

Nutrition Knowledge, Attitude and Practices (NKAP) and Health-Related Quality of Life (HRQOL) Status among Overweight and Obese Children: An Analysis of Baseline Data from the Interactive Multimedia-based Nutrition Education Package(IMNEP) Study

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ABSTRACT

Introduction: This randomised school-based controlled study aimed to evaluate the baseline results of nutrition knowledge, attitude, and practice (NKAP), health-related quality of life (HRQoL), and parents' report of parenting skills (PRPS) among overweight and obese children. **Methods:** This study was performed on three intervention groups and one control group. It was conducted among Year Five students from primary schools who had overweight or obese status and were generally healthy without any chronic diseases. The children completed NKAP and child self-report of Pediatric Quality of Life (PedsQoL) questionnaires, while parents completed parent proxy report of PedsQoL and PRPS questionnaires. Descriptive statistics and parametric test in SPSS were utilised. **Results:** Out of 139 participants involved in the baseline study, 18.7% and 81.3% were overweight and obese respectively. This study revealed a significantly higher knowledge score among boys ($p = 0.016$) and among those who lived in urban areas ($p = 0.019$). The children's self-report PedsQoL recorded highest score for Social Functioning domain and lowest score for Emotional Functioning domain. A contradictory finding was obtained from the parent proxy report, where the Physical Functioning domain scored the lowest and the Emotional Functioning domain had the highest score. Notably, some of the findings from PRPS questionnaires completed by their parents were unfavourable. **Conclusions:** This study provided prospective evidence of the current status of NKAP, HRQoL among overweight and obese children as well as findings from PRPS among their parents.

Key words: Health-related quality of life, nutrition knowledge, overweight and obese children, parenting skills

INTRODUCTION

In Malaysia, obesity is a major health concern as it may lead to long-term health complications such as high blood pressure, diabetes, kidney problem, and heart disease (NCCFN, 2011; Roszanadia & Norazmir, 2011; Ruzita, Wan & Ismail,

2007). Previous studies have indicated that nutrition knowledge, attitude and practice (NKAP) are related to socio-demographic characteristics and residence location. Furthermore, high nutrition knowledge is more common among girls and those from urban areas (Naeeni *et al.* 2014).

Knowledge about food and nutrition is deemed important in promoting healthy eating habits that subsequently reduce the prevalence of obesity (Triches & Giugliani, 2005). A positive attitude towards healthy eating also needs to be incorporated early during childhood to influence dietary practices until adulthood (Kigaru *et al.*, 2015).

Apart from that, health-related quality of life (HRQoL) among overweight and obese children needs to be highlighted. HRQoL has emerged as an important health outcome indicator among health professionals. As defined by WHO, HRQoL refers to the subset of QoL which is directly related to an individual's health that includes physical, mental, emotional, and social well-being (Both *et al.*, 2007; WHO, 1997). Numerous studies have been carried out among obese adults (Jepsen *et al.*, 2015; Muda *et al.*, 2015; Wang *et al.*, 2013) but limited information is available on HRQoL among obese children in the Malaysian population (Jeffrey, Tasha & James, 2003). Sex is an important factor for QoL as obese girls were found to report lower QoL scores than obese boys (Su, Wang & Lin, 2013).

Savage, Fisher & Birch (2007) claimed that parenting techniques at home can have a powerful influence on the development of children's food preferences, intake patterns, diet quality, growth, and weight status. Nonetheless, parental control and pressure to eat may also influence dietary intake and disrupt children's short-term behavioural control of food intake (Savage *et al.*, 2008). Longitudinal studies conducted by Fisher *et al.* (2002) and Lee & Birch (2002) showed that a high level of parental control and pressure to eat is associated with lower fruits and vegetables intake but higher fat intake among young girls. Thus, controlling the children's food intake is better than being restrictive to encourage the development of culturally appropriate eating patterns and behaviours in children.

