Table 3 Factors in 6 years associated with the body build of girls from 3 years to 6 years

Factors in 6 years		Category	Normal/Normal (Group 1)		Obese/Normal (Group 2)		Normal/Obese (Group 3)		Obese/Obese (Group 4)		Among 4 groups χ^2 test P-value
			No.	%	No.	%	No.	%	No.	%	
Eating	Breakfast	Eat every day	3050/3299	92.5	221/251	**88.0**	43/246	**17.5**	168/182	92.3	0.012*
		Eat with his/her mother	2088/3306	63.2	156/250	62.4	147/245	60.0	119/182	65.4	0.691
	Eating between meals	Once a week or more	3079/3286	93.7	237/248	95.6	232/247	93.9	166/180	92.2	0.544
		Snacks	1755/3299	53.2	125/251	49.8	147/247	59.5	100/181	55.2	0.150
	Late-night meal	1–2 times a week or more	325/3307	9.8	29/251	11.6	28/247	11.3	28/181	15.5	0.080
		Soft drink (containing sugar)	49/864	5.7	3/67	4.5	7/59	11.9	6/51	11.8	0.083
		Confections	220/638	34.5	20/45	44.4	18/44	40.9	12/36	33.3	0.476
	Food	Rice	2473/3309	74.7	197/251	78.5	203/246	**82.5**	150/181	**82.9**	0.003**
		Breads	2106/3309	63.6	150/251	59.8	140/246	**56.9**	101/181	**55.8**	0.025*
		Milk	1587/3309	48.0	112/251	44.6	127/246	51.6	84/181	46.4	0.455
		Juices	424/3309	12.8	27/251	10.8	23/246	9.3	14/181	7.7	0.077
		Green tea	1065/3309	32.2	76/251	30.3	97/246	39.4	66/181	36.5	0.063
		Eggs/Meats	2322/3309	70.2	179/251	71.3	195/246	**79.3**	135/181	74.6	0.015*
		Vegetables	1015/3309	30.7	90/251	35.9	82/246	33.3	64/181	35.4	0.182
		Soup	288/3309	8.7	20/251	8.0	28/246	11.4	13/181	7.2	0.409
		Fruits	1190/3309	36.0	87/251	34.7	75/246	30.5	52/181	28.7	0.082
	Instant noodles	1–2 times a week or more	488/3078	15.9	34/226	15.0	46/235	19.6	22/175	12.6	0.267
	Eating out	1–2 times a week or more	180/3298	5.5	10/249	4.0	16/247	6.5	14/179	7.8	0.342
	Eating speed	Slightly rapid eating, rapid eating	177/3126	5.7	27/241	**11.2**	53/235	**22.6**	45/168	**26.8**	<0.0001**
Tutoring service		Participate	1996/3144	63.5	157/239	65.7	139/235	59.1	99/167	59.3	0.320
Sleep	Waking time	7 am or earlier	2587/3151	82.1	199/241	82.6	197/235	83.8	146/169	86.4	0.496
	Bedtime	10 pm or later	2825/3144	89.9	217/239	90.8	193/235	**82.1**	146/169	86.4	0.001**
	Duration of sleep	9 h or less	759/3145	24.1	65/239	27.2	68/235	28.9	52/169	30.8	0.078
Bowel movement (stool)	Frequency of evacuation	Once a day or more	2107/3123	67.5	163/239	68.2	169/232	72.8	123/169	72.8	0.196
	Regularity of evacuation	Almost regular, regular	1629/3122	52.2	132/239	55.2	134/234	57.3	111/169	**65.7**	0.003**
Physical activity	Physical exercise, play outside	Likes very much	1771/3143	56.3	126/241	52.3	117/233	50.2	86/169	50.9	0.164
		Plays frequently	1020/2347	43.5	60/174	34.5	73/187	39.0	60/137	43.8	0.126
Physical club activity		Participate	624/3123	20.0	50/239	20.9	57/234	24.4	35/166	21.1	0.428
	Frequncies of activity	4–5 times a week or more	9/621	1.4	0/50	0.0	1/56	1.8	1/35	2.9	0.736
	Duration of activity	Less than 1 h a time	150/620	24.2	16/50	32.0	10/57	17.5	8/34	23.5	0.385
TV viewing	Duration of viewing on weekdays	3 h a weekday or more	864/3125	27.6	69/241	28.6	73/234	31.2	68/170	**40.0**	0.005**
	Duration of viewing on holidays	4 h a holyday or more	942/2826	33.3	78/219	35.6	81/211	38.4	72/149	**48.3**	0.001**
Disposition of children	Enthusiastic	Relatively yes, Yes	2401/3127	76.8	186/241	77.2	166/233	71.2	122/168	72.6	0.168
	Prone to tantrums	Relatively yes, Yes	330/3142	10.5	24/241	10.0	35/234	15.0	17/169	10.1	0.190
	Competitive	Relatively yes, Yes	2289/3142	72.9	173/240	72.1	172/235	73.2	121/169	71.6	0.977
	Sociable	Relatively yes, Yes	756/3140	24.1	56/241	23.2	64/235	27.2	37/167	22.2	0.637
	Voluntary	Relatively yes, Yes	1971/3143	62.7	173/241	71.8	145/235	61.7	110/169	65.1	0.038*

