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Research Article

The Effect of Family-Based Empowerment in Preventing Overweight and Obesity in Elementary School Children in Kupang

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ABSTRACT

Background: The prevalence of overweight and obesity continues to increase in both developing and developed countries and occurs in all age groups. As well as being the biggest threat to public health, especially non-communicable diseases. Childhood is the most special period in life. It is almost certain that many health problems/illnesses experienced during this period will be carried on into adulthood. The causes of obesity in children are very complex; genetic, biological, psychosocial, behavioral and socio-cultural factors. The impact of overweight and obesity on children is related to physical and psychological effects. Lifestyle modification which includes increasing knowledge, diet, physical activity, sedentary behavior, socio-cultural aspects is believed to be a strategy in preventing and controlling overweight and obesity. This study aims to examine the effect of family empowerment on the prevention of overweight and obesity in elementary school children. This research is a quasy experiment that is pre-test and post-test with control group design. Parallel design with one treatment group and one control group. The sample is determined by purposive random sampling. The research sample was overweight/obese children in elementary school grades 4, 5 and 6, totaling 112 people. Data were obtained through a structured questionnaire covering family abilities, knowledge, physical activity and nutritional intake. Nutritional status was measured after measuring body weight and height using digital scales. Eating patterns were measured using a food frequency questionnaire and a 24-hour recall formula. **Results:** The results showed that there were differences in family ability ($p<0.016$), knowledge ($p<0.001$), physical activity ($p<0.015$) and nutritional intake ($p<0.000$) in the treatment group and the control group after implementing the family empowerment intervention. **Conclusion:** Family-centered empowerment interventions through health education about overweight and obesity management have a positive impact on increasing family capacity, family knowledge, physical activity and changes in family eating patterns. It is necessary to implement lifestyle modifications in preventing and controlling overweight and obesity. Family-centered empowerment interventions through health education about overweight and obesity management have a positive impact on increasing family capacity, family knowledge, physical activity and changes in family eating patterns. It is necessary to implement lifestyle modifications in preventing and controlling overweight and obesity. Family-centered empowerment interventions through health education about overweight and obesity management have a positive impact on increasing family capacity, family knowledge, physical activity and changes in family eating patterns. It is necessary to implement lifestyle modifications in preventing and controlling overweight and obesity.

Key words: Empowerment, Family, Overweigh, Obesity, Elementary School Children.

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INTRODUCTION

Overweight and obesity is a chronic mismatch between food intake and energy expenditure. This is a situation where food consumption exceeds the normal requirements for increasing body mass index or results from a positive energy balance due to excess caloric intake, and/or inadequate physical activity.[1] Another concept explains that obesity is a complex chronic condition that is described as the result of interactions between the obesogenic environment, epigenetic factors, stress, sedentary lifestyle, genetics, growth and development disorders.[2] The prevalence of childhood overweight and obesity has been at high levels for many years and is of great concern to public health.[3] Globally, overweighing and obesity in children is one of the most serious public health problems in the 21st century, and its prevalence continues to increase significantly.[4] The number of obese children worldwide is estimated to reach 250 million by 2030, or one in five children, up from the current figure of 150 million (World Obesity Federation, 2019).[5]

The World Health Organization (WHO) reports that the prevalence of obesity has increased dramatically from 35 million in 2010 to 44 times in 2016 where 1.9 billion adults worldwide aged over 18 years are classified as overweight and of that, 650 million are obese.[6] Nonetheless, 38 million children under the age of 5 years were overweight or obese while more than 340 million children and adolescents aged 5-19 years were categorized as overweight or obese in 2016.[6] Recently, the prevalence of childhood overweight and obesity has increased significantly in both rich and poor countries. Recent studies report that this trend of increasing childhood obesity is more pronounced in developing countries than in developed countries. The prevalence of overweight and obesity in most developed and developing countries has increased markedly over the last two decades covering all age groups, sex, racial and ethnic groups, income, and educational level.[7] In the United States, there has been a significant increase in the prevalence of children with overweight and obesity class III from 1999 to 2016. It is estimated that around 33% of children aged 6-11 years and 50%

