



Promoting Backpack Carrying Behavior in Female Students: An Application of Peer Education

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ABSTRACT

Aims: A backpack is considered as one of the most common cases of carrying things to schools. It is argued that improper carrying can lead to musculoskeletal pain in students. Health education through peers can play an important role in promoting proper backpack carrying behaviors. This study aimed to evaluate peer education on how to carry backpacks in female high school students.

Method and Materials: This quasi-Intervention study was conducted on 92 female high school students in Bahnemir, Iran using multi-stage cluster random sampling. The data regarding knowledge, attitude and backpack carrying behavior were collected through a valid questionnaire before and six months after the intervention. Just intervention group received an educational program in four sessions by peers. The data were analyzed by SPSS version 21.

Findings: 92 students with a mean age of 13.90 ± 0.71 participated in Intervention and control groups ($n= 46$ in each group). The variables of knowledge, attitude and backpack carrying behavior improved after intervention (respectively ($P < 0.001$)).

Conclusion: According to the results of this study, it is suggested to consider these findings in the design, implementation and evaluation of educational interventions to improve carrying behavior of backpacks among this vulnerable target group.

Keywords: Backpack, High school Student, Peer Education, Musculoskeletal Pain.

Introduction

Backpack is considered as one of the most popular and favorite carrying tools among different groups of the community, especially school children and adolescents^[1]. About 90% of students in the world carry backpacks^[2]. The use of backpacks and other types of school bags may impose pressures and apparent or hidden effects on students' posture which leading to some physiological dysfunctions. Musculoskeletal Pain is one of the most important and main pains in students and adolescents^[3]. In recent decades, most students tend to carry backpacks, and since the appearance of the bags becomes more important than their efficiency, the injury caused by improperly carrying heavy backpack has increased. In the

United States, 6,000 injuries have been reported from carrying heavy backpack^[4]. A number of studies have reported improper backpack carrying, increased weight, and improper backpack as a factor in Low Back Pain (LBP)^[2]. Today, LBP is one of the complaints of adulthood around the world and there is a significant relationship between the experience of LBP in childhood / adolescence and this pain in adulthood^[5]. According to the American Professional Association and the American Academy of Orthopedics, it has been argued that the students should not carry bags weighing more than 10% of their body weight^[5]. A study on 12-18 year-old students in Spain found that 74.4% of students who carried backpack, had back pain, low general health, low

physical activity, and more physical pain compared to those who carried less or no backpack^[6]. In Iran, neck, shoulder and back pain complaints have been reported among students regarding carrying school bags, so that girls complained more than boys^[7]. The results of a study on 5,000 11-14 year-old students in Mazandaran Province of Iran showed that 15% of students complained of back pain at the time of the study. In addition, throughout life, 40.3% of all students had back pain at least once, 19.3% twice, 8.9% three times and 31.5% several times^[8]. Many improper health behaviors in adulthood shaped in adolescence. Therefore, it is necessary to pay attention to adolescents' health behavior as the target population in health planning^[9].

Studies of adolescents, especially those which have done among female adolescents, show that lecturing, as the most common educational method, lacks the necessary attractiveness for learners and usually students do not show active participation^[10]. Therefore, other educational methods, such as peer education, can be used to increase learning,^[11-12]. Peer-based health education program is a comprehensive program to create an effective peer network to encourage and support adolescents to promote their health. In this method, the most unique opportunities for learning

health concepts are provided to peer groups to learn and strengthen the concepts through intra-group and extra-group interactions^[11]. Peer education is a type of education in which peer groups, in addition to receiving information and various health concepts, learn active educational skills to provide content. In this approach, the power of thinking and creativity of the individuals increases and their full participation in education is observed^[10]. Peer education allows better expression of learning level, feelings, attitudes, values and norms about what has been learned. As a result, a high-energetic problem-solving team is created to succeed the educational program^[13]. Due to the high prevalence of musculoskeletal disorders which be resulted from improper backpack carrying in students and also the importance of this behavior among female students, this study aimed to explore the effects of peer educational program on promote backpack carrying behavior among this vulnerable target group.

