The Effect of Educational Intervention on Health Literacy and Nutritional Performance of Female High School Students in Zahedan

ABSTRACT

Background and Objective: Adolescence is a complex, sensitive and multidimensional period in the human development process. Nutrition quality is the main factors that have an essential role in the growth and maturity of adolescents. Adolescent's health literacy is an importance because individuals with high levels of health literacy have better health outcomes than individuals with limited health literacy.

Materials and Methods: The present study is an experimental intervention that was conducted on 15-18 years old female adolescents studying in high schools of Zahedan, Iran. The data collection tools in this study consisted of three questionnaires. Health literacy data were collected by HELMA questionnaire and its validity has been proven by Cronbach's alpha coefficient of 0. 95. Educational posters, booklets (designed by the researcher) and PowerPoint were used to conduct training programs during 3 sessions of 45 to 60 minutes. A post-test was carried out in the control and intervention groups One month after the last session. The SPSS software version 26 was used to analyze the data.

Results: The results showed a significant difference between health literacy and nutritional performance of students in the intervention and control groups after the intervention (P-value <0.001), therefore; that educational intervention increased the health literacy and nutritional performance in students. A significant and positive relationship was found between students' health literacy and nutritional performance (P-value <0.05).

Conclusion: According to the results of the present study, it is necessary for policymakers and planners to improve the health literacy of adolescents and students through intervention programs to promote health literacy, awareness, attitude, and nutritional behaviors in adolescent's population.

Paper Type: Research Article

Keywords: Health literacy, Nutritional performance, Students, adolescents.

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Introduction

Adolescence is a complex, sensitive, and multidimensional period in people's developmental process, and is associated with rapid and stunning physical, psychological, cognitive, and social changes (1). The most important change in this period, which is of special importance and is considered as a turning point in an adolescent's life, is puberty. Puberty is a process in which, physical changes cause the child's body to change into an adult with the ability to reproduce (2-4). Most adolescents, especially girls, are deprived of appropriate and correct information about physical and psychological changes during puberty and may suffer from physical and psychological problems due to inaccurate information they receive from unreliable sources in their family (3). One of the factors that play an essential role in the growth and maturity of adolescents is nutrition. Proper nutrition during this period of life can affect the quality and quantity of growth especially puberty. Studies on the nutritional health of adolescent girls indicate that they follow incorrect dietary patterns and models (2, 3, 5). Studies show that most adolescents do not follow the recommended diet such as consuming 5 fruits and vegetables a day, two dairy products or more a day, 6 servings of whole grains daily (6, 7), regular breakfast, and also eat fast food twice a week(6-9). According to nutritional experts, students need three main meals a day to meet their nutritional needs, including breakfast, lunch, dinner, and also must take two snacks a day (10).

Research has shown that students who do not eat breakfast do not have a proper eating pattern, and they suffer from problems, such as boredom, fatigue, nervousness, decreased learning, reduced accuracy, and concentration in the classroom and hypoglycemia complications (shivering, dizziness, weakness, and headache). In adulthood, these students are also prone to diseases such as high blood pressure, diabetes, heart attacks, high cholesterol, and obesity (11).

Childhood and adolescence are two important periods in the formation of eating habits in individuals (12). Eating habits remain stable until adulthood and can hardly be changed. Studies show that children who do not eat breakfast for a long time show violent behaviors and their health level could be affected. Proper and healthy eating patterns in children and adolescents increase their growth and development, promote their ability to perform mental activities, and prevent complications such as iron deficiency anemia, obesity, tooth decay, and digestive disorders. Therefore, correcting the eating patterns during childhood and adolescence, and having proper nutritional behaviors are important issues in disease prevention (13).

Health literacy is of particular importance in adolescents, because people with high levels of health literacy have better health outcomes than individuals with limited health literacy. Health literacy generally means the ability of individuals to access health information and use it to make decisions about maintaining and promoting health (14). Increasing health behaviors and improving access to health care are important outcomes of health literacy. People with high levels of health literacy can use the cognitive and social skills that they have acquired in new situations and show better performance (14, 15). Health literacy is related to the level of literacy of individuals and includes the knowledge, motivation and competence of individuals in accessing, understanding, evaluating and using health information so that, they can make informed judgments and decisions about their daily lives according to health, disease prevention

and health promotion to maintain or improve their quality of life (14-16). A study conducted in Chabaharan, which is one of the cities of Sistan and Baluchestan province, showed that students had a good level of awareness, but their attitude increased after the intervention. This shows that nutritional knowledge alone is not enough to change health behaviors, because behavior can be changed by promoting the attitude. Also, in the above study, the attractiveness of multimedia education and the use of different senses in the education process was effective factors in improving the attitude and performance of samples (17).

