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Izawa, P. Kazuhiro

Oka, Koichiro

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Gender-related differences in sedentary behavior of Japanese living overseas

Kazuhiro P. Izawa^{1,2,3,*} and Koichiro Oka^{2,3}

¹ Department of Public Health, Graduate School of Health Sciences, Kobe University, Kobe 654-0142, Japan

² Faculty of Sport Sciences, Waseda University, Tokorozawa 359-1192, Japan; koka@waseda.jp (K.O.)

³ Cardiovascular stroke Renal Project (CRP), Kobe 654-0142, Japan

* Correspondence: izawapk@harbor.kobe-u.ac.jp; Tel.: +81-78-796-4566 (K.P.I.)

Background: The purpose of the present study was to clarify the differences in social demographic factors and sedentary behavior by gender in Japanese living overseas in Malaysia.

Methods: First, 130 subjects were surveyed by self-entry questionnaire for statistical factors related to social demographics and sedentary behavior. These factors were age (years), gender (man/woman), body mass index (BMI, kg/m²), educational history (>13 years, %), employment (full-time or part-time, yes, %), alcohol intake (a certain amount, yes, %), smoking behavior (yes, %), and marital status (yes, %). BMI, as obtained from the participants' weight and height, was collected from the self-reported questionnaire and assessed. Sitting behavior time as an index of sedentary behavior on workdays, non-workdays, and total time was identified by questionnaire. Data were analyzed using the chi square-test and t-test, respectively. The criterion for a statistically significant difference was $p < 0.05$.

Results: Finally, 107 subjects (68 men, 39 women) were analyzed. The ratios of social demographic factors of the men versus women group were age (58.5 ± 14.7 vs. 61.0 ± 12.1 years, $p = 0.36$), BMI (23.1 ± 2.6 vs. 21.8 ± 2.6 kg/m², $p = 0.01$), educational history (86.7% vs. 56.4%, $p < 0.001$), employment (51.5% vs. 10.3%, $p < 0.001$), alcohol intake (86.7% vs. 35.9%, $p < 0.001$), smoking behavior (30.9% vs. 10.3%, $p = 0.01$), and marital status (88.2% vs. 100%, $p = 0.02$). Sitting behavior time was 501.8 ± 254.6 vs. 346.0 ± 153.4 minutes ($p < 0.001$) on workdays, 415.1 ± 225.3 vs. 320.6 ± 178.7 minutes ($p = 0.019$) on non-workdays, and 458.5 ± 203.9 vs. 333.3 ± 132.1 minutes ($p < 0.001$) in total.

Conclusion: These findings indicated that social demographic factors and sitting behavior time differed by gender. However, there are some limitations. This was a cross-sectional study conducted in only one city with a small number of participants who completed a self-entry questionnaire. In conclusion, assessment of the differences in social demographic factors and postponement of sedentary behavior for both genders may reduce sitting behavior time in overseas Japanese residents and may help in developing public health strategies.

Keywords: Gender, social demographic factors, sedentary behavior, Japanese living overseas, Ipoh, Malaysia.

1. Introduction

Outside of North America, the numbers of Japanese people by world region who live in Asia are large [1]. Among Asian regions, Malaysia is increasingly becoming a long-stay destination for Japanese year by year [1]. Over the past 10 years, the rate of obesity in Malaysian people has rapidly increased [2]. In addition, a recent study of the trends in morbidities and healthcare utilization in

older Malaysian people from three nationwide community-based surveys suggested increasing trends in the prevalence of diabetes, hypertension, hypercholesterolemia, and obesity [3]. Risk factors such as obesity, hypertension, and dyslipidemia also increase the numbers of patients with cardiovascular disease [4]. Another study suggested that overweight and obesity are growing health problems both worldwide and in Malaysia due to such lifestyle changes as decreased physical activity (PA), increased sedentary behavior, and unhealthy eating habits [5]. In this study, there were gender-related differences of PA in these populations.

