Effect of Nutrition Education on Vegetable & Fruit Intake and Knowledge, Attitude, and Practices (KAP) among Overweight and Obese Adolescent Girls

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Abstract: ***This study evaluates the impact of a nutrition education intervention on the dietary habits, knowledge, attitudes, and health-related practices of overweight and obese individuals. Participants were divided into control and experimental groups, with each group assessed at baseline and post-intervention. The results revealed that the experimental groups showed significant improvements in the frequency of vegetable and fruit consumption. The intervention also led to substantial gains in health-related knowledge, with experimental participants demonstrating a comprehensive understanding of nutrition, hygiene, and preventive health measures. Attitudes toward regular exercise, health check-ups, and maintaining a healthy environment also saw significant positive shifts in the experimental groups. In contrast, the control groups showed only marginal improvements, underscoring the effectiveness of the targeted nutrition education. Overall, the study highlights the significant benefits of nutrition education in promoting healthier lifestyle choices, particularly in managing obesity, and emphasizes the need for scaling and refining such interventions for broader impact.***

Keywords: ***Nutrition education, Dietary habits, Knowledge, Attitude, Practice***

INTRODUCTION

The prevalence of overweight and obesity among adolescents has become a global public health challenge, with significant implications for both current and future health outcomes (World Health Organization [WHO], 2021). Adolescence is a critical period for the development of dietary habits, and poor nutritional choices during this stage can contribute to the onset of chronic conditions such as diabetes, cardiovascular diseases, and certain cancers (Sahoo et al., 2015). Given the increasing burden of obesity, targeted interventions that address dietary behaviors, particularly fruit and vegetable consumption, have gained prominence.

Fruits and vegetables are essential components of a healthy diet, providing vital nutrients such as vitamins, minerals, and fiber, which contribute to the prevention of obesity-related health risks (Boeing et al., 2012). Despite their benefits, global studies indicate that adolescents frequently consume suboptimal levels of fruits and vegetables, further exacerbating the obesity epidemic (Hall et al., 2009).

Nutrition education has emerged as a promising strategy to enhance dietary habits and foster positive attitudes toward healthy eating. By improving knowledge, attitudes, and practices (KAP), nutrition education interventions can empower adolescents to make informed dietary choices and adopt healthier lifestyles (Contento, 2016). However, the effectiveness of such interventions in influencing both dietary intake and behavioral changes among overweight and obese adolescent girls requires further exploration.

This study aims to evaluate the impact of nutrition education on the intake of fruits and vegetables, as well as its influence on knowledge, attitudes, and practices (KAP) among overweight and obese adolescent girls. By addressing the unique needs of this population, the findings may contribute to the development of targeted strategies to combat obesity and promote sustainable dietary improvements.

LITERATURE REVIEW

The relationship between nutrition education and dietary habits, particularly in managing obesity, has been a central focus of numerous studies in recent years. Many researchers have explored the role of structured nutrition interventions in improving food choices, health knowledge, and health-related behaviors, with a significant emphasis on overweight and obese populations.

A study by Lam and Lee (2024) highlighted the effectiveness of nutrition education programs in encouraging healthier eating behaviors, particularly through the increased consumption of fruits and vegetables among obese individuals. Their findings align with those of Chung et al. (2021), who noted a marked improvement in the dietary habits of adults following nutrition education, emphasizing increased fruit and vegetable intake. In contrast, Kowalska and Sienkiewicz (2024) found that while nutrition education improved dietary habits in certain groups, the overall impact was more pronounced when combined with other lifestyle changes, such as increased physical activity.

Several studies have shown that interventions targeting both knowledge and practical dietary changes are crucial for long-term improvements. For instance, Wright and Schoenfisch (2023) conducted a family-based program that significantly impacted dietary habits, especially increasing vegetable and fruit consumption. Their findings resonate with those of Smith and Clark (2023), who demonstrated the positive effects of online interventions, which effectively enhanced knowledge on healthy eating and prompted behavioral changes in overweight adults. Additionally, Taylor and Wang (2023) reported a significant increase in daily vegetable consumption among participants following a community-based nutrition education program, further suggesting that the mode of delivery (whether online, group-based, or individual) is a key factor in the success of such interventions.

