 2. Skin disease prevalence among staff

	Australia	**Taiwan**
Category	**n (%)** [a]	**n (%)** [a]
Keratosis ***	19 (52.8)	0 (0.0)
Dermatitis	7 (19.4)	5 (9.3)
Skin cancer **	6 (16.7)	0 (0.0)
Fungal disease	2 (5.6)	5 (9.3)
Xerosis *	0 (0.0)	7 (13.0)
Scabies	0 (0.0)	5 (9.3)
Location		
Head / neck ***	14 (38.9)	1 (1.9)
Arms (L/R)	11 (30.6)	10 (18.5)
Hands (L/R)	8 (22.2)	7 (13.0)
Abdomen	5 (13.9)	7 (13.0)
Legs (L/R)	4 (11.1)	10 (18.5)
Feet (L/R)	1 (2.8)	4 (7.4)
Any disease ***	30 (83.3)	19 (35.2)

[a] results expressed as the total number of cases and percentage of cases per group

* $P < 0.05$, ** $P < 0.005$, *** $P < 0.001$

Figure 2. Body distribution of skin disease among nursing home HCW



(numbers represent the percentage of cases per group at that particular body site)

Skin disease comparisons: Part 2

(Nursing home health-care workers in Japan and South Korea)

Smith DR, Choi JW, Ki M, Yamagata Z. Skin disease among nursing home health care workers in Japan and Korea. Sfty Sci Mon 2003 (in press)

Abstract

Despite the widespread proliferation of palliative care facilities, occupational skin disease studies within Japanese and South Korean nursing homes are comparatively rare. To address this shortfall and evaluate the need for larger cohort studies, it was considered necessary to conduct some preliminary epidemiologic research. As a group, the Japanese HCW experienced significantly more (P = 0.0400) skin diseases of any type when compared to the Koreans (27.6% vs. 11.8%). When adjusted for age, sex and total duration of employment, the former were at 6.4 times higher skin disease risk than the latter group (odds ratio 6.4, 95%CI 1.3-37.0). This situation was most likely due to a higher atopic prevalence among the Japanese HCW. Systemic allergy is a well-documented risk factor for occupational skin disease in many countries. Results tend to support this hypothesis as confounding factors were avoided by including them in the regression model, and thus adjusting for their affect. Even when adjusted, the odds ratio remained statistically significant (P = 0.0254). Overall, this study has shown that skin disease appears to be an important concern for nursing home HCW in Japan and Korea. A higher detection rate among the former group confirmed the importance of systemic allergy as a dermatologic risk factor. The need for more extensive skin disease studies in these regions is therefore indicated.

Introduction

Skin disease represents one of the most common workplace disorders within developed countries. Health care workers (HCW) are a particularly vulnerable occupational group due to their regular exposure to wide variety of contact irritants (including water). Health care related wet-work activities such as cleaning patients and repeated hand washing are an important source of skin trauma, and tasks that may eventually lead to occupational skin disease. As nursing home patients are heavily dependent on staff for many activities of daily living, providing this assistance on a daily basis increases the likelihood of irritant exposure. Recent advances in public health have dramatically increased the proportion of elderly citizens worldwide. In Asia, nursing homes are becoming an increasingly attractive option as traditional notions of extended family care decline. Nursing home staff numbers are also increasing exponentially throughout the region to meet this

demand. Despite the widespread proliferation of palliative care facilities, occupational skin disease studies within Japanese and Korean nursing homes are comparatively rare. To address this shortfall and evaluate the need for larger cohort studies, it was considered necessary to conduct some preliminary epidemiologic research. As Japanese and Korean HCW share many common physiological characteristics, it was also considered worthwhile to investigate whether there were any significant differences in skin disease rates between the two groups.

Methodology

One large nursing home in Yamanashi, Japan and an equivalent, large facility in Seoul, Korea was initially selected and invited to join this study. All HCW completed a preliminary survey with questions regarding age, sex, working hours, duration of employment and whether they undertook daily wet-work. Staff were also asked if they had a history of skin disease, and if so, what condition. After obtaining their informed consent, all available HCW in both groups had their skin examined by a team of specialist physicians to detect the presence of dermatological abnormality. Skin disease was divided into 5 categories: contact dermatitis, atopic dermatitis, fungal disease, xerosis and scabies. Diagnosis criteria were taken from standard dermatological texts and were identical in both countries. Any clinically observed condition was marked on an anonymous anatomical chart and then entered into a common spreadsheet program. Data was processed using logistic regression with P values above 0.05 regarded as statistically insignificant throughout.

Results and discussion

Most participants in this study were female, although the proportion of female Koreans (96.1%) was significantly higher (P = 0.0052) than for the Japanese (77.6%). There was also a significant difference (P = 0.0001) in the average age of Koreans (46.5 years) when compared to the latter group (30.6 years). Pre-existing allergy was significantly more common (P = 0.0001) amongst the Japanese HCW (Table 1). This result was not surprising as the prevalence of atopic dermatitis is known to be particularly high in Japan at present. As a group, the Japanese HCW experienced significantly more (P = 0.0400) skin diseases of any type when compared to the Koreans (27.6%

vs. 11.8%). When adjusted for age, sex and total duration of employment, the former were at 6.4 times higher skin disease risk than the latter group (odds ratio 6.4, 95%CI 1.3-37.0, P = 0.0254). This situation was most likely due to a higher atopic prevalence among the Japanese HCW. Systemic allergy is a well-documented risk factor for occupational skin disease in many countries. Our results tend to support this hypothesis as we were able to avoid confounding factors by including them in the regression model, and thus adjust for their affect. Even when adjusted, the odds ratio remained statistically significant (P = 0.0254). Furthermore, the prevalence of current atopic dermatitis was similar between the two groups, confirming that past not present allergy is a more important predictive variable for occupational skin disease.

Contact dermatitis was the most common dermatologic condition among the Japanese, affecting 17.2%, followed by atopic dermatitis (8.6%) and xerosis (5.2%). Contact dermatitis was significantly less common (P = 0.0266) among the Korean HCW, affecting only 3.9% of them (Table 2). Once again, a higher proportion of pre-existing allergy most likely contributed to the higher Japanese rate. Other important skin diseases for the Korean group included atopic dermatitis (5.8%) and scabies (3.9%). In Japan, hands appeared to be the most important body site (17.2%), followed by the arms (8.6%) and legs (6.9%). The opposite was true for the Korean group, who suffered no hand involvement at all (P = 0.0019). The higher proportion of Japanese staff with hand dermatitis most likely related to their higher prevalence of systemic allergy. Hand dermatitis is a common occupational problem in workers with pre-existing allergy. The abdomen (9.8%), arms and legs (both 3.9%) were important body sites for skin disease among nursing home workers in Seoul. These anatomical differences probably reflected the presence of *Sarcoptes scabiei* among the South Korean group and not the Japanese. All HCW with scabies demonstrated widespread lesions on their abdomen, upper legs and arms; symptoms that were absent in non-scabies cases. Alternatively, dermatoses constituted the majority of skin disease seen in Japan.

Conclusion

Overall, this study has shown that skin disease appears to be an important concern for nursing home HCW in Japan and South Korea. A higher detection rate among the former group confirmed the importance of systemic allergy as a dermatologic risk factor. The need for more extensive skin disease studies in these regions is therefore indicated.

Table 1. Demographic and workplace items

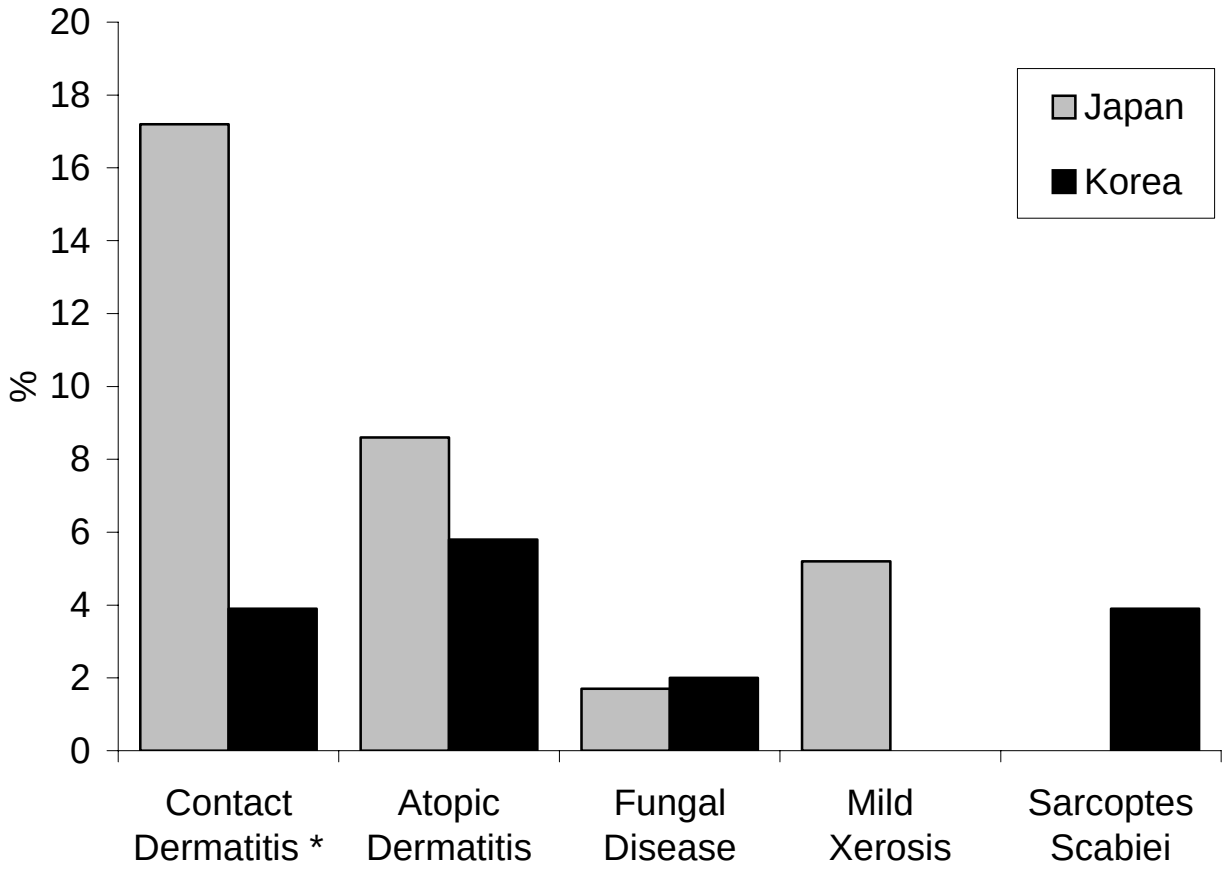
	Japan	**S. Korea**
Demographics	**n (%)** [a]	**n (%)** [a]
Female **	45 (77.6)	49 (96.1)
SD history	28 (48.3)	16 (31.4)
Allergy ***	20 (34.4)	2 (3.9)
Wet-work	48 (82.8)	36 (70.6)
Job description		
Nurse aide *	29 (50.0)	37 (72.5)
Nurse *	25 (43.1)	11 (21.6)
Therapist	4 (6.9)	3 (5.8)
Mean ± SD		
Age (yrs) ***	30.6 ± 10.1	46.5 ± 7.2
Duration (yrs) [b]	5.0 ± 8.4	4.7 ± 3.7
Sample size	N=58	N=51

[a] number of cases and percentage of cases per group

[b] duration of employment in current job

* P < 0.05, ** P < 0.01, *** P < 0.0001

Figure 1. Prevalence of skin disease among nursing home health care workers



* P < 0.05

Table 2. HCW skin disease prevalence

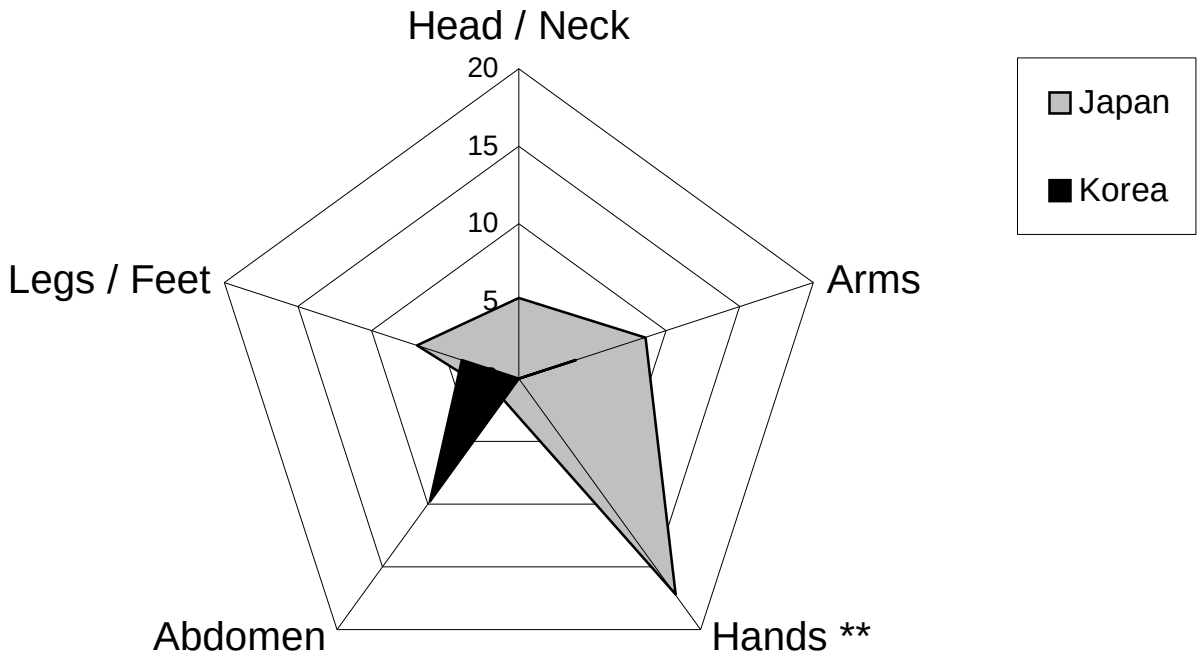
	Japan	**S. Korea**
Category	**n (%)** [a]	**n (%)** [a]
Contact dermatitis *	10 (17.2)	2 (3.9)
Atopic dermatitis	5 (8.6)	3 (5.8)
Fungal disease [b]	1 (1.7)	1 (2.0)
Mild xerosis	3 (5.2)	0 (0.0)
Sarcoptes scabiei	0 (0.0)	2 (3.9)
Location		
Head / neck	3 (5.2)	0 (0.0)
Arms (L/R)	5 (8.6)	2 (3.9)
Hands (L/R) **	10 (17.2)	0 (0.0)
Abdomen	1 (1.7)	5 (9.8)
Legs and feet (L/R)	4 (6.9)	2 (3.9)
Any skin disease *	16 (27.6)	6 (11.8)

[a] number of cases and percentage of cases per group

[b] incorporating tinea pedis and paronychia

* $P < 0.05$, ** $P < 0.01$

Figure 2. Location of skin disease among nursing home health care workers



** P < 0.01

(numbers represent the percentage of cases per group at that particular body site)

Summary

Overall, the skin disease examinations conducted during this study showed that the prevalence of skin disease varied from country to country, with the Australians suffering the highest prevalence. Solar-related skin damage such as actinic keratosis and basal cell carcinoma was detected only among this group. Conversely, *Sarcoptes scabiei* infestation was detected within South Korea and Taiwan, but not Australia and Japan. Other skin diseases diagnosed frequently among the Australian group included fungal infections and dermatoses, which were not as common among the Japanese subjects. Fungal attack and dermatitis were equally common among Korean nursing home staff, with scabies somewhat less frequent. Fungal infection was the most common affliction within Taiwan, followed by scabies and dermatoses. The higher overall prevalence of skin diseases in the Australian cohort was possibly due to their significantly higher rate of sun-induced skin disorders. This result was not surprising as solar-related damage usually affects fair-skinned Caucasians more than Asians, due to the latter race`s higher cutaneous levels of protective melanin. It is also possible that the Australian group had enjoyed more outdoor activities involving sun exposure, particularly when compared to northern Asians who tend to avoid high intensity sun exposure for cosmetic reasons.

The high prevalence of fungal disease seen within Taiwan most probably arose from its comparatively higher temperature and relative humidity. Tropical climatic conditions are well known co-factors in the development of fungal diseases. The discovery of scabies within the Taiwan staff may also have resulted from their greater tendency to live in larger, extended family groups when compared to the Australians, and to an increasing extent, the Japanese and Koreans. Important skin disease risk factors included previous skin disease and a history of allergy, both of which are consistent with current knowledge on the subject. Interestingly, MSD was found to be a co-factor for current skin disease, although the reasons for this interrelation are unclear. Nevertheless, the results of dermatological examinations undertaken during this research project certainly indicate that skin disease is an important occupational issue within the nursing homes of Australia, Japan, South Korea and Taiwan.

