

# Type A Behavior Pattern and Obesity in Japanese Workers: A Cross-Sectional Study

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Obesity is associated with personality. The Type A behavior pattern (TABP), which is characterized by hostility and competitive behavior, is related to psychological stress. However, the relationship between obesity and the TABP has not been examined. This study aimed to examine the relationship between obesity and the Type A behavior pattern in 3,099 Japanese workers. The Type A behavior pattern was measured via the Maeda Type A Behavior Checklist. Data were analyzed using multivariate logistic regression adjusted for age, being current smokers, heavy drinker, lack of exercise, occupation, and rapid eating. The multivariate odds ratio (95% confidence interval) for obesity associated with TABP was 1.55 (1.13 to 2.13) in men. Regarding other variables, age, lack of exercise, and rapid eating were associated with obesity in men. The multivariate odds ratio (95% confidence interval) for obesity associated with TABP was 1.27 (0.81 to 2.02) in women. Regarding other variables, age and rapid eating were associated with obesity in women. The findings suggest that the Type A behavior pattern was associated with increased obesity prevalence in Japanese men. People with TABP tend to eat larger portions during mealtimes repeatedly by rapid eating; it is possible that eating large portions may lead to an increase weight in men with TABP.

ACTA MEDICA NAGASAKIENSIA 61: 105–110, 2018

**Key words:** obesity, Type A behavior pattern, eating behavior, psychological stress

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## Introduction

Obesity has recently become a serious, global medical and social issue. Because of the health-related damage caused by obesity, there is a need for psychosomatic treatment in general internal medicine. Obesity is a major cause of lifestyle-related diseases, such as diabetes, dyslipidemia, and hypertension, and it has been found to lead to heart diseases and stroke.<sup>1-2</sup> The Japan Society of the Study of Obesity defined a body mass index (BMI)  $\geq 25\text{kg/m}^2$  as a criterion for obesity, which is considered to be excessive accumulation of adipose tissue.<sup>3</sup>

Psychosocial factors, which includes eating behavioral abnormalities and personality, is considered to be one of the causes of obesity. Previous studies have reported that obesity is associated with personality.<sup>4-5</sup> Shim et al. examined the association between BMI and personality in Korean men and women; the results showed that obese men exhibited higher scores on openness to experience and lower scores on conscientiousness, while obese women exhibited higher scores on agreeableness and lower scores on neuroticism and openness to experience, relative to their counterparts of normal weight.<sup>4</sup> Kakizaki et al. examined the association

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Received August 7, 2017; Accepted November 2, 2017

between obesity and personality in Japanese people aged 40–60 years.<sup>5</sup> The results that showed extraversion and psychoticism were significantly and positively associated with being overweight in both men and women.<sup>5</sup>

A previous study reported that people with the Type A behavior pattern (TABP) have high stress.<sup>6</sup> The TABP has been associated with drive, competitive behavior, hostility, time urgency, self-confidence, nervousness, scrupulosity, and aggression.<sup>7</sup> According to a meta-analysis, the relationships between TABP characteristics including hostility as a personality trait promoted metabolic syndrome;<sup>8</sup> therefore, the hostility component of the TABP is related to metabolic syndrome. Furthermore, hostility is associated with lifestyle traits such as sedentary behavior, smoking, and drinking.<sup>9</sup> These behaviors increase the risk for the metabolic syndrome.<sup>10</sup> In a survey of Japanese people living in Hawaii, the TABP was associated with BMI in men.<sup>11</sup> However, no studies have examined the association between the TABP and obesity in Japanese workers.

We conducted a cross-sectional study that aimed to examine the relationship between obesity and the TABP in Japanese workers. We hypothesized that the TABP would be associated with increased obesity prevalence among Japanese workers.

## Materials and methods

### Participants and procedure

This cross-sectional study was conducted between August and September 2009. Employees of Nagasaki university who underwent a comprehensive health check-up were enrolled. In total, 3,099 potential participants were assessed for eligibility during periodical health examinations. Of these, 140 individuals with missing data were excluded. We therefore analyzed data from 2,959 participants (1,437 men, 1,522 women). The study was approved by the ethics committee of Nagasaki University (No. 12053007). All participants provided written informed consent to participate in the study. The dataset was anonymized appropriately prior to the initiation of the statistical analysis.

