Original Article

Efficacy and impact of back care education on knowledge and behaviour of elementary schoolchildren

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Abstract

Objectives: To investigate the usefulness of a back care education programme on the promotion of knowledge and behaviour of fifth-grade elementary schoolchildren in terms of reducing risk factors for low back pain later in life.

Methods: Multi-stage random sampling was used to classify the pupils in one of the intervention or control groups. A validated questionnaire was filled out by each subject before the educational programme, and a week and three months afterwards.

Results: Improvement in knowledge and behaviour of pupils was observed a week and three months after the intervention ($P<0.001$) with no significant difference between the boys and the girls. However, a decreasing trend was observed in knowledge and behaviour pattern form a week to three months after the intervention.

Conclusion: Considering back care education in the school curriculum is recommended for long-term sustainability of an educational programme.

Keywords: Back care, Behavior, Education, Elementary schoolchildren, Knowledge (JPMA 62: 580; 2012).

Introduction

Most of the adults (70-80%) worldwide experience low back pain (LBP) at some point in their lifetime.[1] Of these, 80-85% are attributed to non-specific back pain.[2,3] Limited studies in Iran reported a seven-day prevalence of LBP as 23.4% in the rural area of north-west and 15.4% in capital Tehran.[4,5] Worldwide, LBP in childhood is also a major health issue with an annual prevalence of 19-58% in grad schoolchildren from grade 8 to 12.[6] The point and annual prevalence rate of non-specific LBP for 11-14 years-old children in the north of Iran were estimated to be 15% and 17.4% respectively.[7] The prevalence rate approaches to that in adults over school age and it is higher among girls than the boys.[3,8]

LBP risk factors in schoolchildren can be divided into four groups; lifestyle, physical, psychological and school-related factors.[9] Widespread proliferation of information technology and modern media, carrying heavy backpacks, seating mostly on mismatched furniture for a long time, and paying less attention to the child behaviour by parents result in LBP.[6,10-14] Therefore, school back care education for elementary schoolchildren has the advantage of giving prolonged feedback and access to a large population.[2,9,15]

Back care education has been under the spotlight for a long time in industrial countries. Several studies have illustrated the effects of various education programmes (e.g. basic pack pain principles, physical activities, guidelines for parents and teachers) on knowledge and behaviour of schoolchildren.[9,15,16] Further studies granted long-term effect and stability of back care education by conducting a well-designed back education intervention.[17-20]

The impact of education programme may not be similar in all countries with different school education systems, infrastructures and lifestyles. Lecture-based education system, limited space allocated to each child in school, mismatched school furniture with children body size, limited time for physical activities and inadequate sports facilities at school, spending long time commuting to school, inappropriate furniture at home while studying and watching TV can have an adverse impact on children behaviour and lessen the efficacy of any education programme. Furthermore, lack of media coverage and governmental structured programmes do not help to sensitise parents, children and educators to back care education.[21] Therefore, this study aimed at investigating the efficacy of back care education programme on promoting knowledge and behaviour of students in Zahedan, south-east of Iran. To our knowledge, the current study is the first interventional study evaluating the effect of back care education in elementary school in Iran.

Subjects and Methods

The study was carried out in Iran's south-eastern city of Zahedan, which is one the less-privilleged cities in the

country where most of families have a low or middle socio-economic status and low educational level. Transport modes are very limited, are available only on specific routes, taxis are too expensive for many, and there is no underground transportation system. Therefore, most students have to commute to school on foot. Physical activities of students at school are limited to about 2 to 3 hours a week in which children are expected to play football, volleyball or basketball in the school yard. At a time, 20-30 pupils play in a small and inappropriate playground mostly with no physical activity instructor and amid inadequate facilities.

For the purpose of the study, fifth-grade elementary school children aged 10-11 were considered. For sample size determination, a pilot study was conducted and data collected from two schools (25 boys and 25 girls) a week before and after the intervention. Mean promotion of knowledge and behaviour was estimated to be about 20 scores with a standard deviation of 30. Assuming slight difference in scores before and after intervention in the control group and taking 5% type I and 10% type II error, the sample size was calculated to be 48. However, considering possible knowledge and behaviour score reduction after three months of intervention, the final sample size was increased to 100 for both boys and girls in the control and intervention groups.

