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Effectiveness of a Back Care Intervention on Spine-related Behavior among Female students: a school-based randomized controlled trial

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Authors

Niloofar Dadashi Tonkaboni[1] *MSc*
Sedegheh Sadat Tavafian[2*] *PhD*
Zeinab Gholamnia Shirvani[3] *PhD*

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[1] MSc graduated, Department of Health Education and Health Promotion, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
[2] Department of Health Education and Health Promotion, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
[3] Department of Medical Education Development, Education Development Center (EDC), Babol University of Medical Sciences, Babol, Iran

** Correspondence*
Address: No 212, Department of Health Education and Health Promotion, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
Tel: +98(21)82884547
Fax: +98(21)82884555
P.O.Box: 14115-111
Email: tavafian@modares.ac.ir

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ABSTRACT

Aims: Back pain is a major public health problem among adolescents and in particular among pupils. This study aimed to evaluate the effectiveness of a back care intervention on spine-related behavior among female students.

Method and Materials: This randomized quasi-experimental study was conducted on female students who were studying in high schools of Babolsar, Iran. Just intervention group received the peer educational program. However, the control group received no intervention. The data were collected by a valid questionnaire regarding backpack carrying . Effective factors in two time points of initial of the study and 6-month follow up were assessed. The data were analyzed by SPSS software version 21 at a significance level of 0.05.

Findings: Totally, 92 students including 46 students in intervention group and 46 students in control group participated in the study. According the findings of the study, mean ± standard deviation of backpack weight before the intervention was (6.14 ± 0.57), ratio of backpack weight to student weight was (0.1 ± 0.01) and backpack carrying duration was (132.6 ± 46.81) which all these variables six months after the intervention reduced to 4.09 ± 0.92; 0.06 ± 0.02 and 93.36 ± 58.06 respectively (P <0.001). The percentage of bilateral backpack carrying in the experimental group increased from 32.6% (n= 15) to 73.9% (n= 34) (P <0.001). However, no significant difference regarding mentioned variables was observed in the control group (P <0.05). The effect size of the intervention was moderate to large (0.4-0.6).

Conclusion: Peer educational interventions could be effective for improving back pack carrying behavior. However, doing more interventional researches in future is recommended.

Keywords: Backpack Carrying, Female Student, Spine-related Behavior, Educational Intervention.

Introduction

Carrying heavy backpacks by students may be associated with potential health condition[1]. In most studies, school children and adolescents are reported to have upper limb problem including back, neck, and shoulder pain[2, 3]. In one study, about one third of students identified backpacking as the cause of musculoskeletal pain[4]. In Iran, there are complaints about the neck, shoulders and lower back in connection with carrying school bags[5].Health education interventions can play an important role in promoting the correct behaviors of using and carrying a backpack and preventing musculoskeletal pain caused by it, for example, the educational intervention of Rodriguez-Oviedo et al.[6] was effective in reducing the weight of backpacks and Low Back Pain (LBP) in students.

One of the educational methods for adolescents is the use of peer education[7]. Peer education allows for better expression of learnings, feelings, attitudes, values and norms about what has been learned [8]. Peer education, defined as 'the teaching or sharing of health information, values and behaviors by members of similar age or status' has become a very important approach for health promotion and prevention in recent years[9]. The effective role of peer education in promoting

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proper carrying behaviors has been reported. However, lack of educational interventions in this field is so important deficiency and children are vulnerable target group of the community. Thus,, this study aimed to evaluate the effect of peer educational interventions on backpacks carrying behavior in female high school students in Babolsar, Iran.

Method and Materials

This quasi-experimental study was conducted on 92 female high school students in Bahnemir, Babolsar using multi-stage cluster sampling method.

The student and backpack weight was measured using GLAMOR digital scale (GBF-950, China). In order to determine the weight of the backpack, the student's weight was measured once without the backpack and again with the backpack and all its accessories. This measurement was repeated on three even days of the week to reduce the error in calculating the weight of the load carried by the students. The total weight of students' backpacks was averaged over three days and recorded in the relevant questionnaire. The students' height was also measured and recorded by SECA 206 wall height gauge (Germany) by a trained researcher.

In this study, peers were used to educate other students. Thus, the necessary training was first provided to peers. Then, during 4 educational sessions, peers taught other students. Peers used educational materials such as booklets, posters, pamphlets and films in four educational sessions. Furthermore, practical demonstration was provided by peers using a standard backpack. Students were asked to practice the taught topics in the presence of their classmates with their backpacks. In this practical demonstration, the researcher took on the task of guiding and encouraging the playwrights to play a better role. The data were analyzed by SPSS version 21 at a significance level of less than 0.05. ANCOVA was used to compare the effect of education on duration of backpack carrying, the ratio of backpack weight and backpack weight to student weight in two time points of before intervention and six months after the intervention in both groups of intervention and control. Chi-square was applied to evaluate effect of educational intervention on backpack carrying behavior in both groups during 6 month periods. The effect of educational intervention on quantitative and qualitative (nominal) variables in each group was compared by T- test, Paired T-test and McNemar tests, respectively. It is necessary to mention that.

Findings

Totally 92 female high school students including 46 students in intervention with mean age of 14.0 ± 04.72 years and 46 students in control group with mean age of 13.0 ± 07.76 took part in the study. Table 1 shows the rest of demographic characteristics. Table 2 shows the results of ANCOVA test to determine the effect of the educational intervention on the variables such as duration of backpack carrying, backpack weight, and the ratio of backpack weight to student weight after adjusting the effect of the variable in pre-test. A significant difference was between the adjusted means of the scores of the mentioned variables according to the group in the post-test stage ($P < 0.0001$). The effect size of the intervention was moderate to large (0.4-0.6) (Table 2). Chi-square test showed that percentage of backpack carrying behavior in students in the two groups of intervention and control after the educational intervention was significantly different ($P < 0.0001$). According to the results of McNemar test, the difference between before and after intervention within the experimental group was significant. The percentage of bilateral backpack carrying in the experimental group increased from 32.6% (n= 15) to 73.9% (n= 34) ($P < 0.001$) (Table 3).

