

## Quality of life among obese and non-obese early adolescents

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### Abstract

**Background** Obesity in adolescents adversely affects both their psychological as well as their physical health.

**Objective** To compare the quality of life between obese and non-obese early adolescents, using the PedsQL inventory.

**Methods** A cross-sectional study was carried out on early adolescents aged 10-12 years among several elementary schools in Denpasar, Bali. Body mass index (BMI) percentiles for age and sex were categorized as obese (BMI  $\geq$ 95<sup>th</sup> percentile) and non-obese (BMI <95<sup>th</sup> percentile). Data on quality of life were collected using *PedsQL Generic Core Scales version 4.0* inventory, filled by the children and their parents separately.

**Results** Total PedsQL score in obese and non-obese group were significantly difference in both reports [child report: mean difference of 9.59 (95%CI 7.14 to 12.05;  $P < 0.05$ ) and parent-proxy report: mean difference at 8.95(95%CI6.64 to 11.26;  $P < 0.05$ )]. After classifying subjects into impaired and not impaired quality of life based on a total score cut-off  $< 78$  as well as other cut-off points for each domain, the individual domains of physical, social, and school function were also significantly associated with obesity (child report:  $P = 0.02$ ,  $P < 0.001$ ,  $P = 0.018$ , respectively, and parent-proxy report:  $P = 0.007$ ,  $P < 0.001$ ,  $P < 0.001$ , respectively). However, emotional function was not significantly associated with obesity ( $P > 0.05$ ). After adjusting for age, gender, and parental education, obesity was significantly associated with PedsQL scores in the child report (OR 7.25; 95%CI 2.94 to 17.89;  $P < 0.05$ ) and the parent-proxy report (OR 10.87; 95%CI 3.83 to 30.84;  $P < 0.05$ ).

**Conclusion** Obese early adolescents report significantly poorer quality of life with regards to the physical, social, school function domains and total quality of life than those who are classified into non-obese. [Paediatr Indones. 2017;57:216-22 ; doi: <http://dx.doi.org/10.14238/pi57.4.2017.216-22> ].

**Keywords:** obese; early adolescent; health-related quality of life; PedsQL

Obesity is a serious public health problem in children and adolescents, and is an early risk factor for many adult morbidity and mortality issues. Overweight and obesity are reported to be associated with an increased risk of hypertension, coronary arterio sclerosis, elevated cholesterol, type 2 diabetes, joint problems, stroke, and certain types of cancers. Health consequences of overweight and obesity are not just limited to physical health; overweight and obese children experience problems including body dissatisfaction, negative body image, low self-esteem, anxiety, depression, stigmatization, and social marginalization, all of which can influence their psychological and social health.<sup>1,2</sup>

The prevalence of overweight and obesity in children and adolescents has risen in both developed and developing countries in recent decades. *Riset Kesehatan Dasar (Riskesdas)* in 2013, reported that

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the prevalences of obesity in children under five in 2007, 2010, and 2013, was 12.2%, 14.0% and 11.9%, respectively. In addition, the obesity prevalences in children aged 5-12, 13-15, and 16-18 years was 8.8%, 2.5%, and 1.6%, respectively.<sup>3</sup> In the city of Denpasar, the prevalence of obesity in elementary school children was 15%.<sup>4</sup>

Quality of life of obese children and adolescents should receive more attention because of the impact of obesity itself. The WHO define quality of life as “the individual’s perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns,” in other words, a global view that considers many dimensions of human beings. Measures of quality of life assess important aspects of health, included the effect of a health condition on the child’s daily activities, physical symptoms, social interactions, and emotional wellbeing.<sup>5</sup>

Studies have shown a consistent relationship between abnormal weight and the perception of low quality of life in children and adolescents.<sup>3</sup> Khodaverdi et al. in 2011 found that the quality of life of obese children in physical function, social function, and school function were significantly lower than children with normal weight.<sup>6</sup> Furthermore, in early adolescent (10-14 years) some changes can occur, such as anxiety of body appearance, hormonal changes affect the emotion, and navigating friendships and groups of friends. Adjustment to their environment may pose problems for early adolescents, as they leave childhood and enter a new phase that full of challenges. Such adjustments can certainly influence their quality of life.<sup>7</sup>

Information about obesity and quality of life in early adolescents in Denpasar, Bali, was limited. The aim of this study was to evaluate the association between health-related quality of life and weight status in a community sample of school children aged 10–12 years in Denpasar, Bali.

## Methods

A cross-sectional study was carried out by children among five public elementary schools in Denpasar, Bali, who were selected via consecutive sampling. This study used a significance level of  $P < 0.05$  and power

of 80%, resulting in sample size of at least 48 for each group. The inclusion criteria were: children aged 10 to 12 years (of both sexes), parents willing to participate in the study and agreed the informed consent. The exclusion criteria were: children with severe sensory and communication disability (e.g., blindness or deafness) or severe motor disability (e.g., cerebral palsy or hydrocephalus), chronic disease (e.g., asthma, diabetes, malignancy, heart disease), underweight ( $BMI < 5^{\text{th}}$  percentile), incomplete questionnaires.