Ghaderi et al (2015) in a study investigated the level of health literacy of adolescents aged 15-18 years, and reported the average score of health level to be 62.9 out of 100. They also showed that 19.4% of adolescents had inadequate health literacy, 38.1% had poor health literacy and 57.5% had limited health literacy. Only 6% of the adolescents surveyed had an excellent level of health literacy (18).

Adolescent girls as a sensitive and high-risk group are particularly important. Improving the level of health literacy and nutritional status can improve the quality of life of adolescents and young people, who are the capital of our country. By increasing the adolescents' knowledge of health, it is possible to maintain the survival and increase the quality of life of the country's capitals. The aim of this study was to educate and increase female high school students' awareness about health literacy and proper nutritional performance in the city of Zahedan, Iran.

Materials and Methods

This study is an experimental intervention that was performed on adolescent girls aged 15 to 18 years studying in high schools of Zahedan city. Considering the mean and standard deviation of changes in nutritional performance score (as one of the dependent variables studied in this study .SD=19.58) (12) in previous studies, and taking into account $\alpha = 0.05$ and $\beta = 0.2$, $d = 1.5$, the number of samples was estimated to be 400 students considering 9.8% sample drop (200 students in the intervention and 200 students in the control group). The following formula was used for calculating the sample size:

Using stratified sampling, Zahedan city was divided into 5 regions (north, southeast, west, and center). Then, in each region, a list of public high schools for females was prepared. In the next stage, 2 high schools were selected from each region by cluster method, and in each region, one of the high schools was randomly allocated to the intervention group and the other one to the control group. Therefore, in total, 10 high schools (5 high schools in the intervention group and 5 high schools in the control group) were studied, and in each high school, about 40 students were included in the study by stratified sampling. Students were included in this study if they were high school students or transferred student from the other schools. They excluded if they had been absent from school for a long time (more than one month), or/and had been drop out of the school were excluded from the study. First, the purpose of the study and the confidentiality of information were explained to the students, and after obtaining informed consent from them, the students were asked to complete the questionnaires on their own.

Three questionnaires were used in this study for data collection. The first questionnaire was related to students' personal information, including age, educational level, mother's education level, father's education level, family income, and mother and father's employment status. The second questionnaire was the Health Literacy Measure for Adolescents (HELMA)

questionnaire, which was designed and psychometrically evaluated by Ghanbari et al (2014).

The validity and reliability of the HELMA questionnaire have been proven in other studies and in the study of Jalili et al (2017), its Cronbach's alpha coefficient was calculated to be 0.95 (14). The HELMA questionnaire measures a person's ability and skill to take a specific action in dealing with health information and includes 44 items in 8 areas of accessibility, reading, comprehension, evaluation, communication, self-efficacy, and calculation. The responses in this questionnaire are based on 5-option Likert's scale ranging from never (score 1), rarely (score 2), sometimes (score 3), more often (score 4), and always (score 5). In this questionnaire, the adolescents' health literacy is classified into 4 levels of inadequate level (scores 0-55), somewhat inadequate (56-111), adequate (112-168) and excellent (168-220). There are also 8 areas in this questionnaire which include; self-efficacy area (questions 1 and 2), accessibility (questions 3 to 9), reading (questions 10 to 14), comprehension (questions 15 to 24), evaluation (questions 25 to 28), use (questions 29 to 33), communication (questions 34 to 41), and calculation (questions 42 to 44).

Finally, the nutritional performance was assessed by the Nutritional Performance Questionnaire of Jalili et al (2017), which includes 10 questions (14). Its validity and reliability were investigated in this study with Cronbach's alpha coefficient of 0.71. The questions in this questionnaire are based on 5-options Likert scale that ranges from never, most of the time, occasionally, rarely, and never.

The questions in this questionnaire are scored from 1-5, and nutritional performance receive scores of 0 to 50 based on the number of questions. According to the number of questions, scores of less than 25 is classified as poor nutritional performance, between 25-37.5 as moderate nutritional performance, and above 37.5 as good nutritional performance (14). In order to perform the intervention on even and odd days, the selected schools were referred from among the classrooms. The intervention classes were selected and with the guidance of the school principal, he entered the classroom half an hour before the fun bell due to the researcher's order. The educational pamphlet was consciously provided to the students and full explanations were given by playing the prepared videos and slides. Each session lasted 20 to 30 minutes and at the end the students' questions were answered. Then the students were given a nutrition self-report booklet to complete at home. The number of training sessions was 4 sessions. In the last session, parents were invited to participate. After the intervention, 1 month later, the questionnaires were filled out again. Ethical completion was given to the control group in terms of ethics and training materials, then the information was entered into the software. At the next stage of this study, the data were entered into SPSS software version 26, and then, the necessary training were carried out in 3 sessions of 45 to 60 minutes using posters and educational booklets designed by the researcher, as well as PowerPoints. Two months after the last session, a post-test was carried out in the control and intervention groups and prizes were awarded to all students for their participation in the study. The questionnaires were completed again 2 months after the educational intervention, and entered into SPSS software version 26. Data were analyzed by descriptive and analytical statistics. The statistically significant level was fixed at α=0.05

