BREAKFAST CONSUMPTION AND BODY MASS INDEX AMONG PRESCHOOLERS IN KUANTAN, PAHANG

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Abstract

Introduction: Eating patterns such as eating outside frequently and skipping breakfast are among the contributing factors for obesity. This study aimed to describe the breakfast consumption patterns and associate it with the body mass index (BMI) values among preschoolers in Kuantan, Pahang. In addition, the foods and beverages typically consumed by them during breakfast were also described. **Methods:** A total of 147 children aged 4-6 years were recruited using convenient sampling. Their BMI values were determined based on measured height and weight. The frequency of breakfast consumption and typical foods and beverages taken were assessed using a self-administered questionnaire completed by parents. **Results:** About half of the study participants had normal BMI, while 12.2% were either overweight or obese. A total of 57.1% of the preschoolers consumed breakfast at home almost daily, 3-4 times/week (26.5%) and 0-2 times/week (16.3%). Those who ate breakfast at home 3-4 times/week were found to have significantly lower mean BMI compared to those who rarely or never did so (14.1±1.4 kg/m² vs. 15.7±3.2 kg/m², *p*-value=0.022). The breakfast foods typically consumed by preschoolers in this study were *nasi lemak*, fried rice/mee/beehoon/kuey teow, or white bread with spreads. Most of them reported taking malted drinks added with condensed milk for breakfast. **Conclusions:** Infrequent breakfast consumption at home may be associated with a higher BMI among preschoolers. Intake of fatty and sugary foods/beverages during breakfast may also lead to excess energy intake. Eating a healthy and nutritious breakfast at home is strongly recommended among these preschoolers.

KEYWORDS: Body mass index, Breakfast, Children, Obesity, Preschoolers

Introduction

The World Health Organization (WHO, 2020) estimated that over 39 millions of children under five years old are overweight, globally. Surprisingly, almost half of these overweight children old live in Asia. The numbers of overweight and obese young children are predicted to increase up to 70 million by 2025, if the current trend continues. In Malaysia, The National Health and Morbidity Survey 2019 reported that 14.8% of children (under 18 years old) were obese (Institute Public Health, 2020). The prevalence has been showing an increasing trend compared to the 6.1% reported by the NHMS 2011 and 11.9% by the NHMS 2015.

The etiology of obesity is multifactorial. The environmental factors, lifestyle preferences and cultural environment play a critical role in the rising occurrence of obesity globally (Hemmingsson, 2018). In fact, overweight and obese children are prone to stay obese until later in life and the risks of developing non-communicable diseases such as diabetes mellitus and cardiovascular disease at a younger age are high (WHO, 2015). They will also suffer from psychological health problems, for instance, low self-esteem, depression, and disordered eating patterns (Smith, Fu, & Kobayashi, 2020).

Numerous studies have found an association between skipping breakfast and childhood obesity as shown by a systematic review where children who do not regularly consume breakfast have a higher risk of developing obesity (Poorolajal et al., 2020). Breakfast is considered as the most essential meal of the day as it supplies energy and essential nutrients to the body throughout the day. Children who eat breakfast regularly have been demonstrated to have better memory and improved academic performance in school (Adolphus et al., 2013). In addition, breakfast eaters also have higher intakes of nutrients particularly vitamin A, vitamin C, calcium, zinc, iron and riboflavin than breakfast skippers (Rampersaud et al., 2005). More importantly, regular breakfast consumption, especially those rich in dietary fibre and whole foods would prevent obesity as well as other related chronic conditions (Pereira et al., 2011). Individuals who eat breakfast daily also seem to be more physically active (Shafiee et.al., 2013) while those who skip breakfast are more prone to be less physically active (Sandercock et al., 2010), contributing to weight gain.

However, research shows that breakfast is the most frequently missed meal in Malaysia (Moy, Can & Zaleha, 2006). The behaviour is not only restricted to adults. Deshmukh et al. (2010) found that 20% of children and 31.5% of adolescents regularly skip breakfast. In addition, the culture shifting of eating from home to the outside of home is becoming more common. When dining out people are prone to choose foods with higher in energy density (Rolls, 2003). Shamsul et al. (2008) reported that 21.1% of children consume breakfast away from home. As breakfast skipping or breakfast taken outside of home has been linked to increase the risk of obesity, this study aimed to determine breakfast consumption behaviours and its association with body mass index (BMI) among preschoolers in Kuantan, Pahang.

