

Relationship of obesity with lifestyle and eating habits among Thai young adults: Cross-sectional study

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Abstract

A cross-sectional study was conducted to examine the differences in biomarkers, lifestyles, eating habits, and interest in dieting associated with body type, specifically body mass index (BMI) category, among University students in Thailand. From 2017 to 2020, Thai university students were surveyed regarding their lifestyle and eating habits, using physical measurements and a questionnaire. A total of 207 male students and 507 female students were classified as “underweight,” “average weight,” “overweight,” or “obese” according to their BMI: these groups were compared in terms of their differences in biomarkers, lifestyle, and eating habits. Overall, 34.8% of men and 28.4% of women were classified as overweight or obese. Students of both genders in the overweight and obese group had higher body fat percentages, basal metabolic rates, and systolic/diastolic blood pressure (all $P < 0.0001$). Overweight and obese group students were more interested in dieting (men: $P = 0.0007$, women: $P < 0.0001$), and most of them reported that they had dieted in the past ($P = 0.222$, $P < 0.0001$). Additionally, the obese group was more likely to report eating quickly ($P = 0.107$, $P = 0.014$). The rate of obesity among Thai young adults was as high as that among Thai adults; continuous weight loss programs are necessary to prevent the development of lifestyle diseases.

1. Introduction

According to the World Health Organization Media Centre, in 2016, approximately 1.9 billion adults worldwide were overweight or obese^[1]. The prevalence of obesity worldwide nearly tripled between 1975 and 2016. Being Overweight and obese are associated with an increased risk of mortality than being underweight. The proportion of people with obesity is higher than that of underweight population across all regions worldwide, except in sub-Saharan Africa and parts of Asia. In Southeast Asia, rapid urbanization has led to rapid changes in urban lifestyles, coupled with high-energy, high-fat diets, resulting in lower physical activity levels

and energy expenditure^[2]. Globally, although Southeast Asia has the lowest rates of overweight and obesity, an alarming trend in the rate of increase has occurred over the last 10–15 years^[3].

In Thailand, the proportion of obese population has increased due to the improving income levels and the consumption of westernized diet^[4, 5]. In 2016, the proportion of the “overweight population” (Body mass index [BMI] ≥ 25) exceeded 30%, while that of the “obese population” (BMI ≥ 30) surpassed 10%; among the Association of Southeast Asian Nations countries, Thailand only ranked second to Malaysia in terms of overweight and obesity rates^[1]. According to the Global Health Metrics (2020), the leading causes of death in

Thailand have shifted from infectious diseases and injuries 10 years ago to lifestyle-related diseases such as ischemic heart disease and stroke, for which obesity is a risk factor^[6]. Obesity is also prevalent among young adults; the obesity rate among those aged 20 years, and living in suburban areas reportedly increased from 13.0% to 24.1% between 2012 and 2018^[7].

Maintaining an appropriate body weight from young adulthood is one of the most important factors in the prevention of lifestyle-related diseases and increasing healthy life expectancy: nutritional and health education are important in achieving these goals. However, in Thailand, only a limited number of studies have evaluated the body type and health risks in young adults using a small sample size^[8, 9].

In this study, we aimed to examine the differences in biomarkers, lifestyles, eating habits, and interest in dieting associated with body weight classification among young Thai adults; the survey was conducted over several years to reduce random errors in the participants and obtain a sample size that is larger than that in previous studies.

2. Methods

2.1. Participants

The survey questionnaire was administered to 228 male and 566 female Thai university students residing in suburban Bangkok (Thanyaburi) and suburban Chiang Mai from 2017 to 2020. We excluded 18 male and 41 female students with incomplete questionnaire survey results, and 3 male and 18 female students who did not undergo physical measurements; hence, only 207 male (20.39 ± 1.11 years) and 507 female (20.23 ± 1.11 years) students were included in the final analysis. The participants received complete explanations of the study details prior to the survey, and their consent was obtained in the questionnaire. The study was approved by the Life Sciences Research Ethics Review Committee of Otsuma Women's University (26-001-1).

2.2. Measurements

Physical measurements and biomarkers

Height was measured using In Lab 550 (InBody Japan Co., Ltd., Tokyo, Japan). Weight, body fat percentage (BFP), basal metabolic rate, and muscle mass were

measured using ACCUNIQ BC300 (Toyo Medic Co., Ltd., Tokyo, Japan). Blood pressure and heart rate were measured using HEM-7000 (OMRON Ltd., Kyoto, Japan).