Knowledge transfer is another critical aspect of these programs. According to Lam and Lee (2024), improving participants' knowledge of nutrition led to better dietary choices, particularly among those who were already motivated to lose weight. This notion is supported by Zhang and Jiang (2023), who noted that digital nutrition education platforms significantly enhanced participants' understanding of healthy food choices, translating into healthier eating patterns. The impact of such interventions on knowledge is also echoed by Carver and Shaw (2023), who found that family-based education on dietary habits can reduce the risk of childhood obesity by fostering better eating behaviors in both children and parents.

Changes in attitudes are another important outcome of nutrition education programs. Wright et al. (2024) observed that nutrition education not only affected dietary habits but also positively influenced participants' attitudes toward health practices like exercise and regular health check-ups. This shift in attitudes is consistent with the findings of Lee et al. (2023), who highlighted that nutrition education programs that integrated aspects of lifestyle changes, such as exercise, led to more sustained improvements in health outcomes. These changes were also supported by the work of Gill and Shand (2024), which emphasized the importance of integrating health attitudes with education to foster better long-term outcomes.

Health-related practices, such as consistent exercise and proper diet adherence, have also been shown to improve following nutrition education interventions. Moore and Anderson (2024) reported that group-based nutrition interventions significantly improved health practices, including exercise and food selection. These findings align with those of Nguyen and Tran (2024), who demonstrated the positive effects of nutrition education on health practices in rural communities, where participants adopted healthier food choices and improved physical activity levels post-intervention.

METHODOLOGY

For the study, 120 students of obese and overweight girls were selected using a purposive sampling method. Among the 120 students, 60 were categorized as obese, and 60 as overweight. In the obese group, 30 students were selected as the control group, and 30 students were selected as the experimental group. Similarly, in the overweight category, 30 students were assigned to the control group, and 30 students to the experimental group. Nutrition education was provided to the experimental group periodically over six months through WhatsApp and group discussions held online at the end of each week. For the control group, nutrition education was given through a single online meeting at the beginning of the study.

OBJECTIVE

1. To assess the impact of the nutrition education intervention on vegetable and fruit consumption among overweight and obese individuals, comparing baseline and post-intervention intake frequencies.
2. To evaluate changes in health-related knowledge, attitudes, and practices regarding nutrition, exercise, and overall wellness in the experimental and control groups.

RESULTS & DISCUSSIONS

Table 1: Consumption Practices of Vegetables and Fruits: Overweight Control Group

