Prevalence of Lower Extremity Pain and Its Association with Functionality and Quality of Life in Elderly Women in Australia

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ABSTRACT. ***Objective.*** To determine the prevalence of self-reported lower extremity pain and the impact on functionality and quality of life in a population based study of elderly women in Western Australia.

Methods. One thousand four hundred eighty-six women, 6.2% of 24,800 women aged over 70 in Perth, were recruited. An index of relative socioeconomic disadvantage (SES) was derived from postcode. Self-reported lower extremity pain at the hip, knee, and foot was collected by questionnaire. The frequency of lower extremity pain was classified into 5 groups. Mobility was measured by the Timed Up and Go Test (TUG). Quality of life was measured using the Medical Outcome Study Short Form 36 (SF-36) summary statistics: physical and mental component scores (PCS and MCS).

Results. The prevalence of women reporting any hip, knee, and foot pain was 39%, 52%, and 34% respectively. Fourteen percent experienced pain at all sites whereas 28% had no pain. There was no age difference between the various pain groups. Women with more pain were heavier and had higher BMI scores. At all lower limb sites, women with more frequent pain had reduced mobility and lower quality of life as measured by TUG, PCS, and MCS. For the TUG test, significant determinants in stepwise regression were age, BMI, knee and hip pain. For the SF-36 PCS, significant predictors were age, SES, BMI, and foot, knee, and hip pain. For the SF-36 MCS, SES and foot pain were significant predictors.

Conclusions. Our results confirm the high prevalence of lower extremity pain in elderly women in Australia. Lower extremity pain significantly reduced both physical and mental aspects of the quality of life as well as mobility. In view of the availability of effective interventions to reduce joint pain, more aggressive intervention in the most disabled is indicated. (J Rheumatol 2003;30:2689–93)

Key Indexing Terms:
LOWER EXTREMITY PAIN ELDERLY WOMEN QUALITY OF LIFE MOBILITY

Goals for health promotion and disease prevention in the elderly include reducing premature disability caused by illness, maintaining functional independence, extending life expectancy, and maintaining or enhancing quality of life (QOL). Determining whether an intervention is warranted depends upon several key factors, an important one being whether the disease or condition will significantly impact the individual's QOL[1]. Musculoskeletal conditions are a major cause of physical limitation and disability in elderly people and the prevalence of these conditions is expected to rise dramatically as the population ages. However, functional impairment and musculoskeletal disability are often underestimated or overlooked when elderly people attend their doctor for other reasons[2,3].

Lower extremity pain is a very common complaint among the elderly. We surveyed elderly women aged over 70 years in a metropolitan area of Western Australia to identify the prevalence of lower extremity pain and its association with functionality and QOL.

MATERIALS AND METHODS

Subjects. The study sample consisted of 1486 women recruited using a population-based approach in which a random selection of the whole population of women over the age of 70, derived from the electoral roll, received a letter inviting them to join the study. Of the 24,800 women who received a letter, 6.2% joined the study. Although the subjects entering the study were weighted in favor of those in higher socioeconomic categories[4] they did not differ from the whole population in health resource utilization[5]. The mean age of the population was 75.1 ± 2.7 years. Of these women, 46% were aged between 70 and 74 years, 46% were between 75 and 79 years, and 8% were 80 and over. Compared to census data from Western Australia, the older age group, 80-84 years, was under represented in the study population (24% vs 8%, $p < 0.001$). The Human Rights Committee of the University of Western Australia approved the study.

An index of socioeconomic disadvantage (SES) was derived from the subject's postcode area that was recorded at baseline. The Australian

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Bureau of Statistics (ABS) produces a number of indicators of socioeconomic status at the postcode level from Census data. Postcode-based SES groups were derived according to instructions from the ABS[6]. The sociodemographic indicator that was used was socioeconomic disadvantage (range 1-6). A higher score on the index indicated that the area has a higher proportion of families on high income. This score reflects educational, occupational, and economic structure of the community. This variable was used to examine the relationship between lower extremity pain and a sociodemographic index. When compared to other methods the technique we have utilized has high specificity but only moderate sensitivity so the effect of SES may be underestimated[7].

Measurements. Height and weight were measured with the subjects in light clothing and without shoes. Body mass index (BMI) was calculated as weight/height^2 (kg/m^2). Mobility functioning was measured by the Timed Up and Go Test (TUG), which required the subjects to be timed while getting up, walking 3 m, turning, returning to the chair and sitting down again[8]. The test was practiced once and then timed. Pain medication was not taken on the day mobility testing (TUG) was measured.

