Mod Rheumatol (2005) 15:41–47
DOI 10.1007/s10165-004-0362-x

ORIGINAL ARTICLE

Machi Suka · Katsumi Yoshida

Musculoskeletal pain in Japan: prevalence and interference with daily activities

Received: June 16, 2004 / Accepted: October 26, 2004

Abstract We estimated the prevalence of musculoskeletal pain in five anatomical areas and their interference with daily activities (IDA) in a Japanese adult population (n = 3188). A questionnaire survey was conducted among participants in health examinations at three health care centers. On a drawing with predefined body regions, participants marked the regions affected by pain and the regions affected by IDA due to the pain, respectively. Overall prevalence of musculoskeletal pain was 41.4% (M 40.9%, F 42.2%) with a significant increase with age. Neck and shoulder area showed the highest prevalence of pain (20.3%; M 19.6%; F 21.3%), followed by lower back area (19.1%; M 20.1%; F 17.5%), hip and knee area (11.1%; M 9.1%; F 14.3%), elbow, wrist, and hand area (7.4%; M 6.6%; F 8.6%), and ankle and foot area (5.8%; M 5.5%; F 6.3%). Overall percentage of IDA in musculoskeletal pain was 20.5%. After adjustment for age and sex, the ranking of percentage of IDA in the pain was: (1) neck and shoulder area (31.0%), (2) elbow, wrist, and hand area (21.5%), (3) ankle and foot area (18.8%), (4) lower back area (17.9%), and (5) hip and knee area (17.4%). Overall percentage of treatment for musculoskeletal disorders was 6.6% (M 4.7%, F 9.7%), which remained 28.1% (M 21.6%, F 38.0%) even in those who described IDA due to pain. According to our estimates, 42.2 million (41.2%) of Japanese adults might suffer from musculoskeletal pain and 9.1 million (8.8%) might encounter IDA due to the pain. Because of high prevalence and IDA, musculoskeletal pain is one of the health problems to be given high priority in Japan.

Key words Cross-sectional study · Interference with daily activities (IDA) · Musculoskeletal pain · Prevalence

M. Suka (✉) · K. Yoshida
Department of Preventive Medicine, St. Marianna University School of Medicine, 2-16-1 Sugao, Miyamae-ku, Kawasaki 216-8511, Japan
Tel. +81-44-977-8111; Fax +81-44-977-8356
e-mail: suka@marianna-u.ac.jp

Introduction

Musculoskeletal disorders are a major health problem throughout the world. They have an enormous impact on individuals and societies and also on healthcare services and economies. As mentioned in the framework for Bone and Joint Decade 2000–2010 (http://www.bonejointdecade.org), population-based data on musculoskeletal disorders are required to work out preventive strategies in consideration of ethnic, geographic, and socioeconomic backgrounds. Musculoskeletal disorders include a variety of diseases and even complaints without objective findings. It may be useful to have a systematic grasp of the prevalence of musculoskeletal disorders beyond the limits of disease criteria that mainly consist of objective findings.

There are few studies that estimate the prevalence of musculoskeletal disorders, especially subjective complaints like pain, in a Japanese population. The National Life Survey can inform the prevalence of subjective complaints in a representative sample of the Japanese general population, but subjective complaints concerning musculoskeletal disorders are limited to stiff shoulders, lumbago, and arthralgia. In this study, we estimated the prevalence of musculoskeletal pain in five anatomical areas and their interference with daily activities (IDA) in a Japanese adult population.

Methods

Design

The study was designed as a cross-sectional survey with a self-administered questionnaire to participants in health examinations at three health care centers: (1) Niigata Healthcare Association (Niigata, Niigata prefecture), (2) Tsukuba Multiphasic Health Examination Center (Tsukuba, Ibaraki prefecture), and (3) Seirei Health Examination Center (Hamamatsu, Shizuoka prefecture). The questionnaire was personally delivered with a regular

health examination questionnaire in October and November 2003. Only those who agreed to the questionnaire survey turned in their questionnaires then and there. The questionnaire survey was approved by the ethics committee of St. Marianna University School of Medicine in September 2003.

