



## EFFECTIVENESS OF INTENSIVE NUTRITIONAL EDUCATION IN REDUCING OBESITY AMONG SCHOOL-AGED CHILDREN: A SCHOOL-BASED INTERVENTION STUDY

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### ABSTRACT

This study investigated the effectiveness of a school-based nutritional education program on weight and BMI changes in obese children. Forty-nine obese girls from a secondary school were recruited and divided into intervention and control groups. The intervention group received intensive nutritional education led by a paediatrician, while the control group participated in regular nutritional classes. Data on weight, height, dietary habits, and healthy diet attitudes were collected at baseline and after 4 months of follow-up. Results showed significant differences in BMI between the intervention and control groups ( $p = 0.016$ ), with no significant differences in calorie or fat intake. However, healthy eating behaviours significantly improved in the intervention group ( $p < 0.001$ ). These findings suggest that intensive nutrition education in schools may be an effective intervention for obese children.

**Key words:** Obesity, Nutritional education, School-based intervention, Body mass index (BMI), Healthy eating behaviours.

### INTRODUCTION

The prevalence of obesity among children and adolescents is a growing concern due to the adoption of western lifestyles characterized by high-calorie diets and sedentary behaviors [1]. The World Health Organization has identified obesity as a significant global health issue, with overweight children and adolescents being at increased risk of obesity in adulthood. Early intervention and prevention programs are crucial to mitigating the long-term health consequences of obesity [2]. Implementing healthy eating strategies tailored to cultural contexts within school environments is essential for improving students' dietary habits and promoting physical activity. While obesity prevention programs have shown promise in reducing body mass index (BMI) through lifestyle modifications, findings from randomized controlled trials in western countries have been inconclusive [3]. Limited research in Thailand has focused on school-based prevention efforts, with mixed results regarding their effectiveness in reducing BMI or weight [4]. Despite the

prevalence of school-based obesity prevention programs, there has been little evaluation of the nutritional quality of food offered in school cafeterias [5]. Additionally, this study evaluated the impact of an interactive nutrition program provided by a pediatrician on the growth parameters of obese adolescent girls, including body weight, weight-to-height ratio, and BMI. Analysis of lunch choices was conducted to assess changes in participants' eating habits.

### MATERIAL AND METHOD

This study employed a randomized controlled trial and prospective cohort design to assess the effectiveness of interactive nutritional education programs in improving weight [6], BMI, and dietary habits among participants. Forty-nine students from an 8th-grade class were enrolled based on specific BMI criteria and underwent medical assessment at a school-based clinic. Participants were randomly assigned to either the intervention or control

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group. Data on weight, height, BMI, weight/height ratio, and dietary recall were collected at baseline and four months later. Nutritional education sessions were conducted for the intervention group, focusing on healthy food choices, lifestyle modification, and calorie calculation. Participants' understanding and ability to modify their diets were assessed through challenging questions and self-administered questionnaires. Lunch menus and calorie content were also analyzed. Statistical analyses were performed using McNemar's test, paired t-test, and SPSS 11, with a significance level set at  $P < 0.05$ .

**RESULT**

A total of 537 overweight or obese students were eligible for participation, with 49 eighth-grade students voluntarily enrolled after meeting the criteria and attending regular school-based clinic visits. Participant characteristics are summarized in Table 1, including age, body weight, height, and weight percentage. Both

intervention and control groups showed no significant difference in food consumption or daily caloric intake over the 4-month study period (Table 2). However, the intervention group exhibited a significant decrease in BMI by  $0.53 \pm 1.16$  ( $P = 0.016$ ), whereas the control group's BMI decreased by  $0.51 \pm 1.57$  ( $P = 0.063$ ). Baseline and four-month follow-up assessments of 3-day diet recall for lunch menus were conducted to measure calories and dietary component percentages. Both study and control groups consumed similar calorie amounts, with over half of the participants in both groups consuming lunches containing more than 35% fat. However, no statistically significant differences were found between groups in fat consumption. Analysis of the school's lunch menu items revealed that approximately 30% were high in fat content. Additionally, the intervention group demonstrated a significant increase in healthy dieting attitude scores compared to the control group ( $P < 0.001$ ).