VEGETABLES & FRUITS		Overweight – Control Group (n=30)											
		Daily		Weekly		Fort-Nighty		Monthly		Occasionally		Total	
		C	%	C	%	C	%	C	%	C	%	C	%
Beans	B	3	10.00%	2	6.67%	6	20.00%	10	33.33%	9	30.00%	30	100.00%
	P	4	13.33%	1	3.33%	7	23.33%	7	23.33%	11	36.67%	30	100.00%
Bitter Gourd	B	1	3.33%	4	13.33%	8	26.67%	14	46.67%	3	10.00%	30	100.00%
	P		0.00%	5	16.67%	8	26.67%	10	33.33%	7	23.33%	30	100.00%
Brinjal	B	1	3.33%	4	13.33%	6	20.00%	6	20.00%	13	43.33%	30	100.00%
	P	1	3.33%	4	13.33%	7	23.33%	14	46.67%	4	13.33%	30	100.00%
Cauliflower	B	5	16.67%		0.00%	3	10.00%	11	36.67%	11	36.67%	30	100.00%
	P	4	13.33%	1	3.33%	7	23.33%	9	30.00%	9	30.00%	30	100.00%
Cluster Beans	B	1	3.33%	4	13.33%	7	23.33%	7	23.33%	11	36.67%	30	100.00%
	P	4	13.33%	1	3.33%	8	26.67%	9	30.00%	8	26.67%	30	100.00%
Drumstick	B	2	6.67%	3	10.00%	10	33.33%	5	16.67%	10	33.33%	30	100.00%
	P	2	6.67%	3	10.00%	8	26.67%	10	33.33%	7	23.33%	30	100.00%
Ladies Finger	B	3	10.00%	2	6.67%	11	36.67%	8	26.67%	6	20.00%	30	100.00%
	P	3	10.00%	2	6.67%	6	20.00%	9	30.00%	10	33.33%	30	100.00%
Ridge Gourd	B	1	3.33%	4	13.33%	9	30.00%	7	23.33%	9	30.00%	30	100.00%
	P	2	6.67%	3	10.00%	8	26.67%	11	36.67%	6	20.00%	30	100.00%
Snake Gourd	B	2	6.67%	3	10.00%	9	30.00%	10	33.33%	6	20.00%	30	100.00%
	P	4	13.33%	1	3.33%	7	23.33%	12	40.00%	6	20.00%	30	100.00%
Banana Ripe	B	5	16.67%	9	30.00%	2	6.67%	2	6.67%	12	40.00%	30	100.00%
	P	12	40.00%	7	23.33%	1	3.33%	3	10.00%	7	23.33%	30	100.00%
Guava	B	3	10.00%	2	6.67%	9	30.00%	10	33.33%	6	20.00%	30	100.00%
	P	3	10.00%	2	6.67%	10	33.33%	9	30.00%	6	20.00%	30	100.00%
Papaya	B	2	6.67%	3	10.00%	9	30.00%	5	16.67%	11	36.67%	30	100.00%
	P	1	3.33%	4	13.33%	9	30.00%	7	23.33%	9	30.00%	30	100.00%

B – Baseline, P – Post Intervention of Nutrition Education

The table compares the frequency of vegetable and fruit consumption among an overweight control group (n=30) at baseline (B) and post-intervention (P) following a nutrition education program. Notable changes include increased daily consumption of bananas (from 16.67% to 40%) and beans (from 10% to 13.33%), suggesting improved regularity for these items. However, many items, such as guava and papaya, showed minimal change in frequency distribution, with occasional and monthly consumption remaining dominant. While some vegetables like brinjal shifted toward more frequent categories (e.g., monthly increased from 20% to 46.67%), others like bitter gourd showed only minor adjustments. Overall, the intervention had a mixed impact, with significant improvements in a few items but limited effect on most.

Table 2: Consumption Practices of Vegetables and Fruits: Overweight Experiment Group

VEGETABLES & FRUITS		Overweight – Experiment Group (n=30)											
		Daily		Weekly		Fort-Nighty		Monthly		Occasionally		Total	
		C	%	C	%	C	%	C	%	C	%	C	%
Beans	B	2	6.67%	3	10.00%	9	30.00%	6	20.00%	10	33.33%	30	100.00%
	P	13	43.33%	6	20.00%	2	6.67%	2	6.67%	7	23.33%	30	100.00%
Bitter Gourd	B	2	6.67%	3	10.00%	12	40.00%	6	20.00%	7	23.33%	30	100.00%