Study population

In each health care center, about 1000 participants in health examinations were asked to complete the questionnaire anonymously. Most of them responded to the questionnaire. Among the total of 3273 respondents, we included 3188 eligible adult people who had information available on age, sex, and treatment for musculoskeletal disorders. Table 1 shows the age and sex distribution of the study population. No significant difference by sex was found in the age distribution.

Questionnaire

Subjects were asked whether they had experienced a pain in the following regions for more than 1 week during the preceding month: neck, shoulder (right/left), higher back, lower back, upper arm (right/left), elbow (right/left), lower arm (right/left), wrist (right/left), hand (right/left), finger (right/left), hip (right/left), femur (right/left), knee (right/left), crus (right/left), ankle (right/left), and foot (right/left). Subjects were also asked whether the pain had interfered with daily activities if they had experienced a pain. On a drawing with predefined body regions, those 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. Information on age, sex, and treatment for musculoskeletal disorders were collected together.

Prevalence

The prevalence of musculoskeletal pain was estimated for five anatomical areas: (1) neck and shoulder area (including neck, shoulder, and higher back), (2) elbow, wrist, and hand area (including upper arm, elbow, lower arm, wrist, hand, and finger), (3) lower back area (including lower back), (4) hip and knee area (including hip, femur, and knee), and (5) ankle and foot area (including crus, ankle, and foot). The number of areas affected by pain was counted from 0 to 5.

The percentage of IDA in musculoskeletal pain was estimated in each anatomical area. These percentages were adjusted for age and sex by the indirect method using the age- and sex-specific percentages of IDA in musculoskeletal pain in the study population as a standard.

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).

Statistical analyses

Statistical analyses were performed with the Statistical Analysis Systems (SAS, version 8.2). The prevalence of musculoskeletal pain was compared by chi-square test. Its trend was also examined by Cochran–Armitage test for trend if a significant difference was found by χ^2 test.

Results

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). 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 the prevalence 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). No significant difference by sex was found in the prevalence of musculoskeletal pain and IDA. Figure 1 shows the age- and sex-specific prevalence of musculoskeletal pain and IDA. The prevalence of musculoskeletal pain and IDA significantly increased with age in both sexes.

The neck and shoulder area showed the highest prevalence of pain (20.3%; men 19.6%, women 21.3%), followed by lower back area (19.1%; men 20.1%, women 17.5%), hip and knee area (11.1%; men 9.1%, women 14.3%), elbow, wrist, and hand area (7.4%; men 6.6%, women 8.6%), and ankle and foot area (5.8%; men 5.5%, women 6.3%). The prevalence of pain in elbow, wrist, and hand area and in hip and knee area was significantly higher among women than among men. Figure 2 shows the age- and sex-specific prevalence of musculoskeletal pain by anatomical area. The

Table 1. Study population

	Total	Age (years)					
		20–29	30–39	40–49	50–59	60–69	70–
Total	3188	154	497	1055	1003	407	72
		4.8%	15.6%	33.1%	31.5%	12.8%	2.3%
Men	1956	93	322	647	599	252	43
		4.8%	16.5%	33.1%	30.6%	12.9%	2.2%
Women	1232	61	175	408	404	155	29
		5.0%	14.2%	33.1%	32.8%	12.6%	2.4%