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of adolescents aged 12-19 years will be overweight or obese by 2030.[8] In almost all European countries, from 1999 to 2016, the prevalence of overweight/obesity in children aged 2–13 years was very high, especially in several Mediterranean countries. About 25% of obese children are severely obese. In Vietnam, the prevalence of overweight/obesity among children and adolescents aged 5–19 years jumped from 8.5% in 2010 to 19.0% in 2020. Data from other countries (such as Spain, China, Greece, Poland and Australia) also shows a high prevalence of overweight and obesity among children and adolescents.[8] A survey in Turkey, reported that 14.6% of Turkish primary school children were overweight, and 1 in 10 children was obese.[7]

The Indonesian Basic Health Research Survey (Riskesdas) shows that the prevalence of obesity in adolescents has increased from 1.4% (2007) to 7.3% (2013).[9] In Indonesia, based on Basic Health Research (Riskesdas) data, it can be seen that the number of adults who are overweight and obese continues to increase. The overweight rate in 2007 reached 8.6 percent, 10.0 percent in 2010, 11.5 percent in 2013, and rose to 13.6 percent in 2018. The obesity rate has increased even higher. In 2007, the obesity rate reached 10.5 percent, then rose to 11.7 percent in 2010, 14.8 percent in 2013, and increased sharply to 21.8 percent in 2018.[10] Unicef Indonesia (2019), in the Status of World Children 2019 states that in 2018 one fifth of elementary school-aged children are overweight or obese. According to the 2018 Riskesdas for East Nusa Tenggara province, the prevalence of nutritional status based on the BMI category in adults aged > 18 years (Central Obesity) in Kupang City is 11.69% overweight and 20.09% obese. The prevalence of central obesity in people aged ≥ 15 in Kupang City is 31.10% while in the context of the province of NTT it is 19.31%. Meanwhile for the category of children and adolescents in Kupang City, the prevalence of nutritional status (BB/U) is more for children under five years (0-59 months) of 3.48%. The prevalence of nutritional status (BB/TB) for obese children aged 0-59 months (toddlers) is 6.70%. Prevalence of nutritional status (BMI/U) in children aged 5-12 years, obese; by 4.92% and obesity; 7.24%. The prevalence of nutritional status (BMI/U) for adolescents aged 13-15 years is 8.90% fat and obese; 2.67%. The prevalence of nutritional status (BMI/U) at the age of 16-18 years is 9.44% fat and obese; 2.36%.[10]

The causes of obesity are multifactorial and include interactions between eating behavior (eg, frequency, amount, and occasion of eating), food intake (eg, dietary pattern and food components), physical activity, obesogenic environment, and genetics.[11] The immediate cause of obesity is the accumulation of excess fat in the body due to increased energy intake in relation to energy requirements. However, the imbalance between the energy value of food and energy expenditure is related to biological, social, cultural, political, local and global economic factors.[12]

Tackling childhood obesity is important given the devastating impact obesity has on children's physical and mental health. Increased overweight and obesity are metabolic risk factors that contribute to an increased risk of non-communicable diseases (NCDs), including cardiovascular disease, cancer, chronic respiratory disease, hypertension, cholesterol, stroke, diabetes, psychological disorders, musculoskeletal discomfort and joint problems, including in several In recent years, obesity has been recognized as a predictor of poor prognosis in patients with coronavirus disease 2019 (COVID-19).[13]

Early childhood is an appropriate time for obesity intervention, for various reasons, including early life obesity intervention has been associated with very important effects, early life behaviors and patterns (eg, low physical activity, short sleep duration, inadequate consumption controlled) correlates well with the development and persistence of obesity, and behavior and lifestyle modifications appear to be more successful when applied at younger ages and have the potential to be sustained into adulthood.[14]

Among environmental factors, the family environment is the most basic and proximal context for children, where several main variables that cause overweight and obesity can be controlled at the family level.[15] Families including parents play an important role as mediators to shape their children's behavior, because children spend most of their time at home.[16] Family-based interventions are recognized as an effective strategy for preventing and treating childhood obesity. Family-based interventions involve families to encourage adoption of healthy behaviors among all family members.[17] Family-based interventions that help establish and maintain healthy lifestyle behaviors such as healthy eating, physical activity, and controlling sedentary behavior are important approaches to preventing and managing obesity in children.[18] Thus, family-based multidisciplinary lifestyle interventions are recommended as best practices for addressing childhood obesity.[19]

