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Body Image Perception and Its Association with Food Intake among Undergraduate Students in Kuala Lumpur, Malaysia

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Abstract

Background: Body image dissatisfaction may lead to the practice of imbalanced diet to achieve the desired body weight. This study aimed to determine the association between body image perception and food intake among undergraduate students.

Methods: This cross-sectional study was conducted on the data of 155 students from three faculties located at National University of Malaysia, Kuala Lumpur. Assessments included demographic data, body mass index, Contour Drawing Rating Scale, and 3-day food records.

Results: The majority of the subjects were categorized as normal weight (64.5%), and the remaining were classified as underweight (26.5%), overweight (7.7%), and obese (1.3%). Body image dissatisfaction was observed in 80.6% of men and 87.9% of women. The majority of male subjects desired a large body, and the female subjects wanted a thin body. Body image dissatisfaction differed among the body mass index categories for both genders ($p < 0.05$). The mean intake of energy, potassium, calcium, thiamine, folate, vitamin A, vitamin D, vitamin E, vitamin B12, vitamin K, magnesium, and copper intake among the participants was below the recommended amount. Body image dissatisfaction was negatively correlated with calorie intake ($r = -0.164, p < 0.05$).

Conclusions: The perception of having a large body size is associated with low-calorie intake among university students. Nutrition education programs are warranted to ensure healthy and balanced eating practices in this population.

Keywords: body image, body mass index, diet, perception, students

INTRODUCTION

The National Health and Morbidity Survey reported an increasing trend of obesity among Malaysian adults aged 18 years and above from 15.1% in 2011 to 19.7% in 2019.¹ Adolescents who have a high body mass index (BMI) by age over 85% (categorized as overweight) have an increased risk of being obese until adulthood;² therefore, 80% of obese adolescents remain obese during adulthood. Obese individuals have a high risk of acquiring various diseases caused by weight gain and increased body fat percentage.³ These diseases include hypertension, hyperlipidemia, cardiovascular disease, osteoarthritis, Alzheimer's disease, and kidney disease.⁴

A study conducted in Brazil reported a high prevalence (77%) of sedentary lifestyles among university students.⁵ A recent study in Sweden showed that prolonged sedentary time, including sitting, is associated with obesity and poor health.⁶ Overweight and obese university

students from Saudi practiced less frequent physical activity and had a high body fat percentage.⁷ In addition, university students also consumed an extremely high amount of fast food and sugary carbonated beverages. Specifically in Malaysia, the increase in the percentage of overweight and obesity among university students is due to the consumption of fast food with high fat and calorie content and sugary carbonated drinks and the practice of sedentary lifestyle.⁸

A balanced diet plays an essential role in overall health and wellbeing and protects against all forms of malnutrition and noncommunicable diseases, including diabetes, heart diseases, stroke, and cancer. Eating healthy foods, such as increasing the serving size of fruits, vegetables, cereals, and protein-containing foods and reducing the intake of high-fat foods and sugary beverages, can reduce the risk of obesity.⁹ Practicing a healthy diet can also improve mental health and academic performance among university students.¹⁰ Malnutrition refers to an imbalance between food intake and nutritional needs and can affect physical growth, cognitive development, and academic performance.¹¹ Overweight is caused by sedentary lifestyle and intake of high-calorie foods and is associated with the adoption of thin body models, which is related to the high prevalence of body image dissatisfaction.¹²

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Body image is defined as a person's response to his/her own body and how others perceive his/her body size.¹³ Body image dissatisfaction is one of the negative body image characteristics and causes a person to practice dieting and various strategies to change his/her self-image.¹⁴ This strategy includes excessive exercise, low-calorie diet, dietary pill intake, and vomiting.¹⁵ Meanwhile, a positive body image refers to a person's love, respect, acceptance, and appreciation of his/her body.¹⁶ A past study showed that 1 out of 3 university students experience dissatisfaction with their body size; male students prefer a body with low-fat and high muscle mass, and female students aim for a thin body shape.¹⁷ The present research was conducted to determine the association between body image perception and food intake among university students in the National of University Malaysia (Kuala Lumpur Campus).