A multistage random sampling method was used to include a representative sample of the study population. As there are no co-education schools in Iran, separate lists of girls and boys schools were prepared based on their geographical location. With 25-30 students in a classroom, 4 schools each of boys and girls were selected through systematic random sampling method from each list. Next, a class was randomly selected from within the schools and all students in the class were recruited for the study. For control group, a school close to every selected school for the intervention group was randomly picked to make sure children in both groups were matched according to socio-economic factors. Then, a class within each school was randomly selected. Overall, 201 students (104 girls, 97 boys) were selected for the control group and 203 students (101 girls, 102 boys) for the intervention group.

The back care education programme and questionnaire were designed using previous published studies[18,19] and it was revised by a panel of experts in occupational health to validate the questionnaire locally. Some students were then asked to read through the questions one by one and explain what they were asked about. The questionnaire was finalised according to the experts' comments and students' feedback. The reliability of the questionnaire was also examined by Cronbach's alpha (0.84). Apart from demographic, transportation and the pain information, questionnaire contained two main sections regarding knowledge and behaviour of students with 15 and 14 questions respectively. Questions were weighted equally and 1 score was given to the correct answer. Then, the maximum score for knowledge and behaviour was transformed to 100.

The knowledge section contained questions about standards of school bag features (strip, length, weight), best way of carrying the school bag and heavy bags, the best way of moving bench or worktable, the best way of carrying an object, body posture when moving objects to a wheelbarrow, natural curvature of spine, the best way of relaxing the back when recess, the best posture when sleeping, feet position on the floor when sitting, space between the back of the knees and the leading edge of the chair, space between the top of thighs and the underside of the desk, appropriate desk height when sitting on the chair.

The behaviour section comprised the following questions: student's school bag features, sports activities during a week, way of relaxing the back when recess, bending knees or back when lifting objects or tying shoes, how close one shall be standing to the object when lifting, asking for help when lifting heavy objects, way of carrying the school the bag, daily checking of bag weight, placing book/homework on an inclined writing surface of desk/working table, using backrest when sitting in the chair, body posture when doing homework, body posture when sitting in the chair, placing books on the tablet arm of the chair.

A team of three persons with occupational health background were trained to carry out the research. Several meetings were held to make sure that all of them had the same understanding of the education programme content. Accordingly, they were able to disseminate the programme content in an appropriate way. The two groups — interventional and control — were compared. In both the groups, knowledge and behaviour of pupils were measured through the questionnaire a week before conducting the programme, a week and three months after the last educational session.

The education programme consisted of 4 educational pamphlets: anatomy and structure of spine; ergonomic principles about backpack; principles of sitting posture and lying; and body posture while lifting, pushing and pulling. The content of each pamphlet was presented during a 60-minute session in the classroom conducted by a trained expert. To ensure that the students were paying attention, the class teacher was present in all sessions. To allow an easy understanding of back care principles, the anatomy and spinal structure was presented through a skeleton. Furthermore, normal contents of a bag, wearing and carrying backpacks with different features was shown to the students practically. Backpacks of several students were weighed and it was explained to the students in the class whether or not their

backpacks had 10% of their body weight. Favourable postures related to sitting, lying, standing, pushing and pulling were demonstrated to the students. The appropriate posture while picking up objects and lifting was also explained practically in the classroom.

For statistical calculations, Mann-Whitney, Kruskal-Wallis, Pearson correlation and analysis of covariance was used to analyse the data using SPSS version 15. The study protocol was approved by the Health Promotion Research Centre of the Zahedan University of Medical Sciences, as well as by the ethics committee of the institution.

Results

More than 50% of the parents had low level of education (Table-2). The majority of the mothers were housewives with a lower educational level than the fathers. There was no significant difference in the control and intervention groups in terms of gender, ethnicity, father's education, mother's education, father's job and mother's job at the study baseline. However, the mode of transport was significantly different between the studied groups (P=0.003).

Most pupils (75% in control and 81.1% in the intervention group) commuted from home to school by walking. Private car was the second most common transport mode used by 17% and 8.5% in control and intervention groups. The time pupils spent on commuting in the intervention (16.01±14.90 min) and control (18.11±13.76 min) group was not significantly different (P=0.06). Furthermore, no association was detected between transport mode and commuting time in each group.