MATERIALS AND METHODS

Study design

This research is a quasi-experimental study conducted using a pre- and post-test design in SD Kota Kupang, Indonesia, from January 2022 to April 2022. This research was conducted on 120 overweight and obese students who were divided into two groups who completed the intervention. namely the intervention group (58 participants) and the control group (54 participants), using purposive random sampling method.

Research materials and tools

Several variables, such as demographics, family abilities, physical activity and nutritional status of the children were assessed. This data was collected through questionnaires and anthropometric measurements. The questionnaire used was a food frequency questionnaire, a repeated 24-hour recall questionnaire and a structured questionnaire, while the measurements were body weight and height which were measured using digital scales.[20]

Parameters measured

Obesity status was determined using the body mass index for age Z-score (BAZ). Z-score was calculated using WHOAnthroPlus 2007 software.

Statistical analysis

Univariate analysis was used to get an overview of the sample characteristics. Bivariate analysis was used to analyze the relationship between characteristics and interventions. In addition, bivariate analysis revealed the effect of the intervention on four domains namely knowledge, nutritional management, physical activity and sedentary behavior. In this study, because the data is not normally distributed, non-parametric statistics will be used, namely the Mann-Whitney test.

RESULTS

Based on table 1 above, it shows that the respondents in the control group who were male were 25 people (46.3%) and those who were female were 29 people (53.7%). Then in the treatment group there were 32 men (55.2%) and 26 women (44.8%) in the treatment group. From the aspect of parents' work in the control group, the most jobs were civil servants with 26 people (48.1%), private employees with 20 people (37.1%), TNI/Polri with 4 people (7.4%), as many as 3 workers (5.6%) and work as a farmer/fisherman as many as 1 person (1.9%). Then in the treatment group the most were PNS as many as 31 people (53.4%), private employees as many as 21 people (36.2%) and as TNI/Polri as many as 6 people (10.3%). Based on income in the control group, 48 people (88.9%) had family income >UMP and 6 people (11.1%) <UMP. Then in the family income treatment group >UMP there were 53

Table 1: Analysis of subject characteristics in the control and treatment groups.

Characteristics		Group			
		Control		Treatment	
		n	%	n	%
Gender	Man	25	46.3	32	55.2
	Woman	29	53.7	26	44.8
Parents' job	civil servant	26	48.1	31	53.4
	Private	20	37.1	21	36.2
	soldier/police	4	7.4	6	10.3
	Farmer/Fisherman	1	1.9	-	-
	Laborer	3	5.6	-	-
Family Income	>UMP	48	88.9	53	91.4
	<UMP	6	11.1	5	8.6
Number of Family Members	4	28	51.9	30	51.7
	>4	26	48.1	28	48.3
Obesity History of Parents	Yes	30	55.6	36	62.1
	No	24	44.4	22	37.9
Level of education	SENIOR HIGH SCHOOL	25	46.3	27	46.6
	College	29	53.7	31	53.4

Table 2: The results of the Mann Whitney pre-test intervention for family empowerment in preventing and controlling overweight and obesity.

Pre-Test	Group	N	Mean Ranking	Sig
Family Capability	Control	54	55.70	0.764
	Treatment	58	57.24	
Family Knowledge	Control	54	53.78	0.319
	Treatment	58	59.03	
Physical Activity	Control	54	50.39	0.026
	Treatment	58	62.19	
Nutrition Intake	Control	54	50.46	0.026
	Treatment	58	62.12	

Table 3: The results of the Mann Whitney post-test intervention for family empowerment in preventing and controlling overweight and obesity.

