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The Impact of an Educational Intervention on the Adoption of Preventive Behaviors Against Head Lice Infestation Among Female Students to Using the Health Belief Model

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Abstract

Background: Head lice infestation is a significant health issue among students, leading to physical, social, and psychological consequences.

Objectives: This research aims to determine the impact of an educational intervention on the adoption of preventive behaviors against head lice infestation among second-grade female elementary school students using the health belief model (HBM).

Methods: The present study was conducted semi-experimentally in the academic year 2023. The study was conducted before and after 2 months of educational intervention between the intervention and control groups. The allocation of regions to the control and intervention groups was done randomly (random allocation method). Then, one primary school was randomly selected from each district, and in each school, students were randomly selected from the fourth, fifth, and sixth grades (two-stage cluster sampling). The intervention group included 80 students, and the control group included 72 students. Educational classes for the prevention of pediculosis were conducted for the students in the intervention group in the form of lectures, reading stories and poems about the prevention of pediculosis, and using peer education. To collect information, a questionnaire with acceptable validity and reliability based on the HBM was used. Data analysis was performed using SPSS 16 software and descriptive statistical tests, independent *t*-test, paired *t*-test, and ANCOVA.

Results: The results of the study indicated that before the educational intervention, there was no significant difference in the mean scores of the components of the HBM between the intervention and control groups [perceived sensitivity ($P = 0.807$), perceived benefits ($P = 0.811$), perceived barriers ($P = 0.682$), self-efficacy ($P = 0.961$), behavior ($P = 0.140$)]. However, the average scores of the perceived severity construct were significantly different between the intervention (10.41 ± 1.95) and control (9.58 ± 2.08) groups before the educational intervention. After the educational intervention, there was a significant difference in the average scores of all constructs of the HBM between the intervention and control groups ($P < 0.001$).

Conclusions: The study supports the effectiveness of education based on the HBM in promoting preventive behaviors against pediculosis among second-grade female elementary school students.

Keywords: Pediculosis, Prevention, Student, Health Belief Model

1. Background

Public health plays a crucial role in the advancement of society (1). Although the field of health has made tremendous strides, head lice infestation remains a pressing public health issue (2). Head lice, also known as Pediculus capitis, are parasitic insects that feed on human blood and specifically target humans. Head lice can be transmitted either directly (through head-to-head contact with an infested person) or indirectly through shared use of personal items such as clothing, combs, hats, towels, or other personal belongings of an

individual with head lice (3, 4). Children between the ages of 3 to 11 and women are at a higher risk of head lice infestation than other groups (5). Elementary schools play a primary role in the onset of head lice epidemics (6). The centers for disease control and prevention (CDC) report 6 to 12 million cases of infestation annually among children aged 3 to 11 (7). Different prevalence rates of head lice have been reported among elementary school children worldwide. The investigation revealed varying rates of head lice infestation in different parts of the world. In the Netherlands, Brazil, Turkey, Venezuela, and Argentina, the estimated prevalences were 4.8%, 35%, 1.2%, 28.8%, and 29.7%, respectively (8). In 2015, a systematic review and meta-analysis was conducted to determine the prevalence of head lice in Iranian elementary schools, which found infestation rates of 1.6% among boys and 8.8% among girls (2). Similar variations were observed within different provinces of Iran, such as 13.28% in Qom (9), 13.5% in Hamadan (2), 1.8% in Kerman (2), and 3.2% in North Khorasan (10). These differences highlight the need for continued research to better understand and address the prevalence of head lice infestation globally and within individual regions. Symptoms and signs of head lice infestation include itching, lymphadenopathy (swelling of lymph nodes), and periorbital edema (swelling and redness around the eyes), as well as allergic reactions reported among affected children. Prolonged and widespread infestation among school-age students can result in anemia. Beyond just physical effects, head lice can also cause significant psychological distress, as children may associate infestation with a lack of cleanliness (11).

Raising public awareness about preventing head lice infestation is a vital aspect of health education (12). When creating a health education program, it is essential to carefully choose an effective instructional model. A widely utilized model for disease prevention is the health belief model (HBM), known for its longevity in the medical field (13). The model emphasizes the correlation between one's beliefs and actions, making it a valuable tool in educating individuals about health. The components of the HBM include perceived susceptibility, perceived severity, perceived barriers, perceived benefits, cues to action, and self-efficacy. These factors are important to consider when it comes to individual beliefs and behaviors related to health and disease prevention. These components play a significant role in shaping an individual's willingness to adopt new behaviors and take action to minimize their risk or severity of illness (5).