Body weight classification

BMI was calculated based on the patient's height and weight using the following formula:

$$\text{BMI (kg/m}^2\text{)} = \text{weight (kg)}/\text{height (m)}^2$$

BMI < 18.5 was classified as "underweight," $18.5 \leq$ BMI < 25.0 as "average weight," $25.0 \leq$ BMI < 30.0 as "overweight," and BMI \geq 30.0 as "obese."

Lifestyle, eating habits, and dieting

Lifestyle (seven questions), eating habits (seven questions), and dieting (two questions) were surveyed using a self-administered questionnaire.

The lifestyle-related questions were as follows. The participants were asked regarding their living arrangements and were required to respond by choosing one of the following options: "living alone," "living with family", or "dormitory". With regard to exercise, the average daily walking time, including the time it takes to commute to school, was requested in a free-response format. With regard to sleep duration, they were asked the question "How much sleep did you usually get in the last year?" and responded by choosing one of the following options: "less than 5 hours," "5 hours to less than 6 hours," "6 hours to less than 7 hours," "7 hours to less than 8 hours," or "8 hours or more." With regard to the frequency of bowel movements, they responded to the question "How often do you have a bowel movement?" by selecting one of the following options: "once a day or more," "five to six times a week," "three to four times a week," or "less than 2 times a week." Moreover, the question "What is the usual consistency of your stools?" was asked, and the participants responded by selecting one of the following options: "loose stools," "normal stools," "hard stools," or "cycles of diarrhea and constipation." The participants' smoking habits were also determined using the question "Have you ever smoked one cigarette or more per day?" and they responded by selecting one of the following options: "never," "I smoked in the past but not now," or "I currently smoke." In response to the

question “Are you satisfied with your current life?,” the respondents answered by choosing between “satisfied,” “somewhat satisfied,” or “not satisfied.” With regard to menstrual cycles, the question “Is your menstrual cycle regular?” was asked, and the female participants responded by selecting one of the following options: “generally regular” or “irregular.”

The participants were asked about their daily eating habits regarding the following: “I eat breakfast”; “I eat snacks”; “I eat meat dishes”; “I eat vegetable dishes”; “I eat sweets”; “I eat quickly”; and “I try new foods and dishes.” For each question above, the following options were provided: “rarely,” “1–2 days a week,” “3–4 days a week,” and “almost daily.”

Meanwhile, the participants responded to the question “How strong is your current interest in dieting?” by selecting one of the following options: “not at all,” “not much,” “fair,” and “strong.” Furthermore, they were asked the question, “Have you ever been on a diet?” and responded as “never,” “previously dieted,” or “currently dieting.”

2.3. Statistical analysis

The numbers and percentages of participants in each body weight category (underweight, average weight, overweight, and obese) were determined separately for men and women. The biomarkers, lifestyle, eating habits, and dieting data were compared across the four groups. Qualitative variables were analyzed using the chi-square test or Fisher’s exact probability test, while quantitative variables were assessed using a one-way analysis of variance.

The statistical software SAS ver. 9.4 (SAS Institute Japan K.K., Tokyo, Japan) was used to perform all analyses, and the significance level was set at 5%.

3. Results

3.1. Body weight classification

Participants in the underweight, average weight, overweight, and obese groups accounted for 10.1%, 55.1%, 16.4%, and 18.4% of male students and 22.3%, 49.3%, 10.9%, and 17.6% of female students, respectively (Table 1).

3.2. Physical measurements and biomarkers

Height did not significantly differ across body types, for either men or women. For both genders, body weight, BMI, BFP, and basal metabolic rate were significantly higher in the average weight than in the underweight group, in the overweight than in the average weight group, and in the obese than in the overweight group (all $P < 0.0001$). Muscle mass in men was significantly higher in the obese group than in the underweight group. In women, no difference was observed in the muscle mass between underweight and average weight group participants, but it was significantly higher in the obese group. Systolic blood pressure in men was significantly higher in the obese group than in the underweight group, and in the average weight. Systolic blood pressure in women was significantly higher in the overweight group than in the underweight group. For both genders, the diastolic blood pressure in the obese group was significantly higher than in the other group. Heart rate did not differ significantly according to body type among men, but it was higher in the obese group among women (Table 2).

