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ASSOCIATION BETWEEN FREQUENCY OF EATING AND EATING OUTSIDE WITH 'OVERWEIGHT AND OBESITY' AMONG POSTGRADUATE AFRICAN STUDENTS IN A PUBLIC UNIVERSITY IN MALAYSIA

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ABSTRACT

Background: Higher frequency of eating and eating outside has been reported to be associated with 'overweight and obesity' (i.e.body mass index (BMI) ≥ 25kg/m2). This study aimed to determine the associations between 'overweight and obesity' and frequency of eating and eating outside, among postgraduate African students in a public university in Malaysia.

Materials and Methods: A cross-sectional study was conducted using a pretested self-administered questionnaire and body weight and height was measured to calculate BMI. Respondents were asked to recall eating frequency as well as frequency of eating outside for two days (which include one weekday and one weekend day). Data was analysed using Statistical Package for Social Sciences (SPSS) version 23.

Result: The response rate was 87% (559 students). About 64.6% of them were 'overweight and obese'. There was a significant association between 'overweight and obese' and higher frequency of eating (during the weekdays and weekend days) ($p < 0.001$) and eating outside ($p<0.002$).

Conclusion: Being 'overweight and obese' were positively associated with higher frequency of eating as well as higher frequency of eating outside among the respondents.

Keywords: Frequency of eating, Eating outside, Body mass index (BMI), Postgraduate African students, overweight, obese

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1.0 Introduction

There has been a noticeable rise in the body weight of the population causing what has been termed as the epidemic obesity over the last decades (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). Given the growing implication of overweight and obesity in modern life, the frequency of eating has been reported to be associated with overweight and obesity. However, their association is still being debated as several studies have reported inconsistent outcomes. Some studies had reported that higher frequency of meal consumption has been associated to obesity (Powell & Nguyen, 2013; Seguin, Aggarwal, Vermeylen, & Drewnowski, 2016; and Bauer, 2013), while other studies have reported a negative association between high frequency of eating and overweight or obesity (Smith et al., 2011, Holmbäck, Ericson, Gullberg, & Wirfält, 2010).

In parallel, there has been a remarkable change in eating pattern in the past four decades, with consumption of foods prepared outside from home has progressively increased from 16.5% to about 33% of the daily meals intake of an individual in the United States of America (USA) (Powell & Nguyen, 2013; and Seguin, Aggarwal, Vermeylen, & Drewnowski, 2016). In developing countries, the rate of eating food outside home is gradually increasing (Musaiger, 2011). This, could be explained as a result of social, cultural and environmental changes (de Castro, King, Duarte-Gardea, Gonzalez-Ayala, & Kooshian, 2012a).That these changes matching the rise in the incidence of overweight and obesity is symbolic of a probable causal relationship (Trasande et al., 2009 and Kirk, Penney, & McHugh, 2010).

Frequency of eating outside is among the contributing factor of obesity that have attracted research and practical interests as a result of its direct applicability to daily life (Lee, 2008). A systemic review on the prevalence and possible causes of overweight and obesity in Eastern Mediterranean region revealed that eating outside is associated with an increased probability of overweight and obesity (Musaiger, 2011). Another study conducted among adults in the USA reported an association between higher body mass index (BMI) and higher frequency of eating foods away from home (Seguin et al., 2016). A systematic review to assess the association between body BMI and out of home eating revealed a positive association in 7 out of 8 prospective cohort studies. The review also revealed almost half of the 20 cross-sectional studies reported a positive association between BMI and out of home eating (Bezerra, Curioni, & Sichieri, 2012).

Malaysia has several public universities that accept post graduate students from other countries including African countries such as Nigeria, Libya, Somalia and Sudan. Living in a foreign country and leading such a hectic lifestyle as postgraduate students might have influence the frequency of eating and eating outside. Thus, this study aims to further investigate the association between frequency of eating and eating outside with ‘overweight and obesity’ among them in a public university in Malaysia.

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2.0 Materials and Methods

2.1 Study design, study location and sampling

This was a cross sectional study among postgraduate African students in a public university in Selangor State, Malaysia. Inclusion criteria was a registered postgraduate African students and exclusion criteria was pregnancy and physical inability to stand for weight and height measurements. The eligible students from all faculties in the university was 646.