Information on lower extremity pain scores at the hip, knee, and foot was collected by questionnaire. The question was phrased as follows: Please tick the category that best describes the number of times you experience pain in each of the following parts of your body: in the hip joints, knee joints, or feet joints. The frequency of lower limb pain was classified into 5 groups: never (1), less than once a month (2), once a month to once a week (3), once a week to once a day (4), and once a day or more (5). Each subject questionnaire was checked for completion at the baseline appointment. The subjects were further divided into groups: those that didn't experience pain (No pain) and those that experienced pain at any site (Pain at any site).

QOL was assessed by the Medical Outcome Study Short Form-36 (SF-36) questionnaire. Standardized instructions were given to the participants but no extra direct assistance was given. The domains of Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional and Mental Health were calculated. The SF-36 summary statistics, the physical and mental component score (PCS and MCS), were derived from these domains using Australian normative data[9] and used in this analysis[10]. The SF-36 has been validated for use in Australia[11].

Statistical analysis. All statistical analyses were performed with SPSSPC for Windows (SPSS, version 10, Chicago, USA). Differences between the groups for parametric data were examined by oneway ANOVA. If the F-test was significant, a Duncan's *post hoc* test was used to examine individual group differences. Differences between the groups for non-parametric data were examined by the Kruskall Wallace test and Spearman Rank test. Differenced between those experiencing pain at any site and those experiencing no pain for parametric variables were examined by ANOVA. Multiple regression analysis was used to examine the relationships between variables. Variables were considered different if $p < 0.05$ in a 2 tailed test.

RESULTS

The mean (± SD) values for demographic characteristics, function, and QOL are shown in Table 1. The prevalence of individuals reporting any pain at the hip, knee, and foot was 39%, 52%, and 34% respectively. Seventy-two percent had pain at one or more lower limb sites as shown in the Venn diagram (Figure 1). Fourteen percent (n = 213) of subjects experienced pain at all sites whereas 28% (n = 422) had no pain at any of the sites. Subjects with more frequent hip pain were more likely to have knee or foot pain; subjects with knee pain were more likely to have foot pain ($p < 0.0001$ for all comparisons).

The effects of hip, knee, and foot pain frequency on mobility and QOL are shown in Table 2. These data show that although there was no difference in age between the various pain groups, those subjects with more severe pain were heavier and had higher BMI scores ($p < 0.001$). There was no difference in frequency of pain based on the index of socioeconomic disadvantage.

At each site the subjects with more frequent pain had reduced mobility as shown by increased TUG time (Table 2). The 11 to 16% of the population with the most frequent hip, knee, or foot pain were 10 to 13% slower than subjects without any pain, and had significantly worse QOL as shown by the reduction in PCS at all sites ($p < 0.001$) and MCS for knee ($p < 0.001$) and foot ($p < 0.001$) pain. The PCS was 18-21% lower in this group compared to subjects without any pain. However, there was less effect of lower extremity pain on the MCS, reducing the score by only 2.2-3.3% in those most frequently affected by pain. There were significant correlations between these variables in bivariate analysis.

Those who experienced pain at any site daily had an 11% reduction in mobility and a 23% and 3% reduction in PCS and MCS scores, respectively, when compared to those with no pain (Table 3).

Table 1. Demographics, function, and quality of life characteristics of 1486 subjects.

Characteristic	Mean ± SD
Age, yrs	75.2 ± 2.7
Socioeconomic status*	4.3 ± 3.0
Weight, kg	68.7 ± 12.6
Height, cm	158.8 ± 6.00
BMI, kg/m^2	27.2 ± 4.8
TUG, sec	10.0 ± 3.0
SF36 physical component score, units	44.8 ± 9.8
SF36 mental component score, units	53.2 ± 8.7

* Median and interquartile range.

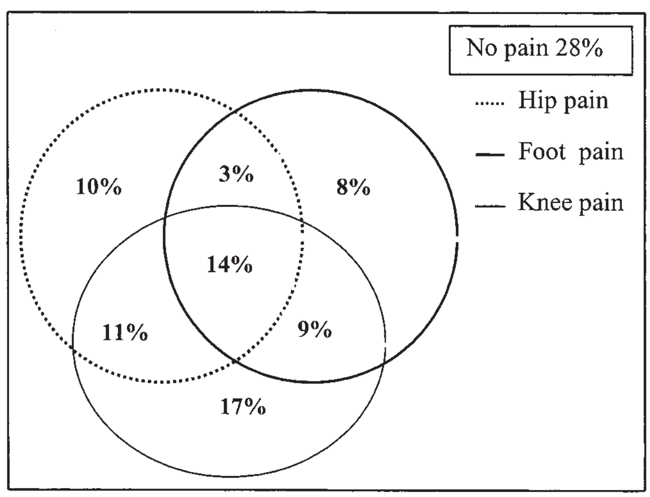

Figure 1. The percentage of subjects with pain at each site and more than one site.