As data from previous studies are somewhat outdated, current data are needed to provide valuable insight in developing the Nutrition Education Package (NEP) that contributes to nutritional well-being of overweight and obese children. Thus, the purpose of this baseline data from the Interactive Multimedia-based Nutrition Education Package (IMNEP) study was to ensure that the total number of respondents was selected in equal proportions from urban and rural areas. Schools from suburban and urban areas were also selected approximately with equal numbers for each group. This study also aimed to evaluate the current nutrition knowledge, attitude, and practice (NKAP), HRQoL, and parent report of parenting skills (PRPS) among overweight and obese children together with their parents by groups, differentiated by socio-demographics (sex, residential zone, breakfast frequency). Findings from this baseline study are expected to be useful in contributing further understanding to deliver the next level of interventions.

METHODS

Design

The design of this study consisted of a quadruple arm with a duration of six months. It was a randomised school-based controlled trial. This paper provides the baseline results which include the NKAP, HRQoL, and parent report of parenting skills among children who were overweight and obese.

Recruitment

Criteria for inclusion were as follows: (i) school children from Year 5; (ii) overweight and obese status; (iii) generally healthy without any chronic diseases (self-declared or data from school record) except for asthma; and (iv) ability to complete the study intervention. Conversely, the major criteria for exclusion were as follows: (i)

diagnosed with any chronic diseases such as cancer, appendicitis, or heart disease that can affect the data collection; (ii) children who were following a special diet due to medical reasons; and (iii) inability to complete the study intervention.

The sample size calculation was based on the formula for sample size determination in experimental studies by Daniel (1999):

$$n = \frac{2\sigma^2 (Z_\alpha + Z_\beta)^2}{\Delta^2}$$

where n = required sample size; σ = standard deviation of BMI for obese children, 0.3 (Thivel *et al.*, 2011); Z_α = value from the standard normal distribution corresponding to α , 2.58; Z_β = value from the standard normal distribution corresponding to β , 1.28; and Δ = value of clinically important mean difference to be detected which was set at 0.18 (Thivel *et al.*, 2011). The minimum sample size calculated for this study was 120 participants or 30 participants per group (after considering a 20% dropout rate).

Outcomes

Personal details

Personal details of the participants such as sex, residential zone, and frequency of taking breakfast were obtained using a self-administered questionnaire. The categorisation of urban and suburban were classified according to the Kelantan State Education Department criteria.

Anthropometric measurements

The weight and height measurements were taken twice by a trained researcher. The body weight was determined to the nearest 0.5 kg on an electronic digital scale (TANITA Body Composition Analyzer SC-330) and height was measured to the nearest 0.1 cm using a bodymeter (SECA 206). The measurements were performed by a single evaluator, by using the same tools throughout the data collection period. Body mass index (BMI) was derived using

the following equation: weight in kilogram divided by height in meter square; $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$. Subsequently, BMI results were categorised according to the WHO Reference BMI-for-age growth charts (WHO, 2007). For children, overweight was defined as having a BMI above $>+1SD$ whereas above $>+2SD$ was categorised as obese

Nutrition Knowledge, Attitude and Practice (NKAP) questionnaire

This instrument was previously translated into the Malay language and validated. The NKAP questionnaire consisted of three sections: i) "knowledge" that listed 22 multiple-choice questions; ii) "attitude" that listed 6 responses, and iii) "practice" that listed 10 questions (Roszanadia & Norazmir, 2011). Each question in the knowledge section had five multiple-choice answers that included one correct answer, three distracters, and one "I do not know" answer. The score of nutrition knowledge was computed as the sum of the correctly answered items. Furthermore, the attitude section comprised of six questions related to food choices and mealtime that were measured using a five-point Likert scale: strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree (range: 1 - 5). The first seven practice items presented multiple choices (range: 1-5), while the last three items had open-ended questions (range: 0 - 2/ 0 - 3). The sum of all these three variables reflected the final total NKAP score (range: 0 - 57). A high score indicated better nutrition knowledge, attitude, and practice of the participants.

