RESEARCH ARTICLE

SIGNIFICANT ASSOCIATION BETWEEN BODY MASS INDEX (BMI) AND HEALTH-RELATED QUALITY OF LIFE IN ELEMENTARY SCHOOL-AGED CHILDREN, ON THE IMPORTANCE OF WEIGHT MANAGEMENT TO IMPROVE CHILDREN'S QUALITY OF LIFE

Edwin Timoti Japanto[1]

1 Author

Korespondesi:
edwintimoti98@gmail.com

ABSTRACT

Background : *Nutrition problems in school-age children still occur in Indonesia and associated with a decrease in quality of life in children. School-age children are vulnerable to physical, emotional, social and school problems.*

Method : *This cross-sectional study measured BMI with body weight and height using the z-score method and measuring quality of life (QOL) in children using a generic core scale Pediatric Quality of Life Inventory (PedsQL) 4.0. This research was conducted on school-age children 8-12 years old at Budya Wacana Yogyakarta Elementary school in 2018.*

Conclusion : *There is a significant relationship between BMI and quality of life in school-aged children at SD Budya Wacana Yogyakarta.*

Keywords : *Body mass index, health related quality of life*

ABSTRAK

Latar belakang : Masalah gizi pada anak usia sekolah masih terjadi di Indonesia dan dikaitkan dengan penurunan kualitas hidup anak. Anak usia sekolah rentan terhadap masalah fisik, emosional, sosial, dan sekolah.

Metode : Penelitian cross-sectional ini mengukur BMI dengan berat badan dan tinggi badan menggunakan metode z-score serta mengukur kualitas hidup (QOL) pada anak menggunakan skala inti generik Pediatric Quality of Life Inventory (PedsQL) 4.0. Penelitian ini dilakukan pada anak usia sekolah 8-12 tahun di SD Budya Wacana Yogyakarta pada tahun 2018.

Kesimpulan : Terdapat hubungan yang signifikan antara BMI dengan kualitas hidup pada anak usia sekolah di SD Budya Wacana Yogyakarta.

Kata Kunci : Indeks Massa Tubuh, Kualitas Hidup Terkait Kesehatan.

INTRODUCTION

Quality of life is an individual's perception of various aspects of life, if it is related to health, it is called health-related quality of life. Health Related Quality of life has aspects of physical health, psychological health, social relationships, relationships with the environment, and spiritual conditions in the form of religion or belief [1]. Factors that can affect the quality of life in children can be internal factors and external factors. One of the internal factors is the physical dimension. These physical dimensions are related to weight, height, and age or can be said to be related to nutritional status [2].

Nutritional status is the body condition as a result of food consumption and the use of nutrients, which used for body energy sources, growth and maintenance of body tissues, and regulating processes in the body. One of the anthropometric measurements of nutritional status can measured by using body mass index (BMI). In children BMI measurement can use the body mass index according to age and related to the Z score or the threshold standard that acording to WHO [3]. A normal BMI indicates a normal nutritional status, while an abnormal BMI indicates the occurrence of malnutrition, either obesity or deficiency [4]. The existence of malnutrition in children affects the physical and psychological functions, which these functions are the main aspects of the quality of life.

Nutritional problem between rural and urban in Indonesia is still not balanced. Areas outside of Java, especially in eastern Indonesia, still have a high prevalence of nutrition problems [5]. Urban areas such as Yogyakarta City should have a lower prevalence of nutritional problems than the east. But physical activity and diet in urban areas can affect the nutritional problems such as overweight or obesity [6]. This nutrition problem can occur in a long time or chronic and can decrease an individual's physical health [7].

This study aims to explore the relationship between Body Mass Index (BMI) and health-related quality of life in elementary school-aged children. In this context, we want to analyze the extent to which BMI can affect children's life experiences, both physically and emotionally. By understanding this relationship, it is hoped that the significant impact of weight management on improving children's quality of life can be identified.

In addition, this study aims to assess the effectiveness of various weight management programs and how these programs can contribute to improving children's quality of life. In the process, we will identify factors that contribute to the relationship between BMI and quality of life, including diet, physical activity, and social support from the surrounding environment.

Through this study, we also want to provide useful recommendations for parents, educators, and policy makers about the importance of healthy weight management. Finally, we hope that this study can increase public awareness of the importance of maintaining a healthy weight for the well-being and better quality of life for children.