Table 1 Body shapes of Thai young adults

	Men (n=207)		Women (n=507)	
	Frequency	%	Frequency	%
Lean ($18.5 > \text{BMI}$)	21	10.1	113	22.3
Average ($18.5 \leq \text{BMI} < 25.0$)	114	55.1	250	49.3
Overweight ($25.0 \leq \text{BMI} < 30.0$)	34	16.4	54	10.7
Obese ($\text{BMI} \geq 30.0$)	38	18.4	90	17.8

BMI; body mass index

Table 2 Physical characteristics of Thai young adults by body shape

		Lean group	Average group	Overweight group	Obese group	P value [†]	Multiple comparison ^{††}
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Men							
n		21	114	34	38		
Height	cm	172.4 ± 8.8	171.4 ± 6.4	171.4 ± 6.8	172.9 ± 6.2	0.623	
Body weight	kg	51.8 ± 5.3	64.0 ± 7.2	80.5 ± 8.1	101.5 ± 13.4	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
BMI		17.4 ± 1.0	21.7 ± 1.7	27.3 ± 1.5	33.9 ± 3.8	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Body fat percentage	%	12.9 ± 5.4	18.1 ± 5.5	27.9 ± 6.5	34.6 ± 8.1	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Muscle mass	g	30.6 ± 10.5	36.0 ± 12.5	34.9 ± 11.0	41.6 ± 12.2	0.007	1-4
Basal metabolic rate	kcal	1351.7 ± 133.7	1490.2 ± 235.5	1609.5 ± 285.9	1866.9 ± 218.8	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Systolic blood pressure	mmHg	114.8 ± 14.6	121.2 ± 12.2	126.1 ± 14.0	132.7 ± 16.0	< 0.001	1-4, 2-4
Diastolic blood pressure	mmHg	66.8 ± 13.7	75.5 ± 11.7	78.4 ± 11.6	83.9 ± 18.8	0.0001	1-2, 1-3, 1-4, 2-4
Pulse	bmp	79.2 ± 9.8	79.3 ± 15.1	75.9 ± 14.7	81.9 ± 15.2	0.384	
Women							
n		113	250	54	90		
Height	cm	159.6 ± 5.6	159.4 ± 5.9	159.7 ± 6.3	160.8 ± 5.6	0.266	
Body weight	kg	43.9 ± 4.2	53.6 ± 6.2	70.5 ± 7.5	89.4 ± 11.8	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
BMI		17.2 ± 1.1	21.1 ± 1.8	27.6 ± 1.5	34.5 ± 3.6	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Body fat percentage	%	22.0 ± 4.5	29.2 ± 5.4	38.6 ± 5.2	45.0 ± 6.1	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Muscle mass	g	27.5 ± 26.1	27.0 ± 13.5	29.2 ± 10.4	34.3 ± 27.5	0.0237	2-4
Basal metabolic rate	kcal	1087.4 ± 82.6	1178.7 ± 142.0	1342.7 ± 141.3	1475.1 ± 170.9	< 0.001	1-2, 1-3, 1-4, 2-3, 2-4, 3-4
Systolic blood pressure	mmHg	104.3 ± 10.7	112.6 ± 57.8	129.9 ± 88.7	121.8 ± 12.4	0.008	1-3
Diastolic blood pressure	mmHg	66.7 ± 9.2	69.6 ± 10.5	77.9 ± 9.9	82.9 ± 10.3	< 0.001	1-3, 1-4, 2-3, 2-4, 3-4
Pulse	bmp	83.7 ± 14.1	84.0 ± 13.8	85.5 ± 11.3	88.6 ± 13.8	0.036	1-4

Lean group; 18.5 > BMI

Average group; 18.5 ≤ BMI < 25.0

Overweight group; 25.0 ≤ BMI < 30.0

Obese group; BMI ≥ 30.0

†; ANOVA

††; Tukey-Kramer method.

BMI; body mass index

3.3. Lifestyle

The proportion of women who reported having a bowel movement at least once daily differed significantly by body type (P=0.013), being the highest in the obese group. No difference was observed in the bowel movement among men. Women’s smoking habits also differed significantly according to body type (P=0.035); a higher proportion of women in the overweight group were current smokers, whereas no such difference was found among men. Life satisfaction among men differed significantly by body type (P=0.040), with a higher proportion of participants in the overweight group being dissatisfied. Though not statistically significant, a higher proportion of women in the overweight group were dissatisfied. Meanwhile, no differences were found in the living arrangements, stool consistency, or sleep duration between men and women, and in the menstrual cycle status among women. Additionally, walking time did not significantly differ according to

body type among men and women (Table 3).