Chapter 4

Musculoskeletal disorder surveys

Introduction

This chapter contains the results of musculoskeletal disorder surveys conducted within Australian, Japanese, South Korean and Taiwanese nursing homes. Countries are addressed in separate subchapters, each containing an abstract, background, methods, results, discussion and conclusion section. Although conducted in four separate countries, the survey forms and MSD reporting criteria were identical throughout. The questionnaire was initially written in English before being translated into the respective languages (Japanese, Korean and Chinese). It was then assessed for clarity within each individual setting by a native speaker, before being back-translated and rechecked by the original author. This process was critical to ensure consistency between the multilingual versions used throughout the 4 countries. All surveys and collection methodologies conformed to ethical standards and protocols relevant to each particular region. The entire process of data entry, data analysis and subsequent publication was then undertaken solely by the author of this dissertation as noted for earlier parts of the thesis.

Apart from the fact that both the skin disease and musculoskeletal disorder surveys were to be performed on subjects from the same facilities, it was considered appropriate to investigate the intrinsic biomechanical differences between Caucasian and Asian staff employed in differing institutions and locations. The Taiwanese and Australian cohorts came from similar climatic environments, but differed in racial background and thus physical makeup. On the other hand, the Korean and Japanese subjects were racially and geographically similar, although the nature of Korean palliative care, and thus nursing home work, differs slightly from that of Japanese. As previously mentioned, the Japanese having a more hospital-based philosophy. By selecting such a multicultural group with diverse working environments, the ability to evaluate cultural influences on MSD was increased. As for the skin disease component of this research, subjects who completed self-reporting questionnaires relating to the MSD data component came voluntarily from cooperative institutions. All had the option of refusing to take part in the surveys without penalty.

Musculoskeletal disorders reported by Australian nursing home staff

Smith DR, Atkinson R. Ergonomic problems self-reported by workers in a nursing home in Queensland, Australia. Ergonomics Aust 2001; 15: 14-19.

Abstract

Background

Although many nursing home staff are at risk from musculoskeletal disorders (MSD), the prevalence among Australian nursing home workers is unknown.

Methodology

A structured MSD questionnaire was completed by staff members from a large nursing home complex in Queensland, Australia. Questions included age, sex, height, weight, shift-work details, duration of current employment, nature of current employment, the presence of MSD during the past 12 months, the phase lag before the onset of injury and sick leave details.

Results

A total of 140 employees responded, the majority of whom were female (85.0%), married (65.7%) non-smokers (80.0%). Low back pain was the most commonly reported MSD site, affecting 25.7% of the staff within the nursing home. This was followed by the shoulder (22.1%), neck (16.4%), knee (15.7%) and upper back (12.9%). There were no statistically significant differences in prevalence by gender except at the hand, where males reported significantly more MSD than the females (19.1% vs. 5.9%, P = 0.0387). Working full-time increased the risk of suffering any MSD 6.3 fold (OR 6.3, 95%CI 1.2 – 39.7, P = 0.0364). Washing the patients on a daily basis was another important MSD risk factor (OR 2.9, 95%CI 1.3 – 6.5, P = 0.0077), as was changing their clothes (OR 2.3, 95%CI 1.1 – 4.9, P = 0.0358). Other demographic and workplace items were not associated with any increased MSD risk during this study.

Conclusion

This study suggests that working full-time, washing nursing home patients and changing their clothes increases the risk of developing MSD among nursing home staff. The prevalence of certain injuries and symptoms are also different from previous reports.

Keywords: self-reported, musculoskeletal disorders, nursing home, Australia

Introduction

Musculoskeletal disorders (MSD) are a significant concern for many health care workers (HCW), particularly in situations where the regular physical handling of patients is required.[1] Among industrialised societies, the percentage of elderly citizens is continually rising owing to improved standards of public health and general living conditions. Caring for incapacitated elderly people may be particularly hazardous as most nursing home patients depend heavily on nursing care for almost all their daily activities.[2] Although many nursing home HCW are at risk from pain and injury during employment, few authors have investigated these ergonomic issues within the nursing homes of Australia. Therefore, it was considered appropriate to conduct an MSD investigation of nursing home workers (NHW) within the fast growing region of Queensland, Australia.

Methodology

For this study 140 NHW from 8 sections of a large nursing home complex were recruited in Nambour, Queensland, Australia. Nambour is located around 100 km north of Brisbane city (latitude 26.64°S, longitude 152.93°E) and has a reasonably elderly population of 11 397 citizens. All fieldwork was undertaken in November and December 2000. The nursing home complex surveyed provides care for a wide range of patient categories, including very frail patients and those with significant motor disturbances or dementia. Each section was sent questionnaires for staff to complete and return individually. Questions included age, sex, height, weight, shift-work details, duration of current employment, nature of current employment, occurrence of MSD within the past 12 months and the phase lag between beginning work and the onset of MSD. Sick leave details arising from MSD were also obtained. Surveys were collected approximately 2 days after distribution and staff members interviewed when further clarification was required. Data was entered into a spreadsheet program (MS Excel 2000) before undergoing statistical analysis with JMP statistical software (SAS Labs, 2001), which included descriptive statistics for the prevalence of MSD in conjunction with logistic regression of staff variables to determine potential workplace risk factors. Variables were chosen using the stepwise selection method. Gender differences in MSD prevalence were investigated using Pearson’s chi square and Fisher’s exact test. Odds ratios

(OR) were also calculated to establish risk factors, with P values above 0.05 regarded as statistically insignificant throughout. Odds ratios were adjusted for age, sex and duration of employment where appropriate.

Results

A total of 140 employees were analysed, the majority of whom were female (85.0%), married (65.7%) non-smokers (80.0%). Over half reported drinking alcohol regularly (58.6%). Their age ranged from 16 to 65 years with an average age of 44.8 years (SD 10.4). The mean height of staff was 165.6cm (SD 9.2), weight 71.9kg (SD 14.9) and Body Mass Index (BMI) 26.7 kg/m^2 (SD 6.3). Most workers were employed on a part-time basis (80.0%) and worked day shifts (95.0%). Their working week ranged from 6.5 to 84 hours with an average of 31.6 hours (SD 13.0). Their monthly working schedule ranged from 2 to 34 days with a mean of 16.7 days (SD 5.7). A large proportion of staff had remained in their current job for more than 1 year (77.9%), with an average career length of 6.1 years (SD 6.3). Refer to Table 1.

The predominant employment category of workers was nursing, comprising almost half the total (48.5%). Other significant categories included care assistants (21.2%), food service employees (16.2%) and administrative officers (14.1%). Education levels varied from primary school to university training, however the majority had completed high school (71.1%); which requires 12 years of schooling in Australia. Technical college was the next highest category (15.6%), followed by university (11.1%) and primary school (2.2%). Patient handling was regularly undertaken by 43.6% of all staff, with an average of 15.9 patient contacts (SD 22.2) per day. The mean number of hours spent working beside the patient's bed was 4.4 hours (SD 2.3) daily. Patient handling tasks were divided into four major categories, moving the patient (37.9%) being slightly more common than changing the patient's clothes (36.4%), changing their bed and washing the patient (both 35.7%). Some employees (30.0%) were required to complete all 4 tasks every day (Table 2).

Low back pain was the most commonly reported MSD site, affecting 25.7% of the staff within the

nursing home. This was followed by the shoulder (22.1%), neck (16.4%), knee (15.7%) and upper back (12.9%). There were no statistically significant differences in prevalence by gender except at the hand, where males reported significantly more MSD than the females (19.1% vs. 5.9%, P = 0.0387). Refer to table 3 and Figure 1. The phase lag between commencing work and receiving an MSD ranged from 2 to 240 months, with an average of 53.1 months (SD 51.0). Sick leave was taken by 13.6% of staff in the last 12 months, with a range of 1 to 90 days and a mean of 20.5 days off work (SD 26.6). Working full-time increased the risk of suffering any MSD 6.3 fold (OR 6.3, 95%CI 1.2 – 39.7, P = 0.0364). Washing the patients on a daily basis was another important MSD risk factor (OR 2.9, 95%CI 1.3 – 6.5, P = 0.0077), as was changing their clothes (OR 2.3, 95%CI 1.1 – 4.9, P = 0.0358). Demographic items such as height, weight age, sex and cumulative length of employment however, showed no correlation with MSD (Table 4).

Discussion

The high percentage of females within this study (85.0%) was similar to previous international reports.[3-5] The low rate of tobacco smoking (20.0%) and high prevalence of occasional alcohol consumption (58.6%) reflected past studies of Australian HCW.[6] The proportion of married NHW (65.7%) was higher than among Japanese HCW (24.2%), although this probably relates to a lower average age of staff between the two studies (44.8 vs. 29.5 years in Japan).[2] The average height of employees within this study (165.5 cm) was similar to previous research conducted in the Netherlands (168.8 cm), although their weight (71.9 vs. 65.4 kg) and BMI (26.7 vs. 23.2 kg/m^2) was higher than for the Dutch study.[4] It is possible this discrepancy might reflect the higher average age of the Australian workers when compared to the Dutch research (44.8 vs. 29.3 years in Holland). Subjects within this study worked similar weekly hours as the Dutch (31.6 vs. 33.0 hours). Conversely, with an employment duration of 6.1 years the Australian staff had remained in their profession for shorter time periods than Japanese [2] (7.7 years), Italian [3] (8.8 years) or Dutch [4] (9.5 years) HCW. Other investigations suggest that most nursing home care in Australia is performed by staff with limited formal qualifications, often because many NHW view their job as an adjunct to family income rather than a long-term career choice.[7] The current study revealed a low

prevalence of formally educated NHW, with only 48.5% working as nurses and most (71.1%) progressing their education no further than high school.

Manual handling is a common and regular component for HCW involved in aged care.[4] Almost half the employees surveyed during this study were involved in regular manual handling tasks (43.6%), with 'patient moving' the most frequent activity at 37.9%. Previous research has indicated a much higher rate of patient moving tasks among American [1] (70.0%) and Japanese [2] (66.2%) HCW. The Japanese study reported the percentage of their staff undertaking manual handling tasks to be higher than for Australians during this investigation (changing the patient's clothes: 43.7% vs. 36.4%, changing the patient's bed: 87.1% vs. 35.7% and washing the patient: 79.3% vs. 35.7%). An Italian study also found that manual handling was a frequent task for at least 60.0% of their HCW.[3] It is possible the higher rates documented during previous studies relate to the finer targeting of only those employees involved in regular patient contact. On the other hand, the current research project targeted all staff within the study location regardless of their expected patient contact frequency.

MSD represents a significant concern for HCW, particularly in situations where the regular physical handling of patients is required. Musculoskeletal injury is known to affect certain HCW at greater rates than other social service employees, and is most likely the result of physically stressful tasks.[8] Low back pain was the most common MSD reported during this study, followed by the shoulder and neck. Similar MSD pain rank structures (back, shoulder, neck) have been reported in Japanese [2] and Dutch [4] investigations, although generally at much higher prevalence rates. Prevalence rates in the Japanese HCW for example were slightly more than double the magnitude revealed during the current Australian research (lower back 54.7%, shoulder 42.8% and neck 31.3%). It is possible that this reflects the more specific focus of other studies on only those HCW involved in manual handling when compared to the current, more generalised study. Alternatively, the average duration of sick leave among the Australian subjects (20.5 days) was similar to that seen within Italian HCW (22.1 days).[3]

Statistical associations for MSD injury and pain are known to include age, duration of employment, sporting activity, work postures, work control, work organisation and patient conditions.[2,3,5] Despite this, statistical analysis of our data revealed no significant correlation between any demographic items and MSD among NHW. Working full-time was however, an important factor in the development of MSD, increasing the risk 6.3 fold. Most likely this situation arose from the greater burden of physiologically stressful activities incurred by a full-time staff member during their comparatively longer work hours. Washing the patients and changing their clothes on a daily basis was another important factor in the development of MSD and is probably an example of typical, high load nursing home activities. Increased risk from washing patients has been previously demonstrated in Japanese HCW, although at a lower level (OR 1.1).[2] Interestingly, moving the patients was not associated with increased risk, despite a study of HCW within the United Kingdom revealing a risk factor of 1.3 among staff who move patients.[5]

Why risk factors from the Australian nursing home study are several degrees of magnitude higher than those of previous studies is difficult to explain. It is possible that the broad demographic focus combined with the questionnaire's distinctive manual handling categories to produce a non-representative statistical artefact. Alternatively, the risk factors uncovered during this study may be indicative of genuine hazards among Australian NHW that were previously obscured.

Conclusion

This study suggests that working full-time, washing nursing home patients and changing their clothes increases the risk of developing MSD among nursing home staff. It is acknowledged that the investigation suffered certain limitations, most significantly the small sample size and relative geographical isolation. As the current investigation was confined to Queensland, results may not accurately reflect the entire Australian nursing home situation. Nonetheless, many important ergonomic and demographic factors associated with NHW have been documented within one region of Australia. Further research is required to elucidate some of these emerging issues.

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Table 1. Demographic items of staff

	n	(%) [a]
Demographics		
Female	119	(85.0)
Male	21	(15.0)
Alcohol	82	(58.6)
Tobacco	28	(20.0)
Characteristics		
Age (y)	44.8 ± 10.4	
Height (cm)	165.6 ± 9.2	
Weight (kg)	71.9 ± 14.9	
BMI (kg/m^2)	26.7 ± 6.3	
Workplace items		
Full-time	28	(20.0)
Part-time	112	(80.0)
Working week (hrs)	31.6 ± 13.0	
Total duration (yrs)	6.1 ± 6.3	

[a] percentage of all staff (N=140)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
High school	96	(71.1)
Technical college	21	(15.6)
University	15	(11.1)
Primary school	3	(2.2)
Job description		
Nursing	48	(48.5)
Care assistant	21	(21.2)
Food service	16	(16.2)
Administration	14	(14.1)
Patient handling		
Move patient	53	(37.9)
Change clothes	51	(36.4)
Change bed	50	(35.7)
Wash patient	50	(35.7)

[a] percentage of staff who responded to the question

Table 3. Prevalence of specific musculoskeletal disorders by gender

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**P value** [b]
Trunk							
Neck	23	(16.4)	1	(4.8)	22	(18.5)	0.1176
Upper back	18	(12.9)	3	(14.3)	15	(12.6)	0.8320
Shoulder	31	(22.1)	3	(14.3)	28	(23.5)	0.3469
Lower back	36	(25.7)	4	(19.1)	32	(26.9)	0.4483
Arms							
Upper arm	4	(2.9)	0	(0.0)	4	(3.4)	0.3940
Elbow	6	(4.3)	0	(0.0)	6	(5.0)	0.2929
Lower arm	5	(3.6)	1	(4.8)	4	(3.4)	0.7498
Hand	11	(7.9)	4	(19.1)	7	(5.9)	0.0387
Legs							
Leg	4	(2.9)	0	(0.0)	4	(3.4)	0.3940
Knee	22	(15.7)	3	(14.3)	19	(16.0)	0.8453
Calf	1	(0.7)	0	(0.0)	1	(0.8)	0.6733
Ankle	8	(5.7)	3	(14.3)	5	(4.2)	0.0664

[a] percentages of each group are in parenthesis (n=140, 21 and 119 respectively), [b] gender differences in MSD prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Prevalence of musculoskeletal disorders among Australian nursing home staff