### Measurements

Height and weight were measured by a nurse at a health checkup venue using height and weight measurement scales. Obesity was defined according to the definition provided by The Japan Society of the Study of Obesity, wherein individuals with a BMI  $\geq 25$  kg/m<sup>2</sup> are considered obese.<sup>3</sup>

## Questionnaires

**Demographic variables.** The questionnaire cover sheet contained items pertaining to participants' demographic characteristics (i.e., age, sex, and occupation). Occupation was classified into three categories: (a) engineer, researcher, or teacher; (b) clerical staff; and (c) other. Those whose occupation was experimental assistant staff, clerical assistant staff, or service industry staff selected (c) "other".

**The TABP.** The TABP was measured using the Maeda Type A Behavior Checklist,<sup>12</sup> which comprises 12 items (Table 1). The total score on this measurement tool was positively correlated with the Type A scale score on the Jenkins Activity Survey ( $r = 0.72$ ).<sup>12</sup> Furthermore, Kojima et al. reported the scale's Cronbach's  $\alpha$  to be 0.80, demonstrating good internal consistency.<sup>13</sup> For items 5, 6, and 9, responses of "always," "often," and "never" were given four, two, and zero points, respectively. For the remaining items, responses of "always," "often," and "never" were given two, one, and zero points, respectively. The cutoff point was 17.

**Lifestyle habits (drinking, smoking, and exercise habits).** Participants were asked if they consume alcohol (every day, sometimes, hardly, or never). Further, the frequency of alcohol consumption (less than 20 g/day, 20–40 g/day, 40–60 g/day and more than 60 g/day).<sup>14</sup> Heavy drinker was defined as ethanol intake of at least 40 g/day in men and 20 g/day in women.<sup>15–17</sup> Participants were also asked if they smoke (habitually smoking/never) and if they exercise at least 30 minutes no more than twice per week (yes/no).<sup>14</sup>

**Rapid eating.** Participants were asked about their eating speed (slow, normal, or fast). Those who answered "fast" were considered to eat rapidly.<sup>14</sup>

### Data Analysis

We used  $\chi^2$  and  $t$  tests to examine the differences between the obesity and non-obesity groups. The multivariate logistic regression was performed, with the presence or absence of obesity as the dependent variable and various psychological and behavioral variables as independent variables according to sex. In addition, we calculated the odds ratio (OR) and 95% confidence interval (CI) for obesity. The analyses were performed to examine the following factors: age ( $\leq 29$ , 30–39, 40–49, 50–59, and 60–69 years), being a current smoker (yes, no), heavy drinker (yes, no), lack of exercise (yes, no), occupation (engineer, researcher, or teacher; clerical staff; and other) and rapid eating (yes, no). Covariates included age,<sup>18–19</sup> smoking habits,<sup>20–21</sup> drinking habits,<sup>22–23</sup> exercise habits,<sup>24–25</sup> occupation,<sup>17, 26</sup> and rapid eating,<sup>27–28</sup> which were

**Table 1.** Items of Maeda Type A Behavior Checklist

No	Items
1	Do you have a busy daily life?
2	Do you feel being pressed for time in your daily life?
3	Do you easily become enthusiastic over your job or other things?
4	When you are absorbed in your job, do you find it difficult to change your mind?
5	Are you a perfectionist?
6	Do you have confidence in yourself?
7	Do you easily feel tense?
8	Do you easily feel irritated or angry?
9	Are you punctual with everything?
10	Are you unyielding?
11	Do you have an intense temper?
12	Do you easily become competitive about job or other things?

*Note.* For items 5, 6, and 9, responses of “always,” “often,” and “never” were given four, two, and zero points, respectively. For the remaining items, responses of “always,” “often,” and “never” were given two, one, and zero points, respectively.

**Table 2.** Demographic characteristics of the obesity and the non-obesity group

Variable	All ( <i>n</i> = 2959)	Non-Obesity group ( <i>n</i> = 2408)	Obesity group ( <i>n</i> = 551)	<i>p</i> value
BMI <sup>a</sup>	22.09 ± 3.48	20.83 ± 2.16	27.62 ± 2.68	< .0001
TABP <sup>b</sup> score	11.79 ± 5.76	11.58 ± 5.62	12.72 ± 6.23	< .0001
Age ( <i>Mean</i> ± <i>SD</i> )	39.11 ± 11.20	38.23 ± 11.10	42.88 ± 10.84	< .0001
Men/Women	1437/1522	1028/1380	409/142	< .0001
Current smoker (%)	14.80	13.33	21.23	< .0001
Heavy drinker (%) <sup>c</sup>	6.42	6.42	6.80	0.7777
Lack of exercise (%) <sup>d</sup>	78.67	79.10	76.77	0.2316
Occupation				
Engineer, researcher or teacher (%)	35.69	35.51	36.48	0.6677
Clerical (%)	13.11	14.00	9.26	< .001
Other (%)	51.20	50.50	54.26	0.1103
Rapid eating (%)	28.89	25.96	41.74	< .0001