*$P < 0.05$, **$P < 0.01$. For variables where there was a significant difference between the four groups, pairwise comparisons were undertaken, using Group I (Normal/Normal) as comparison, to determine the source of the difference (these numbers appear in bold).

interpretations for this association. Sakata and Yoshimatsu suggested, from the study of obese rats, that eating rate abnormalities might be the result of a defect in hypothalamic neuronal histamine.[21] Due to a lack of satiety, rapid eating may cause overeating before the stomach senses fullness. A study of a multicomponent and multidisciplinary after-school intervention program indicated the possibility for improving this behavior.[22]

Short sleep duration (≤9 h) reached statistical significance among boys, confirming previous reports.[23] Similar results were previously reported among girls in the Toyama study, which were derived from the same subjects at age 3 years.[7] Because these previous reports demonstrated an association between hyposomnia and obesity by multivariate methods, which took confounders into consideration, these results could minimize the possibility of either a sampling error or an information bias. Serotonin, involved in both bulimic behavior and sleeping disorders, and the reduction of lipolytic activity that is maximal at night, and the reduction of growth hormone secretion, may account for this association.[24] In the boys' analysis, although increase in height from 3 years to 6 years did not reach statistical significance ($P = 0.21$), we found that growth rate of height in short sleepers seemed to be higher (21.4 ± 3.9 cm vs 20.8 ± 3.8 cm). However, we need to ascertain whether obesity leads to a shortage of sleep or if short sleepers are at risk of obesity.

Conversely, early bedtime showed significant association with the girls' overweight groups, and this result seems contradictory to results of short sleep duration ostensibly. Further studies, which consider other factors, are needed to validate this discrepancy.

Evacuation frequency seemed to be higher among overweight groups in both genders, which might be caused by higher bowel movement. Alternatively, Pecora et al. reported that constipation frequency was significantly higher in obese patients than in normal-weight subjects.[26] Although we need further studies, we should not overlook the association between body build and autonomic imbalance.

Physical inactivity significantly associated with boys' overweight subjects. Physical inactivity is a well-known factor that influences obesity, and in addition, it is expected to provide substantial benefits in reducing future morbidity and mortality from several chronic diseases in adults.[27] Several studies indicated that today's children might be less fit than children several decades ago and they might become more sedentary than earlier.[27] It is necessary to conduct education in early childhood for both high-risk children and their parents, to increase physical activity in daily living. However, among girls, physical inactivity failed to reach statistical significance. There may be gender differences in influencing factors on developing obesity during early childhood, and it might be necessary and practicable to conduct health promotion programs according to sex aimed at preventing obesity.

Concerning boys' psychiatric dispositions, 'prone to tantrums' showed significant association with overweight groups. Although, other personality factors failed to reach significance, they also appeared to be associated with overweight groups. Previous studies have reported association between psychopathology and obesity in adolescence.[28,29] We should not fail to notice this association, and when we conduct education for obesity we should give greater weight to these psychiatric results.

