

BREAKFAST CONSUMPTION ASSOCIATION WITH BODY STATUS AND PHYSICAL ACTIVITY AMONG FEMALE UNIVERSITY STUDENTS

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Abstract

Breakfast consumption is associated with many benefits, including behavioural, cognitive, and affective aspects. Young adults, especially female university/college students, frequently fail to meet the prescription of nutritional intake and often skip meals, particularly breakfast. Thus, this study investigates the associations of breakfast consumption with body status and level of physical activity among female university students. A total of 165 female university students, mean age 21.9 ± 1.5 years from Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia, voluntarily took part in this study. Body weight, height, waist circumference and body fat percentages were measured using standard procedures. The odd ratios were calculated to compare in level of physical activity between breakfast skippers and non-skippers. The findings revealed that breakfast consumption was not significantly associated with body mass index (BMI), waist circumference or physical activity level. Conversely, the results showed that breakfast consumption was significantly associated with body fat percentages (%BF) ($p < 0.05$; $p = 0.006$). The results show that skippers were more likely (OR: 1.6; 95% CI) never to perform mild exercise or only performed mild exercise for less than half an hour per day (56.5%) compared to non-skippers (43.5%) even though the data did not meet the level of statistical significance. Among the respondents, skippers (56.5%) were more likely (OR: 1.6; 95% CI) to spend less than half an hour in moderate exercise than non-skippers (43.5%). Also, the data indicates that non-skippers (53.3%) were more likely (OR: 2.4 times) to do moderate exercise of more than half an hour than skippers (46.7%). Skippers (65.3%) tend to do more strenuous exercise of less than half an hour (OR: 5.3; 95% CI) compared to non-skippers (34.7%). Emphasizing the importance of eating breakfast may lead university students

to have better healthy lifestyles, improve academic achievement and prevent obesity crisis among young adults.

Keywords: Breakfast consumption, body mass index, waist circumferences, body fat percentages, physical activity level

Introduction

Malaysia is facing public health problems caused by non-communicable diseases (NCD) such as obesity, especially among adults. Based on the National Health Morbidity Survey (2015), the percentage of obesity has increased to 17.7% (3.3 million for adults above 18 years) compared to the previous survey at 15.1% (NHMS, 2011). In other words, 1 out of 3 adult persons are overweight in Malaysia (Zainuddin, Manickam, Baharudin, Selamat, Cheong et al., 2016) and obesity has become a community health crisis.

In a study conducted by Hakim, Muniandy, and Danish (2012), the prevalence of underweight was 27% and overweight or obese was 12% among university students. Lower body weight (underweight) is harmful as could raise the risk of clinical state such as anaemia, distortion of body image, anorexia and bulimia (Hakim et al., 2012). Overweight and obesity are related to increasing rates of several chronic diseases (Sungsoo, Dietrich, Brown, Clark, & Block, 2003; Zainuddin et al., 2016); (Al Suwaidi, Higano, Holmes, Lennon, & Lerman, 2001; Flegal, Carroll, Kuczmarski, & Johnson, 1998; Lissner & Heitmann, 1995).

University students experience changes in their life patterns and may build up an unhealthy eating practice and have a low level of physical activity (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). This transition starts in school and university and may continue even during their work lives. Most studies of young adults have reported that breakfast skipping is common practice (Keski-Rahkonen, Kaprio, Rissanen, Virkkunen, & Rose, 2003; Osako, Takayama, & Kira, 2005; Song, Joung, Engelhardt, Yoo, & Paik, 2005). In addition, Alizadeh and Ghabili (2008) also reported that university students often skip meals, especially breakfast, and fail to meet the recommended nutritional intake. Furthermore, skipping meals does not necessarily leads to weight loss. The individual may tend to overeat at next meal and this may result in weight gain (Hakim et al., 2012).

