

RELATION BETWEEN SITTING TIME AND SOCIODEMOGRAPHIC FACTORS OF JAPANESE LIVING OVERSEAS

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Abstract. This study aimed to determine differences in sitting time based on certain sociodemographic factors among Japanese living overseas. Sitting times and sociodemographic factors were measured among 110 Japanese (mean age, 59.7±13.8 years) living in Ipoh, Perak, Malaysia from February to March 2015. Sitting time was defined as total sitting time per day as self-reported by the subjects. Differences in sitting time based on the sociodemographic factors were calculated by Mann-Whitney *U* test. Odds ratios (OR) and 95% confidence intervals (CI) were calculated for sitting times and sociodemographic factors using multivariate logistic regression analysis. Sitting times were higher in subjects <65 years old, males, with an occupation, non-married, and who drank alcohol. Of these, occupation was significantly associated with higher likelihood of long sitting time (OR=3.546; 95% CI: 1.056-11.912; *p*=0.039). These findings suggest that reducing sedentary behavior may be an important public health strategy in employed Japanese working overseas.

Keywords: sitting time, sociodemographic factors, overseas Japanese, Malaysia

INTRODUCTION

The database of the Ministry of Foreign Affairs of Japan shows that, as of October 1, 2015, the number of Japanese who resided outside the country was 1,317,078 people (Ministry of Foreign Affairs of Japan, 2016). This was an increase of 26,903 people (about 2.1%) over the previous year, and was the most since 1968 when this statistic began to be recorded. By region, Asia accounts for about 42% of

the long-stay travelers (357,966 people) and has consistently maintained the lead since 2006. Next is North America with about 30% (261,179 people), and Western Europe with about 18% (150,994 people). These three regions account for 90% of the long-stay travelers. In the Asian region, Malaysia has become the preferred location for Japanese long-stay travelers over the period from 2006 to 2014 (Long Stay Foundation, nd). Moreover, the number is increasing every year.

With regard to health care in the Japanese living overseas in Kuwait, a previous report suggested that Japanese businessmen had to adapt to climatic, religious, cultural, and historical differences. As a result, stress-related disease frequently

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occurred in 15.7% of the total cases, and some of the diseases were very severe (Toh, 1991). Moreover, the obesity rate of Malaysian people increased by more than three times from 1996 (4.4%) to 2006 (14%) (Khor, 2012). In addition, the risk factors of obesity, high blood pressure, and dyslipidemia have become factors that have increased the number of patients with cardiovascular disease (Ghazali *et al*, 2015).

Several previous studies have shown the promotion of physical activity (exercise, sports, and greater activities of daily living) to be effective not only in preventing and improving various diseases such as obesity, diabetes, high blood pressure, and some cancers but also in preventing the necessity of long-term care (Oka *et al*, 2014). However, even though physical activity is regularly promoted, recent research from America and Europe has clarified that people who sit for long periods of time (sedentary time as assessed by sitting time) are at increased risk for death, obesity, diabetes, and cardiac disease (Biswas *et al*, 2015). Moreover, the sitting time per day in Japanese adults was found to be longer than that of adults in foreign countries (Bauman *et al*, 2011). Therefore, to improve health care based on the Japanese lifestyle, it is important not only to promote physical activity but also to decrease the sitting time of the Japanese people (Oka *et al*, 2014).

However, very few reports have investigated the lifestyle of Japanese populations in terms of helping to increase the health of Japanese living overseas. Especially, there are no investigations of sitting times and related factors. Thus, we hypothesized that the amount of sitting time in Japanese living overseas is different depending on certain sociodemographic factors. Therefore, this study aimed to determine sitting time and differences

in these times based on the sociodemographic factors of Japanese people living overseas in Ipoh, Perak, Malaysia.

MATERIALS AND METHODS

Study design and population

This was a cross sectional study comprising a study population of 130 Japanese people, 20 years old or older, residing in Ipoh, Perak, Malaysia in 2015. A self-reported questionnaire was distributed to these 130 people who agreed to cooperate with local volunteers in this research. After the study population had completed the self-reported questionnaires; local volunteers then collected them.