*Note.* <sup>a</sup> body mass index; <sup>b</sup> Type A behavior pattern; <sup>c</sup> heavy drinking was defined as ethanol intake of at least 40 g/day in men and 20 g/day in women; <sup>d</sup> exercise of at least 30 min no more than twice per week.

strongly related to obesity in the previous studies. In the univariate and multivariate logistic regression, we defined the group that answered “no” as a reference to the items of being a current smoker, heavy drinker, lack of exercise, and rapid eating. We set below the TABP cutoff score, under 29

years old, others in occupation as reference. All statistical analyses were performed using SPSS ver. 22.0 (IBM Institute Inc.), and *p* values of < 0.05 were considered statistically significant.

## Results

### 1. Demographic characteristics of the obesity and the non-obesity group

Table 2 shows the demographic characteristics of the obesity and the non-obesity groups as well as the results of the  $\chi^2$  and *t* tests, indicating differences between the groups. The proportions of participants in the obesity group who reported BMI  $\geq 25\text{kg/m}^2$ , TABP score, age, being current smoker, and rapid eating were significantly higher compared

to those observed in the non-obesity group ( $p < 0.0001$ ). The number of participants in the obesity group who reported clerical staff as occupation was significantly lower compared to those observed in the non-obesity group ( $p < 0.001$ ). The number of men was higher than women in the obesity group, while the number of men was lower than women in the non-obesity group ( $p < 0.001$ ).

### 2. Relationship between obesity and the TABP

We examined the relationship between obesity and the TABP by multivariate analysis adjusted for age, being a cur-

**Table 3.** Multivariate analysis of the associations between obesity (body mass index of  $\geq 25\text{kg/m}^2$ ) and demographic characteristics, drinking and smoking habits, exercise habits, and rapid eating

Variables	Men		Women	
	No. of persons with obesity/ No. of participants	Multivariate OR <sup>d</sup> (95%CI <sup>e</sup> )	No. of persons with obesity/ No. of participants	Multivariate OR <sup>d</sup> (95%CI <sup>e</sup> )
TABP <sup>a</sup>				
Non-TABP	281/805	1.00 (referent)	115/1178	1.00 (referent)
TABP	128/223	1.55 (1.13-2.13)	27/202	1.27 (0.81-2.02)
Age				
$\leq 29$	38/173	1.00 (referent)	30/494	1.00 (referent)
30-39	120/303	1.54 (0.90-2.64)	43/460	1.44 (0.88-2.36)
40-49	125/265	2.01 (1.18-3.41)	35/260	1.98 (1.17-3.36)
50-59	89/209	2.26 (1.31-3.91)	32/145	3.45 (2.00-5.94)
60-69	37/78	2.83 (1.43-5.59)	2/21	1.37 (0.30-6.32)
Current smoker				
No	306/780	1.00 (referent)	128/1307	1.00 (referent)
Yes	103/248	0.97 (0.68-1.36)	14/73	1.70 (0.91-3.17)
Heavy drinker <sup>b</sup>				
No	396/983	1.00 (referent)	127/1292	1.00 (referent)
Yes	13/45	0.66 (0.34-1.28)	15/88	1.45 (0.79-2.66)
Lack of exercise <sup>c</sup>				
No	107/314	1.00 (referent)	21/190	1.00 (referent)
Yes	302/714	1.59 (1.15-2.21)	121/1190	1.09 (0.66-1.80)
Occupation				
Engineer, researcher or teacher	158/419	1.03 (0.76-1.40)	43/436	0.87 (0.59-1.30)
Clerical staff	34/93	1.03 (0.60-1.77)	17/244	0.56 (0.32-0.98)
Other	217/516	1.00 (referent)	82/700	1.00 (referent)
Rapid eating				
No	229/692	1.00 (referent)	92/1091	1.00 (referent)
Yes	180/336	1.66 (1.23-2.23)	50/289	1.92 (1.32-2.80)

Note. <sup>a</sup> Type A behavior pattern; <sup>b</sup> heavy drinking was defined as ethanol intake of at least 40 g/day in men and 20 g/day in women; <sup>c</sup> exercise of at least 30 min no more than twice per week; <sup>d</sup> odds ratio; <sup>e</sup> confidence interval.