Breakfast is typically considered the first and most important meal of the day (Ahadi, Qorbani, Kelishadi, Ardalan, Motlagh et al., 2015; Arora, Nazar, Gupta, Perry, Reddy et al., 2012; Hammons & Rafael, 2014), that been classified as any food eaten before or at the start of daily activities, within two hours of waking and typically no later than 10:00 am, as reported by Giovannini, Verduci, Scaglioni, Salvatici, Bonza et al. (2008). Haines, Guilkey, and Popkin (1996) and Rampersaud, Pereira, Girard, Adams, and Metz (2005) also reported that breakfast consumption is consuming breakfast daily on school day between 5 a.m. and 9 a.m. Breakfast skipping was defined as consuming breakfast less than 7 days per week (Moy, Johari, Ismail, Mahad, Tie et al., 2009). Breakfast skipping is

also always interconnected with diverse health-compromising behaviours and unhealthy lifestyles, like tobacco, alcohol, and substance use (Hoglund, Samuelson, & Mark, 1998; Isralowitz & Trostler, 1996; Revicki, Sobal, & Deforge, 1991). The present study was aimed to determine the associations of breakfast consumption on body status and the level of physical activity among undergraduate female students at UiTM Shah Alam, Selangor.

Methodology

Respondents

This cross-sectional study was conducted in the main campus of Universiti Teknologi MARA (UiTM) Shah Alam, Selangor. Respondents included 165 female undergraduate students. Sample size was computed using G- Power (version 3.1) software where an assumed 95% confidence level and 95% statistical power with an effect size of 0.3 indicated a minimal required sample size of about 134 students. Using the assumption of a 23% drop-out rate, 31 respondents were added to the sample size for a total of 165 respondents. A multistage stratified random sampling was employed and stratified based on academic cluster namely science and technology, social science and humanities, and lastly in business and management. The faculty was randomly selected from each academic cluster, comprised of undergraduates (degree) with ages ranging between 20-26 years old. Respondents were excluded if they were sophomores, pregnant, athletes, or diploma or postgraduate students. The study protocol was approved by Research Ethics Committee of Universiti Teknologi MARA. Self-administered questionnaires for breakfast, demographic information (age, education status, and semester) and physical activity level were obtained from each respondent.

Instrumentation

Breakfast consumption is determined by a single item, “Usually on how many days of the week do you eat breakfast on weekdays and weekends?” (Ahadi et al., 2015; Arora et al., 2012). Responses ranged from “I don't eat breakfast at all” to “I eat breakfast up to 7 days”. Breakfast consumption has been defined as skippers (eating breakfast 0-4 days/week) and non-skippers (eating breakfast 5-7 days/week) (Ahadi et al., 2015; Arora et al., 2012). Physical activity was rated as mild ($\geq 1/2$ hour/day), moderate ($\geq 1/2$ hour/day) or strenuous ($\geq 1/2$ hour/day).

Body status was measured according to standardized protocols for anthropometric measurements (Gan, Mohd, Zalilah, & Hazizi, 2011; Hakim et al., 2012). The %BF is divided into four categories according to the Omron manufacturer: low (<20% for females), normal (20-30% for females), moderate (30-35% for females), and high (>35% for females) (Gan et al., 2011). The abdominal obesity of the respondents was defined by waist circumferences and measured following standard procedures briefly using a non-elastic tape to the nearest 0.1 cm, at a point midway between the lower borders of the rib cage and the iliac crest at the end of normal expiration (Hakim et al., 2012). The cut-off point for WC as reported by Study of Obesity/International Obesity Task Force

(WHO/IASO/IOTF) cut-offs for Asians with >90 cm for men and >80 cm for women to be considered at increased risk for metabolic syndrome or cardiovascular diseases. Body mass index (BMI) based on WHO specifies the cut-off points for BMI necessary in determining overweight and obesity in Asian populations (World Health Organization, 2004) as follows: underweight (< 18.5), normal weight (18.5 < 24.9), overweight (25 < 29.9), low obesity (30 < 34.9), medium obesity (35 < 39.9) and extreme obesity (\geq 40).

In this present study, physical activity has been determined by categories level like mild, moderate and strenuous (Arora et al., 2012). The researcher measured the average frequency of the respondents spending their time in exercise classified as mild (little effort like walking slowly or yoga), moderate (not exhausting like dancing or slow cycling) and strenuous (heart beats rapidly like aerobic exercises or basketball) in a week.