In both genders, duration of TV viewing was significantly higher among overweight groups. Proportions of long TV viewing seemed to increase with BMI values in a dose-dependent manner. These results were consistent with previous reports.[30] Locard et al. suggested that TV viewing would reduce energy expenditure in daily life.[23] In addition to this, TV viewing means exposure to advertisements for food products that can be fattening.[31] A national report in Japan suggested that communication between parents and children represented by 'watching TV and having talks' trend upwards as the child grows older.[32] Therefore, it may be important to warn of the risks of long TV viewing, in regards to the development of obesity in early childhood. Before television games were widely preferred among Japanese children, we should also bear in mind this new environmental factor.[7,33]

Eating between meals was associated positively with the overweight group (group 3) among boys. A late, high-calorie dinner was known for its association with obesity. Yet, group 2 showed lower frequency of this item. Group 2 consisted of subjects who were overweight at age 3 years and became normal at age 6 years, and were characterized as 'improving obesity at age 6'. Therefore, this result might be explained by modification of an unhealthy lifestyle (i.e. late-night eating) from ages 3 to 6 years.

There are several limitations in this study. First, we have to consider that we have shown only 'associations' and not 'causality' of changes in children's body build. However, this relatively large cohort population study could be very helpful in teasing out developing child obesity and may help to form intervention strategies. Second, in this study we used anthropometrical measures (height and weight) at birth by the questionnaire. Although they were derived from trustworthy data, namely the Maternal and Child Health Handbook obliged by the Law for the Health of Mothers and Children, we should take into account the reproducibility of anthropometrical data in evaluating the correlations of BMI in different ages. Third, we undertook a large number of statistical analyses and we need to be aware of problems leading from multiple statistical testing. Although we quoted significance level of 0.05, UKPDS group paper used 0.01 and attention must be paid to the interpretation of the results.[16]

In summary, significant factors at age 6 years associated with the overweight body build were: diet items (rice, green tea, eggs, meat, less bread), rapid eating, short sleep duration,

early bedtime, long TV viewing, dislike of physical activity, and frequent bowel movements. Elucidating the factors promoting the reasons for overweight children will be useful in conducting effective health education, aiming both to prevent obesity in childhood and in early life as well as to reduce chronic diseases in adult life.

Acknowledgments

References

1 Sugimori H, Yoshida K, Miyakawa M, Izuno T, Takahashi E, Nanri S. Temporal course of the development of obesity in Japanese school children: a cohort study based on the Keio study. *J. Pediatr.* 1999; **134**: 749–59.

2 Yoshida K. *Epidemiological Analysis of Behavior and Lifestyles in Toyama Study. Psychosomatic Disturbance Research 'Research Concerning Prevention of Adult Chronic Disease from Childhood'.* Ministry of Health and Welfare, Japan, 1992 (in Japanese).

3 Berenson GS, Srinivasan SR, Hunter SM *et al.* Risk factors in early life as predictors of adult heart disease: The Bogalusa heart study. *Am. J. Med. Sci.* 1989; **298**: 141–51.

4 Shapiro LR, Crawford PB, Clark MJ, Pearson DL, Raz J, Huenemann RL. Obesity prognosis. A longitudinal study of children from the age of 6 months to 9 years. *Am. J. Public Health* 1984; **74**: 968–72.

5 Pi-Sunyer FX. Medical hazards of obesity. *Ann. Intern. Med.* 1993; **119**: 655–60.

6 NIH Technology Assessment Conference Panel. Methods for voluntary weight loss and control. *Ann. Intern. Med.* 1993; **119**: 764–70.

7 Sugimori H, Yoshida K, Miyakawa M, Izuno T, Kishimoto T, Takahashi E. Influence of behavioral and environmental factors on the development of obesity in three year-old children – A case-control study from Toyama study. *J. Environ. Health Prev. Med.* 1997; **2**: 74–8.

8 Takahashi E, Yoshida K, Sugimori H *et al.* Influence factors on the development of obesity in 3-year-old children based on the Toyama study. *Prev. Med.* 1999; **28**: 293–6.

9 Kagamimori S, Yamagami T, Sokejima S *et al.* The relationship between lifestyle, social characteristics and obesity in 3-year-old Japanese children. *Child Care Health Dev.* 1999; **25**: 235–47.

10 Yamagami T, Kagamimori S. *Report of establishment and proceeding in Toyama study. Psychosomatic Disturbance Research 'Research Concerning Prevention of Chronic Disease in Adulthood from in Childhood'.* Ministry of Health and Welfare, Japan, 1992 (in Japanese).