METHODS

Study design and sampling

This cross-sectional study was conducted to determine the association between body image perception and food intake among university students. Participants were recruited from three faculties located at National of University Malaysia (Kuala Lumpur Campus), namely, the Faculty of Health Sciences, Faculty of Pharmacy, and Faculty of Dentistry, and were selected through simple random sampling. Inclusion criteria were as follows: undergraduate students who are Malaysian citizens aged 18–29 years. Exclusion criteria were as follows: Master or PhD students studying in the National of University Malaysia; having health problems; experiencing drug abuse; and pregnant or lactating students. Postgraduate students were excluded due to their different commitment and time schedule compared with the undergraduate students. This study obtained ethical approval from the National University of Malaysia Research Ethics Committee, (JEPUKM) (reference number of JEP-2020-394). The participants were provided with information sheet about the study, and informed consent was obtained prior to study participation.

Sample size calculation

Sample size was calculated with the formula of Hulley *et al.*¹⁸ using the correlation value (*r* value) from a study about the perception of body image and the consumption of healthy food among adults.¹⁹ A dropout rate of 20% was considered when calculating the sample size to overcome the problem of participants' withdrawal or incomplete data. The total number of participants from the calculation was 155.

Study questionnaires

Questionnaires used in this study consisted of three major types, namely, sociodemographic, 3-day food records, and body image perception, and were

administered using Contour Drawing Rating Scale (CDRS). Data were collected from August to October 2020. Owing to the COVID-19 pandemic, online platform using Google form was used for data collection because face-to-face data collection was not allowed. The sociodemographic data included full name, age, gender, student matric number, email address, telephone number, race, program or course with the year of study, current height (cm), current body weight (kg), and medical condition. Data for body weight and height were self-reported by the participants. BMI was calculated by using weight (kg) divided by height (m²) and categorized using WHO classification as follows:²⁰ underweight (less than 18.5 kg/m²), normal weight (between 18.5 and 24.9 kg/m²), overweight (between 25.0 and 29.9 kg/m²), obese class I (between 30.0 and 34.9 kg/m²), obese class II (between 35.0 and 39.9 kg/m²), and obese class III (more than 40.0 kg/m²).

The 3-day food record, including two weekdays and one weekend, is a self-report of food and beverage intake, including dietary supplements consumed, and was used to obtain dietary intake information. Instructions on how to record their daily food intake and examples of a food record form and household measurement were given to the participants. They were required to fill in the food record form, including information on preparation method, portion size, and foods brand, for 3 days. Nutritionist Pro® software was used to analyze the nutrient intake. The data were compared with the recommended calorie and nutrient intake for men and women aged 18–29 years from the Recommended Nutrient Intakes for Malaysia (RNI 2017).²¹

CDRS was used to determine the participants' body image perception.²² The validated version of this questionnaire was adapted from a study conducted among high school adolescents in Pahang, Malaysia.²³ The validated CDR was used because it is the nearest representative of body image construct of Malaysians. Nine unique figures are available for both genders, and each figure has a number to represent a different degree of body size. Hence, the figures were scored from 1 (the thinnest body size) to 9 (the biggest body size). The participants were required to choose a figure representing their current body size and a figure representing their ideal body size. Body image dissatisfaction score was calculated from the difference score between the perception of current body size and the ideal body size. Zero score was categorized as satisfaction, and a negative or positive score indicated body image dissatisfaction.

Statistical analysis

Data were analyzed using SPSS software version 25. Data normality was assessed with Kolmogorov-Smirnov test because the number of participants in this study was more than 100. Descriptive analysis was applied to

calculate the percentage, mean, and standard deviation of the anthropometric data, body image perception data, and nutrient intake data. Independent T-test and Mann-Whitney U test were utilized to determine the difference between genders. Kruskal-Wallis test was used to determine the difference in BMI category and body image dissatisfaction among the participants. Pearson and Spearman's Rho correlation test were employed to determine the relationship between dietary intake and body image dissatisfaction. Significance level was set as $p < 0.05$.