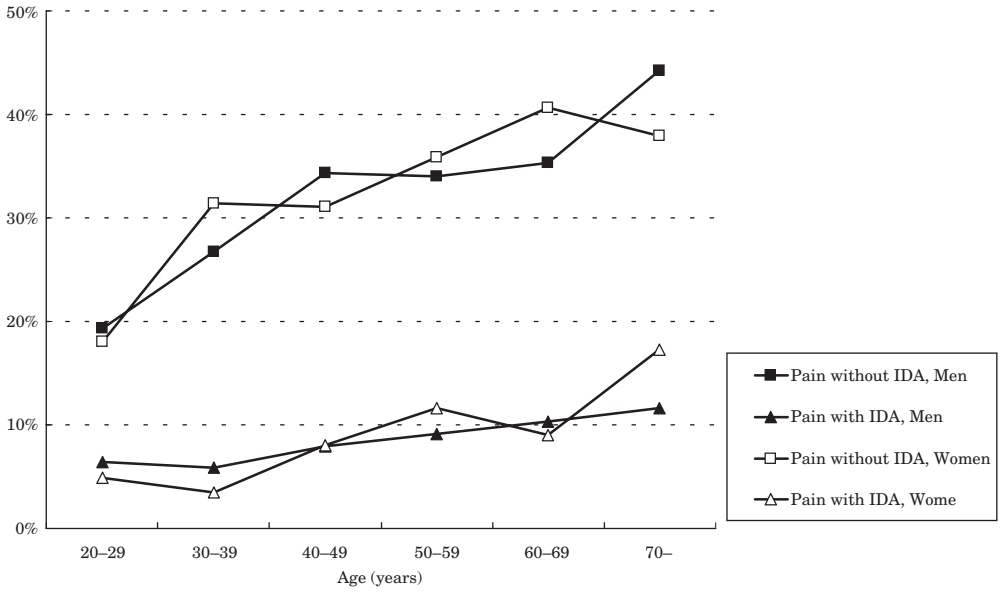

Fig. 1. Age- and sex-specific prevalence of musculoskeletal pain and interference with daily activities (*IDA*)