Performing PA is one effective means of preventing and ameliorating diseases such as obesity, diabetes, and heart disease. Several previous studies have shown the promotion of PA (exercise, sports, and increased activities of daily living) and exercise behavior to be effective in preventing and improving various diseases such as diabetes, obesity, some cancers, and high blood pressure [6, 7]. However, of great important, even if PA is regularly promoted, is that research in America and European countries in recent years has found that people with long sitting behavior time (sedentary time as assessed by time spent sitting) are at increased health risks for death, obesity, diabetes, and cardiac disease [7]. Therefore, it may be important not only to promote PA in the Japanese lifestyle but also to decrease sitting behavior time to improve health [6].

Moreover, in Japanese populations, there are gender-related differences in physical performance and PA not only for several diseases but also in community-dwelling individuals [8, 9]. However, there are very few data on the involvement of weekdays, holidays, or total time on sedentary behavior by gender. We hypothesized that there would be differences in social demographic factors and sedentary behavior according to gender and performed a study to verify this hypothesis. Thus, the purpose of this study was to clarify the differences in social demographic factors and sedentary behavior by gender in Japanese living overseas in Ipoh, Malaysia.

2. Materials and Methods

2.1 Data sources and search strategies

This was a cross-sectional study. The target population comprised 130 Japanese nationals aged 20 years or over living for 3 months or more in Ipoh, the capital city of the Malaysian state of Perak, in 2015 who consented to participate. The investigation was accomplished with a self-registered questionnaire that was distributed to these 130 participants by local volunteers who later collected the questionnaires after they had been filled out.

2.2 Social demographic factors

Social demographic factors were surveyed by self-entry questionnaire. The factors assessed were age (years), gender (man/woman), body mass index (BMI, (kg/m²), educational history (≥13 years, %), employment (yes, %), alcohol intake (yes, %), smoking (yes, %), and marital status (yes, %). BMI as obtained from the participants' height and weight were also collected from the self-reported questionnaire and assessed.

2.3 Sedentary behavior

The sedentary behavior questionnaire survey was based on the Workforce Sitting Questionnaire [10], whose reliability and validity were confirmed in a previous study in Japan [11]. This questionnaire survey is composed of six items related to sitting behavior time in one week according to typical life scenarios: driving, transportation, work, television viewing, personal computer/smart phone use, and other leisure time activity. We asked the participants to answer each item for both workdays and non-workdays for 7 days (1 week) [12].

After collecting the questionnaires, we calculated sitting behavior time as the index of sedentary behavior as related to the six life scenarios for workdays and non-workdays and total time for 7 days. After that, we calculated the workday and non-workday times and total sitting behavior time in minutes per day [13].

2.4 Ethics

The present study complied with the principles of the Declaration of Helsinki regarding investigations in humans. This study was approved by the Institutional Committee on Human Research of the Graduate School of Health Sciences, Kobe University. Written informed consent was obtained from each participant.

2.5 Statistical analysis

We divided the subjects into the men group and women group based on gender after collecting the questionnaires. We compared social demographic factors and workday, non-workday, and total sitting behavior times by gender using *t*-tests and the Chi-square tests. Results are expressed as mean $\pm$ SD. The criterion for a statistically significant difference was $p < 0.05$. Statistical analyses were performed with IBM SPSS 25.0 statistical software (IBM SPSS Japan, Inc., Tokyo, Japan).

3. Results

3.1. Participants

Among the 130 participants, 115 returned the self-registered questionnaire, giving a response rate of 88.5%. Several data in eight of the 115 questionnaires were missing or double answers were given, and these questionnaires were also excluded from the analysis. Finally, 107 (68 men, 39 women) of the 130 participants (82.3%) were analyzed.

3.2. Sociodemographic factors

Table 1 shows the sociodemographic factors in the present study. The social demographic factors of BMI, educational history, employment, alcohol consumption, and marital status differed significantly between the men and women. However, there was no significant difference in subject age between the genders.