Materials & Methods

This quasi-Intervention study was conducted on 92 female high school students in Bahnemir, Iran using multi-stage cluster sampling method. Thus, out of six public high schools for girls, two high schools were randomly selected and assigned to the control

Table 1) Details of educational sessions regarding proper backpacks carrying

Session No.	Target variable	Educational content	Teaching method	Educational aids and materials
1 st session	Knowledge	Physical, psychological and social complications of improper backpack carrying	Programmed lecture (question and answer, discussion and lecture)	Power point, Video projector, and booklet
2 nd session	Attitude	Prevalence of musculoskeletal pain in students and the importance of carrying a backpack properly	Group discussion	Pamphlets and Class boards
3 rd session	Backpack carrying behavior	Ergonomic features regarding backpack carrying and the ways right carrying	Demonstration	Videos, Booklets, Posters, and Backpacks
4 th session	Backpack carrying behavior		Demonstrations and Psychodrama	Backpacks

Table 2) Demographic and contextual variables in Intervention and control groups (n = 46)

Group	Variable	Mean ± SD	No. (%)	P-value
Intervention Control	Age (years)	14.04 ± 0.72 13.0.76 ± 0.70		0.062
Intervention Control	Height (cm)	156.87±21 160.5 ± 36.77		0.194
Intervention Control	Weight (kg)	61.14 ± 27.30 61.16 ± 58.07		0.922
Intervention Control	Grade	7	23 (50)	1**
		8	23 (50)	
Control		7	23 (50)	
		8	23 (50)	
Intervention Control	Educational level	≤Diploma	41(89.1)	1**
		>Diploma	5(10.9)	
Control		≤Diploma	36(78.3)	
		>Diploma	10(21.7)	
Intervention Control	Father's job	Governmental employed	11 (23.9)	0.184***
		Self-employed	35 (76.1)	
Control		Governmental employed	5(10.9)	
		Self-employed	41 (89.1)	
Intervention Control	Mother's job	Employed	10 (18.7)	0.436
		Housewife	36 (78.3)	
Control		Employed	7 (15.2)	
		Housewife	39 (84.8)	
Intervention	Previous training history	Yes	13 (28.3)	0.815
		No	33 (71.7)	
		Yes	12 (26.1)	
		No	34 (73.9)	
Intervention Control	History of pain	Yes	16 (34.8)	0.501
		No	30 (65.2)	
Control		Yes	13 (28.3)	
		No	33 (71.7)	
Intervention Control	The site of pain	Shoulder	11 (23.9)	0.449
		Waist	5 (10.9)	
Control		Shoulder	9 (19.9)	
		Waist	4 (8.7)	

* ANOVA, ** Mann-Whitney, *** Chi-square

and intervention groups. Two classes were randomly selected in each high school. The sample size was estimated as 35 students in both intervention and control groups, using the study results of Mirmohammadi et al. [14]

with 90% test power, 95% confidence interval and using Pocock's formula^[15]. However with increasing 30% of sample size due to sample attrition, the number of total subjects in each group reached to 46 students.

Table 3) Comparison of studied variables between intervention and control groups at initial of the study and \ 6- month follow up