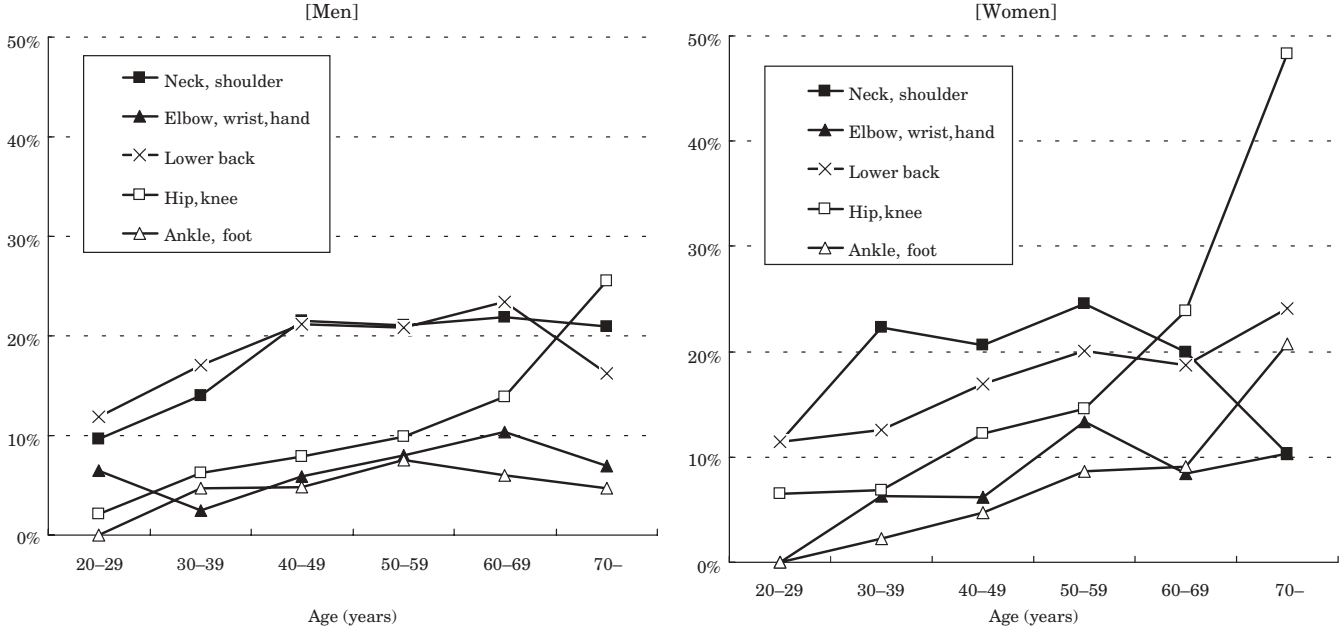

Fig. 2. Age- and sex-specific prevalence of musculoskeletal pain by anatomical area

prevalence of pain in every anatomical area, except for the neck and shoulder area (in women) and lower back area (both in men and in women), significantly increased with age. Pain in the hip and knee area showed a substantial increase with age, especially in the age groups of 50–59, 60–69, and 70 years or older, and this increase was steeper among women than among men. Pain in the lower back area in men and in women increased up to the age groups of 40–49 and 50–59 years, respectively, and then reached a constant level or decreased. Pain in the neck and shoulder area in women increased up to the age group of 50–59 years, and then decreased.

The clustering of areas affected by pain was observed in 16.0% of the study population. Of those who had experienced pain, 27.6%, 7.5%, and 3.5% had two, three, and four or more areas affected by pain, respectively. These percentages were 28.5%, 6.5%, and 2.4%, respectively, in men and 26.2%, 9.0%, and 5.4%, respectively, in women. The number of areas affected by pain significantly increased with age in both sexes.

Table 2. Percentages of interference with daily activities in musculoskeletal pain

	Age (years)	Total		Neck, shoulder		Elbow, wrist, hand		Lower back		Hip, knee		Ankle, foot	
		n	IDA	*n*	IDA	*n*	IDA	*n*	IDA	*n*	IDA	*n*	IDA
Total	Total	1320	270 (20.5%)	646	198 (30.7%)	235	52 (22.1%)	610	109 (17.9%)	354	63 (17.8%)	186	36 (19.4%)
	20–29	38	9 (23.7%)	16	8 (50.0%)	6	1 (16.7%)	19	4 (21.1%)	6	2 (33.3%)	0	0 (0.0%)
	30–39	166	25 (15.1%)	84	24 (28.6%)	19	2 (10.5%)	77	12 (15.6%)	32	4 (12.5%)	19	2 (10.5%)
	40–49	433	84 (19.4%)	223	64 (28.7%)	63	15 (23.8%)	206	36 (17.5%)	101	17 (16.8%)	50	11 (22.0%)
	50–59	451	102 (22.6%)	225	69 (30.7%)	102	27 (26.5%)	206	37 (18.0%)	118	19 (16.1%)	80	16 (20.0%)
	60–69	192	40 (20.8%)	86	29 (33.7%)	39	6 (15.4%)	88	18 (20.5%)	72	13 (18.1%)	29	5 (17.2%)
	70–	40	10 (25.0%)	12	4 (33.3%)	6	1 (16.7%)	14	2 (14.3%)	25	8 (32.0%)	8	2 (25.0%)
Men	Total	800	162 (20.3%)	383	123 (32.1%)	129	30 (23.3%)	395	73 (18.5%)	178	31 (17.4%)	108	20 (18.5%)
	20–29	24	6 (25.0%)	9	6 (66.7%)	6	1 (16.7%)	12	4 (33.3%)	2	0 (0.0%)	0	0 (0.0%)
	30–39	105	19 (18.1%)	45	18 (40.0%)	8	2 (25.0%)	55	10 (18.2%)	20	3 (15.0%)	15	2 (13.3%)
	40–49	273	51 (18.7%)	139	36 (25.9%)	38	9 (23.7%)	137	27 (19.7%)	51	7 (13.7%)	31	7 (22.6%)
	50–59	259	55 (21.2%)	126	41 (32.5%)	48	13 (27.1%)	125	20 (16.0%)	59	11 (18.6%)	45	7 (15.6%)
	60–69	115	26 (22.6%)	55	20 (36.4%)	26	4 (15.4%)	59	12 (20.3%)	35	6 (17.1%)	15	3 (20.0%)
	70–	24	5 (20.8%)	9	2 (22.2%)	3	1 (33.3%)	7	0 (0.0%)	11	4 (36.4%)	2	1 (50.0%)
Women	Total	520	108 (20.8%)	263	75 (28.5%)	106	22 (20.8%)	215	36 (16.7%)	176	32 (18.2%)	78	16 (20.5%)
	20–29	14	3 (21.4%)	7	2 (28.6%)	0	0 (0.0%)	7	0 (0.0%)	4	2 (50.0%)	0	0 (0.0%)
	30–39	61	6 (9.8%)	39	6 (15.4%)	11	0 (0.0%)	22	2 (9.1%)	12	1 (8.3%)	4	0 (0.0%)
	40–49	160	33 (20.6%)	84	28 (33.3%)	25	6 (24.0%)	69	9 (13.0%)	50	10 (20.0%)	19	4 (21.1%)
	50–59	192	47 (24.5%)	99	28 (28.3%)	54	14 (25.9%)	81	17 (21.0%)	59	8 (13.6%)	35	9 (25.7%)
	60–69	77	14 (18.2%)	31	9 (29.0%)	13	2 (15.4%)	29	6 (20.7%)	37	7 (18.9%)	14	2 (14.3%)
	70–	16	5 (31.3%)	3	2 (66.7%)	3	0 (0.0%)	7	2 (28.6%)	14	4 (28.6%)	6	1 (16.7%)