	P	14	46.67%	6	20.00%	2	6.67%	2	6.67%	6	20.00%	30	100.00%
Brinjal	B	3	10.00%	2	6.67%	12	40.00%	6	20.00%	7	23.33%	30	100.00%
	P	9	30.00%	8	26.67%	3	10.00%	1	3.33%	9	30.00%	30	100.00%
Cauliflower	B	1	3.33%	4	13.33%	12	40.00%	8	26.67%	5	16.67%	30	100.00%
	P	7	23.33%	9	30.00%	2	6.67%	2	6.67%	10	33.33%	30	100.00%
Cluster Beans	B	1	3.33%	4	13.33%	5	16.67%	11	36.67%	9	30.00%	30	100.00%
	P	6	20.00%	11	36.67%	3	10.00%	1	3.33%	9	30.00%	30	100.00%
Drumstick	B	1	3.33%	4	13.33%	12	40.00%	4	13.33%	9	30.00%	30	100.00%
	P	11	36.67%	8	26.67%	1	3.33%	3	10.00%	7	23.33%	30	100.00%
Ladies Finger	B	3	10.00%	2	6.67%	8	26.67%	9	30.00%	8	26.67%	30	100.00%
	P	9	30.00%	13	43.33%	1	3.33%	3	10.00%	4	13.33%	30	100.00%
Ridge Gourd	B	4	13.33%	1	3.33%	11	36.67%	6	20.00%	8	26.67%	30	100.00%
	P	10	33.33%	6	20.00%	3	10.00%	1	3.33%	10	33.33%	30	100.00%
Snake Gourd	B	1	3.33%	4	13.33%	6	20.00%	12	40.00%	7	23.33%	30	100.00%
	P	8	26.67%	10	33.33%	3	10.00%	1	3.33%	8	26.67%	30	100.00%
Banana Ripe	B	10	33.33%	7	23.33%	2	6.67%	2	6.67%	9	30.00%	30	100.00%
	P	5	16.67%	12	40.00%	2	6.67%	2	6.67%	9	30.00%	30	100.00%
Guava	B	5	16.67%		0.00%	12	40.00%	8	26.67%	5	16.67%	30	100.00%
	P	9	30.00%	9	30.00%	2	6.67%	2	6.67%	8	26.67%	30	100.00%
Papaya	B	2	6.67%	3	10.00%	8	26.67%	8	26.67%	9	30.00%	30	100.00%
	P	9	30.00%	10	33.33%	2	6.67%	2	6.67%	7	23.33%	30	100.00%

B – Baseline, P – Post Intervention of Nutrition Education

The table shows changes in the frequency of vegetable and fruit consumption in the overweight experiment group (n=30) before (baseline, B) and after (post-intervention, P) a nutrition education program. There was a significant shift toward more frequent consumption of vegetables and fruits post-intervention. For instance, daily consumption of beans increased from 6.67% to 43.33%, and bitter gourd from 6.67% to 46.67%. Similarly, daily intake of vegetables like drumstick (3.33% to 36.67%), cauliflower (3.33% to 23.33%), and ladies' finger (10% to 30%) showed marked improvement. Fruits like guava and papaya also saw increases in daily consumption from 16.67% to 30%. Conversely, items such as ripe bananas showed a reduction in daily intake (33.33% to 16.67%) but an increase in weekly intake (23.33% to 40%), indicating an overall positive shift in frequency. These results suggest the intervention effectively encouraged more consistent and frequent consumption of several vegetables and fruits.

Table 3: Consumption Practices of Vegetables and Fruits: Obesity Control Group

VEGETABLES & FRUITS		Obesity – Control Group (n=30)											
		Daily		Weekly		Fort-Nighty		Monthly		Occasionally		Total	
		C	%	C	%	C	%	C	%	C	%	C	%
Beans	B	2	6.67%	3	10.00%	10	33.33%	6	20.00%	9	30.00%	30	100.00%
	P	1	3.33%	4	13.33%	10	33.33%	5	16.67%	10	33.33%	30	100.00%
Bitter Gourd	B	3	10.00%	2	6.67%	8	26.67%	8	26.67%	9	30.00%	30	100.00%
	P	2	6.67%	3	10.00%	8	26.67%	7	23.33%	10	33.33%	30	100.00%
Brinjal	B	3	10.00%	2	6.67%	11	36.67%	8	26.67%	6	20.00%	30	100.00%
	P	1	3.33%	4	13.33%	11	36.67%	9	30.00%	5	16.67%	30	100.00%
Cauliflower	B	4	13.33%	1	3.33%	3	10.00%	10	33.33%	12	40.00%	30	100.00%
	P	3	10.00%	2	6.67%	5	16.67%	10	33.33%	10	33.33%	30	100.00%
Cluster Beans	B	4	13.33%	1	3.33%	5	16.67%	11	36.67%	9	30.00%	30	100.00%
	P		0.00%	5	16.67%	5	16.67%	6	20.00%	14	46.67%	30	100.00%

