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Burden of musculoskeletal pain in Japan

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Abstract Based on the prevalence of musculoskeletal pain in the context of interference with daily activities (IDA) and treatment for musculoskeletal disorders in the study population ($n = 3188$), we estimated the prevalence and years lived with disability (YLD) of musculoskeletal pain in Japan. The total of 42287 thousand (41.2%) of Japanese adult people was estimated to suffer from musculoskeletal pain. Among them, 9127 thousand was estimated to interfere with daily activities due to the pain. Overall YLD for musculoskeletal pain in Japan were estimated at 1297843.7 (1263.6 per 100000). The YLD for Pain without IDA were 33159.3 (32.3 per 100000) and the YLD for Pain with IDA were 1264684.4 (1231.3 per 100000). One-way sensitivity analysis showed that the YLD of musculoskeletal pain might increase to 4421844.0 (4305.2 per 100000) with the increased disability weight for Pain without IDA of 0.1, while they might inversely decrease to 1018875.0 (992.0 per 100000) with the increased treatment rate in Pain with IDA of 100%. Musculoskeletal pain imposes a substantial burden on the Japanese adult population. To allow the population to keep their health-related quality of life, health professionals should pay more attention to musculoskeletal pain and make positive efforts to improve prevention and control of musculoskeletal pain.

Key words Burden · Cross-sectional study · Musculoskeletal pain · Prevalence · Years lived with disability (YLD)

Introduction

Musculoskeletal pain is very common and it has a substantial impact on daily life. According to our estimates, 42.2

million (41.2%) of Japanese adult people might suffer from musculoskeletal pain and 9.1 million (8.8%) might encounter interference with daily activities (IDA) due to the pain.¹ Because of high prevalence and IDA, musculoskeletal pain is one of the health problems to be given high priority in Japan.

From the point of view of evidence-based health care, health professionals require reliable information on the burden of disease to devise strategies for the prevention and control of the disease. Disability-adjusted life year (DALY) is often used to quantify the burden of disease in a population.² A DALY is equivalent to a lost year of healthy life due to premature mortality and disability. Years lived with disability (YLD) is the disability component of DALY. The estimated YLD indicate how much the disease deprives the population of their health-related quality of life. In this study, we estimated the prevalence and YLD of musculoskeletal pain in Japan.

Methods

Questionnaire survey

A questionnaire survey on musculoskeletal pain was conducted with 3273 participants in health examinations at three health-care centers in Japan. Details of the questionnaire survey have been described elsewhere.¹ The questionnaire asked whether (1) they had experienced musculoskeletal pain for more than 1 week during the last month and (2) the pain had interfered with daily activities if they had experienced musculoskeletal pain somewhere. On a drawing with predefined body regions, the regions affected by pain were marked by a white circle and the regions affected by IDA due to the pain were marked by a black circle.

Among the 3273 participants, 3188 eligible adult people (1956 men and 1232 women) who had information available on age, sex, and treatment for musculoskeletal disorders were included in the study population. The age- and sex-

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Table 1. Prevalence of musculoskeletal pain in the context of interference with daily activities and treatment for musculoskeletal disorders in the study population