IDA, interference with daily activities

Table 3. Percentages of treatment for musculoskeletal disorder

	Ag (years)	Total		Pain without IDA		Pain with IDA	
		n	Treatment	*n*	Treatment	*n*	Treatment
Total	Total	3188	212 (6.6%)	1050	121 (11.5%)	270	76 (28.1%)
	20–29	154	4 (2.6%)	29	2 (6.9%)	9	1 (11.1%)
	30–39	497	11 (2.2%)	141	7 (5.0%)	25	3 (12.0%)
	40–49	1055	53 (5.0%)	349	27 (7.7%)	84	21 (25.0%)
	50–59	1003	76 (7.6%)	349	41 (11.7%)	102	32 (31.4%)
	60–69	407	56 (13.8%)	152	37 (24.3%)	40	14 (35.0%)
	70–	72	12 (16.7%)	30	7 (23.3%)	10	5 (50.0%)
Men	Total	1956	92 (4.7%)	638	52 (8.2%)	162	35 (21.6%)
	20–29	93	4 (4.3%)	18	2 (11.1%)	6	1 (16.7%)
	30–39	322	7 (2.2%)	86	4 (4.7%)	19	2 (10.5%)
	40–49	647	23 (3.6%)	222	12 (5.4%)	51	10 (19.6%)
	50–59	599	35 (5.8%)	204	20 (9.8%)	55	13 (23.6%)
	60–69	252	19 (7.5%)	89	11 (12.4%)	26	8 (30.8%)
	70–	43	4 (9.3%)	19	3 (15.8%)	5	1 (20.0%)
Women	Total	1232	120 (9.7%)	412	69 (16.7%)	108	41 (38.0%)
	20–29	61	0 (0.0%)	11	0 (0.0%)	3	0 (0.0%)
	30–39	175	4 (2.3%)	55	3 (5.5%)	6	1 (16.7%)
	40–49	408	30 (7.4%)	127	15 (11.8%)	33	11 (33.3%)
	50–59	404	41 (10.1%)	145	21 (14.5%)	47	19 (40.4%)
	60–69	155	37 (23.9%)	63	26 (41.3%)	14	6 (42.9%)
	70–	29	8 (27.6%)	11	4 (36.4%)	5	4 (80.0%)