Results

A total of 400 students (200 in the intervention

group, 200 in the control group) with a mean age of 16.66 ± 0.83 participated in the study. The education level of parents in the intervention group was better than parents in the control group. On the other hand, 72% of the mothers in the intervention group and 79% of the mothers in the control group were housewives. Also, 88% of the fathers in the intervention group and 80% of the fathers in the control group were employed. Furthermore, 51% of the students in the intervention group were in the tenth grade and 55.5% of the students in the control group were in the eleventh grade.

Table 1: Frequency distribution of demographic variables in two groups of control and intervention

Variable		Intervention (n=200)	Control (n=200)	P-Value *
		Frequency (percentage)	Frequency (percentage)	
Class	10th	102 (51)	66 (33)	-
	11th	77 (38.5)	103 (55.5)	
	12th	21 (10.5)	31 (15.5)	
Father's employment status	Employed	176 (88)	160 (80)	0.077
	Unemployed	3 (1.5)	16 (8)	
	Retired	21 (10.5)	24 (12)	
Mother's employment status	Employed	52 (26)	38 (19)	0.24
	Housewife	144 (72)	158 (79)	
	Retired	4 (2)	4 (2)	
Father's education	Illiterate	3 (1.5)	13 (6.5)	0.088
	Below diploma	32 (16)	37 (18.5)	
	Diploma	79 (39.5)	83 (41.5)	
	University	86 (43)	67 (33.5)	
Mother's education	Illiterate	11 (5.5)	20 (10)	0.018
	Below diploma	50 (25)	63 (31.5)	
	Diploma	68 (34)	72 (36)	
	University	71 (35.5)	45 (22.5)	

* Based on Independent sample t-test & One- way ANOVA test

In order to investigate the relationship between demographic variables in the two intervention and control groups, chi-square test was used and the results showed that, except for the mother's education, the relationship was not significant between all variables.

Based on the scoring system of the questionnaires, the students' health literacy and nutritional performance were classified into 4 and 3 levels, respectively. The mean score of health literacy before the intervention was 158 out of 400 in the intervention group and 156 out of 400 in the control group. The results showed that 52% of the students in the intervention group and 66% of the students in the control group had good health literacy before the intervention. However, after the intervention, 62% of students in the intervention group and 65% of students in the control group had excellent health literacy. Also, the mean score of nutritional performance before the intervention was 32 out of 50 in the intervention group and 31 out of 50 in the control group. In the intervention group, 4.5% of the students had poor nutritional performance,

81% had moderate nutritional performance and 14.5% had good nutritional performance. In the control group, 6.5% had poor nutritional performance, 81% had moderate nutritional performance, and 12.5% had a good nutritional performance.

Table 2: Frequency distribution of the score of health literacy and nutritional performance of the students before and after the intervention in two groups

Variable		Before intervention		After intervention	
		Intervention Frequency (%)	Control Frequency (%)	Intervention Frequency (%)	Control Frequency (%)
Student's health literacy	Inadequate (score 0-50)	0 (0)	1 (0.5)	0 (0)	1 (0.5)
	Somewhat inadequate (score 50.1-66)	1 (0.5)	5 (2.5)	0 (0)	5 (2.5)
	Adequate (score 66.1-84)	104 (52)	132 (66)	76 (38)	130 (65)
	Excellent (score 84.1-100)	95 (47.5)	62 (31)	124 (62)	64 (32)
Nutritional performance	Poor performance (Score < 25)	9 (4.5)	13 (6.5)	4 (2)	13 (6.5)
	Moderate performance (score 25-37.5)	162 (81.5)	163 (81.5)	127 (63.5)	162 (81)
	Good performance (score<37.5)	29 (14.5)	24 (12)	69 (34.5)	25 (12.5)

Table 3: Comparison of mean and standard deviation of health literacy and nutritional performance before and after the intervention in each group