The *PedsQL 4.0* was used to assess health-related quality of life in this study. This inventory was a validated, 23-item questionnaire for children aged 2–18 years, administered as either a child self-report or a parent proxy-report.<sup>8</sup> *PedsQL Generic Core Scales version 4.0* inventory was used for children and adolescents aged 8 to 12 years. In brief, the *PedsQL* comprised four subscales: physical (8 items), social (5 items), emotional (5 items), and school function (5 items). The instructions asked how much of a problem each item had been during the last month. A five-point response scale was used (0=never, 1=almost never, 2=sometimes, 3=often, 4=always). Items were reverse-scored and linearly transformed to a 0–100 scale (0=100, 1=75, 2=50, 3=25, 4=0), so that higher scores indicated better quality of life. A total scale score, derived by the mean of all 23 items, was calculated to provide an overall measure of the quality of life.<sup>8</sup>

All participating children had anthropometric measurements taken in school by trained research staff using standardized procedures and equipment. Height was measured to the nearest 0.5 cm using a portable stadiometer. Weight was measured to the nearest 0.1 kg using scales. BMI was calculated as weight (kg)/height (m<sup>2</sup>) and percentiles for age and sex were categorized into obese ( $BMI \geq 95^{\text{th}}$  percentile) or non-obese ( $BMI < 95^{\text{th}}$  percentile). Parent’s education was divided into high and low. Parent who had completed senior high school were classified into high education category.

Total *PedsQL* score and domain score in child and parent-proxy report were grouped by different cut-off, and used to identify special health care need as well as children who may have needed services above what is normally expected. The cut-off for each domain were used to define the categories of impaired and not impaired quality of life. The cut-off

scores were as follows physical function  $\leq 88$  and  $> 88$ , emotional function  $\leq 75$  and  $> 75$ , social function  $\leq 75$  and  $> 75$ , school function  $\leq 70$  and  $> 70$ , and total score  $\leq 78$  and  $> 78$ .<sup>9</sup>

The Ethics Committee of Udayana University Medical School approved the study. Written informed consent was obtained from parents of the participating children and oral consent obtained from children. Furthermore, the children and their parents also were informed that they had the right to withdraw from the study at any time and were assured of confidentiality.

All statistical analyses were performed using SPSS for Windows. Descriptive statistics were used to summarize demographic and anthropometric data.

The independent sample T-test (two groups) was used to analyze differences in PedsQL scores between groups, while Chi-square test was used to analyze the relationship between obesity and PedsQL scores.

## Results

Written informed consent was sought from parents of 310 eligible children aged 10 to 12 years, 230 (74.19%) of those who agreed to participate. After exclusion of 97 student questionnaires, which were incomplete, the remaining number of subject was 133. The characteristics of subjects are shown in **Table 1**. Fifty children were obese (group 1) and 83 were

**Table 1.** Subjects' characteristics (N=133)

Characteristics	Obese (n=50)	Non-obese (n=83)
Median age (range), years	11 (10-12)	11 (10-120)
Gender, n(%)		
Male	29 (58)	42 (50.6)
Female	21 (42)	41 (49.4)
Median age of parents (range), years		
Father	41 (34-54)	41 (33-57)
Mother	39 (32-53)	38 (31-58)
Maternal education, n(%)		
Low	4 (8)	13 (15.7)
High	46 (92)	70 (84.3)
Paternal education, n(%)		
Low	8 (16)	10 (12)
High	42 (84)	73 (88)
Median anthropometric measures (range)		
Weight, kg	53.00 (39-70)	41 (32.52)
Height, cm	144 (132-160)	148 (135-136)
BMI, kg/m <sup>2</sup>	25.38 (22.38-32.09)	19.17 (14.28-23.78)
Median PedsQL score (range)		
Physical function		
Child report	73.44 (43.75-90.62)	82.50 (59.38-96.88)
Parent-proxy report	75.00 (59.38-90.62)	84.37 (59.38-100)
Physical function		
Child report	75.00 (30.00-95.00)	75.00 (60.00-90.00)
Parent-proxy report	75.00 (35.00-90.00)	80.00 (55.00-95.00)
Physical function		
Child report	75.00 (50.00-90.00)	90.00 (55.00-100)
Parent-proxy report	75.00 (50.00-90.00)	90.00 (50.00-100)
Physical function		
Child report	70.00 (45.00-90.00)	75.00 (50.00-90.00)
Parent-proxy report	70.00 (50.00-80.78)	75.00 (50.00-90.00)
Mean PedsQL score (SD)		
Child report	70.63 (8.31)	80.23 (5.92)
Parent-proxy report	71.98 (7.05)	80.93 (6.19)

non-obese (group 2). In obese group, there were 29 (58%) boys and 21 (42%) girls, with median age of 11 (range 10 to 12) years. In non-obese group, there were 42 (50.6%) boys and 41 (49.4%) girls, with median age of 11 (range 10 to 12) years. The median age of parents (fathers and mothers) in the obese group were 41 and 39 years, respectively, and 41 and 38 years, respectively, in the non-obese group. In both groups, most fathers and mothers were highly educated. All families in both groups had an average monthly income above the regional minimum wage.

