

Overweight and Obesity among Malay Primary School Children in Kota Bharu, Kelantan: Parental Beliefs, Attitudes and Child Feeding Practices

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ABSTRACT

Introduction: The increasing prevalence of overweight and obesity among children has become a major public health problem in Malaysia. Parents play an important role in child feeding especially among younger children. **Methods:** A study was conducted to evaluate the beliefs, attitudes and practices in child feeding among parents of normal weight, as well as overweight and obese primary school children in Kelantan using the Child Feeding Questionnaire (CFQ). This cross-sectional study was carried out on 175 Malay children from three schools in Kota Bharu district in Kelantan. **Results:** This study showed that 13.1% of the children were overweight and obese. Scores for *perceived parent weight* ($p<0.05$) and *perceived child weight* ($p<0.001$) were significantly higher among parents of overweight and obese children compared to parents of children with normal body weight. However, the score for *pressure to eat* among parents of overweight and obese children was significantly lower ($p<0.05$) than parents of normal weight children. The *perceived child weight* ($r=0.468$, $p<0.01$), *perceived parental weight* ($r=0.190$, $p<0.05$) and *food restriction* ($r=0.179$, $p<0.05$) factors were found to be positively correlated with children's body mass index (BMI), whereas *pressure to eat* factor ($r=-0.355$, $p<0.01$) was negatively correlated with children's body mass index (BMI). **Conclusion:** The findings showed that parental feeding practices were linked to children's weight status and childhood obesity. Therefore parents should be given education and guidance on appropriate child feeding practices to maintain their child's nutritional status on a healthy weight range.

Keywords: Child feeding practices, obesity, school children

INTRODUCTION

The prevalence of childhood obesity has been on the rise in most parts of the world. Globally, it is estimated that 10% of school-going age children suffer from overweight problems, with one-fourth being obese (Lobstein, Baur & Uauy, 2004). In Japan, the prevalence of childhood obesity increased from 6.1% to 7.1% between the years 1976 to 1980, but declined from 11.1% to 10.2% in

the years 1996 to 2000 (Matsushita *et al.*, 2004). The prevalence of overweight among children in Malaysia is also on the rise. A study conducted in Peninsular Malaysia between 2001 and 2002 found that 10.5% and 5.9% of school children aged 6 to 12 years old were overweight and obese, respectively (Mohd Ismail *et al.*, 2009). Over the span of a few years, the Third National Health and Morbidity Survey (NHMS III) in 2006 reported a higher prevalence of

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overweight (15.9%) and obesity (12.0%) among children of the same age group (Institute of Public Health, 2008).

Obese children have a higher risk of becoming obese adults (Dehghan, Akhtar-Danesh & Merchant, 2005). Moreover, childhood obesity is linked to chronic health problems and diseases such as type 2 diabetes mellitus, hypertension, dyslipidemia, hyperinsulinemia, impaired glucose tolerance, sleep apnea, depression and poor self-esteem (Freedman *et al.*, 1999; Daniels *et al.*, 2005). In the meantime, the burden of this public health problem on health services has yet to be determined. As the obese children grow into adulthood, the greatest impact may be seen in the next generation of adults with increased rates of cardiovascular diseases, diabetes, metabolic syndrome, osteoarthritis, certain types of cancers and other obesity-related ailments (Lobstein *et al.*, 2004).

Therefore, it is important to evaluate the multiple factors contributing to the development of childhood obesity epidemic. Genetic abnormalities and environmental factors have been reported to influence childhood obesity (Procter, 2007). In addition, sedentary lifestyles, physical inactivity, as well as changes in dietary preferences also seem to play major roles in the rising prevalence of obesity among children (Deghan *et al.*, 2005). According to Davison and Birch (2001), parents play an important and influential role in helping their children achieve and maintain a healthy body weight. Parenting strategies and feeding practices such as providing food as reward and excessive control and restriction of certain foods are examples of modifiable environmental factors that should be identified to provide a better platform for childhood obesity prevention and intervention programs (Boles *et al.*, 2010).