RESULTS

As shown in Table 1, 155 undergraduate students aged 18 -29 years from National of University Malaysia (Kuala Lumpur Campus) participated in this study. The majority of the participants were female (80.0%), and only 20.0% were male. The majority of the participants were Chinese (72.9%), and the remaining were Malay (23.2%) and Indian (2.5%). Most of the participants were from the Faculty of Health Sciences (82.6%) consisting of 10 different programs, and the remaining were from the Faculty of Pharmacy (12.2%) and Faculty of Dentistry (5.2%). Most of the participants in the Faculty of Health Science were from Nutrition Science (36.7%), and the least number were from Environmental Health (1.6%).

Table 2 shows the anthropometric data of participants. Significant differences in weight (kg), height (cm), and BMI were observed between genders ($p < 0.05$). The mean weight for male participants was 63.9 ± 11.1 kg, and that for female participants was 51.3 ± 8.3 kg. The mean height for male participants was 171.2 ± 5.4 cm, and that for female participants was 158.8 ± 5.1 cm. Most of the participants had a normal BMI (64.5%), and the rest were underweight (26.5%), overweight (7.7%), and obese (1.3%).

In this study, 80.6% of males and 87.9% of females were dissatisfied with their current body image (Table 1). Most of the male participants (41.9%) perceived themselves as having a smaller size than their ideal body image. By comparison, the majority of female participants (74.2%) perceived themselves as larger than their ideal body image. Significant differences in body image dissatisfaction were observed among BMI categories (underweight, normal, and overweight) in both genders ($p < 0.05$) as shown in Table 3.

Table 4 shows the nutrient intake of participants according to the RNI for Malaysia (RNI 2017). Significant differences in mean energy, carbohydrate, protein, fat, sodium, iron, niacin, vitamin B6, phosphorus, and zinc intake were observed between genders ($p < 0.05$). All the participants did not meet the required energy intake and most of the micronutrients recommended by RNI (2017). The male participants achieved 90.7% (2032 kcal) of

calorie intake from RNI (2240 kcal), and the female participants achieved a high percentage of 92.4% (1701 kcal) according to the recommendation (1840 kcal). Furthermore, the males (163.1%) and females (143.2%) had achieved the recommendation for protein intake.

TABLE 1. Sociodemographic characteristics of the participants (N = 155)

Sociodemographic characteristics	Male (N = 31) N (%)	Female (N = 124) N (%)	Total (N = 155) N (%)
Ethnicity			
Malay	7 (22.6)	29 (23.4)	36 (23.2)
Chinese	23 (74.2)	90 (72.6)	113 (72.9)
Indian	0 (0)	4 (3.2)	4 (2.6)
Others*	1 (3.2)	1 (0.8)	2 (1.3)
Faculty			
Health Sciences	24 (77.4)	104 (83.9)	128 (82.6)
Pharmacy	6 (19.4)	13 (10.5)	19 (12.2)
Dentistry	1 (3.2)	7 (5.6)	8 (5.2)
Faculty of Health Sciences			
Nutrition Science	9 (37.5)	38 (36.5)	47 (36.7)
Dietetics	2 (8.3)	10 (9.6)	12 (9.4)
Speech Science	1 (4.2)	8 (7.7)	9 (7.0)
Biomedical Science	1 (4.2)	4 (3.8)	5 (3.9)
Optometry	1 (4.2)	11 (10.6)	12 (9.4)
Audiology	0 (0)	7 (6.7)	7 (5.5)
Physiotherapy	3 (12.5)	6 (5.8)	9 (7.0)
Occupational Therapy	3 (12.5)	11 (10.6)	14 (10.9)
Environmental Health	1 (4.2)	1 (1.0)	2 (1.6)
Diagnostic Imaging & Radiotherapy	3 (12.5)	8 (7.7)	11 (8.6)
Body Image Dissatisfaction			
Perceived thinner	13 (41.9)	17 (13.7)	30 (19.4)
Satisfied	6 (19.4)	15 (12.1)	21 (13.5)
Perceived larger	12 (38.7)	92 (74.2)	104 (67.1)