11 Sekine M, Yamagami T, Hamanishi S *et al.* Parental obesity, lifestyle factors and obesity in preschool children: results of the Toyama Birth Cohort study. *J. Epidemiol.* 2002; **12**: 33–9.

12 Sekine M, Yamagami T, Hamanishi S, Kagamimori S. Accuracy of the estimated prevalence of childhood obesity from height and weight values reported by parents: results of the Toyama Birth Cohort study. *J. Epidemiol.* 2002 January; **12**: 9–13.

13 Sekine M, Yamagami T, Handa K *et al.* A dose–response relationship between short sleeping hours and childhood obesity: results of the Toyama Birth Cohort Study. *Child Care Health Dev.* 2002; **28**: 163–70.

14 Saeki K. Definition for obesity in preschool children. *Health Care* 1995; **37**: 524 (in Japanese).

15 Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau, Health Resources and Services Administration and the Department of Health and Human Services. *Pediatrics* 1998; **102**: E29.

16 UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular complications in type 2 diabetes. UKPDS 38. *BMJ* 1998; **317**: 703–12.

17 Takada H, Harrell J, Deng S, Bandgiwala S, Washino K, Iwata H. Eating habits, activity, lipids and body mass index in Japanese children: the Shiratori Children Study. *Int. J. Obes. Relat. Metab. Disord.* 1998; **22**: 470–6.

18 Appleby PN, Thorogood M, Mann JI, Key TJ. Low body mass index in non-meat eaters: the possible roles of animal fat, dietary fibre and alcohol. *Int. J. Obes. Relat. Metab. Disord.* 1998; **22**: 454–60.

19 Hill SW, McCutcheon NB. Contributions of obesity, gender, hunger, food preference, and body size to bite size, bite speed, and rate of eating. *Appetite* 1984; **5**: 73–83.

20 Morio S, Sugihara J, Okamoto N, Suyama A, Okamoto M, Nakayama H. Follow-up study of obese pupils and their life styles in the lower grades of primary schools. *Nippon Koshu Eisei Zasshi* 1996; **43**: 238–45 (in Japanese).

21 Sakata T, Yoshimatsu H. Homeostatic maintenance regulated by hypothalamic neuronal histamine. *Meth. Find. Exp. Clin. Pharmacol.* 1995; **17** (Suppl. C): 51–6.

22 Hoerr SL, Nelson RA, Essex-Sorlie D. Treatment and follow-up of obesity in adolescent girls. *J. Adolesc. Health Care* 1988; **9**: 28–37.

23 Locard E, Mamelle N, Billette A, Miginiac M, Munoz F, Rey S. Risk factors of obesity in a five year old population. Parental versus environmental factors. *Int. J. Obes. Relat. Metab. Disord.* 1992; **16**: 721–9.

24 Jouvet M. Neuro mediateurs et facteurs hyponogenes. *Rev. Neurol.* 1984; **140**: 389–400.

25 Veldhuis JD, Iranmanesh A, Ho KK, Waters MJ, Johnson ML, Lizarralde G. Dual defects in pulsatile growth hormone secretion and clearance subserve the hyposomatotropism of obesity in man. *J. Clin. Endocrinol. Metab.* 1991; **72**: 51–9.

26 Pecora P, Suraci C, Antonelli M, De Maria S, Marrocco W. Constipation and obesity: a statistical analysis. *Boll. Soc. Ital. Biol. Sper.* 1981; **57**: 2384–8.

27 Harsha DW. The benefits of physical activity in childhood. *Am. J. Med. Sci.* 1995; **310** (Suppl. 1): S109–13.

28 Pine DS, Cohen P, Brook J, Coplan JD. Psychiatric symptoms in adolescence as predictors of obesity in early adulthood: a longitudinal study. *Am. J. Public Health* 1997; **87**: 1303–10.

29 MacReynolds WT. Toward a psychology of obesity. Review of research on the role of personality and level of adjustment. *Int. J. Eating Dis.* 1982; **1**: 37–57.

30 Gortmaker SL, Dietz WH Jr, Cheung LW. Inactivity, diet, and the fattening of America. *J. Am. Diet Assoc.* 1990; **90**: 1247–52.