The Child Feeding Questionnaire (CFQ) developed by Birch *et al.* (2001) is a tool to measure and assess the various aspects of parental beliefs, attitude and child feeding practices. It contains 31 items and measures the following seven factors: *perceived*

responsibility (3 items), *perceived parent weight* (4 items), *perceived child weight* (6 items), *parents' concern about child weight* (3 items); *restriction (of food)* (8 items), *pressure to eat* (4 items) and *monitoring* (3 items). The *perceived responsibility*, *perceived parent weight* and *perceived child weight* factors are considered as parental beliefs. *Parents' concern about child weight* factor is regarded as parental attitude, while *restriction (of food)*, *pressure to eat* and *monitoring* are viewed as parental child-feeding practices. These factors or subscales in the CFQ were linked to children's weight status and had been used to investigate the relationship between parental child feeding beliefs, attitudes and practices with childhood obesity (Birch *et al.*, 2001, Birch & Fisher, 2000; Faith *et al.*, 2004; Anderson *et al.*, 2005; Keller *et al.*, 2006; Geng *et al.*, 2009).

Parents' child feeding practices are said to shape children's eating behaviours and influence the development of their self-regulation of energy intake (Birch, 2006; Faith *et al.*, 2004). Parental attitudes towards child feeding and concerns about childhood obesity may influence child-feeding practices, which, in turn, have an effect on children's eating habits and weight status (Birch *et al.*, 2001).

The role of parental feeding practices on childhood obesity is an important area that should be further explored to provide better insight into its influence on adiposity among children. Thus, the aims of this study were to determine the extent of parental child feeding practices and attitudes, as well as their concern about childhood obesity on their children's weight status.

METHODOLOGY

Study background

Three primary schools located in Kota Bharu were selected through systematic sampling for this cross-sectional study. Kota Bharu is the capital of Kelantan and is more populated and urbanised compared to other districts in Kelantan. Permission to conduct

the study was obtained from Ministry of Education, Malaysia and Kelantan State Education Department. This study was also approved by the Research Committee of Universiti Sains Malaysia. Written informed consent forms containing information regarding the study were distributed to parents/guardians. Only children who fulfilled the inclusion criteria and were given consent by their parents or guardians were enrolled in the study. Verbal consent was also obtained from the children before the study began to enable us to acquire anthropometric measurements and administer the questionnaire.

Sampling method

A study by Anuar Zaini and colleagues on school children in Selangor (2005) reported that the prevalence of overweight and obese Malay children in their study was 13.5%. The estimated sample size required for calculation based on the formula by Daniel (1999) is as follows:

$$n = Z^2 p (1-p) / d^2$$

where:

- n = estimated sample size
- Z = standard value at Confidence Level of 95%
- = 1.96
- p = estimated prevalence of obese school children
- = 13.5%
- d = margin error set at 5%
- = 0.05

Thus,

$$\begin{aligned}
 n &= 1.96^2 (0.135) (1-0.135) / (0.05)^2 \\
 &= 179.44 \\
 &= 179
 \end{aligned}$$

Based on a 10% drop-out rate, the estimated sample size for this study was 197 children. Only Malay children aged between 7 to 8 years old or studying in Standard 2 in primary schools in Kota Bharu were enrolled into the study. Stratified sampling

was applied to select a number of classes from each school. Two Standard 2 classes were chosen from each school. A total of 205 children were enrolled after obtaining consent from the parents. However, only 175 children and their parents successfully completed the study. Drop-out was mainly due to refusal of parents to complete the questionnaire, while some withdrew their consent.

Data collection

Data was collected in two stages: In the first stage, anthropometric measurements of the children were taken while the second stage involved the answering of questionnaires by both children and their parents. The children’s weight and height were measured according to standard procedures using a SECA weighing scale (SECA 762, Germany) and a SECA Bodymeter (SECA 208, Germany), respectively. Each measurement was taken twice by trained research assistants to obtain the average measurement value. The body mass index (BMI) of each child was calculated and categorised according to their body weight status, thereafter.