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Table 1) Demographic characteristics of participants in experimental and control groups (n = 92)

Group	Variables		Mean ± SD	Mean rank	N (%)	P-value
Experimental Control	Age (Yrs)		14.0 ± 04.72 13.0 ± 07.76			0.062*
Experimental Control	Height (cm)		156.87 ± 21.00 160.5 ± 36.77			0.194
Experimental Control	Weight (kg)		61.14 ± 27.30 61.16 ± 28.07			0.922
Experimental	Grade		7 8	46.0	23 (50) 23 (50)	1**
Control	Grade		7 8	46.0	23 (50) 23 (50)	1**
Experimental	Father's education	< Diploma ≥Diploma			23(50) 23(50)	0.545
Control	Father's education	< Diploma ≥Diploma			25(54.3) 21(45.65)	0.545
Experimental	Mother's education	< Diploma ≥Diploma			20(43.4) 26(56.5)	0.792
Control	Mother's education	< Diploma ≥Diploma			25(54.3) 21(45.6)	0.792

* ANOVA, ** Mann-Whitney

Table 2) Effect of educational interventions on backpack weight, the ratio of backpack weight to student weight and backpack carrying duration

Variables / Statistical tests	Mean Square	Freedom degree (df)	Fisher statistics (F)	Significance	Effect size Partial Eta Squared
Backpack weight (pre-test)	7.16	1	10.47	0.002	0.105
Group	40.98	1	59.92	<0.0001	0.402
Backpack weight to student weight (kg) (Pre-test)	0.22	1	104.65	<0.0001	0.540
Group	0.12	1	59.60	<0.0001	0.401
Backpack carrying duration (min / week) (pre-test)	432267.15	1	506.02	<0.0001	0.850
Group	35364.02	1	41.39	<0.0001	0.317

Dependent variables: backpack weight, backpack weight to student weight and backpack carrying duration (post-test)

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Table 3) Comparison of backpacks carrying type between intervention and control groups in two time points

Time		Before		6-month follow up		Sig*
Group	**Carrying type**	**N**	**%**	**N**	**%**	
Experimental (n= 46)	One-way carrying	27	58.7	8	17.4	<0.0001
	Two-way carrying	15	32.6	34	73.9	
	Carrying by hand	4	8.7	4	8.7	
Total		46	100	46	100	
Control (n= 46)	One-way carrying	27	58.7	27	58.7	0.100
	Two-way carrying	14	30.4	14	30.4	
	Carrying by hand	5	10.9	5	10.9	
Total		46	100	46	100	
Chi-square (Sig)		0.146 (P = 0.93)		18.75 (P < 0.0001)		

*McNemar

Discussion

This study assessed the effects of educational intervention on backpack carring. The significant reduction in backpack weight in this study was consistent with educational interventions of previous studies.[10-13]. The intervention of previous study [14] using power point, pamphlet, and poster also led to a significant reduction in backpack weight in students. However, the existed evidence [15] was not consistent with this finding . It is argued that this difference could be due to not using peer educators. The ratio of backpack weight to student weight before the intervention was more than 10% of students' weight, which was consistent with the results of previous studies [10, 16-21]. After education, this rate reduced to 6%, which was consistent with the study results of previous studies.[14]. The backpack carrying duration was significantly reduced in the intervention group. This result was consistent with the previous study [14], which led to a reduction in backpack carrying duration and also neck, shoulder and back pain in students. Promoting the two-way backpack carrying method in the intervention group was consistent with the existed study [11]. In fact, the use of appropriate educational methods through peers led to the improvement of behavior regarding backpacking , reducing the weight of the backpack and its carrying time , the ratio of backpack weight to student weight and also increasing the rate of two-way backpack carrying that have positive effect .

In fact, peer education allows for better expression of what has been learned, feelings and attitudes, values and norms about what has been learned. As a result, a high-energy problem-solving team is created to succeed the program[8]. The present intervention, as far as the researcher knows, was the first program that promoted the correct

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carrying of backpacks in female students by employing peer educators. However, its results need to be interpreted with caution because this research was conducted on female high school students and future health education interventions need to be done in a larger sample size of male and female students at different levels of education so that if the same results are repeated, it can be provided for relevant organizations for implementation. Furthermore, in future studies, it is better to compare the effectiveness of peer-based education with at least one other type of educational method in the field of proper backpack carrying. Moreover, it is suggested that in future research, the effect of the intervention on the continues proper backpack carrying behavior over longer periods of time (for example one year) should be evaluated. Also, it is suggested that education, as an effective method to maintain the ratio of backpack weight to student weight at less than 10%, provide the necessary training in this field with the help of teachers and peers.

Conclusion

This study showed educational interventions could be effective for reducing backpack weight, backpack carrying duration, improving the ratio of backpack weight to student weight and also carrying two-way backpack. However, doing more interventional researches in future is recommended.

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Authors' Contribution: NDT was the main researcher and conduct all stages of the study and wrote the first draft of the manuscript. SST was supervisor of the study and supervised all stages of the study. ZGh was advisor of the study and conducted all statistical method for the study. All authors read the manuscript and approved it.

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

Ethical Permissions: Ethical principles were considered in the 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.

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