Intervention Based on the SHEP Framework on Students' Health-Promoting Lifestyle, Attitudes, and Knowledge Related to Diabetes Prevention

Abstract

Aims: The systematic comprehensive health education and promotion model (SHEP), which is rooted in the theory of Knowledge Management, is an innovative tool within the education and health promotion system. The purpose of this study was to investigate the effects of an educational intervention utilizing the SHEP model on students' health-promoting lifestyle, attitude, and knowledge regarding diabetes prevention.

Methods: This study was quasi-experimental study involving 120 middle-aged women (divided into experimental and control groups). The data collection tools were knowledge, attitudes, and health-promoting lifestyle behaviours questionnaires. Experimental group received training based on the SHEP model by student trainers. Analysis was done using SPSS.

Findings**:** There were significant interaction effects between time and group for all variables. Additionally, the results revealed significantly different changes between follow-up and baseline in the intervention group for knowledge, attitude, and HPLP.

Conclusions: The SHEP model's approach of matching coaches to specific audiences, promoting open discussions, and tailoring education to local culture has proven effective in enhancing attitudes, values, and knowledge. The application of this model in diabetes prevention training among university students shows promise for future research and development using this learning approach.

Keywords: SHEP model, Lifestyle, Attitudes, Knowledge, Diabetes prevention

Introduction

Type 2 Diabetes Mellitus (T2DM) is a costly disease that has a global impact on individuals, economies, healthcare systems, and entire societies [1]. T2DM represents 95% of all diabetes cases [2] and is progressively evolving into a widespread non-communicable health issue, contributing to considerable illness and death [3]. The World Health Organization has reported that the number of individuals with diabetes in Iran was 2,300,110 in 2000, and this figure is projected to rise to 6,421,000 by 2030 [4]. Furthermore, considering that 50% of individuals with diabetes are unaware of their condition, and that the onset of diabetes in Iran occurs 5 to 10 years earlier than the global average, it is anticipated that the actual prevalence of diabetes in Iran exceeds the aforementioned estimates [5].

Unhealthy lifestyle behaviours, like poor diet, smoking and drug use, insufficient physical activity, disrupted sleep patterns, and stress, have been identified as independent risk factors for developing diabetes [6, 7]. Numerous studies conducted over the past two decades have demonstrated the effectiveness of lifestyle interventions in preventing diabetes. For instance, prospective randomized studies have shown that modifying diet and engaging in regular exercise can reduce the risk of developing diabetes [8, 9]. Furthermore, evidence suggests that lifestyle changes can help mitigate the impact of genetic factors on diabetes risk. These findings highlight the significant and long-lasting benefits of lifestyle interventions in preventing T2DM [10]. Moreover, improving individuals' knowledge and attitudes towards T2DM and its complications has been shown to have substantial advantages. These include preventing diabetes, maintaining optimal blood sugar levels, enhancing treatment adherence, reducing treatment costs, and slowing disease progression [11].

Education plays a crucial role in healthcare today, particularly in promoting lifestyle changes and self-management [7, 12]. With individuals becoming more engaged in health-related activities, effective healthcare education and promotion are essential. This is achieved through efficient instructional techniques [13, 14]. The use of theories and models in healthcare education provides a systematic view of events and helps assess the success and shortcomings of interventions [15]. These theories and models serve as a roadmap for planning, implementing, and evaluating educational interventions. They provide valuable information for the educational process [12, 16].

The development of the systematic comprehensive health education and promotion (SHEP) model aimed to improve health literacy by utilizing educators who have received specialized training. This model is characterized by its comprehensiveness and systematic approach [17]. The "comprehensive" aspect of the SHEP model involves including all relevant health concepts that contribute to enhancing health literacy. The trainer delivers content to the audience based on the specific characteristics and needs of the target group. The "systematic" nature of the model means that the program follows a flowchart that encompasses all components, including evaluation, research, development of educational packages, workshops, and stages of monitoring and evaluation. The SHEP model consists of three main stages: evaluation, implementation, and assessment. The evaluation stage involves activities such as literature review, selection of research topics, and provision of educational content. The implementation stage includes designing visual training tools, training educators, and conducting audience training. The assessment stage of the program incorporates short-term, medium-term, and long-term evaluations to gauge the program's effectiveness [18].