31 Dietz WH Jr, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. *Pediatrics* 1985; **75**: 807–12.

32 Ministry of Health, Labour and Welfare. *White Paper: Annual report for health and welfare (Japan). Section 6. Changes in circumstances surrounding children. 1. Changes in the status of children and the family (1) The relationship between children and the family <3> Consumer Activity is often used as a means of communication between parents and children.* Gyousei, Tokyo, 1997.

33 Tazawa Y, Okada K. Physical signs associated with excessive television-game playing and sleep deprivation. *Pediatr. Int.* 2001; **43**: 647–50.

ORIGINAL ARTICLES

Health Examinations Should Expand Their Scope to Musculoskeletal Conditions: Estimation of Burden of Musculoskeletal Pain on AMHTS Population in Terms of Prevalence and Interference with Daily Activities

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ABSTRACT

Objectives To estimate the prevalence of musculoskeletal pain and their interference with daily activities (IDA) in Japan.
Design A cross sectional survey with a self administered questionnaire.
Setting N/A.
Participants Participants in AMHTS at three Japanese health care centers in October and November 2003.
Results Overall prevalence of musculoskeletal pain was 41.2% (Men 40.7%, Women 42.0%) with a significant increase with age. One person in five described IDA due to the pain (prevalence 8.4%; Men 8.2%, Women 8.7%).
Conclusions Because of high prevalence and IDA, musculoskeletal conditions should be identified as the major health problem in Japan. Health examinations should expand their scope to musculoskeletal conditions, following internal and mental conditions.
Key Words Musculoskeletal Conditions, Pain, Interference with Daily Activities, Prevalence, Questionnaire Survey

INTRODUCTION

Live long, Live well is a hope of every nation. In Japan, health examinations play an important part in the national health strategies and contribute to the national well-being on the basis of established legal systems. Early identification of diseases and their risk factors enables us to take preventive measures and receive medical treatment at the earliest opportunity, which may improve our health and quality of life (QOL). Recent changes in environment and lifestyle has brought about great changes in morbidity and mortality. Health examinations should be sensitive to the health needs of the times and deal with health problems that have great impacts on the national health and QOL for the time being.

Musculoskeletal conditions are prevalent and their burden is pervasive. They are the major cause of long-term pain and physical disability and substantially affect health and QOL. WHO identifies musculoskeletal conditions as a target and started a global campaign called the Bone and Joint Decade 2000–2010 (http://www.bonejointdecade.org). One of the

most important activities of the Decade is data collection, which enables the development of policies and strategies to improve the prevention and treatment of musculoskeletal conditions in consideration of ethnic, geographic, and socioeconomic backgrounds.[1] In Japan, population based data on musculoskeletal conditions are scarce, and there has been no report on overall prevalence of musculoskeletal conditions in the general population. According to the 2001 National Life Survey, those who described stiff shoulders, lumbago, and arthralgia in hands and feet accounted for 9.3%, 9.6%, and 5.9%, respectively.[2] Overall prevalence of musculoskeletal conditions should be considerably higher than that reported in the national survey, because musculoskeletal conditions include a variety of disease and even complaints without objective findings. Moreover, an increasing number of elderly people will lead to an increasing incidence of musculoskeletal conditions. As part of the Decade, we conducted a cross sectional survey with a self administered questionnaire to participants in AMHTS at three Japanese health care centers. In the questionnaire, subjects were asked whether they had experienced pains in predefined body regions and whether the pain had interfered with daily activities if they had experienced a pain. Here, we give a summary of the questionnaire survey. Our results demonstrate that because of high prevalence and interference with daily activities (IDA), musculoskeletal conditions should be identified as the major health problem in Japan. Health examinations should expand their scope to musculoskeletal conditions, following internal and mental conditions.