Pre-Test	Group	N	Mean Ranking	Sig
Family Capability	Control	54	49.93	0.016
	Treatment	58	62.62	
Family Knowledge	Control	54	47.46	0.001
	Treatment	58	64.91	
Physical Activity	Control	54	50.04	0.015
	Treatment	58	62.52	
Nutrition Intake	Control	54	49.52	0.000
	Treatment	58	63.00	

people (91.4%) and <UMP there were 5 people (8.6%). Based on the number of family members in the control group, there were 28 (51.9%) family members of 4 people and >4 of 26 people (48.1%). Then in the treatment group, 30 people (51.7%) had 4 family members and 28 people (48.3%) were > 4. From the aspect of family history of obesity in the control group, there were 30 parents who had a history of being overweight and obese (55.6%) and parents who had no history of being overweight and obese were 24 people (44.4%). Then in the treatment group, there were 36 parents who had a history of being overweight and obese (62.1%) and parents who had no history of being overweight and obese were 22 people (37.9%). Based on education in the control group, 25 people (46.3%) had the last education level in high school and 29 people (48.1%) had the last education level in tertiary education. Then in the treatment group, 27 people (46.6%) had the last education level from high school and 31 people (53.4%) had the last education level from tertiary education. Based on education in the control group, 25 people (46.3%) had the last education level in high school and 29 people (48.1%) had the last education level in tertiary education. Then in the treatment group, 27 people (46.6%) had the last education level from high school and 31 people (53.4%) had the last education level from tertiary education. Based on education in the control group, 25 people (46.3%) had the last education level in high school and 29 people (48.1%) had the last education level in tertiary education. Then in the treatment group, 27 people (46.6%) had the last education level from high school and 31 people (53.4%) had the last education level from tertiary education.

Based on table 2 above, it shows that the probability value (sig) is > 0.05 for all variables, which means that in general at the pretest stage there is no significant difference between the control group and the treatment group.

Based on table 3 above, it shows that the probability value (sig) <0.05 for all variables means that in general at the posttest stage there is a significant difference between the control group and the treatment group after the family empowerment intervention.

DISCUSSION

Intervention studies on family empowerment through health education show that family-based interventions bring positive and beneficial results in efforts to prevent and control overweight and obesity, especially in elementary school-age children. This is consistent with the results of studies which state that family-based interventions have shown important effects immediately at the end of the intervention.[21] The family and home environment form early health habits, and parents play an important role in developing children's nutritional, physical activity, and sedentary behaviors.[22]

Family capability

Family-centered empowerment through health education on efforts to prevent and control overweight and obesity in children has succeeded in increasing family capacity which in the long term increases family independence in maintaining family health. This is in line with research findings which state that family ability characteristics are an important determinant of the solution to child obesity.[23]

Interventions that target families have been shown to be effective for preventing and controlling overweight and obesity in children. Family-based interventions involve families to create increased healthy lifestyle behaviors among all family members. Improving the ability of this family includes increasing family knowledge about efforts to prevent and control overweigh and obesity as well as management of a healthy lifestyle including improving nutritional intake, eating patterns, physical activity, absorption habits, sleep quality, screen time and sedentary behavior. Many studies have shown that family-based behavior programs can successfully prevent and control overweight and obesity in children.[17,24]

The family as the smallest social system, in which there are sub-systems that influence each other to create a healthy lifestyle. Health education intervention by conducting home visits to deliver health education sessions related to the material mentioned above, ultimately changes health behavior as a system in a family that is permanent. In the long term, this healthy lifestyle becomes part of the family culture for all family members.[25]

Family knowledge

Fundamentally, knowledge is an important capital in managing life, including managing aspects of health. Empowerment that focuses on families through health education about overweight and obesity management has succeeded in increasing family knowledge. This learning process improves family cognitive. Along with increasing knowledge, it is hoped that there will also be an increase in awareness, family will which will eventually lead to changes in family health behavior. With an increase in knowledge, awareness and willingness to live a healthy life, families become empowered to maintain and maintain family health and practice a healthy way of life in everyday life. Increased knowledge, for example about diet, is associated with a reduced risk of overweight and obesity.[26]