Statistical analysis

All statistical measures were estimated using survey data analysis method. A categorical variable was presented as percentage and at 95% confidence interval (CI). The differences between breakfast categories (skippers and non-skippers) and outcome variables (body status measurements and level of physical activity) using cross-tabulations and Pearson Chi-square (χ^2) test of independence were used to estimate associations between categorical variables. Odd ratios were calculated to compare in level of physical activity between skippers and non-skippers. Univariate analysis was used to analyse descriptive data. The results are presented as frequencies and percentages for categorical variables and as means and standard deviations for continuous variables. The data collected were analysed and performed with the statistical software IBM SPSS Statistics for Windows version 21 (SPSS Inc. Chicago, IL). All tests were two-sided and an alpha level was set at ($p < 0.05$) to determine statistical significance.

Results

The age range of the respondents was 20 to 26 years, with a mean age of 21.9 years (SD = 1.5). The percentage of respondent distribution by field of study that computed into science and technology, social science and humanities and business management was equally sampled ($n = 55$).

Breakfast Consumption

Overall, out of 165 female undergraduate university students, more than half of the respondents reported skipping breakfast (54.6%; $n = 90$), while the others (45.5%; $n = 75$) consumed breakfast, with a mean breakfast consumption of 1.45 times a week (SD = 0.50).

Body Status Measurement

Table 1 describes the respondents' physical characteristics. Results indicate that about 53.9% (n = 89) of the respondents were in normal BMI, followed by 25.5% (n = 42) were overweight, and lastly 20.6% (n = 34) were underweight. Breakfast consumption was found to have no association with body mass index (BMI) category ($\chi^2 = 4.953$; $p = 0.084$) as per presented in Table 2. Results indicated that among the underweight respondents, non-skippers (58.8% or n = 20) were more common than skippers (41.2% or n = 14). However, the data showed that the prevalence of overweight was higher in the breakfast skippers (66.7% or n = 28) compared to their non-skipping counterparts (33.3% or n = 14). Similarly, there was no association observed between breakfast consumption and WC ($\chi^2 = 3.667$; $p = 0.056$). However, the data revealed that the high risk of abdominal obesity were higher percentages in skippers (63.6% or n = 42) rather than non-skippers (36.4% or n = 24). Breakfast consumption was found to be significantly associated with body fat percentage (% BF) ($\chi^2 = 12.335$; $p = 0.006$). The findings indicate that breakfast skippers (75%) were more likely to have higher body fat percentages than non-skippers (25%).

Table 1: Respondent's distribution by body status measurements (n= 165)

Characteristics	Frequency (n)	Percentages (%)	Mean \pm S.D
Height(cm)			156.24 \pm 5.39
Body weight(kg)			56.15 \pm 13.54
BMI (kg/m ²)			22.92 \pm 5.20
Underweight	34	20.6	
Normal	89	53.9	
Overweight	42	25.5	
Waist circumferences (cm)			79.89 \pm 10.55
High risk of abdominal obesity	66	40.0	
No risk of abdominal obesity	99	60.0	
Percentages of body fat (%BF)			24.01 \pm 8.31
Low (<20%)	48	29.1	
Normal (20-30%)	78	47.3	
Moderate (30-35%)	23	13.9	
High (>35%)	16	9.7	

Table 2: Associations between breakfast consumption and body status

Characteristics	Skippers n (%)	Non-skippers n (%)	χ^2 value, <i>p</i>
BMI (kg/m ²)			4.953, <i>p</i> = 0.084
Underweight	14 (41.2%)	20 (58.8%)	
Normal	48 (53.9%)	41 (46.1%)	
Overweight	28 (66.7%)	14 (33.3%)	
Waist circumferences (cm)			3.667, <i>p</i> = 0.056
High risk of abdominal obesity	42 (63.6%)	24 (36.4%)	
No risk of abdominal obesity	48 (48.5%)	51 (51.5%)	
Percentages of body fat (%BF)			12.335, <i>p</i> = 0.006*
Low (<20%)	18 (37.5%)	30 (62.5%)	
Normal (20-30%)	50 (64.1%)	28 (35.9%)	
Moderate (30-35%)	10 (43.5%)	13 (56.5%)	
High (>35%)	12 (75.0%)	4 (25.0%)	

