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Orthopedic, ophthalmic, and psychiatric diseases primarily affect activity limitation for Japanese males and females: Based on the Comprehensive Survey of Living Conditions

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ABSTRACT

Background: Healthy life expectancy (HLE) is used as one of the primary objectives of fundamental health promotion plans and social development plans. Activity limitation is used to calculate HLE, but little study has been done to identify determinants of activity limitation in order to extend HLE. The purpose of this study is to identify diseases and injuries that commonly lead to activity limitation to prioritize countermeasures against activity limitation.

Methods: We used anonymous data from the 2007 "Comprehensive Survey of Living Conditions," collected by the Ministry of Health, Labour and Welfare of Japan according to the Statistics Act, Article 36. We used logistic regression analyses and calculated odds ratios (ORs) after adjusting for age and sex. Limitation in daily activities was applied as the dependent variable, and each disease/injury was applied as an independent variable in this analysis. Furthermore, population attributable fractions (PAFs) were calculated.

Results: The provided data included 98,789 subjects. We used data for 75,986 valid subjects aged 12 years or older. The following diseases showed high PAF: backache (PAF 13.27%, OR 3.88), arthropathia (PAF 7.61%, OR 4.82), eye and optical diseases (PAF 6.39%, OR 2.01), and depression and other mental diseases (PAF 5.70%, OR 11.55). PAFs of cerebrovascular diseases, hypertension, and diabetes were higher for males than for females; on the other hand, PAFs of orthopedic diseases were higher among females.

Conclusions: Our results indicate that orthopedic diseases, ophthalmic diseases, and psychiatric diseases particularly affect activity limitation.

1. Introduction

Healthy life expectancy (HLE) is used as one of the primary objectives of fundamental health promotion plans[1–4] and social development plans. Japan has adopted HLE as the first objective of the national health promotion plan, Health Japan 21 (the second term), which was launched in 2012, and also uses HLE as a domain in other plans, such as the Japan Revitalization Strategy. The United States used HLE as one of the main target objectives for Healthy People 2010 and Healthy People 2020. The European Union (EU) adopted Healthy Life Years (HLY), which is the same as HLE, in social development plans, such as the Lisbon Strategy and Europe 2020, in addition to the health promotion plan of the EU health programme. Health-adjusted life expectancy (HALE), which is a kind of HLE, is also used to compare health status between countries.[1,5–7] Prolonging HLE is important for health policy in each country and region. Several studies have investigated the risk factors of reduced HLE and reported effects of educational disparities, socioeconomic status, and chronic diseases.[8–10] Hashimoto[11] reported that elimination of diseases and injuries in Japan increased HLE.

There are several indices for HLE, such as life expectancy without activity limitation, good perceived health, absence of chronic morbidity, and the average period of time spent

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independently in daily activities. Among them, the most popular index is life expectancy without activity limitation, calculated by the Sullivan method[12] using mortality rates and proportion of activity limitation for each age group. Therefore, revealing determinants of activity limitation is useful for prolonging HLE, aside from determinants of mortality. WHO[13] defines activity limitation as difficulty encountered by an individual in executing tasks or actions in everyday life. Difficulties in activities of daily living (ADL) correspond to the most severe level of activity limitation.[14] Many studies[15–17] have examined the risk factors of impairment of ADL. However, activity limitation, which is used to calculate HLE, is less serious than ADL impairment, and the risk factors of the two might be different. It is important to identify determinants of activity limitation in order to extend HLE.

The purpose of this study is to identify diseases and injuries associated with activity limitation so as to prioritize countermeasures.

2. Methods

2.1. Data

We used data of activity limitation and diseases and injuries for treatment from the 2007 Comprehensive Survey of Living Conditions,[18] which is a self-administered questionnaire survey for all residents living in 5440 areas selected by stratified random sampling method of census enumeration districts in Japan.[19,20] This survey is conducted every 3 years. The response rate of the 2007 survey was 79.9%. Data were provided by the Ministry of Health, Labour and Welfare, Japan with permission according to the Statistics Act, Article 36. These data were resampled to make the original data anonymous. The 2007 data is the latest of the provided information.