Pediatric Quality of Life Inventory (Malay version)

Pediatric HRQoL was measured using the published and validated 23-item Pediatric Quality of Life Inventory (PedsQoL) (Varni, Seid & Rode, 1999). This instrument was applicable for a healthy school and community populations as well as pediatric populations with acute and

chronic health conditions. It comprised parallel child self-reports and parent proxy reports. Child self-reports were based on perceptions of internal state, whereas parent proxy reports reflected the child's observable behaviours. Scores were generated on a 5-point scale as follows: Physical Functioning (8 items), Emotional Functioning (5 items), Social Functioning (5 items), and School Functioning (5 items). Each item was scored in a reversed manner then transformed linearly to a 0 - 100 scale. Psychosocial Health Summary score was computed as the sum of the items over the number of items answered in the Emotional Functioning, Social Functioning, and School Functioning scales. Meanwhile, the Physical Health Summary score was equivalent to the Physical Functioning scale's score. A score of <25 was classified as bad QoL, 25 to <50 as fair QoL, 50 to <75 as good QoL and 75-100 as very good QoL.

Parent report of parenting skills

The original questionnaire was initially forward translated into Malay and later back translated into English. Cross-cultural adaptations were finally conducted to clarify certain items. This cross-cultural adaptation was conducted and reviewed by an expert committee which comprised health researchers who ensured that items had been translated correctly and were relevant in the new setting (Gjersing *et al.*, 2010). The instrument was used to tap into theoretically meaningful parenting dimensions that are associated with child behavioral outcomes (Hart *et al.*, 2003) which consisted of 12 items under three sections: i) limiting the child's behaviour that presented 3 questions, ii) encouraging the child that had 6 questions, and iii) participating in program activities with the child with 3 questions. In section of limiting the child's behavior and encouraging the child, parents rated their agreement as strongly agree (SA), somewhat agree (SWA), somewhat disagree (SWD) or strongly

disagree (SD). High scores (SA and SWD) indicate higher levels of permissiveness and encouragement for these activities. For questions in section three, the items "In the past week, how many times did you cook dinner at home for your family?" and "In the past week, how many times did you eat dinner with your child (who is here with you today)?" were rated as never, 1-3 times per week, 4-5 times per week, 6-7 times per week. Items "How often do you engage in physical activities/exercise with your child who is here with you today (e.g. walking, riding bikes, going to the gym)?" was rated as never, 2-3 times per month, 1-3 times per week and 4-7 times per week. The results of each section are presented only in frequencies and percentages. The internal consistency values of these three sections ranged from 0.38 to 0.73 which was considered as acceptable.

Data collection procedure

An information sheet was given to enhance participant's understanding of the nature of the study as well as to clarify information required from them. On agreeing, informed consent was signed by the parents and guardians. The children were also asked for their consent verbally.

Ethical approvals

The project was approved by the Universiti Sains Malaysia Human Research Ethics Committee (USM/JEPeM/14110478), Ministry of Education (MoE), Kelantan Education Department, and all school directors that were involved in the study.

Statistical analysis

The data were then compiled and analysed using SPSS version 22.0. Normal distribution of data was initially checked by using Kolmogorov-Smirnov test. Descriptive statistics were used to examine the distribution of study variables. Independent *t*-test was employed to test between-group differences while one-way

ANOVA and post-hoc test (with Bonferroni correction) were performed on continuous variables. Statistical significance was tested at $p < 0.05$.

RESULTS

Out of the 96 listed schools in Kota Bharu district, 20 schools were approached with a total student number of 2986. However, six schools were excluded due to less cooperation from schools' administrators; furthermore there were no overweight and obese children in the schools - Figure 1. Fourteen schools were randomly chosen from urban and suburban areas in Kota Bharu. Finally, 139 primary school children who were overweight and obese together with their parents agreed to participate. Overall, the mean BMI of the children was

25.96 kg/m² (overweight = 18.7%; obese = 81.3%). From Table 1, it can be seen that 61.9% were boys and 53.2% lived in suburban areas. During the baseline period, 17 parents did not return the PedsQoL and PST questionnaires.

