Nutritional Literacy and Fast Food and Junk Food Consumption Behavior among Overweight Adolescents

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ABSTRACT

Overweight among adolescents has become an important public health concern because it increases the risk of various degenerative diseases and long-term health complications. Poor dietary patterns, particularly frequent consumption of fast food and junk food, are often associated with limited nutritional literacy among adolescents. This study aimed to examine the effect of nutritional literacy on fast food and junk food consumption behavior among overweight adolescents. This study employed a quasi-experimental design with a pre-test and post-test control group approach. The sample consisted of 46 overweight adolescents from SMA Negeri 7 Bengkulu City, divided into an intervention group (23 participants) and a control group (23 participants), selected using purposive sampling. The intervention group received nutritional literacy education using a flipchart accompanied by explanations, while the control group received education through leaflets without explanation. The study variables included nutritional literacy, fast food and junk food consumption habits, body weight, and height. Data were analyzed using independent t-test, paired t-test, Mann–Whitney test, and Wilcoxon test. The results showed a significant increase in knowledge scores before and after the nutritional literacy intervention (p = 0.014). There was a significant difference in the mean change in attitude scores between the intervention and control groups (p = 0.0001), with a higher improvement observed in the intervention group. In addition, there was a significant difference in the mean change in fast food and junk food consumption habits between the two groups (p = 0.043). In conclusion, nutritional literacy education is effective in improving knowledge, attitudes, and reducing fast food and junk food consumption behavior among overweight adolescents.
Keywords: nutritional literacy; consumption behavior; overweight

INTRODUCTION

Overweight has become a global epidemic and a major public health concern that requires immediate attention. Nutritional status problems are commonly categorized into overweight and obesity, conditions that can occur across all age groups, particularly among adolescents [1]. Overweight in school-aged children is a serious issue because it increases the risk of developing various chronic diseases in both developed and developing countries [2]. According to the World Health Organization (WHO), more than 1.9 billion adolescents under 18 years of age were affected by overweight in 2018. In Indonesia, national health survey data reported that the prevalence of overweight among adolescents aged 16–18 years reached 13.5% in 2018 [3]. This figure shows a substantial increase compared with 7.3% in 2013 and 1.4% in 2010 [4].

Data from the Bengkulu Provincial Health Office in 2023 indicated that the Lingkar Barat Public Health Center had the highest number of overweight adolescents among the 20 health centers in Bengkulu City, recording 67 cases during the 2022/2023 academic year. Preliminary data showed that the highest prevalence occurred at SMA Negeri 7 Bengkulu City, accounting for 54 adolescents, or 80.5% of the total overweight cases identified by the Lingkar Barat Public Health Center [5]. An initial survey conducted at the school found that most respondents frequently consumed fast food and snacks, and a considerable proportion had overweight nutritional status. Although many adolescents had a relatively good level of knowledge about dietary habits, unhealthy eating patterns were still commonly observed.

Fast food refers to food that is easily packaged, quickly prepared, practical to consume, and processed through relatively simple procedures. These foods are generally produced using modern technology and typically contain high amounts of calories, fat, salt, and sugar but low levels of fiber, vitamins, and essential micronutrients. Dietary patterns characterized by high intake of energy-dense foods such as fast food may lead to nutritional imbalance and are considered an important risk factor for overweight [6]. Junk food is commonly defined as ready-to-eat food that is widely available at affordable prices but provides low nutritional value. Such foods are usually high in sodium and saturated fat while containing limited amounts of iron, calcium, and dietary fiber. Frequent consumption of junk food combined with low fiber intake can contribute to cholesterol accumulation and ultimately lead to excessive body weight [7]. Junk food is not limited to Western-style foods such as pizza, hamburgers, and French fries but also includes various fried snacks and street foods, such as fried chicken skin, fried intestines, chips, and other deep-fried snacks commonly sold by street vendors [8].