Sitting time and sociodemographic factors, such as age, sex, level of education, marital status, occupation, alcohol intake, smoking behavior, and body mass index were measured. Sitting time was defined as the 'total sitting time per day' as self-reported in the questionnaire. This questionnaire survey was based on the Workforce Sitting Questionnaire (Chau *et al*, 2011); the psychometric properties of which (reliability and validity) have already been confirmed.

The questionnaire survey is composed of six items: sitting time over one week according to the daily life tasks of driving, transportation, work, television viewing, personal computer/smart phone use, and other leisure time activity. We requested that the participants provide sitting times for each item for both workdays and holidays.

After the questionnaire was collected, we calculated the total sitting time for each of the six items on the workdays and holidays. We also calculated the total sitting time (total sitting time in minutes/7 days) (min/day).

Sociodemographic factors were also

self-reported on the questionnaire. We respectively classified these variables into two groups: age (<65 years/≥65 years), sex (male/female), level of education (≤12 years/>12 years), marital status (married/single), occupation (full-time or part-time/none), alcohol intake (yes/no), and smoking behavior (yes/no) were measured. We also calculated body mass index obtained from height and weight and classified the participants as overweight/obese (≥25.0 kg/m²) or not (<25.0 kg/m²).

We investigated the following values: 1) final analysis of the population, 2) total sitting time per day, 3) differences in sitting time based on the sociodemographic factors, and 4) sociodemographic factors in relation to sitting time in the Japanese living overseas.

Statistical analysis

Results are expressed as mean ± standard deviation and percentage of values. We compared sitting time based on the sociodemographic factors using the Mann-Whitney *U* test and chi-square test. Logistic regression analysis was used to examine the association between sitting time and each variable. Sitting time (more than the average min/day or less than the average min/day) was used as the dependent variable whereas the independent variables included the sociodemographic factors. We selected as confounding factors those that were significantly different at $p < 0.05$ in bivariate analyses. The final logistic regression model was developed by simultaneous, collective, and direct analysis of all variables that were significantly associated with sitting time in the bivariate analyses ($p < 0.05$). A p -value of < 0.05 was considered to indicate statistical significance. Statistical analyses were performed with IBM SPSS 23.0[®] statistical software (IBM SPSS, Tokyo, Japan).

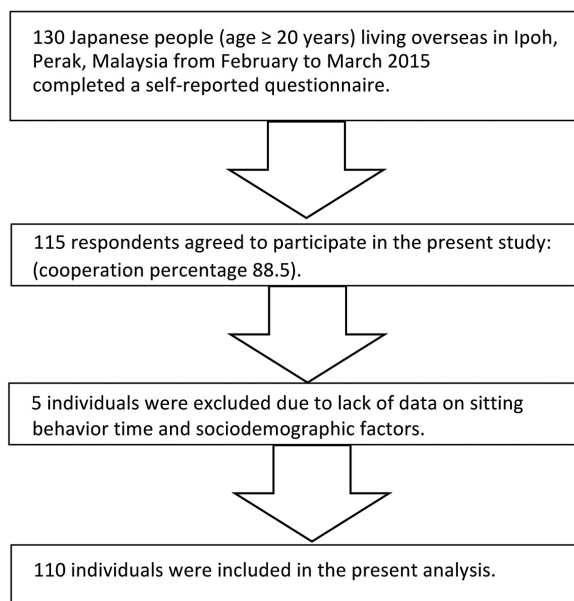


Fig 1—Schematic diagram of the participant selection process.

Ethical considerations

This study complied with the principles of the Declaration of Helsinki regarding investigations in humans. The Graduate School of Health Sciences, Kobe University Institutional Committee on Human Research, approved this study. Participants received explanations of the research procedures from the researchers and informed consent was obtained from them.