The mean NKAP achieved was grouped by sex, residential zone, and breakfast frequency categories (Table 2). Overall, the total NKAP was categorised as moderate. Significant difference in knowledge score was noted in sex and residential zone categories. The knowledge score was significantly higher among boys compared to girls ($p = 0.016$) and among those who lived in urban areas compared to those who lived in suburban areas ($p = 0.019$). A comparison on the practice scores via frequencies of taking breakfast showed

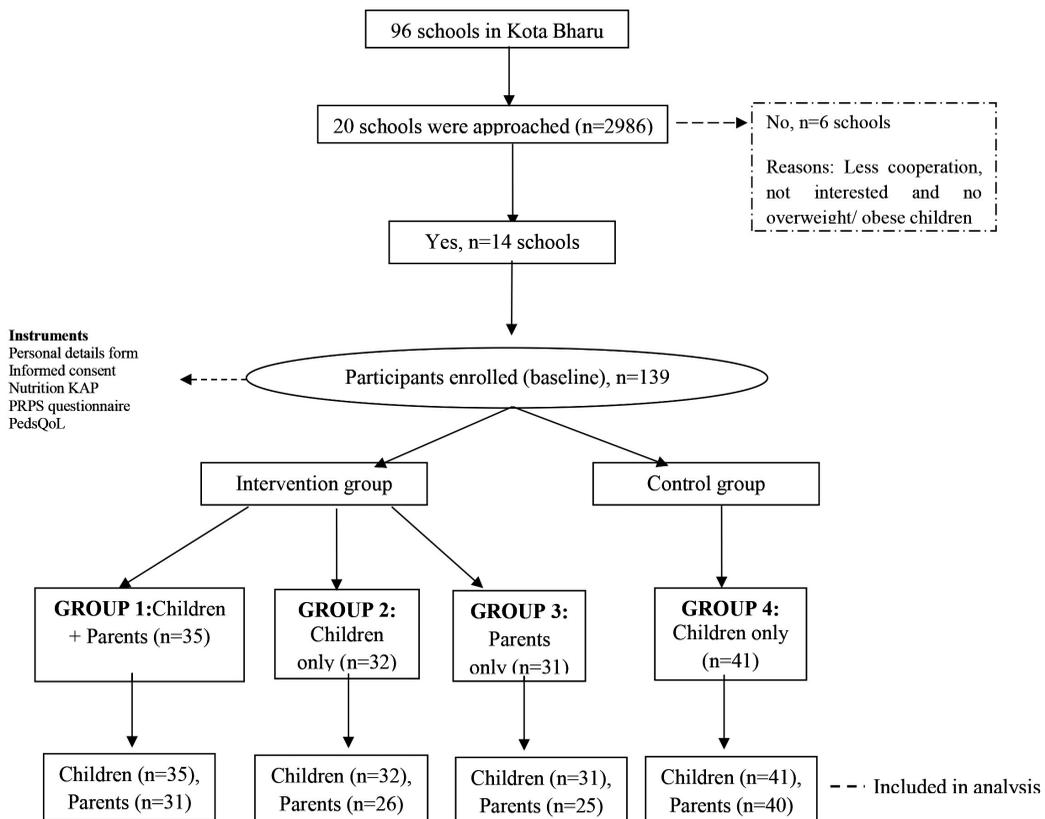


Figure 1. Participant's flow

Table 1. General characteristics of participants (children) (n=139).

Characteristics	Frequency	Percentage (%)
Sex		
Boys	86	53
Girls	61.9	38.1
Residential zone		
Urban	65	74
Sub-urban	46.8	53.2
BMI status		
Overweight	26	113
Obese	18.7	81.3
Frequency of breakfast		
Every day	68	45
2 - 5 days per week	26	48.9
Almost never	32.4	18.7

that those who consumed breakfast daily had a significantly better practice score than those who never took breakfast ($p = 0.007$).