Drumstick	B	2	6.67%	3	10.00%	5	16.67%	11	36.67%	9	30.00%	30	100.00%
	P	2	6.67%	3	10.00%	11	36.67%	8	26.67%	6	20.00%	30	100.00%
Ladies Finger	B	3	10.00%	2	6.67%	6	20.00%	6	20.00%	13	43.33%	30	100.00%
	P	3	10.00%	2	6.67%	12	40.00%	6	20.00%	7	23.33%	30	100.00%
Ridge Gourd	B	3	10.00%	2	6.67%	7	23.33%	9	30.00%	9	30.00%	30	100.00%
	P	2	6.67%	3	10.00%	13	43.33%	6	20.00%	6	20.00%	30	100.00%
Snake Gourd	B	3	10.00%	2	6.67%	7	23.33%	9	30.00%	9	30.00%	30	100.00%
	P	4	13.33%	1	3.33%	10	33.33%	6	20.00%	9	30.00%	30	100.00%
Banana Ripe	B	5	16.67%	13	43.33%	1	3.33%	3	10.00%	8	26.67%	30	100.00%
	P	2	6.67%	5	16.67%	6	20.00%	8	26.67%	9	30.00%	30	100.00%
Guava	B	3	10.00%	2	6.67%	6	20.00%	13	43.33%	6	20.00%	30	100.00%
	P	2	6.67%	3	10.00%	9	30.00%	7	23.33%	9	30.00%	30	100.00%
Papaya	B	1	3.33%	4	13.33%	9	30.00%	8	26.67%	8	26.67%	30	100.00%
	P	1	3.33%	4	13.33%	8	26.67%	10	33.33%	7	23.33%	30	100.00%

B – Baseline, P – Post Intervention of Nutrition Education

The table illustrates the frequency of vegetable and fruit consumption among an obese control group (n=30) before (baseline, B) and after (post-intervention, P) a nutrition education program. The data shows minimal changes across most categories, with occasional and monthly consumption remaining prevalent for many items. Daily consumption saw negligible improvement or slight declines for several vegetables and fruits, such as beans (6.67% to 3.33%) and brinjal (10% to 3.33%). Similarly, weekly intake remained relatively stable or showed minor shifts. Notably, there was a decline in ripe banana daily consumption (16.67% to 6.67%) and guava monthly intake decreased (43.33% to 23.33%). These results suggest that the intervention had limited impact on altering the dietary habits of this group, with occasional consumption still dominating for most items post-intervention.

Table 4: Consumption Practices of Vegetables and Fruits: Obesity Experiment Group

VEGETABLES & FRUITS		Obesity – Experiment Group (n=30)											
		Daily		Weekly		Fort-Nighty		Monthly		Occasionally		Total	
		C	%	C	%	C	%	C	%	C	%	C	%
Beans	B	3	10.00%	2	6.67%	10	33.33%	8	26.67%	7	23.33%	30	100.00%
	P	8	26.67%	11	36.67%	4	13.33%		0.00%	7	23.33%	30	100.00%
Bitter Gourd	B	2	6.67%	3	10.00%	8	26.67%	10	33.33%	7	23.33%	30	100.00%
	P	10	33.33%	6	20.00%	2	6.67%	2	6.67%	10	33.33%	30	100.00%
Brinjal	B		0.00%	5	16.67%	14	46.67%	6	20.00%	5	16.67%	30	100.00%
	P	9	30.00%	9	30.00%	1	3.33%	3	10.00%	8	26.67%	30	100.00%
Cauliflower	B	3	10.00%	2	6.67%	6	20.00%	9	30.00%	10	33.33%	30	100.00%
	P	8	26.67%	12	40.00%	1	3.33%	3	10.00%	6	20.00%	30	100.00%
Cluster Beans	B	2	6.67%	3	10.00%	10	33.33%	8	26.67%	7	23.33%	30	100.00%
	P	9	30.00%	10	33.33%	4	13.33%		0.00%	7	23.33%	30	100.00%
Drumstick	B	3	10.00%	2	6.67%	10	33.33%	4	13.33%	11	36.67%	30	100.00%
	P	8	26.67%	13	43.33%	3	10.00%	1	3.33%	5	16.67%	30	100.00%
Ladies Finger	B	4	13.33%	1	3.33%	8	26.67%	6	20.00%	11	36.67%	30	100.00%
	P	5	16.67%	12	40.00%	1	3.33%	3	10.00%	9	30.00%	30	100.00%
Ridge Gourd	B	5	16.67%		0.00%	6	20.00%	5	16.67%	14	46.67%	30	100.00%
	P	7	23.33%	8	26.67%	2	6.67%	2	6.67%	11	36.67%	30	100.00%
Snake Gourd	B	3	10.00%	2	6.67%	9	30.00%	6	20.00%	10	33.33%	30	100.00%
	P	10	33.33%	11	36.67%	1	3.33%	3	10.00%	5	16.67%	30	100.00%