IDA, interference with daily activities

Table 4. Estimated number of adult people with musculoskelectal pain in Japan

	Total	Neck, shoulder	Elbow, wrist, hand	Lower back	Hip, knee	Ankle, foot
	n	*n*	*n*	*n*	*n*	*n*
Total	42273 (41.2%)	18509 (18.0%)	7344 (7.2%)	18449 (18.0%)	15501 (15.1%)	6550 (6.4%)
Men	19877 (40.1%)	8878 (17.9%)	3269 (6.6%)	9120 (18.4%)	5093 (10.3%)	2294 (4.6%)
Women	22395 (51.9%)	9651 (22.4%)	4075 (9.4%)	9328 (21.6%)	10408 (24.1%)	4256 (9.9%)

n, thousand

Table 2 shows the percentages of IDA in musculoskeletal pain. The overall percentage of IDA in musculoskeletal pain was 20.5% (95%CI: 18.4–22.7; men 20.3%, 95%CI: 17.6–23.2; women 20.8%, 95%CI: 17.5–24.5). After adjustment for age and sex, the ranking of percentage of IDA in the pain was: (1) neck and shoulder area (31.0%, 95%CI: 26.1–37.0), (2) elbow, wrist, and hand area (21.5%, 95%CI: 16.5–29.4), (3) ankle and foot area (18.8%, 95%CI: 13.8–26.6), (4) lower back area (17.9%, 95%CI: 15.0–21.5), and (5) hip and knee area (17.4%, 95%CI: 13.9–22.2). However, when the distribution of pain was regrouped into three types (only upper body, only lower body, and both upper and lower body), those who had pain only in upper body showed a significantly lower percentage of IDA (15.9%, 95%CI: 12.8–20.0) in contrast to those who had pain only in lower body (19.7%, 95%CI: 16.4–23.9) and those who had pain in both upper and lower body (26.5%, 95%CI: 21.1–33.4).

Table 3 shows the percentages of treatment for musculoskeletal disorders. The overall percentage of treatment for musculoskeletal disorders was 6.6% (95%CI: 5.8–7.6). This percentage was significantly higher among women (9.7%, 95%CI: 8.2–11.5) than among men (4.7%, 95%CI: 3.9–5.7), with a significant increase with age. Even in those who described IDA due to pain, the percentage of treatment for musculoskeletal disorders remained 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).

Table 4 shows the estimated number of adult people with musculoskeletal pain in Japan. As of October 2003, 42.2 million (41.2%) Japanese adults suffered from musculoskeletal pain and 9.1 million (8.8%) encountered IDA due to the pain. Among the 9.1 million people who might be subject to medical treatment, 5.8 million people were left untreated.

Discussion

This is the first study to estimate the prevalence of musculoskeletal pain by anatomical area in a Japanese adult population. It is known that stiff shoulders and lumbago are the most common complaints both in community[1] and at the worksite,[2] but population-based data on other types of musculoskeletal pain are scarce. Moreover, the impact of musculoskeletal pain on daily life is still unclear. The findings of this study may provide useful information to devise preven-

tive strategies for musculoskeletal disorders from the basic statistics on musculoskeletal pain in Japan.

The overall prevalence of musculoskeletal pain was 41.4%, which is equal to or lower than that shown in other studies.[3–8] Besides racial and cultural backgrounds, the differences in design, setting, and definitions may explain most of the discrepancy in the prevalence of musculoskeletal pain. It is difficult to conclude solely from the results of this study that Japan has a lower prevalence of musculoskeletal pain than other countries.