Note: * χ^2 analyses with significance at *p* < 0.05

Physical Activity

The data showed that approximately half of the respondents (51.5%; *n* = 85) never did exercise or did mild exercise for less half an hour per day, while approximately half of the other respondents (48.5%; *n* = 80) did mild exercise for more than half an hour per day (Table 3). Respondents conducted moderate exercise for more than half an hour per day (18.2%, *n*=30) and majority never did moderate exercise or did moderate exercise for less than half an hour per day (81.8%, *n*=135).

Table 4 shows the association between breakfast consumption and the level of physical activity. There was no significant association between breakfast consumption and mild exercise ($\chi^2 = 0.262$; *p* = 0.609). The results show that skippers were more likely (OR: 1.6; 95% CI) to never do mild exercise or do mild exercise for less half an hour per day (56.5%; *n*=48) compared to non-skippers (43.5%; *n* = 37) even though the data did not meet the statistical significance. Besides, association between breakfast consumption and moderate exercise also showed no significant ($\chi^2 = 0.921$; *p* = 0.631).

Yet, the data showed that skippers (56.0%; *n* = 28) were higher in never to do moderate exercise than non-skippers (44.0%; *n* = 22). Among the respondents also, skippers (56.5%; *n* = 48) were more likely (OR: 1.6; 95% CI) who spend time less half an hour in moderate exercise than non-skippers (43.5%; *n* = 37). The data indicates that non-skippers (53.3%; *n* = 16) were more likely (OR: 2.4 times) to do moderate exercise of more than half an hour rather than skippers (46.7%; *n* = 14).

Similarly, results have shown that breakfast consumption is also not associated with strenuous exercise ($\chi^2 = 3.255$; *p* = 0.196). Skippers (65.3%; *n* = 32) tend to do more strenuous exercise of less half an hour (OR: 5.3; 95% CI) compared to non-skippers (34.7%; *n*=17). However, there was no difference between skippers and non-skippers in

terms of doing strenuous exercise for more than half an hour (50%; n = 7) and those who never do strenuous exercise (50%; n = 51).

Table 3: Respondent’s distribution by level of physical activity

Characteristics	Frequency (n)	Percentages (%)	Mean ± S.D (hours/day)
Mild exercise			2.44 ± 0.59
Never or < 1/2 hours/day	85	51.5	
≥1/2 hours/day	80	48.5	
Moderate exercise			1.88 ± 0.69
Never	50	30.3	
< half hour/day	85	51.5	
≥1/2 hours/day	30	18.2	
Strenuous exercise			1.47 ± 0.65
Never	102	61.8	
< half hour/day	49	29.7	
≥1/2 hours/day	14	8.5	

Table 4: Associations between breakfast consumption and level of physical activity

Characteristics	Skippers n (%)	Non-skippers n (%)	χ^2 value, p
Mild exercise			0.262, p = 0.609
Never or < 1/2 hours/day	48 (56.5%)	37 (43.5%)	
≥1/2 hours/day	42 (52.5%)	38 (47.5%)	
Moderate exercise			0.921, p = 0.631
Never	28 (56.0%)	22 (44.0%)	
< half hour/day	48 (56.5%)	37 (43.5%)	
≥1/2 hours/day	14 (46.7%)	16 (53.3%)	
Strenuous exercise			3.255, p = 0.196
Never	51 (50.0%)	51 (50.0%)	
< half hour/day	32 (65.3%)	17 (34.7%)	
≥1/2 hours/day	7 (50.0%)	7 (50.0%)	

Discussion

In the context of the present study, the researcher explored the patterns of breakfast consumption among female university students from UiTM Shah Alam, Selangor and its association with body status and level of physical activity. Overall, this study revealed an important finding which is, that out of the 165 female university undergraduate students, more than half of the respondents, 54.5% were skipping breakfast completely or only eat breakfast one to four days in a week. In contrast, less than half, 45.5% consumed breakfast daily or at least five to six days in a week.