Materials And Methods

Study Design and Population

A cross-sectional was conducted involving five private kindergartens around Kuantan area. Determination of sample size was calculated using a single proportion formula based on the prevalence of preschoolers aged 4-6 years old consuming breakfast (89.5%, Norimah et al., 2014) which yielded a total of 143 respondents.

Convenient sampling method was used to select the study respondents. The inclusion criteria for the respondents were preschool children aged between 4-6 years and attending the selected kindergartens.

The study protocol was approved by the Kulliyyah of Allied Health Sciences Postgraduate and Research Committee (Reference No: IIUM/310/G/13/4/41199/KAHS78). A written consent to allow their children to participate in this study was attached to each questionnaire and completed by the parents. All information was treated as strictly confidential.

Questionnaire

For this study, a self-administered questionnaire in Malay was constructed and verified by six nutrition and dietetics experts through content validation. The questionnaire was to be completed by the parents or guardians of the respondents. This consisted of four sections: i) Sociodemographic data (respondent's age and sex, parents' level of education and household income), ii) Frequency of breakfast consumption at home and outside of home in a week among preschoolers, iii) Foods typically consumed by preschoolers during breakfast - a list of common breakfast foods in Malaysia was provided and parents needed to tick a maximum of three foods that their children always eat for breakfast, iv) Beverages typically consumed by preschoolers during breakfast - a list of common beverages was listed, and the parents needed to indicate a maximum of three foods beverages their child commonly drink and whether or not it was added with sugar/sweetened condensed milk or not added at all.

Anthropometric measurements

Height and weight of the respondents were measured at the kindergarten using standard procedures, height was measured using a SECA 763 digital stadiometer to the nearest 0.1cm while weight was measured using SECA 217 digital weighing scale (SECA, Germany) to the nearest 0.1kg. Only minimal clothing (kindergarten's uniform) was allowed with no shoes or headgear such as *songkok*. Based on the measured height and weight, the BMI was determined using the formula $BMI = kg/m^2$ where kg is a person's weight in kilograms and m^2 is their height in metres squared. The BMI values were classified by referring to the Centres for Disease Control (CDC)'s BMI-for-age Growth Chart. The BMI values that fell between >5th to <90th percentile were categorized as normal, >90th percentile (underweight), <5th percentile to >90th percentile.

Statistical Analyses

The data obtained were statistically analyzed using IBM SPSS Statistics for Windows, version

21 (IBM Corporation, Armonk, New York, USA). The results were expressed as mean and standard deviation (SD). Descriptive analysis was used to describe the sociodemographic characteristics and foods and beverages consumed by preschoolers. The association between BMI values and frequency of breakfast consumption was analysed using one-way ANOVA with a post hoc (Bonferonni) test. The significance level was set at $p<0.05$.

Results

Sociodemographic Information

A total of 147 respondents (79 boys and 68 girls) were included in this study. The sociodemographic details are presented in Table 1.

Table 1 Sociodemographic data of respondents (N=147)

Characteristics	Participants (n= %)
Gender	
Boys	79 (53.7%)
Girls	68 (46.3%)
Maternal Education	
Secondary education	52 (35.4%)
Tertiary education	95 (64.6%)
Paternal Education	
Secondary education	55 (37.4%)
Tertiary education	92 (62.6%)
Parental Income	
< RM 2,000	14 (9.5%)
RM2,000 - RM 4,999	49 (33.3%)
RM5,000 - RM 9,999	39 (26.5%)
≥ RM10,000	18 (12.2%)
No answer	27 (18.4%)

Most parents (64.6% mothers and 62.6% fathers) attained tertiary level education. The family economic status indicates that 42.8% have a monthly household income of < RM5,000, 26.5% of them have an income of RM5,000 - 10,000, and 12.2% of them have a household income of ≥RM 10,000 per month. The mean estimated household income was RM 4,501, indicating that the children were mostly from middle income families based on the mean monthly household income (RM 4,573) for the middle 40% of the population in Malaysia (Department of Statistics, 2020). However, nearly one-fifth of the parents did not report their monthly household income.

Body Mass Index

The mean (SD) of BMI for the respondents was 14.8 ± 2.3 kg/m². More than half (57.1%) of the respondents have normal BMI (54.4% for boys and 60.3% for girls). Almost one-third (30.6%) were underweight, while 6.1% were overweight or obese (respectively).

Breakfast Consumption

Among the preschoolers in the current study, 57.1% reported consuming breakfast at home 5-7 times/week, 26.5% did this 3-4 times/week, while 16.3% never or rarely (0-2 times per week) took breakfast at home. On the other hand, about two-thirds (67.3%) of the respondents never or rarely consumed breakfast outside of home; 17.0% did this 3-4 times/week, while 15.6% did this 5-7 days/week.