The level of nutritional knowledge plays an important role in determining adolescents' food choices. Adolescents with adequate knowledge about types and amounts of food needed to meet nutritional requirements are more likely to maintain normal nutritional status. Good nutritional literacy can help adolescents understand which foods may contribute to excessive or insufficient body weight [9]. Conversely, low nutritional knowledge is considered a risk factor for nutritional problems and unhealthy dietary behaviors during adolescence. Nutritional knowledge includes understanding food sources of nutrients, safe food consumption, and appropriate food processing methods to preserve nutritional value and support a healthy lifestyle [10].

Previous research conducted by Fitriani (2021) reported that educational interventions using flipchart media significantly improved knowledge levels among participants [11]. Flipcharts are educational tools consisting of illustrated sheets arranged like an album or calendar, with images on one side and health information on the other. Educational activities using flipcharts can improve knowledge through a combination of visual images and written explanations, making the learning process more engaging and easier to understand [12].

Despite the increasing prevalence of overweight among adolescents, there are still limited educational interventions based on nutritional literacy that have been implemented directly in school settings using simple and practical educational media. The lack of adolescents' awareness regarding the long-term effects of frequent fast food and junk food consumption highlights the need for further research to examine the influence of nutritional literacy on these dietary behaviors. Therefore, this study is important to provide scientific evidence supporting preventive strategies for adolescent overweight through practical and applicable educational approaches. Based on the background, this study aimed to examine the effect of nutritional literacy on fast food and junk food consumption behavior among overweight adolescents.

METHODS

This study was conducted from February to March 2024 at SMA Negeri 7 Bengkulu City, Indonesia. The study employed a quantitative approach using a quasi-experimental method with a pre-test and post-test control group design. Two groups were involved in the study: an intervention group and a control group. The subjects of the study were overweight adolescents selected using purposive sampling. A total of 46 participants were recruited,

consisting of 23 adolescents in the intervention group and 23 adolescents in the control group, with a ratio of 1:1. All participants were overweight students enrolled at SMA Negeri 7 Bengkulu City.

The independent variable was a nutritional literacy intervention. Participants in the intervention group received nutritional literacy education delivered individually using a flipchart medium, where the material was explained directly to each respondent. The intervention was implemented over a period of three weeks. In contrast, the control group received educational material in the form of a leaflet without explanation or direct assistance. The dependent variables were knowledge, attitudes, and fast food and junk food consumption behavior. These outcomes were measured using structured questionnaires administered before the intervention (pre-test) and after the intervention (post-test). Additional measurements included body weight and height to confirm the overweight status of the participants.

Primary data included respondent characteristics (sex, age, and allowance), nutritional knowledge, and eating habits related to fast food and junk food consumption. Secondary data included general information about the research site and student demographic data obtained through documentation and interviews. Data analysis was performed using several statistical tests. The independent t-test was used to compare differences between groups when the data were normally distributed. The Mann–Whitney U test was used for non-normally distributed data. The paired t-test was applied to assess differences between pre-test and post-test scores when data were normally distributed, while the Wilcoxon signed-rank test was used when the data were not normally distributed.

RESULTS

Based on sex, the proportion of males and females was homogeneous between the intervention and control groups (p-value = 1.000 > 0.05). Similarly, the age distribution (16 and 17 years) was homogeneous between the intervention and control groups (p-value = 0.541 > 0.05). The proportion of allowance categories was also homogeneous between the two groups (p-value = 0.238) (Table 1).

The mean pretest knowledge score in the intervention group was comparable with the control group, indicating that both groups were homogeneous before the intervention. After the intervention, the mean posttest knowledge score in the intervention group was higher, with a significant difference between groups (p < 0.05) (Table 3).

The delta values indicate an increase in knowledge scores after the nutritional literacy intervention. The intervention group demonstrated a greater mean improvement in knowledge (p = 0.014). Within-group analysis using the Wilcoxon signed-rank test showed significant differences between pretest and posttest knowledge scores in both the intervention and control groups (p < 0.05). These findings indicate that nutritional literacy significantly improved students' knowledge.