rent smoker, heavy drinker, lack of exercise, occupation, and rapid eating. Tables 3 show the results of the multivariate analysis of the associations between obesity (BMI of  $\geq 25\text{kg}/\text{m}^2$ ) and demographic characteristics, drinking and smoking habits, exercise habits, and eating behavior in men and women. The multivariate OR (95%CI) for obesity associated with TABP was 1.55 (1.13 to 2.13) in men. Other variables, associated with increased risk of obesity in men were 40-49 years (OR = 2.01, 95% CI = 1.18 to 3.41), 50-59 years (OR = 2.26, 95% CI = 1.31 to 3.91), 60-69 years (OR = 2.83, 95% CI = 1.43 to 5.59), lack of exercise (OR = 1.59, 95% CI = 1.15 to 2.21), and rapid eating (OR = 1.66, 95% CI = 1.23 to 2.23). The multivariate OR (95%CI) for obesity associated with TABP was 1.27 (0.81 to 2.02) in women. Other variables associated with an increased risk of obesity in women were 40-49 years (OR = 1.98, 95% CI = 1.17 to 3.36), 50-59 years (OR = 3.45, 95% CI = 2.00 to 5.94), and rapid eating (OR = 1.92, 95% CI = 1.32 to 2.80).

## Discussion

The findings suggest that the TABP could be associated with increased obesity prevalence, particularly among men Japanese workers. However, the TABP was not associated with obesity in Japanese women. Therefore, the hypothesis that the TABP would increase the risk of obesity was partially supported. Moreover, in Japanese men, the factors related to obesity were found to be age, lack of exercise, and rapid eating. In Japanese women, the factors related to obesity were found to be age and rapid eating.

The TABP as a risk factor of obesity in men might be related to eating large portions of food rapidly. Previous studies have reported that rapid eating is associated with current obesity.<sup>27-29</sup> In addition, rapid eating does not lead to a feeling of satiety;<sup>28</sup> therefore, it is possible that the TABP in men leads to overeating and increased risk of obesity. People with TABP tend to eat larger portions during mealtimes repeatedly by rapid eating; it is possible that eating large portions may lead to an increase weight in men with TABP.

In this study, the TABP was related to obesity in men; however, in women, there was no association between the TABP and obesity. The TABP in women may not increase eating portions by rapid eating. Moreover, in women, lack of exercise was not a risk of obesity. In this study, lack of exercise was observed in 71% of men and 86% of women ( $p < 0.0001$ ); in this study, women tended to exercise less frequently. Since women have a low basal metabolism, it is considered that lack of exercise was not related to obesity in

women. In addition, the factors related to obesity in men were found to be age, lack of exercise, and rapid eating. The factors related to of obesity in women were found to be age and rapid eating. In the previous studies, age,<sup>18-19</sup> exercise habits,<sup>24-25</sup> and eating behavior<sup>27-28</sup> were associated with obesity, and similar results were observed in the Japanese workers in the current study. It is known that obesity in men and women is prevalent in the middle age.<sup>18-19</sup> Obesity in women in their 40s to 50s is related to menopause.<sup>30</sup> In this study, the relationship between obesity and age were also similar.

This study involved four limitations. First, it was a cross-sectional study; therefore, we could not infer a causal relationship between the TABP and obesity. Second, the research targeted workers from only one workplace; therefore, the results are not generalizable to all workers. Third, the TABP could not be accurately grasped because we used a self-report questionnaire; therefore, it is difficult to determine which elements of the TABP affected obesity. Fourth, endocrine diseases including thyroid diseases,<sup>31-32</sup> metabolic diseases such as diabetes,<sup>33-34</sup> diseases requiring steroids,<sup>35-36</sup> psychiatric diseases<sup>37-38</sup> are associated with obesity. However, in this study, the participants were not inquired in detail regarding these diseases, and we did not exclude them from the analysis. Therefore, there is a limitation to the interpretation of the result of this study. Fifth, this study was targeted at university staff; the university staff's specific stress may have influenced this outcome.

The study has two clinical implications. First, the identification of TABP as a risk factor for obesity could contribute to obesity prevention. Second, reducing the tendency to eat rapidly could increase the effectiveness of efforts to lose weight.

We plan to conduct a longitudinal study to determine whether the TABP is a risk factor for obesity. Moreover, it is necessary to examine weight-loss programs that focus on the TABP, to verify the effects observed in the present study.

## Acknowledgments

This study was supported by Grants-Aid for Scientific Research from Japan Society for the Promotion of Science, 26870437. This paper received English proofread by Editage. We would like to express our gratitude to the participants in the present study. This study was supported by the Center for Health and Community Medicine at Nagasaki University.

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