The mean, standard deviation (SD), and range of PedsQoL for both child and parent are depicted in Tables 3 and 4. For child self-report, Social Functioning domain (mean = 78.69; SD = 20.14) scored the highest, whereas Emotional Functioning domain (mean = 70.55; SD = 21.98) had the lowest score. The results in Table 3 also showed no statistical difference in all PedsQoL scores between sex and degree of obesity categories. In parent proxy report, Physical Functioning domain (mean = 56.27; SD = 18.91) had the lowest score and Emotional Functioning domain (mean = 71.91; SD = 19.03) scored the highest.

Table 5 depicts the status of PST under three categories: limiting the child's behaviour, encouraging the child, and participating in program activities with the child. Approximately 19.5% of parents disagreed with putting a limit on the amount of food that their children eat at home and less than 20.0% of parents usually let their children decide how much time was allocated to watch television, play video games, and use the computer.

Parents also responded with disagreement to "encourage my child not to eat while watching television" (27.3%), "encourage my child to not eat junk food (17.2%) and eat less fast food (23.7)", and "encourage my child to be physically active (8.7%)". Only a small number of parents participated 4 to 7 times per week (10.8%) in physical activities with their children and 21.6% had zero participation. Notably, a majority of parents ate dinner with their children everyday (41.7%).

DISCUSSION

Overall, an almost equal number of schools and children were located in four groups. The baseline participants had a moderate total score of NKAP which is similar to findings of a previous study (Kigaru *et al.*, 2015). Compared to girls, boys were more aware of nutrition knowledge but weaker in practice score. It appears that even though the boys had some knowledge of nutrition, they still continued to consume unhealthy foods. Once children are in possession of money given by their parents, they will make independent decisions on what to buy without parental guidance (Kigaru *et al.*, 2015). Further, factors such as lifestyle, developmental, social and environmental

Table 2. Comparison of NKAP by sex, residential zone and breakfast frequency

Factor	Sex		Residential zone		Breakfast frequency			p-value#
	Boys (n=86)	Girls (n=53)	Urban (n=65)	Sub-urban (n=74)	Everyday (n=45)	2-5 days/ week (n=26)	Almost never	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Knowledge	11.81 (3.48)	10.21 (4.23)	12.02 (3.99)	10.49 (3.60)	11.22 (3.94)	10.93 (3.95)	11.62 (3.51)	0.773
Attitude	19.56 (3.29)	19.49 (2.95)	19.62 (3.39)	19.46 (2.95)	20.00 (3.24)	19.09 (2.65)	19.08 (3.64)	0.233
Practice	11.87 (2.75)	12.11 (2.90)	11.72 (2.98)	12.18 (2.63)	12.56a (2.54)	11.84 (2.79)	10.62a (3.06)	0.007
Total NKAP	43.14 (6.73)	41.98 (6.79)	43.35 (7.21)	42.12 (6.32)	43.78 (6.61)	41.87 (66.55)	41.31 (7.25)	0.172

*Independent t-test; #One-way ANOVA and post-hoc analysis with Bonferroni correction

Table 3. Means and SD for individual items and the summary score for the PedsQoL child self-report.

Items	General		Sex Mean (SD)		p-value	Degree of obesity Mean (SD)		
	Mean (SD)	Min, max	Boys (n=86)*	Girls (n=53)*		OW (n=25)	OB (n=114)	p-value
Physical Functioning	75.41 (19.58)	6.25, 100.00	76.10 (21.22)	74.28 (16.69)	0.297	74.75 (20.35)	75.77 (19.54)	0.814
Emotional Functioning	70.55 (21.98)	5.00, 100.00	69.71 (23.37)	71.92 (19.66)	0.149	69.20 (20.50)	70.92 (22.20)	0.723
Social Functioning	78.69 (20.14)	10.00, 100.00	75.88 (22.04)	83.27 (15.71)	0.641	83.00 (16.27)	77.94 (20.77)	0.255
School Functioning	75.99 (18.68)	5.00, 100.00	74.00 (19.99)	79.23 (15.95)	0.441	77.20 (13.55)	75.80 (19.61)	0.670
Psychosocial Health summary score	75.07 (17.38)	8.33, 100.00	73.20 (18.97)	78.14 (14.06)	0.261	76.47 (13.69)	74.88 (18.10)	0.681
Total Scale score	75.19 (16.33)	16.30, 100.00	74.21 (17.94)	76.80 (13.29)	0.254	75.87 (15.06)	75.04 (16.66)	0.819