The prevalence of breakfast consumption decreased compared to a previous study by Gan et al. (2011), who reported that 62.2% of female Malaysian university students conducted

at Klang Valley, Selangor consumed breakfast daily or four to six days weekly. Keski-Rahkonen et al. (2003) reported that adults had breakfast significantly less often than adolescents. In addition, as reported by Alizadeh and Ghabili (2008) the most frequently skipped meal by university students was breakfast. There was no difference in breakfast skipping in both sexes (Gan et al., 2011).

The reasons of the university students skipped their breakfast meal may due to having feeling of 'no appetite' followed by 'not enough time' or 'over slept' (You, Kim, & Chang, 2009). They might prefer to sleep late at night and not awake early, and thus skip their morning meal like breakfast. Commonly, reported reasons students are skipping breakfast are lack of time to eat, lack of appetite, dislike to eat early in the morning, oversleeping (Moy et al., 2009; Ozdogan et al., 2010), concerns about excess body weight (Chapman & Melton, 1998; Haines et al., 1996; Ruxton & Kirk, 1997), and lack of parental control (Mullie, Clarys, De Ridder, Deriemaeker, Duvigneaud et al., 2006; Shaw, 1998). Other than that, as cited by Shaw (1998), skipping breakfast more frequently occurred either when eating alone or when breakfast had to be prepared by the teenagers themselves.

Breakfast consumption was not significantly associated with BMI and waist circumferences (WC) among female university respondents. However, for the 25.5% of overweight respondents, the results revealed that more than half were breakfast skippers. This finding is supported by the previous study by Corder, Van Sluijs, Steele, Stephen, Dunn et al. (2011) that reported breakfast skippers were more likely to be overweight than frequent breakfast eaters. Also, Arora et al. (2012) reported that regular breakfast eaters were significantly less overweight and obese as compared to breakfast skippers. It has been reported that although some individuals skipped breakfast to control weight, it was noted that skipping breakfast may lead to reduced satiety later during the day, and therefore increased eating snacks (Huang et al., 2003) or frequent other meals. Female university students have been reported to have had an inadequate intake of iron due to diets aimed at weight control, which may lead to iron deficiency anaemia (Gan et al., 2011).

The data from the current study showed that breakfast skippers tend to have larger waist circumferences than non-skippers. Non-skippers were less likely to be risk of abdominal obesity or have no risk of abdominal compared to skippers. Ahadi et al. (2015) also showed that the percentage rate of abdominal obesity was significantly higher among breakfast skippers rather than non-skippers. It is noted that abdominal obesity is more prevalent among female than males due to fat distribution differences between sexes. Age is another factor, as waist circumference increases with age (Kleinman, Hall, Green, Korzec-Ramirez, Patton et al., 2002). The present study findings on abdominal obesity may not able to provide better understanding except for poor nutritional status as there is still no universal consensus on the cut-off points for waist circumferences (Garnett, Baur, & Cowell, 2008) and different population may have different cut-off points to measure (Kleinman et al., 2002).

The present findings revealed that breakfast consumption was significantly associated with body fat percentages (%BF) with skippers having more body fat than non-skippers.

Higher intake of fat in dairy products may increase body fat (Keski-Rahkonen et al., 2003), although the current study did not investigate specifically the type of dairy foods that the respondents consumed during breakfast. This could be one of the possible reasons that the skippers had higher body fat rather than non-skippers. Future studies need to be explored that could deeply determine the type of food consumed among female undergraduate university students related to the body fat percentages.

Breakfast consumption was not significantly associated with mild, moderate or strenuous level of physical activity (refer to Table 4). Among the respondents who never do mild or moderate exercise or exercised less than half an hour per day, the majority were skippers compared to non-skippers. It is noted from literature that university students who participate in sports are more prone to have breakfast when compared to their counterparts (Kee, Jamaiyah, Safiza, Geeta, Khor et al., 2008). In a study conducted among Chilean university students, physical inactivity among females is higher than males and reason mainly due to lack of time for exercise and laziness (Garnett et al., 2008). Wells and colleagues (2016) reported that when students ate breakfast, they tended to exercise longer and created a negative energy balance despite ingesting more overall food and beverage. In addition, Arora et al. (2012) reported that non-skippers had significantly higher levels of physical activity compared to skippers. However, further longitudinal studies are required to assess whether the relation is causal or these behaviours simply co-occur.