The median weight, height, and BMI in the obese group were 53.00 (range 39-70) kg, 144 (range 132-160) cm, and 25.38 (range 22.38 to 32.09) kg/m<sup>2</sup>, respectively. For non-obese group, the median were 41 (range 32 to 52) kg, 148 (range 135-156) cm, and 19.17 (range 14.28 to 23.78) kg/m<sup>2</sup>, respectively.

Median score reported for each domain (physical, social, and school function) in obese group compared to non-obese group were 73.44 vs. 82.55, 75.00 vs. 90.00, and 70.00 vs. 75.00, respectively. The emotional function child report scores were similar in both groups (median 75.00). Median scores of the parent-proxy report for each domain function (physical, emotional, social, and school function) in the obese compared to non-obese group were 75.00 vs. 84.37, 75.00 vs. 80.00, 70.00 vs. 90.00, and 70.00 vs. 75.00, respectively. The mean total PedsQL scores in the obese compared to the non-obese group were 70.63 (SD 8.31) vs. 80.23 (SD 5.92) with mean difference 9.59 (95%CI 7.14 to 12.05; P<0.05) for the child report, and 71.98 (SD 7.05) vs. 80.93 (SD 6.19), with mean difference 8.95 (95%CI 6.64 to 11.26; P<0.05) for the parent-proxy report. The total PedsQL score

**Table 2.** Association of nutritional status and PedsQL scores according to child self-report

Variables	Quality of life	Nutritional status				OR	95%CI	P value
		Obese		Non-obese				
		n	%	n	%			
Physical function	Impaired	46	92	58	69.9	4.957	1.61 to 15.25	0.02
	Not impaired	4	8.0	25	30.1			
Emotional function	Impaired	34	68.0	46	55.4	1.71	0.82 to 3.57	0.105
	Not impaired	16	32.0	37	44.6			
Social function	Impaired	29	58.0	8	9.6	12.95	5.16 to 32.49	<0.001
	Not impaired	21	42.0	75	90.4			
School function	Impaired	30	60.0	33	39.8	2.27	1.11 to 4.65	0.018
	Not impaired	20	40	50	60.2			
Total score	Impaired	42	84.0	37	44.6	6.53	2.73 to 15.59	<0.001
	Not impaired	8	16.0	46	55.4			

**Table 3.** Association of nutritional status and PedsQL scores according to parent-proxy report

Variables	Quality of life	Nutritional status				OR	95%CI	P value
		Obese		Non-obese				
		n	%	n	%			
Physical function	Impaired	46	92.0	61	73.5	4.15	1.34 to 12.87	0.007
	Not impaired	4	8.0	22	26.5			
Emotional function	Impaired	29	58.0	41	49.4	1.42	0.69 to 2.87	0.105
	Not impaired	21	42.0	42	50.6			
Social function	Impaired	31	62.0	3	3.6	43.51	12.02 to 157.48	<0.001
	Not impaired	19	38.0	80	96.4			
School function	Impaired	41	82.0	35	42.2	6.25	2.69 to 14.51	0.018
	Not impaired	9	18.0	48	57.8			
Total score	Impaired	43	86.0	36	43.4	8.02	3.23 to 19.91	<0.001
	Not impaired	7	14.0	47	56.6			

and scores for each domain function in the child and parents-proxy reported classified as impaired or not impaired quality of life, by different cut-off. **Table 2** and **Table 3** show the association between obesity and total PedsQL scores.

After age, gender, and parental education adjusted, obesity was significantly associated with impaired quality of life in both child and parent-proxy report (OR 7.25; 95%CI 2.94 to 17.89;  $P < 0.05$  and OR 10.87; 95%CI 3.83 to 30.84;  $P < 0.05$ , respectively).