Table 4 shows that the mean pretest attitude score in the intervention group was similar to that in the control group (p > 0.05), indicating homogeneity between groups before the intervention. However, after the intervention, the mean posttest attitude score in the intervention group was significantly higher than in the control group (p < 0.05).

The delta analysis also shows greater improvement in attitude scores in the intervention group (p < 0.05). Within-group analysis using the Wilcoxon signed-rank test revealed significant differences between pretest and posttest attitude scores in both groups. These findings indicate that nutritional literacy interventions influenced students' attitudes.

Table 5 shows that the mean pretest score for fast food and junk food consumption habits in the intervention group was similar to that of the control group (p > 0.05), indicating homogeneity before the intervention. After the intervention, both groups experienced changes in eating habits, with a greater reduction observed in the intervention group. The delta analysis shows a greater improvement in eating habits in the intervention group (p = 0.043). Within-group analysis using the Wilcoxon signed-rank test showed significant differences between pretest and posttest scores in both groups (p < 0.05). These results indicate that nutritional literacy significantly influenced changes in fast food and junk food consumption habits among students.

Table 1. Distribution of demographic characteristics of students at SMA Negeri 7 Bengkulu

Demographic characteristics	Intervention group		Control group		p-value
	Frequency	Percentage	Frequency	Percentage	
Sex					1.000
Male	10	43.5	10	43.5	
Female	13	56.5	13	56.5	
Age					0.541
16 years	13	56.5	16	69.6	
17 years	10	43.5	7	30.4	
Allowance					0.238
IDR 10,000–19,000	9	39.1	14	60.9	
IDR 20,000–30,000	14	60.9	9	39.1	

Table 2. Results of data normality test

Variable	Group	p-value	Conclusion
Knowledge score before intervention	Intervention	0.035	Data not normally distributed
	Control	0.201	Data normally distributed
Knowledge score after intervention	Intervention	0.013	Data not normally distributed
	Control	0.014	Data not normally distributed
Attitude score before intervention	Intervention	0.409	Data normally distributed
	Control	0.038	Data not normally distributed
Attitude score after intervention	Intervention	0.000	Data not normally distributed
	Control	0.029	Data not normally distributed
Eating habit score before intervention	Intervention	0.156	Data normally distributed
	Control	0.673	Data normally distributed
Eating habit score after intervention	Intervention	0.040	Data not normally distributed
	Control	0.362	Data normally distributed

Table 3. Improvement in knowledge before and after nutritional literacy using flipchart and leaflet media

Knowledge	Intervention	Control	p-value	Note
Pretest			0.918[a]	[a] Independent t-test
Minimum–maximum	22.0–35.0	26.0–33.0		[b] Mann–Whitney U test
Mean ± SD	29.1 ± 3.2	29.0 ± 2.3		[c] Wilcoxon signed-rank test
Posttest			0.002[b]	
Minimum–maximum	29.0–40.0	29.0–37.0		
Mean ± SD	35.7 ± 3.9	32.0 ± 2.1		
p-value	0.0001[c]	0.0001[c]		
Delta				
Minimum–maximum	0.0–14.0	0.0–8.0	0.0001[b]	
Mean ± SD	7.0 ± 4.1	3.0 ± 2.1		

Table 4. Changes in attitudes before and after nutritional literacy using flipchart and leaflet media

Attitude	Intervention	Control	p-value	Note
Pretest			0.918[a]	[a] Independent t-test
Minimum–maximum	22.0–35.0	26.0–33.0		[b] Mann–Whitney U test
Mean ± SD	29.1 ± 3.2	29.0 ± 2.3		[c] Wilcoxon signed-rank test
Posttest			0.002[b]	
Minimum–maximum	29.0–40.0	29.0–37.0		
Mean ± SD	35.7 ± 3.9	32.0 ± 2.1		
p-value	0.0001[c]	0.0001[c]		
Delta				
Minimum–maximum	0.0–14.0	0.0–8.0	0.0001[b]	
Mean ± SD	7.0 ± 4.1	3.0 ± 2.1		