RESULTS

The return ratio of the self-reported questionnaire was 88.5% (115 of 130 subjects). Five of the 115 subjects were excluded from the analysis due to missing data or a double answer. Therefore, in the final analysis, we were able to analyze each index in 110 of the 130 subjects (84.6%) (Fig 1). The data collected from the self-reported questionnaire, including sit-

Table 1
Sociodemographic factors of the study population, N=110.

Variable	%
Age (<65 yr)	45.7
Sex (male)	63.6
Level of education	
≤ 12 yr	23.6
Marital status	
Married	93.6
Occupation	35.4
Alcohol intake	67.9
Smoking (%)	22.7
Body mass index (< 25.0 kg/m ²)	82.7

Values are presented as population-weighted percentage.

ting time and sociodemographic factors, are presented in Table 1. The mean age of this study population was 59.7 ± 13.8 years. In addition, sitting time per day was 408.6 ± 190.1 min/day (minimum: 100.0, maximum: 1,320.0; 25th, 50th, and 75th percentiles: 270.0, 385.0, and 541.9 min/day, respectively).

The differences in sitting time based on the sociodemographic factors are presented in Table 2. There were significant differences in sitting time by age, sex), marital status, occupation *vs* no occupation, and alcohol intake *vs* no intake. However, there were no significant differences in sitting time for level of education, smoking *vs* non-smoking and body mass index. Table 3 shows the results of the multivariate analysis of sociodemographic factors for sitting time. Logistic regression analyses were conducted with sitting time (≥ 400 *vs* < 400 min/day) as the dependent variable and the sociodemographic factors as the independent variables. Of these five factors, occupation was the only factor significantly associ-

ated with the likelihood of longer sitting time (odds ratio=3.546; 95% confidence interval: 1.056-11.912; $p = 0.039$).

DISCUSSION

The present study investigated sitting time and differences in these times based on certain sociodemographic factors in Japanese people living overseas. It was previously reported in cross-national research of sitting time on the weekday in adults of 20 countries around the world that many Japanese citizens are sitting the longest (median 420 min/day) (Bauman *et al*, 2011). The total average sitting time was 408.6 ± 190.1 min/day in the present study, which approximately supports the value of the weekday sitting time from the previous study. However, the present study evaluated total sitting time, which included weekdays and holidays. Thus, we need to evaluate the differences in these two time periods in a future trial. The present study showed sitting times in the subjects < 65 years of age, males, those with work, those not married, and those who drank alcohol to be greater than those in the subjects ≥ 65 years of age, females, those who were married, and those who did not drink alcohol.

A previous report found that the overall risk of total death increased by as much as 1.40 times in adults with ≥ 11 hours or more (660 min/day) of total sitting time per day compared to that in adults with < 4 hours (240 min/day) even if the amount of the physical activity recommended by the World Health Organization in 2015 was attained (van der Ploeg *et al*, 2012). Results of average sitting time as assessed by age, sex, occupation, and alcohol intake in the present study were less than the 660-min/day value. However, sitting time values tended to be increased for the fac-

Table 2
Differences in sitting time based on sociodemographic factors.

Variable	Rank Sum	Z	p-value
Age (<65/≥65 yr)	2,391.0/3,604.0	-4.178	<0.001
Sex (Male/Female)	4,404.5/1,700.5	-3.229	0.001
Level of education (≤12/>12 yr)	1,380.0/4,725.0	-0.443	0.657
Married/Not married	5,374.5/620.5	-2.912	0.004
Occupation/None	3,020.0/3,085.0	-5.347	<0.001
Alcohol intake/None	4,397.0/1,598.0	-2.123	0.034
Smoking/None	1,468.0/4,637.0	-0.574	0.566
Body mass index (< 25.0/≥ 25.0 kg/m ²)	4,964.5/1,140.5	-0.680	0.496

Mean ± SD standard deviation.

Table 3
Multivariate analysis of sociodemographic factors affecting sitting time.