2.2 Study instruments

A self-administered questionnaire was developed and pretested. The Cronbach's alpha value was 0.76. Respondents were asked to recall the most recent 24 hour meal taking frequency as well as the place of eating for one weekday and one weekend day (Saturday or Sunday). Frequency of eating is the number of meal per day and frequency of eating outside is the number of meal (not prepare at home) eaten outside per day for also one weekday and one weekend day. Frequency was categorized as 0 – 1, 2 – 3, and 4 – 5.

Weight and height was measured using the SECA 877 mobile flat weighing scale and SECA 213 portable standiometer respectively. Two readings were taken for each respondent in order to get accurate results. Calculation was done according to the definition of BMI, which is weight (kg) divided by square of height (m); and the result expressed in kg/m2 as shown in the formula below:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Those with body mass index (BMI) ≥ 25kg/m2 were categorized into the category of 'overweight and obesity'.

2.3 Data collection and analysis

Data was collected in April and May 2017. Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) software version 23. First, descriptive characteristic of the respondents were demonstrated as frequency, and percentage. Then, bivariate association between two categorical variables was carried using the Chi-square test.

3.0 Result

The overall response rate was 87% (559 respondents). The respondents were between 22 to 59 years old and the mean was 36.08 ± 7.47. Majority were male (77.3%), married (74.2%), from Nigeria (67.4%) and were on scholarship (52.8%). Regarding their BMI, 361 (64.6%) was either overweight or obese.

Table 1 shows the frequency of eating in one weekday and one weekend day among the respondents. During weekdays, majority of the respondents reported eating 3 times per day (46.7%), followed with 4 times per day (29%), then 5 times per day (21.6%). Lowest

percentage was for those who ate twice per day (2.7%). During weekend, in general there was a slight increase in the frequency of eating per day.

Table 1: Frequency of eating per day among the respondents (N=559)

Variables	Total n (%)	Female n(%)	Male n(%)
Weekday			
2 times per day	15 (02.7)	0 (0)	15 (3.5)
3 times per day	261 (46.7)	51 (40.2)	210 (48.6)
4 times per day	162 (29.0)	43 (33.8)	119 (27.5)
5 times per day	121 (21.6)	33 (26.0)	88 (20.4)
Weekend			
2 times per day	4 (0.7)	1 (0.8)	3 (0.7)
3 times per day	245 (43.9)	34 (26.8)	211 (48.8)
4 times per day	156 (27.9)	54 (42.5)	102 (23.6)
5 times per day	154 (27.5)	38 (29.9)	116 (26.9)

Table 2 shows that during the weekdays, most of the respondents did not eat outside or ate outside only once (49.6%) and during the weekend more ate at home or ate outside only once (68.9). The mean frequency of eating outside during the weekdays was slightly higher 1.63 ± 0.69 when compared with eating outside during the weekend days 1.39 ± 0.63

Table 2: Frequency of eating outside among the respondents (N=559)

Variables	Total n (%)	Female n (%)	Male n (%)
Weekday			
0 – 1 times	277 (49.6)	63 (49.6)	214 (49.6)
2 – 3 times	213 (38.1)	50 (39.4)	163 (37.7)
4 – 5 times	69 (12.3)	14 (11.0)	55 (12.7)
Weekend			
0 – 1 times	385 (68.9)	88 (69.3)	297 (68.8)
2 – 3 times	130 (23.2)	28 (22.0)	102 (23.6)
4 – 5 times	44 (0 7.9)	11 (08.7)	33 (07.6)

Table 3 shows positive association between 'overweight and obesity' with the frequency of eating per day (weekday and weekend) ($p<0.001$) and eating outside home (weekend) ($p<0.002$). The percentages of 'overweight and obesity' were highest for ate five times per day during weekday (50.4%), weekend (50.6%) and ate outside 5 times per day (52.3%)

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Table 3: Association between overweight, obesity and frequency of eating per day and of eating outside home (N=559)