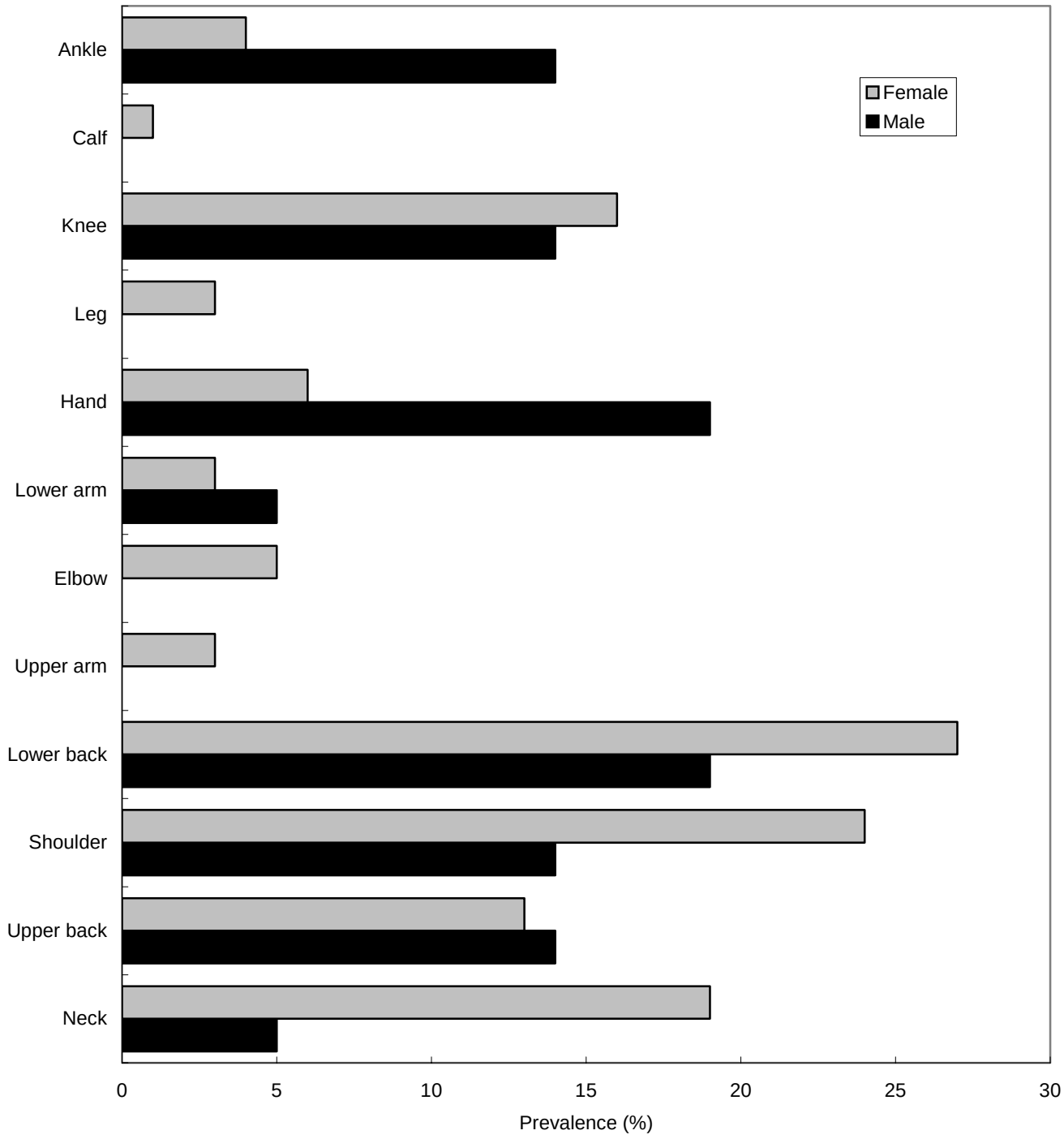

Table 4. Risk factors associated with any musculoskeletal disorders

	Category	n	(%) [a]	OR [b]	(95% CI)	P value
Full-time worker						
	No	107	(76.4)	1.0	-	-
	Yes	33	(23.6)	6.3	(1.2 – 39.7)	0.0364
Wash patients						
	No	132	(94.3)	1.0	-	-
	Yes	8	(5.7)	2.9	(1.3 – 6.5)	0.0077
Change clothes						
	No	106	(75.7)	1.0	-	-
	Yes	34	(24.3)	2.3	(1.1 – 4.9)	0.0358

[a] percentage of all staff in each subcategory (N=140), [b] calculated using logistic regression and expressed as odds ratios with 95% confidence intervals (adjusted for age, sex and duration of employment in current workplace)

Musculoskeletal disorders reported by Japanese nursing home staff

Smith DR, Kubo H, Mizutani T, Yamagata Z. Musculoskeletal disorders self reported by nursing home workers in Japan. Asian J Ergonomics 2003 (in press).

Abstract

Background

Although central Japan has one of the highest proportions of elderly citizens and an increasing proliferation of palliative care institutes, regional studies of nursing home workers are comparatively rare. As such, it was considered necessary to conduct one of the first MSD investigations of palliative care staff within Yamanashi prefecture, central Japan.

Methodology

This data collection methodology for this study was a self-reported questionnaire which consisted of a check-box format 4-page anonymous form with questions such as age, sex, smoking status, shift-work details, working hours, the nature of current employment and the presence of specific MSD within the previous 12-month period. Information regarding the phase-lag between commencing work and first experiencing an MSD was also requested.

Results

Low back pain was the most common disorder (affecting 57.8% of all workers), followed by shoulder (34.9%) and neck pain (26.6%). There were no statistically significant differences in MSD prevalence between the genders except at the leg, where females reported all cases (15.3% vs. 0.0%, P = 0.0238). The risk of suffering any MSD was increased 4.9 fold among alcohol drinkers (95%CI 1.8-15.1, P = 0.0029), 4.7 among tobacco smokers (95%CI 1.6-17.0, P = 0.0099) and 3.8 times (95%CI 1.1-13.6, P = 0.0331) among female staff. Working night shift increased the odds of any MSD by a factor of 5.3 (95%CI 1.9-18.1, P = 0.0034), as did moving patients (OR 5.2, 95%CI 2.0-14.3, P = 0.0009) and changing their clothes on a daily basis (OR 4.5, 95%CI 1.8-12.1, P = 0.0016).

Conclusion

Overall, the employees within this study reported reasonably high MSD prevalences when compared to previous investigations.

Keywords: musculoskeletal disorders, nursing home, Japan, self-reported, low back pain

Introduction

Musculoskeletal disorders (MSD) are a major concern for nursing home workers as most palliative care patients depend heavily on staff for their activities of daily living. Providing this physically demanding care on a constant basis puts significant strain on workers` musculoskeletal systems and may eventually result in pain or injury. Previous studies have shown that nursing home work usually involves intensive, alternating and physically stressful tasks with considerable energy expenditure.[1-5] Significant fatigue and muscle strain following work shifts is also common amongst this occupational demographic.[6,7] MSD risk factors are known to include demographic items,[8] work organisation [9] and patient factors.[1] Nursing home numbers are increasing throughout Japan in recent years as the population rapidly ages and traditional forms of family-based palliative care diminish. These facilities are also emerging as a significant employer within the health care sector. Although central Japan has one of the highest proportions of elderly citizens and an increasing proliferation of palliative care institutes,[10] regional studies of nursing home workers are comparatively rare. As such, it was considered necessary to conduct one of the first MSD investigations of palliative care staff within Yamanashi prefecture, central Japan.

Methodology

Gathering epidemiological data on MSD prevalence is commonly achieved by self-reported surveys as the validity and reliability of this method is well established.[11-13] The questionnaire for this research was initially adapted from the Standardised Nordic Questionnaire for Musculoskeletal Symptoms [13] and instruments used in previous nursing home studies,[14,15] before being translated into Japanese language and then evaluated by a panel of bilingual researchers. The final document consisted of a check-box format 4-page anonymous form with questions such as age, sex, smoking status, shift-work details, working hours, the nature of current employment and the presence of specific MSD within the previous 12-month period. Information regarding sick leave and the phase-lag between commencing work and first experiencing an MSD was also requested. To gain a more representative sample and avoid biases due to institute size, 1 large and 1 small nursing home from 2 separate geographical regions in Yamanashi prefecture, central Japan were

selected at random and approached to join the study. After carefully explaining the research methodology and voluntary nature of participation, the survey was distributed to staff who were asked to return it over a 1 week period. Data was entered into a common spreadsheet program before being analysed by statistical software. Pearson's chi square and Fisher's exact test was used to investigate gender differences in specific MSD prevalence, while logistic regression was also performed to establish possible risk factors. Variables were chosen using the stepwise selection method and adjusted for confounding factors such as age, sex and duration of employment. P values above 0.05 were regarded as statistically insignificant throughout.

Results

From a total group of 128 workers, 118 returned their questionnaires in the allocated time period and 9 were excluded for incomplete answers, leaving an overall response rate of 85.2%. The majority were female (78.0%), health care workers (78.9%) with an average age of 34.3 years (SD 12.5). They worked an average 40.6 hours (SD 4.1) per week and had remained in the same job for approximately 4.5 years (Table 1). The 12-month period-prevalence of self-reported MSD among all staff varied from 5.5% to 57.8%; with low back pain (LBP) being the most common disorder (affecting 57.8% of all workers), followed by shoulder (34.9%) and neck pain (26.6%). Among males, LBP was the most frequently occurring MSD (50.0%), followed by the upper back, shoulder and knee (all 20.8%). LBP was also the most regularly reported MSD among females (60.0%), followed by the shoulder (38.8%) and neck (30.6%). There were no statistically significant differences in MSD prevalence between the genders except at the leg, where females reported all cases (15.3% vs. 0.0%, P = 0.0238). Refer to Table 2. Of the 67.8% of all staff who reported an MSD at any body site, 6.8% had taken sick leave for their condition (a statistically insignificant association: P = 0.1154). The average phase-lag between commencing work and first reporting an MSD was 1.6 years during our investigation. Six risk factors in 2 distinctive groups (demographic and workplace) were identified by logistic regression (Table 3). The risk of suffering any MSD was increased 4.9 fold among alcohol drinkers (95%CI 1.8-15.1, P = 0.0029), 4.7 among tobacco smokers (95%CI 1.6-17.0, P = 0.0099) and 3.8 times (95%CI 1.1-13.6, P = 0.0331) among female

staff. Working night shift increased the odds of any MSD by a factor of 5.3 (95%CI 1.9-18.1, P = 0.0034), as did moving patients (OR 5.2, 95%CI 2.0-14.3, P = 0.0009) and changing their clothes on a daily basis (OR 4.5, 95%CI 1.8-12.1, P = 0.0016).

Discussion

LBP was the most frequently reported MSD among staff within this study, with a 12-month period-prevalence of 57.8%. A previous investigation conducted by Fujimura et al [1] revealed a very similar rate among Japanese nursing home employees (57.6%). Alternatively, other nursing home studies undertaken in Australia [14] and Taiwan [15] have documented much lower LBP prevalence of 23.6% and 12.0% respectively. Myers et al [9] also reported a lower incidence rate of 36.7 cases per 100 full-time employment years (FTEY) among American palliative care workers. LBP was the most common MSD for both males and females, although the gender-specific prevalence rate was higher among the latter group (60.0% vs. 50.0%). Shoulder MSD was the second most common condition, reported by around one-third of all staff (34.9%); 20.8% of males and 38.8% of females. As such, the Japanese prevalence rate was higher than other research conducted among similar Australian (20.7%) [14] and Taiwanese (8.0%)[15)] employees. It was also higher than the 100 FTEY incidence rate of American nursing home staff (10.3%).[9]

With slightly more than one-quarter (26.6%) of all workers suffering it, neck MSD was the third most common complaint among the Japanese palliative care employees. This result is very similar to a previous study by Engels et al, [2] revealing neck MSD among 27% of their Dutch nursing home employees. Alternatively, it is higher than other investigations of Australian (15.7%) [14] and Taiwanese (4.0%) [15] staff with similar job descriptions. Why these results varied from previous studies is difficult to explain, although it is possible that the Japanese MSD self-reporting threshold differed from that of nursing home employees in other countries. The low percentage of staff taking MSD-related sick leave (only 6.8%) and the long phase-lag between work onset and injury (1.6 years) also suggests that few MSDs resulted in significant work disruption and most were probably minor in nature. Alternatively, the Japanese employees may have suffered MSD at genuinely

higher rates than those reported in other countries.

The identification of alcohol as a demographic risk factor during this investigation was surprising as liquor consumption is not regularly associated with increased MSD rates. It is unlikely that this variable arose as a complication or co-factor associated with other lifestyle items as all demographic risk factors were simultaneously analysed during logistic regression. It is possible therefore, that certain lifestyle choices surrounding alcohol consumption may also be favourable to MSD development. Alternatively, staff already suffering MSD may choose drinking as a means to ameliorate their pain. The demonstration of both tobacco and female gender as important risk factors in our study is consistent with previous research conducted by Alcouffe et al.[8] Similar to these French authors, it is possible that female gender reflects certain sex-related differences in job category, which may lead to higher MSD rates. Alternatively, women may simply be more likely to report adverse health events such as MSD when compared to men.

Night shift work was an important workplace risk factor identified by logistic regression, and one that is also supported by other studies.[3,4,6] Wakui,[3] Wakui et al [4] and Matsumoto et al [6] have all demonstrated how night shift work can be an important cause of energy expenditure and fatigue among Japanese nursing home workers. The increased MSD risks associated with moving patients and changing their clothes on a daily basis is similar to previous studies conducted in Australia and Taiwan, where both were found to be important predictive variables.[14,15] Similarly, the complicity of various patient factors in muscle strain, work intensity and MSD development has also been shown among palliative care employees in Japan.[1,5,7] These risks most likely arise from the heavy strain imposed on workers` bodies when physically handling awkward and heavy objects such as partially immobilised human beings.

Conclusion

Overall, the employees within this study reported reasonably high MSD prevalence rates when compared to previous investigations. The presence and nature of various risk factors was however,

consistent with other reports. Although it is acknowledged that this research suffered certain limitations, the prevalence of MSD within central Japanese nursing home staff has been demonstrated for the first time. Further research is require to elucidate these emerging findings.

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Table 1. Demographic items of staff

	n	(%) [a]
Demographics		
Female	24	(22.0)
Male	85	(78.0)
Alcohol	66	(60.6)
Tobacco	40	(36.7)
Characteristics		
Age (yrs)	34.3 ± 12.5	
Height (cm)	160.3 ± 7.5	
Weight (kg)	55.3 ± 15.2	
BMI (kg/m^2)	21.8 ± 4.2	
Workplace items		
Full-time	99	(90.8)
Part-time	10	(9.2)
Working week (hrs)	40.6 ± 4.1	
Total duration (yrs)	4.5 ± 6.6	

[a] percentage of all staff (N=109)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
University	50	(45.9)
High school	38	(34.9)
Post-graduate	19	(17.4)
Technical school	2	(1.8)
Job description		
Health care	86	(78.9)
Administration	10	(9.2)
Service work	8	(7.3)
Other	5	(4.6)
Patient handling		
Move patients	71	(65.1)
Feed patients	69	(63.3)
Wash patients	63	(57.8)
Change clothes	63	(57.8)

[a] percentage of all staff (N=109)

Table 3. Prevalence of specific musculoskeletal disorders by gender

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**P value** [b]
Trunk							
Neck	29	(26.6)	3	(12.5)	26	(30.6)	0.0766
Upper back	24	(22.0)	5	(20.8)	19	(22.4)	0.8739
Shoulder	38	(34.9)	5	(20.8)	33	(38.8)	0.1024
Lower back	63	(57.8)	12	(50.0)	51	(60.0)	0.3811
Arms							
Upper arm	15	(13.8)	1	(4.2)	14	(16.5)	0.1223
Elbow	6	(5.5)	2	(8.3)	4	(4.7)	0.4914
Lower arm	11	(10.1)	2	(8.3)	9	(10.6)	0.7461
Wrist	16	(14.7)	4	(16.7)	12	(14.1)	0.7553
Legs							
Leg	13	(11.9)	0	(0.0)	13	(15.3)	0.0238
Knee	22	(20.2)	5	(20.8)	17	(20.0)	0.9284
Calf	12	(11.0)	1	(4.2)	11	(12.9)	0.2252
Ankle	11	(10.1)	2	(8.3)	9	(10.6)	0.7338

[a] percentages of each group are in parenthesis (n=109, 24 and 85 respectively), [b] gender differences in MSD prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Prevalence of musculoskeletal disorders among Japanese nursing home staff

