ORIGINAL ARTICLE

BMI Correlated to Dietary Pattern of Indonesian College Students Lives in Taipei City, Taiwan

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ABSTRACT

Background: The college students who live abroad tend to have the difficulty of food shopping in the country which has different cultural food and the lack of intention to prepare their own food. Those conditions may encourage them for getting overweight around 21% due to having careless eating habits

Aim: To measure the association between body mass index (BMI) and gender, cooking awareness, food shopping, dinner time, and dietary pattern. Moreover, the correlation of food shopping and cooking awareness.

Methods: A total of 100 Indonesian college students who lived in Taipei city, Taiwan participated in the descriptive study for measuring variables i.e. socio-demographic, BMI, cooking awareness, food shopping, dinner time, and dietary pattern. Statistical analysis was using fisher exact test and frequency descriptive.

Results: The findings showed 46% female respondents with normal BMI, 53% respondents with normal BMI tended to have the dependency in cooking awareness, 47% respondents with normal BMI had easy access to food, 55% respondents with normal BMI were tending to have the healthy diet, and 53% respondents with normal BMI had dinner time more than 6 pm. The significant association were found between BMI and gender, cooking awareness, and dinner time ($p=0.011$, $\chi2=11.111$; $p=0.033$, $\chi2=13.680$; $p=0.017$, $\chi2=15.530$; respectively). However, There was no significant association between BMI with food shopping and dietary pattern ($p=0.769$, $\chi2=3.307$; and $p=0.169$, $\chi2=9.087$; respectively).

Conclusion: This study suggests that overweight/obese tends to have in male, they have the dependency in cooking awareness and doing late in dinner more than 6 pm.

Keywords: body mass index, college students, cooking awareness, and dinner time

INTRODUCTION

Referring to the phenomenon of college students who live abroad tend to have the difficulty of food shopping in the country which has different cultural food and the lack of intention to prepare their own food. Those conditions may encourage them for getting overweight and obese due to having careless eating habits. In the previous study showed the consumption of ultra-processed food ≥3x/day in male age ≥35 years and not preparing one's food were independently associated with overweight[1].

College life is free from parental supervision, allowing students greater autonomy and broader support networks[2].. Students' eating behaviors are most affected by their families and schools before starting college, afterward, their dietary choices are mostly made independently[3]. Therefore, the college stage is important to the development of individuals' eating behavior, and the food choices made at this stage influence whether they will gain weight or maintain a healthy lifestyle during adulthood[4,5]. Noteworthy findings regarding college students from a 2011 national survey of Taiwan indicated unhealthy eating behaviors of frequent fast food and sugar-sweetened beverage consumption and inadequate fruit and vegetable intake[6]. Thus, unhealthy eating behaviors have become a health risk for today's college students[7,8].

Evaluation of the prevention research already conducted in college-based populations provides information useful to college health officials[9]. However, the association between BMI and gender, cooking awareness, food shopping, dinner time & dietary pattern are unknown.

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SUBJECTS AND METHODS

The research design was conducted by the descriptive study. The study participants included Indonesian college students of age group 19 – 42 years lived in Taipei city, Taiwan. The participants were voluntarily recruited in three colleges i.e. Taipei Medical University (TMU), National Taiwan University of Science and Technology (NTUST), National Chengchi University (NCU). A total of 100 participants were recruited by quota sampling.

The schedule for collecting all of the data during 2 months in the year of 2016. The data requests of the questionnaire included socio-demographic characteristics (gender, age, domicile, marital status, and highest educational level); Anthropometric measures (BMI was calculated by the formula weight in kg/height2 in meter); cooking awareness; food shopping; dinner time. This project described the dietary pattern which comes from these questions: How many times do you usually eat the main meals?, Are you having breakfast frequently?, How many times do you having the breakfast in a week?, what time do you usually have dinner?, How many hours the distance between dinner time and sleeping time?

The cooking awareness comes from these questions: What are you doing besides studying?, Who are daily responsible for cooking? The food shopping come from these questions: How are you doing for getting food?, How far the place for getting food?

This study had no a conflict with ethical issues because this study was conducted through questionnaires. Furthermore, there were no sensitive questions were put in the questionnaires. Informed consent was obtained from all participants before they filled the questionnaires. This research had passed the ethical clearance at Health Research Commission of Health Polytechnic of Malang with register number: 190 / KEPK-POLKESMA / 2016.