Variables	'Overweight or obese' Yes n (%)	No n(%)	χ^2	df	*p*-value
Frequency of eating per day					
Weekday					
2 times per day	5 (33.3)	10 (66.7)	48.151	3	<0.001*
3 times per day	54 (20.7)	207 (79.3)			
4 times per day	78 (48.1)	84 (51.9)			
5 times per day	61 (50.4)	60 (49.6)			
Weekend					
2 times per day	1 (25.0)	3 (75.0)	62.039	3	<0.001*
3 times per day	44 (18.0)	201 (82.0)			
4 times per day	75 (48.1)	81 (51.9)			
5 times per day	78 (50.6)	76 (49.4)			
Frequency of eating outside					
Weekday					
0 – 1 times	87 (31.4)	190 (68.6)			
2 – 3 times	79 (37.1)	134 (62.9)	5.830	2	0.054
4 – 5 times	32 (46.4)	37 (53.6)			
Weekend					
0 – 1 times	143 (37.1)	242 (62.9)	12.579	2	0.002*
2 – 3 times	32 (24.6)	98 (75.4)			
4 – 5 times	23 (52.3)	21 (47.7)			

Note: (*) – significant $p < 0.05$

4.0 Discussion

This study examined the association between 'overweight and obesity' and frequency of eating as well as the frequency of eating outside per day among post graduate African student. Among this study population, a high percentage of them were either overweight or obese (64.6%) and the results revealed a significant positive association between high frequency of eating and 'overweight and obesity' in both, weekday and weekend days. This finding is in line with the result from a study conducted among USA adults, which revealed a significant positive association between high eating frequency (>3 times per day) and 'overweight and obesity' (Murakami & Livingstone, 2015). Again, the result concur with the finding from a study conducted in the United Kingdom (UK) which found a significant positive association between BMI, waist circumference and high eating frequency (Murakami & Livingstone, 2014). On the other hand, the result contradicts a study among Australian adults which reported a significant negative association between high frequency of eating and a reduction

in waist circumference (Smith et al., 2011). Also, it contradicts the finding from a UK study which found a significant association between eating 3 times or less per day and a chance of developing general and central obesity in men and vice versa (Holmbäck et al., 2010). The differences could be because these studies were only looking at frequencies of eating while the most definite methodology would be counting the calories uptake per day which involves more complicated method of data collection.

This study revealed a significant association between 'overweight and obesity' and frequency of eating outside. As mentioned, this was comparable with many studies such as the results from a systematic review, which reported an association between body BMI and frequency of out of home eating (Bezerra et al., 2012, Seguin et al., 2016, Musaiger, 2011). Among possible explanation for this positive association is the fact that, foods outside home are likely to be high in fat, energy, and cholesterol sodium, sugar, and sugar-containing beverages as well as lower consumptions of various micronutrients and fibre (Larson et al., 2011, Powell & Nguyen, 2013, and Todd et al., 2010). The other possible explanation is individuals appeared to be principally exposed to overeating when they were outside home, thus increased the chance of developing additional weight (de Castro, King, Duarte-Gardea, Gonzalez-Ayala, & Kooshian, 2012b).

The strength of this study was that the anthropometric measurements were done by the researcher, in order to remove potential errors, since data measured by a researcher is more certain than self-reported measurements. The study was relatively quick and easy to perform, without long periods of follow-up. On the other hand, among the limitations, this research did not allow the formation of causal relationships from the result since the design was cross-sectional and there might be an information bias because of the nature of data collection using self-administered questionnaire. Most important limitation is the absence of data concerning the quantities and type of food or caloric intake calculation which is cardinal in overweigh and obesity research.

Although the association between frequency of eating and 'overweight and obesity' is debatable, the finding in this study shows positive association. Thus, post graduate African student should be aware of their frequency of eating particularly during their life as a post graduate student which in general is hectic, stressful and most probably sedentary. When eat outside, student should be encouraged to choose healthy food and drinks such as choosing water instead of sugar sweetened beverages and selecting small or medium servings and dishes that have been boiled, grilled or steamed instead of fried or sautéed. Malaysian should look into public health policies to intervene obesogenic environment. intervention health promotion campaign on making healthy choice when eat outside and such as in ensuring healthy food sold in eateries should be seriously look into.

5.0 Conclusion and recommendation

Although the association between frequency of eating and 'overweight and obesity' is debatable, the finding in this study shows positive association. Thus, post graduate African student should be aware of their frequency of eating particularly during their life as a post graduate student which in general is hectic, stressful and most probably sedentary. When eat outside, student should be encouraged to choose healthy food and drinks such as choosing

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Ethical approval was obtained from the Ethics Committee for Human Study of the Universiti Putra Malaysia on 12 April 2017 with the reference number of UPM/TNCPI/RMC/1.4.18.2 (JKEUPM) – FPSK-P025/2017. Written informed consent was obtained from the respondents prior to data collection and confidentiality was assured for the information given by the respondents. We would like to thank all respondents for their timely response.