No significant difference by sex was found in the overall prevalence of musculoskeletal pain, but the prevalence of pain in elbow, wrist, and hand area and in the hip and knee area were significantly higher among women than among men. Similar results were shown in other studies.[3,8] As a possible reason, the elbow, wrist, and hand area and the hip and knee area are subject to overloads beyond muscle strength and/or degenerative changes with aging (e.g., osteoarthritis, osteoporosis), which more frequently happen to women than to men. This explanation may be supported by the fact that the increase in pain in the hip and knee area with age was steeper among women than among men.

The prevalence of pain in most of the anatomical areas significantly increased with age. In this context, the number of areas affected by pain also significantly increased with age. Based on the results of this study and others,[3,4,8] the age-related patterns of the prevalence of pain probably vary according to anatomical area: pain in some anatomical areas (e.g., hip and knee area) monotonously increases with age, while that in other areas (e.g., neck and shoulder area, low back area) increases with age up to middle age, then reaches a constant level or decreases. It is difficult to explain in detail, but the sensitivity of degenerative changes with aging may play an important role in the differences by anatomical area.

As shown in other studies,[3,4,8] the top three areas affected by pain were (1) neck and shoulder area, (2) lower back area, and (3) hip and knee area. Meanwhile for the percentage of IDA in the pain, the top three areas were (1) neck and shoulder area, (2) elbow, wrist, and hand area, and (3) ankle and foot area. The areas with a high prevalence of pain were not exactly in agreement with those with a high percentage of IDA in the pain. Only the neck and shoulder area showed both the highest prevalence of pain and the highest percentage of IDA in the pain. Preventive strategies for musculoskeletal disorders should focus on pain in the neck and shoulder area.

Generally speaking, the areas located in the upper body showed a higher percentage of IDA in the pain than the areas located in the lower body. However, those who had pain only in the upper body showed a significantly lower percentage of IDA than those who had pain in both upper and lower body, while those who had pain only in the lower body did not. As a possible reason, those who had pain only in the upper body rather experienced local pain: those who described multiple areas affected by pain accounted for 8.4% of those who had pain only in the upper body in contrast to 18.4% of those who had pain only in the lower body. Based on the results of this study and others,[9,10] those who had pain in the lower body are more likely to describe multiple areas affected by pain. Such pain in the lower body may lead to disabilities for retention of standing and sitting positions, as well as locomotion.[9,10] It may be important to prevent the clustering of areas affected by pain, especially in the lower body.

In spite of the high prevalence of musculoskeletal pain, the percentage of treatment for musculoskeletal disorders was 6.6%, which remained 28.1% even in those who described IDA due to pain. Such a low percentage of treatment for musculoskeletal disorders was also shown in other studies.[8,10] A 4-year follow-up study showed a high incidence and low recovery rates of musculoskeletal pain in the community.[11] It may be important to design public education campaigns for the prevention and control of musculoskeletal disorders, and raise a sense of responsibility to look after oneself.

This study had the following possible limitations. First, the study population comprised participants under health examination. Those who have participated in a health examination during the last year account for 60.4% of the community population.[1] 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 4) may be overestimated. According to the 2001 National Life Survey, those who described stiff shoulders and lumbago accounted for 9.3% and 9.6% of the community population, respectively.[1] According to the 1997 National Survey on State of Employees' Health, these percentages were 51.9% and 39.9% of the worksite population, respectively.[2] The difference in setting (community or worksite populations) may explain most of the discrepancy between the two national studies. The corresponding percentages in this study (20.3% and 19.1%, respectively) were intermediate between the percentages in the two national surveys. The severity of the pain in this study probably differed from that in the 2001 National Life Survey: high percentages of treatment in those who had stiff shoulders (69.6%) and lumbago (82.1%) suggest that considerably severe pain was counted into the cases in the 2001 National Life Survey. In spite of the differences in design, setting, and definitions, this study and the 2001 National Life Survey showed a similar pattern of prevalence of the pain, i.e., a significant increase with age up to middle age. The findings of this study should be applied to the community population with care, but they are in all probability not likely to be far from the actual community population experience.

