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Research Article
The Effect of the Implementation of a Planned Peer Group Session Model on Obesity Prevention Among Students of an Integrated Islamic Primary School in Makassar

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Abstract

Objective: The objective of this study was to identify the risk factors that modify food consumption patterns and physical activity in school-age children to encourage a healthy body mass index. **Materials and Methods:** The study used a quasi-experimental method with a non-equivalent control design. The intervention was implemented for six months in the form of planned group sessions using a peer group model and leaflets. The progress was also monitored on a monthly basis using questionnaires. A proportional random sampling method was used. The data analyses performed were univariate, bivariate and multivariate analyses with Hotelling's trace and paired t-test. **Results:** The results of this study show that there was a change in body mass index ($p = 0.000$), food consumption pattern ($p = 0.000$) and physical activity ($p = 0.001$) in both groups. **Conclusion:** The implementation of the planned peer group session model contributed to the change in nutritional status, eating behaviour and physical activity of the respondents. The parties involved should cooperate to find ways to prevent obesity in school-age children by changing lifestyle habits such as diet and physical activity.

Key words: Eating behavior, obesity, physical activity, planned group sessions peer group, school-age children

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Obesity is a public health problem that commonly occurs in elementary school children. Obesity has become a complex global epidemic and is estimated to be the fifth leading cause of death worldwide[1]. It is believed that the increased popularity of various fatty foods has invariably led to an increased prevalence of overweight individuals in developing countries owing to a shift in dietary habits, which poses many health-related risks[2].

The prevalence of childhood obesity in Asian, African and Eastern and Central European countries as well as in the United States of America is high. The World Health Organization (WHO) reports Iran as one of the seven countries with the highest number of obese children[3]. In Saudi Arabia, one out of every six children between the ages of 6 and 18 years are obese[4]. Similar research in Brazil also showed that 7.4% of children between the ages of 8 and 10 years are obese. Romania has been shown to have a prevalence of obesity of 31.6%[5]. The transition of nutritional and lifestyle habits to a diet that tends to be high in calories, fat and cholesterol is evidenced by the increased popularity of fast foods and sedentary lifestyles in children in developing countries, including Indonesia.

The data from the Basic Health Research Survey (Riskesdas) in 2013 showed that nationally, the prevalence of obesity and overweight among school children between the ages of 5 and 12 years in Indonesia was 18.8%, of which 10.8% were overweight and 8.8% were obese[6]. A previous study conducted in South Sulawesi Province showed that 6.5% of school children were overweight and 4.2% were obese, while in Makassar City, the prevalence was 7.0 and 5.8%[7], respectively. The high prevalence of obesity in school children and adults in Indonesia not only poses a threat to individual health but also has a tremendous impact on the health status of the Indonesian people. Preventing obesity in children and adults must be one of the primary goals of public health nutrition[7]. The habit of consuming large portions of energy-dense food, fat, simple carbohydrates, low-fibre foods, junk food and soft drinks can cause overweight and obesity[8]. An environment that encourages less physical activity, with a high consumption rate of the aforementioned classes of food, supports the occurrence of overweight and obesity[9].

According to previous research, overweight and obesity are results of unhealthy eating behaviours and lack of physical activity; therefore, it is essential to enhance nutritional behaviour and increase physical activity in primary school children to reduce and prevent obesity and overweight[10]. Two-thirds of school children spend half of their time in school; hence, it is important to implement proper health promotion interventions. The CDC[11] stated that schools play a major role in improving the eating behaviours and physical well-being of school-age children, which is important in the efforts to prevent and reduce the prevalence of overweight and obesity[11].

Peer-group influence is another factor that influences school-age children and aids in changing their behaviours[12]. The nutritional behaviour of children can be improved by promoting healthy nutritional habits in schools[13]. This nutritional education involving children will make them feel responsible for determining the healthy behaviour they must adopt. This can be done by empowering peer groups. Nutritional changes in school children, if not addressed, will affect society in the future; hence, information and treatment targeting obesity in primary school-aged children through models of planned peer group sessions is needed to prevent negative outcomes. This study aimed to identify the risk factors for obesity and modify the food patterns as well as physical activity habits in school-age children to encourage the maintenance of a healthy body mass index.

MATERIALS AND METHODS

This study used a quasi-experimental design with a non-equivalent control group design[14]. The study was conducted at an Integrated Islamic Primary School in Makassar City with a sample of 64 students. The interventions were carried out for 6 months (from January to July 2018) by providing a module of the planned peer group sessions, leaflets and questionnaires. Sample size determination for health studies and proportional random sampling methods were used[15]. Data were analysed by univariate, bivariate, multivariate analysis using the chi-square test, Hotelling's trace and paired t-test.