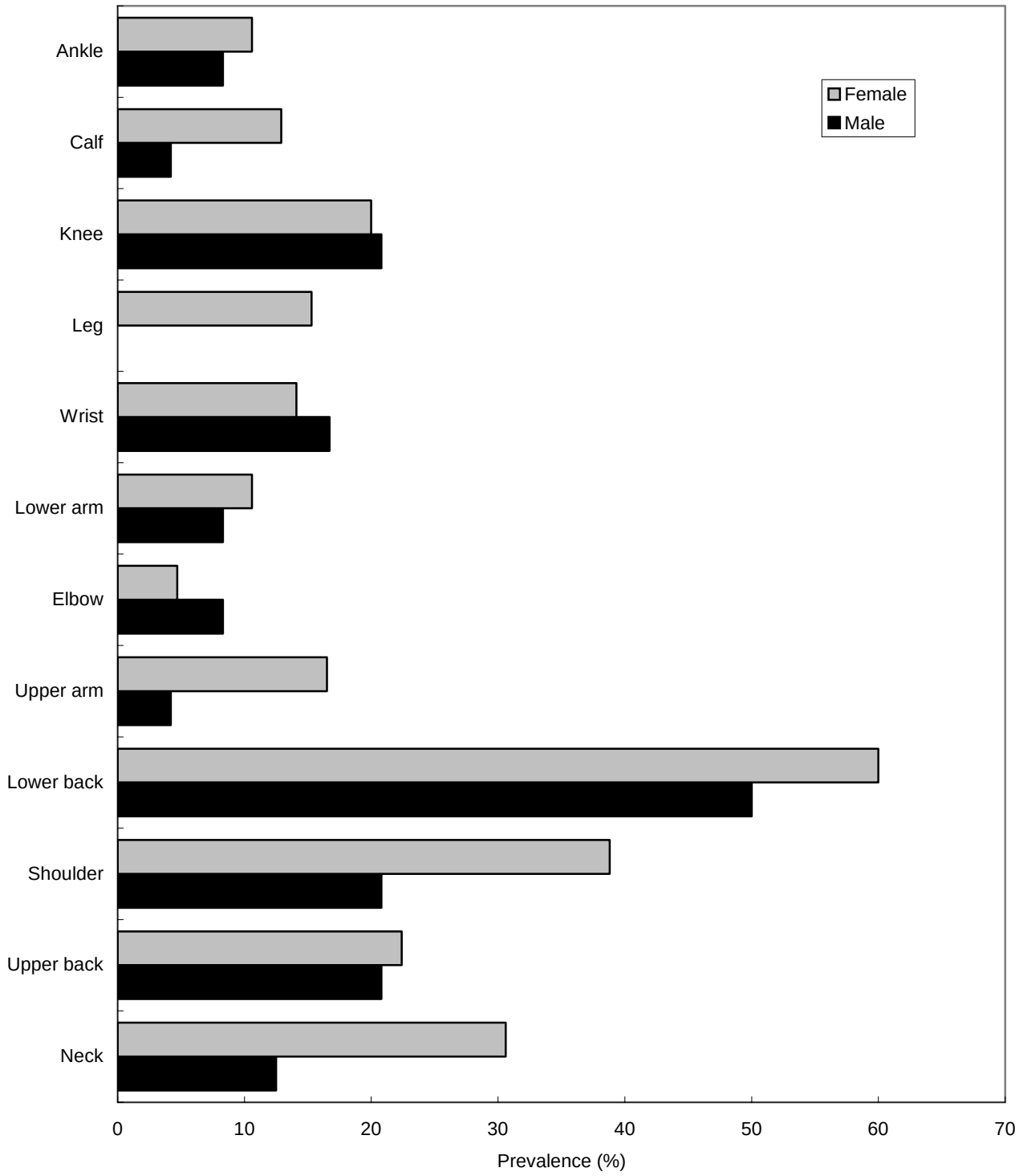

Table 4. Risk factors associated with any musculoskeletal disorders

	Category	n	(%) [a]	OR [b]	(95% CI)	P value
Demographics						
Alcohol drinker	No	57	(52.3)	1.0	-	-
	Yes	52	(47.7)	4.9	(1.8 – 15.1)	0.0029
Tobacco smoker	No	75	(68.8)	1.0	-	-
	Yes	34	(31.2)	4.7	(1.6 – 17.0)	0.0099
Female gender	No	48	(44.0)	1.0	-	-
	Yes	61	(56.0)	3.8	(1.1 – 13.6)	0.0331
Workplace						
Night shift work	No	73	(77.0)	1.0	-	-
	Yes	36	(33.0)	5.3	(1.9 – 18.1)	0.0034
Moving patients	No	51	(46.8)	1.0	-	-
	Yes	58	(53.2)	5.2	(2.0 – 14.3)	0.0009
Changing clothes	No	57	(52.3)	1.0	-	-
	Yes	52	(47.7)	4.5	(1.8 – 12.1)	0.0016

[a] percentage of all staff in each subcategory (N=109), [b] calculated using logistic regression and expressed as odds ratios with 95% confidence intervals (adjusted for age, sex and duration of employment in current workplace)

Musculoskeletal disorders reported by South Korean nursing home staff

Smith DR, Choi JW, Ki M, Oh JY, Yamagata Z. Musculoskeletal disorders self reported by nursing home workers in Korea. Env Health Prev Med 2003; 8: 23-28.

Abstract

Background

Although musculoskeletal disorders (MSD) represent a significant occupational issue for most nursing home workers, few epidemiological studies have been conducted in South Korea. This issue is becoming particularly important as the elderly demographic expands and nursing homes become a larger occupational group.

Methodology

A typical, large nursing home was selected in Seoul, South Korea and a questionnaire distributed to all staff. The survey form investigated the prevalence of, and risk factors for MSD using a structured, self-reporting questionnaire previously established by previous research in other countries.

Results

MSD occurred in varying amounts and was classified into distinct categories depending on body site. The most commonly affected region was the shoulder (reported by 35.2% of all staff), followed by the arm (22.0%), knee (20.9%) and lower back (19.8%). Three statistically significant risk factors were consistently identified among all 4 MSD sites: manually handling patients (OR 5.1 to 20.8), changing the patients clothes (OR 6.7 to 30.1) and working as a nursing aide (OR 3.7 to 74.3).

Conclusions

Overall, these results suggest that employment within a South Korean nursing home incurs certain hazards depending on job description and daily work tasks. The MSD prevalence differed from other occupations within Korea and previous nursing home studies. The need for future studies is indicated.

Keywords: musculoskeletal disorders, low back pain, South Korea, nursing home staff

Introduction

Musculoskeletal disorders (MSD) are a significant concern for health care workers (HCW), particularly in situations where the regular physical handling of patients is required.[1] Caring for incapacitated, elderly people may be especially hazardous as most nursing home patients depend heavily on nursing care for almost all their daily activities. Studies have shown that the more dependent the patient, the higher the prevalence of musculoskeletal disorders among their caring staff.[2] Employment within a nursing home usually involves repetitive work, working fast and expending significant amounts of energy.[3-6] Staff caring for the elderly are often fatigued after work and may have high strain complaint rates.[7,8] Their activities are known to alternate rapidly and be of short duration.[9] Working under time pressures with limited ability to take rest breaks are also common features among this demographic.[10] Physical stress from providing round-the-clock assistance to nursing home patients may be a causal factor in workplace injury and illness.[11] Nursing home employees may be at higher risk of musculoskeletal injury when compared to HCW in other specialities.[12] Some studies have also shown that more injuries are reported by home care and nursing home workers than by other occupations.[13,14]

Among industrialized societies, the percentage of elderly citizens is continually rising due to improved standards of public health and general living conditions. South Korea is no exception in this regard, with the proportion of elderly citizens doubling between 1970 and the year 2000. At the present time, around 7% of South Koreas` 47 million total population are aged over 65 years and this rate is expected to double again within the next 20 years. Among them, at least 8% currently require some degree of nursing care for senile dementia, representing a subgroup of around 280 000 citizens.[15] Although caring for elderly Koreans was traditionally a woman's responsibility, dramatic societal and familial changes throughout the late 20th century have made them less available for this role.[16] As such, nursing homes are emerging as an increasingly important palliative care provider and employer within modern South Korean society. Although the exact number of nursing home employees is unclear, in 2001 there were at least 229 institutions registered throughout the country.[15]

MSD appears to be significant and widespread among South Korean workers, with various investigations reporting prevalence rates between 11.8 and 65.5%.[17-20] Similarly, a previous hospital study revealed MSD among 59.9% of nursing staff.[21] Despite the fact that many Korean nursing home workers are potentially at risk of MSD, few authors have investigated ergonomic issues within such settings. Therefore, it was considered appropriate to conduct one of the first ergonomic investigations within a typical Korean nursing home using a methodology previously established in other countries.[22,23] It was also considered worthwhile to investigate potential risk factors for the development of MSD within this specific setting.

Methodology

The validity of questionnaire-based data collection for MSD studies has been previously demonstrated in both English [24-26] and Korean language.[17,18] The survey instrument for this study was adapted from the Standardized Nordic Questionnaire for Musculoskeletal Symptoms [25] and a questionnaire which had been previously used for nursing home studies in Australia [22] and Taiwan.[23] To maximize feasibility, we selected a reasonably large nursing home within metropolitan Seoul, south Korea and obtained ethical clearance to conduct the study. This facility cared for around 250 patients with varying levels of disability ranging from bedridden to fully mobile. Although the majority of residents were partially ambulant, most staff undertook at least some kind of patient assistance during their daily activities. Where possible, manual workloads were ameliorated by the use of various load-reduction devices such as hoists, stretchers and team lifting. As an entire cross-sectional cohort was required for this study, all staff in each each sub-section of the facility were recruited and asked to complete and return our anonymous questionnaire.

The survey instrument included questions such as age, sex, height, weight, shift-work details, duration of current employment, nature of current employment and the occurrence of MSD within the past 12 months. Sick leave details arising from MSD were also obtained. Surveys were collected approximately 2 days after distribution and staff members interviewed when further clarification was required. Data was entered into a spreadsheet program (MS Excel 2000) before

undergoing statistical analysis with JMP statistical software (SAS Labs, 2001), which included descriptive statistics for the prevalence of MSD in conjunction with logistic regression of staff variables to determine potential workplace risk factors. Variables were chosen using the stepwise selection method. Gender differences in MSD prevalence were investigated using Pearson's chi square and Fisher's exact test. Odds ratios (OR) were also calculated to establish risk factors, with P values above 0.05 regarded as statistically insignificant throughout. Odds ratios were adjusted for age, sex and duration of employment where appropriate.

Results

From a total of 130 employees, 91 (70.0%) successfully completed questionnaires were obtained. The majority of staff were female (80.2%) and non-smokers (85.7%). Slightly more than one-third reported drinking alcohol regularly (35.2%). Their age ranged from 27 to 62 years with an average age of 47.0 years (SD 8.0). The mean height of staff was 160.4cm (SD 6.8), weight 58.6 kg (SD 10.5) and Body Mass Index (BMI) 22.7 kg/m^2 (SD 3.5). Around half were employed on a full-time basis (52.7%) and most worked day shifts (92.3%). Their working week ranged from 8 to 65 hours with an average of 42.1 hours (SD 13.4). Employment duration at the nursing home ranged from 0.08 to 12.1 years, averaging 4.4 years (SD 3.7). Refer to Table 1.

The predominant employment category of nursing home workers in our study was nursing aide, comprising almost half the total (45.1%). As they had no contact with patients and were not office workers we grouped kitchen, laundry and technical staff together. This miscellaneous category comprised 30.7% of all staff. Other significant job descriptions included registered nurses (12.1%) and administrative officers (12.1%). Education levels varied from primary school to university training; however the majority had completed high school (58.2%), which requires 12 years of schooling in Korea. University was the next highest category (22.0%), followed by primary school (11.0%) and technical college (8.8%). Manual handling was regularly undertaken by 62.6% of all staff, with an average of 6.0 hours spent working beside the patients bed each day (SD 3.2). These tasks were divided into four major categories, with moving the patient (58.2%) being slightly

more common than changing the patient's clothes (50.5%), washing the patient (44.0%) and changing their bed (41.8%). Refer to Table 2.

Moving the patient included manually transferring residents between their beds, wheelchairs, bath and so on. It also included any tasks directly related to physical patient handling. MSD occurred in varying amounts and was classified into distinct categories depending on body site. The most common region was the shoulder (affecting 35.2% of all staff), followed by the arm (22.0%), knee (20.9%) and lower back (19.8%). There were only 2 categories where gender differences in MSD prevalence were statistically significant (females > males): arm pain (P = 0.0113) and wrist pain (P = 0.0239). However, female staff accounted for the entire burden of arm, elbow, wrist, hand and leg pain; with male workers reporting no MSD in these sites. Only 1 staff member (1.1%) reported taking sick leave because of an MSD (6 days off work). Refer to Table 3 and Figure 1.

Statistical analysis of staff MSD and workplace issues revealed various risk factors, with odds ratios ranging from 3.7 to 74.3. Demographic items such as height, weight age, sex, marital status, smoking and cumulative length of employment showed no correlation with MSD. As shoulder, arm, knee and lower back were the most commonly reported MSD categories, regression analysis focused on these key areas. Three statistically significant risk factors were consistently identified among all 4 MSD sites: moving the patients around, changing the patients clothes and working as a nursing aide. The presence of shoulder pain was significantly related to moving the patient (OR 5.1), changing their clothes (OR 6.7) and working as a nursing aide (OR 3.7). Arm pain was also related to the above categories with odds ratios of 20.8, 30.1 and 11.2, respectively. Moving patients (OR 13.1), changing their clothes (OR 15.6) and being a nursing aide (OR 74.3) closely correlated with knee pain during this study. Low back pain was similarly related to the aforementioned categories with odds ratios of 10.3, 7.6 and 7.0, respectively. Refer to Table 4. Although our results were experimentally adjusted for other job descriptions, no additional risk factors were identified for other MSD sites or workplace factors.

Discussion

The 12-month MSD period prevalence reported by staff during this study was highest in the shoulder (35.2%), arm (22.0%), knee (20.9%) and lower back (19.8%). In the shoulder region, this result was lower than previous investigations of South Korean hairdressers (61.0%),[19] Australian palliative care workers (60%),[12] Korean bank tellers (51.4%) [20] and Japanese nurses (42.8%).[1] Conversely, it was higher than other research conducted among Australian nursing home employees (20.7%),[22] Korean foundry workers (13.7%) [17] and Taiwanese palliative care staff (8.0%).[23] The prevalence of arm localised MSD reported during this research was lower than 2 previous nursing home studies conducted in Holland (30.4 and 35%) [10,9] as well as the aforementioned Korean hairdresser study (28.5%).[19] However, it was higher than that of Japanese hospital nurses (18.6%) [1] and South Korean foundry workers (13.7%).[17]

MSD rates in the knee region were also variable when compared to previous research conducted by Park et al (36.7%),[19] Lusted et al (30%) [12] and Ha et al (21.6%);[17] all of whom identified higher prevalence rates in their subjects. Conversely, Engels et al,[9] Smith et al [22] and Smith et al [23] all documented a lower prevalence of knee MSD among their nursing home staff (13%, 15.0% and 3.2%, respectively). The prevalence of lower back pain during the current study (19.8%) was lower than previous nursing home investigations conducted in Australia (23.6 and 63%),[22,12] as well as Holland (33.8 and 38%).[10,9] It was also much lower than for Japanese and Korean hospital nurses (54.7% and 59.9%, respectively);[1,21] Korean foundry workers (29.4%),[17] bank tellers (38.3%),[20] hairdressers (53.2%) [19] and welders (65.5%).[18] The aetiology behind these differences is difficult to accurately ascertain however, as many utilised slightly different methodologies and research subjects. Only 2 previous nursing home investigations conducted in Australia [22] and Taiwan [23] followed a similar format as the current study, although neither of their results were similar to those revealed by the current investigation. This study nonetheless suggests that MSD does occur at reasonably high rates among Korean nursing home workers and is no doubt an important cause of occupational morbidity in this country as throughout the world. The prevalence among nursing home staff also appears to different to that of other occupations within South Korea.

The main factor contributing to MSD among aged care staff is probably the manual handling of patients who require assistance for all their daily activities of living. More than half the employees surveyed during this study were involved in regular manual handling tasks, with moving patients being their most frequent, strenuous activity (undertaken by 58.2% of all staff). This category included many tasks such as manually transferring residents between their beds, wheelchairs, bath and any activities directly related to physical patient handling. Nevertheless, previous studies have indicated a much higher rate of patient moving tasks among American (70.0%) [27] and Japanese (66.2%) HCW.[1] Nursing home studies in Australia and Taiwan on the other hand have reported lower rates of patient moving tasks (37.9 and 56.0% respectively).[22,23] In Japan, Ando et al [1] reported the percentage of their staff undertaking strenuous manual tasks to be higher than ours (changing the patient's bed: 87.1 vs. 41.8% and washing the patient: 79.3 vs. 44.0%). Conversely, a lower proportion of their Japanese workers were involved in changing the patient's clothes when compared to the current study (43.7 vs. 50.5%). It is possible the differing rates of manual handling tasks documented during previous studies relate to the finer targeting of only those employees involved in regular patient contact. On the other hand, the present research targeted all staff within the study facility regardless of their expected patient contact frequency; a factor which may have reduced the overall MSD prevalence to a certain extent. The existence of various load-reduction strategies such as mechanical aids and lifting techniques might also have varied between our research group and those within other studies.

Statistical associations for MSD are known to include age, duration of employment,[28] manual handling,[29] work postures, work control, work organisation [1] and patient care needs.[1,2] Female gender, smoking and uncomfortable work positions have also been published as intrinsic risk factors.[30] Despite these reports, statistical analysis of the Korean data revealed no significant correlation between any demographic items and the presence of MSD. There were significant gender differences in the prevalence of arm and wrist pain; although when adjusted for age and duration of employment during regression analysis these differences disappeared. It is possible therefore, that our sample sizes were simply to small to detect any significant gender differences

when confounding variables were introduced. Certain manual handling tasks were found however, to be consistent risk factors for all 4 major MSD categories during regression analysis.

Moving patients as a daily work task consistently elevated the risk of MSD in the shoulder (OR 5.1), arm (OR 20.8), knee (OR 13.1) and lower back (OR 10.3). Changing the patients clothes every day was another important factor, incorporating a risk among the aforementioned MSD categories of 6.7, 30.1, 15.6 and 7.6, respectively. It has been previously reported that nursing aides within nursing homes may have high rates of MSD (2), particularly when compared to other occupational groups (14). Therefore, we conducted an additional regression analysis with respect to employment description and found a statistically significant association between nursing aide work and MSD at all 4 body sites. The odds ratios varied between 3.7 and 74.3, even when adjusted for age, sex and duration of employment. All were statistically significant with many p values below 0.01. These results represent some of the highest odds ratios related to manual handling tasks and employment descriptions ever documented among HCW.