All of the data in questionnaires were included in the analysis by SPSS 23.0. We determine to mean ± SD and p<0.5 was considered significant with CI 95%. Statistical analysis was using Fisher exact test and frequency descriptive.

RESULTS

Of socio-demographic characteristics, the proportion of male and female was 1 : 2 which 33% of male and 67% of female. Marital status of respondents showed 76% unmarried, 22% married, and 2% widower/widow. Most of them had the hometown in Java (82%), 11% in Sumatra, 3% in Kalimantan, 2% in Sulawesi, and 2 % in Bali. Their highest educational level was postgraduate (82%) and undergraduate (18%). The results of self-reported BMI showed that mean ± SD was 21.3 ± 3.2, most of them had normal BMI (61%), then 18% of underweight, 13% of obese, and 8% of overweight. See Table 1.

Figure 1 showed most of them felt dependent for cooking awareness(78%), 12% felt independent, and 10% felt very independent. However, most of them felt easiness of food shopping(72%), 16% felt difficult, and only 12% felt very easy. Most of them had the healthy dietary pattern (89%), 7% of unhealthy, and only 4% of very healthy. Most of them were having late for dinner (83%) and only 16% having early time (Table 1).

The findings in Table 2 showed 46% female respondents with normal BMI, 13% of underweight in female, 7% of obese in male, and 6% of obese in female. There were 53% respondents with normal BMI tended to have the dependency in cooking, 13% of underweight felt dependent in cooking, and 7% of obese had the dependency in cooking. 47% respondents with normal BMI and 12% with underweight had easy access to food, only 8% of normal BMI having difficulty. 55% respondents with normal BMI and 18% with underweight were tending to have the healthy diet, contrast 4% of normal BMI felt having the unhealthy diet. 53% respondents with normal BMI and 16% of underweight had dinner time more than 6 pm, and only 6% of obese was doing early in dinner. The significant association were found between BMI gender, cooking awareness, and dinner time (p=0.01, $\chi2$=11.1; p=0.03, $\chi2$=13.7; p=0.02, $\chi2$=15.5; respectively). However, There was no significant association between BMI with food shopping and dietary pattern (p=0.77, $\chi2$=3.3; and p=0.17, $\chi2$=9.1; respectively) (Table 2).

Moreover, there were 58% with easily food shopping but having the dependency in cooking. Furthermore, 16% with difficulty food shopping felt dependent. Positively, 67% with easy food shopping had the healthy dietary pattern. The significant correlations were found between food shopping, cooking awareness, and dietary pattern (p=0.00, $\chi2$=31.1; p=0.00, $\chi2$=30.8; respectively) (Table 3).

Table 1: Socio-demographic Characteristics and BMI of Indonesian college studentsin Taipei city (n= 100)

Variables	**n%**
Gender	
Male	33 (33)
Female	67 (67)
Marital status	
Unmarried	76 (76)
Married	22 (22)
Widower/widow	2 (2)
Hometown	
Java	82(82)
Sumatera	11 (11)
Sulawesi	2 (2)
Kalimantan	3 (3)
Bali	2 (2)
Highest Educational level	
Undergraduate	18 (18)
Postgraduate	82 (82)
Self-reported BMI, kg/m^2(mean ±SD)	21.3± 3.2
Underweight< 18.5	18 (18)
Normal 18.5 – 22.9	61 (61)
Overweight 23 – 24.9	8 (8)
Obese≥25	13 (13)
Dinner time	
Early	16 (16)
Late	83 (83)

Table 2: The association between BMIand gender, cooking awareness, food shopping, dietary pattern, and dinner time (n=100)

Characteristics	**BMI (kg/m^2)**				**χ^2**	**P**
	Underweight n (%)	**Normal** n (%)	**Overweight** n (%)	**Obese** n (%)		
Gender					**11.1**	**0.01***
Male	5 (27.8)	15 (24.6)	6 (75)	7 (53.8)		
Female	13 (72.2)	46 (75.4)	2 (25)	6 (46.2)		
Cooking awareness					**13.7**	**0.03***
Very independent	1 (5.6)	3 (4.9)	2 (25)	4 (30.8)		
Independent	4 (22.2)	5 (8.2)	1 (12.5)	2 (15.4)		
Dependent	13 (72.2)	53 (86.9)	5 (62.5)	7 (53.8)		
Food shopping					**3.3**	**0.77**
Very easy	2 (11.1)	6 (9.8)	2 (25)	2 (15.4)		
Easy	12 (66.7)	47 (77.1)	5 (62.5)	8 (61.5)		
Difficult	4 (22.2)	8 (13.1)	1 (12.5)	3 (23.1)		
Dietary pattern					**9.1**	**0.17**
Very healthy	0	2 (3.3)	0	2 (15.4)		
Healthy	18 (100)	55 (90.2)	7 (87.5)	9 (69.2)		
Unhealthy	0	4 (6.5)	1 (12.5)	2 (15.4)		
Dinner time					**15.5**	**0.02***
Early	2 (11.1)	8 (13.1)	0	6 (46.2)		
Late	16 (88.1)	53 (86.9)	8 (100)	7 (53.8)		