The process of changing one's behavior that will lead to a healthy lifestyle begins with increasing knowledge regarding overweight and obesity management. Management of overweight and obesity in children requires the role and support of the family, especially parents. Because in principle, early childhood is not yet able to independently manage itself and is still very dependent on parents. Optimal child health will usually continue into adolescence and adulthood. Therefore, the home environment through the parents is fully responsible for the life and health of the child. Parents play an important role, including providing nutritious food, good parenting practices, eating habits with the family, increasing children's physical activity, limiting staring behavior, screen time and sufficient sleep time. The results of the analysis showed that there were differences in the knowledge of the respondents after the intervention in the treatment group. This means that health education interventions have a positive effect on respondents. This is in line with a finding which states that the importance of educating parents to achieve better knowledge, attitudes and practices towards obesity is the first step in implementing educational programs and strategies to reduce obesity in children.[27]

Health education through family empowerment interventions to prevent and control overweight and obesity is very effective. Increased knowledge about overweight and obesity management also has a positive effect in increasing the role and confidence of families in dealing with children with health problems. Families have high confidence in adopting a healthy lifestyle for their children. There is a strong relationship between health literacy and overweight and obesity.[28]

Physical activity

In this study, in addition to conducting family empowerment interventions through health education, children who were respondents in the treatment group also carried out physical activities accompanied by a team of research assistants. Physical activity is a form of body movement carried out by skeletal muscles which is a form of energy expenditure (expressed in kilo calories).[29] The physical activity in this study is a planned exercise, namely badminton. Badminton was chosen because this type of sport is popular in the city of Kupang in almost all circles and age groups, including children after elementary school. Badminton is a type of sport that is considered suitable for preventing and controlling overweight and obesity.[30] In physical activity there are four components, namely the type of exercise, duration (time), frequency, and intensity.[30] In this study the type of exercise chosen was badminton, the duration (time) of exercise was 60 minutes, the frequency was three (3) times a week and the intensity was moderate to heavy. This exercise is carried out in the home environment of each participant. Every time you exercise, it always begins with a 5-10-minute warm-up and ends with a 5-10-minute stretch.

Based on data analysis, there were differences in children's physical activity before and after the intervention. In the treatment group there was an increase in physical activity while in the control group there was a decrease in physical activity. This proves that there is a significant influence between family empowerment interventions on children's physical activity. The results of this study are in line with the research of Jakicic *et al.* who explained that at least 150 minutes per week of moderate to vigorous intensity physical activity can reduce weight gain and protect against weight gain, which can contribute to obesity prevention.[31] Controlled exercise for four (4) months can reduce body weight between 3-12 kilograms.[31] In the study, there was a decrease in children's weight ranging from 0.5 kg - 2 kg, considering that the Covid-19 situation had not yet recovered so that space for movement was still limited and activities at school had not fully run normally. A review conducted for the 2008 Physical Activity Guidelines Advisory Committee Report showed that 180 to 270 minutes of physical activity per week can result in a 0.5 to 3.0 kg weight loss. These findings are consistent with the magnitude of weight loss in response to a 3 to 6-month intervention that did not include a specified reduction in energy intake.[31]

Physical activity interventions in the short term will reduce the child's weight, besides that health promotion for behavior modification and healthy lifestyle changes not only affects the prevention and control of overweight and obesity but also in the long term is beneficial for maintaining and maintaining the overall health of children. These behavior modifications include a healthy diet, 60 minutes of physical activity per day, screen time/sedentary behavior of less than 2 hours per day (playing games, watching TV), consuming fruits and vegetables, reducing sweets/sugar.

Physical activity intervention is a key measure in preventing and mitigating childhood obesity. In order for this to go well, it is important to have support and attention from parents. Parents significantly influence whether their children participate in organized sport and in a supportive environment. Parental support (eg, encouragement, facilitation) correlated significantly with children's level of physical activity (including organized sports). Children's perceptions of parental support and expected positive outcomes from organized sports are significantly related to children's participation.[30]

Nutritional intake

Nutrient intake is the amount of nutrients that enter through daily food consumption to obtain energy to carry out daily physical activities. While diet is basically a pattern of eating, in which the method and type of food are regulated, the aim is to maintain overall body health, including in order to maintain body weight.[32] Diet is one of the main pillars in preventing and controlling overweight and obesity. Changes in eating behavior are very important in weight management. In early childhood, including elementary school age, the role of parents is needed in regulating the child's diet. Therefore, interventions that target families are very important in order to increase the ability of families to regulate family eating patterns.