Conclusion

Overall, the results from this study suggest that employment within a nursing home incurs certain hazards depending on job description and daily work tasks. It has been shown that MSD occurs at reasonably high rates among South Korean nursing home workers and is no doubt an important cause of morbidity in this country as throughout the world. The prevalence among nursing home staff also differs from other occupations within South Korea and other countries. While this study suffered from certain limitations, it has documented many important ergonomic and demographic factors associated with nursing home work in Korea for the first time. Further research is required to elucidate some of the emerging issues and confirm these preliminary findings.

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Table 1. Demographic items of staff

	n	(%) [a]
Demographics		
Female	73	(80.2)
Male	18	(19.8)
Alcohol	32	(35.2)
Tobacco	13	(14.3)
Characteristics		
Age (yrs)	47.0 ± 8.0	
Height (cm)	160.4 ± 6.8	
Weight (kg)	58.6 ± 10.5	
BMI (kg/m^2)	22.7 ± 3.5	
Workplace items		
Full-time	48	(52.7)
Part-time	43	(47.3)
Working week (hrs)	42.1 ± 13.4	
Total duration (yrs)	4.4 ± 3.7	

[a] percentage of all staff (N=91)

Table 2. Workplace characteristics

	n	**(%)** [a]
Education level		
High school	53	(58.2)
University	20	(22.0)
Primary school	10	(11.0)
Technical college	8	(8.8)
Job description		
Nursing aide	41	(45.1)
Miscellaneous	28	(30.7)
Registered nurse	11	(12.1)
Administration	11	(12.1)
Patient handling		
Move patients	53	(58.2)
Change clothes	46	(50.5)
Wash patients	40	(44.0)
Change bed	38	(41.8)

[a] percentage of all staff (N=91)

Table 3. Prevalence of specific musculoskeletal disorders by gender

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**P value** [b]
Trunk							
Neck	12	(13.2)	2	(11.1)	10	(13.7)	0.7718
Upper back	16	(17.6)	2	(11.1)	14	(19.2)	0.4216
Shoulder	32	(35.2)	4	(22.2)	28	(38.4)	0.1997
Lower back	18	(19.8)	3	(16.7)	15	(20.5)	0.7115
Arms							
Arm	20	(22.0)	0	(0.0)	20	(27.4)	0.0113
Elbow	8	(8.8)	0	(0.0)	8	(11.0)	0.1410
Wrist	17	(18.7)	0	(0.0)	17	(23.3)	0.0239
Hand	9	(9.9)	0	(0.0)	9	(12.3)	0.1172
Legs							
Leg	11	(12.1)	0	(0.0)	11	(15.1)	0.0795
Knee	19	(20.9)	2	(11.1)	17	(23.3)	0.2541
Ankle	10	(11.0)	1	(5.5)	9	(12.3)	0.4100
Foot	10	(11.0)	2	(11.1)	8	(11.0)	0.9857

[a] percentages of each group are in parenthesis (n=91, 18 and 73 respectively), [b] gender differences in MSD prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Prevalence of musculoskeletal disorders among South Korean nursing home staff

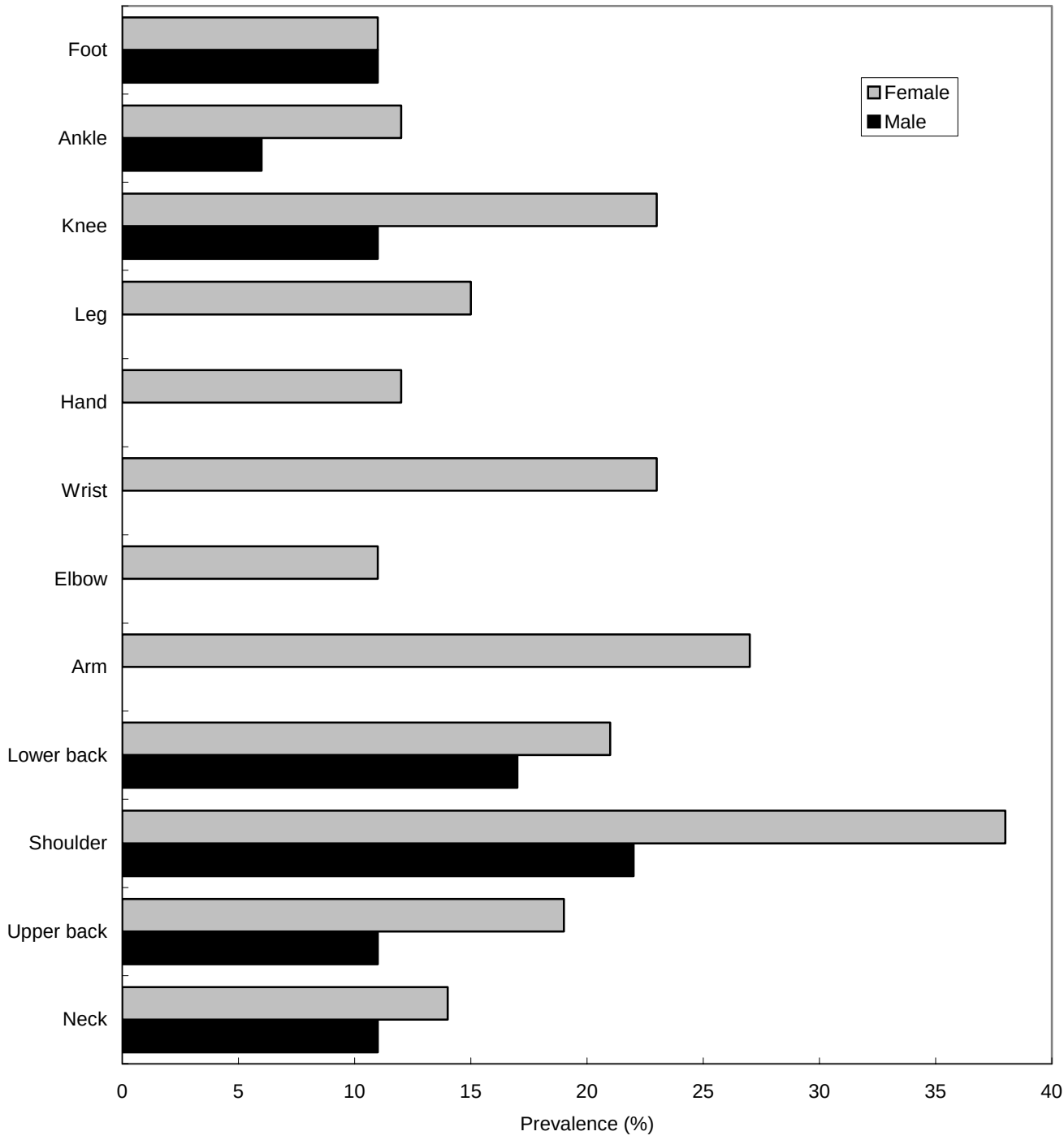

Table 4. Risk factors associated with musculoskeletal disorders

	Risk factor [a]	**(%)** [b]	**OR** [c]	**(95% CI)**	**P value**
Shoulder					
	Moving patients	(28.6)	5.1	(1.7-17.3)	0.0047
	Changing clothes	(26.4)	6.7	(1.9-28.8)	0.0049
	Nursing aide work	(28.6)	3.7	(1.9-13.2)	0.0293
Arm					
	Moving patients	(20.9)	20.8	(3.9-388.3)	0.0044
	Changing clothes	(20.9)	30.1	(5.5-564.0)	0.0014
	Nursing aide work	(18.7)	11.2	(3.1-58.5)	0.0009
Knee					
	Moving patients	(18.7)	13.1	(2.6-138.9)	0.0078
	Changing clothes	(18.7)	15.6	(3.6-120.0)	0.0015
	Nursing aide work	(16.5)	74.3	(7.0-3892.2)	0.0048
Lower back					
	Moving patients	(17.6)	10.3	(2.3-81.0)	0.0076
	Changing clothes	(15.4)	7.6	(1.6-59.0)	0.0227
	Nursing aide work	(13.2)	7.0	(1.5-52.8)	0.0273

[a] calculated using the logical reference category (eg. moving patients / not moving patients), [b] percentage of all staff in each subcategory (N=91), [c] calculated using logistic regression and expressed as odds ratios with 95% confidence intervals (adjusted for age, sex and duration of employment in current workplace)

Musculoskeletal disorders reported by Taiwanese nursing home staff

Smith DR, Guo YL, Lee YL, Chang SJ. Ergonomic and demographic issues reported by palliative care workers in southern Taiwan. Am J Hosp Palliat Care 2002; 19: 96-102.

(This manuscript was devised and written entirely by Derek Richard Smith.
Guo YL, Lee YL and Chang SJ helped design, organise and carry out the field work component)

Abstract

Background

Although ergonomics issues have been reasonably well studied in Western countries, ergonomic and demographic problems among nursing home workers in southern Taiwan are not clear.

Methodology

A structured questionnaire was completed by staff members from 11 nursing homes in southern Taiwan. Questions included age, sex, height, weight, shift-work details, duration of current employment, nature of current employment, the presence of MSD during the past 12 months, the phase lag before the onset of injury and sick leave details.

Results

The most commonly affected regions were the lower back and elbow (reported by 12.0% of all staff), followed by the shoulder (9.6%), neck and wrist (both 4.8%) and ankle (4.0%). There were no statistically significant gender differences in MSD prevalence detected during this study. Working beside the patients` bed on a daily basis increased the risk of any MSD by a factor of 2.9 (OR 2.9, 95%CI 1.3 – 6.8, P = 0.0134). Employees who changed the patients' bed or clothes every day had a 3.8 and 3.7 times higher risk of MSD respectively when compared to staff not completing these tasks (OR 3.8, 95%CI 1.6 – 9.9, P = 0.0034 and OR 3.7, 95%CI 1.6 – 9.4, P = 0.0038 respectively). Moving the patients another predictor of eventual MSD, with a risk factor of 2.7 (OR 2.7, 95%CI 1.1 – 6.9, P = 0.0303).

Conclusion

This study documented the rate of MSD among nursing home workers in southern Taiwan for the first time. The overall prevalence of these conditions were lower than those reported by previous studies.

Keywords: musculoskeletal disorders, low back pain, Taiwan, nursing home staff

Introduction

Ergonomics is a multidisciplinary science incorporating physiology, engineering and social factors that aims to promote health, comfort and efficiency in the workplace.[1] Understanding the relationship between human beings and their work environment is the domain of ergonomic research, and one that is often investigated by cross-sectional methods such as questionnaire surveys.[2] Ergonomic issues, particularly musculoskeletal disorders (MSD), are fast becoming some of the most important occupational diseases among health care workers (HCW) around the world. Risk factors for MSD include various demographic and workplace items such as duration of employment, work control, work postures and work organisation.[3,4] These variables are particularly relevant for palliative care workers (PCW) as most nursing home patients require continuous manual handling and physical assistance. PCW are also known to have high levels of physical activity and rapidly alternating tasks, which constitute additional sources of ergonomic risk.[5,6]

In recent years declining mortality rates and subsequent longevity gains have expanded the demand for palliative care services, making PCW an increasingly important component of the health care profession. Although ergonomic issues have been well studied among Western PCW, risk factors for their Taiwanese counterparts are less clear. Therefore, this study was conducted as one of the first projects to specifically investigate these issues among PCW in southern Taiwan. Similarly, the demographic characteristics of southern Taiwanese PCW were largely unknown until this study was undertaken.

Methodology

A total group of 125 PCW was recruited from 11 nursing homes within southern Taiwan for this study. Each participating institution was initially sent a detailed ergonomics questionnaire by the Tainan Bureau of Public Health to be completed by all staff members. Questions included age, sex, height, weight, shiftwork details, duration of current employment, nature of current employment, presence of MSD within the past 12 months and the phase lag between beginning work and the onset of MSD. Sick leave details arising from MSD were also obtained. Approximately one week

after distribution the surveys were collected and staff members interviewed if further clarification was required. Data was entered into a spreadsheet program (MS Excel 2000) before undergoing statistical analysis with JMP statistical software (SAS Labs, 2001), which included descriptive statistics for the prevalence of MSD in conjunction with logistic regression of staff variables to determine potential workplace risk factors. Variables were chosen using the stepwise selection method. Gender differences in MSD prevalence were investigated using Pearson's chi square and Fisher's exact test. Odds ratios (OR) were also calculated to establish risk factors, with P values above 0.05 regarded as statistically insignificant throughout. Odds ratios were adjusted for age, sex and duration of employment where appropriate.

Results

A total of 125 staff were analysed, the majority of whom were female (89.3%), married (64.0%), non-smokers (94.4%) and non-drinkers (90.4%). Their mean age was 38.3 years (SD 15.2) with a range of 18 to 69 years, mean height 159.0cm (SD 6.5), weight 60.1kg (SD 10.0) and Body Mass Index (BMI) 23.8 kg/m^2 (SD 3.6). Most PCW were employed on a full-time basis (64.8%) and worked day shifts (57.6%). The average number of hours worked per week was 38.6 (SD 15.8) with a range of 5 to 50 hours. Their working month ranged from 2 to 30 days, with a mean of 23.6 days (SD 6.7). More than half the employees (52.0%) had worked in their current job for 1 year or more, with an average employment duration of 2.5 years (SD 2.7). More than half the workers (55.2%) were categorized as care assistants, and almost one-quarter (24.8%) nurses. Other large groups included administrative officers (10.5%) and general workers (6.7%). Around one-third (34.7%) were educated to a senior high school level which requires 12 years full-time schooling in Taiwan. Primary school (29.7%), technical college (18.6%) and junior high (16.9%) represented the other educational categories. Almost two-thirds of the employees (61.6%) were regularly involved in patient handling, with an average of 11.5 patient contacts (SD 8.4) per day. The mean number of hours spent beside the patient's bed was 3.5 hours (SD 1.9) daily. The most common task undertaken was moving the patient (56.0% of all staff), followed by changing the patients' clothes (46.4%), changing the patients' bed (44.8%) and washing the patient (30.4%). Almost one-

quarter of staff (23.2%) completed all 4 tasks on a daily basis.

MSD occurred in varying amounts and was classified into distinct categories depending on body site. The most commonly affected regions were the lower back and elbow (affecting 12.0% of all staff), followed by the shoulder (9.6%), neck and wrist (both 4.8%) and ankle (4.0%). There were no statistically significant gender differences in MSD prevalence detected during this study. However, female staff accounted for the entire burden of shoulder, upper back, wrist, elbow, hand, arm, leg, knee and ankle complaints; with male workers reporting no MSD in these sites. The phase lag between commencing their employment and first receiving an MSD ranged from 1 to 12 months, with an average of 5.1 months (SD 4.8). Sick leave was taken by 12.8% of staff with a range of 1 to 90 days and mean of 13.6 days (SD 28.8) off work.

There were no statistical associations between MSD and demographic factors such as age, gender, height, weight and BMI. However, logistic regression revealed certain workplace factors and workplace tasks as important MSD risk factors. Working beside the patients` bed on a daily basis increased the risk of any MSD by a factor of 2.9 (OR 2.9, 95%CI 1.3 – 6.8, P = 0.0134). Employees who changed the patients' bed or clothes every day had a 3.8 and 3.7 times higher risk of MSD respectively when compared to staff not completing these tasks (OR 3.8, 95%CI 1.6 – 9.9, P = 0.0034 and OR 3.7, 95%CI 1.6 – 9.4, P = 0.0038 respectively). Moving the patients around was also an important predictor of eventual MSD, with a risk factor of 2.7 (OR 2.7, 95%CI 1.1 – 6.9, P = 0.0303).

Discussion

The high percentage of females among this study group was similar to previous research.[6] The low rate of smoking is also supported by other studies.[7] The average age of our HCW was older than other international reports.[8] Regarding marital status, Ando et al[4] recounted how 24.2% of their Japanese HCW were married, while Arad and Ryan[7] found a similar marriage rate of 25.8% amongst Australian subjects. Both of these low marriage rates probably relate to the younger

average age of their subjects (mean age 29.5 years in Japan and median age 20-24 years in Australia) compared to ours (38.3 years in Taiwan with 64.0% married). The average body weight and BMI of workers within this study was 60.1kg and 23.8 kg/m^2 respectively. Research conducted in the Netherlands gave slightly different results to ours (65.4 kg and 23.2 kg/m^2 BMI).[6] By contrast, a study of Japanese HCW[4] revealed much smaller average body sizes of 50.1kg and 20.5 kg/m^2 BMI. In both our Taiwanese study and the Japanese research, HCW were of similar height (159.0 and 156.5cm respectively). It would appear therefore, that the physical size of Taiwanese PCW might be somewhere between Caucasian and Japanese HCW.

The Taiwanese PCW in this study worked relatively long hours. Day shift staff worked an average of 6 days per week, with more than half keeping their jobs more than 1 year (52.0%). The most common job description during this study was patient care assistant (55.2%), an occupation that requires no formal education and little training in Taiwan. As Taiwan is rapidly industrialising, workers without tertiary education are being forced into occupations with limited job security and longer working hours. Living costs are also rising, ensuring that nursing homes and palliative care facilities must carefully balance expenditure versus income. From a fiscal perspective, care assistants represent a cost effective method to staff nursing homes as their pay rates are generally lower than registered nurses. The unstable nature of employment for care assistants also means that these workers are probably determined to remain employed for as long as possible once finding a job.