*Others refer to Sabah and Sarawak

TABLE 2. Anthropometry data of the participants (mean ± SD)

Anthropometry data	Male (N = 31)	Female (N = 124)	<i>p</i>
Age	22.1 ± 1.1	22.3 ± 1.1	0.445
Weight (kg)	63.9 ± 11.1	51.3 ± 8.3	0.001*
Height (cm)	171.2 ± 5.4	158.8 ± 5.1	0.001*
Body Mass Index (kg/m ²)	21.8 ± 3.2	20.3 ± 3.1	0.008*

*significant at $p < 0.05$ using Mann-Whitney test

TABLE 3. Body image dissatisfaction according to BMI category (mean \pm SD)

Sex	Underweight	Normal	Overweight	<i>p</i>
Male	(N = 4)	(N = 2)	(N = 4)	
Body image dissatisfaction	-2.3 \pm 0.5	-0.2 \pm 1.1	-0.8 \pm 1.0	0.007*
Female	(N = 37)	(N = 78)	(N = 8)	
Body image dissatisfaction	-0.1 \pm 0.9	-1.5 \pm 0.9	-3.0 \pm 1.1	0.001*

*significant at $p < 0.01$ and $p < 0.001$ using Kruskal-Wallis test**TABLE 4.** Nutrient intake of the participants according to Recommended Nutrient Intake (RNI 2017)

Nutrient	Male			Female			Total	<i>p</i>
	(N = 31)	RNI	% RNI	(N = 124)	RNI	% RNI	(N = 155)	
Energy (kcal) ^a	2032 \pm 346	2240	90.7	1701 \pm 367	840	92.4	1767 \pm 386	0.001*
Carbohydrate (g) ^a	223.6 \pm 42.8	-	-	196.7 \pm 53.1	-	-	202.1 \pm 52.2	0.001*
Protein (g) ^a	101.1 \pm 37.2	62	163.1	75.9 \pm 18.3	53	143.2	80.9 \pm 25.3	0.001*
Fat (g) ^a	81.2 \pm 19.5	-	-	68.5 \pm 18.4	-	-	71.0 \pm 19.3	0.002*
Sodium (mg) ^a	3952.2 \pm 1879.3	1500	263.5	3136.4 \pm 1457.7	1500	209.1	3299.6 \pm 1578.7	0.036*
Potassium (mg) ^b	1777.5 \pm 540.7	4700	37.8	1664.2 \pm 466.2	4700	35.4	1686.8 \pm 482.3	0.243
Vitamin C (mg) ^a	67.0 \pm 57.2	70	95.7	76.3 \pm 52.0	70	109.0	74.5 \pm 53.0	0.114
Calcium (mg) ^a	567.7 \pm 193.6	1000	56.8	536.7 \pm 200.8	1000	53.7	542.9 \pm 199.1	0.283
Iron (mg) ^a	19.5 \pm 6.1	14	139.3	16.8 \pm 6.8	29	57.9	17.3 \pm 6.8	0.011*
Thiamine (mg) ^b	1.0 \pm 0.4	1.2	83.3	1.0 \pm 0.4	1.1	90.9	1.0 \pm 0.4	0.285
Riboflavin (mg) ^a	1.7 \pm 0.8	1.3	130.8	1.5 \pm 0.5	1.1	136.4	1.6 \pm 0.6	0.175
Niacin (mg) ^a	19.3 \pm 7.0	16	120.6	15.9 \pm 5.3	14	113.6	16.5 \pm 5.8	0.012*
Folate (μ g) ^a	168.0 \pm 100.0	400	42.0	152.1 \pm 73.7	400	38.0	155.3 \pm 80.0	0.431
Vitamin A (μ g) ^a	177.6 \pm 134.6	600	29.6	202.6 \pm 209.6	600	33.8	197.6 \pm 196.8	0.993
Vitamin D (μ g) ^a	1.2 \pm 0.9	15	8.0	1.1 \pm 1.0	15	7.3	1.1 \pm 1.0	0.405
Vitamin E (mg) ^a	4.0 \pm 0.9	10	40.0	3.9 \pm 2.1	7.5	52.0	3.9 \pm 2.1	0.527
Vitamin B6 (mg) ^a	1.4 \pm 0.6	1.3	107.7	1.2 \pm 0.4	1.3	92.3	1.2 \pm 0.5	0.026*
Vitamin B12 (μ g) ^a	3.8 \pm 3.0	4.0	95.0	3.1 \pm 4.5	4.0	77.5	3.2 \pm 4.2	0.071
Vitamin K (μ g) ^a	32.1 \pm 48.5	65	49.4	37.4 \pm 45.2	55	68.0	36.3 \pm 45.7	0.080
Phosphorus (mg) ^b	1284.7 \pm 415.6	700	183.5	1088.6 \pm 313.9	700	155.5	1127.8 \pm 344.3	0.004*
Magnesium (mg) ^a	166.7 \pm 66.1	400	41.7	149.8 \pm 55.0	310	48.3	153.2 \pm 57.6	0.184
Zinc (mg) ^a	7.5 \pm 3.9	6.6	113.6	6.0 \pm 2.5	4.7	127.7	6.3 \pm 2.9	0.023*
Copper (mg) ^a	0.8 \pm 0.4	0.9	88.9	0.8 \pm 0.3	0.9	88.9	0.8 \pm 0.3	0.498