The results of the Mann Whitney test showed that there were differences in eating patterns before and after the family empowerment intervention in the control group and the treatment group. However, compared to the control group, the increase in the treatment group was more significant. This proves that family empowerment interventions can improve families' ability to regulate nutritional intake and children's eating patterns.

The family or home environment has a very big role in changing children's eating behavior. This is in line with the findings (Boswell, *et al*) which states that environmental factors within the family have a clear relationship with the development of childhood obesity and obesogenic behavior.[15] The role of the family is to arrange a balanced healthy menu for children to ensure children's health and prevent overweight and obesity. (Buksh, *et al*) reported that mothers identified as the gatekeepers of family meal planning, preparing, and shopping for groceries, fruits, and vegetables.[33] Likewise, if on the contrary the family does not adopt a healthy diet for children, it will have a negative impact on the child's health. It is known that economic affluence, urbanization, food abundance, and preferences contribute to the tendency of children to eat too much, children eat more than 4 times, drink sweetened milk up to 5-6 times, and consume unhealthy snacks and drinks, and on special occasions families celebrate by serving fast food.[34]

In this study, it can be seen that the macro-nutrient group and some micro-nutrients show an unbalanced nutritional composition. This happens because maybe the family is not used to setting a complete and regular food menu. The solution is to promote healthy eating habits and a diet rich in whole grains, legumes, fruits, vegetables and unsaturated fatty acids, in addition to limiting consumption of refined grains and foods with added sugar, processed meats and fats. fed up.[35-40] In addition, to combat the obesity epidemic, it is necessary to consider the specific contributions not only of carbohydrates, proteins and lipids, but also of individual amino acids, fatty acids and various carbohydrate-derived molecules, as well as interactions with genetics. Intake of fat and sugar, as energy-producing macronutrients, has been considered to be the main driver of the obesity epidemic because they both contribute to energy supply. children who eat more sweets also eat more red and processed meats and therefore a high-sugar-fat diet is associated with childhood obesity.[40] Intake of high-fiber foods and legumes was predicted to lead to less weight gain, and high intake of meat was predicted to cause more weight gain.

Diet-related modifiable factors that influence childhood obesity are nutrition, food, diet, dietary behavior and eating habits.[37-42] Multicomponent interventions are the right strategy to prevent and control overweight and obesity. Reducing eating, increasing physical activity, sedentary behavior, reducing the duration of watching TV, playing games, cellphones, reducing consumption of fried/processed foods, junk food, and not drinking carbonated drinks frequently are multi-component interventions in the management of overweight and obesity.

CONCLUSION

Overweight and obesity in school-age children is an ongoing problem with serious consequences in the future. To manage the growing public health crisis throughout the world in both developed and developing countries caused by increasing rates of child overweight and obesity, effective prevention and control options include a family-based approach. Including the family in weight management interventions is a very important aspect of successfully modifying a child's lifestyle from an early age. The health education strategy provided through family empowerment in efforts to prevent overweight and obesity has a positive impact on knowledge, attitudes and behavior of families, especially for children in terms of controlling effective eating patterns, increasing physical activity.

Significance for public health

Overweight and obesity are disorders that occur due to the accumulation of nutrients and fat that exceeds normal body weight. Disorders in early childhood, including elementary school children, are a major problem because they usually continue into adulthood and play a major role as a risk factor for non-communicable diseases, metabolic disorders and degenerative diseases. Prevention and therapy of overweight and obesity in children is carried out by adjusting diet, increasing physical activity and changing sedentary behavior through lifestyle modifications. One effective way to prevent overweight and obesity is through a family-based approach. Family empowerment interventions through health education and behavior change are ultimately effective in preventing and significantly controlling overweight and obesity. This study illustrates the strong relationship between family-based empowerment interventions and efforts to prevent and control overweight and obesity.

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CONTRIBUTION

The authors contributed to the research and writing of this article.

CONFLICTS OF INTEREST

The author declares that there are no potential conflicts of interest.

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