SUBJECTS AND METHODS

We conducted a cross sectional survey with a self administered questionnaire to participants in AMHTS 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. In each health care center, about one thousand participants in AMHTS were asked to complete the questionnaire anonymously. After reading the intent and purpose of the questionnaire survey, most of them agreed to the questionnaire

Right shoulder ( ) Left shoulder ( )
Right upper arm ( ) Left upper arm ( )
Right elbow ( ) Left elbow ( )
Right lower arm ( ) Left lower arm ( )
Right wrist ( ) Left wrist ( )
Right hand ( ) Left hand ( )
Right finger ( ) Left finger ( )
Right hip ( ) Left hip ( )
Right femur ( ) Left femur ( )
Right knee ( ) Left knee ( )
Right crus ( ) Left crus ( )
Right ankle ( ) Left ankle ( )
Right foot ( ) Left foot ( )

Neck ( )
Higher back ( )
Lower back ( )

O——— Area affected by musculoskeletal pain
●——— Area affected by interference with daily activities due to the pain
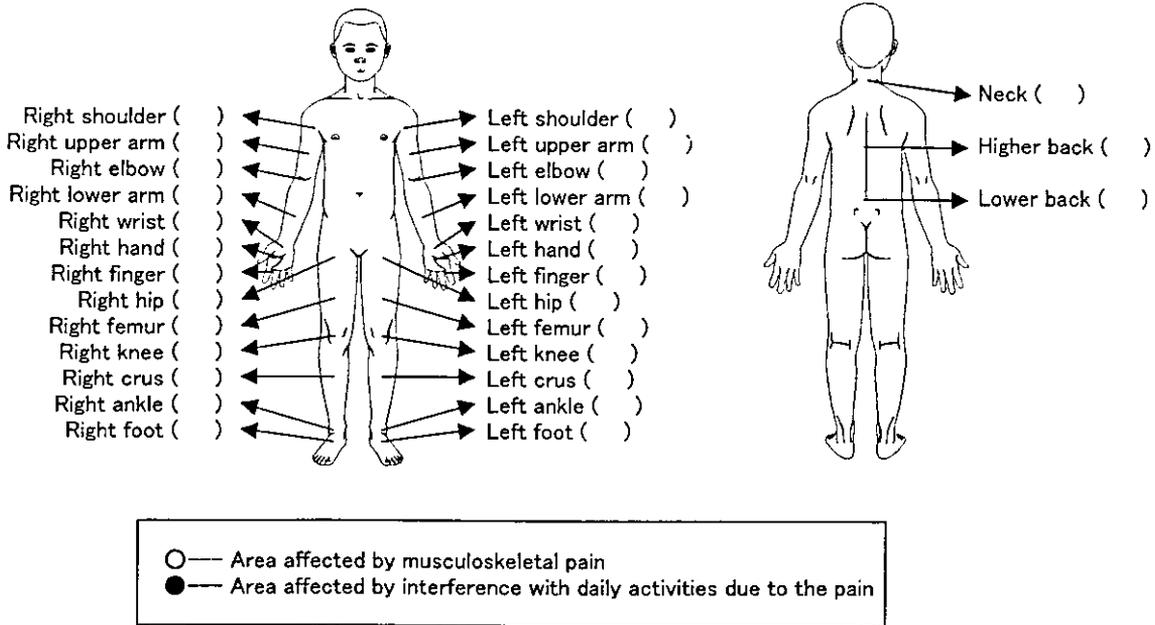
Fig. 1 Drawing with predefined body regions used in the questionnaire.

Table 1 Age and sex distribution of study subjects.

	Total	Age, y.o.					
		20–29	30–39	40–49	50–59	60–69	70–
Total	3,208	174	497	1,055	1,003	407	72
		17.3%	15.5%	32.9%	31.3%	12.7%	2.2%
Men	1,970	107	322	647	599	252	43
		17.9%	16.3%	32.8%	30.4%	12.8%	2.2%
Women	1,238	67	175	408	404	155	29
		16.6%	14.1%	33.0%	32.6%	12.5%	2.3%

survey and turned in their questionnaires then and there.

Subjects were asked whether they had experienced a pain in the following regions for more than one week during the last 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 (Fig. 1), 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.

The questionnaire survey was approved by the ethics committee of St. Marianna University School of Medicine in September 2003.

RESULTS

Among the total of 3,273 respondents, we obtained 3,208 eligible subjects who had information on age, sex, and treatment for musculoskeletal disorders available. Table 1 shows the age and sex distribution of study subjects. No significant difference by sex was found in the age distribution.