Due to the fact that habits and behavior patterns are formed in childhood and adolescence and are likely to persist into later years (14), adolescence provides an opportunity for intervention and encouragement to engage in healthy and positive behaviors (15). As schools, particularly girls' primary schools, are a major source of head lice epidemics, understanding the effectiveness of such interventions is crucial.

2. Objectives

This study aimed to investigate how an educational intervention, based on the HBM, could impact the adoption of preventive behaviors against head lice infestation in second-grade girls.

3. Methods

The present study was conducted as a quasi-experimental study during the year 2023 on second-grade female elementary school students in the city of Sabzevar. The sampling process commenced in January and concluded in May 2023.

Ethical approval (IR.MEDSAB.REC.1401.089) was obtained from the Research Deputy of Sabzevar University of Medical Sciences. Before participating in the study, the parents of the students were fully informed and gave their written consent. The participants were also reassured that any information collected would be kept confidential. Additionally, they were given the choice to withdraw at any point if they faced any obstacles that could impede their involvement.

Due to the fact that there are only two education districts in Sabzevar, one district was selected as the control group, and the other district was selected as the intervention group. The allocation of the regions to the control group and the intervention group was done randomly (random allocation method). Then, one primary school was randomly selected from each district, and in each school, students were randomly selected from the fourth, fifth, and sixth grades (two-stage cluster sampling).

The sample size was determined based on a similar study conducted by Moshki et al. (16), in which the mean and standard deviation of the perceived benefits related to the preventive behaviors of pediculosis after the educational intervention in the intervention group were 15.57 ± 3.25, and in the control group, the value was 13.52 ± 4.52. The sample size was calculated by considering a confidence coefficient of 95%, a test power of 80%, and using the formula for comparing the means in two independent groups.

$$n = \frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 \times \left(s_1^2 + s_2^2\right)}{\left(x_1 - x_2\right)^2}$$

$$n = \frac{(1.960 + 0.842)^2 \times \left(3.25^2 + 4.52^2\right)}{(15.57 - 13.52)^2} = 58$$

After inputting the values into the above formula, 58 people were obtained for each group. A total of 70 samples were considered for each group, but due to the presence of more students in some classes, there were 80 participants in the intervention group and 72 in the control group, resulting in a total of 152 samples included in the study. Students were selected by random sampling from the fourth, fifth, and sixth grades of each school. In total, 152 female students from these grades participated in the study. Both schools had part-time health educators. Inclusion criteria for participants included obtaining informed consent from the parents, being in the fourth, fifth, or sixth grade of elementary school, while exclusion criteria included student dissatisfaction with participating in the study and the presence of skin or fungal diseases.

Data collection for the study, both before and after the intervention, was conducted using the Knowledge, Attitude, and Practice (KAP) Questionnaire developed by Daneshvar et al. (17). The validity and reliability of this questionnaire had been previously assessed. The Content Validity Index (CVI) and Content Validity Ratio (CVR) were calculated, resulting in a CVI of 0.93 and a CVR of 0.82. Additionally, Cronbach's alpha coefficient for the questions related to knowledge was 0.85, perceived susceptibility was 0.79, perceived severity was 0.76, perceived benefits was 0.80, perceived barriers was 0.74, self-efficacy was 0.77, and behavior was 0.82, indicating good reliability.

The questionnaire consists of four sections: The first section includes 7 demographic questions, such as age, parental education and occupation, the number of family members, and the student's previous infestation with head lice. The second section contains 6 questions regarding students' awareness of head lice, prevention, and transmission. Responses to these questions are scored using words such as "Yes," "No," and "I don't know," with a correct answer receiving a score of one, and incorrect answers receiving a score of zero. The third section of the questionnaire pertains to the components of the HBM. It includes 6 questions for perceived susceptibility, 5 questions for perceived severity, 7 questions for perceived benefits, 6 questions for perceived barriers, and 6 questions for self-efficacy. The HBM scale assesses individual beliefs using a 3-point Likert Scale, offering participants options of "Agree," "Neutral," and "Disagree," with scores ranging from 3 to 1. It's worth noting that scores for all items in the perceived barriers structure and one question from the self-efficacy structure are reversed. The fourth section consists of 7 questions to assess individual behavior regarding head lice prevention, with responses ranging from "Always" to "Never," scored from 3 to 1. The questionnaires were completed both before the educational intervention and two months after the intervention, comparing the experimental and control groups.