The BMI-for-Age Growth Chart developed by the World Health Organization (WHO) in 2007 (de Onis *et al.*, 2007) served as the standard reference to determine the nutritional status of the children. A child was considered to be underweight if his BMI-for-age was below the 5th percentile of the growth chart. Meanwhile, the children were categorised as overweight and obese if their BMI-for-age was in the ≥85th and ≥95th percentile, respectively. All of the children were grouped into 3 categories: underweight; normal weight; and overweight or obese.

The second stage of data collection excluded underweight children. A total of 127 normal weight and overweight or obese children were involved in this stage. A set of self-administered questionnaires was used to obtain information about the children and

their parents. A set of self-administered questionnaires was used to obtain information about the children and their parents. The structured questionnaire that aimed at obtaining relevant socio-demographic background information of the families was completed by the parents, while incomplete information was taken from the school's records.

The second part of the questionnaire consisted of the translated and validated (*Bahasa Malaysia*) Child Feeding Questionnaire (CFQ) developed by Birch *et al.* (2001). The results of the validation study is not published. The CFQ was used to assess parental beliefs, attitudes and practices regarding child feeding (Birch *et al.*, 2001). The children were required to take the CFQ home to be completed by their parents or guardians, and the completed questionnaire was returned to the researcher via their class teachers within a week. In order to ensure anonymity and privacy of the children and their parents, their names were not displayed on the questionnaire but were number-coded for official use.

Statistical analysis

Statistical analysis of the data was performed using SPSS version 17.0 (SPSS Inc., Chicago, IL., USA). Descriptive statistics, analytical statistical tests such as independent *t*-test and Chi-square test were used to examine the quantitative variables and categorical variables, respectively. Pearson's correlation was used to identify the relationship between child feeding

behaviours and children's body weight and BMI. The level of significance was fixed at $p < 0.05$.

RESULTS

Sex and age

About 54.3% ($n=95$) of the total 175 children were girls, thus both sexes were equally represented in this study. The mean age of the children and their parents was 7.4 ± 0.5 years and 39.9 ± 6.2 years, respectively.

Children's nutritional status

Table 1 shows the body weight status of the children according to sex. There was no significant difference in the body weight status among boys and girls. Overall, 27.5% were underweight, 59.4% had normal body weight and 13.1% were either overweight or obese.

Socio-demographic characteristics of normal-weight and overweight/obese children

The following statistical analysis involved only two groups of children - the normal weight group and the overweight and obese group. The mean weight, height and BMI of the children from both groups ($n=127$) are summarised in Table 2. There were significant differences in all anthropometric measurements between the two groups. Meanwhile, the socio-demographic characteristics of children from both groups are shown in Table 3. Almost all the parents

Table 1. Body weight status of children according to sex ($n=175$)

Sex	Nutritional status			Total n (%)
	Underweight n (%)	Normal body weight n (%)	Overweight and Obese n (%)	
Boys	25 (14.3)	42 (24.0)	13 (7.4)	80 (45.7)
Girls	23 (13.1)	62 (35.5)	10 (5.7)	95 (54.3)
Total	48 (27.5)	104 (59.4)	23 (13.1)	175 (100.0)

Table 2. Mean anthropometric measurements and BMI for normal weight (n=104) and overweight/obese (n=23) children

<i>Anthropometric measurements</i>	<i>Normal body weight (n=104) Mean ± SD</i>	<i>Overweight and Obese (n=23) Mean ± SD</i>	<i>Total (n=127) Mean ± SD</i>
Weight (kg)**	21.6 ± 2.3	33.4 ± 5.4	23.7 ± 5.5
Height (m)**	1.2 ± 0.0	1.3 ± 0.1	1.2 ± 0.0
BMI (kg m ⁻²)**	14.8 ± 0.9	21.1 ± 2.6	15.9 ± 2.8

** $p < 0.05$ (Independent *t*-test)

Table 3. Socio-demographic characteristics of normal and overweight/obese children and their parents (n=127)