Second, some confounding factors were not adjusted exactly in this study. Previous studies showed that the following factors were associated with pain: residence (urban or rural areas),[5] education (low educational level),[5,6,8] household composition (living alone),[8] occupational status (manual worker),[3,5,6,10] body weight (obesity),[10] and smoking habit (smoker).[6] If adjusted for the confounding factors, the estimated number of adult people with musculoskeletal pain in Japan (Table 4) may slightly increase or decrease. Finally, IDA was not defined in consideration of its kind

and degree.[4,5,8] IDA includes a variety of personal and social activities, which consist of a combination of various physical functions. Each anatomical area is responsible for specific physical functions. In future studies, to compare the magnitude of IDA due to pain by anatomical area, IDA should be weighted according to its kind and degree using some kind of weighting function.

In conclusion, musculoskeletal pain is very common and it has a substantial impact on daily life in the Japanese adult population. According to our estimates, 42.2 million (41.2%) of Japanese adults might suffer from musculoskeletal pain and 9.1 million (8.8%) might encounter IDA due to the pain. Because of high prevalence and IDA, musculoskeletal pain is one of the health problems to be given high priority in Japan.

Acknowledgments This study was supported by the 2003–2004 Health and Labor Sciences Research Grant (Research on Prevention and Treatment for Immune Allergic Diseases) from the Japanese Ministry of Health, Labour and Welfare. We would like to thank all the staff of Niigata Healthcare Association, Tsukuba Multiphasic Health Examination Center, and Seirei Health Examination Center for their help and assistance of the questionnaire survey.

References

1. Japanese Ministry of Health and Welfare, Minister's Secretariat, Department of Statistics and Information (editors). The 2001 National Life Survey (in Japanese). Tokyo: Health and Welfare Statistics Association; 2003.
2. Japanese Ministry of Labor, Minister's Secretariat, Department of Policy Planning and Research (editors). The 1997 National Survey on State of Employees' Health (in Japanese). Tokyo: Institute of Labor Administration; 1998.
3. Andersson HI, Ejlertsson G, Leden I, Rosenberg C. Chronic pain in a geographically defined general population: studies of differences in age, gender, social class, and pain localization. Clin J Pain 1993;9:174–82.
4. Urwin M, Symmons D, Allison T, Brammah T, Busby H, Roxby M, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. Ann Rheum Dis 1998;57:649–55.
5. Bassols A, Bosch F, Campillo M, Canellas M, Banos J. An epidemiological comparison of pain complaints in the general population of Catalonia (Spain). Pain 1999;83:9–16.
6. Bergman S, Herrstrom P, Hogstrom K, Petersson IF, Svensson B, Jacobsson LTH. Chronic musculoskeletal pain, prevalence rates, and sociodemographic associations in a Swedish population study. J Rheumatol 2001;28:1369–77.
7. Ihlebaek C, Eriksen HR, Ursin H. Prevalence of subjective health complaints (SHC) in Norway. Scand J Public Health 2002;30:20–9.
8. Picavet HSJ, Schouten JSAG. Musculoskeletal pain in the Netherlands: prevalence, consequences, and risk groups, the DMC3-study. Pain 2003;102:167–78.
9. Odding E, Valkenburg HA, Algra D, Vandenouweland FA, Grobbee DE, Hofman A. Association of locomotor complaints and disability in the Rotterdam study. Ann Rheum Dis 1995;54:721–5.
10. Nagaosa Y, Kikuchi S, Konno S. Epidemiology of low back pain, sciatica, and knee pain: a cross-sectional questionnaire study (in Japanese). Seikei Saigai Geka 1994;37:59–67.
11. Elliot AM, Smith BH, Hannaford PC, Smith WC, Chambers WA. The course of chronic pain in the community: results of a 4-year follow-up study. Pain 2002;99:299–307.