*Contains missing values; Independent *t*-test; OW=Overweight; OB=Obese

Table 4. Means and SD for individual items and the summary score for the PedsQoL parent proxy report.

Items	General		
	Mean (SD)	Median	Min, max
Physical functioning	56.27 (18.91)	53.13	12.5, 100.0
Emotional functioning	71.91 (19.03)	70.00	20.0, 100.0
Social functioning	67.52 (17.38)	65.00	35.0, 100.0
School functioning	61.35 (17.08)	60.00	30.0, 100.0
Psychosocial health summary score	66.93 (14.61)	66.67	33.3, 95.0
Total scale score	63.22 (14.23)	63.04	32.6, 95.7

Score range: 0 - 100

were found to influence children's food choices (Story, Neumark-Sztainer & French, 2002). Since suburban students were found to be considerably less aware of nutrition knowledge, educational programs should be extended to suburban areas as well.

In the practice section of NKAP, the participants provided several reasons

for skipping breakfast: (i) no appetite in the morning or uninterested in the foods served; (ii) no breakfast was prepared at home; and (iii) no time for breakfast if both parents were working. This situation is worrisome as the first meal of the day is crucial to replenish energy in order to start a new day after a night's fast (Soo et

Table 5. Status of parent report of parenting skills

<i>Items</i>	<i>Limiting the child's behaviour</i>			
	<i>SA</i>	<i>SWA</i>	<i>SWD</i>	<i>SD</i>
I usually put limits on the amount of food my child eats at home	49 (35.3)	35 (25.2)	14 (10.1)	13 (9.4)
I usually let my child decide how much to watch TV	7 (5.0)	9 (6.5)	50 (36.0)	56 (40.3)
I usually let my child decide how much time to spent on video games or use the computer	12 (8.6)	14 (10.1)	25 (18.0)	71 (51.1)
	<i>Encouraging the child</i>			
	<i>SA</i>	<i>SWA</i>	<i>SWD</i>	<i>SD</i>
I encourage my child not to eat while watching TV	40 (28.8)	44 (31.7)	16 (11.5)	22 (15.8)
I encourage my child to not eat junk food	47 (33.8)	51 (36.7)	7 (5.0)	17 (12.2)
I encourage my child to eat less fast food	45 (32.4)	44 (31.7)	17 (12.2)	16 (11.5)
I encourage my child to spend less time on the computer (not including for school work)	83 (58.7)	17 (12.2)	15 (10.8)	7 (5.0)
I encourage my child to watch less TV	63 (45.3)	34 (24.5)	8 (5.8)	17 (12.2)
I encourage my child to be physically active	82 (59.0)	29 (20.9)	3 (2.2)	9 (6.5)
	<i>Participating in program activities with the child</i>			
	<i>Never</i>	<i>1 – 3 per week</i>	<i>4 – 5 times per week</i>	<i>6 – 7 times per week</i>
In the past week, how many times did you cook dinner at home for your family?	7 (5.0)	40 (28.7)	36 (25.9)	39 (27.0)
In the past week, how many times did you eat dinner with your child (who is here with you today)?	5 (3.6)	32 (23.0)	26 (18.6)	58 (41.7)
	<i>Never</i>	<i>2 – 3 times per month</i>	<i>1 – 3 times per week</i>	<i>4 – 7 times per week</i>
How often do you engage in physical activities/ exercise with your child who is here with you today (e.g. walking, riding bikes, going to the gym)?	30 (21.6)	42 (30.3)	35 (25.2)	15 (10.8)

SA=strongly agree; SWA=somewhat agree; SWD=somewhat disagree; SD=strongly disagree

al., 2011). The children felt that they need not be concerned as they were still young. Asthma, that is not too chronic, was present in 15 children (3.6%); these children may experience physical limitations leading to a decrease in caloric expenditure with the potential consequence of a further mismatch in energy balance, resulting in additional weight gain (Jeffrey *et al.*, 2003).