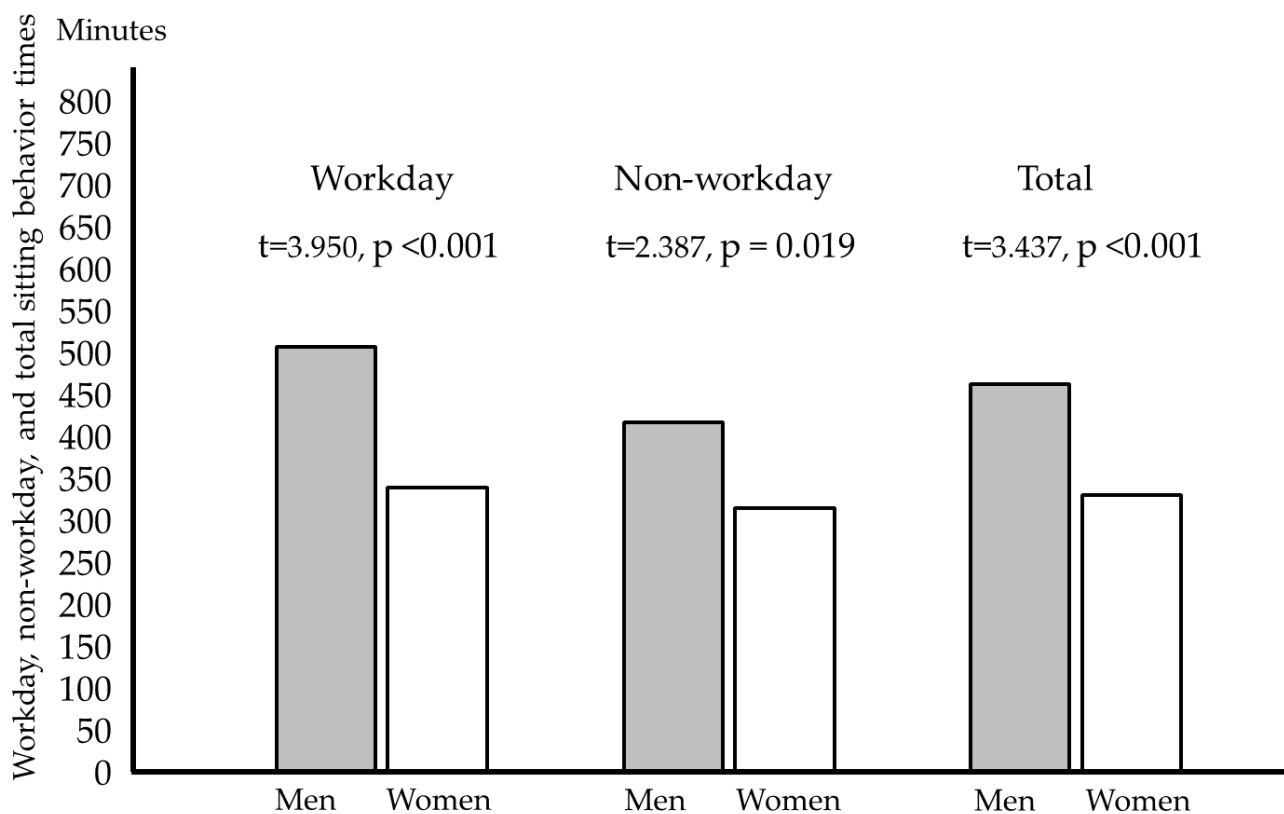
3.3. Sitting behavior time

Figure 1 shows the differences in workday, non-workday, and total sitting behavior times by gender. In the men versus women, sitting behavior time was 501.8 ± 254.6 vs. 346.0 ± 153.4 minutes ($t = 3.950$, $p < 0.001$) on workdays, 415.1 ± 225.3 vs. 320.6 ± 178.7 minutes ($t = 2.387$, $p = 0.019$) on non-workdays, and 458.5 ± 203.9 vs. 333.3 ± 132.1 minutes ($t = 3.437$, $p < 0.001$) in total.

Table 1 Sociodemographic factors of the study population.