Table 5. Changes in fast food and junk food consumption habits before and after nutritional literacy using flipchart and leaflet media

Eating habits	Intervention	Control	p-value	Note
Pretest			0.556[a]	[a] Independent t-test
Minimum–maximum	185.0–405.0	215.0–350.0		[b] Mann–Whitney U test
Mean ± SD	295.4 ± 64.8	286.0 ± 38.7		[c] Wilcoxon signed-rank test
Posttest			0.064[b]	[d] Paired t-test
Minimum–maximum	150.0–370.0	160.0–300.0		
Mean ± SD	227.8 ± 56.8	246.3 ± 38.0		
p-value	0.0001[c]	0.0001[d]		
Delta				
Minimum–maximum	10.0–200.0	10.0–120.0	0.043[b]	
Mean ± SD	67.6 ± 51.9	39.7 ± 30.2		

DISCUSSION

The characteristics of respondents based on sex in this study indicated that overweight was more frequently observed among female adolescents compared with males. Adolescence is a vulnerable period for overweight due to increased appetite and the tendency to consume excessive and irregular foods such as fast food and junk food [9]. The Chi-square test analysis of sex characteristics showed no significant difference between sex and nutritional status among students. This finding is consistent with a study conducted in elementary schools in Bandar Lampung in 2019, which reported a p-value of 1.000, indicating no significant difference between the intervention and control groups. Therefore, it can be concluded that the sex distribution of study subjects was statistically homogeneous between the intervention and control groups [14]. These findings are also consistent with a study conducted among schoolchildren in North Sumatra, which reported no statistically significant difference between sex and overweight or obesity status [15]. Similarly, research conducted at Kathmandu University examining the prevalence and risk factors of overweight among male and female adolescents showed no significant difference in overweight prevalence between the two groups [16].

The results of this study indicated that there was no significant association between age and overweight status among adolescents at SMA Negeri 7 Bengkulu City in 2024. The respondents in this study were aged 16–17 years, which falls within the late adolescent age group. Adolescents are particularly vulnerable to nutritional problems because this stage is characterized by increased energy and nutrient requirements accompanied by rapid physical growth [17]. Previous studies have reported that metabolic processes gradually decline with increasing age and are accompanied by biological changes such as reduced muscle function and increased body fat levels. These findings are consistent with research conducted in school settings that reported a p-value of 0.520, indicating no significant difference between age and overweight nutritional status [18]. Another study also reported a p-value of 0.720, suggesting no significant association between adolescent overweight and age [19].

An increase in adolescents' socioeconomic conditions is often accompanied by increased consumption of snacks and sweet foods. If the foods consumed are high in calories, the risk of excessive nutritional status may increase. Snacking habits represent one of the less healthy eating behaviors, particularly when snack foods are of low nutritional quality or interfere with the intake of main meals [20]. The results of univariate analysis showed that there was no significant difference between allowance and nutritional status among students. In this study, students' allowance was not only used to purchase food at school. A portion of the allowance was also used for transportation costs to and from school, purchasing mobile phone credit or internet data, and other personal needs. Similar findings were reported in a study conducted at SMPN Tiongkok, which found no significant relationship between allowance and nutritional status. Students used their allowance not only to buy food but also for transportation expenses, fuel, phone credit, photocopying, and savings [21].

The results of this study showed that knowledge increased after nutritional literacy interventions using flipchart and leaflet media. The nutritional literacy delivered through flipchart and leaflet media significantly improved knowledge among students at SMA Negeri 7 Bengkulu City before and after the intervention. The comparison of pretest and posttest results showed an increase in the number of correct responses for all questionnaire items. These findings are consistent with research conducted in Yogyakarta, which reported increased knowledge regarding healthy foods following health education interventions. Before the nutritional literacy intervention, students had limited knowledge about balanced nutrition, overweight conditions, and fast food consumption. After the intervention, students' knowledge improved significantly because educational media enhanced their understanding and expanded their insight into nutrition-related topics [22].