RESULTS

Participant characteristics: Data on the participant characteristics and the results of the homogeneity test based on sex, age group, body weight and height can be seen in Table 1.

The results of the analysis showed homogeneity between the treatment and control groups. The results of the chi-square test ($p>0.05$) revealed that sex, age group, weight and height were the same between the treatment and control groups. This homogeneity test showed that there was no difference in the sex, age group, body weight and height of the children between the treatment and the control groups (homogeneous).

Table 1: The characteristics of the study participants

	Groups				
	Treatments		Control		
Characteristic	No.	Percentage	No.	Percentage	p-value
Sex					
Male	17	54.8	16	48.5	0.321*
Female	14	45.2	17	51.5	
Age group					
9 years old	7	22.6	11	33.3	0.567*
10 years old	14	45.2	17	51.5	
11 years old	10	32.3	5	15.2	
Weight					
28-34 kg	7	22.6	11	33.3	0.436*
35-41 kg	11	35.5	13	39.4	
42-48 kg	10	32.3	5	15.2	
49-55 kg	3	9.7	4	12.1	
Height					
123-135 cm	5	16.1	11	33.3	0.641*
136-145 cm	14	45.2	12	36.4	
146-155 cm	10	32.3	7	21.2	
156-165 cm	2	6.0	3	9.0	

*Homogeneity test (chi-square)

Table 2: The effect of planned peer group sessions on eating and physical activity patterns

	Groups				
	Treatments		Control		
Variables	No.	Percentage	No.	Percentage	p-value
Food type					
Fast food	18	58.1	23	69.7	0.003*
Non-fast food	13	41.9	10	30.3	0.002**
Meal frequency					
Excessive	15	48.4	20	60.6	0.000*
Good	16	51.6	13	39.4	0.000**
Food preference					
Like	17	54.8	23	69.7	0.000*
Dislike	14	45.2	10	30.3	0.000**
Physical activity					
Inactive	22	70.9	19	57.6	0.000*
Active	9	29.0	14	42.4	0.000**
Body mass index					
Overweight	31	100.0	33	100.0	0.000*
Normal	0	0.0	0	0.0	0.000**

*Chi-square, **Paired t-test

The implementation of planned group sessions with peers can influence food choices and increase the frequency of meals as well as influencing food preferences, effect physical activity and body mass index (BMI) status (Table 2). The application of peer group sessions will have an effect on the prevalence of overweight in adolescents.

The influence of the planned peer group sessions on diet and physical activity towards the prevention of obesity can be seen in Table 3.

Table 3 shows that there were differences in dietary and physical activity patterns in those who received the planned peer group sessions, which affected food type, frequency of eating, food preference, physical activity and body mass index status of the respondents ($p<0.05$).

Table 3: Multivariate analysis of the differences in eating and physical activity patterns between the treatment and control groups

Variables	Value	F	Sig.
Food type	1.100	1.216	0.074
Meal frequency	11.210	14.761	0.000
Food preference	23.250	15.261	0.000
Physical activity	24.000	5.626	0.004
Body mass index	4.016	6.066	0.000
Hotelling's trace	0.761	6.262	0.000

DISCUSSION

The effect of planned peer group sessions on eating patterns: Based on the results of this study, it was found that the type of food consumed by respondents, eating frequency, food preferences and dietary patterns were unhealthy in both the treatment and control groups. However, after the implementation of the peer group sessions, there was a change in the dietary patterns of the respondents in both groups ($p = 0.000$). This change shows that there was a significant influence of the intervention on the type of food, frequency of eating and food preferences in the treatment and control groups. The existence of a significant change in the statistical results in this study could be due to the time of the intervention.

The finding of this study is different from that of Whidayati[16], who stated that there were no significant differences as a result of individual counselling groups after nutrition education. This lack of difference is because the subjects lack control, while the counselling group decreases energy adequacy ratio (EAR)[16]. According to a previous study conducted by AlMarzooqi et al.[17], a 2-year nutrition education program also did not have an effect on weight loss or food consumption. The timing of the planned peer group sessions is very influential. An effective nutrition education program will create excitement for all the interventions carried out. Therefore, the subject chooses to be active and in control of the food consumed.