Variable	Men	Women	t* & χ^2 value	p Value
No. of individuals	68	39	-	-
Age (years) (mean $\pm$ SD)	58.5 $\pm$ 14.7	61.0 $\pm$ 12.1	-0.954*	0.36
Body mass index (kg/m ²) (mean $\pm$ SD)	23.1 $\pm$ 2.6	21.8 $\pm$ 2.6	2.614*	0.01
Educational history ($\geq$ 13 years, %)	86.7	56.4	12.415	<0.001
Employment (yes, %)	51.5	10.3	18.175	<0.001
Alcohol intake (yes, %)	86.7	35.9	29.582	<0.001
Smoking (yes, %)	30.9	10.3	5.889	0.01
Marital status (yes, %)	88.2	100	4.959	0.03

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121 **Figure 1. The differences in workday, non-workday, and total sitting behavior times by gender**

4. Discussion

To our knowledge, this is the first time that differences in both social demographic factors and sedentary behavior have been compared by gender in Japanese living overseas. Compared to those of the women, the social demographic factors of BMI, educational history, working, alcohol intake, and smoking were higher in the men, but marital status was higher in the women. In addition, the values of sitting behavior time were higher for men compared to women on workdays and non-workdays and in total as identified by self-reported questionnaire.

4.1. Social demographic factors

High and low BMI are related with mortality and several diseases such as heart disease and cerebrovascular disease [14]. Educational achievement also affects the speed of cognitive decline [15]. However, a previous study in Japanese working men found that the age-adjusted prevalence of hypertension was higher for those employed and those who were unmarried, smoked, and consumed more alcohol [16]. Another recent study also suggested that socioeconomic and lifestyle factors such as being single, not working, and smoking were more frequently associated with depression in men compared to women [17]. In the present study, there were significant differences in the social demographic factors of BMI, educational history, employment, alcohol intake, smoking, and marital status by gender. Therefore, the relationship between gender differences in social demographic factors and various diseases and risk factors will require further study in Japanese living overseas.

4.2. Sitting behavior time

It was previously reported in cross-national research into weekday sitting behavior time of adults in 20 countries that many Japanese citizens are sitting too much as their sitting behavior time is the longest in the world (median 420 min/day) [18]. Our previous study reported a total average sitting behavior time of 408.6 ± 190.1 min/day [12]. However, there were significant differences in the workday, non-workday, and total sitting behavior times per day as evaluated by gender in the present study (Figure 1). The values of sitting behavior time were higher for men compared to women on workdays and non-workdays and in total. In particular, average sitting time on workdays by the men was 501.8 ± 254.6 min/day, and this was the longest time of all. A recent longitudinal cohort study suggested that stroke survivors were highly sedentary and remained so a year after stroke independently of their functional ability [19]. Another recent Japanese collaborative cohort study also suggested prolonged television watching to be a substantial risk factor for mortality from pulmonary embolism [20]. Therefore, future long-term follow-up will be required to evaluate the potential time-related benefits of reducing sitting behavior time by gender. The present study was not an intervention study, so we could not directly compare our findings with these previous studies. Thus, we may need to consider an interventional study in the future that assesses reductions in workday, non-workday, and total sitting time in workers by gender.

4.3. Study limitations

There are several limitations in the present study. This was cross-sectional study conducted in only one city with a small number of participants who completed a self-reported questionnaire. In addition, the three patterns of sitting behavior time, workday, non-workday, and total day, and the details of sitting behavior time were not adjusted for social demographic factors. Nevertheless, the values for sitting behavior time by gender that were determined may be important in future research. They may also represent appropriate targets of workday, non-workday, and total sitting behavior time to stimulate exercise behavior to improve the lifestyle of Japanese of both genders living overseas. These deficiencies should be addressed in subsequent longitudinal studies.

166 5. Conclusions

167 This cross-sectional study showed gender-related differences in sociodemographic factors and
168 in workday, non-workday, and total sitting behavior times of sedentary behavior. The findings may
169 further reinforce the established importance of sitting behavior time based on gender, particularly in
170 the male Japanese living overseas. In addition, we need to consider strategies to alter
171 sociodemographic factors and to stimulate men and women to reduce their sedentary behavior.
172 Assessment of the differences in social demographic factors and discouragement of sedentary
173 behavior based on gender may reduce sitting time for overseas Japanese residents and may help in
174 developing effective public health strategies to combat such behavior.

175 **Author Contributions:** K.P.I. and K.O. prepared the manuscript and researched the literature. K.P.I. conceived
176 and designed the study. K.P.I. collected the data. K.P.I. and K.O. analyzed the data. K.P.I. and K.O. drafted or
177 critically revised the manuscript for important intellectual content.

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185 **Conflicts of Interest:** The authors declare no conflicts of interest.

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