<i>Socio-demographic characteristics</i>	<i>Normal (n=104) n (%)</i>	<i>Overweight/Obese (n=23) n (%)</i>	<i>Total (n=127) n (%)</i>
Sex			
Male	42 (33.0)	13 (10.3)	55 (43.3)
Female	62 (48.8)	10 (7.8)	72 (56.7)
Parent's total monthly income			
Less than RM 500	14 (11.0)	3 (2.4)	17 (13.4)
RM500 – RM1000	21 (16.5)	5 (3.9)	26 (20.4)
RM1001 – RM3000	33 (26.0)	8 (6.3)	41 (32.3)
More than RM3000	36 (28.4)	7 (5.5)	43 (33.9)
Parent's educational level			
No formal education	1 (0.8)	0 (0.0)	1 (0.8)
Primary	1 (0.8)	0 (0.0)	1 (0.8)
Secondary	59 (46.5)	11 (8.6)	70 (55.1)
Tertiary	43 (33.9)	12 (9.4)	55 (43.3)

(98.4%) received secondary school education and above. One-third of the parents earned more than MYR 3,000 per month.

Child Feeding Questionnaire (CFQ)

The CFQ was completed by parents or primary caregivers of the normal weight and overweight/obese children to assess aspects of child-feeding perceptions, attitudes and practices, as well as their relationship with

the children's food acceptance patterns, control of food intake, and obesity (Birch *et al.*, 2001). All the items in the questionnaire with 7 different subscales were measured using a 5-point Likert-type scale. Table 4 shows the scores of the subscales in CFQ between parents of normal and overweight/obese children. No significant differences were found in the scores of subscales of *concern about child weight, restriction (on food)* and *monitoring* between the two groups.

Table 4. Score differences in CFQ subscales of parents between normal weight and overweight/obese children

CFQ Subscales	Children		Total (n=127) Mean ± SD
	Normal body weight (n=104) Mean ± SD	Overweight and Obese (n=23) Mean ± SD	
Beliefs			
Perceived responsibility	3.4 ± 0.9	3.4 ± 0.9	3.4 ± 0.9
Perceived parent weight *	3.0 ± 0.3	3.2 ± 0.3	3.1 ± 0.3
Perceived child weight **	2.9 ± 0.2	3.2 ± 0.3	2.9 ± 0.3
Attitude			
Concern about child weight	3.3 ± 0.8	3.6 ± 0.9	3.4 ± 0.9
Practices			
Restriction (on food)	3.6 ± 0.6	3.9 ± 0.6	3.7 ± 0.6
Pressure to eat *	4.0 ± 0.6	3.5 ± 0.9	3.9 ± 0.7
Monitoring	3.5 ± 0.9	3.6 ± 0.8	3.7 ± 0.9

* $p < 0.05$, ** $p < 0.001$ (Independent t -test)

Table 5. Correlation between CFQ subscales (parental child feeding beliefs, attitudes and practices) and children's BMI

CFQ subscales	Children's body weight	Children's BMI
Perceived responsibility	-0.094	-0.107
Perceived parent weight	0.136	0.190*
Perceived child weight	0.477**	0.468**
Concern about child weight	0.124	0.106
Restriction (on food)	0.211*	0.179*
Pressure to eat	-0.280**	-0.355**
Monitoring	0.062	0.037

* $p < 0.05$, ** $p < 0.01$

Meanwhile, the difference in mean scores of *perceived parent weight*, *perceived child weight* and *pressure to eat* subscales were significant. There was no difference in mean scores of *perceived responsibility* subscale.

Relationship between CFQ subscales with children's body weight and BMI

The correlations between parental child feeding subscales scores and the children's body weight and BMI are presented in Table 5. *Parental perception of child's weight* ($r=0.477$,

$p < 0.01$) and *food restriction* ($r=0.211$, $p < 0.05$) were positively correlated with children's body weight, while *pressure to eat* ($r=-0.280$, $p < 0.01$) was negatively correlated with children's body weight. *Perceived child weight* ($r=0.468$, $p < 0.01$), *perceived parental weight* ($r=0.190$, $p < 0.05$) and *food restriction* ($r=0.179$, $p < 0.05$) were found to be positively correlated with children's BMI, whereas *pressure to eat* ($r=-0.355$, $p < 0.01$) was reported to be negatively correlated with children's BMI.