Significant differences associated with body type were found with respect to the interest in dieting in both men and women (men: P=0.007, women: P<0.0001): more than 90% of men and women in the overweight and obese groups were “fairly” or “strongly” interested in dieting. Furthermore, a significant difference was observed in the women’s dieting experience based on body type (P<0.0001), with a higher percentage of respondents in the obese group having dieted in the past. Men’s dieting experience did not differ according to body type (Table 3).

3.4. Eating habits

Although not statistically significant for either men or women, more respondents in the underweight group answered “almost never” to the item “I eat breakfast” (men: P=0.659, women: P=0.060). A significant difference was found in the frequency of eating meat

dishes among women (P=0.015), with a higher proportion of overweight respondents answering that they ate meat dishes “almost every day.” Among women, although not statistically significant (P=0.081), the frequency of “eating vegetables” was lower in the overweight and obese groups than in the underweight group. Among men, a significant difference was observed in the frequency of eating snacks (P=0.034), and the percentage of those who answered “almost every day” was lower in the obese group than in the

underweight group; among women, the obese group tended to consume sweets more frequently (P=0.058). In both men and women, the proportion of respondents who answered “almost every day” to the item “I eat quickly” was higher in the overweight and obese groups (men: P=0.107, women: P=0.001). Among women, the proportion of those who answered “almost never” to the item “I try new foods and dishes” was higher in the underweight group (P=0.012) (Table 4).

Table 3 Lifestyle habits of Thai young adults by body shape

	Men				P value†	Women				P value‡
	Lean group (n=21)	Average group (n=114)	Overweight group (n=34)	Obese group (n=38)		Lean group (n=113)	Average group (n=250)	Overweight group (n=54)	Obese group (n=90)	
Walking time (per day)										
Minutes	40.3±32.0	63.9±88.8	85.04±117.4	65.7±108.3	0.535 †††	110.5±174.8	72.3±92.8	70.2±104.5	84.6±226.5	0.225 †††
Type of residence										
Living alone	9.5	10.1	0.0	5.4	0.157 ††	2.8	5.4	2.0	3.5	0.725 ††
Living with family	19.1	40.4	51.6	37.8		40.7	39.4	50.0	45.9	
Dormitory	71.4	49.5	48.4	56.8		56.5	55.2	48.0	50.6	
Sleep duration										
Less than 5 hours	9.5	10.5	0.0	10.5	0.621 ††	8.9	6.8	1.9	8.9	0.753
5 hours to less than 6 hours	33.3	38.6	32.4	34.2		29.2	33.2	31.5	38.9	
6 hours to less than 7 hours	42.9	35.1	44.1	36.8		35.4	33.6	33.3	25.6	
7 hours to less than 8 hours	9.5	11.4	20.6	7.9		19.5	21.6	27.8	20.0	
8 hours or more	4.8	4.4	2.9	10.5		7.1	4.8	5.6	6.7	
Frequency of bowel movements										
At least once daily	81.0	84.2	88.2	94.7	0.730 ††	57.5	59.6	68.5	78.9	0.013
5-6 times/week	9.5	7.9	5.9	5.3		8.9	12.4	16.7	8.9	
3-4 times/week	4.8	6.1	5.9	0.0		22.1	20.0	11.1	10.0	
Less than twice weekly	4.8	1.8	0.0	0.0		11.5	8.0	3.7	2.2	
State of bowel movements										
Loose stools	4.8	6.3	11.8	0.0	0.173 ††	5.4	4.0	3.7	7.9	0.354 ††
Normal stools	90.5	88.4	76.5	100.0		76.6	81.1	90.7	82.0	
Hard stools	4.8	1.8	5.9	0.0		6.3	6.9	0.0	4.5	
Cycles of diarrhea and constipation	0.0	3.6	5.9	0.0		11.7	8.1	5.6	5.6	
Smoking habits										
Never	85.7	70.2	67.7	73.7	0.406 ††	96.5	91.2	87.0	97.8	0.035 ††
Previous smoker	4.8	13.2	20.6	5.3		2.7	4.4	3.7	2.2	
Current smoker	9.5	16.7	11.8	21.1		0.9	4.4	9.3	0.0	
Level of satisfaction with life										
Satisfied	95.2	78.1	55.9	83.8	0.040 ††	84.4	81.8	69.2	78.7	0.408
Somewhat satisfied	4.8	13.2	29.4	10.8		11.9	12.6	21.2	15.7	
Not satisfied	0.0	8.8	14.7	5.4		3.7	5.7	9.6	5.6	
Interest in dieting										
Not at all	60.0	8.2	0.0	4.6	0.007 ††	30.2	1.5	0.0	2.1	<.0001 ††
Not much	0.0	6.6	5.0	4.6		12.7	6.6	0.0	6.4	
Slight	30.0	45.9	40.0	36.4		34.9	52.6	52.9	57.5	
Strong	10.0	39.3	55.0	54.6		22.2	39.4	47.1	34.0	
Dieting experience										
Never	66.7	34.4	14.3	26.1	0.222 ††	51.6	18.3	5.7	10.9	<.0001
Previously dieted	22.2	36.1	52.4	43.5		34.4	51.8	54.3	69.6	
Currently dieting	11.1	29.5	33.3	30.4		14.1	29.9	40.0	19.6	
Menstrual Cycle										
Generally regular						37.5	48.5	58.1	44.9	0.133
Irregular						62.5	51.5	41.9	55.1	