Banana Ripe	B	9	30.00%	8	26.67%	2	6.67%	2	6.67%	9	30.00%	30	100.00%
	P	3	10.00%	2	6.67%	6	20.00%	5	16.67%	14	46.67%	30	100.00%
Guava	B	4	13.33%	1	3.33%	9	30.00%	8	26.67%	8	26.67%	30	100.00%
	P	5	16.67%	10	33.33%	1	3.33%	3	10.00%	11	36.67%	30	100.00%
Papaya	B	2	6.67%	3	10.00%	11	36.67%	5	16.67%	9	30.00%	30	100.00%
	P	8	26.67%	12	40.00%	2	6.67%	2	6.67%	6	20.00%	30	100.00%

B – Baseline, P – Post Intervention of Nutrition Education

The table displays the frequency of vegetable and fruit consumption among an obese experiment group (n=30) before (baseline, B) and after (post-intervention, P) the implementation of a nutrition education program. Post-intervention, there is a notable increase in daily and weekly consumption for most vegetables and fruits. For example, daily intake of beans rose from 10% to 26.67%, and bitter gourd from 6.67% to 33.33%. Weekly consumption also improved, with cauliflower increasing from 6.67% to 40% and drumstick from 6.67% to 43.33%. Additionally, occasional and monthly consumption showed a decrease, indicating a shift toward more frequent intake patterns. The data suggests the intervention was effective in encouraging healthier eating habits in the experiment group.

Table 5: Pre- and Post-Intervention Knowledge Scores in Overweight and Obese Adolescents

1 - No Awareness, 2 - Minimal Awareness, 3 - Moderate Understanding, 4 - Good Understanding, 5 - Comprehensive Understanding

Factor	Scale	Overweight (n=60)				Obesity (n=60)			
		Control (n=30)		Experiment (n=30)		Control (n=30)		Experiment (n=30)	
		B	P	B	P	B	P	B	P
Knowledge	How well do you understand the importance of consuming a nutritious diet?	1.53	2.43	2.53	4.47	1.50	2.50	2.47	4.33
	How much do you know about the benefits of drinking wholesome water?	1.53	2.47	2.50	4.47	1.60	2.63	2.43	4.40
	How familiar are you with hygienic practices?	1.33	2.50	2.43	4.53	1.57	2.43	2.50	4.37
	How well do you understand the preventive measures that should be taken during epidemics?	1.53	2.53	2.73	4.53	1.47	2.60	2.53	4.50
	How knowledgeable are you about the benefits of taking nutritive supplements?	1.47	2.53	2.60	4.50	1.37	2.57	2.50	4.40
	How would you rate your knowledge of general health and nutrition tips?	1.40	2.43	2.47	4.50	1.33	2.57	2.77	4.43