## Discussion

In our study, health-related quality of life scores were measured using PedsQL Generic Core Scales version 4.0 inventory. In repeated reliability and validity tests, the PedsQL has consistently had high reliability scores ( $\alpha = 0.71-0.89$ ) and was also able to distinguish between healthy children and those with chronic diseases.<sup>10</sup> There is no definitive cut-off point to determine the value of a good or a poor quality of life on children and adolescents. Huang et al. reported that the recommended cut-off scores for children  $< 8$  years were 83, 79 for moderate, and 77 for major chronic conditions. For children  $\geq 8$  years, the cut-off scores were 78, 76, and 70, respectively.<sup>9</sup> Khairy et al. also developed a classification of PedsQL score. They calculated total score from the four domain scores, out of a possible 100, then changed the total score into percentage and grouped the percentages. Scores  $< 25\%$  were interpreted as bad quality of life, 25% to  $< 50\%$  as fair quality of life, 50 to  $< 75\%$  as good quality of life, and 75–100% as very good quality of life.<sup>1</sup> In our study, we followed the classification of Huang et al. for children  $\geq 8$  years of age.

Obese early adolescent reported poorer quality of life in the physical, social, and school function domains, as well as in total quality of life than non-obese early adolescents. This finding suggests that obesity has a negative impact on children and adolescent's daily life. Similarly, Riazi et al. in the United Kingdom stated that obese and overweight groups reported impairment in all quality of life dimensions compared to the normal weight group.<sup>11</sup> However, Hughes et al. in the United Kingdom, found that only physical health was significantly impaired in obese children

aged 8 to 12 years.<sup>12</sup> In our study, both child and parent-proxy reports showed lower scores for each domain function in the obese group compared to the non-obese group. The mean total PedsQL score was also significantly lower in the obese group compared to the non-obese group. After classification into impaired vs not impaired quality of life based on different cut-off points for each domain, only the emotional function was not significantly associated with obesity. Children aged 10 to 12 years are included in early adolescence. At that age the child's emotional maturity function is influenced by many factors. Individual factors, such as cognitive development and temperament, influence the development of emotional competencies. These skills are also influenced by past social experience and learning, including an individual's relationship history, as well as the system of beliefs and values in the which the person lives.<sup>14</sup>

The total quality of life scores were evaluated for relationships to characteristics of the obese and normal children. Recent study found a significant, negative correlation between total quality of life scores and BMI, waist circumference, and weight. Their observation indicates that increased BMI, waist circumference, and weight leads to impairment and negative impacts on the quality of life of children.<sup>1</sup> An explanation is that excess weight may lead to a decrease in their physical functional health status. These findings are consistent with that of Abdel Aziz et al. in Egypt, who found that overweight children had significantly worse physical function than children with normal BMI.<sup>13</sup>

Obese children and adolescents were more likely to experience psychosocial problems than their normal weight peers. Obesity stigma, teasing, and bullying are pervasive, and can have serious consequences for emotional and physical health, and school performance. A previous study of depression and adolescent obesity showed that weight gain during adolescence may be related to depression, negative mood status, and poor self-esteem.<sup>15</sup> Obese children, compared with normal weight children, were found to be significantly more likely to experience depression.<sup>16</sup> Recent study findings confirmed that obese adolescent had significantly lower self esteem than normal weight peers, as measured by various focused questionnaires. Findings confirmed that a clear negative impact on self-esteem was associated with obese adolescent.<sup>17</sup>

We found that school function scores were significantly lower in the obese than in the non-obese group, in the child and parent-proxy reports. These findings are consistent with a Hong Kong study, in which school function of normal weight children was significantly higher than the group of overweight children.<sup>18</sup> In contrast, Williams *et al.* in Australia found that the difference in school function scores were not significantly different between obese and non-obese groups.<sup>19</sup>

Findings were mixed with regards to gender. Obese girls, compared to obese boys, had significantly more negative perceptions of their physical appearance, self-worth, and how they felt they were accepted by social groups, including their peers. In contrast, no sex differences were found between psychological factors and weight problems, with both sexes reporting the association with low self-esteem and obesity.<sup>1</sup> In our study, the number of boys (58%) in the obese group was greater than the number of girls (42%).

Peer relationship problems were greater at age 8-9 years than at younger ages (4-5 years).<sup>20,21</sup> Obese children aged 6 to 13 years were 4 to 8 times more likely to be teased and bullied than normal weight peers. Obesity and weight-related teasing were significant risk factors for the development of psychosocial problems, including social stigmatization or peer rejection, and later eating disorders, and unhealthy weight-control behaviors.<sup>22,23</sup>

The weakness of our study was we did not differentiate nutritional status in non-obese group, as we were not looking for a relationship between total quality of life scores and waist circumference, we also did not make adjustments to other factors that could affect quality of life of early adolescents.

Total PedsQL score in obese and non-obese group was difference significantly in both child and parent-proxy reports. Management of obesity should include health-related quality of life measurements as a parameter of overweight and obesity outcome. We recommend the use of PedsQL questionnaire as a simple, easy-to use, and reliable measurement model for assessment of health-related quality of life. Better understanding quality of life is a key element essential for the treatment of childhood and adolescent obesity.

## Conflict of Interest

None declared.

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