DISCUSSION

Chronic energy imbalance due to excess energy intake that exceeds energy expenditure is the reason behind weight gain in humans (Flodmark *et al.*, 2004). The multiple health complications of obesity, poor response to medical treatment and its economic costs justifies the need for effective prevention strategies (Geng *et al.*, 2009).

The overall prevalence of overweight and obesity in our study (13.1%) was considerably lower compared to other studies including the NHMS III data (Institute of Public Health, 2008). A previous study conducted in the urban areas of Kuala Lumpur reported that 27.4% of their school-aged participants (of which 97.1% were Malays) were either overweight or obese (Noor Azimah *et al.*, 2008). Meanwhile, another study conducted among primary school children in the district of Kuala Selangor, Selangor reported a prevalence of overweight and obesity of 21.7% (Sumarni *et al.*, 2006). A similar study carried out in the same location (Kota Bharu, Kelantan) but on school children of Chinese ethnicity, found that the prevalence of overweight and obesity was 24.8% (Soo *et al.*, 2011). This difference may be explained by the fact that Kelantan is one of the poorest states in Malaysia (UNDP, 2005) and Kota Bharu may not be as urbanised compared to the capital city of Kuala Lumpur or other cities in the West coast of Peninsular Malaysia. Moreover, the majority of children in this study came from poor and middle income households, whereby 33.8% and 32.3% of the parents earn an income of less than RM1000 and RM3000 per month, respectively.

The prevalence of underweight children in this study (27.5%) was twice the prevalence of overweight and obese children. Previous studies by Noor Azimah *et al.* (2006), as well as Soo *et al.* (2011) found that 14.8% and 10.8% of their study subjects were underweight, respectively. These findings suggest that under-nutrition is still a problem among Malay children in this area.

The difference in the mean scores of all the subscales in CFQ was also analysed. The *perceived responsibility* subscale measures the feeling of responsibility of the parent when feeding and providing a healthful diet for a child. The scale is scored from 1 (for low feelings of responsibility) to 5 (for high feelings of responsibility). The mean score of *perceived responsibility* subscale was the same in both normal weight and overweight/obese groups (3.4 ± 0.9). This indicates that no difference was detected between both groups in terms of their beliefs regarding responsibility for their children during feeding time.

The *perceived parent weight* subscale is another factor for measuring parental belief. It examines the parent's self-perception of her own body weight, ranging from 1 (severely underweight) to 5 (severely overweight or obese). The mean score of this subscale was higher in the overweight/obese group (3.2 ± 0.3) than the normal body weight group (3.0 ± 0.3). The difference was significant ($p < 0.05$). This showed that parents of overweight/obese children also perceived themselves as being heavier.

The *perceived child weight* subscale requires the parent to determine the child's body weight with scores ranging from 1 for severely underweight to 5 for severely overweight or obese, which is also one of the parental belief subscales. A significant difference was detected between the mean score of the *perceived child weight* factor between both groups ($p < 0.001$). Parents of overweight/obese children thought that their child were heavier, with mean scores of 3.2 ± 0.3 compared to 2.9 ± 0.2 in the normal weight group.

Meanwhile, the mean scores for *concern about child weight* factor were 3.6 ± 0.9 and 3.3 ± 0.8 for overweight/obese and normal body weight groups, respectively. This factor measures parental attitude towards child feeding. Although the mean score of the former group was higher, there was no significant difference detected, inferring that parents of both groups were almost similarly

concerned about their children's body weight. The *concern about child weight* subscale measures the level of the parent's concern that the child is currently or will become overweight and may force the child to diet. The scores range from 1 (unconcerned) to 5 (highly concerned).