Despite reports of increased awareness among trainees using the SHEP educational materials in various provinces in Iran, there is a lack of studies utilizing this approach. Therefore, it is crucial to establish and implement regular training for students as both instructors and end users to enhance health awareness and literacy in this important segment of society. The findings of this research can have implications across different managerial and executive levels. The purpose of this study was to investigate the effects of an educational intervention utilizing the SHEP model on students' health-promoting lifestyle, attitude, and knowledge regarding diabetes prevention.

Methods

Type of research

This study is a quasi-experimental intervention conducted among university students. It involved six student trainers and 120 audience members who were divided into experimental and control groups. For the educational intervention program, one trainer was assigned for every ten participants from the experimental audience group, resulting in a total of six trainers. The eligibility criteria for this study included being of Iranian nationality, not having participated in any relevant educational programs for at least six months prior to the study, actively participating in training sessions, not having diabetes, and expressing willingness to take part in the study. The exclusion criteria for this study encompassed participants who were unwilling to continue their participation, provided incomplete questionnaire responses, failed to take part in any tests or assessments, or did not attend the training sessions.

Sampling

The sample size for the audience was determined using an appropriate formula and based on previous studies [19]. With a power of 0.80, a mean difference of 48.47, and standard deviations of 12.98 and 12.09, and at a confidence level of 0.95, the initial estimated sample size was 52 cases for each group. To account for potential subject attrition, the final sample size for each group was determined to be 60 cases.

$n = (Z_1 + Z_2)^{\wedge 2} * (\sigma_1^{\wedge 2} + \sigma_2^{\wedge 2}) / (\mu_1 - \mu_2)^{\wedge 2}$

$Z_1 = 1.96$ (for a 95% confidence level)

$Z_2 = 0.84$ (for an 80% test power)

$\sigma_1 = 12.982$

$\sigma_2 = 12.097$

$\mu_1 - \mu_2 = 48.47$

$n = (1.96 + 0.84)^{\wedge 2} * ((12.982^{\wedge 2}) + (12.097^{\wedge 2})) / (48.47^{\wedge 2})$

$n \approx 52$

Data collection

The data collection tools used in this study included personal characteristics, knowledge about diabetes, attitudes towards diabetes prevention and management, and health-promoting lifestyle behaviors.

The personal information questionnaire collected data on age, marital status, and personal and family history of diabetes diseases.

The knowledge questionnaire in this study comprised 10 questions that assessed participants' understanding of symptoms, diagnostic methods, complications, and preventive behaviours associated with diabetes. Participants were required to indicate whether each statement was true,

false, or if they had no idea. For each correct response, one point was assigned, while incorrect answers or "do not know" responses received zero points. The total score of knowledge ranged from 0 to 20. The validity of this questionnaire was confirmed by Ghazanfari et al [20].

The attitude questionnaire comprised 15 statements that participants were asked to rate their agreement or disagreement with using a 5-point Likert scale. The responses ranged from "totally disagree" (score 1) to "absolutely agree" (score 5). This allowed for a scoring range of 15 to 75 for each participant. The validity of this scale was also confirmed by Ghazanfari et al [20].

The Health-Promoting Lifestyle questionnaire (HPLP) in this study consisted of 52 items that evaluated participants' engagement in health-promoting behaviours by six dimensions: physical activity, dietary, responsibility of health, interpersonal relations, management of stress, and self-actualization. Participants were asked to rate their frequency of engaging in these behaviours on a scale ranging from never (score 1) to always (score 4). The total HPLP score ranged from 52 to 208. The Persian version of the HPLP questionnaire was validated by Mohammadi Zaidi et al [21].

The reliability computed from a pilot study of 30 cases using the Alfa Cronbach coefficient yielded values of 0.78 for knowledge, 0.75 for attitude, and 0.88 for HPLP, respectively.