Patient handling is a common feature of HCW worldwide, and is steadily increasing due to the expanding number of geriatrics dependent on regular nursing care.[4] This study revealed patient handling as the most common task undertaken by staff, with 61.6% involved in this activity. These figures suggest that manual handling (lifting and moving patients) constitutes the vast majority of labour undertaken by nursing home care assistants in southern Taiwan. Other research has shown how the physical work load of PCW may be quite high.[5] As only a small percentage of the Taiwanese workers were trained nurses (24.8%) and higher education levels were similarly low

(only 18.6% attended technical college), quite possibly the majority of their daily tasks did not required extensive medical knowledge.

Ergonomic issues, particularly MSD, are fast becoming some of the most important occupational diseases among PCW. MSD of the elbow and lower back was reported at the highest prevalence during this study, affecting 12.0% of all staff. As roughly three-quarters of them undertook manual handling, tasks involving constant elbow flexion were the most likely aetiology for this high rate. Low back pain (LBP) is another important site for workplace injury among HCW, particularly within the nursing profession.[9] Twelve percent of the subjects within this study reported LBP. The high proportion of LBP among Taiwanese nursing home workers is supported by previous studies of HCW,[3] particularly when compared to the average rate across all occupations.[10] As pain is often the first symptom of an occupational MSD, the presence of pain, particularly LBP is widely recognised. Similarly, the complicity of manual handling in LBP is also recognised as a causal factor.[9] Many studies of HCW and PCW have reported LBP throughout the world, with prevalence rates ranging from 41% in Dutch PCW [6] to 48% in Italian HCW.[3] In Asia, a high prevalence of LBP has also been reported among Japanese nurses, with a previous monthly rate of 54.7%.[4]

Although the Japanese investigation was carried out in a hospital setting rather than a nursing home, we suspect their work organisation did not differ greatly from the Taiwanese group. In Japan, most elderly people who require palliative care reside in hospital geriatric wards, which often serve as pseudo nursing homes.[11] It was surprising to find a comparatively low prevalence of LBP during the current research, with only 12.0% of the group affected. Considering the results of previous reports, the low incidence of LBP among Taiwanese PCW is perplexing. However, it is possible that LBP was not necessarily very low amongst Taiwanese PCW, rather the results were obscured due to underreporting. Underreporting is known to occur in Taiwan and probably relates to job insecurity and employer pressures. As the unskilled-labour market is fickle and LBP is often believed to effect work productivity, it is possible that certain cases of LBP and lower back MSD were concealed by staff during this study to protect their employment.

When compared to other research, few PCW within this study had taken sick leave (12.8%). Smedley et al [9] reported 10% of their female HCW taking more than 4 weeks sick leave, while Larese and Fiorito [3] described an average sick leave duration between 22.1 and 25.9 days. It is once again possible that the low incidence of sick leave in our study might have been related to job insecurity and a reduced understanding of preventive biomechanical concepts among staff. The tenuous nature of employment is reflected in their limited formal education and therefore, reduced employability within the contemporary Taiwanese job market. Their long working week implies low pay rates, while a reduced prevalence of LBP suggests that lower back MSD are being concealed to prevent adverse attention from nursing home management within southern Taiwan.

Associations between MSD and various factors are known to include age, duration of employment, sporting activity, work postures, work control, work organisation and patient conditions.[3,4,9] Nevertheless, statistical analysis of the current data revealed no significant correlation between any demographic items and either injury or pain among PCW. Statistical evaluations during this study did not reveal any increased risk with increasing height, despite a report by Smedley et al [9] indicating an association. Conversely, Ando et al's [4] elevated relative risk with respect to moving patients was supported by the current research. Logistic regression of various workplace factors indicated that working directly with patients was an important MSD risk factor among staff. These findings are not surprising. Changing the clothes or bed of a debilitated, comatose or non-compliant patient is often a difficult and strenuous task, and one that requires the use of many muscle groups. Similarly, back twisting under load is usually required when manoeuvring palliative care residents who have limited mobility. Rapid movements incorporating poor posture are common amongst HCW particularly during emergency situations, as patients must not be left in uncomfortable or dangerous positions for any length of time. For PCW manual handling takes on an even bigger focus, as residents often require continuous assistance for almost all their daily activities. These situations will no doubt increase in future as society ages and palliative care facilities become even more widespread.

Conclusion

It is acknowledged that this study had certain limitations, most significantly the small sample size and relative geographical obscurity. As the investigation was confined to one county of southern Taiwan (Tainan county), results may not accurately reflect the entire Taiwanese HCW situation. Nonetheless, this study has investigated ergonomic and demographic issues reported by nursing home health care workers in southern Taiwan for the first time. Further research is required to elucidate some of the more complex issues.

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Table 1. Demographic items of staff

	n	**(%)** [a]
Demographics		
Female	109	(89.3)
Male	16	(10.7)
Alcohol	12	(9.6)
Tobacco	7	(5.6)
Characteristics		
Age (yrs)	38.3 ± 15.2	
Height (cm)	159.0 ± 6.5	
Weight (kg)	60.1 ± 10.0	
BMI (kg/m^2)	23.8 ± 3.6	
Workplace items		
Full-time	81	(64.8)
Part-time	44	(35.2)
Working week (hrs)	38.6 ± 15.8	
Monthly work (dys)	23.6 ± 6.7	

[a] percentage of staff responding to question

Table 2. Workplace characteristics

	n	(%) [a]
Education level		
Senior High	41	(34.7)
Primary school	35	(29.7)
Technical college	22	(18.6)
Junior High	20	(16.9)
Job description		
Care assistant	58	(55.2)
Nursing	26	(24.8)
Administration	11	(10.5)
General	7	(6.7)
Patient handling		
Move patient	70	(56.0)
Change clothes	58	(46.4)
Change bed	56	(44.8)
Wash patient	38	(30.4)

[a] percentage of staff responding to question

Table 3. Prevalence of specific musculoskeletal disorders by gender

	All		Male		Female		
	n	**(%)** [a]	**n**	**(%)** [a]	**n**	**(%)** [a]	**P value** [b]
Trunk							
Neck	6	(4.8)	1	(6.3)	5	(4.6)	0.7714
Shoulder	12	(9.6)	0	(0.0)	12	(11.0)	0.1627
Upper back	2	(1.6)	0	(0.0)	2	(1.8)	0.5849
Lower back	15	(12.0)	2	(12.5)	13	(11.9)	0.9475
Arms							
Wrist	6	(4.8)	0	(0.0)	6	(5.5)	0.3361
Elbow	15	(12.0)	0	(0.0)	15	(13.8)	0.1137
Hand	3	(2.4)	0	(0.0)	3	(2.8)	0.5018
Arms	1	(0.8)	0	(0.0)	1	(0.9)	0.7005
Legs							
Legs	1	(0.8)	0	(0.0)	1	(0.9)	0.7005
Knee	2	(1.6)	0	(0.0)	2	(1.8)	0.5849
Calf	4	(3.2)	1	(6.3)	3	(2.8)	0.4579
Ankle	5	(4.0)	0	(0.0)	5	(4.6)	0.3819

[a] percentages of each group are in parenthesis (n=125, 16 and 109 respectively), [b] gender differences in MSD prevalence investigated using Pearson's chi square and Fisher's exact test

Figure 1. Prevalence of musculoskeletal disorders among Taiwanese nursing home staff

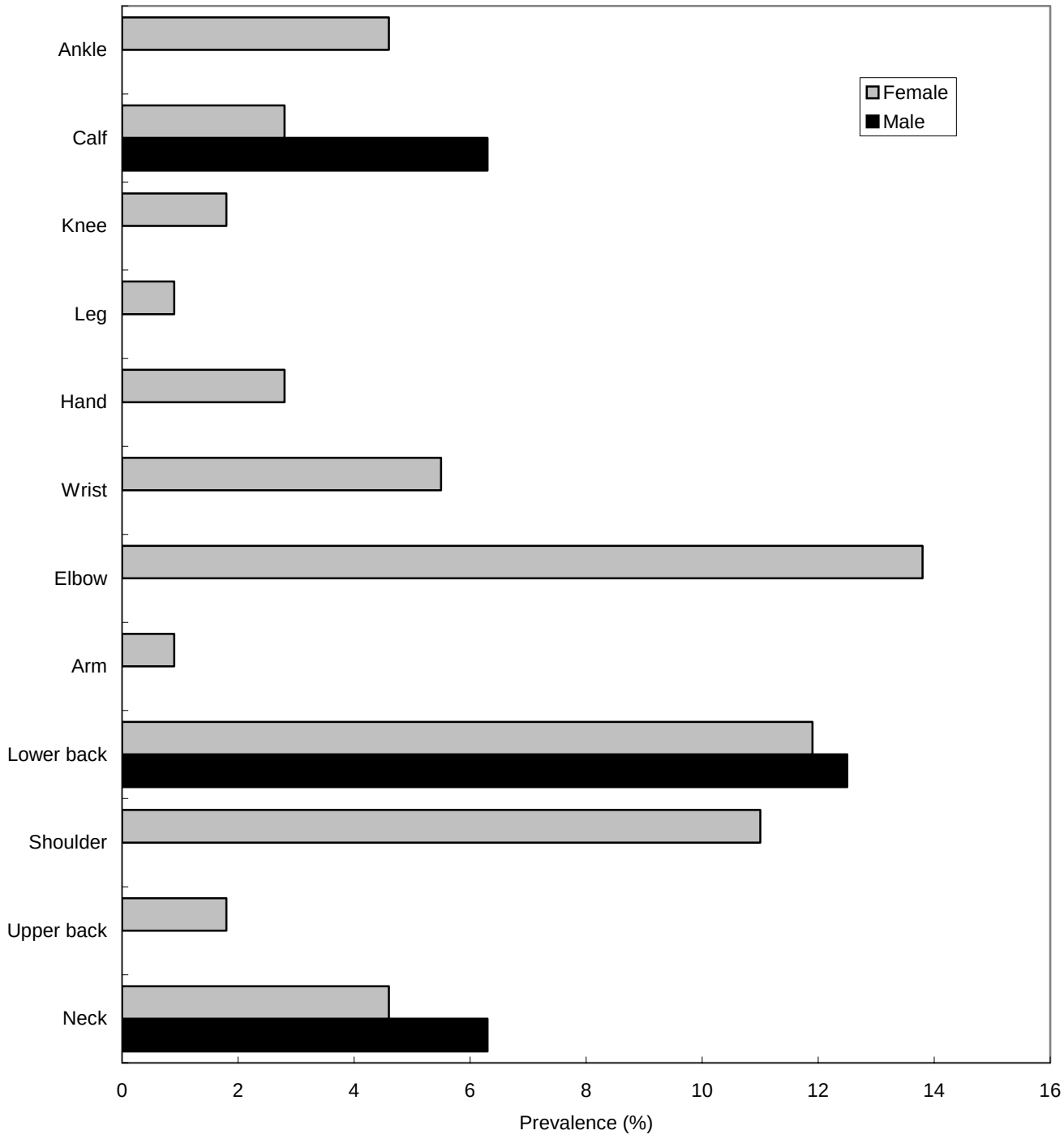

Table 4. Risk factors associated with any musculoskeletal disorders

	Category	n	(%) [a]	OR [b]	(95% CI)	P value
Workplace factors						
>4 hrs beside bed	No	98	(78.4)	1.0	-	-
	Yes	27	(21.6)	2.9	(1.3 – 6.8)	0.0134
Workplace tasks						
Change bed	No	97	(77.6)	1.0	-	-
	Yes	28	(22.4)	3.8	(1.6 – 9.9)	0.0034
Change clothes	No	97	(77.6)	1.0	-	-
	Yes	28	(22.4)	3.7	(1.6 – 9.4)	0.0038
Moving patients	No	96	(76.8)	1.0	-	-
	Yes	29	(23.2)	2.7	(1.1 – 6.9)	0.0303

[a] percentage of all staff in each subcategory (N=125), [b] calculated using logistic regression and expressed as odds ratios with 95% confidence intervals (adjusted for age, sex and duration of employment in current workplace)

Musculoskeletal disorder comparisons: Part 1

(Nursing-home nurses in Australia and Taiwan)

Smith DR, Guo YL, Lee YL, Atkinson R. Musculoskeletal pain self-reported by nursing home nurses in Australia and Taiwan. Asian J Ergonomics 2001; 2: 139-144.

Abstract

The prevalence of musculoskeletal disorders (MSD) among nurses in Australian and Taiwanese nursing homes is unclear. Therefore, a preliminary investigation was conducted to redress this balance and evaluate the need for more extensive studies. Results suggest that MSP occurs at significantly higher rates among Australian nursing home nurses than in their Taiwanese counterparts. However, the true incidence among the Taiwanese group may have been obscured by underreporting during this study. There were no significant statistical associations between MSP and age, height, body weight, total employment duration and manual handling despite previous reports implicating these factors.

Introduction

Musculoskeletal disorders (MSD) represents a common cause of occupational morbidity within the nursing profession. Risk factors are known to include manual handling tasks, work postures, work control, work organization and various personal factors.[1-3] Caring for highly dependent patients in nursing homes is another important contributor to MSD prevalence among nurses.[4] As their tasks often involve rapidly alternating activities and poor work postures,[5] nursing home nurses represent an increasingly important area for ergonomic research. Although MSD have been well studied in other countries, the prevalence among nurses in Australian and Taiwanese nursing homes is unclear. Therefore, a preliminary investigation was undertaken to redress this balance and evaluate the need for more extensive studies.

Methodology

For this research a convenience sample of nurses was recruited from a total of 11 nursing homes within Queensland, Australia (1 large facility) and Tainan county, southern Taiwan (10 small facilities). To avoid gender differences, only female nurses were included. All subjects completed an ergonomics survey with questions regarding age, height, weight, job description, presence of MSD within the past 12 months, duration of current employment and the number of patient-handling tasks undertaken by them per day. Where MSD was reported, nurses were also asked if

they had taken sick leave for their condition. Data from the 2 groups was analysed separately and then compared using Pearson's chi square test for statistical significance. Risk factors were derived from logistic regression using the presence of self-reported MSD as the dependent variable and demographic items and workplace factors as the independent variables (results expressed as Odds Ratios with 95% confidence intervals). OR used increasing increments of 1 unit for continuous variable categories (1 yr, 1 cm, 1 kg, 1 hr, 1 yr, 1 patient lift respectively). The remaining categories utilised the logical reference variable (nurse aide / not a nurse aide, sick leave / no sick leave). To compare the risk of MSD between the two groups, the OR was calculated from pooled data (Australia and Taiwan) using Australia as the independent variable. P values above 0.05 were considered statistically insignificant throughout.

Results and discussion

A total of 100 female nurses were involved in this comparative study (46 from Australia and 54 from Taiwan). As a group, the Australian nurses were significantly older (P = 0.0154), taller (P = 0.0086) and heavier (P = 0.0019) than their Taiwanese counterparts (Table 1). Around one-half of the Australian nurses worked as nurse aides (54.3%), compared with almost two-thirds of the Taiwanese nurses (64.8%). The Taiwanese worked longer hours per week (38.5 hrs) than the Australians (32.2 hrs), but had a significantly shorter (P = 0.0001) duration of employment (2.0 years versus 7.7 years). Both groups undertook similar amounts of manual handling work (15.0 and 14.3 patient lifting tasks per day). A higher percentage of Taiwanese nurses (18.5%) took sick leave for MSP than Australians (8.7%), although this difference was not statistically significant.