METHODS

This cross-sectional study used a descriptive-analytic design. The population of the study was students in grades IV, V, and V Budya Wacana Elementary School Yogyakarta, amounting to 152 people with a sampling method that is the total sampling method so that the total population is the same as the number of samples [8]. After inclusion and exclusion, the number of samples was 143 people. BMI data retrieval was carried out by measuring body weight and height using a stepping and microtoise staturmeter. Health Related Quality of life was measured using the Pediatrics Quality of Life (PedsQL) Inventory 4.0 Generic which consisted of 23 questions and 4 dimension [2]. Data processing using IBM SPSS 24 program. In this study, univariate analysis, bivariate chi-square test, and multivariate logistic regression testwere performed.

RESULTS

Respondent characteristics

The characteristics of the respondents are shown in table 1. Respondents were 143 people in grades IV, V, and VI of the Yogyakarta Budya Wacana Elementary School in 2018 which consists of 55.9% women. The age of the respondents ranged from 8 until 12 years old and at most at 9 years old with 50% normal nutritional status, 25% obesity, 32% fat, and 5% underweight. The description of body weight (BB), height (TB), and body mass index (BMI) can be seen in table 2. The average weight of the respondents is 38.15 kg, the average height is 138.9 cm, and the average BMI is 19.49 kg/m2. Table 3 shows the description of the HRQOL of the respondents, both the total score of the quality of life, and the dimensions of the quality of life. The mean of quality of life and the respective dimensions are taken as a cutoff to determine the good or bad quality of life.

Table 1 Characteristics Respondent

		(n)	(%)
Sex	Male	63	44,1
	Female	80	55,9
Age	8 years old	2	1,4
	9 years old	48	33,6
	10 years old	38	26,6
	11 years old	43	30,1
	12 years old	12	8,4
Penyakit	Yes	42	29,4
	No	101	70,6
Status gizi	Very Thin	2	1
	Thin	3	2
	Normal	71	50
	Overweight	32	22
	Obesity	35	25

Table 2 Characteristics of respondents on non-categorical variables

	Mean±SD	Mode	Min	Max
Weight (Kg)	38,15±12,8	31	21	83
Height (cm)	138,9±9,3	138	121,5	164
BMI (Kg/m²)	19,46±4,9	15,75	12,27	34,88

Table 3 Health-Related Quality of Life Description and classification

	(N / %)		Mean±SD	Minimal	Maxim
	Good	Bad			
Physical	87 (61%)	56 (39%)	78±12,7	34,38	100
Emotion	68 (48%)	75 (52%)	60,8±17,6	20	100
Social	81 (56%)	62 (44%)	72,3±19,6	20	100
School	75 (52%)	68 (48%)	66,7±16,1	20	100
Total Score	82 (57%)	61 (43%)	70,6±12,7	29,35	100

Nutritional status, age, gender, and quality of life

Table 4 shows the results of the bivariate test of the variables of nutritional status, age, and sex, with the dependent variable being quality of life. There was a significant relationship between nutritional status and the total score of quality of life (p=0.013, R=-0.21), especially in the emotional (p=0.015) and social (p=0.036) dimensions. There was also a relationship between age and the total quality of life score (p=0.002) and a significant relationship between gender and quality of life (p=0.037).

The multivariate test is described in table 5, namely the logistic regression test. This test is divided into four models in which there are two significant results: the group of variables BMI, gender, and age affects 14.4% of the HRQOL. Others show that BMI and age affect 12.5% of the HRQOL.

Table 4 Multivariate Test

		Total Score		Physique		Emotion		Sosial		School	
		Bad	Good	Bad	Good	Bad	Good	Bad	Good	Bad	Good
BMI	Normal	24	52	28	48	32	44	27	49	32	44
	Overweight	19	13	13	19	23	9	20	12	20	12
	Obesity	18	17	15	20	20	15	15	20	16	19
	p (R)	**0,013** (-0,21)		0,82 (-0,053)		**0,015** (-0,18)		**0,036** (-0,12)		0,148 (-0,08)	
Age (years)	< 10	30	20	30	20	30	20	27	23	30	20
	≥ 10	31	62	26	67	45	48	35	58	38	55
	p (R)	**0,002** (0,26)		**0,001** (0,313)		0,185 (0,11)		0,06 (0,157)		**0,029** (0,183)	
Sex	Laki-laki	33	30	30	33	42	21	28	35	41	22
	Perempuan	28	52	26	54	33	47	34	46	27	53
	p (R)	**0,037** (0,17)		0,066 (0,15)		**0,003** (0,253)		0,816 (0,019)		**0,001** (0,311)	
Condition	Sick	43	58	17	25	21	21	22	20	21	21
	No	18	24	39	62	54	47	40	61	47	54
	p (R)	0,975(-0,03)		0,835 (0,017)		0,705 (-0,032)		0,16 (0,117)		0,705 (0,032	