Variable	OR	95% CI	p-value
Age (<65/≥65 yr)	0.572	0.194-1.690	0.312
Sex (Male/Female)	0.588	0.194-1.782	0.348
Married/Not married	2.043	0.211-19.779	0.537
Occupation/None	3.546	1.056-11.912	0.039
Alcohol intake/None	0.934	0.327-2.669	0.899

Logistic regression analyses were conducted with sitting time (≥400 min/day vs <400 min/day) as the dependent variable. Sociodemographic factors were included as independent variables. OR, odds ratio; CI, confidence interval.

tors of alcohol intake (438.6 ± 201.7 min), male sex (453.6 ± 203.8 min), age < 65 years (475.8 ± 160.1 min), occupation (537.3 ± 197.6 min), and not married (606.1 ± 156.7 min). Therefore, we need to find a new strategy to reduce sitting time in people with these sociodemographic values. In addition, after multivariate logistic regression analysis, occupation was significantly associated with the likelihood of longer sitting time (odds ratio=3.546; 95% confidence interval: 1.056-11.912, $p = 0.039$) in the Japanese subjects living overseas.

Thorp *et al* (2012) measured the sitting time of 193 Australian workers (average

age 37.2 years, male 34.2%, married 67.4%, post-school education 77%) with an activity meter (Actigraph GT1M, Pensacola, FL). As a result, the ratio of sitting time to total work hours was 77.0%. However, they showed that it was 63.0% during non-work hours, a difference of 14%. There are differences in age, sex, marital status, levels of education, and occupation, such as in the types of employment and businesses, between the previous study and our study. Therefore, their results cannot be directly compared with our results. However, we believe that Thorp *et al* (2012) support the finding of the present

study that the sitting time is longer in those with an occupation compared with those without an occupation.

There were no significant differences in education, overweight/obesity, and smoking in the present study, indicating that differences in these values may not effect sitting time. However, a previous cross sectional study found relations between sitting time (time spent watching television) and overweight/obesity in elderly people (Inoue *et al*, 2012). Therefore, it is necessary to classify the criteria of overweight and obesity in more detail and to examine the relation between overweight/obesity and sitting time in a future study.

Total sitting time was reported to increase as age increases although the total sitting time in one's thirties decreases slightly from that in one's twenties as measured by an activity meter (Actigraph Model 7164) in 6,235 adults including senior citizen who participated in the US National Health and Nutritional Examination Survey for 2003-2004 and 2005-2006 (Healy *et al*, 2011). It was suggested that the sitting time of elderly people tended to be longer than that of young and middle-aged people. However, the results of the present study were different from those of the US survey. We found the sitting time in subjects <65 years old to be longer than that in subjects ≥ 65 years old.

As one possible reason, the elderly participants in the present study may be retired from work. Thus, they may have the chance to participate in activities such as golf and to perform more physical activity compared to youths and middle-aged participants. However, as the methods of evaluating sitting time were different between the US survey and the present study, we simply note this finding here. This should be investigated in

greater detail in future trials.

Limitations of the present study include its small sample size and its cross-sectional nature in which data from self-reported questionnaires were evaluated. These deficiencies should be addressed in subsequent longitudinal studies.

Sitting time in this study includes the total time spent sitting during work, transportation and leisure time. Therefore, the details of sitting time for each life activity are not clear. Additionally, this study was carried out in one city only and by random sampling. Furthermore, a self-administered questionnaire was used in this research, thus allowing the possibilities of recall bias and inaccurate presumptions to affect the results.

This cross sectional study found that there were differences in sitting time based on age, sex, marriage status, occupation, and alcohol intake in Japanese people living in Ipoh, Perak, Malaysia. Of these factors, only occupation was significantly associated with the likelihood of longer sitting time in these Japanese dwelling overseas. These results may further reinforce the established importance of sitting time as related to certain sociodemographic factors, particularly occupation, in Japanese people dwelling overseas. We need to consider a strategy for work that reduces the amount of sitting time. These study results may also be useful for clinicians or community-based populations as targets for reducing sitting time on the basis of certain sociodemographic factors.

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