Activity limitation in this survey was evaluated using the answer to the question “Is your daily life now affected by health problems?” A respondent who answered “Yes” was considered to have an activity limitation. On the other hand, a respondent who answered “No” was considered to be without activity limitation.

Diseases and injuries requiring treatment were evaluated by answers to the following two questions: “Do you now go to a hospital, clinic, or a facility for Japanese traditional massage, acupuncture, moxibustion, or judo-orthopedics for diseases or injuries?” and “What are your diseases or injuries?” The second question was multiple choice with questions regarding 39 diseases or injuries, and was asked of persons who replied “Yes” to the first question.

2.2. Statistical analyses

Odds ratios (ORs) of activity limitation for both sexes, and for males and females separately, were computed from logistic regression analyses adjusted for age group and sex (for both sexes). Being with or without activity limitation was assigned as a dependent variable. Each disease and injury for treatment was assigned as an independent variable for respective models. Analyses were performed with SPSS ver.21 for Windows (IBM, New York, NY, USA).

In addition, we computed population attributable fractions (PAF) for each disease and injury as follows:[21]

$$PAF_X = \{(RR_X - 1)/RR_X\}^*\{A_X/(A_X + NA_X)\}$$

where PAF refers to risk ratios (RR_x), number of affected individuals (A_x), and number of non-affected individuals (NA_x). The affected and non-affected individuals were among those having activity limitation. We considered the RRs and ORs to be approximated because the proportion with activity limitation was low among the subjects. In this study, PAF means the proportion of people for whom activity limitation would be expected to decrease if no participant suffered from this disease or injury.

3. Results

The provided data included 98,789 subjects. We used data for 75,986 subjects after eliminating 11,129 subjects who were less than 12 years old, 10,573 subjects who had invalid responses to the questions regarding activity limitation, and 1101 subjects w an invalid response to the questions regarding each disease and injury for treatment.

Table 1 shows the age-class distribution of the proportion of those with activity limitations by gender. The proportion of participants with activity limitation among old people was about 10 times higher than among young people. The proportion of participants with activity limitation for males was higher than for females among those under 20 years old and was the reverse among those over 20 years old.

Table 2 shows the number and proportion of outpatients with each disease and injury among males and females, respectively. We eliminated “infertility” from the analysis because its prevalence was very low. Diseases with high prevalence for both sexes were hypertension (9.88%), backache (5.25%), dental diseases (4.65%), eye and optical diseases (4.40%), hyperlipemia (3.81%), and diabetes (3.66%). These diseases were more prevalent among females than males, except for diabetes.

Table 3 shows the OR and PAF for each disease and injury. For both sexes, diseases and injuries showing high ORs were Parkinson's disease (19.27; 95% CI, 10.58–35.07), fracture (12.44; 95% CI, 9.91–15.63), depression and other mental diseases (11.55; 95% CI, 10.16–13.13), and other nervous diseases (9.37; 95% CI, 7.60–11.54). The OR of Parkinson's disease was 29.47 (95% CI, 11.56–75.11) for females and 13.15 (95% CI, 5.93–29.18) for males. In other words, the OR for females was 2.2 times higher than for males.

Diseases and injuries showing high PAF for both sexes were backache (13.27%), arthropathia (7.61%), eye and optical diseases (6.39%), depression and other mental diseases (5.70%), and diabetes

Table 1
Age-class distribution of the proportion of activity limitation by gender and age class.

	Male		Female	
	n	%	*n*	%
12–14	1385	5.85	1269	4.41
15–19	2424	5.53	2137	4.49
20–24	2195	3.87	2154	5.80
25–29	2382	5.00	2433	5.88
30–34	3069	5.05	3254	6.45
35–39	3219	5.90	3435	7.57
40–44	2778	6.44	2915	7.99
45–49	2750	6.84	2848	10.22
50–54	2921	8.87	2962	11.88
55–59	3626	11.20	3702	12.51
60–64	2810	13.67	2822	13.43
65–69	2506	17.16	2638	18.61
70–74	2049	23.47	2363	23.83
75–79	1473	28.65	1811	34.07
80–84	818	39.00	1342	42.77
85–89	325	43.08	689	54.28
90-	139	48.20	343	60.93
Total	36,869	10.96	39,117	13.90

% is the proportion of subjects with activity limitation divided by all subjects of the age class.

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