The educational intervention program for preventing Pediculosis, based on the HBM, comprised the following elements: Conducting four 30-minute educational sessions, with one session per week specifically for students in the experimental group. These weekly sessions included lectures, storytelling, and poetry recitation on the prevention of Pediculosis, exclusively for the students in the experimental group. Peer education was implemented alongside the primary educational program to enhance its effectiveness. Credible internal and external sources were utilized to enhance the educational content, ensuring that it was simple, understandable, and communicated effectively with students.

This program, based on the HBM, aimed to improve knowledge and attitudes regarding the prevention of Pediculosis through engaging and informative activities. In close partnership with teachers and in coordination with the Department of Education and the school, our dedicated research team designed and facilitated the implementation of the comprehensive educational program, focused on equipping students with essential health knowledge. Additionally, posters on the prevention of head lice infestation were displayed on school corridor noticeboards to raise awareness among all family members. One of the key considerations in creating these posters was to ensure they were visually appealing and relatable to students of a certain age. To achieve this, we carefully selected easily readable fonts and incorporated popular cartoon characters that are adored by students.

Prior to commencing the study, we sought input from students on the type of guidance they preferred, and it was evident that they heavily relied on their parents as their main source of guidance. To equip parents with the necessary knowledge, we collaborated with the school principal and health mentor to develop informative materials like pamphlets and brochures on preventing head lice infestation. By doing so, we aimed to empower parents and enable them to better guide

their children. Furthermore, at the end of the study, educational pamphlets on preventing head lice infestation were provided to the control group.

After completing the questionnaires, the data were entered into SPSS 16 software. Subsequently, descriptive statistics (mean, standard deviation, and frequency) and inferential statistics (independent *t*-tests, paired *t*-tests, chi-square, and ANCOVA) were used to analyze the data. The normality of the data was assessed using the Kolmogorov-Smirnov test. All analyses were conducted at a significance level of 0.05.

4. Results

In total, 72 participants were included in the control group, and 80 participants were examined in the intervention group. There was no significant difference between the intervention and control groups in terms of students' grade levels, parental occupations, and parental education. However, there was a significant difference between the intervention and control groups in terms of students' previous infection with pediculosis ($P = 0.002$) (Table 1).

The paired *t*-test indicated that in the control group, there was no significant difference between the pre- and post-intervention scores for awareness and the HBM constructs. In the intervention group, there was a significant increase in all variables between before and after the intervention ($P < 0.001$) (Table 2). The independent *t*-test between the intervention and control groups before the intervention revealed a statistically significant difference for awareness ($P = 0.033$) and the perceived severity construct ($P < 0.012$). However, for the other constructs of the HBM, no significant difference was found before the intervention. The ANCOVA test showed that the average scores for all variables in the intervention group increased after the intervention and were significantly different from the control group ($P < 0.001$) (Table 2).

In the examination of the "Action Guide" construct for obtaining information on preventing head lice infestation, it was found that in the control group, 50% of students (36 individuals) considered the advice of a doctor important. In the intervention group, 57% of students (46 individuals) valued the advice of their parents. A positive and significant correlation was found between awareness and behavior (Table 3).

5. Discussion

This research focuses on the effects of an educational program on the adoption of preventive measures against head lice among girls in elementary schools in Sabzevar. Concerning the students' previous infestation with pediculosis, a significant difference was observed between the intervention and control groups ($P = 0.002$). In other words, 5.62% of students in the intervention group had previously been affected by pediculosis. The findings of this study demonstrated the effectiveness of the educational intervention based on the HBM in promoting preventive behaviors among students to prevent head lice infestation. The students' awareness regarding head lice infestation and its transmission methods was low before the intervention. Moreover, similar to previous studies (6, 12, 18), after the intervention, the intervention group showed a significant increase in their average awareness score compared to the control group ($P < 0.001$). This suggests that the implementation of easily comprehensible material, as well as repetitive and reinforcing methods, effectively generated a heightened level of awareness among students. This finding aligns with previous studies (12, 19), indicating that the utilization of straightforward and comprehensible materials, coupled with reinforcement strategies, plays a crucial role in enhancing awareness. Because lice can quickly become an epidemic, its control depends on the full awareness of parents, school administrators, and students. Therefore, in order to continue learning, pamphlets were distributed among the students to take them home and provide their parents with information on how to prevent and treat head lice. Additionally, we prepared educational materials such as tracts and leaflets on the prevention of head lice for parents' training sessions, which were held in the presence of the school's director and health coach, to guide them in providing continuous and correct guidance.