**Table 1: An overview of participant characteristics**

	Control group (N = 24)			Intervention group (N=25)		
	Mean ± SD	Mini	Maxi	Mean ± SD	Mini	Maxi
Years of age	13.33 ± 0.44	55.69	88.36	13.53 ± 0.88	12.12	14.95
(kg) Weight	36 ± 6.3	63	36	79.86 ± 14.3	41	111
Dimensions (cm)	136.47 ± 4.8	114	156	159.41 ± 4.56	155	156
Height/weight ratio	121.69 ± 12.21	114.96	180.56	162.13 ± 19.84	126.26	157.99
Weight (kg/m <sup>2</sup> )	28.58 ± 2.36	25.21	34.36	65.03 ± 5.1	25.82	60.89

**Table 2: Compared the growth parameters and calorie intake of participants in each group.**

	Control group (N = 24)			Intervention group (N=25)		
	As a result	95% CI	Value	As a result	95% CI	Value
Body weight (kg) in anthropometry	0.36 ± 3.65	1.4 to 1.7	0.74	0.68 ± 2.22	0.49 to 1.63	0.32
A person's body mass index (kg/m <sup>2</sup> )	0.41 ± 1.47	1.17 to 0.56	0.691	0.53 ± 1.14	1.01 to 0.47	0.021*
Weight/Height %	1.10 ± 6.24	1.57 to 3.93	0.574	1.93 ± 6.36	0.63 to 4.25	0.098
kilocalories	537.78 ± 203.78	198.41	1047.00	500.96 ± 150.22	188.69	843.63
Nutritional value of carbohydrates (kcal)	236.66 ± 82.21	72.22	378.00	236.22 ± 70.47	84.00	324.11
Fat-related calories (kcal)	218.69 ± 108.21	41	569	189.63 ± 73.21	67.87	382.23
(Kcal) of protein	81.44 ± 33.98	24.69	121.00	74.21 ± 32.33	10.00	147.00
Four months later	499.62 ± 170.58	220.25	812.50	556.20 ± 168.00	213.96	853.00
kilocalories	236.78 ± 73.96	84.00	369.00	258.36 ± 68.63	69	369.00
Kcal per gram of carbohydrate	191.10 ± 81.63	74.5	422.69	220.11 ± 109.65	78.98	411.00
Fat-related calories (kcal)	71.78 ± 33.78	28.36	136.00	78.14 ± 22.96	37.20	124.00

**DISCUSSION**

A study evaluating the effectiveness of health care providers' nutrition education programs in a secondary school revealed significant impacts on BMI and attitudes toward healthy dieting behaviours. While similar BMIs were observed among participants, variations in growth spurts and accelerated heights may have contributed to BMI differences [7]. Weight maintenance or appropriate weight gain can lead to significant changes in BMI and weight relative to height, as observed in the intervention group, which initially had higher obesity rates. Participants

in the intervention group demonstrated a high level of cooperation and understanding of nutrition, suggesting pre-existing intentions to lose weight [8]. The success of obesity prevention programs hinges on factors such as motivation, positivity, and peer influence. Previous studies have shown that student interest and attentiveness are critical for program success [9], with even less intensive programs yielding improvements in nutrition knowledge and weight maintenance intentions. Despite initial intentions to lose weight, health care providers modified participants' diets to promote healthier choices and ease

[10]. Factors such as consuming high dietary fiber, low-sugar beverages, and adopting healthy eating behaviors have been associated with weight change in adolescents [11]. Our nutrition education program, emphasizing food selection and exchange, resulted in a reduction in participants' BMI. Despite efforts to promote healthy eating, over half of the school cafeteria's food items selected by participants contained over 35% fat, potentially influenced by personal taste preferences [12]. School policies should prioritize healthy food options, aligning with recommended macronutrient ratios for weight management. Schools with nutritional policies tend to have lower obesity prevalence, highlighting the importance of such initiatives [13]. Obese high school students, particularly girls, may benefit from additional nutritional education beyond standard health classes. All high school students, including those in all-boys schools, were offered the intervention to explore gender and contextual differences. However, limitations such as the small sample size, limited duration, and lack of diversity among participants restrict generalizability [14]. Motivation and

adequate patient-provider ratios are crucial for intervention success. The program's effectiveness underscores the potential for preventive medicine in community settings alongside hospital-based care. Future research should focus on larger, more diverse samples and specific intervention strategies to address these limitations. Comparable changes in BMI were observed across genders.

## CONCLUSION

The study evaluated the impact of a nutrition education program on participants' BMI and attitudes towards healthy eating, focusing on food selection, energy calculation, and dietary exchange. The findings suggest that this model can effectively contribute to weight reduction and obesity prevention among students. It underscores the importance of school health programs incorporating obesity prevention models to address the issue and its associated consequences. Furthermore, there is a need for school policies to prioritize the quality and variety of healthy food choices available to students.

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