*Statistical significance was assessed with Fisher exact test with significant P set at ≤ 0.05.

Table 3. The correlation between food shopping and cooking awarenessdietary pattern (n= 100)

Characteristics	Food shopping			X^2	P
	Very easy n (%)	**Easy** n (%)	**Difficult** n (%)		
Cooking awareness				**31.1**	**0.00***
Very independent	1 (8.3)	9(12.5)	0		
Independent	7 (58.4)	5 (6.9)	0		
Dependent	4 (33.3)	58 (80.6)	16 (100)		
Dietary pattern				**30.8**	**0.00***
Very healthy	4 (33.3)	0	0		
Healthy	7 (58.4)	67 (93.1)	15 (93.8)		
Unhealthy	1 (8.3)	5 (6.9)	1 (6.2)		

*Statistical significance was assessed with Fisher exact test with significant P set at ≤ 0.05.

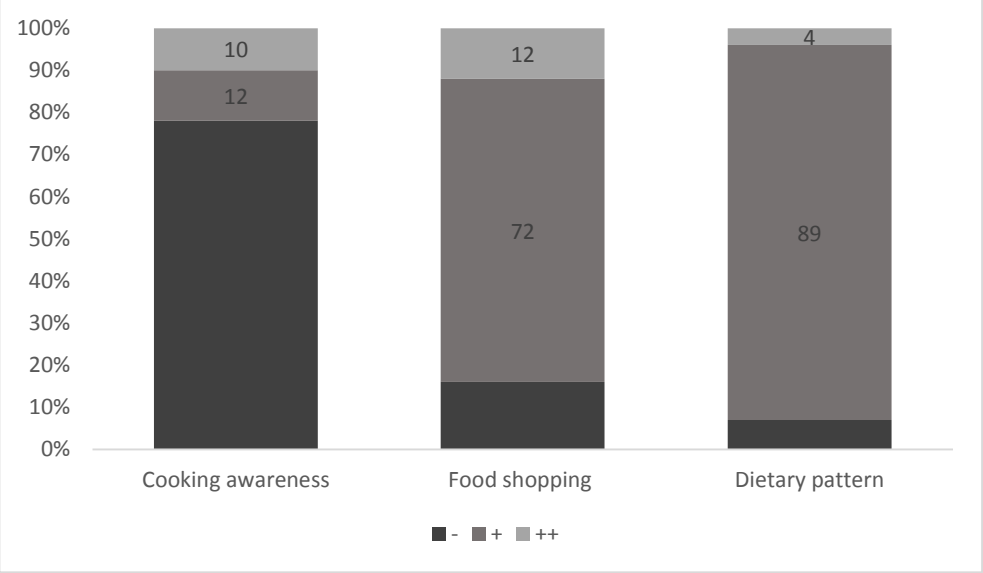

Fig. 1. The prevalence of cooking awareness, food shopping, and dietary pattern in Indonesian college students live in Taipei (n = 100)

Sign - of cooking awareness meant participants had been dependent on cooking for their food. Sign + of cooking awareness meant participants had been independent in cooking for their food. Sign ++ of cooking awareness meant participants had been very independent in cooking for their food.
Sign - of food shopping meant participants felt difficult for buying their food. Sign + of food shopping meant participants felt easy for buying their food. Sign ++ of food shopping meant participants felt very easy for buying their food.
Sign - of dietary pattern meant participants had the unhealthy dietary pattern. Sign + of dietary pattern meant participants had the healthy dietary pattern. Sign ++ of dietary pattern meant participants had the very healthy dietary pattern**.**

DISCUSSION

The number of female participants of twice in male participants could be because the sample moon was taken from health campuses where the female population tends to be more than men. The previous study for the Health eHeart participants with complete survey data was more likely to be female[10].