The students in the intervention group experienced improved beliefs, thanks to the application of key elements of the HBM, such as perceived sensitivity, perceived severity, perceived benefits, perceived barriers, and self-efficacy. This positive change was observed in comparison to the control group and can likely be attributed to the educational intervention implemented in the study. These results are in line with previous research findings (5, 12, 20). In the intervention group, providing education on how to prevent head lice infestation effectively increased the mean behavior score. On the other hand, the control group did not demonstrate any noticeable changes in behavior. This suggests that the intervention group students' behavior was greatly impacted by their heightened awareness, improved beliefs, and better understanding of how to prevent head lice infestation. This is consistent with similar findings from previous studies (5, 20). Moreover, after implementing educational interventions,

Table 1. Frequency Distribution of Students' Demographic Characteristics [a]

Variables	Control (n = 72)	Intervention (n = 80)	P-Value
Grade			0.816
Fourth	25 (34.7)	27 (33.8)	
Fifth	21 (29.2)	27 (33.8)	
Sixth	26 (36.1)	26 (32.5)	
Mother's occupation			0.395
Worker	2 (2.8)	3 (3.8)	
Employee	4 (5.6)	5 (6.2)	
Freelance	9 (12.5)	18 (22.5)	
Housekeeper	57 (79.2)	54 (67.5)	
Father's occupation			0.622
Worker	19 (26.4)	21 (26.2)	
Employee	7 (9.7)	12 (15.0)	
Freelance	42 (58.3)	45 (56.2)	
Unemployed	4 (5.6)	2 (2.5)	
Mather's education			0.099
Illiterate	3 (4.2)	1 (1.2)	
Primary school	18 (25.0)	13 (16.2)	
Guidance school	15 (20.8)	10 (12.5)	
Diploma	27 (37.5)	47 (58.8)	
University degree	9 (12.5)	9 (11.2)	
Father's education			0.505
Illiterate	4 (5.6)	1 (1.2)	
Primary school	23 (31.9)	26 (32.5)	
Guidance school	18 (25.0)	17 (21.2)	
Diploma	19 (26.4)	28 (35.0)	
University degree	8 (11.1)	8 (10.0)	
Students' previous infestation			0.002
Yes	27 (37.5)	50 (62.5)	
No	45 (62.5)	30 (37.5)	

[a] Values are expressed as No. (%).

Gholamnia Shirvani et al., and Zareban et al. both observed significant enhancements in preventive measures against head lice infestation (12, 19).

In the present study, the highest and statistically significant correlation was found between preventive behaviors against head lice infestation and the variable of awareness, showing a positive association. In stark contrast to past research (21-24), which found a strong correlation between individuals' self-efficacy and their adoption of preventative measures against head lice infestation, this study paints a different picture. Given the positive impact of using the HBM in preventing head lice infestation, as confirmed by the results of the current study, it is noteworthy that studies by Moshki et al. (5), Panahi et al. (25), and Nejaei et al. (26) have also shown support for utilizing the HBM in promoting proactive measures against head lice infestation. Based on the results of this research, it is evident that the HBM holds great potential in encouraging preventive actions against head lice among students. Thus, in order to effectively promote prevention in schools, it is crucial to assess the needs of the community using the framework of the HBM and then design a targeted health education program. It is imperative that health authorities receive training and issue clear guidelines to individuals, promoting the importance of consistently trimming their hair, frequently combing it, regularly changing clothes, and upholding thorough personal hygiene routines.