Declaration

Author(s) declare that there was no conflict of interest in this study.

Authors contribution

Author 1: preparation of manuscript

Author 2 and 3: review and editing of manuscript

References

Bauer, S. (2013). Food away from home and food at home: Demand and nutritional quality research. In *Food Away From Home and Food at Home: Demand and Nutritional Quality Research*.

Bezerra, I. N., Curioni, C., & Sichieri, R. (2012, February). Association between eating out of home and body weight. *Nutrition Reviews*.

de Castro, J. M., King, G. A., Duarte-Gardea, M., Gonzalez-Ayala, S., & Kooshian, C. H. (2012a). Overweight and obese humans overeat away from home. *Appetite*. https://doi.org/10.1016/j.appet.2012.04.020

de Castro, J. M., King, G. A., Duarte-Gardea, M., Gonzalez-Ayala, S., & Kooshian, C. H. (2012b). Overweight and obese humans overeat away from home. *Appetite*, *59*(2), 204–211.

Holmbäck, I., Ericson, U., Gullberg, B., & Wirfält, E. (2010). A high eating frequency is

associated with an overall healthy lifestyle in middle-aged men and women and reduced likelihood of general and central obesity in men. *British Journal of Nutrition*. https://doi.org/10.1017/S0007114510001753

Larson, N., Neumark-Sztainer, D., Laska, M. N., & Story, M. (2011). Young adults and eating away from home: Associations with dietary intake patterns and weight status differ by choice of restaurant. *Journal of the American Dietetic Association*. https://doi.org/10.1016/j.jada.2011.08.007

Lee, S.-K. (2008). Acculturation, meal frequency, eating-out, and body weight in Korean Americans. *Nutrition Research and Practice*. https://doi.org/10.4162/nrp.2008.2.4.269

Murakami, K., & Livingstone, M. B. (2015). Eating Frequency Is Positively Associated with Overweight and Central Obesity in US Adults. *J Nutr*. https://doi.org/10.3945/jn.115.219808

Murakami, K., & Livingstone, M. B. E. (2014). Eating frequency in relation to body mass index and waist circumference in British adults. *International Journal of Obesity (2005)*. https://doi.org/10.1038/ijo.2014.1

Musaiger, A. O. (2011). Overweight and obesity in Eastern Mediterranean Region: Prevalence and possible causes. *Journal of Obesity*, *2011*(January 1990). https://doi.org/10.1155/2011/407237

Powell, L. M., & Nguyen, B. T. (2013). Fast-food and full-service restaurant consumption among children and adolescents: effect on energy, beverage, and nutrient intake. *JAMA Pediatrics*. https://doi.org/10.1001/jamapediatrics.2013.417

Seguin, R. A., Aggarwal, A., Vermeylen, F., & Drewnowski, A. (2016). Consumption Frequency of Foods Away from Home Linked with Higher Body Mass Index and Lower Fruit and Vegetable Intake among Adults: A Cross-Sectional Study. *Journal of Environmental and Public Health*. https://doi.org/10.1155/2016/3074241

Smith, K. J., Blizzard, L., McNaughton, S. A., Gall, S. L., Dwyer, T., & Venn, A. J. (2011). Daily eating frequency and cardiometabolic risk factors in young Australian adults: cross-sectional analyses. *Br J Nutr*. https://doi.org/10.1017/S0007114511006398

Todd, J. E., Mancino, L., & Lin, B.-H. (2010). The Impact of Food Away from Home on Adult Diet Quality. *SSRN eLibrary*.

Trasande, L., Cronk, C., Durkin, M., Weiss, M., Schoeller, D. A., Gall, E. A., … Gillman, M. W. (2009). Environment and obesity in the national children's study. *Environmental Health Perspectives*. https://doi.org/10.1289/ehp.11839

Wang, Y., Beydoun, M. A., Liang, L., Caballero, B., & Kumanyika, S. K. (2008). Will All Americans Become Overweight or Obese? Estimating the Progression and Cost of the US Obesity Epidemic. *Obesity*. https://doi.org/10.1038/oby.2008.351