Intervention

At the first phase of the study, educational intervention based on the SHEP model was implemented through workshops comprising four 2-hour sessions for trainers. First, a pre-test was administered using the questionnaires mentioned earlier to assess participants' knowledge, attitudes, and HPLP. Following the pre-test, the trainers reviewed education and communication skills and presented educational materials based on the prepared training packages. The educational package covered various aspects of diabetes, including its framework, risk factors, signs and symptoms, screening techniques, preventive measures, and health-enhancing behaviours. The training was delivered using different educational approaches such as lectures, group discussions, question and answer sessions, brainstorming and problem-solving skills, and the use of visual aids like PowerPoint presentations and pamphlets. Then, each trainer received a diabetes education package and was instructed to practice delivering the educational material according to the principles taught. This allowed trainers to familiarize themselves with the content and delivery methods. In the last workshop session, each trainer presented the contents of their assigned topic, and their peers provided feedback by identifying strengths and limitations in their presentations. This peer feedback helped improve the trainers' delivery skills and ensured that they were well-prepared to deliver effective diabetes education.

During the second phase of the study, the trainers conducted the training program (eight 1-hour sessions) for the experimental group of the target audience. This program utilized various educational approaches such as lectures, group discussions, question and answer sessions, and the distribution of educational materials based on the SHEP model. The control group did not receive any training during this period.

Questionnaires were completed by the participants 3 times before the intervention, immediately after the educational intervention, and 3 months' follow-up.

Analysis

Data analysis was done using SPSS 22 The first step in analysing the data involved assessing the normality of the variables using the Kolmogorov-Smirnov test. Descriptive statistics, such as means and standard deviations, were then computed for the variables of interest. To analyse group differences and changes in outcome variables over time, a two-way repeated measures ANOVA was performed. The significance level used to determine statistical significance was set at α=0.05.

Ethical considerations

The study was approved by the Mashhad University of Medical Sciences ethics board (Number: IR.MUMS.FHMPM.REC.1402.167). A written consent was obtained from all participants after explaining the aim of the study.

Results

At the beginning of the study, participants in all groups had similar demographic characteristics, and there were no significant differences among them. This information is presented in Table 1.

Table 1. The characteristics of participants at baseline

Variable	Group	*p*-value

	Experimental	Control	
Age, Mean (Standard Deviation)	44 (7.2)	45 (7.7)	0.85
Marital status, Number (%)			
Married	10 (16.7)	7 (11.7)	0.73
Single	50 (83.3)	53 (88.3)	
Family history of diabetes, Number (%)			
Yes	11 (18.3)	18 (30)	0.30
No	49 (81.7)	42 (70)	

At the beginning of the study, the mean scores for knowledge, attitude, and HPLP were initially low in the trainers' group. However, following the intervention, both immediately and three months afterward, there was a notable increase in knowledge, attitude, and HPLP scores compared to the pre-test (Table 2).

Table 2. Comparison of the mean scores of trainers group between pretest, posttest, and follow-up

Variable **Mean (Standard Deviation)**	**Time**			***p*-value**
	Pretest	Posttest	Follow-up	
Knowledge	13.00 (2.37)[a]	16.33 (2.58)[b]	19.33 (0.82)[c]	0.0001
Attitude	44.50 (12.14)[a]	56.17 (9.17)[b]	67.83 (3.97)[c]	0.002
HPLP	93.17 (26.49)[a]	121.00 (28.95)[b]	152.17 (18.91)[c]	0.004

[a,b,c] Means with the same letter in row (different times) for each variable are not significantly different according to ANOVA test

The t-test analyses conducted at baseline showed no significant differences between the control and experimental audience groups for knowledge, attitude, and HPLP (Table 3). Additionally, there were significant interaction effects between time and group for all variables. Additionally, the results revealed significantly different changes between follow-up and baseline in the intervention group for knowledge, attitude, and HPLP.

Table 3. Changes in outcomes variables of audiences group during baseline through follow-up

Variable **Mean (Standard Deviation)**	**Time**	**Experimental** **(N = 60)**	**Control** **(N = 60)**	**Group × time** **(*p*-value)**
Knowledge	Pretest	13.55 (4.47)[aA]	13.45 (4.59)[aA]	
	Posttest	17.03 (2.78)[bA]	13.62 (4.77)[aB]	0.0001
	Follow-up	18.42 (1.73)[cA]	13.80 (4.81)[aB]	
Attitude	Pretest	45.53 (12.58)[aA]	45.90 (12.85)[aA]	0.0001
	Posttest	51.22 (11.50)[bA]	46.18 (12.87)[aB]	
	Follow-up	55.57 (10.27)[cA]	46.33 (12.82)[aB]	
HPLP	Pretest	93.98 (26.40)[aA]	94.50 (26.33)[aA]	0.0001
	Posttest	130.67 (32.67)[bA]	95.18 (25.43)[aB]	
	Follow-up	136.03 (26.74)[bA]	96.43 (25.53)[aB]	