Studied variables	Initial of the study		6- month follow up		P value** (within group)
	Mean	SD	Mean	SD	
Knowledge- Intervention	7.71	2.48	9.78	1.72	<0.0001
Knowledge-Control	7.97	2.07	7.73	2.08	0.483
*P value (between groups)	0.586		<0.0001		
Attitude- Intervention	39.78	5.62	42.84	5.04	0.009
Attitude-Control	39.15	4.50	38.58	4.40	0.334
*P value (between groups)	0.554		<0.0001		
Behavior- Intervention	8.60	3.33	11.73	2.94	<0.0001
Behavior-Control	8.86	3.18	8.08	3.46	0.115
*P value	0.702		<0/0001		
Backpack weight - Intervention (kg)	6.14	0.57	4.09	0.92	<0.0001
Backpack weight - Control (kg)	5.93	0.65	5.35	0.81	0.100
*P value (between groups)	0.108		<0.0001		
The ratio of backpack weight to student' body weight - Intervention (kg)	0.10	0.01	0.06	0.02	<0.0001
The ratio of backpack weight to student' body weight - Intervention (kg)- Control (kg)	0.10	0.02	0.09	0.02	0.100
*P value	0.53		<<0.0001		
Backpack carrying duration (min / week) - Intervention	132.06	46.81	93.36	58.06	<0.0001
Backpack carrying duration (min / week) - Control	150.10	89.33	150.43	89.01	0.569
*P value (between groups)	0.228		<0.0001		

*ANOVA **T-paired

The study inclusion criteria included studying in junior high school, using a backpack to carry school supplies, and willingness to participate in the study. However, suffering from any kind of chronic pain, pain due to a known cause (such as trauma and rheumatic

diseases) and musculoskeletal disorders were the study exclusion criteria.

The data were collected through demographic and contextual variables and a researcher-made questionnaire taken from various studies in the field of knowledge, attitude

and backpack carrying behavior^[15-17]. Content validity (CVR = 0.8-1, CVI = 0.9-1), face validity (impact score = 2.5-3) and reliability (Alpha coefficient = 0.77, ICC = 0.72) were evaluated^[18]. The sub scale of knowledge consists of 12 questions with the answers 'Yes' (score 1) or No and I do not know " (score 0). The sub-scale attitude consists of 10 questions on 5-point Likert scale (from strongly agree to strongly disagree) with scores from 1 to 5. The sub-scale behavior has 9 items with answer options of correct (score 2), partially correct (score 1) and incorrect (score zero). The total score of the items for whole questionnaire was from 10 to 80.

Educational content was provided on the short-term and long-term effects of improper backpack carrying, how to arrange the book in the backpack, the definition of what is called ergonomic backpack, the importance of two-way carrying backpack instead of one-way carrying, training to estimate the appropriate weight of a backpack according to the weight of student body, training the necessary exercises after walking a relatively long distance.

In order to implement the educational intervention, two students interested in education and approved by other students were selected as peer educators. In a 75-minute session, the necessary education was presented to the peers by the trained researcher in the form of an interactive lecture and demonstration along with an educational video, poster and pamphlet. The trained researcher answered possible questions from peers after the educational session. After evaluating the ability and mastery of peers in the field of education and its content, the intervention was implemented by them under the supervision of the trained researcher. Peers used programmed lectures, demonstrations, psychodrama and educational materials such as booklets, posters, pamphlets and

films in four educational sessions (Table 1). Intervention and control groups were evaluated at the beginning of the study and six months later. After describing the aims and procedures of the research for the students the consent form was signed by the students.

Findings

Totally, 92 female students participated in the two Intervention and control groups (46 in each group) with mean age of 14.04 ± 0.72 and 13.76 ± 0.70 , respectively. Other demographic and contextual variables were listed in Table 2.

There were no significant difference between two groups in terms of knowledge, attitude, backpack carrying behavior, backpack carrying duration, backpack weight and the ratio of backpack weight to student' body weight at initial of the study ($P < 0.05$). However, six months after intervention, significant differences were observed in these regards ($P < 0.0001$). Paired t-test showed significant difference between before and after intervention just within the Intervention group ($P < 0.0001$)