	Age (years)	Total	Pain without IDA			Pain with IDA		
			Total	Untreated	Treated	Total	Untreated	Treated
Total	Total	3188	1050 (32.9%)	929 (29.1%)	121 (3.8%)	270 (8.5%)	194 (6.1%)	76 (2.4%)
	20–29	154	29 (18.8%)	27 (17.5%)	2 (1.3%)	9 (5.8%)	8 (5.2%)	1 (0.6%)
	30–39	497	141 (28.4%)	134 (27.0%)	7 (1.4%)	25 (5.0%)	22 (4.4%)	3 (0.6%)
	40–49	1055	349 (33.1%)	322 (30.5%)	27 (2.6%)	84 (8.0%)	63 (6.0%)	21 (2.0%)
	50–59	1003	349 (34.8%)	308 (30.7%)	41 (4.1%)	102 (10.2%)	70 (7.0%)	32 (3.2%)
	60–69	407	152 (37.3%)	115 (28.3%)	37 (9.1%)	40 (9.8%)	26 (6.4%)	14 (3.4%)
	70–	72	30 (41.7%)	23 (31.9%)	7 (9.7%)	10 (13.9%)	5 (6.9%)	5 (6.9%)
Men	Total	1956	638 (32.6%)	586 (30.0%)	52 (2.7%)	162 (8.3%)	127 (6.5%)	35 (1.8%)
	20–29	93	18 (19.4%)	16 (17.2%)	2 (2.2%)	6 (6.5%)	5 (5.4%)	1 (1.1%)
	30–39	322	86 (26.7%)	82 (25.5%)	4 (1.2%)	19 (5.9%)	17 (5.3%)	2 (0.6%)
	40–49	647	222 (34.3%)	210 (32.5%)	12 (1.9%)	51 (7.9%)	41 (6.3%)	10 (1.5%)
	50–59	599	204 (34.1%)	184 (30.7%)	20 (3.3%)	55 (9.2%)	42 (7.0%)	13 (2.2%)
	60–69	252	89 (35.3%)	78 (31.0%)	11 (4.4%)	26 (10.3%)	18 (7.1%)	8 (3.2%)
	70–	43	19 (44.2%)	16 (37.2%)	3 (7.0%)	5 (11.6%)	4 (9.3%)	1 (2.3%)
Women	Total	1232	412 (33.4%)	343 (27.8%)	69 (5.6%)	108 (8.8%)	67 (5.4%)	41 (3.3%)
	20–29	61	11 (18.0%)	11 (18.0%)	0 (0.0%)	3 (4.9%)	3 (4.9%)	0 (0.0%)
	30–39	175	55 (31.4%)	52 (29.7%)	3 (1.7%)	6 (3.4%)	5 (2.9%)	1 (0.6%)
	40–49	408	127 (31.1%)	112 (27.5%)	15 (3.7%)	33 (8.1%)	22 (5.4%)	11 (2.7%)
	50–59	404	145 (35.9%)	124 (30.7%)	21 (5.2%)	47 (11.6%)	28 (6.9%)	19 (4.7%)
	60–69	155	63 (40.6%)	37 (23.9%)	26 (16.8%)	14 (9.0%)	8 (5.2%)	6 (3.9%)
	70–	29	11 (37.9%)	7 (24.1%)	4 (13.8%)	5 (17.2%)	1 (3.4%)	4 (13.8%)

IDA, interference with daily activities

specific prevalence of musculoskeletal pain was estimated in the context of IDA and treatment for musculoskeletal disorders.

Estimation of the prevalence of musculoskeletal pain in Japan

To estimate the number of adult people with musculoskeletal pain in Japan, the age- and sex-specific prevalence of musculoskeletal pain in the study population was multiplied by the corresponding age- and sex-specific population projections from the national census in October 2003 (<http://www.stat.go.jp/data/jinsui/2003np/index.htm>).

Estimation of the YLD of musculoskeletal pain in Japan

YLD is defined in terms of incidence multiplied by duration (equivalent to prevalence) and disability weights.² To estimate the YLD of musculoskeletal pain in Japan, the estimated number of adult people with musculoskeletal pain was multiplied by the corresponding disability weights. There are arguments for and against the time-discounting and age-weighting health outcomes, so that we avoid such processes. The Global Burden of Disease Study shows a table of disability weights.² The table covers a wide range of diseases, but does not give subjective health complaints including musculoskeletal pain. Therefore, the values for periodontal disease (0.001 for both treated and untreated cases) and osteoarthritis (0.108 for treated cases, 0.156 for untreated cases) were assigned to Pain without IDA and Pain with IDA, respectively.

Sensitivity analysis

The following factors were evaluated their impacts on YLD by means of one-way sensitivity analysis. First, the disability weight for Pain without IDA was varied in the range of 0.001 (equivalent to treated periodontal disease) to 0.1 (equivalent to treated osteoarthritis). As is the case with osteoarthritis,² the values in treated cases were set at 70% of those in untreated cases. Second, the treatment rate in Pain with IDA was varied in the range of 0% to 100%.

Results

Table 1 shows the prevalence of musculoskeletal pain in the context of IDA and treatment for musculoskeletal disorders in the study population. Overall prevalence of musculoskeletal pain was 41.4% (95% confidence interval [CI]: 39.7–43.1; men 40.9%, 95%CI: 38.7–43.1; women 42.2%, 95%CI: 39.5–45.0), with a significant increase with age. The prevalence of Pain without IDA was 32.7% (95%CI: 31.1–34.4; men 32.6%, 95%CI: 30.6–34.7; women 33.4%, 95%CI: 30.9–36.1) and that of Pain with IDA was 8.4% (95%CI: 7.5–9.4; men 8.3%, 95%CI: 7.1–9.6; women 8.8%, 95%CI: 7.3–10.5). The treatment rate in Pain without IDA was 11.5% (95%CI: 9.7–13.6; men 8.2%, 95%CI: 6.3–10.5; women 16.7%, 95%CI: 13.5–20.7), and that in Pain with IDA was 28.1% (95%CI: 23.1–33.8; men 21.6%, 95%CI: 16.0–28.6; women 38.0%, 95%CI: 29.4–47.4).