Figure 1 shows the foods typically consumed by the preschoolers during breakfast. Popular choices included *nasi lemak* (21.8%), fried rice/*mee*/*beehoon*/*kuey teow*, white bread with spread such as jam/kaya/peanut butter/margarine (19.3%), *roti canai* (18.9%) and breakfast cereals (16.9%). Other respondents selected processed foods such as nugget/burger/fries/sausage (7%), local sweet kueh (5.8%), and egg/chicken/fish (4.9%) during breakfast. The rest chose sandwiches, oats and muesli, fruits, as well as others (such as pasta and biscuits).
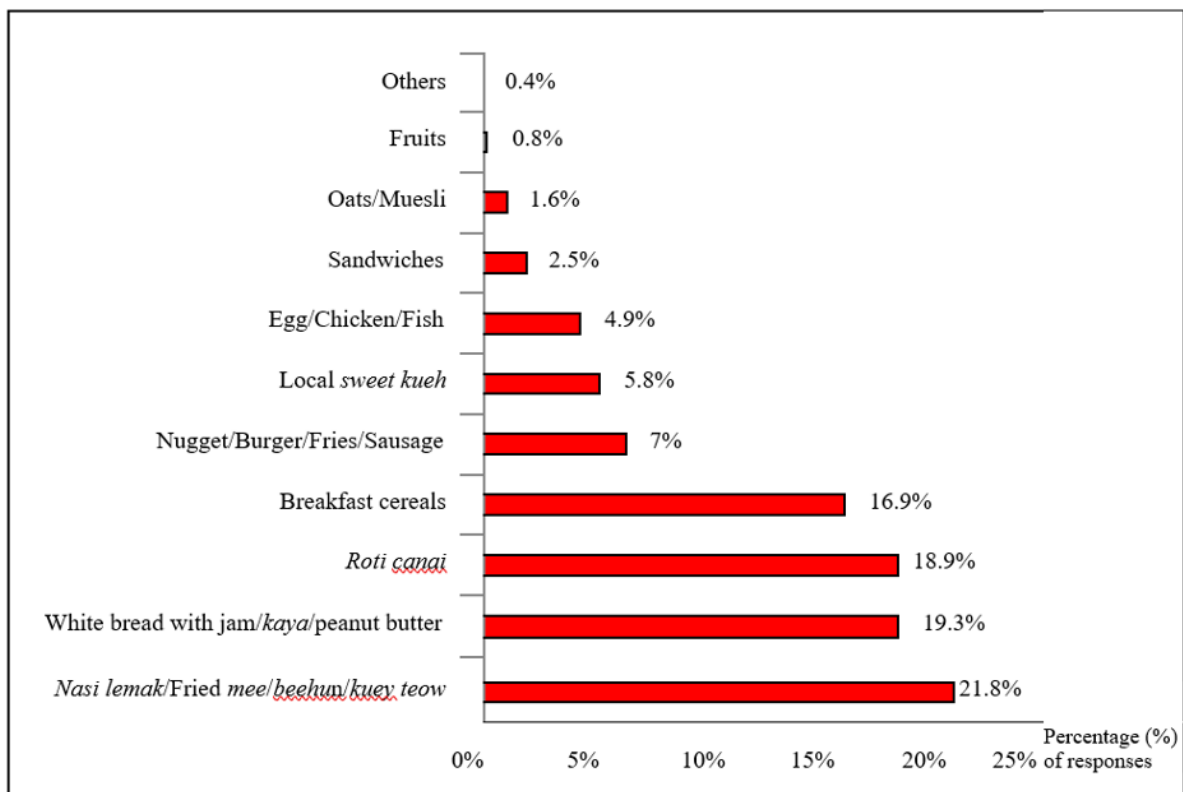

Figure 1 Foods typically consumed during breakfast by preschoolers (N=147)

Figure 2 shows beverages typically consumed by preschoolers during breakfast. Almost one-fifth of the respondents took malted drinks added with condensed milk during breakfast. This is followed by unsweetened powdered milk (not added with sugar or condensed milk)