Previous research conducted at SDN Putat Jaya III Surabaya also reported a positive association between nutritional knowledge and food consumption behavior among school-aged children. This suggests that higher levels of nutritional knowledge are associated with better food consumption behaviors. Nutritional literacy can therefore help children understand healthy and nutritious foods and encourage them to adopt healthier dietary patterns [23]. A study conducted in Bogor also reported that educational interventions using flipchart media about snack foods effectively improved students' knowledge [24]. Other studies have similarly shown that nutritional education using flipchart media can increase individuals' knowledge levels [25]. These findings are supported by systematic studies indicating that flipchart media is an effective educational tool because it has strong visual appeal, clear information structure, and enables interactive communication between educators and participants. According to Mayer's Multimedia Learning Theory (2001), combining images and text in educational media can improve comprehension and information retention [26].

Other research has also reviewed the effectiveness of flipchart media as a health education tool, highlighting advantages such as practicality and affordability while also acknowledging certain limitations related to production and preparation [27]. Furthermore, research conducted at Stikes Yogyakarta demonstrated increased knowledge among adolescents about HIV transmission prevention after health promotion interventions using video and leaflet media [28]. Similarly, a study conducted at SMA Swasta Pertiwi in Jambi reported differences in effectiveness between booklet and leaflet media, both of which significantly improved adolescents' knowledge regarding the impacts of teenage pregnancy [29]. Another systematic review conducted at Airlangga University in Surabaya highlighted the effectiveness of leaflet media in health promotion programs, noting advantages such as flexibility in delivering information, ease of access, and relatively low production costs, although some limitations were also identified [30].

Overall, various studies indicate that nutritional literacy can improve adolescents' knowledge. Higher levels of nutritional literacy are positively and significantly associated with dietary intake. This suggests that adolescents who better understand energy sources in foods, portion sizes, nutrition labels, nutrient values, food classification, and food consumption skills are more likely to have healthier dietary intake patterns [9]. Nutritional knowledge developed through effective educational media tailored to adolescent characteristics may therefore represent a long-term strategy for preventing nutritional problems, including overweight and obesity.

The results of this study showed significant changes in attitudes after the nutritional literacy intervention using flipchart and leaflet media. The findings also suggest that flipchart media may be more effective than leaflet media in influencing attitude change. Students' attitudes toward fast food and junk food consumption improved after the intervention, shifting from less supportive attitudes toward healthier dietary behaviors. Previous research involving 65 respondents also reported similar results, showing that the mean attitude score in the intervention group increased from 35.65 in the pretest to 58.50 in the posttest, while the control group increased from 34.60 to 49.8. These results demonstrate that attitudes improved significantly after health education interventions [31].

Other studies have also shown that educational interventions using flipchart media can significantly improve adolescents' knowledge and attitudes regarding health and nutritional status [32]. Research conducted at Poltekkes Bandung similarly reported that the use of flipchart media in nutrition education significantly influenced attitude changes [12]. A study conducted in Kalimantan also provided insights into the effectiveness of flipchart media in improving adolescents' attitudes toward health and nutritional status through controlled experimental evaluation [33].

Additional research indicates that adolescents who received nutrition education using flipchart media experienced greater improvements in nutritional literacy compared with those receiving leaflet media. Moreover, the flipchart group showed greater changes in attitudes toward healthier dietary patterns and adequate nutrient intake than the leaflet group. These findings suggest that flipchart media may be more effective in improving adolescents' nutritional literacy and encouraging healthier eating attitudes than leaflet media [34]. According to Mayer's Multimedia Learning Theory,

presenting information simultaneously through images and text can enhance comprehension and long-term retention of information [26]. This perspective is also supported by Bloom's Taxonomy, which states that improvements in cognitive domains (knowledge) can influence affective and behavioral domains, ultimately leading to changes in dietary practices [35].