A total of 42287 thousand (41.2%) of Japanese adult people was estimated to suffer from musculoskeletal pain. Among them, 9127 thousand was estimated to encounter

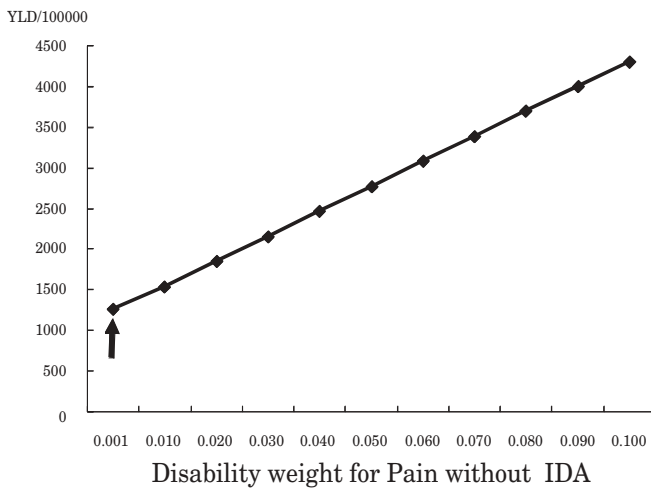


Fig. 1. Sensitivity analysis for disability weight. *IDA*, interference with daily activities; *YLD*, years lived with disability. The value used in this study is indicated by an arrow

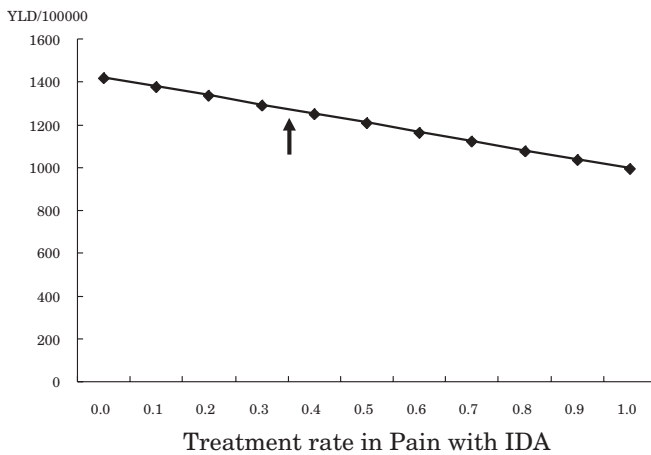


Fig. 2. Sensitivity analysis for treatment rate. The value used in this study is indicated by an arrow

IDA due to the pain. Overall, YLD for musculoskeletal pain in Japan were estimated at 1297843.7 (1263.6 per 100000). The YLD for Pain without IDA were 33159.3 (32.3 per 100000), and for Pain with IDA were 1264684.4 (1231.3 per 100000).

Figure 1 shows the sensitivity analysis for the disability weight for Pain without IDA. The disability weight for Pain without IDA was initially set at 0.001 (for both treated and untreated cases). The YLD of musculoskeletal pain increases with the disability weight for Pain without IDA, and reaches 4421844.0 (4305.2 per 100000) with the disability weight of 0.1.

Figure 2 shows the sensitivity analysis for the treatment rate in Pain with IDA. The treatment rate in Pain with IDA was initially set at 36%. The YLD of musculoskeletal pain inversely decreases with the treatment rate in Pain with IDA, and reaches 1018875.0 (992.0 per 100000) with the treatment rate of 100%.

Discussion

This is the first study to estimate the burden of musculoskeletal pain in the whole of Japan. Concerning the burden of musculoskeletal disorders, previous studies focused only on a disease of interest. However, musculoskeletal disorders include a variety of diseases and even complaints without objective findings. It may be useful to have a systematic grasp of the burden of musculoskeletal disorders beyond the limits of disease criteria that mainly consist of objective findings. The estimates in this study may be evidence that musculoskeletal pain is a health problem to be given high priority in Japan.

Overall prevalence of musculoskeletal pain was 41.4%, which is equal to or lower than that shown in other studies.³⁻⁸ Corresponding to high prevalence, the estimated YLD of musculoskeletal pain was considerably high. To our knowledge, there has been no attempt to estimate the YLD of musculoskeletal pain. We assigned the disability weights for periodontal disease and osteoarthritis to Pain without IDA and Pain with IDA, respectively, because musculoskeletal pain is not given in the table of disability weights.² Among a wide range of diseases given in the table, periodontal disease has the smallest disability weight (0.001). Because of the assumption of disability weights, the YLD of Pain without IDA may be underestimated. However, the sensitivity analysis shows that the YLD may increase no more than fourfold even if the disability weight for Pain without IDA increases to 0.1 ($\times 100$) (Fig. 1). It is likely that the estimated YLD are not substantially different from the actual state of burden.