*significant at $p < 0.01$ and $p < 0.05$ using Mann-Whitney^a and Independent T-test^b**TABLE 5.** Correlation of body image dissatisfaction with calorie and macronutrient intake

Calorie and Macronutrient	Body Image Dissatisfaction (current body image perception - current body image perception)	
	R value	<i>p</i>
Energy (kcal)	-0.164	0.042*
Carbohydrate (g)	-0.148	0.067
Protein (g)	-0.125	0.121
Fat (g)	-0.111	0.168

*significant at $p < 0.05$ using Spearman's Rho test

The average sodium intake for males (263.5%) and females (209.1%) was higher than the recommended amount. Meanwhile, the potassium intake of male (37.8%) and female (35.4%) participants did not meet the recommendation. The calcium intake of participants was also inadequate but was more than 50%. Intake of most micronutrients, including vitamin A, vitamin D, vitamin E,

vitamin K, vitamin B1, vitamin B12, folate, magnesium, and copper, did not meet the recommendation for both genders.

Table 5 shows the relationship of body image dissatisfaction with calorie and macronutrient intake among the participants. Body image dissatisfaction was negatively correlated with calorie intake ($r = -0.164$, $p < 0.05$). The participants who perceived to have a large body size (selection of the current body image picture was larger than the ideal body image picture) had a low-calorie intake. By contrast, the participants who perceived a thin body size had a high-calorie intake.

DISCUSSION

This study was conducted to determine the relationship between body image perception and food intake among university students in Universiti Kebangsaan Malaysia Kuala Lumpur. The majority of participants were classified with a normal BMI, and the remaining were underweight,

overweight, and obese. A similar research conducted among university students in Malaysia showed that most of the participants had a normal BMI (68.5%) and the remaining were underweight (18.2%) and overweight (13.6%).²⁴ Another work from Southeast Asian Countries reported a higher percentage of overweight and obesity among males (36.5%) compared with females (17.7%).²⁵ Furthermore, the percentage of underweight was high among female participants because women prefer a thin body size and thus practice low-calorie intake compared with men who want to gain weight and have a large body size.²⁶ In the current study, body weight and height were self-reported due to the constraints of conducting face-to-face data collection. A recent report suggested that self-reported weight and height have a reasonable accuracy and can be used as a valid measure to compute the BMI of a population.²⁷