While there is no association between breakfast consumption and level of physical activity as reported in this study, the results indicate that breakfast consumers were more likely to do mild, moderate and strenuous intensity of physical activity compare to skippers and this finding is consistent with a previously reported by Arora et al. (2012). According to Ahadi et al. (2015) also, their finding showed that non-skippers significantly do more physical activity compared to breakfast skippers. Furthermore, this finding also supports a previous study by Keski-Rahkonen et al. (2003) that reported breakfast skippers were much more likely to do little exercise compared to breakfast eaters. The respondents who had greater level of physical activity would be more likely to be early risers and eaten breakfast in preparation for the anticipated activities for the rest of the day (Corder et al., 2011). It is possible that skippers do not get enough energy from an early morning meal, and thus feel quickly exhausted when performing physical activity either early in the morning or late in the evening after class.

Conclusion

In conclusion, this study has shown that a majority of the female university students practiced unhealthy lifestyles, including skipping breakfast. The finding in this current study showed that breakfast consumption was not associated with BMI, waist circumferences and level of physical activity; however, breakfast consumption was significantly associated with body fat percentage. During the transition from high school to university life, the development of good eating habits is important because it could be a significant influence on lifelong eating behaviours.

Thus, there is a specific need to develop successful nutrition strategies that target weight management to reverse the obesity epidemic and prevent or delay serious health complications. Future studies should address more questions specifically towards patterns of breakfast consumption with other factors such as type of food consumed during breakfast, nutrient intake for 24 hours, reasons for breakfast skipping, academic performance, and socio-economic status among female university undergraduate students. Breakfast appears to be easily skipped, but it could appear as one of the major components that co-occur with health-compromising behaviours. Optimal nutrient intake is needed to meet a basic demand of growth and development as age increases. Thus, it is important to start the day with breakfast.

Conflict of interest

The authors declare no conflict of interest in this study.

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References

- Abalkhail, B., & Shawky, S. (2002). Prevalence of daily breakfast intake, iron deficiency anaemia and awareness of being anaemic among Saudi school students. *International Journal of Food Sciences and Nutrition*, 53(6), 519-528.
- Adolphus, K., Lawton, C. L., & Dye, L. (2013). The effects of breakfast on behaviour and academic performance in children and adolescents. *Frontiers in Human Neuroscience*, 7.
- Affenito, S. G. (2007). Breakfast: A missed opportunity. *Journal of the American Dietetic Association*, 107(4), 565-569.
- Ahadi, Z., Qorbani, M., Kelishadi, R., Ardalan, G., Motlagh, M., Asayesh, H., et al. (2015). Association between breakfast intake with anthropometric measurements, blood pressure and food consumption behaviors among Iranian children and adolescents: The caspian-iv study. *Public Health*, 129(6), 740-747.