Lean group; 18.5 > BMI
 Average group; 18.5 ≤ BMI < 25.0
 Overweight group; 25.0 ≤ BMI < 30.0
 Obese group; BMI ≥ 30.0
 †; Chi-square test
 ††; Fisher's exact test.
 †††; ANOVA
 BMI; body mass index

Table 4 Eating habits of Thai young adults by body shape

	Options *	Men				P value †	Women				P value †
		Lean group (n=21)	Average group (n=114)	Overweight group (n=34)	Obese group (n=38)		Lean group (n=113)	Average group (n=250)	Overweight group (n=54)	Obese group (n=90)	
I eat											
Breakfast	1	33.3	20.2	21.2	15.8	0.659	28.3	20.8	18.5	8.9	0.060
	2	14.3	32.5	30.3	36.3		31.9	34.0	25.9	37.8	
	3	38.1	24.6	27.3	29.0		21.2	24.0	22.2	28.9	
	4	14.3	22.8	21.2	29.0		18.6	21.2	33.3	24.4	
Snacks	1	9.5	13.3	6.1	15.8	0.034 ††	7.1	8.8	11.3	11.2	0.320
	2	14.3	41.6	33.3	39.5		32.1	36.0	22.6	30.3	
	3	38.1	26.6	39.4	31.6		25.9	31.6	39.6	34.8	
	4	38.1	18.6	21.2	13.2		34.8	23.6	26.4	23.6	
Meat dishes	1	2.7	1.2	1.9	1.1	0.107 ††	0.0	0.9	0.0	0.0	0.015 ††
	2	24.8	14.9	9.3	12.4		10.0	13.3	6.1	13.5	
	3	23.9	29.7	42.6	33.7		55.0	29.2	27.3	37.8	
	4	48.7	54.2	46.3	52.8		35.0	36.6	66.7	48.7	
Vegetables	1	4.8	2.6	3.0	5.3	0.932 ††	8.9	4.4	3.7	3.3	0.081
	2	23.8	27.2	21.2	18.4		25.7	20.0	33.3	21.1	
	3	38.1	35.1	45.5	47.4		29.2	43.2	38.9	46.7	
	4	33.3	35.1	30.3	29.0		36.3	32.4	24.1	28.9	
Sweets	1	19.1	21.4	12.1	16.2	0.705 ††	12.5	16.8	13.0	7.9	0.058
	2	33.3	35.7	45.5	54.1		48.2	42.8	38.9	59.6	
	3	42.9	36.6	39.4	27.0		25.0	31.6	40.7	22.5	
	4	4.8	6.3	3.0	2.7		14.3	8.8	7.4	10.1	
Fast	1	9.5	21.9	3.0	7.9	0.107	31.0	27.1	16.7	15.6	0.001
	2	38.1	33.3	33.3	29.0		34.5	35.2	22.2	33.3	
	3	38.1	26.3	39.4	36.8		23.0	19.4	37.0	28.9	
	4	14.3	18.4	24.2	26.3		11.5	18.2	24.1	22.2	
New foods and dishes	1	19.1	19.3	18.2	21.1	0.716 ††	26.6	27.4	22.2	16.7	0.012
	2	61.9	56.1	42.4	50.0		54.0	52.0	64.8	46.7	
	3	19.1	20.2	27.3	23.7		15.0	15.7	9.3	33.3	
	4	0.0	4.4	12.1	5.3		4.4	4.8	3.7	3.3	