Weight loss can be achieved by regulating diet and physical activity in addition to nutrition education[17]. Although, there were statistically significant changes in this study, the intervention had a tremendous effect on the types of food consumed, frequency of eating and food preferences. There was a change in the dietary pattern because most of the respondents had a good status before the intervention. Thus, the researcher only emphasized the selection of good types of food and the portions. These changes can be due to the timing of the study, which might have coincided with the day the individual wanted to fast. Additionally, based on a 24 h food recall, respondents from the treatment group were able to control their level of consumption by choosing foods that were low in calories, carbohydrates, saturated fat and fibre and controlling their eating frequency and food preferences. This means that the respondent's dietary patterns were healthy and supported by external factors such as family.

The effect of planned peer group sessions on physical activity: Physical activity is one factor that can reduce weight. If performed properly and regularly, physical activity will prevent overweight and can also improve health status. Physical activity should be a behaviour that is performed every day. Physical activity will burn energy in the body and prevent excessive energy intake, which is the main cause of weight gain[18]. Practically, it can be stated that a lack of physical activity is a major risk factor for overweight, although a cross-sectional study only found a moderate relationship between the level of physical activity and overweight.

Using the method of planned group sessions, physical activity habits can be changed. This intervention can also be used to prevent obesity. Low physical activity is related to technological progress. Technological advances in the field of transportation have reduced walking, resulting in a dependence on motorized vehicles. An obesity study with a cross-cultural approach showed that the development of video games has led to a decrease in physical activity. Sedentary lifestyles also increase as physical activity decreases. Being overweight is also caused by low energy expenditure. The results show that overweight persons most often perform light activities. There are a number of studies on the relationship of physical activity with the incidence of obesity and the results are consistent with the findings of this study[19]. Furthermore, a study conducted by Kantoma *et al.*[20] suggested that physical activity is a mediator of the impact of motoric functions of obese children on achieving academic excellence during adolescence. Some examples of physical exercise commonly carried out by overweight people include playing games, watching television, sleeping, playing with friends, playing with the computer and using the internet[21].

The influence of physical activity is a result of the fact that most obese people do not participate in these activities each day. Although statistically significant, the data show that in most subjects, the frequency of the two acts are classified as low. Low physical activity is one factor in the occurrence of being overweight. This was found in the Fox and Hillsdon[22] study where sedentary lifestyles were mild, thereby relating to overweight. Although this finding is in accordance with the theory, the results of the study show that most overweight respondents performed mild physical activity. This is what causes statistical analysis to demonstrate an effect of change. This is also supported by the a study conducted by Arundhana[23], who illustrated that lack of physical activity is one of the dominant factors responsible for overweight.

Research states that lifestyles of children have changed dramatically in many countries. Electronic games have replaced active outdoor games[24]. Despite the limitations, researchers adjusted the time spent conducting these meetings. Guidance material for physical activity in every meeting was summarized in the leaflet that was provided. A

lack of physical activity leads to the storage of energy fat, so people who are less active tend to accumulate fat. This means that if one can adjust the diet and the energy balance, which involves physical activity, obesity can be avoided.

The effect of planned peer group sessions on body mass index (BMI): The changes in body mass index in respondents is a motivation for them to adopt healthy lifestyle behaviours. The motivation to lose weight is the key to success because school children tend to have the ability to connect a number of events and actions, with questions about health asked out of curiosity[25]. A significant influence on body mass index status was observed in both the treatment and control groups. The result of this study is in accordance with the results of Nurmasyita[26], who stated that there were significant differences in BMI before and after nutrition education in the treatment and control groups. Nutritional education with planned peer group sessions is expected to be one of the solutions to improve body mass index status and health by conveying theories and information about nutrition as an academic learning technique.

However, the results of this study are different from a previous study conducted by Whidayati[16], who stated that BMI percentiles in both "Group counselling and individual counselling" groups, was not significantly different after nutrition education carried out for 6 months; this finding was related to commitment and motivation. AlMarzooqi *et al*.[17] reported that there was no significant change in the overweight level over a two-year period in subjects who participated in either group or one-on-one consultations. The existence of a significant change observed in this study based on the results of statistical analysis could be due to the interventions that were carried out over a relatively long period. However, even though the intervention took place over a long time, these respondents could still be totally controlled by the researchers because they always felt comfortable, happy and motivated even though they were not always in school.

In this study, an intervention using the planned group sessions method is a form of health education that is essential for changing the nutritional behaviour of school children. This type of intervention is expected to increase the nutritional knowledge and attitudes of school children in terms of choosing and consuming foods, thus meeting the nutritional requirements. Food consumption in accordance with nutritional needs will have an impact on decreasing the BMI of overweight/obese children so that they achieve a better nutritional status.

CONCLUSION

In conclusion, after implementing the planned peer group sessions, nutritional status, eating patterns and physical activity were significantly improved.

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