(15.9%). A total of 0.7% of respondents took powdered milk added with condensed milk. The rest selected water (13%), cultured drinks (12.6%), ready-to-drink milk (10.5%), or tea/coffee with added sugar (11.2%).
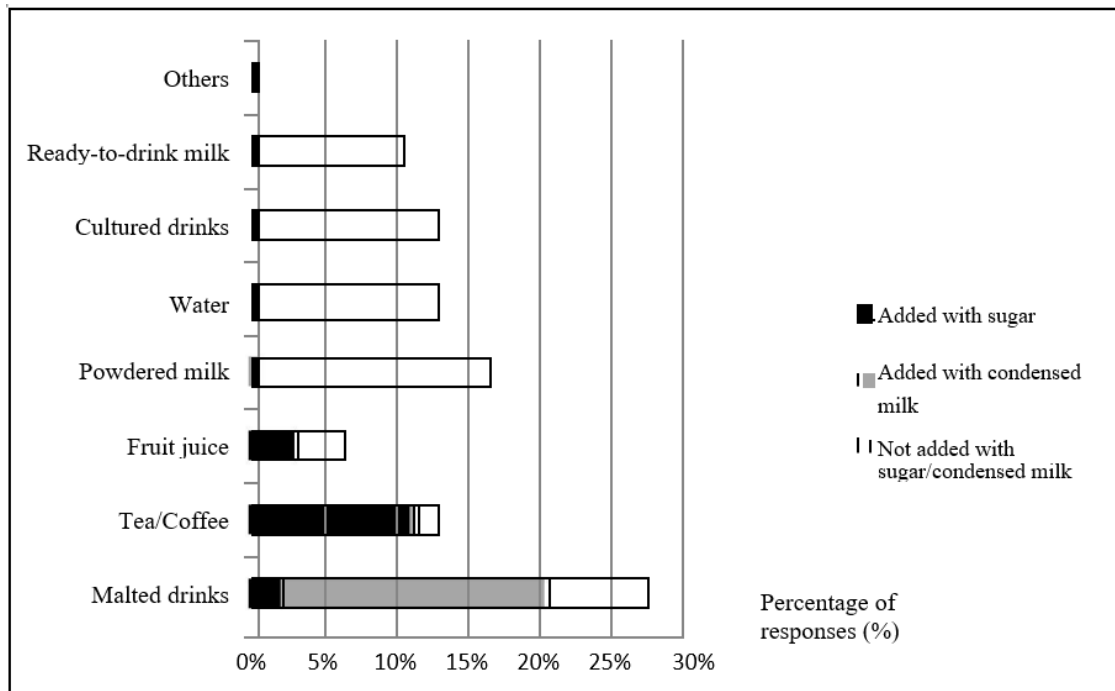

Figure 2: Beverages typically consumed during breakfast by preschoolers (N=147)

Association between BMI and Breakfast Consumption Patterns

Table 2 demonsrates that the preschoolers who seldom ate breakfast at home have the highest mean BMI (15.7 ± 3.2 kg/m^2) compared to those who did this more frequently. Post-hoc (Bonferonni) test indicated that preschoolers who consumed breakfast at home 0-2 times per week were shown to have significantly (p=0.022) higher mean BMI (15.7±3.2 kg/m^2) than those who did this 3-4 times per week (14.1±1.4 kg/m^2). On the other hand, the preschoolers who had their breakfast regularly outside had the highest mean BMI (15.5 ± 3.2) than their counterparts, although this was not statistically significant.

Table 2: Mean BMI according to the frequency of breakfast consumption pattern (N = 147)

	BMI (kg/m^2) Mean (SD)	p-value*
Frequency of taking breakfast BMI at home per week		0.022
0-2 times/week	15.7 (3.2)	
3-4 times/week	14.1 (1.4)	
5-7 times/week	14.9 (2.2)	
Frequency of taking breakfast outside of home per week		0.214
0-2 times/week	14.7 (2.2)	
3-4 times/week	14.4 (1.4)	
5-7 times/week	15.5 (3.2)	

*One-way ANOVA

Discussion

The findings of this study indicate about 73% of the respondents were reported to consume breakfast either at home or outside almost daily. This is slightly lower than the prevalence reported by Poh et al. (2012), who found that 86% of their study participants consumed breakfast daily, and Norimah et al. (2014), who found that 83% of their preschoolers took breakfast. In addition, Aziz and Devi (2012) found a lower prevalence where 63% and 57.1% of urban and rural preschoolers eat breakfast daily, respectively. In the current study, 57% reported consuming breakfast at home, while 16% were taking outside almost daily. Similarly, Poh et al. (2012), concluded that most preschoolers (26.5%) ate meals which consist of breakfast, lunch and dinner outside of home 2-3 times per week, and 5.3% of them ate meals outside of home 4-6 times per week and only a small percentage (1.9%) of them eat outside daily.