B – Baseline, P – Post Intervention of Nutrition Education

Table 5 presents an analysis of participants' knowledge on various health-related topics before and after a nutrition education intervention, with participants categorized by weight status (overweight and obese) and subgroup (control and experiment). At baseline, knowledge levels were generally low to moderate across all groups, with scores ranging from 1.33 to 2.77. Post-intervention, the experimental groups demonstrated substantial improvement, achieving scores between 4.33 and 4.53, indicating good to comprehensive understanding. In contrast, the control groups showed only marginal gains, suggesting minimal impact without targeted education. Notably, the experimental groups showed consistent and significant progress across all factors, including the importance of consuming a nutritious diet, benefits of drinking wholesome water, hygienic practices, preventive measures during epidemics, benefits of nutritive supplements, and general health tips. Baseline knowledge was particularly low for areas like general health tips and nutritive supplements, but post-intervention scores indicated a strong uptake of information in these areas. This highlights the effectiveness of the educational intervention in enhancing awareness and understanding, especially in the experimental groups, while underscoring the limited natural progression observed in control groups. Overall, the intervention proved to be a vital tool in improving health-related knowledge in both overweight and obese populations.

Table 6: Pre- and Post-Intervention Attitude Scores in Overweight and Obese Adolescents

1 - Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 - Strongly Agree

Factor	Scale	Overweight (n=60)				Obesity (n=60)			
		Control (n=30)		Experiment (n=30)		Control (n=30)		Experiment (n=30)	
		B	P	B	P	B	P	B	P
Attitude	I believe it's important to maintain a healthy environment, both physically and mentally.	1.47	2.47	2.63	4.30	1.30	2.53	2.60	4.30
	I think regular exercise is important for my health.	1.33	2.47	2.60	4.53	1.50	2.47	2.43	4.33
	I believe regular health check-ups are necessary.	1.53	2.47	2.40	4.50	1.33	2.53	2.67	4.37
	I feel it's important to maintain regular mealtimes.	1.37	2.47	2.47	4.47	1.47	2.57	2.57	4.27
	I am interested in reading books that promote health and wellness.	1.43	2.50	2.43	4.40	1.43	2.60	2.40	4.23
	I enjoy gardening and believe it contributes to my well-being.	1.43	2.37	2.53	4.50	1.57	2.40	2.50	4.23

B – Baseline, P – Post Intervention of Nutrition Education

Table 6 analyzes the participants' attitudes toward various health and wellness aspects, comparing their baseline and post-intervention responses. Participants are categorized as overweight or obese and further split into control and experiment subgroups. Attitudes are measured on a scale from 1 (strongly disagree) to 5 (strongly agree). At baseline, all groups showed low to neutral attitudes (scores ranging from 1.30 to 2.67). Post-intervention, the experimental groups showed significant improvements, with scores ranging from 4.23 to 4.53, reflecting a shift toward strong agreement on all factors. In contrast, control groups showed minor improvements, with post-intervention scores reaching only 2.37 to 2.60. Notable improvements in the experimental groups were observed in attitudes toward regular exercise, health check-ups, and maintaining a healthy environment, indicating a strong influence of the nutrition education intervention. The intervention also fostered interest in health-promoting activities, such as reading health books and gardening, which saw substantial attitude shifts in the experimental groups. Overall, the results highlight the intervention's effectiveness in positively shaping attitudes toward health and wellness, emphasizing its transformative impact compared to the limited progression in control groups.

Table 7: Pre- and Post-Intervention Practice Scores in Overweight and Obese Adolescents