Table 5 Logistic regression test

Independent	**Model I**		**Model II**		**Model III**		**Model IV**	
Variables	p	R^2	p	R^2	p	R^2	p	R^2
Sex	0,076	0,144	0,074	0,087	0,018	0,068		0,125
Age	0,003		0,004				0.001	
BMI	0,001				0,034		0,003	

DISCUSSION

In general, this study did not find a strong correlation between nutritional status and quality of life or other variables such as gender and age on quality of life. However, there was a significant relationship between nutritional status, gender, age with quality of life at Budya Wacana Elementary School. Yogyakarta. The relationship in question is that overweight nutritional status (overweight and obesity) is associated with decreased quality of life.

This study is in line with various studies in Padang, Indonesia (in 110 children); Tehran, Iran (in 829 children aged 8-12 years); Guangzhou, China (in 5781 children aged 8-12 years); and Tainan, Taiwan (in 70 children) [9-12], in some of these studies there was a significant relation between BMI and quality of life in children. Another study in Vojvodina, northern Serbia (*on 182 children*) [13] with a different questionnaire, KIDSCREEN, found different results; there was no significant relationship between BMI and quality of life. Another related study found that BMI was significantly associated with emotional and social functioning, which is in line with this study [10]. Several studies suggest that the physical function domain is significantly lower in overweight children related to exercise problems, even though it is not a serious medical problem for children [11]. Obesity in children can be a risk for various metabolic diseases during adolescence and even adulthood. Children with obesity are more likely to do the strenuous physical activity than normal children, affecting the physical dimensions of quality of life [13]. Previous research suggests a decrease in the score of social dimensions in children with obesity, and this can be explained by the condition of the child at school and the possibility of being verbally abused by schoolmates.

In this study, gender has a significant relation with quality of life. Previous research in Vojvodina, Serbia; Tehran, Iran; and Guangzhou, China had results in line with this study, which found a significant relationship between gender and quality of life. Research in Vojvodonia in girls has a higher quality of life than boys, especially regarding psychological domains such as emotional, social, and school functioning [13]. Previous research in Tehran, Iran, the quality of life of girls is higher than boys, especially in the domain of the social function, while in other parts, it is not significant [10]. A similar study in Guangzhou suggested a higher mean quality of life score in girls with normal nutritional status. Still, different results were found in obese girls having a lower quality of life than similar boys [11]. The existence of an ideal body perception between boys and girls can be the cause of this incident. Boys tend to want to have a larger body portion at school age, while the reverse is the case with girls who prefer a slim body at school age [11].

In this study, there was a relationship between age and quality of life in school-age children. Age was divided into two groups, the group under ten years and the group ten years and above ten years. This division was carried out on the basis of consideration of the number and the middle age limit, as seen in previous studies, which divided the age groups into the same age group as this study [11]. Similar research is a prior study in Guanzhou which stated that older children (10-12) years had a higher quality of life score than younger children (<10 years). This fact is a general fact that does not compare obese children with normal children. Similar studies were also conducted in Germany on children and adolescents 11-17 years of age, where it was found that the quality of life in younger children was lower than in older children [14]. The results of this study are supported by the theory which states that early puberty in younger children results in premature hormonal changes related to attitudes and behavior that can affect the quality of life domains as external factors. Plus, the age of puberty in children who are getting more advanced is below ten years can support this [15]. Another theory says children under the age of 10 are still less emotionally developed than older children.

Based on the results of the logistic regression analysis shown in table 5, it was found that model I, namely gender, BMI, and age, affected 14.4%, and model IV showed the effect of age and BMI on 12.5% of the quality of life. These two models have the most significant influence compared to the other two models. Model IV is more acceptable than the model I because, with two variables, it affects 12.5% quality of life compared to model I, which has three variables with numbers that are not too far apart. However, these four models do not have a significant influence on the quality of life of children. In previous studies, it had a more significant impact than the variables in this study; in another study, BMI and alanine aminotransferase (ALT) affected 26% of the quality of life and even 38% of the physical domain. ALT is associated with liver conditions, and chronic liver disease can affect the quality of life [12]. Another study showed that age, family type, and mental health status affected 30% of the quality of life [16]. Research in Shaoxing, China, measured several variables, namely mother's rejection, father's rejection, emotional support, relationships with classmates, excessive protection from mothers, and social support that affect 28% of the quality of life in immigrant children [17].