The research results indicate a decrease in the average scores of perceived sensitivity, perceived severity, perceived benefits, and perceived barriers among students in the control group in the post-test compared to the pre-test. For this research, the initial

Table 2. Comparison of Means ± SD Score Awareness, Health Belief Model Constructs and Behavior for Intervention and Control Groups Before and After the Intervention [a]

Variables	Before	After	P-Value
Awareness			
Control	3.92 ± 1.19	4.07 ± 1.23	0.086
Intervention	3.51 ± 1.12	4.99 ± 0.934	0.001
P-value	0.033	0.001	
Perceived sensitivity			
Control	12.01 ± 2.17	11.62 ± 2.42	0.053
Intervention	12.10 ± 2.12	15.81 ± 1.63	0.001
P-value	0.807	0.001	
Perceived severity			
Control	9.58 ± 2.08	9.43 ± 2.48	0.533
Intervention	10.41 ± 1.95	13.40 ± 1.47	0.001
P-value	0.012	0.001	
Perceived barriers			
Control	12.82 ± 2.35	12.60 ± 2.70	0.088
Intervention	12.98 ± 2.31	16.41 ± 1.78	0.001
P-value	0.682	0.001	
Perceived benefits			
Control	15.47 ± 1.86	15.43 ± 2.43	0.848
Intervention	15.55 ± 2.11	18.92 ± 1.76	0.001
P-value	0.811	0.001	
Self-efficacy			
Control	13.81 ± 2.65	14.04 ± 2.75	0.091
Intervention	13.82 ± 2.19	16.78 ± 1.33	0.001
P-value	0.961	0.001	
Behavior			
Control	15.47 ± 3.08	15.81 ± 3.24	0.121
Intervention	14.82 ± 2.27	17.19 ± 3.74	0.001
P-value	0.140	0.001	

[a] Values are expressed as mean ± SD.

Table 3. Correlation Between Health Belief Model Constructs and Awareness Before the Intervention

Variables	Awareness	Perceived Sensitivity	Perceived Severity	Perceived Barriers	Perceived Benefits	Self-efficacy	Behavior
Awareness	1						
Perceived sensitivity	0.137	1					
Perceived severity	0.206 [a]	0.215 [a]	1				
Perceived barriers	0.380 [a]	0.143	0.182 [a]	1			
Perceived benefits	0.207 [a]	0.243 [a]	0.284 [a]	0.247 [a]	1		
Self-efficacy	0.284 [a]	0.217 [a]	0.105	0.203 [a]	0.266 [a]	1	
Behavior	0.473 [a]	0.110	0.153	0.372 [a]	0.261 [a]	0.127	1

[a] $P < 0.05$ was considered statistically significant.

and final assessments were carried out in January and May of 2023 with diligent care. During the pre-test, health instructors in schools addressed the high prevalence of head lice infestation during colder months by conducting health examinations and providing education to students. This simultaneous occurrence of processes may have contributed to the decrease in average scores of perceived sensitivity,

perceived severity, perceived benefits, and perceived barriers among students in the post-test compared to the pre-test in the control group. However, the lack of accuracy in completing the questionnaires by fourth to sixth-grade students may also have contributed to the reduction in these scores.

This study was limited as it only included students from two primary schools in the city of Sabzevar. It is worth considering that these participants may differ from students in other areas of the country, due to a variety of factors such as economic, social, and cultural conditions. Therefore, generalizing the results of this research to students from different cities in Iran is not possible. Additionally, data collection posed challenges, as the sensitivity and social stigma associated with a previous infestation of head lice can lead to feelings of shame, depression, insomnia, and academic decline for the students. The researcher tried to address this issue cautiously while preserving the privacy of the students. Furthermore, it is recommended that future intervention studies on preventing head lice infestation also be conducted on male students.

5.1. Conclusions

The study results support the effectiveness of the educational intervention based on the HBM in promoting preventive behaviors against head lice infestation among female elementary school students. However, it is recommended to enhance awareness further by incorporating educational content about preventing head lice infestation into students' textbooks. Additionally, organizing educational classes for the families of students can increase community awareness and attention to the health of their children.

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Footnotes

Authors' Contribution: Main executor, data collection and analysis, collaboration in writing: M. A., M. H., R. Sh., and H. J.; Scientific guidance and supervision and participation in all stages: M. A., A. M., A. T., and D. M.; Drafting of the manuscript: M. A., M. H., A. T., and D. M.; Scientific guidance and supervision and participation in all stages: M. A. and M. H.

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