[a,b,c] Means with the same letter in each column (different times) are not significantly different according to ANOVA test ($p<0.05$)
[A,B] Means with the same letter in row (different groups) for each variable are not significantly different according to *t*-test ($p<0.05$)

Discussion

Diabetes is a prevalent metabolic that can have long-lasting on a person's health. It is important to recognize the implications of diabetes, especially in advanced stages, as neglecting its management can lead to irreversible physical and spiritual harm. On the other hand, timely awareness and education can help prevent such losses and slow down the progression of the disease [22]. Health education and behavioural enhancement methods have been proven effective in preventing and managing diabetes. The SHEP model, based on the theory of Knowledge Management, is a novel tool used in the system of health education and promotion [17]. The purpose of this study was to investigate the effects of an educational intervention utilizing the SHEP model on students' health-promoting lifestyle, attitude, and knowledge regarding diabetes prevention. By implementing this

intervention, the researchers aimed to assess whether the SHEP model could positively influence these outcomes among the student participants.

It is important to note that no similar articles utilizing the SHEP model for diabetes prevention were found during our literature search. Therefore, in the discussion section of this study, comparative analysis was made with studies applying the SHEP model to other behaviours, as well as education-related studies using different models for diabetes prevention. The absence of similar articles for review and comparison was acknowledged as a limitation of this study. By addressing this gap in research, it contributes to the existing body of knowledge on health education interventions for diabetes prevention and management.

The findings of our study indicated that participants in the intervention group showed significant improvements in their knowledge scores immediately after the intervention and three months later. This suggests that the educational intervention based on the SHEP model effectively enhanced participants' knowledge related to diabetes prevention. These findings are consistent with previous studies that have applied the SHEP model or similar educational interventions for diabetes prevention [17]. Safajou et al found that their intervention group had a statistically significant increase in mean knowledge scores at multiple time points, while the control group did not show such improvements [23]. Similarly, Peyman and Alipour Anbarani's research demonstrated that diabetes prevention behaviour training led to a significant increase in knowledge, attitude, and practice scores among students [24]. The study conducted by Mirzaii et al demonstrated the effectiveness of training using the SHEP model with peer trainers in enhancing women's knowledge about breast cancer screening [18]. Their findings, aligning with our results but with a different educational focus, suggested that the SHEP model facilitates superior and more impactful learning among students. Additionally, in Akbarzadeh et al's study, by utilizing a combination of peer-led and professional-led education, the researchers sought to assess the effectiveness of this approach in enhancing knowledge and promoting positive attitudes towards breast self-examination among the student participants [25]. Similarly, Malak and Dicle examined the efficacy of matching coaches with female students in Turkey to enhance their health-related knowledge [26]. Both studies found that training with matched trainers was associated with increased knowledge scores among participants. The SHEP model, with its emphasis on knowledge management, appears to be a valuable framework for designing and implementing such interventions. These findings reinforce the importance of tailored and engaging educational strategies in promoting knowledge acquisition and behaviour change among students.