Table 2. The effects of pain frequency on demography, function, and quality of life (mean ± SD).

Hip Pain Frequency	Group 1 Never	Group 2 < Once per Month	Group 3 1/Week-1/Month	Group 4 1/Day-1/Week	Group 5 1/Day or More
Number (%)	906 (61)	188 (13)	115 (8)	113 (8)	160 (11)
Age, yrs	75.3 ± 2.8	74.9 ± 2.6	75.0 ± 2.8	75.1 ± 2.5	75.0 ± 2.8
Socioeconomic score†	5.0 ± 3.0	4.0 ± 3.0	5.0 ± 3.0	4.0 ± 3.0	5.0 ± 3.0
TUG, sec*	9.8 ± 2.6[a]	9.6 ± 2.6[a]	10.5 ± 3.5[b,c]	10.2 ± 3.2[a,b]	11.0 ± 4.2[c]
Weight, kg*	67.9 ± 11.9[a]	66.5 ± 12.3[a]	68.6 ± 10.7[a]	72.1 ± 13.3[b]	73.0 ± 15.0[b]
Height, cm	158.8 ± 5.8	158.3 ± 5.6	159.2 ± 5.9	158.7 ± 5.7	159.1 ± 7.4
BMI, kg/m^2*	26.9 ± 4.5[a]	26.5 ± 4.7[a]	27.1 ± 4.0[a]	28.6 ± 4.9[b]	28.9 ± 5.9[b]
Physical component score*	47.1 ± 9.0[a]	45.6 ± 8.9[a]	42.2 ± 9.0[b]	39.7 ± 9.4[c]	37.2 ± 10.5[d]
Mental component score	53.7 ± 8.4	53.0 ± 9.0	53.1 ± 9.0	51.8 ± 9.0	52.2 ± 9.9
Knee Pain Frequency					
Number (%)	714 (48)	233 (16)	141 (10)	161 (11)	231 (16)
Age, yrs	75.2 ± 2.7	75.2 ± 2.7	74.9 ± 2.8	75.1 ± 2.8	75.2 ± 2.6
Socioeconomic score†	5.0 ± 3.0	5.0 ± 3.0	5.0 ± 3.0	4.0 ± 2.0	4.0 ± 3.0
TUG, sec*	9.7 ± 2.6[a]	9.5 ± 2.1[a]	10.1 ± 4.1[a,b]	10.4 ± 3.0[b]	11.0 ± 3.6[c]
Weight, kg*	66.8 ± 11.6[a]	67.6 ± 12.5[a]	70.6 ± 12.3[b]	71.1 ± 12.9[b]	72.0 ± 14.1[b]
Height, cm	158.9 ± 5.5	158.3 ± 6.6	158.8 ± 6.5	158.8 ± 6.3	159.0 ± 6.2
BMI, kg/m^2*	26.4 ± 4.3[a]	27.0 ± 4.9[a]	28.0 ± 4.9[b]	28.2 ± 4.5[b]	28.5 ± 5.3[b]
Physical component score*	47.9 ± 8.8[a]	45.6 ± 9.3[b]	44.1 ± 8.8[b]	41.5 ± 9.1[c]	37.8 ± 10.0[d]
Mental component score*	53.3 ± 8.6[a,b,c]	53.9 ± 7.6[a,b]	54.5 ± 7.8[a]	52.4 ± 9.8[b,c]	52.1 ± 9.8[c]
Foot Pain Frequency					
Number (%)	970 (66)	144 (10)	101 (7)	103 (7)	160 (11)
Age, yrs	75.2 ± 2.7[a,b]	75.5 ± 2.8[a,b]	75.0 ± 2.6[a]	75.2 ± 2.6[a,b]	74.7 ± 2.6[b]
Socioeconomic score†	5.0 ± 3.0	4.0 ± 3.0	4.5 ± 3.0	4.0 ± 3.0	4.0 ± 3.0
TUG, sec*	9.8 ± 2.7[a]	10.3 ± 3.1[a,b]	9.6 ± 2.4[a]	10.3 ± 3.2[a,b]	10.8 ± 4.1[b]
Weight, kg*	67.6 ± 12.0[a]	68.7 ± 12.6[a,b]	71.0 ± 12.4[b,c]	70.2 ± 12.9[a,b,c]	72.5 ± 14.4[c]
Height, cm	158.8 ± 5.9[a,b]	158.5 ± 5.5[a,b]	159.5 ± 6.0[b]	157.6 ± 6.3[a]	159.3 ± 6.3[b]
BMI, kg/m^2*	26.8 ± 4.5[a]	27.3 ± 4.9[a,b]	27.8 ± 4.3[a,b,c]	28.2 ± 4.6[b,c]	28.6 ± 5.7[c]
Physical component score*	46.7 ± 9.4[a]	44.6 ± 9.2[a,b]	43.2 ± 8.8[b,c]	40.8 ± 9.3[c]	38.0 ± 9.5[d]
Mental component score*	53.7 ± 8.4[a]	54.0 ± 7.6[a]	52.1 ± 8.7[a,b]	50.7 ± 10.3[b]	51.9 ± 10.1[a,b]