The current study demonstrated that the respondents who ate breakfast at home regularly would have a lower BMI. The result might be due to the type of foods eaten outside are generally high in calories compared to foods prepared at home. In a review on the diet and nutrition causes of obesity, foods that are prepared outside of home contain higher total energy, total fat, saturated fat, sodium and cholesterol yet contain less fibre and calcium and is concluded as having poorer nutritional value than foods prepared at home (Swinburn et al., 2004). No local or Asian studies were found regarding the association of eating at home and outside of home with BMI in preschool children population. The current findings align with Antonogeorgos et al. (2012), where they found the association between breakfast consumption with childhood obesity among children aged 10-12 years. They found that children who consumed breakfast daily were two times less likely to be overweight or obese (OR: 0.49, 95%CI: 0.27-0.88).

The foods often consumed for breakfast by the respondents in the current study is in line with Norimah et al. (2014) which found that the most common breakfast eaten by preschoolers aged 4-6 years old in Peninsular Malaysia were bread, rice, and noodles. Poh et al. (2012) also concluded that the foods usually consumed at breakfast by preschoolers in Klang Valley were bread and *nasi lemak*. Similarly, a study by Nurul Fadhilah et al. (2013) on school children aged 12-19 years also found that bread and rice dishes were the typical foods eaten during breakfast. Mohd Nasir et al. (2012) stated that out of 1933 preschoolers aged 4-6 years old in Peninsular Malaysia, the majority of them consumed bread and milk during breakfast.

The current study indicated that most preschoolers were taking foods high in fat and sodium, and highly processed, for breakfast. Institute of Medicine (2005) has highlighted that saturated fat, trans-fatty acids, and cholesterol should be consumed as low as possible while maintaining a nutritionally adequate diet. Total fat intake for children aged 4 to 18 years old should be between 25% to 35% of calories with most fats coming from sources of polyunsaturated and monounsaturated fatty acids such as fish, poultry, nuts and vegetable oils. This ensures that the children's health is at the optimum level and preventing obesity later in life. In addition, the WHO (2012) recommends that children aged 2-15 years to reduce their sodium intake to a maximum level of 2g/day. Increased blood pressure can lead to

health complications such as stroke and renal impairment in later life (Couch & Daniels, 2005). The Malaysian Dietary Guidelines (2013) recommends children and adolescent to eat fruits and vegetables, include appropriate amounts of fats in the diet and consume foods and beverages which are low in sugar. These guidelines will help children to eat healthily to ensure the daily nutrients needed by the body are achieved.

The current study reports that most preschoolers like to drink malted drinks added with sweetened condensed milk for breakfast. This is consistent with a finding by Norimah et al. (2014) where most preschoolers consumed malted drinks during breakfast. They, however, did not consider whether the beverages were added with sugar or sweetened condensed milk. Sugary drinks are another reason which could be contributing to obesity (Bhadoria et al., 2015). The WHO (2015) recommends reducing free sugar intake to <10% of total energy in children. Free sugars include monosaccharides and disaccharides which are added to foods and beverages as well as sugars which present naturally in honey, syrups, fruit juices and fruit juices concentrates. A meta-analysis of five prospective cohort studies which had been discussed in the WHO guidelines concluded that children with the highest intake of sugar-sweetened beverages had a greater risk of being overweight or obese than those with the lowest intake. DeBoer, Scharf & Demmer (2013) found that regular drinkers of sugar-sweetened beverages at age 4-5 years had a higher odd of being overweight and obese compared to their counterparts of infrequent or non-drinkers (<1 serving daily).

This study was able to describe the patterns of breakfast consumption as well as the foods and beverages typically consumed during this mealtime among preschoolers in Kuantan, Pahang. However, the kindergartens where the respondents of the current study were recruited were mainly from the urban areas of Kuantan. As Kuantan district covers a relatively large geographical area, further studies might be useful to obtain more generalizable findings.

Conclusions

The findings of this study indicate about 73% of the respondents were reported to consume breakfast either at home or outside almost daily. In addition, the respondents who rarely or never ate breakfast at home were shown to have a significantly higher BMI than those who did this at least 3-4 times a week. The foods typically consumed by preschoolers during breakfast included *nasi lemak*, fried noodles, as well as white bread with spread (jam, *kaya*, peanut butter, margarine). Meanwhile, they often drink malted drinks with sweetened condensed milk or other sugary drinks. These indicate high saturated fat and sugar intake, but low in other nutrients such as dietary fibre.. Thus, parents should encourage their children to have breakfast at home more often and ensure that their children eat healthily according to recommendations, whether at home or outside.

Acknowledgments

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