Lower Back Pain (LBP) was the most frequently reported MSD in both groups (45.6% and 24.1%) and was significantly more common (P = 0.0232) among the Australian nurses (Table 2). The Australian LBP prevalence rate was very similar to a previous study of British hospital nurses (45%),[1] but lower than other studies of Japanese (54.7%) [2] and Taiwanese (69.7%) [3] hospital nurses. An investigation of Japanese nursing homes has also reported higher levels of LBP among nurse aides (77.0%).[4] Wrist pain was significantly more common (P = 0.0027) in Australia (23.9%)

than in Taiwan (3.7%). The differences between elbow pain (13.0% versus 0.0%) were also statistically significant (P = 0.0062). Surprisingly, a relatively low prevalence of neck pain among was reported among these subjects (8.7% and 18.5%). Previous studies have reported higher levels of this condition among Japanese hospital nurses (31.3%)[2)], and Dutch nursing home nurses (27%).[5]

The prevalence of MSP at any site was significantly higher among the Australian subjects (P = 0.0232). No risk factors for self-reported MSD were statistically significant within the Australian group (Table 3). Among the Taiwanese nurses however, higher weekly working hours were significantly related to the presence of MSD (OR 5.3, 95%CI 1.0-29.2, P = 0.0492). When the data was combined, the risk of MSD for Taiwanese nurses was only 40% of that for the Australians (OR 0.4, 95%CI 0.2-0.9, P = 0.0250). Why the Taiwanese nurses within this study had a comparatively lower risk of MSD is difficult to explain, although it is possible that underreporting was a contributory factor. Underreporting on occupational health surveys has been previously documented at very high rates among Taiwanese health care workers.[6]

Conclusion

Overall, this study suggests that MSP occurs at significantly higher rates among Australian nursing home nurses than in their Taiwanese counterparts. When compared to other research however, these results are conflicting. On one hand, the LBP prevalence rate was similar to a previous study.[1] However, there were no significant statistical associations between MSP and age, height, body weight, total employment duration and manual handling despite previous reports implicating these factors.[1-5]

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Table 1. Staff demographic and workplace items

	Australia	**Taiwan**
Demographics	**Mean ± SD**	**Mean ± SD**
Age (yrs)*	44.4 ± 8.9	39.0 ± 11.7
Height (cm)**	162.8 ± 7.7	158.9 ± 5.3
Weight (kg)**	67.8 ± 10.9	60.4 ± 9.4
BMI (kg/m^2)	25.5 ± 4.1	23.9 ± 3.4
Workplace items		
Weekly hours	32.2 ± 11.1	38.5 ± 16.1
Total years ***	7.7 ± 8.1	2.0 ± 2.3
Patient lifts / day	15.0 ± 22.3	14.3 ± 16.8
Nurse aide	25 (54.3)	35 (64.8) [a]
Sample size	N=46	N=54

[a] results expressed as the total number of cases and percentage of cases per group

* P < 0.05, ** P < 0.01, *** P < 0.001

Table 2. Prevalence of MSD by body site

Specific body site	Australia n (%) [a]	Taiwan n (%) [a]
Neck	4 (8.7)	10 (18.5)
Shoulder	0 (0.0)	3 (5.6)
Lower back *	21 (45.6)	13 (24.1)
Elbow **	6 (13.0)	0 (0.0)
Wrist **	11 (23.9)	2 (3.7)
Hand	4 (8.9)	5 (9.3)
Leg	2 (4.3)	0 (0.0)
Knee	1 (2.2)	3 (5.6)
Ankle	2 (4.3)	7 (13.0)
MSD at any site *	21 (45.6)	13 (24.1)

[a] results expressed as the total number of cases and percentage of cases per group

* $P < 0.05$, ** $P < 0.01$

Table 3. Risk factors for self-reported MSD and comparative MSD analysis

	Australia			Taiwan		
Demographics [a]	**OR** [b]	**(95%CI)**	**P**	**OR** [b]	**(95%CI)**	**P**
Age	2.9	(0.2-53.8)	0.4596	4.8	(0.4-60.5)	0.2040
Height	0.8	(0.1-10.5)	0.8504	2.5	(0.1-80.5)	0.5868
Weight	0.2	(0.0-3.6)	0.3069	1.3	(0.1-26.3)	0.8707
BMI	0.5	(0.03-8.0)	0.6066	1.0	(0.05-22.7)	0.9754
Workplace items [a]						
Weekly hours	0.2	(0.0-7.1)	0.3908	5.3	(1.0-29.2)	0.0492
Total years	3.2	(0.2-103.5)	0.4585	1.1	(0.1-30.0)	0.9348
Patient lifts [c]	3.6	(0.1-228.8)	0.4597	4.4	(0.5-81.2)	0.2299
Nurse aide [c]	0.6	(0.2-1.8)	0.3474	0.8	(0.2-2.8)	0.7024
Australia / Taiwan [d]	1.0	-	-	0.4	(0.2-0.9)	0.0250

[a] odds ratios calculated for increasing increments of 1 yr, 1 cm, 1 kg, 1 kg/m^2, 1 hr and 1 yr respectively, [b] risk factors derived from logistic regression using MSD as the dependent variable and demographic and workplace items as the independent variables, [c] odds ratios (OR) calculated using the following reference categories (patient lifts / no patient lifts, nurse aide / not nurse aide), [d] OR calculated from pooled data (Australia and Taiwan) using Australia as the independent variable

Musculoskeletal disorder comparisons: Part 2

(Nursing-home nurses in Japan and South Korea)

Smith DR, Atkinson R, Kubo H, Yamagata Z. A comparison of MSD among female nursing-home nurses in Japan and Korea. Ergonomics Aust 2002; 16: 16-19.

Abstract

A questionnaire-based study of musculoskeletal disorders (MSD) was conducted among 113 female, nursing-home nurses from matched facilities in Japan (61) and South Korea (52). Most physical and demographic characteristics were similar between the two, although the average age of the latter group was higher. MSD at any site was reported by 77.0% of the Japanese and 65.4% of the South Korean nursing-home nurses within this investigation. Low back pain (LBP) was the most frequently reported MSD among the Japanese, affecting 68.9% of them. This result was significantly higher than LBP within the Korean group (P = 0.0001), where it was reported by 25.0% of those surveyed. Shoulder pain was the most common MSD among the Korean nurses (44.2%), followed by pain in the upper arm (28.8%), knee (28.8%) and wrist (26.9%). Shoulder pain was also common amongst the Japanese participants (affecting 41.0%), as was neck (37.7%), knee (23.0%) and upper arm (19.7%) MSD. The risk of developing any condition was 8.3 times greater (95%CI 2.0-43.7, P = 0.0060) among South Korean nurse aides when compared to registered nurses of the same country. It is therefore suggested that future ergonomic interventions for nursing home staff should target this high-risk group.

Introduction

Musculoskeletal disorders (MSD) are an important source of morbidity among nursing-home nurses the world over. As most palliative patients require constant assistance for their activities of daily living, staff who provide this care are at high risk of developing MSD at some stage in their career. Previous studies have shown predictive factors to include not only social and workplace factors,[1] but also the dependency levels of patients within their care.[2] Japanese research has further demonstrated a possible link between aging, sporting activity and exercise and the development of various MSD among Asian nursing home staff.[3] Prevalence studies of equivalent Korean workers however, appear to be rare. Although Japanese and Korean palliative care staff share many similar physical and employment-related characteristics, to our knowledge there have been no comparative studies of MSD prevalence within these adjacent Asian nations. Thus, it was considered appropriate to conduct some of the first research of this nature.

Methodology

Two nursing homes were initially selected in Yamanashi Prefecture, Japan and 1 equivalent facility in Seoul, Korea and approached to join the study. To avoid gender bias and occupation-specific differences, only female nurses were included. All subjects completed a simple, anonymous survey with questions regarding age, height, weight, job description, presence of MSD within the past 12 months, duration of current employment and the number of patient-handling tasks undertaken per day. Where MSD was reported, nurses were also asked if they had taken sick leave for their condition. Data from the 2 groups were analysed separately and then compared using Pearson's chi square test for statistical significance. Potential risk factors were also investigated using logistic regression, with P values above 0.05 considered statistically insignificant throughout.

Results and discussion

For this study a total of 113 nursing staff were recruited, among whom 61 (53.9%) were Japanese and 52 (46.1%) South Korean. Although the Japanese nurses were significantly younger than the Koreans (33.7 yrs vs. 47.4 yrs, P = 0.0001), their physical characteristics such as height, weight and body mass index (BMI) were very similar (Table 1). This reflects a previous study conducted by Fujimura et al,[2] where the mean height and weight of Japanese nursing-home nurses was reported at 153.8 cm and 53.1 kg respectively. The Korean nurses` body mass was also similar to previous Korean research conducted among female computer terminal operators (55.2 kg).[4] However, it appears that nursing-home nurses may be older than hospital nurses at least in Korea; with a previous investigation revealing 85% of the latter group to be under 30 years of age.[5] Weekly working hours and total years of employment were similar between the two groups, but different from that of Dutch nursing-home nurses (33 hrs per wk and 9.5 yrs).[6] There were differences in the average number of bedside hours worked daily between the Japanese (7.5 hrs) and Korean staff (6.4 hrs), but they were not statistically significant. On the other hand, there was a higher proportion of nursing aides in the South Korean group than among the Japanese participants (78.8% vs. 57.4% of all staff, P = 0.0096).

MSD at any site was reported by 77.0% of the Japanese and 65.4% of the Korean nursing-home nurses within this study (Table 2). Low back pain (LBP) was the most frequent MSD among the Japanese nurses, affecting 68.9% of them. This result was significantly higher than for the Korean group (P = 0.0001), where LBP was reported by 25.0%. Previous studies have revealed LBP among Dutch and Japanese nursing-home nurses at 38% and 77% respectively.[6,2] Another Japanese study conducted by Kinugasa et al [3] demonstrated that nursing home LBP prevalence varied between 64.9% and 75.9% depending on the age of staff. The prevalence among Korean nurses (25.0%) was lower than among computer terminal operators in the same country (39.8%).[4] Shoulder pain was the most common MSD among the Korean group (44.2%), followed by pain in the upper arm (28.8%), knee (28.8%) and wrist (26.9%). Shoulder pain was also common within the Japanese group, affecting 41.0% of them. This result is much higher than stated in a previous report of Dutch nursing-home nurses (22%).[6] MSD of the neck was statistically more common (P = 0.0036) amongst the Japanese (37.7%) when compared to the Korean nurses (13.5%). Interestingly, Engels et al[6] has documented a neck MSD prevalence of 27% in Holland, which appears to be somewhere between these two figures.

Only one statistically significant risk factor was identified through logistic regression during this investigation. The risk of developing MSD was 8.3 times greater (95%CI 2.0-43.7, P = 0.0060) among South Korean nurse aides or assistant nurses when compared to registered nurses of the same country. A previous study of operating room nurses in Korea suggested that working posture, working environment, stress and job satisfaction were important risk factors for MSD.[5] On the other hand, a Japanese investigation found that the patients` dependency level was an important indicator of MSD among staff.[2] It is therefore suspected that working as a nursing-home nursing aide in Korea may involve many high-risk manual activities that predispose an individual to MSD. These tasks most likely include suboptimal working postures that vary according to the degree of care required by each patient. More dependent nursing home patients require extended physical assistance for almost all their activities of daily living; tasks that would presumably be delegated to the assistant nurse or nursing aide. By this mechanism, high-risk workplace activities eventually

become concentrated among the latter group.

Conclusion

Overall, this study has shown that MSD appears to be reasonably common among nursing-home nurses in Japan and a little less so among their South Korean counterparts. LBP was the most important MSD within the Japanese group, while for the South Koreans shoulder MSD appeared to be a more important issue. Working as a nursing aide was identified as a statistically significant MSD risk factor, which suggests that future ergonomic interventions for nursing home staff should target this high-risk group.

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Table 1. Staff demographic and workplace items

	Japan	**S. Korea**
Demographics	**Mean ± SD**	**Mean ± SD**
Age (yrs) **	33.7 ± 12.2	47.4 ± 6.7
Height (cm)	157.0 ± 4.7	157.5 ± 5.4
Weight (kg)	52.0 ± 13.2	56.5 ± 6.6
BMI (kg/m^2)	21.6 ± 4.2	22.7 ± 2.4
Workplace items		
Weekly hours	41.6 ± 4.2	36.8 ± 15.4
Total years	5.2 ± 8.0	4.6 ± 3.7
Bedside hours	7.5 ± 2.0	6.4 ± 3.2
Nurse aide *	35 (57.4) [a]	41 (78.8) [a]
Sample size	N= 61	N= 52

[a] number of cases and percentage of cases per group

* P < 0.01, ** P < 0.001

Table 2. Prevalence of MSD by body site

Specific body site	Japan n (%) [a]	S. Korea n (%) [a]
Neck *	23 (37.7)	7 (13.5)
Shoulder	25 (41.0)	23 (44.2)
Lower back **	42 (68.9)	13 (25.0)
Upper arm	12 (19.7)	15 (28.8)
Lower arm	9 (14.8)	9 (17.3)
Wrist	12 (19.7)	14 (26.9)
Legs	9 (14.8)	10 (19.2)
Knee	14 (23.0)	15 (28.8)
Feet	5 (8.2)	8 (15.4)
MSD at any site	47 (77.0)	34 (65.4)

[a] number of cases and percentage of cases per group

* P < 0.01, ** P < 0.001

Table 3. Risk factors for self-reported MSD and comparative MSD analysis

	Japan			South Korea		
Demographics [a]	**OR** [b]	**(95%CI)**	**P**	**OR** [b]	**(95%CI)**	**P**
Age	1.4	(0.0-20.3)	0.7063	0.3	(0.0-2.1)	0.2075
Height	0.7	(0.0-15.8)	0.8745	9.7	(0.7-173.3)	0.0664
Weight	6.7	(4.2-2.3)	0.5973	0.1	(0.0-11.1)	0.3624
BMI	2.1	(2.2-2.5)	0.5903	0.1	(0.0-8.3)	0.8905
Workplace items [a]						
Weekly hours	1.3	(0.0-40.4)	0.8910	0.4	(0.0-5.6)	0.5195
Total years	0.0	(0.0-1.3)	0.2414	0.5	(0.1-3.5)	0.5256
Bedside work [c]	0.3	(0.0-5.7)	0.4624	2.6	(0.8-9.1)	0.1253
Nurse aide [c]	1.1	(0.3-4.9)	0.9040	8.3	(2.0-43.7)	0.0060
Japan / Korea [d]	1.0	-	-	0.6	(0.2-1.3)	0.3396

[a] odds ratios calculated for increasing increments of 1 yr, 1 cm, 1 kg, 1 kg/m^2, 1 hr and 1 yr respectively, [b] risk factors derived from logistic regression using MSD as the dependent variable and demographic and workplace items as the independent variables, [c] odds ratios (OR) calculated using the following reference categories (any bedside work / no bedside work, nurse aide / not nurse aide), [d] OR calculated from pooled data (Japan and Korea) using Korea as the independent variable

Summary

Overall, lower back pain was the most common musculoskeletal disorder detected during this study of nursing home staff, the prevalence rate increasing from Taiwan at the lowest, followed by South Korea and Australia, with Japanese staff reporting the highest rates of MSD. Shoulder, head and upper back pain were most the common MSD reported by the Japanese staff. Shoulder pain was also frequent within the other groups, but at lower levels. Although MSD was found to be most prevalent among the Japanese group at almost all body sites, the reasons for this are not clear. It may have related to a generally higher MSD rate, or a higher degree of self-reporting on their questionnaires. Interestingly, MSD was found to be a co-factor for current skin disease. Individual MSD risk factors included moving patients, washing patients, working as an assistant nurse and daily alcohol consumption. Although there appears to be consistent MSD risk factors across the 4 groups, certain racial differences may be explained by variations in approved lifting protocols, ergonomic management and workplace standards with respect to load limits. It is also important to recognise the relative affect of body stature and body size among the 3 Asian groups when compared to the (generally larger) Australian cohort.

Racial differences in physique may have lead to an excess MSD rate seen among the Japanese, irrespective of their correct lifting postures and or protocols. The Australian group may have been encumbered by generally heavier patients, thereby exposing them to an increased risk of muscle and joint strain. Similarly, the rapidly changing nature of Japanese body demographics, particularly with respect to the increasing prevalence of obesity in Japan may have also led to similar problems among their nursing home staff. Such situations would be compounded among the Japanese staff members who do not appear to be simultaneously increasing in stature. There may also have been cultural differences in the willingness to self-report personal ailments, or even individual differences in the perception of MSD. Regardless of the aetiology behind MSD development in the 4 countries, this chapter has demonstrated that many ergonomics issues such as musculoskeletal disorders appear to be a common problem for nursing home staff worldwide.

Chapter 5

Conclusions

A summary of the main results from this study

Smith DR, Yamagata Z, Atkinson R, Choi JW, Guo YL. A comparison of occupational health issues among nursing-home staff in Australia, Japan, Korea and Taiwan. Bull Yamanashi Med Univ 2002; 19: 5-7.

(This manuscript was devised and written entirely by Derek Richard Smith. Yamagata Z, Atkinson R, Choi JW and Guo YL helped design, organise and carry out the field work component)

Summary of main results

A total of 465 nursing home employees were included in this study, with 140 (30.1%) coming from Australia, 109 (23.4%) from Japan, 91 (19.6%) from South Korea and 125 (26.9%) from Taiwan. Although in all cases the majority were female, the prevalence of smoking varied significantly between the groups (range 5.6% to 36.7%, P for trend = 0.0116). The Japanese staff were 2.2 times more likely to be smokers than workers within the other countries (rate ratio 2.2, 95%CI 1.3 - 4.0). The relative effect of smoking on elevated skin disease prevalence most likely relates to the reduction in skin integrity and diminished tissue-healing properties often seen among regular smokers. The relationship between smoking and increased rates of MSD on the other hand is less precise. It is possible that heavy smokers are less likely to adopt good ergonomic practices or that socio-demographic factors leading to smoking also more likely to lead to high rates of MSD. Overall, the Japanese employees were of significantly younger age (mean 34.3 years), when compared to the group as a whole (Table 1). Although the relative proportions of job categories was mixed throughout the 4 groups, health care workers constituted the largest job description, ranging from 60.7% to 78.9% in each group. This was followed by service workers (0.0% to 24.3%), with the Australians 4.8 times more likely to have service workers within their nursing homes when compared to other groups (95%CI 2.6 - 9.1, P < 0.0001). The Australian cohort were significantly less likely to undertake patient handling than the staff from other countries (P < 0.0001), while the Taiwanese were less likely to be washing patients (P = 0.0072).