Our findings showed that participants in the intervention group had significantly higher attitude scores immediately after the intervention and three months later. This suggests that the educational intervention based on the SHEP model effectively influenced participants' attitudes related to diabetes prevention. The cultivation of attitudes is an important aspect of education and requires a relevant and effective approach to enhance knowledge [27]. In our study, the observed elevation in attitude scores may be attributed to the effectiveness of student educators in positively influencing the attitudes of the audience group. Peer education involves dynamic group problem-solving, which is crucial for creating a successful program. Effective education goes beyond knowledge acquisition and also involves examining values and attitudes. In our study, we utilized educational methods such as group discussions, brainstorming, and problem-solving skills to influence participants' attitudes. It was emphasized that simply providing information is not enough to bring about a desired change in behaviour unless it also leads to a change in attitude. The use of peer educators and interactive educational methods played a crucial role in shaping these attitudes. These findings underscore the significance of addressing attitudes alongside knowledge acquisition in health education interventions. Safajou et al also emphasized the need for a change in attitude alongside knowledge acquisition for effective behaviour change [23]. The study conducted by Akbarzadeh et al examined the effectiveness of peer health educators in reshaping students' attitudes through teaching. The researchers found that this form of instruction had the potential to enhance students' attitudes. In their study, there was a significant difference in average attitude scores between the two groups immediately after the intervention, and this difference persisted one month later [25]. Similarly, the study conducted by Mirzaii et al highlighted the effectiveness of training using the SHEP model with peer trainers in reforming women's attitudes towards breast cancer screening [17]. These studies collectively demonstrate that educational interventions utilizing peer educators or trainers can effectively reshape attitudes. The findings suggest that peer education is a valuable approach for promoting positive attitudes towards health-related behaviours.

The results of the study indicated that there was a significant change in mean HPLP scores between the pre-test and immediate post-test, as well as 3 months after the intervention, within the experimental group. These scores were notably higher compared to the control group. This suggests that the intervention had a positive effect on participants' lifestyle. One strength of our study compared to other studies is the emphasis on skills of problem-solving, brainstorming, and discussion in group to enhance participants' self-actualization. By incorporating these interactive and participatory activities into the educational intervention, we provided a platform for students to actively engage in the learning process and apply their knowledge in real-life scenarios. Therefore, cognitive and behavioural interventions aimed at modifying and improving health-related lifestyles are crucial [28, 29]. Lifestyle changes can help individuals with diabetes maintain better health and reduce various related issues, including hypertension [30]. Educational interventions have been shown to significantly increase individuals' awareness and understanding of their health status, leading to changes in their health-related behaviours [12]. Understanding the role of these factors in predicting diabetes risk can inform interventions aimed at promoting healthier lifestyles and preventing the onset of the disease. By addressing irrational health beliefs and encouraging a health-oriented lifestyle, healthcare professionals can help individuals reduce their risk of developing diabetes and improve their overall well-being [31]. Healthcare training plays a vital role in promoting beneficial behavioural patterns by providing necessary knowledge and cultivating positive attitudes towards specific health-related behaviour [24, 32]. The investigation by Ebrahimi et al supports the impact of educational interventions on women's lifestyle. The intervention group showed improvements in various dimensions of lifestyle [30]. Similarly, Khani Jeihooni et al found that the mean scores of different lifestyle dimensions significantly increased following an educational intervention [33]. These studies collectively demonstrate the effectiveness of educational interventions in promoting lifestyle modification.

Our research aligns with previous studies that have highlighted the efficacy of the SHEP model in promoting various health-related behaviours. For example, Sevil et al explored the effects of a peer education project on breast screening in Turkey and reported positive results [34]. Mirzaii et al study highlighted the importance of using a comprehensive educational approach, such as the SHEP model, combined with peer trainers, to improve women's knowledge, self-efficacy, and intention for breast cancer screening [18]. Despite variations in the specific focus of these studies, the findings consistently support the efficacy of the SHEP model in promoting positive health-related behaviours and lifestyle changes.

Our study has several limitations. Firstly, the sample was confined to a specific group of female university students, which may restrict the generalizability of the findings to the larger population. Additionally, the use of self-report data carries the risk of bias, as participants might not accurately portray their behaviours or attitudes. Moreover, the short time frame between the pre- and post-tests poses another limitation; conducting a longer-term follow-up evaluation would be beneficial for assessing the lasting effects of the educational intervention on behaviour change over time.

Conclusion

The results of this study indicated changes in outcome variables over time for the groups, with significant interaction effects between time and group for all variables, indicating differences for the group over time. Additionally, the results revealed significantly different changes between follow-up and baseline in the intervention group for knowledge, attitude, and HPLP. In conclusion, the SHEP model's approach of matching coaches to specific audiences, promoting open discussions, and tailoring education to local culture has proven effective in enhancing attitudes, values, and knowledge. Its cost-efficiency and adaptability make it a valuable tool for healthcare education. The application of this model in diabetes prevention training among university students shows promise for future research and development using this learning approach.