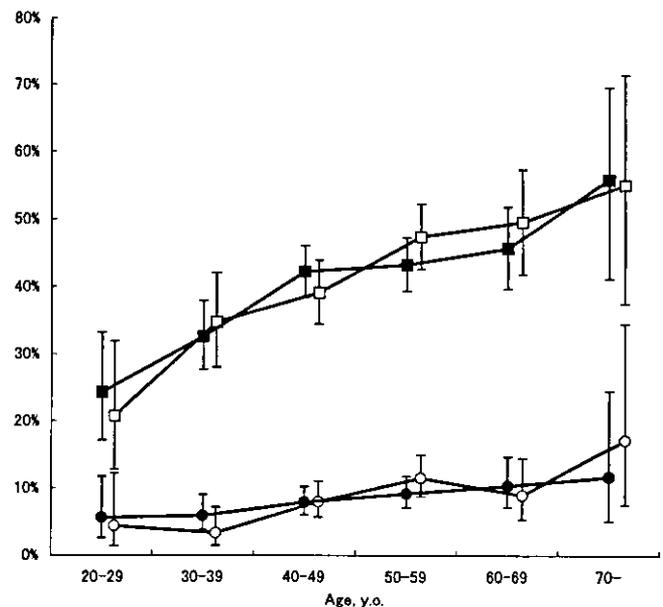Overall prevalence of musculoskeletal pain and IDA due to

Fig. 2 Prevalence of musculoskeletal pain (■ men; □ women) and interference with daily activities due to the pain (● men; ○ women).

the pain were 41.2% (95% CI: 39.5–42.9; Men 40.7%, 95% CI: 38.6–42.9; Women 42.0%, 95% CI: 39.3–44.8) and 8.4% (95% CI: 7.5–9.4; Men 8.2%, 95% CI: 7.1–9.5; Women

8.7%, 95% CI: 7.3–10.4), respectively. The rates were much the same after adjusted for the Japanese national census population in October 2003 (http://www.stat.go.jp/data/jinsui/2003np/index.htm). No significant difference by sex was found in the prevalence of musculoskeletal pain and IDA due to the pain. Figure 2 shows the age and sex specific prevalence of musculoskeletal pain and IDA due to the pain. The prevalence of musculoskeletal pain was significantly increased with age and exceeded 40% in the age groups of 40 years or older. Correspondingly, the prevalence of IDA due to the pain was significantly increased with age and exceeded 10% in the age groups of 50 years or older.

DISCUSSION

To our knowledge, this is the first study to estimate overall prevalence of musculoskeletal conditions in Japan. Previous studies showed the prevalence of specific diseases (e.g. rheumatoid arthritis, osteoarthritis, osteoporosis) and subjective complaints in specific body regions (e.g. stiff shoulders, lumbago, arthralgia in hands and feet), and there has been no report on overall prevalence of musculoskeletal conditions in the general population. Musculoskeletal conditions include a variety of disease and subjective complaints, which are usually associated with pain. On the other hand, pain is defined as the major component of QOL in most tools for assessing QOL.[3]-[6] Therefore, we conducted the questionnaire survey of musculoskeletal pain and their IDA to examine the impact of musculoskeletal conditions on Japanese health and QOL.

Overall prevalence of musculoskeletal pain was 41.2% (Men 40.7%, Women 42.0%) with a significant increase with age. According to the fifth National Circulatory Disease Survey in 2000, the prevalence of hypertension and hypercholesterolemia were 33.4% (Men 37.3%, Women 30.7%) and 31.5% (Men 28.3%, Women 35.1%), respectively.[7] According to the 2002 National Diabetes Survey, the prevalence of diabetes was 9.0%.[8] Our study subjects were participants in AMHTS, who are more likely to have awareness of their own health. Because of the selection bias, the prevalence of musculoskeletal pain may be overestimated. However, it is worth pointing out that the prevalence of musculoskeletal pain is equal to or higher than that of the major chronic diseases. Moreover, an increasing number of elderly people will lead to an increasing incidence of musculoskeletal conditions. One person in five described IDA due to the pain (prevalence 8.4%; Men 8.2%, Women 8.7%). Musculoskeletal pain is associated with both physical and mental distresses, which significantly deteriorate QOL. Because of high prevalence and IDA, musculoskeletal conditions should be identified as the major health problem in Japan.