Lean group; 18.5 > BMI

Average group; 18.5 ≤ BMI < 25.0

Overweight group; 25.0 ≤ BMI < 30.0

Obese group; BMI ≥ 30.0

*; 1; few, 2; 1-2 days per week, 3; 3-4 days per week, 4; almost every day

†; Chi-square test

††; Fisher's exact test.

BMI; body mass index

4. Discussion

4.1. Body type distribution among Thai young adults

In this study, more than 30% of all men were overweight or obese. Although women also constituted a high percentage of obesity group, the proportion of men who were obese was higher than that of women who were overweight. However, the proportion of women in the underweight group was also over 20%. The Thai Food Consumption Survey reported that the proportion of overweight (BMI ≥ 25.0) women population aged 19–39 years was 24.1%^[5]; however, the proportion of overweight or

obese Thai participants in this study was higher. This discrepancy might be explained by the better economic impact on their diet and physical activity in our participants' environments. Although people all over the country participate in the Thai Food Consumption Survey, the study participants were Thai university students living in more urban areas of Thailand, such as the suburbs of Bangkok and Chiang Mai.

4.2. Differences in body fat percentage by body type

Both men and women in the overweight and obese

groups had a high BFP, especially women, whose mean BFP in the obese group exceeded 40%. Some reports suggest that BMI is more effective in determining metabolic syndrome because it does not distinguish between bone density, muscle mass, and body fat^[10], and others recommend using both together^[11]. However, BMI is the most convenient and valuable indicator of population-level overweight and obesity and has been used in many epidemiological studies. It has also been reported that BMI and BFP are strongly correlated^[12], and in this study, the obese group had a higher rate of students with higher BFP. There is a growing research interest worldwide in the so-called “normal-weight obesity,” a condition in which the BMI is normal but the body fat mass is high. Since normal-weight obesity has been reported to be associated with higher risks of cardiovascular morbidity and mortality^[13], it is important to identify the health risks associated with this condition, as body fat composition is not measured during routine physical examinations. The association of “normal-weight obesity” with lifestyle-related and other health risks in the Thai population should be examined further as well.

4.3. Differences in basal metabolic rate by body type

Both men and women in the overweight and obese groups had higher basal metabolic rates; the basal metabolic rate of the obese group was significantly higher than that of the overweight group. Basal metabolic rate is defined as the amount of daily energy metabolism required to maintain the waking and resting vital functions^[14] and accounts for 35%–70% of an individual’s total energy needs. Basal metabolic rate is higher in younger individuals, men, and those with greater height, weight, and lean body mass. Basal metabolic rate is also positively associated with inflammatory state in not only overweight or obese but also normal-weight individuals^[15], suggesting that it may be a marker of metabolic health independent of BFP. Given that some studies suggested that high basal metabolic rate is associated with increased cancer risk^[16], reducing the basal metabolic rate through dietary and exercise interventions in young

adults with obesity may help reduce future morbidity and mortality attributed to cancer.

4.4. Differences in blood pressure according to body type

Both men and women in the overweight and obese groups had high systolic and diastolic blood pressure levels. The clinically problematic values were 132.7 mmHg for systolic and 83.9 mmHg for diastolic blood pressure among men in the obese group, 129.9 mmHg systolic pressure among women in the overweight group, and 82.9 mmHg diastolic pressure among women in the obese group. The blood pressure values for men (obese group) in this study met the definition of hypertension according to the 2020 International Society of Hypertension Global Hypertension Practice Guidelines (systolic pressure 130–139 mmHg and/or diastolic pressure 85–89 mmHg)^[17], and the blood pressure levels of women (overweight and obese group) in this study were also close to the hypertensive range. The International Society of Hypertension recommends that pharmacological therapy should be initiated early for high-risk hypertensive individuals if the target blood pressure is not achieved through lifestyle changes alone, while it is reported that hypertension can be managed by reducing salt and refined carbohydrate intake and incorporating an exercise program^[18]. Therefore, lifestyle modification for preventing hypertension among Thai adults with overweight and obesity seem to be urgent concern.