The majority of students who migrated abroad were single, it probably because they had not been committed to the couple so free to pursue higher education abroad. The previous study in the medical school, only 2.9% were married students and 97.1% were unmarried[11]. A small number who were married usually bring a spouse (husband/wife) and children if they have.

The majority of them were from Java island. Because primary education in Java was more developed than outside of Java, so many graduates were continuing higher education abroad. Most of them were undergoing postgraduate study abroad. They went abroad after completing an undergraduate education in their home country. Students in the previous study shared how their commitment (e.g. funding and academics–life balance) to engage in a study abroad program[12].

Most participants who had a normal BMI for sampling the majority on college campuses health, which they were already aware of the importance of having a normal BMI. Gender had a significant relationship with BMI which was normal BMI more commonly found in women as much as three times. Women tended to pay more attention to weight. In addition, women tend to be more concerned about weight gain than men[13]. Body size misperception could be experienced by both women and men. Women tend to overestimate their body image, they feel overweight/obese while in reality normal. Contrastly, men tended to underestimate where they feel normal when in fact overweight/obese.

Most of them depended on others in the preparation of the food they consume. Postgraduate students spent more of their time in laboratories for research or writing

thesis, so the opportunity to cook smaller daily meals, except during the weekend. It might be that they cater to food needs by hanging others through buying food at the restaurant/cafeteria, or subscribing to catering, or asking friends/spouses for cooking. There were no standardized, widely accepted definitions for home cooking and food preparation[14]. The terms were used here interchangeably, to refer to making food ready to eat. However, cooking was generally used here in the context of meals, whereas food preparation includes less structured eating occasions such as snacks[15].

Cooking awareness had a significant relationship with BMI. Those who are dependent on food preparation tend to be overweight/obese. This happened because they eat while hungry, so the need for the necessary nutrients tended to be proportional to that issued. In fact, a small proportion of those who are dependent on cooking is underweight, possibly because of the frequent delay in eating. The previous study showed food preparation methods may be linked to diet and health benefits[15]. Preparing food at home had been associated with a range of potential benefits, such as consuming fewer calories and smaller portions, and eating less fat, salt, and sugar[16,17]. Home food preparation was also positively correlated with greater intake of fruits and vegetables(18)and a healthful dietary pattern[19]. Recent systematic reviews had identified potential advantages of home cooking interventions, in terms of diet, health, and cooking knowledge/skills, confidence and attitudes[20,21].

Dinner time had a significant relationship with BMI. Half of the participants who were used to dinner over 6 pm tend to have a normal BMI. They more often ate an afternoon snack before returning from the laboratory. Doing dinner was usually delayed after completing the job.

Food shopping showed easiness because the residence or campus was not far from traditional markets, convenience stores, cafeterias, and restaurants. Cooking awareness had a significant relationship with food access. Participants who were dependent on others in food fulfillment tended to have easy access to food. It could happen from close distance with traditional market, convenience store, canteen, or restaurant.

The dietary pattern showed in healthy because of eating two to three main meals a day, accustomed to breakfast, dinner distance with more than three hours of sleep, but dinner time is still above 6 pm. The dietary pattern was significantly associated with food shopping. Participants with a healthy diet tend to have easy access to food because it is close to where to buy food.

There was no significant relationship between food shopping and BMI. However, given the easy access to food, they tend to have a normal BMI. Similarly, the dietary pattern had no significant relationship with BMI. However, with the majority of a healthy diet, it tended to have a normal BMI. The previous study showed the 'traditional' dietary pattern had positively associated with BMI in women aged 19–30 years. However, the 'traditional' dietary pattern was not significantly associated with BMI in other population groups. Studies investigating associations between dietary patterns and anthropometric measurements had reported inconsistent findings[22,23]. Those were the limitations in the results of this study. Uncorrelated measurement error of dietary pattern affects mainly the variability of principal component scores rather than introducing bias[24]. Other limitations included the design quota sampling of the study might limit the generalizability of the findings.

CONCLUSION

This study suggests that overweight/obese tends to have in male, they have the dependency in cooking awareness and doing late in dinner more than 6 pm. The significant association are found between BMI and gender, cooking awareness, and dinner time. However, There are no significant association between BMI with food shopping and dietary pattern. Moreover, The significant correlation were found between food shopping, cooking awareness, and dietary pattern. Further research should explore the various method of dietary patterns within subgroups of the population. Additional research is needed to assess associations between dietary patterns, waist circumference, and other nutrition-related risk factors (e.g. blood pressure, cholesterol levels) and nutrient intakes in this group.

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