1 – Never, 2 – Rarely, 3 – Occasionally, 4 – Frequently, 5 - Always

Factor	**Scale**	**Overweight (n=60)**				**Obesity (n=60)**			
		Control (n=30)		**Experiment (n=30)**		**Control (n=30)**		**Experiment (n=30)**	
		B	**P**	**B**	**P**	**B**	**P**	**B**	**P**
Practice	How often do you consume a nutritious diet?	1.57	2.60	2.40	4.37	1.47	2.40	2.70	4.43
	How frequently do you drink wholesome water?	1.40	2.60	2.43	4.37	1.73	2.47	2.63	4.23
	How often do you practice good hygiene habits?	1.53	2.57	2.37	4.47	1.40	2.63	2.53	4.37
	How frequently do you take preventive measures during epidemics?	1.47	2.50	2.43	4.30	1.50	2.47	2.50	4.33
	How often do you consume nutritive supplements as needed?	1.47	2.57	2.37	4.43	1.43	2.37	2.70	4.50
	How regularly do you follow health and nutrition tips?	1.33	2.67	2.53	4.50	1.40	2.33	2.57	4.37
	How often do you maintain a healthy environment, both physically and mentally?	1.50	2.50	2.47	4.33	1.43	2.40	2.37	4.30
	How frequently do you exercise?	1.47	2.63	2.50	4.37	1.57	2.40	2.40	4.37
	How regularly do you go for health check-ups?	1.33	2.53	2.43	4.23	1.53	2.50	2.60	4.33
	How consistently do you keep to a regular mealtime schedule?	1.57	2.50	2.50	4.33	1.43	2.23	2.40	4.30

	How often do you read books related to health and wellness?	1.47	2.47	2.40	4.47	1.40	2.47	2.60	4.33
	How frequently do you engage in gardening as part of your lifestyle?	1.63	2.53	2.47	4.43	1.70	2.40	2.63	4.47

B – Baseline, P – Post Intervention of Nutrition Education

Table 7 evaluates participants' health-related practices before and after a nutrition education intervention, categorizing them by weight status (overweight and obese) and subgroup (control and experiment). The practices are assessed on a scale from 1 (never) to 5 (always). At baseline, participants' practice scores were generally low to moderate, ranging from 1.33 to 2.70. Post-intervention, the experimental groups exhibited marked improvements, with scores ranging from 4.23 to 4.50, indicating frequent to always engaging in healthy practices. In contrast, the control groups showed minimal improvements, with post-intervention scores still below 3. The experimental groups showed the most significant improvements in practices like consuming a nutritious diet, drinking wholesome water, exercising, taking preventive measures during epidemics, and consuming nutritive supplements. For example, the overweight experimental group increased their score for consuming a nutritious diet from 2.40 to 4.37, while the obese experimental group improved from 2.70 to 4.43. Other practices, including maintaining a healthy environment, following health tips, and engaging in gardening, also saw notable positive changes. The results suggest that the nutrition education intervention effectively transformed participants' practices, leading to more consistent engagement in health-promoting behaviors, particularly in the experimental groups. Conversely, control groups showed limited changes in their practices, emphasizing the impact of the targeted intervention.

FINDINGS

- The nutrition education program led to a significant increase in daily and weekly consumption of certain vegetables (e.g., beans, bitter gourd) and fruits (e.g., guava, papaya) in the experimental group, though changes were minimal for some items.
- The experimental groups showed substantial improvement in health-related knowledge, with post-intervention scores indicating a comprehensive understanding of nutrition, hygiene, health supplements, and preventive health measures.
- The intervention led to a significant improvement in the experimental groups' attitudes toward regular exercise, health check-ups, and maintaining a healthy environment, with scores reflecting stronger agreement post-intervention.
- Participants in the experimental group exhibited significant improvements in health-related practices, such as consuming a nutritious diet, exercising, and practicing good hygiene, with notable changes in both overweight and obese subgroups.
- The control groups showed only marginal improvements in all areas, highlighting the effectiveness of the targeted nutrition education intervention for the experimental groups.

CONCLUSION

The study concludes that nutrition education is a vital tool in improving health outcomes, particularly for overweight and obese populations. The significant improvements in the experimental groups' dietary habits, health knowledge, attitudes, and practices demonstrate the potential of such programs to not only inform but also motivate participants to make healthier choices. For future interventions, there is a need to expand the reach of these programs and further optimize their content to address specific barriers to healthy eating. Additionally, continuous support for control groups and the exploration of further behavioral influences could enhance the overall effectiveness of such interventions.

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