However, some studies have reported contrasting findings. For example, certain studies found that adolescents receiving leaflet-based nutrition education showed significant improvements in nutritional literacy compared with those receiving flipchart-based education. Nevertheless, no significant difference was found between leaflet and flipchart groups regarding attitude change, suggesting that both media may have comparable value depending on the context of implementation [36]. Overall, evidence suggests that nutritional literacy interventions can effectively promote attitude changes and healthier dietary behaviors among adolescents, although the choice of educational media should be guided by appropriate multimedia learning and persuasion strategies.

The results of this study showed significant changes in fast food and junk food consumption habits after the nutritional literacy intervention using flipchart and leaflet media. After the intervention, some students demonstrated improved eating habits, although a few did not show substantial changes. Pretest results indicated that many students frequently consumed foods such as rolled eggs, chicken noodles, meatball soup, batagor, stuffed fried snacks, siomay, fried chicken, and other fast foods. Posttest results showed improvements in dietary habits, with students reporting reduced consumption of fast foods and sugary or carbonated beverages following the nutritional literacy intervention.

A study conducted in Surabaya reported that 64% of students frequently consumed fast food more than three times per week. The study also found that students who frequently consumed fast food and junk food had up to four times higher risk of overweight compared with those who consumed such foods less frequently [37]. Other studies have similarly found a significant relationship between the frequency of fast food consumption and overweight risk among adolescents ($p < 0.05$) in cross-sectional analyses examining dietary patterns and nutritional status [38]. Research conducted in Aceh also reported a significant association between fast food consumption frequency and overweight status among adolescents ($p = 0.001$), indicating that higher consumption frequency increases the risk of overweight [39]. Similarly, research conducted in Bandung reported that nutrition education using flipchart and leaflet media significantly influenced fast food consumption habits ($p < 0.05$) [12].

However, some studies have reported inconsistent findings. Certain research indicates that nutrition education interventions may not significantly influence individual dietary behaviors among overweight adolescents, including changes in fast food consumption habits after flipchart-based education [40]. Nevertheless, other studies evaluating flipchart and leaflet interventions found significant reductions in fast food and junk food consumption frequency among adolescents receiving nutrition education [41].

Research conducted in Yogyakarta also found that both flipchart and leaflet media significantly influenced students' fast food and junk food consumption habits. These findings support previous research showing that both types of educational media positively influence nutritional literacy and dietary behavior among high school students [42]. However, other studies conducted in Aceh reported that although several interventions showed significant results, some studies did not find consistent behavioral changes in overweight adolescents after nutrition education interventions using flipchart media [43]. Another large-scale study involving 800 adolescents reported that those with higher nutritional literacy were more likely to choose healthier foods and had lower body mass index values. The study concluded that improved nutritional literacy is significantly associated with reduced prevalence of overweight among adolescents [44].

These findings are consistent with the Theory of Planned Behavior (TPB), which explains that nutritional literacy interventions can influence attitudes, subjective norms, and perceived behavioral control regarding fast food consumption, thereby strengthening healthy behavioral intentions [45]. In addition, according to the Elaboration Likelihood Model, educational interventions are more effective when they encourage central processing pathways through engaging and interactive visual media. Furthermore, this approach aligns with the concept of Food Literacy, which emphasizes individuals' ability to understand, select, and prepare foods according to nutritional needs and has been shown to positively influence adolescents' dietary habits [46]. Overall, the results of this study suggest that nutritional literacy has strong potential to improve adolescents' dietary patterns and reduce fast food and junk food consumption, particularly when combined with supportive environmental and health policy interventions.

CONCLUSION

The results indicate that nutrition literacy improved students' knowledge, fostered more positive attitudes, and encouraged healthier eating habits. The flipchart medium was found to be more effective than the leaflet medium in supporting the improvement of adolescents' nutrition literacy.

Ethical consideration, competing interest and source of funding

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