In Japan, health examinations play an important part in the national health strategies on the basis of established legal systems. To be effective health strategies, health examinations should deal with health problems that have great impacts on the national health and QOL for the time being. Existing systems of health examinations focus on cancers and cardiovascular diseases, which are the major cause of death in Japan. Regular health examinations have hardly dealt with musculoskeletal conditions. To be sure, musculoskeletal conditions are usually nonfatal, but these diseases substantially affect health and QOL. As expressed in the words of Live long, Live well, the improvement of health and QOL in life is as important as longevity. Musculoskeletal conditions, as well as cancers and cardiovascular diseases, should deserve attention to promote the national well-being. Some randomized controlled trails for musculoskeletal pain showed that early identification and early interventions could relieve pain, prevent physical disability, and reduce health care consumption.[9]-[11] As mentioned by the U.S. Preventive Services Task Force, health examinations should select target conditions on the basis of burden and potential effectiveness of preventive intervention.[12] Musculoskeletal conditions meet the two requirements. Health examinations should expand their scope to musculoskeletal conditions, following internal and mental conditions.

We hope that every health examination organization takes an active interest in preventive measures for musculoskeletal conditions to improve the national health and QOL. Information on musculoskeletal pain and IDA due to the pain was briefly collected from the questionnaire, which demonstrates great potential of the questionnaire as a tool of assessing musculoskeletal conditions in health examinations. If the questionnaire is used as a supplement to a regular health examination questionnaire, health examinations will help early identification and early interventions for musculoskeletal conditions.

CONCLUSION

To estimate the prevalence of musculoskeletal pain and their IDA in Japan, we conducted a questionnaire survey on participants in AMHTS at three Japanese health care centers. Our results demonstrate that because of high prevalence and IDA, musculoskeletal conditions should be identified as the major health problem in Japan. Health examinations should expand their scope to musculoskeletal conditions, following internal and mental conditions.

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REFERENCES

[1] Lidgren L: The Bone and Joint Decade 2000-2010. Bull WHO 81: 629, 2003.

[2] Japanese Ministry of Health and Welfare, Minister's Secretariat, Department of Statistics and Information (eds). The 2001 National Life Survey. Tokyo: Health and Welfare Statistics Association, 2003 (in Japanese)

[3] The EuroQol group: EuroQol: A New Facility for the Measurement of Health Related Quality of Life. Health Policy 16: 199-208, 1990

[4] Ware JE Jr, Sherbourne CD: The MOS 36-item Short-form Health Survey (SF-36). I. Conceptual Framework and Item Selection. Med Care 30: 473-483, 1992

[5] Furlong WJ, Feeny DH, Torrance GW, Barr RD: The Health Utilities Index (HUI) System for Assessing Health-related Quality of Life in Clinical Studies. Qual Life Res 8: 209-224, 1999

[6] Hawthorne G, Richardson J, Osborne R: The Assessment of Quality of Life (AQoL) Instrument: A Psychometric Measure of Health-related Quality of Life. Ann Med 33: 375-384, 2001

[7] Japanese Ministry of Health and Welfare, Health Service Bureau, General Affairs Division: The Fifth National Circulatory Disease Survey in 2000. http://wwwdbtk.mhlw.go.jp/toukei/kouhyo/indexkk_18_1.html

[8] Japanese Ministry of Health and Welfare, Health Service Bureau, General Affairs Division: The 2002 National Diabetes Survey (preliminary report). J Health Welfare Statistics 50: 51-53, 2003 (in Japanese)

[9] Haugli L, Steen E, Laerum E, Nygard R, Finset A: Learning to Have Less Pain: Is It Possible?: A One-year Follow-up Study of the Effects of a Personal Construct Group Learning Programme on Patients with Chronic Musculoskeletal Pain. Patient Educ Couns 45: 111-118, 2001

[10] Linton SJ, Ryberg M: A Cognitive-behavioral Group Intervention as Prevention for Persistent Neck and Back Pain in a Non-patient Population: A Randomized Controlled Trial. Pain 90: 83-90, 2001

[11] Hagen EM, Eriksen HR, Ursin H: Does Early Intervention with a Light Mobilization Program Reduce Long-term Sick Leave for Low Back Pain?. Spine 25: 1973-1976, 2000

[12] U.S. Preventive Services Task Force: Guide to Clinical Preventive Services, second edition. Baltimore: Lippincott Williams&Willkins, 1996