Though physical education is part of the weekly schedule in primary schools of Iran, most students (62.5%) had a weekly 40-minute session and 37.5% of the students had no session. At the time of arriving home from school, the common complaint was pain in the knee (44.9%), neck (41.2%), finger and wrist (39.1%), shoulder (30.7%), upper back (25.6%) and lower back (18.3%) respectively (Table-2).

A week after intervention, knowledge promotion in the intervention group (31.0±21.70) was significantly higher than the control group (1.8±18.01) after adjusting for primary knowledge scores (P<0.001). However, boy's and girl's knowledge promotion was not significantly different (P=0.238) and there was no significant interaction (P=0.146) between gender and groups of study. After three months of intervention, knowledge promotion remained significantly higher in the intervention group (17.1±26.07) than the control group (-6.4±18.52) after adjusting for primary knowledge scores (P<0.001). However, knowledge promotion was not related to gender (0.497) and no significant interaction between gender and group of study (P =0.182) was found (Table-3).

After a week of intervention, students could make a significant difference (P<0.001) in self-assessment of their behaviour in the intervention group (22.3±22.62) compared

Table-1: Frequency distribution of pupils' characteristics in intervention and control groups.

Pupils' characteristic		Control group number (%)	Intervention group number (%)	P_value
Sex	Boy	97 (48.3)	102 (50.2)	0.689
	Girl	104 (51.7)	101 (49.8)	
Ethnicity	Fars	103 (51.2)	93 (45.8)	0.275
	Baluch	98 (48.8)	110 (54.2)	
Father's education	Illiterate	29 (14.8)	24 (12.1)	0.149
	Elementary	32 (16.3)	41 (20.7)	
	Secondary	40 (20.4)	57 (28.8)	
	High school	54 (27.6)	45 (22.7)	
	University graduates	41 (20.9)	31 (15.7)	
Mother's education	Illiterate	57 (28.8)	53 (27.9)	0.702
	Elementary	46 (23.2)	54 (28.4)	
	Secondary	45 (22.7)	34 (17.9)	
	High school	33 (16.7)	33 (17.4)	
	University graduates	17 (8.6)	16 (8.4)	
Father's Job	Office worker	45 (23.9)	29 (15.7)	0.144
	Manual worker	41 (21.8)	42 (22.7)	
	Business	59 (31.4)	79 (42.7)	
	Military	18 (9.6)	11 (5.9)	
	Others	25 (13.3)	24 (12.9)	
Mother's job	Housewife	166 (83.4)	178 (90.4)	0.19
	Office worker	15 (7.5)	7 (3.6)	
	Business#	16 (8.0)	10 (5.1)	
	Others	2 (1.0)	2 (1.0)	

Business (tailor,barber,shopkeeper,…).

Table-2: Frequency distribution of pain when arriving from school to home.

Pain	None	Low	moderate	Sever
Neck	184 (58.8)	63 (20.1)	36 (11.5)	30 (9.6)
Shoulder	217 (69.3)	44 (14.1)	27 (8.6)	25 (8.0)
Upper back	233 (74.4)	30 (9.6)	27 (8.6)	23 (7.4)
Lower back	255 (81.7)	23 (7.4)	14 (4.5)	20 (6.4)
Knee	172 (55.1)	56 (17.9)	38 (12.2)	46 (14.7)
Finger & Wrist	190 (60.9)	48 (15.4)	30 (9.6)	44 (14.1)

Table-3: Mean and standard deviation of knowledge and behavior in the control and intervention group.

Group	Control		Intervention	
	Mean±SD	Mean diff. ±SD†	Mean±SD	Mean diff. ±SD†
Knowledge (before)	47.0±12.76	---	43.4±12.93	---
Knowledge (1w after)	48.1±13.78	1.8±18.01	74.5±19.60	31.0±21.70
Knowledge (3m after)	39.6±15.89	-6.4±18.52	60.5±24.32	17.1±26.07
Behavior (before)	54.7±13.57	---	53.3±16.34	---
Behavior (1w after)	56.0±16.43	0.27±18.78	75.8±18.58	22.3±22.62
Behavior (3m after)	49.2±14.37	-6.4±17.97	65.5±20.34	12.1±23.06

†Mean difference after and before intervention. Maximum score was transformed to 100.

to the control group (0.27±18.78). The difference between two groups still remained significant (P<0.001) three months after the intervention (12.1±23.06 vs. -6.4±17.97). The relationship of behaviour promotion and its interaction with gender was detected neither a week (p=0.311, p=0.389) nor three months after intervention (P=0.174, P=0.900).