* $p < 0.001$; ** $p < 0.05$; † median and interquartile range. Mean values for different groups followed by the same letter are not significantly different from one another at $p < 0.05$ (Duncan post hoc test).

Table 3. Demography, function, and quality of life of subjects with pain at any lower limb site or no pain. Results are expressed as mean ± SD.

	Group 1 No Pain	Group 2 < Once per Month	Group 3 1/Week-1/Month	Group 4 1/Day-1/Week	Group 5 1/Day or More
Number (%)	422 (28)	269 (18)	191 (13)	226 (15)	378 (26)
Age, yrs	75.4 ± 2.8	75.2 ± 2.8	75.0 ± 2.7	75.1 ± 2.6	75.2 ± 2.6
Socioeconomic score†	5.0 ± 3.0	5.0 ± 3.0	5.0 ± 3.0	4.0 ± 3.0	4.0 ± 3.0
TUG, sec*	9.6 ± 2.8[a]	9.4 ± 2.1[a]	9.7 ± 2.7[a,b]	10.0 ± 2.8[b]	10.8 ± 3.7[c]
Weight, kg	66.3 ± 11.2[a]	66.6 ± 12.2[a,b]	68.5 ± 11.2[b,c]	70.7 ± 12.9[c,d]	71.6 ± 13.7[d]
Height, cm	159.1 ± 5.5[a]	158.6 ± 5.6[a,b]	158.9 ± 6.0[a,b]	158.1 ± 6.1[b]	158.9 ± 6.7[a,b]
BMI, kg/m^2*	26.2 ± 4.2[a]	26.4 ± 4.6[a,b]	27.1 ± 4.3[b]	28.2 ± 4.8[c,d]	28.4 ± 5.2[d]
Physical component score*	50.1 ± 7.6[a]	47.3 ± 8.3[b]	45.1 ± 8.4[c]	42.6 ± 9.3[d]	38.5 ± 10.1[e]
Mental component score**	54.2 ± 7.5[a]	53.7 ± 8.4[a,b]	53.5 ± 8.3[a,b,c]	52.2 ± 9.7[b,c]	52.4 ± 9.7[c]

* $p < 0.001$; ** $p = 0.02$; † median and interquartile range. Mean values for different groups followed by the same letter are not significantly different from one another at $p < 0.05$ (least significant difference by multiple comparison test).

Because of the co-correlation of pain, all pain sites were entered in the multiple regression analysis. This showed that for the TUG test, significant determinants in stepwise regression were age, BMI, knee and hip pain ($r = 0.35$, $p < 0.001$) (Table 4). A similar analytical approach for the PCS showed that age, SES, BMI, and foot, knee, and hip pain were all significant predictors ($r = 0.53$, $p < 0.001$). Finally the MCS analysis showed that SES and foot pain were

Table 4. Standardized regression coefficients for variables related to the Timed Up and Go (TUG) test and the PCS and the MCS summary scores of the SF36. Independent variables were all entered into the linear regression model. The log of the TUG data was analyzed.

	TUG	Physical Component	Mental Component
Age	+0.22**	–0.14**	NS
Socioeconomic status	NS	0.05*	+0.08*
BMI	+0.21**	–0.22**	NS
Hip pain frequency	+0.07*	–0.22**	NS
Knee pain frequency	+0.11**	–0.22**	NS
Foot pain frequency	NS	–0.15**	–0.09**
Overall R value	0.33	0.53	0.12

* $p < 0.05$, ** $p < 0.001$.

significant predictors although with a much lower correlation coefficient ($r = 0.12$, $p < 0.001$).