4.5. Differences in bowel movement frequency by body type

In women, a higher proportion of participants in the overweight and obese groups had at least one bowel movement daily. A review of the relationship between obesity and chronic constipation reported that chronic constipation is associated with overweight and obesity^[19], although other, epidemiological studies have indicated no clear association between obesity and constipation^[20–22]. Conversely, a cross-sectional study involving Japanese individuals suggested that previous dieting experience was associated with bowel movements^[23]. However, in the present study, the proportion of participants with prior dieting

experience was higher in the overweight and obese groups than in the underweight group, which is inconsistent with the reports of previous studies. In a study of Japanese participants, many of those who had experienced dieting reported stress, and stress has been considered to be associated with the development of constipation^[23], but this may be because there was no relationship between dieting and stress among the participants in the present study.

4.6. Dieting experience and interest according to body type

A relationship was observed between body type and interest in dieting in both men and women. However, “strong” interest in dieting was the most endorsed response among men in the overweight and obese groups, whereas “fair” interest was the most endorsed response among women in the average-weight, overweight, and obese groups. Among women in the obese group, the proportion of those who had dieted in the past was high, but the proportion of those who were currently dieting was lower than that in the average-weight and overweight groups. The obese group might have contained individuals who were interested in dieting, but did not have an intense desire to lose the extra weight, did not try, or had simply quit dieting.

Nevertheless, general levels of interest in dieting were high, with “strong” or “fair” interest in dieting expressed by 40% of men and 57.1% of women in the underweight group. Young adult women often perceive their body as being heavier than their actual weight, leading to an excessive desire to lose weight^[24-26]. The present study found that underweight young adult men also have the same desire to lose weight as women in the underweight group.

4.7. Differences in eating habits according to body type

Both men and women in the obese group were more likely to report “rarely” eating breakfast and less likely to report “rarely” eating snacks. Thai people eat three to five times a day, and each meal portion is small^[27]. The results of the present study suggest that the

content of the meals may have an effect on risk of obesity rather than the number of meals per day, including breakfast and snacks. In the present study, a high proportion of men in the obese group and women in the overweight group reported eating meat “almost every day,” a low proportion of women in the overweight group reported eating vegetables “almost every day,” while a low percentage of women with obesity reported “rarely” eating sweets.

The proportion of those who ate quickly was higher in the overweight and obese groups for both men and women. A previous study found that body weight, BFP, and BMI are significantly higher in individuals who subjectively rate their eating speed as being fast than in those who rate it as being slow^[28]. Similarly, the results of the present study suggest that habitual fast eating may contribute to the increase in body weight and body fat.

4.8. Limitations

Because the present study was cross-sectional, it was impossible to clarify a causal relationship between body weight classification and biomarkers, lifestyle, eating habits, and dieting intentions. However, it was relatively large with a large number of participants. Based on accumulated data over a long period, it can access multiple variables simultaneously for the population, providing hypotheses for future studies that will clarify causal relationships. Although the participants of this study were limited to urban university students, this study represents an essential proposition for maintaining proper weight among young people in Thailand, which will continue to urbanize in the future. In the present study, since walking time per day was the only surveyed physical activity, we were unable to examine the influence of proactive physical activity. Although daily stress can also increase the risk of overweight and obesity, we did not evaluate the stress levels of our participants. As life satisfaction among men differed by body type, we cannot exclude the possibility that daily stress may contribute to the high prevalence of overweight and obesity among young Thai adults.

5. Conclusion

In this study, the combined percentage of university students with overweight or obese were 34.8% among men and 28.4% among women, which is as high as the rates among the Thai adult population. The mean values of systolic and diastolic blood pressure in the overweight and obese groups met the criteria for diagnosing hypertension according to the 2020 International Society of Hypertension Global Hypertension Practice Guidelines; therefore, it is crucial to address hypertension as a lifestyle-related condition urgently, in order to prevent the development of cardiovascular and cerebrovascular diseases. Many participants with obesity were not currently dieting, yet had previously been on a diet. It is necessary to propose intervention programs that increase knowledge of healthy eating habits and self-efficacy to reduce the risk of lifestyle-related diseases. Furthermore, we suggest that continuous weight loss intervention programs should be proposed to such individuals to help them maintain appropriate weight and body composition.

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