The *pressure to eat* subscale evaluates parental child feeding practices by assessing the extent to which a parent encourages the child to eat by insisting that the child finishes all the food on the plate. The scores range from 1 to 5 indicating low to high levels of pressure on the child. In this study, the mean score was significantly higher in the normal body weight group (4.0 ± 0.6) compared to the overweight/obese group (3.5 ± 0.9) ($p < 0.001$). This meant that parents of overweight/obese children seemed to exert less pressure on their children to have their meals completed.

No significant difference was found between both groups in *restriction (of food)* factor, with mean scores of 3.9 ± 0.6 for overweight/obese group and 3.6 ± 0.6 for normal body weight group, respectively. This subscale assesses parental child-feeding practices by considering the parent's attempt to restrict a child's intake of certain types of foods (such as sweets, ice-creams, cakes, pastries, snacks and high fat foods) by controlling the type and amount of food allowed. The scores ranged from 1 for low restriction to 5 for high restriction. This showed that the food restricting behaviours and practices of parents on their children were almost similar in both groups.

Lastly, the *monitoring* subscale (child-feeding practices) measures the degree of parent monitoring and keeping track of the child's intake of sweets, ice-creams, cakes, pastries, snacks and foods high in fat, ranging from never (scale of 1) to always (scale of 5). There was no significant difference in the mean scores of *monitoring* factor among both groups. Parents of overweight/obese children (3.5 ± 0.8) and normal weight children (3.6 ± 0.9) appeared

to be monitoring their children's eating behaviour in an almost similar manner.

In this study, data on anthropometric measurements were used to explore the relationship between the subscales of CFQ and children's weight status. Parental perception of child's weight was found to be positively correlated significantly with both children's weight and BMI. These findings were consistent with a local study conducted among parents of primary school children in Kuala Lumpur and Selangor by Tung, Shamarina & Mohd Nasir (2011). Meanwhile, the significant positive correlation of food restricting practices on children's weight and BMI may be explained by worried parents who were anxious about their overweight or obese children's body weight. Therefore, these parents might restrict their children's intake of sweets, snacks, cakes and other high-fat food for fear of increased adiposity resulting from consumption of these foods.

The *perceived parental weight* subscale was reported to be positively correlated with children's BMI ($p < 0.01$), but not children's body weight. This signified that parents of overweight or obese children also had a higher BMI. A similar condition was observed in another study in Korea where overweight parents were reported to be more likely to have an overweight child (Lee *et al.*, 2006).

Conversely, the significant negative correlation in the *pressure to eat* subscale may imply that parents of children who were lighter in weight were more likely to exert pressure on their children to increase their food intake compared to parents of overweight or obese children. Other studies also revealed that parents are more likely to encourage leaner rather than heavier children to eat (Spruijt-Metz *et al.*, 2002; Wardle & Carnell, 2007). In addition, another study carried out on parents of elementary school children in Japan also discovered significantly positive correlations in all the

subscales except the *pressure to eat* subscale (Geng *et al.*, 2009).

Parental feeding practices may influence children's food intake by creating an eating environment in the family, whereby parents' decision on the type of food, portion size, and eating time can have an impact on children's eating habits (Birch *et al.*, 2001). Certain extreme parenting behaviours such as excessive control of feeding may disrupt children's ability to respond to their own hunger cues and satiety, causing a decreased capacity over self-control of energy intake and eventually influencing body weight (Rolls, Engell & Birch, 2000). Meanwhile, the use of restrictive feeding practices could also attract children's attention to restricted food items, increase the intake of such foods, and even cause a sense of guilt in children after eating the restricted foods (Birch & Fisher, 2000).

CONCLUSION

The prevalence of overweight and obesity in this study was found to be lower (13.1%) compared to the national data and other studies. The present findings also showed that parental feeding attitudes and practices were correlated with childhood obesity. Parents should be more responsible towards their children by practising appropriate child feeding strategies without exerting force during feeding so as to avoid unwanted circumstances such as weight problems and eating disorders.

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