The total duration of employment varied significantly between the 4 groups (P = 0.0002), ranging from 26.8 to 73.0 months. Weekly working hours ranged from 31.5 (Australia) to 42.1 (South Korea), another statistically significant difference (P for trend = 0.0141). The prevalence of skin disease varied, with the Australians suffering an overall higher prevalence of dermatologic abnormality (Figure 1). Solar-related skin damage such as actinic keratosis and basal cell carcinoma was only detected among this group (12.0%). Conversely, *Sarcoptes scabiei* infestation was seen within South Korea and Taiwan, but not Australia and Japan. Other skin diseases diagnosed among the Australian group included fungal infections (17.3%) and dermatoses (13.4%),

which were not as common among the Japanese, affecting only 1.3% and 12.7% respectively. Fungal attack and dermatitis affected Korean staff equally (4.8% each), with scabies somewhat less common (2.4%). Fungal infection was the most common affliction within Taiwan, affecting 21.4%, followed by scabies (10.7%) and dermatoses (8.0%).

Lower back pain was the most common musculoskeletal disorder detected during this study, with a prevalence ranging from 12.0% in Taiwan, 19.8% in South Korea, 23.6% in Australia and 57.8% in Japan (Figure 2). Shoulder, head and upper back pain were reported by the Japanese staff at rates of 34.9%, 26.6% and 22.0% respectively. Shoulder pain was also common within the other groups, affecting 35.2% of the subjects in Korea, 20.7% in Australia and 8.0% in Taiwan. Skin disease risk factors for the entire group (N=465) included a previous history of skin disease (OR 6.1), working in Australia (OR 3.6), having a history of allergy or atopy (OR 3.2), working in a service occupation (OR 1.9), suffering any MSD (OR 1.8), working part-time (OR 1.8) and having worked longer than 36 months in their current job (OR 1.6). Refer to Table 2. MSD risk factors were also calculated for the group as a whole, and revealed the following odds ratios: moving patients (3.5), washing patients (3.2), working in Japan (2.8), working as an assistant nurse (2.8), undertaking daily wet-work (2.4), working as a health care worker (2.3) and drinking alcohol on a daily basis (1.8).

Table 1. Demographic and workplace items of nursing home staff

	Australia	**Japan**	**S. Korea**	**Taiwan**	
Demographics [a]					**Trend** [b]
Female	119 (85.0)	85 (78.0)	73 (80.2)	109 (87.2)	0.1294
Smoker	28 (20.0)	40 (36.7)	14 (15.4)	7 (5.6)	0.0116
Age (yrs)	44.8 ± 10.4	34.3 ± 12.5	45.9 ± 10.5	40.6 ± 12.4	<0.0001
BMI (kg/m^2)	26.7 ± 6.3	21.8 ± 4.2	23.0 ± 2.6	23.7 ± 3.6	0.1117
Job description [a]					
Health care	85 (60.7)	86 (78.9)	56 (61.5)	97 (77.6)	0.7097
Service work	34 (24.3)	8 (7.3)	13 (14.3)	0 (0.0)	0.0296
Miscellaneous	11 (7.9)	5 (4.6)	11 (12.1)	16 (12.8)	0.8207
Administration	10 (7.1)	10 (9.2)	11 (12.1)	12 (9.6)	0.6541
Workplace tasks [a]					
Move patients	53 (37.9)	71 (65.1)	53 (58.2)	70 (56.0)	0.0101
Wash patients	50 (35.7)	63 (57.8)	40 (44.0)	36 (28.8)	<0.0001
Hours / week	31.5 ± 12.9	40.6 ± 4.1	42.1 ± 13.4	36.6 ± 15.8	0.0141
Duration (mnth) [c]	73.0 ± 75.1	53.6 ± 78.6	52.4 ± 44.5	26.8 ± 31.6	0.0002
Sample size	140 (30.1)	109 (23.4)	91 (19.6)	125 (26.9)	**465 (100)**

[a] figures are expressed as the total number of cases per group (with the percentage of each group in parenthesis), [b] P for trend calculated using Pearson`s chi square test and Fisher`s exact test

[c] total duration of employment in the nursing home

Figure 1. Prevalence of skin diseases among nursing home staff

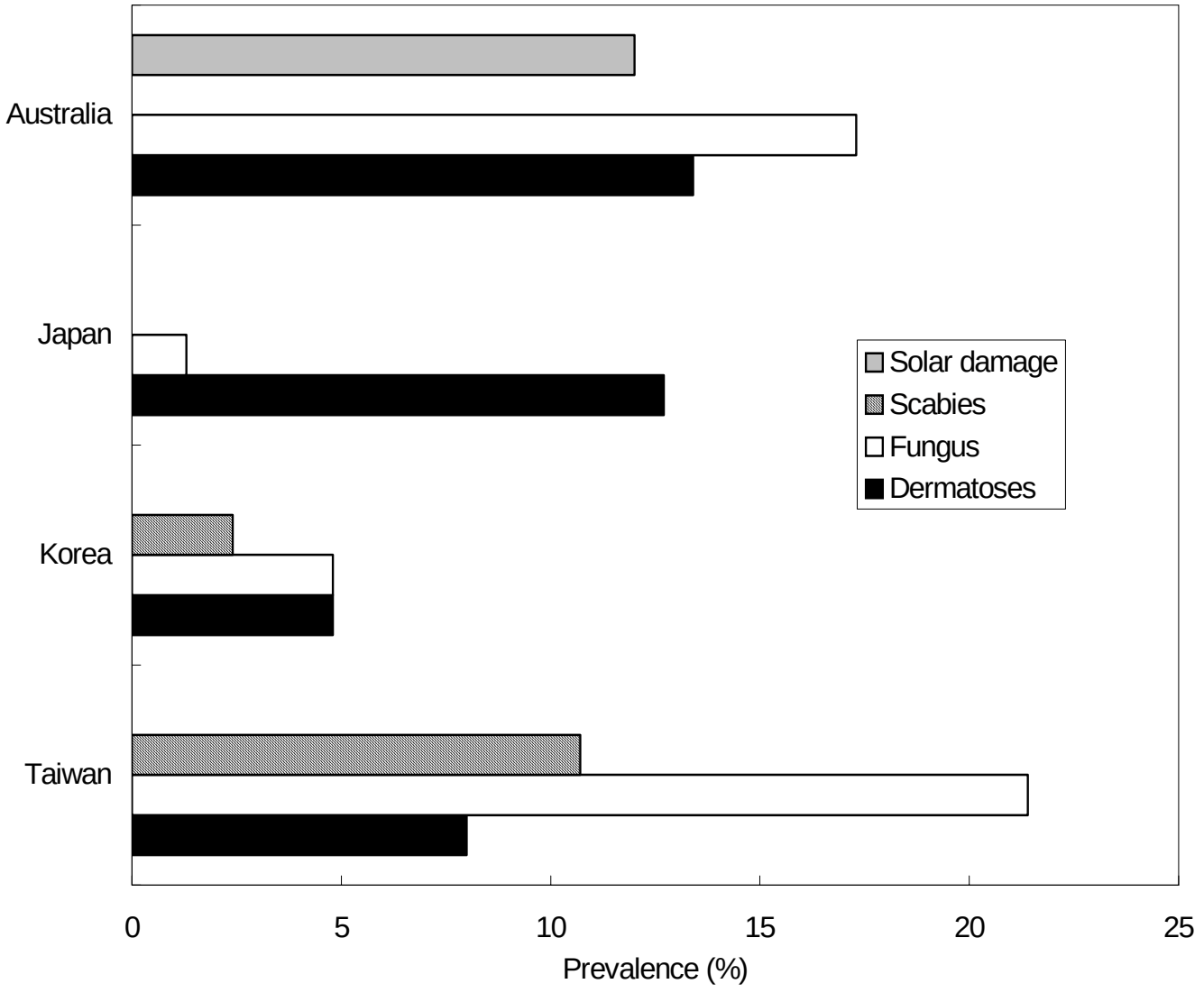

Figure 2. Prevalence of musculoskeletal disorders among nursing home staff

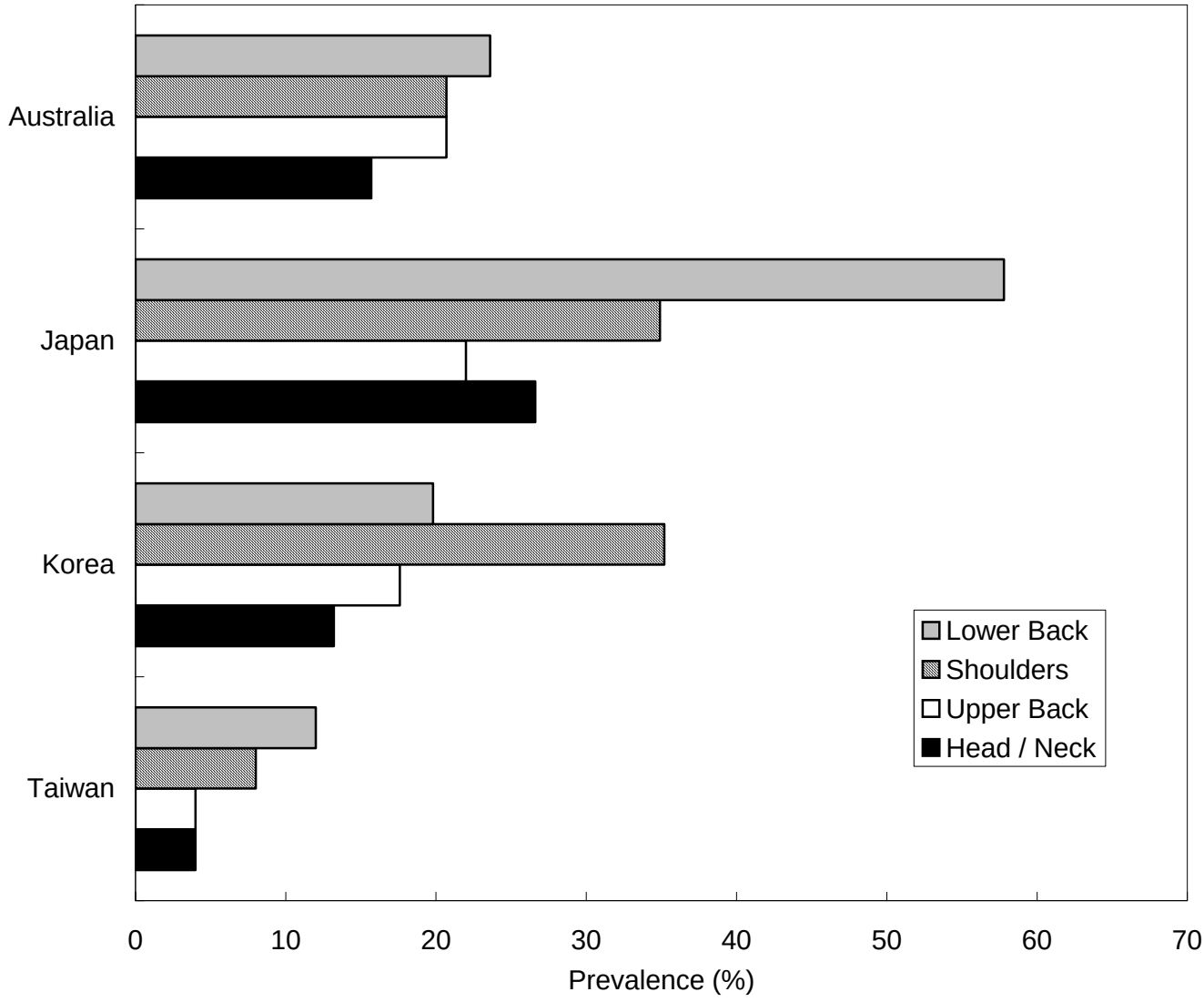

Table 2. Risk factors associated with skin disease and musculoskeletal disorders

	n	(%) [a]	OR [b]	95% CI	P value [c]
SD risk factors					
Previous skin disease	118	(25.4)	6.1	(3.8 – 9.8)	<0.0001
Australian staff	140	(30.1)	3.6	(2.3 – 5.8)	<0.0001
History of allergy	58	(12.5)	3.2	(1.8 – 5.8)	<0.0001
Service worker	55	(11.8)	1.9	(1.0 – 3.6)	0.0342
Any self-reported MSD	235	(50.5)	1.8	(1.6 – 2.8)	0.0087
Part-time worker	209	(44.9)	1.8	(1.1 – 2.7)	0.0106
Working >36 months	200	(43.0)	1.6	(1.1 – 2.5)	0.0270
MSD risk factors					
Moving patients	247	(46.9)	3.5	(2.4 – 5.3)	<0.0001
Washing patients	189	(40.6)	3.2	(2.2 – 4.9)	<0.0001
Japanese staff	109	(23.4)	2.8	(1.7 – 4.6)	<0.0001
Assistant nurse	216	(46.5)	2.8	(1.9 – 4.2)	<0.0001
Daily wet-work	379	(81.5)	2.4	(1.4 – 4.5)	0.0031
Health care worker	324	(69.7)	2.3	(1.5 – 3.7)	0.0003
Alcohol drinker	192	(41.3)	1.8	(1.2 – 2.7)	0.0057

[a] percentage of all staff is shown in parenthesis, [b] odds ratios (OR) calculated using the presence of any diagnosed skin disease as the dependent variable and demographic or workplace items as the independent variables, [c] adjusted for age, sex and total duration of employment within the nursing home

The main conclusions from this study

Overall, this study showed that the Australian group of nursing home staff suffered a generally higher prevalence of skin disease than those in the other 4 countries investigated, most likely due to their significantly higher rate of sun-induced skin disorders. Solar-related damage usually affects fair-skinned Caucasians more than Asians, due to the latter groups` higher cutaneous levels of protective melanin and differences in lifestyle philosophies between the countries. The high prevalence of fungal disease seen within Taiwan most probably arose from its comparatively higher temperature and relative humidity. The discovery of scabies within the Taiwanese staff may also have resulted from their greater tendency to live in larger, extended family groups when compared to the Australians, and to an increasing extent, the Japanese and Koreans. Important skin disease risk factors included previous history of skin disease and a history of allergy, both of which are consistent with previous research. Interestingly, MSD was found to be a co-factor for current skin disease, although the reasons for this interrelation are unclear. Nonetheless, the results of skin disease examinations certainly indicate that skin disease is an important occupational issue within the nursing homes of all four countries included in this study.

Although MSD was found to be most prevalent among the Japanese group at almost all body sites, the reasons for this are not immediately clear. They may have related to a generally higher MSD rate, or a higher degree of self-reporting on their questionnaires. Individual MSD risk factors included moving patients, washing patients, working as an assistant nurse and daily alcohol consumption. Although there appears to be consistent MSD risk factors across the 4 groups, certain racial differences may still exist with respect to approved lifting protocols, ergonomic management and workplace standards with respect to load limits. It is also important to consider the relative affect of body stature and body size among the 3 Asian groups when compared to the generally larger Australian cohort. For the Japanese subjects, differences in physique, lifestyle and the rapidly changing nature of Japanese body demographics, particularly with respect to the increasing prevalence of obesity in Japan, have clearly all contributed to the relatively high incidence of musculoskeletal disorders among their nursing home staff.

Although the exact influence of cultural factors seems obvious for some of the disorders surveyed, it was not readily apparent in the aetiology of others. Among the unavoidable limitations of this research were the issues of single-institution-bias in Australia and Korea, and the voluntary nature of participation by the nursing homes. This may have meant that only institutions with a positive occupational health record were willing to participate. Nevertheless, by incorporating such racially diverse groups in this research project, the results from skin disease examinations and surveys provide valuable information on the nature and prevalence of skin diseases and musculoskeletal disorders across a variety of work environments and cultural settings. Furthermore, this research project appears to have documented occupational issues among a cross-cultural nursing home cohort in both northern and southern Asia for the first time. Further investigations of nursing home workplace issues can now be built on this knowledge base.

Some recommendation arising from this study

This study has revealed some interesting data regarding the current status of skin disease and musculoskeletal disorders among nursing home staff in Australia, Japan, South Korea and Taiwan. From the risk factors outlined during statistical analysis, the following recommendations are suggested by the author:

1) A pre-employment screening for allergic disease should be conducted for new staff
2) The manual handling of nursing home patients is to be avoided whenever possible
3) Wet-work needs to be minimized among nursing home staff wherever possible
4) Regular health checkups should be provided for nursing home staff at no cost to them
5) These check-ups probably need to be more frequent as the duration of employment increases
6) A greater focus on Nursing Aides` job description and occupational health needs to be taken
7) A greater focus on skin disease and musculoskeletal disorder prevention needs to occur

Overall, a greater emphasis should be placed on nursing home workers` health worldwide. Further, international research into this topic will help target appropriate interventions more effectively.

Appendix

Survey forms and examination sheets as used during this study