- Al Suwaidi, J., Higano, S. T., Holmes, D. R., Lennon, R., & Lerman, A. (2001). Obesity is independently associated with coronary endothelial dysfunction in patients with normal or mildly diseased coronary arteries. *Journal of the American College of Cardiology*, 37(6), 1523-1528.
- Alizadeh, M., & Ghabili, K. (2008). Health related lifestyle among the Iranian medical students. *Research Journal of Biological Sciences*, 3(1), 4-9.
- Arora, M., Nazar, G. P., Gupta, V. K., Perry, C. L., Reddy, K. S., & Stigler, M. H. (2012). Association of breakfast intake with obesity, dietary and physical activity behavior among urban school-aged adolescents in Delhi, India: Results of a cross-sectional study. *BioMed Central Public Health*, 12(1), 1.
- Breslow, L., & Enstrom, J. E. (1980). Persistence of health habits and their relationship to mortality. *Preventive Medicine*, 9(4), 469-483.
- Chao, E., & Vanderkooy, P. (1989). Overview of breakfast nutrition. *Journal of the Canadian Dietetic Association*.
- Chapman, G. E., & Melton, C. L. (1998). College and university students' breakfast consumption patterns: Behaviours, beliefs, motivations and personal and environmental influences. *Canadian Journal of Dietetic Practice and Research*, 59(4), 176.
- Corder, K., Van Sluijs, E., Steele, R., Stephen, A., Dunn, V., Bamber, D., et al. (2011). Breakfast consumption and physical activity in British adolescents. *British Journal of Nutrition*, 105(02), 316-321.
- Currie, C., Roberts, C., Morgan, A., Smith, R., Settertobulte, W., Samdal, O., et al. (2004). *Young people's health in context*: World Health Organization Regional Office for Europe.
- Flegal, K. M., Carroll, M. D., Kuczmarski, R. J., & Johnson, C. L. (1998). Overweight and obesity in the United States: Prevalence and trends, 1960–1994. *International Journal of Obesity*, 22(1), 39-47.
- Fujiwara, T. (2003). Skipping breakfast is associated with dysmenorrhea in young women in Japan. *International Journal of Food Sciences and Nutrition*, 54(6), 505-509.
- Gan, W. Y., Mohd, N., Zalilah, M., & Hazizi, A. (2011). Differences in eating behaviours, dietary intake and body weight status between male and female Malaysian university students. *Malaysian Journal of Nutrition*, 17(2), 213-228.
- Garnett, S., Baur, L., & Cowell, C. (2008). Waist-to-height ratio: A simple option for determining excess central adiposity in young people. *International Journal of Obesity*, 32(6), 1028-1030.

- Giovannini, M., Verduci, E., Scaglioni, S., Salvatici, E., Bonza, M., Riva, E., et al. (2008). Breakfast: A good habit, not a repetitive custom. *Journal of International Medical Research*, 36(4), 613-624.
- Haines, P. S., Guilkey, D. K., & Popkin, B. (1996). Trends in breakfast consumption if us adults between 1965 and 1991. *Journal of the American Dietetic Association*, 96(5), 464-470.
- Hakim, N. A., Muniandy, N., & Danish, A. (2012). Nutritional status and eating practices among university students in selected universities in Selangor, Malaysia. *Asian Journal of Clinical Nutrition*, 4(3), 77.
- Hammons, A. J., & Rafael, K. (2014). Breakfast consumption and physical fitness in elementary school children. *Californian Journal of Health Promotion*, 12(3), 88-92.
- Hoglund, D., Samuelson, G., & Mark, A. (1998). Food habits in Swedish adolescents in relation to socioeconomic conditions. *European Journal of Clinical Nutrition*, 52(11), 784-789.
- Hoyland, A., Dye, L., & Lawton, C. L. (2009). A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. *Nutrition Research Reviews*, 22(02), 220-243.
- Isralowitz, R. E., & Trostler, N. (1996). Substance use: Toward an understanding of its relation to nutrition-related attitudes and behavior among Israeli high school youth. *Journal of Adolescent Health*, 19(3), 184-189.
- Kaplan, G. A., Seeman, T. E., Cohen, R. D., Knudsen, L. P., & Guralnik, J. (1987). Mortality among the elderly in the Alameda county study: Behavioral and demographic risk factors. *American Journal of Public Health*, 77(3), 307-312.
- Kee, C. C., Jamaiyah, H., Safiza, M. N., Geeta, A., Khor, G. L., Suzana, S., et al. (2008). Abdominal obesity in Malaysian adults: National Health and Morbidity Survey III (NHMS III, 2006). *Malaysian Journal of Nutrition*, 14(2).
- Keski-Rahkonen, A., Kaprio, J., Rissanen, A., Virkkunen, M., & Rose, R. J. (2003). Breakfast skipping and health-compromising behaviors in adolescents and adults. *European Journal of Clinical Nutrition*, 57(7), 842-853.
- Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., et al. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition and Metabolism*, 46(1), 24-30.
- Kunimoto, M., Nishi, M., & Sasaki, K. (1997). The relation between irregular bowel movement and the lifestyle of working women. *Hepato-gastroenterology*, 45(22), 956-960.