Compared with other musculoskeletal disorders, musculoskeletal pain was estimated to have considerably high prevalence and YLD. For example, the numbers of patients with osteoarthritis and rheumatoid arthritis in Japan were estimated at 771.8 thousand and 311.3 thousand, respectively, and their YLD were estimated at 65.8 per 100000 and 42.8 per 100000, respectively.⁹ In terms of YLD, the burden of musculoskeletal pain was 19 and 29 times as large as that of osteoarthritis and rheumatoid arthritis, respectively. Musculoskeletal pain is a subjective health complaint, which is difficult to identify by objective findings. Health professionals have not adequately dealt with musculoskeletal pain. To allow the population to keep their health-related quality of life, health professionals should pay more attention to musculoskeletal pain and make positive efforts to improve prevention and control of musculoskeletal pain.

In spite of the potential loss of health-related quality of life, the treatment rate in musculoskeletal pain was 14.9%, which remained 28.1% even in Pain with IDA. The sensitivity analysis shows that the YLD of musculoskeletal pain may be able to decrease by 20% if the treatment rate in Pain with IDA increases to 100% (Fig. 2). The decrease in YLD seems to be small for the increase in treatment rate. Of course, it is important to design public education campaigns for prevention and control of musculoskeletal pain and raise a sense of responsibility to look after oneself. To en-

Table 2. Number of areas affected by pain

Age (years)	Number of areas affected by pain ^a									
	1	2	3	4	5	6	7	8	9	10+
Total	653 20.5%	325 10.2%	164 5.1%	88 2.8%	37 1.2%	22 0.7%	13 0.4%	8 0.3%	4 0.1%	6 0.2%
20–29	26 16.9%	7 4.5%	4 2.6%	0 0.0%	0 0.0%	0 0.0%	1 0.6%	0 0.0%	0 0.0%	0 0.0%
30–39	90 18.1%	38 7.6%	17 3.4%	13 2.6%	4 0.8%	1 0.2%	0 0.0%	3 0.6%	0 0.0%	0 0.0%
40–49	212 20.1%	116 11.0%	56 5.3%	28 2.7%	11 1.0%	6 0.6%	3 0.3%	0 0.0%	0 0.0%	1 0.1%
50–59	214 20.7%	103 10.0%	57 5.5%	34 3.3%	16 1.5%	12 1.2%	6 0.6%	5 0.5%	2 0.2%	2 0.2%
60–69	89 21.9%	53 13.0%	25 6.1%	11 2.7%	5 1.2%	3 0.7%	2 0.5%	0 0.0%	2 0.5%	2 0.5%
70–	22 30.6%	8 11.1%	5 6.9%	2 2.8%	1 1.4%	0 0.0%	1 1.4%	0 0.0%	0 0.0%	1 1.4%

^aThe total of 17 areas are defined: neck, higher back, lower back, shoulder and upper arm (left/right), lower arm, and wrist (left/right), hand and finger (left/right), hip and femur (left/right), knee and crus (left/right), ankle (left/right), and foot (left/right)

hance the effect of treatment, health professionals should advance research on the treatment of musculoskeletal pain.

This study had the following possible limitations. First, the study population comprised participants under health examination. Those who had participated in a health examination during the last year account for 60.4% of the community population.¹⁰ The study population is indeed a community population, but they are more likely to have awareness of their own health. Because of the selection bias, the number of adult people with musculoskeletal pain in Japan (Table 1) may be overestimated. Second, as mentioned above, the smallest disability weight (equivalent to periodontal disease) was assigned to Pain without IDA. Because of the assumption of disability weights, the YLD of Pain without IDA may be underestimated. Third, the number of areas affected by pain was not taken into account. As shown in Table 2, the clustering of areas affected by pain accounted for 20.9% of the study population. The estimated YLD of musculoskeletal pain may increase if disability weights increase with the number of areas affected by pain. Unfortunately, the Global Burden of Disease Study has not established a method of dealing with the clustering of diseases in the estimation of DALY. Further studies may be required to develop a method of adjusting for the number of areas affected by pain, so we will at least be able to estimate the burden of musculoskeletal pain by anatomical area.

In conclusion, musculoskeletal pain imposes a substantial burden on the Japanese adult population. In terms of YLD, the burden of musculoskeletal pain was 19 and 29 times as large as that of osteoarthritis and rheumatoid arthritis, respectively. To allow the population to keep their health-related quality of life, health professionals should take a great interest in musculoskeletal pain and make positive efforts to improve prevention and control of musculoskeletal pain.

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