A study conducted in Germany found that age, economic status, health problems of children and parents, self-improvement, family climate, and social support affect 49% of the quality of life in children and adolescents [14]. From these studies, it was not found that there were variables that affected more than 50% of the quality of life. This is because all analyses were conducted on children, considering that the quality of life of children, adults, or the elderly is theoretically different [1]. Children with the same disease as the elderly tend to have a better prognosis.

CONCLUSIONS AND RECOMMENDATIONS

There is a statistically and theoretically significant relationship between body mass index and quality of life in school-age children. The significant association between body mass index and quality of life was also influenced by age and gender.

Parents are advised not to underestimate the problem of malnutrition, especially the problem of being overweight in children, which affects the quality of life of children. Future research is expected to look for other variables that significantly affect the quality of life using appropriate and complete measurement instruments.

REFERENCES

1. WHO. WHO Website. [Online].; 2018. Available from: HYPERLINK "http://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/" http://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/ .
2. Varni JW, Limbers CA. The Pediatric Quality of Life Inventory: Measuring Pediatric Health-Related Quality of Life from the Prespective of Children and Their Parents. Pediatrics Clinics of North America Vol 56. 2009;: p. 843-863.
3. KEMENKES. Keputusan Menteri Kesehatan Republik Indonesia Nomor: 1995/Menkes/SK/XII/2010 Tentang Standar Antopometri Penilaian Status Gizi Anak Jakarta: Kementerian Kesehatan; 2010.
4. Ulilalbab A. Obesitas Anak Usia Sekolah Yogyakarta: Deepublish; 2017.
5. KEMENKES. Buku Saku Pemantauan Status Gizi Tahun 2017 Jakarta: Kementerian Kesehatan; 2018.
6. KEMENKES. Data dan Informasi Profil Kesehatan Indonesia 2017 Jakarta: Kementerian Kesehatan RI; 2018.
7. Varni JW, Seid M, Kurtin S. PedsQL 4.0: Reliability and Validity od Pediatric Quality of Life Inventory Version 4.0 Generic Core Scale in Healthy and Patient Populations. Medical Journal San Diego. 2001.
8. Syahdrajat T. Panduan Menulis Tugas Akhir Kedokteran dan Kesehatan Edisi Pertama Jakarta: Prenadamedia Group; 2015.
9. Suto PK. Hubungan Kejadian Obesitas dengan Kualitas Hidup Pada Anak Usia Sekolah di SDN 30 Kubu Dalam Kota Padang Tahun 2017 (Skripsi) Padang: Universitas Andalas; 2017.
10. Farajpour M, PishgahRoodsari M, Salehiniya H, Soheilipour F. The Relationship between Body Mass Index (BMI) and Quality od Life in Iranian Primary School Student in Tehran, Iran. BioMedicine No. 1, Article 3. 2018;: p. 18-25.
11. Liu W, Lin R, Liu W, Guo Z, Xiong L, Li B, et al. Relationship between Weight Status and Health-Related Qualitf of Life in Chinese Primary School Children in Guangzhou: Cross-Sectional Study. Biomed Central. 2016.
12. Lee CT, Lin CY, Strong C, Lin YF, Chou Yy, Tsai MC. Metabolic Correlates of Health Related Quality of Life Among Overweight and Obese Adolescents. BMC Pediatrics. 2018;: p. 18-25.
13. Halasi S, Lepes J, Dordic V, Stevanovic D, Ihasz F, Jaksic D. Relationship Between Obesity and Health-Related Quality of Life in Children Aged 7-8. Health and Quality of Life Outcomes. 2018; 16: p. 149.
14. Otto C, Haller AC, Klasen F, Holling H, M B, Ravens-Siberiar U, et al. Risk and Protective Factors of Health-Related Quality of Life in Children and Adolescents: Result of Longitudinal BELLA Study. Plos One. 2017; 12: p. 12.
15. Kliegman RM, Stanton BF, Geme JWS, Schor F. Nelson Textbook Of Pediatrics, Twentieth Edition Philadelphia: Elsevier; 2016.
16. Murillo M, Bel J, Perez J, Corripio R, Carreras G, Herrero X, et al. Health-Related Quality of Life (HRQOL) and Its Associated Factors in Children with Type 1 Diabetes Mellitus (T1DM). BMC Pediatrics. 2017; 17: p. 16.

17. Xu F, XIng H, Yu W, Chen S, Li H. Health-Related Quality of Life and Influencing Factors among Migrant Chilren in Shaoxing, China. Health and Quality of Life Outcomes. 2017; 15: p. 100.