- Lissner, L., & Heitmann, B. L. (1995). Dietary fat and obesity: Evidence from epidemiology. *European Journal of Clinical Nutrition*, 49(2), 79-90.
- Moy, F., Johari, S., Ismail, Y., Mahad, R., Tie, F., & Wan Ismail, W. (2009). Breakfast skipping and its associated factors among undergraduates in a public university in Kuala Lumpur. *Malaysian Journal of Nutrition*, 15(2).
- Mullie, P., Clarys, P., De Ridder, D., Deriemaeker, P., Duvigneaud, N., Hebbelinck, M., et al. (2006). Breakfast frequency and fruit and vegetable consumption in Belgian adolescents a cross-sectional study. *Nutrition & Food Science*, 36(5), 315-326.
- National Health Morbidity Survey. (2015). Minister of health session with press.
- Nelson, M. C., Story, M., Larson, N. I., Neumark-Sztainer, D., & Lytle, L. A. (2008). Emerging adulthood and college-aged youth: An overlooked age for weight-related behavior change. *Obesity Journal*, 16(10), 2205-2211.
- Nicklas, T. A., Regehr, C., Myers, L., & O'neil, C. (2000). Breakfast consumption with and without vitamin-mineral supplement use favorably impacts daily nutrient intake of ninth-grade students. *Journal of Adolescent Health*, 27(5), 314-321.
- Osako, M., Takayama, T., & Kira, S. (2005). Dietary habits, attitudes toward weight control, and subjective symptoms of fatigue in young women in Japan. *Japanese Journal of Public Health*, 52(5), 387-398.
- Ozdogan, Y., Ozcelik, A. O., & Surucuoglu, M. S. (2010). The breakfast habits of female university students. *Pakistan Journal of Nutrition*, 9(9), 882-886.
- Pollitt, E., & Mathews, R. (1998). Breakfast and cognition: An integrative summary. *The American Journal of Clinical Nutrition*, 67(4), 804S-813S.
- Rampersaud, G. C., Pereira, M. A., Girard, B. L., Adams, J., & Metzler, J. D. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *Journal of the American Dietetic Association*, 105(5), 743-760.
- Resnicow, K. (1991). The relationship between breakfast habits and plasma cholesterol levels in school children. *Journal of School Health*, 61(2), 81-85.
- Revicki, D., Sobal, J., & Deforge, B. (1991). Smoking status and the practice of other unhealthy behaviors. *Family Medicine*, 23(5), 361-364.
- Ruxton, C., & Kirk, T. (1997). Breakfast: A review of associations with measures of dietary intake, physiology and biochemistry. *British Journal of Nutrition*, 78(02), 199-213.

- Shaw, M. E. (1998). Adolescent breakfast skipping: An Australian study. *Adolescence Journal*, 33(132), 851.
- Song, Y., Joung, H., Engelhardt, K., Yoo, S. Y., & Paik, H. Y. (2005). Traditional v. Modified dietary patterns and their influence on adolescents' nutritional profile. *British Journal of Nutrition*, 93(06), 943-949.
- Stanton Jr, J. L., & Keast, D. R. (1989). Serum cholesterol, fat intake, and breakfast consumption in the United States adult population. *Journal of the American College of Nutrition*, 8(6), 567-572.
- Sungsoo, C., Dietrich, M., Brown, C. J., Clark, C. A., & Block, G. (2003). The effect of breakfast type on total daily energy intake and body mass index: Results from the Third National Health and Nutrition Examination Survey (NHANES III). *Journal of the American College of Nutrition*, 22(4), 296-302.
- You, J. S., Kim, S. M., & Chang, K. J. (2009). Nutritional knowledge and dietary behavior of the 6th grade elementary school students in Daejeon area by gender and skipping breakfast. *Korean Journal of Nutrition*, 42(3), 256-267.
- Zainuddin, A. A., Manickam, M. A., Baharudin, A., Selamat, R., Cheong, K. C., Ahmad, N. A., et al. (2016). Prevalence and socio-demographic determinant of overweight and obesity among Malaysian adult. *International Journal of Public Health Research*, 6(1), 661-669.