Variable		Before intervention	After intervention
		Mean± SD	Mean± SD
Health literacy	Intervention	165 ± 20	171 ± 18.6
	Control	156 ± 24	156 ± 24.1
	*P-value	0.2	<0.001
Nutritional performance	Intervention	32.6 ± 4.4	35.5 ± 4.4
	Control	31.8 ± 4.8	31.9 ± 4.8
	*P-value	0.089	<0.001

*Based on independent t-test

Table 4: Comparison of mean scores of health literacy and nutritional performance before and after the intervention

Variable	mean difference	Test statistics	P-value *
Health literacy	-3.16	-11.23	<0.001
Nutritional performance	-1.5	-12	<0.001

* Based on paired t test

In this study, independent t-test was used to compare the changes of mean scores of health literacy and nutritional performance of students in the two groups of control and intervention before and after the intervention. There was a significant difference between the health literacy of students in the two groups after the intervention (P-value <0.001). Also, a significant difference was found between the students' nutritional performance in the two groups after the intervention (P-value <0.001). Therefore, the intervention has increased the health literacy and nutritional performance of students.

Also, comparing the health literacy and nutritional performance of students before and after the intervention using paired t-test, we found a significant difference between the scores of both health literacy and nutritional performance of students before and after the intervention (P-value <0/001).

The Pearson correlation test was used (Table 4) to determine the relationship between students' health literacy and nutritional performance before and after the intervention. It showed a significant relationship between health literacy and nutritional performance in students before and after the intervention (P - value <0.05). However, the significance of the relationship between them after the intervention was higher than before intervention (correlation coefficient was higher after the intervention).

Table 5: Results of Pearson correlation coefficient to determine the relationship between health literacy and nutritional performance before and after the intervention

	Correlation coefficient	Significant level (p-value)
Before intervention	0.249	p<0.001
After intervention	0.479	p<0.001

Discussion

The goal of health education is to change behavior, which is an important subject in health education programs. The findings of this study showed a significant difference between students' health literacy before and after the intervention, therefor; educational intervention has increased the level of health literacy in the students after intervcention.

The results also showed that most students before the intervention had good health literacy and moderate nutritional performance, while in the study of Jalili et al (1396) and Ghaderi et a. (2015), 74.5% and 57.5% of students, respectively, had limited health literacy, which are not consistent with the present study (14, 18).

Linnebur et al (2018) in a study assessed the adolescents' health literacy by NVS tool found that 12.6% of students had inadequate health literacy (19), which is not consistent with our study. The difference in the results obtained in these studies can be due to the difference in socio-cultural situations and differences in assessment tools that were used in these three studies. Considering the effect of educational intervention on students' health literacy in the present study, it can be stated that the mean score of students' health literacy in the intervention group was 171 ± 18.6 after the intervention, which was significantly higher than control group (156.7 ± 24.1). This result is in line with the findings of Motamedi et al (1399) study (20). The results of the present study are also in line with Pajouh Hejazi et al (2017), and Abdullahi et al (2016) studies that showed the effectiveness of educational intervention on student' health literacy. The results of Peter et al (2013) study are also in line with our study, as adequate health literacy required empowerment of people through education (21-23). Findings of this study showed a significant difference

between students' nutritional performance before and after the intervention, so that educational intervention has increased the students' nutritional performance score. The study of Tavousi et al (2016) showed that educational intervention caused a positive effect on health literacy and increasing change in individual's knowledge, attitude and especially, behavior in terms of healthy eating (24). Also, in the study of Niknami et al (2016), the results showed a significant difference between the mean score of nutritional performance in students before and after the training (17). Therefore, the results of these two recent studies are consistent with the findings of present study. According to the present study, there is a a relationship between health literacy and nutritional performance, it seems that promoting health literacy intervention in adolescents helps to improve their nutritional performance.

Limitations: In the present study, only the adolescents who were studying in selected high schools were studied, and there was no access to other adolescents who had been dropped out of the school, and this made it difficult to compare the differences between different individuals or subgroups. Also, the self-reporting method used in completing the questionnaires could have produced inaccurate information. The lack of similar studies on this issue for comparison was another limitation of the present study. Other limitations of the present study including lack of cooperation of some students, lack of sufficient time to perform educational interventions, and the interference of study intervention with classrooms and school activities.

Conclusion

According to the findings of present study, the health literacy of most students before the intervention was adequate and their nutritional performance was at moderate level, but these two variables were improved after intervention. The results also showed a positive relationship between health literacy and nutritional performance in adolescents, so that as their health literacy increased, their nutritional performance also increased. Since, there are many health opportunities for adolescence, and also as health education interventions are essential to improve adolescents' health literacy and nutritional performance, and to achieve the global health goals. Therefore, more attention should be paid to adolescents in each area of public health, and health system policymakers should pay more attention to improv the health literacy in adolescents.

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