DISCUSSION

We found that 39%, 52%, and 34% of women aged over 70 years complained of hip, knee, and foot pain, respectively. The 1991 Australia National Health Survey reported that 45% of people aged 65 years and over suffered from arthritis or rheumatism[11]. A 1998 Australian musculoskeletal disorders disability survey found that 55.8% of elderly people had symptomatic joint disease[2]. In Sweden investigators reported a prevalence of joint pain of 30 to 43% in women between age 70 and 79; in Japan and Hawaii the prevalence of knee pain has been reported as 53% and 20% in this age group[12,13]. In addition to high prevalence of these complaints in this age group, lower extremity pain has been shown to be associated with large reductions in functionality and mobility as assessed by the TUG. The magnitude of the effect of frequency of hip pain on the TUG is large, especially considering that these subjects were not selected because of concerns about arthritis.

These findings are consistent with previous epidemiological surveys of joint pain, which have shown that older women experience a decline in mobility and physical function associated with these symptoms[14]. In a previous study, the presence of arthritis or rheumatism, age, overall poorer level of general health, and other causes of physical impairment were significant predictors of a higher disability score, as measured by the Health Assessment Questionnaire[2].

There has been little examination of the effects of lower extremity pain on QOL measures. We used the SF-36, a well recognized and validated instrument[15]. Not only did self-reported lower extremity joint pain have significant effects on the PCS but the various areas of lower extremity pain accounted for as large an effect as age and BMI. The fact that each pain region, the hip, knee, and foot, entered the regression suggests that each plays a significant, and to some extent independent, role in the QOL of elderly women. Furthermore the size of the reduction in QOL was large. In the most severely affected, the physical component of the QOL was reduced by 20%. The effects of lower extremity pain were much less on the MCS, as noted previously in a smaller and different population of patients with hip pain[16]. Several studies have investigated the changes in QOL using the questionnaire. These studies have assessed patients undergoing hip replacement[17], cardiac surgery[18], or coronary artery bypass graft[19] and concluded that the SF-36 QOL questionnaire is an adequate tool to assess changes in QOL when compared to other standardized tools.

In our study those who experienced pain daily had a significantly lower PCS than those who had no pain (38.5 ± 10.0 vs 50.1 ± 7.6, $p < 0.001$). Our data conform to the published reference values for those with arthritis (43.7 ± 0.4) compared to those without arthritis (51.3 ± 0.1)[9]. Similarly the MCS in our study, for those with daily pain and without pain (52.4 ± 9.7 vs 54.2 ± 7.5, $p < 0.01$), conform to national data that also showed less of a difference between those with and without arthritis (48.3 ± 0.4 vs 50.5 ± 0.1) for the MCS[9]. These data suggest that the difference in the PCS between the groups observed in this study is of clinical significance.

The identification of lower limb pain was based on the subjects' self-reported responses to the questionnaire. Although there are correlations between clinical signs of osteoarthritis (OA) and radiographic OA, clinical signs are often present without radiological evidence, and moderate or severe radiographic OA is often present without clinical symptoms. Although OA is not the only musculoskeletal disease contributing to joint pain, it is the most common cause of joint pain disease in elderly patients. Thus, joint pain may be a reasonable representation of symptomatic OA for certain joint groups such as the knee, hip, and hand[13,20].

In previous studies the number of self-reported painful joints increases with age[2,13,21], but as we found, the prevalence may plateau after the age of 70[12]. Contrary to other reports[22] we found no relationship between the socioeconomic disadvantage score and frequency of lower extremity pain. Excessive body weight increases the load borne by weight-bearing joints in the lower extremities and is considered a risk factor for OA[23]. We found that increasing weight was associated with increasing frequency of lower extremity pain. However as shown by our data, in which there was co-correlation between BMI, lower limb pain, and the TUG score, it is possible that reduced mobility may also increase weight.

When we examined the study population we were able to show that those with pain at any site had significantly reduced mobility and scored lower for their mental and physical health compared to those with no pain. These findings confirm the co-correlation between pain at different lower limb sites and the nature of pain affecting function. In addition, the groups that experience pain less than once per month were in most cases not different from those who did not experience any pain for mobility, body size, or their physical and mental health. Therefore the burden of pain is more evident in those that experience pain frequently and this fact should be reflected in patient management.

In summary, our results showed that there is a high prevalence of lower extremity pain in elderly women. Lower extremity pain significantly reduced both mobility and physical and mental aspects of QOL. Thus, these potentially correctable causes of disability should be the target of more vigorous interventions.

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