Overweight or obese children who are bullied and victimised by their peers are more depressive, anxious, have more eating disorders, and poorer self-esteem (Buttita *et al.*, 2014). General QoL status noted Emotional Functioning as the lowest scoring domain. This result may be attributed to obese children being more likely to be victims of bullying behaviour (Janssen *et al.*, 2004). Obese children commonly suffer discrimination and teasing from their peers, causing them to feel stress, which leads to low confidence, and self-esteem (Khodaverdi *et al.*, 2011). The baseline results also showed that those who skipped breakfast had a higher mean in the Physical Functioning domain than those who ate breakfast. This is inconsistent with the previous results that claimed those who skipped breakfast had a lower level of physical activity (Szajewska & Ruszczynski, 2010). This conflicting finding could be explained from our observation that the majority of our participants were active during school day and then they tend to take large amounts of food during lunch. Regular breakfast consumption during childhood has been linked to improved cognition, academic performance, and QoL. Breakfast is deemed an important meal of the day and is an essential element for optimal growth and development (Tin *et al.*, 2011). The major benefits of eating breakfast should be included in the intervention program. The parent's perspective on their child's QoL is also important in treatment-seeking for childhood obesity as family lifestyle

changes might be made in response to obesity treatment interventions (Hughes *et al.*, 2008; Wake *et al.*, 2002).

In our study we also found parents who encouraged their child to eat while watching television and to eat junk food. Previous studies reported a positive association contributing to overweight children between prevalence of eating while watching television (Liang, Kuhle & Veuelers, 2009). This eating habit has been linked to several potential mechanisms such as (i) increased energy intake, (ii) reduced time available for physical activity, (iii) increased sedentary behaviour, and (iv) reduced resting metabolic rate (Cox *et al.*, 2012; Crespo *et al.*, 2001; Pate *et al.*, 2011). In addition, the children were also exposed to the advertising of energy-rich, nutrient-poor food and beverages while watching television (Lobstein & Dobb, 2005). The results also revealed that a few parents never had dinner with their children. Woodruff *et al.* (2010) stated that eating meals together with the family may not only reduce meal skipping but children would be encouraged to adopt a more healthy diet. It is suggested that information or messages on the benefits of eating with family should be included in the intervention study. Targeting both parents and children in childhood obesity prevention interventions is crucial because parents' involvement has powerful effects on a child's perception and behaviour towards food and physical activity.

The imbalance in terms of sex in the participants was evident. It is a common situation in overweight and obese population; more boys are obese compared to girls (Ahmad *et al.*, 2013; Soo *et al.*, 2011). Nonetheless, this study has a strong base as a large number of participants with adequate randomisation was utilised alongside with direct anthropometric measurements.

CONCLUSION

In conclusion, the prevalence of obesity was higher than overweight. Boys and those who were living in urban areas experienced relatively more favourable nutrition knowledge compared to girls and children in suburban areas. Those who took breakfast daily also possessed higher nutrition practice. This group also reported the lowest score in emotional domain of Malay PedsQoL but can be still classified as good QoL. Undesirable results of parenting skills were also observed. Overall, this baseline data is important to provide evidence on the current status of NKAP, HRQoL and parent report of parenting skills of overweight and obese children. Providing nutrition education for both children and parents should improve NKAP and parent reports of parenting skills. Consequently, the positive impacts on a child's weight status could be ensured.

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Conflict of interest

The authors have no conflict of interest or relevant financial relationship in this study.

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