The percentage of body image dissatisfaction in this study was extremely high for both genders. Most of the male participants perceived themselves as having a small body size, and the female participants perceived having a larger body size than their ideal body image. The female participants also reported a higher body image dissatisfaction than the males.^{28,29} Women are focused on the desire to be thin, and men are likely to consider a large and muscular body as an ideal body shape.³⁰ A similar study conducted in one of the universities in Malaysia reported that 76.5% of the male participants and 76.9% of the female participants were dissatisfied with their current body size.³¹ The current results corroborated with previous findings, which stated that body image dissatisfaction significantly differed with the BMI category among university students.³² The participants who were overweight reported the most dissatisfied feelings with their current body image.

This work found that the mean energy, carbohydrate, protein, and fat intake was high among male participants. Another local study conducted among university students reported that the energy and macronutrient intake among male participants was higher than that among their female counterpart.³³ A research conducted among Nigerian students who studied in Malaysia showed that the energy intake of all the participants did not reach the recommended amount because most students skip breakfast due to lack of appetite and time constraints.³⁴

Vitamin C intake was higher among the female participants than among the male participants because women prefer healthy eating by consuming fruits and vegetables for their skin's health and slimming purposes.³⁵ A study exploring the importance of taste on dietary choice among university students recorded that 82.0% of the participants prioritized taste and consumed high-sodium foods, such as fast food and snacks, and practiced adding salt during food preparation.³⁶ This

behavior can lead to excessive sodium and low potassium intake, which may increase blood pressure and hypertension risk.³⁷ The current study also showed a similar pattern: the sodium intake for both genders was 200% higher than the recommended amount. Calcium intake by the participants in the current study did not meet the required amount. The inadequate calcium intake can partly be explained by the consumption of milk and dairy products in small quantities throughout the day.³⁸

Compared with that among females, the higher intake of meat, poultry, fish, and eggs among males contributed to their adequate iron intake. As a result, women are at a high risk for anemia due to inadequate iron intake for the body.³⁹ This study found that the vitamin A, vitamin D, vitamin E, vitamin K, vitamin B1 (thiamine), vitamin B12, folate, magnesium, and copper intake of all participants did not meet the RNI recommendations. Low consumption of vegetables, fruits, legumes, and dairy products among students leads to insufficient vitamins and minerals in their diet.⁴⁰

This study found a significant negative correlation between body image dissatisfaction and calorie intake. The participants who perceived themselves as having a large body size consumed low-calorie foods, and the participants who perceived having a smaller body size than their ideal body size consumed high-calorie foods. A previous work found that female university students who perceived themselves as having a large body size are likely to reduce their regular food intake, contributing to malnutrition and health problems.⁴¹ High body image dissatisfaction levels were positively associated with calorie and macronutrient restriction for weight loss and the formation of an ideal body image among early adults.⁴² Having a positive body image is necessary for students because it plays a vital role in their quality of life.⁴³

CONCLUSIONS

There was a significant difference between body image dissatisfaction and BMI categories (underweight, normal and overweight) for both gender. Calorie and most micronutrients intake did not achieve the recommendations of RNI (2017) for both gender. Next, there was a significant negative correlation between body image dissatisfaction and calorie intake. Participants who perceived larger body size consumed lower calories, while participants who perceived smaller body size consumed higher calories. This study provides insight about body image dissatisfaction among undergraduate students from health related field. This study is limited by the imbalance number of subjects involved, whereby majority of the subjects are Chinese and female students. Furthermore, the sample is not representative in term of number of participants from

each faculty involved due to the time limitation for data collection. Participants with nutrition background could have some basic about the subject studied in this research, thus could contribute to sampling bias. The use of the Contour Drawing Rating Scale (CDRS) is not suitable for individual who are muscular because the pictures shown in the questionnaire do not clearly characterize the muscular image. Nutrition education programs to educate the correct information on nutrition and health in relation to body image are needed to ensure healthy and balanced eating practices among university students. Furthermore, intervention program to instil positive body image can be implemented to improve students' self-esteem.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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