Although knowledge and behaviour promotion after a week and three months of intervention were significantly different between the two studied groups, the effect of education programme reduced with time. In the intervention group, knowledge promotion a week after the intervention (31.0±21.70) was much higher than three months after the intervention (17.1±26.07). The same pattern was observed for behavior promotion (Table-3). A significant correlation between knowledge and behaviour promotion after three months (r=0.488, P<0.001) was found in the intervention group.

Discussion

This study aimed at investigating the effect of back care education programme on the promotion of knowledge and behaviour of fifth-grade schoolchildren. Knowledge and behavior promotion after a week and three months of intervention was observed which was in line with previous studies.[12,15-20] As expected, the intervention was more effective on the improvement of knowledge than behaviour. Behaviour change needs further attention to be paid by school teachers and parents as well as improvement in school infrastructure and furniture which was not the case in this study. The majority of parents had low-level education and teachers were not involved in the intervention programme due to the schools' compact regular schedule as well as the number of students (25-30) in a small classroom which could have made it difficult for the teachers to monitor and correct pupil's behaviour. Furthermore, inappropriate school infrastructure and mismatched school furniture with pupil dimensions could have had a negative effect on the sitting posture of the children, especially when reading and writing.[11]

The effect of the educational programme reduced with time, indicating that pupil's knowledge and behaviour promotion will not be sustained if the interventional programme is not repeated over time. It has been suggested that illustrated that education leaves a permanent effect in 2 years if the educational package is considered in the curriculum and teachers cooperate to repeat the educational materials.[19,20] This was not possible in our study as we were not allowed to intervene in the curriculum.

In our study, pupils felt pain in knee (44.9%), neck (41.2%), finger and wrist (39.1%) and shoulder (30.7%) when they arrived home. Another study in secondary schools of Tehran showed that the most musculoskeletal discomfort was observed in shoulders (38%) and neck (27.6%) area.[22] In two different rural and urban areas of Iran, although adults experienced pain in knee (39.2%, 25.5%), shoulder (22.7%, 14.5%), wrist (17.4%, 10%), hand and fingers (14.9%, 9.4%), the prevalence of musculoskeletal complaints was not as much as pupils reported in our study.[4,5] This might be due to the fixed-size school furniture for pupils of all ages, lack of media coverage and structured education programme for students' physical activities, lack of parent's knowledge about the risk factors of musculoskeletal disorders and long time

spent on commuting to school. In the study, 75% and 81.1% of the pupils in the control and intervention groups commuted to school by walking for a long time. The time of carrying the backpack must be considered even longer for several reasons; i) before starting their actual school sessions, all the pupils have to take part in the morning ceremony where they must stand in a queue for about 10-15 minutes and most of the students might carry their backpack during the ceremony; ii) there are no lockers for pupils at schools and majority of them probably carry their backpack in the break time between two sessions; iii) many schools have at least two floors and pupils have to carry their backpack while going up or down the stairs. Previous studies identified that the feature and weight of the backpack and carrying the backpack in an inappropriate way for a long time can affect neck and shoulder posture.[21,23,24]

Upper and lower back pain were estimated to be 25.6% and 18.3% in this study respectively. LBP prevalence in primary school-age children was estimated at 15% in the north of Iran and it was reported to be 23.4% for adults in a rural area of north-west, and 15.4% in the capital city of Tehran.[4,5] It seems LBP increases with age as exposure to risk factors is prolonged. Without shaping behaviour in childhood, it is less likely to be corrected in adulthood easily.

This study had some limitations; i) most schools did not have a physical instructor to help us in conducting the research, ii) there were 20-30 students in a classroom where students had a fixed seat and there was no space for re-designing the furniture to make it easier for conducting the education programme or make it more practical in the classroom, iii) teachers had to deal with so many students and it was not possible to evaluate pupil's behaviour through their teachers. Furthermore, we were not allowed to use a video camera to monitor pupil behaviour.

Conclusion

Knowledge and behaviour of students about LBP risk factors can be improved by an educational programme. However, the sustainability of education effects are not guaranteed unless the educational package is considered in the curriculum, parents are informed about the risk factors of musculoskeletal disorders and they are encouraged to monitor their children's behaviour. Furthermore, school infrastructure and furniture must be designed according to the needs of the students.

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