Discussion

The educational intervention by peers led to promotion of knowledge, attitude, behavior, two-way backpack carrying as well as weight loss of backpack, backpack carrying duration and the ratio of backpack weight to students' body weight. The students' knowledge on how to carry a backpack was promoted after the educational intervention that is consistent with the study results of Goodgold et al.^[16] on promoting health of carrying a backpack, Mohammad Zaidi et al.^[19] on ergonomic behaviors of workers and Habib-Abadi et al.^[20] on back care. A study by Foltran et al.^[21] showed that acquisition of theoretical knowledge is the first step towards adopting healthy neural habits

to prevent back pain. Using programmed lecture teaching method, which is a kind of interactive lecture in combination with questions/answers and discussion could be resulted in increasing knowledge. In fact, if knowledge is increased properly, it can be maintained at a desired level over time. The knowledge promotion by peers has been consistent with the results of numerous studies on HIV/AIDS prevention behaviors [22, 23], pubertal health [24], mental health [11], and menstrual health [25]. The peers can communicate with other peers and convey information effectively and, as an available model, influence their peers [12]. However, the study results of Azizi et al [26], with the aim of comparing the effects of three methods of education by peers, physicians and pamphlets on knowledge of female students in the field of HIV prevention showed that education by physicians is more effective on increasing knowledge. The reason for the difference in the results can be due to the inability of peers to properly convey scientific content and engage the target group in the discussion. In other words, choosing the right and accepted educator with the power of expression and the ability to control the audience, is one of the essential conditions of education by peers.

A significant increase in attitude about the importance of proper backpack carrying after implementation of the educational intervention was consistent with the study results of Goodgold et al. [16] and Mohammadi Zaidi et al. [19]. In the study by Zaidi et al. [19], attitude was introduced as the strongest factor in explaining the behavior of observing the correct posture. In the present intervention, hiring peers in the role of guide and counselor as well as the participation of students in group discussions promoted the level of attitude. In this way, the most unique opportunities for learning health concepts are provided to peer groups to learn and

strengthen the concepts through inner and outer group interactions [11]. This finding was consistent with the study results of Alizadeh et al. [23], Taghdisi et al. [11] and Parsa et al. [25] in the field of peer education.

The students' behavior in carrying a backpack properly was improved in the intervention group. This finding was consistent with the study results of Goodgold et al. [16] and Mohammadi Zaidi et al. [19]. Feingold et al. [27] who reported that education on how to carry a backpack properly has an effect on improving students' quality of life and is reflected in participants' reduced reporting of musculoskeletal pain. Vidal et al. [28] stated that posture education has an effect on backpacking habits associated with low back pain and promotes health. In the present intervention, applying peer education approach empowered students and provided them with opportunities to participate in activities that improve the way of carrying a backpack. One of the achievements of this approach is development of appropriate behaviors and changes in unhealthy behaviors in target groups [11].

In fact, the use of peer education along with appropriate educational methods such as programmed lectures, group discussions, demonstrations and psychodrama led to promotion of knowledge, attitude, and proper carrying behavior in students. This education led to an increase in two-way carrying and a reduction in backpack weight, backpack carrying duration, and the ratio of backpack weight to student weight. Peer education allows learnings, feelings, attitudes, values and norms about learnings to be better expressed and a high-energy problem-solving group to be created for program success [13]. In this approach, all five senses are used, the power of thinking and creativity of individuals are increased and their full participation at different stages of the educational program is observed [24].

The present educational intervention led to promotion of knowledge, attitude and proper backpack carrying behavior in intervention group that receive routine and standard education in the field of proper backpack carrying. Although this study has its strong points due to experimental design and testing the proper educational intervention, the limitation of self-reporting might interfere the accuracy the findings. However the results of this study is consistent with previous valid studies.

Conclusion

Educational interventions using peers play an effective role in promoting knowledge, attitude, behavior, and standards of backpack carrying behavior among female high school students. It is suggested to consider these results in the design, implementation and evaluation of further educational interventions designing to improve backpack carrying behavior in this vulnerable target group.

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Authors contribution: NDT design and implement the study. SST supervised all steps of the study. Z Gh analyzed the data. All authors read the manuscript and approved it.

Conflict of Interests: There is no conflict of interest for this study.

Ethical Permission: In this study, the code of ethics was obtained from the Medical Ethics Committee of Tarbiat Modares University (IR. TMU. REC. 1396. 660) and informed consent was taken after describing the aims and procedures of the research for the students.

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