



Contents lists available at ScienceDirect

Chinese Journal of Traumatology

journal homepage: <http://www.elsevier.com/locate/CJTEE>

Original Article

Iranian teachers' knowledge about first aid in the school environment

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ARTICLE INFO

Article history:

Received 20 August 2018

Received in revised form

28 February 2019

Accepted 27 March 2019

Available online 19 April 2019

Keywords:

First aid
Knowledge
School teachers

ABSTRACT

Purpose: School students are at risk of unintentional injuries. Teachers are the main caregivers and the first protectors for school students and must be able to deliver first aid. This study aimed to assess the school teachers' knowledge about first aid in Kashan, Iran.

Methods: A cross-sectional study was undertaken on a sample of 200 teachers working in public and private primary, secondary and high schools in Kashan city, Iran. Data collection was achieved via a questionnaire consisting of items on teachers' characteristics and 20 questions on basic first-aid practices. One point was given for each correct answer. The lowest and highest possible scores were 0 and 20. Then, the sum scores 0–9, 10–16, and 17–20 were ranked as weak, moderate, and good first aid knowledge, respectively. Statistical analyses were performed using descriptive statistics, Chi-square and Fisher's exact tests, and regression analysis.

Results: The mean age and working experience of teachers were respectively (41.37 ± 6.35) years and (20.07 ± 7.29) years. Among all teachers 51.0% were males and 66.3% were working in public schools. Totally, 40.3% of the teachers had passed courses on first aid and 48.5% had confronted with situations needing first-aid; 59.7% evaluated their own knowledge of first aid as moderate. The mean score of first-aid knowledge was 10.00 ± 2.58. Teachers who had received first aid training and those with previous experiences of situations requiring first-aid possessed higher scores ($p < 0.001$). Most teachers answered wrongly to the questions regarding first aid in a child with a fracture (93.4%) or struck by electricity (85.2%).

Conclusion: Most of the teachers had insufficient knowledge on first aid. They mostly did not pass any training on first aid. Urgent action seems necessary for training teachers on first aid through in-service training programs.

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Introduction

Emergency situations can occur anywhere and anytime, whether on the street, at home or even in the school environment. School students are especially at the risk of unintentional injuries because they are in their active hours and especially have breaks between lessons to play and being refreshed.¹ Injuries can also take place during school sporting events and while engaging in extra-curricular activities organized by the school.^{2,3}

Studies showed that 88% of injuries in students were directly related to their physical activities,⁴ and almost 20%–24.5% of all activity-related injuries occurred during school hours.^{4,5} A study in

Egypt reported that of 614 injuries among high school students, 13.5% occurred at school.⁶ A study in France showed that 52.8% of the accidents in school students occurred during physical activities and 12.7% during breaks.² Allergic reactions to foods, drugs and insect bites may also occur in the school environment so that about 20% of children suffering from allergies have episodes of disorders during the school hours.^{1,7}

Injuries, accidents and urgent conditions occurring in the school environment need immediate and appropriate life-saving care before the affected person receives treatment by a medical expert.⁸ The life saving care or first aid is an assessment and interventions that can be implemented by a person nearby immediately with minimal or without medical equipment.⁹ Many western countries tried to provide better health care for students while at school by training of school nurses.^{10–12} However, in Iran, school nursing has not been introduced yet, and although a number of schools have health instructors, yet, in the school environment, teachers are the

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Peer review under responsibility of Chinese Medical Association.

main caregivers and the first line of protection for school children. Therefore, they must be able to deal suitably with injuries and health emergencies in students and those with special health care needs.³ The role of teachers is especially crucial in countries such as Iran where school health services are often neglected. However, this role can only be properly achieved if teachers are equipped with the needed knowledge and skills.^{3,9} Accordingly, the assessment of school teachers' knowledge regarding first-aid measures is important to provide the educational and health care authorities with appropriate data about the educational needs, which can help them plan and organize proper educational programs to enhance teachers' competence in providing appropriate timely healthcare to injured students.

In the United States, only in 5.4% of schools some teachers passed the first-aid training, and in many other schools none of the members of staff are equipped with proper knowledge or skills in this regard.¹³ A recent study in the United States compared the data from 2006, 2012, and 2016 and did not reveal statistically significant increases from 2006 to 2016 in the percentage of schools' preparedness plans for emergencies and disasters.¹⁴ In a study conducted on 187 teachers in Saudi Arabia, only 28.3% reported that they have attended a course on first-aid. Of them, 52.4% had satisfactory knowledge about bleeding, and 31% had satisfactory knowledge about poisoning.³ A study in India also reported that among 50 school teachers studied, 72% had previous experience of handling injured children in schools. But 86% did not attend any specific training program about the first aid management of injuries, and 74% of them obtained their first aid management information through health-related literature and from friends or relatives.¹⁵ In a study in Turkey, Eraslan and Ayca¹⁶ identified 254 injuries (such as trauma, sprain, and fractures) among 378 students in a primary school during a month. However, Turkish studies showed that most of the teachers had poor or unsatisfactory knowledge in first aid because they did not get such knowledge before.^{17,18}

Despite the prevalence and importance of unintentional injuries at school, the knowledge of Iranian teachers on the first aid management of trauma has not been studied. Two studies only examined the frequency of trauma in school environments. In the first study, Abdoli et al.¹⁹ investigated the prevalence of accident at schools in Rafsanjan. They assessed 153 schools and reported that on average 5.9 traumatic injuries and 14.1 non-traumatic injuries occurred in each school during a year. In another study, Amirzadeh and Tabatabaiee⁵ investigated the incidence of accidents among students in selected schools in Shiraz and reported that among 7137 school students, 1.2% experienced traumatic injuries in the school environment, among them 19.8% were hospitalized. In a recent study, Kamali et al.²⁰ in Hamadan examined the knowledge of 81 primary school health teachers regarding the emergency treatment of avulsed permanent teeth. The study showed that health teachers' knowledge of dealing with dental avulsion was poor. Only 16% of them had been trained on emergency management of dental trauma while more than 65% have encountered dental avulsion in students and only 11% reported that they were able to replant the avulsed teeth. Considering the prevalence of trauma and injuries in the school environment, and the importance of provision of rapid first aid, and due to the lack of studies on this important issue in Iran, this study aims to assess the school teachers' knowledge about first aid in Kashan, Iran.

Methods

This cross-sectional study was conducted between 1st November 2017 and 28th March 2018. The study was conducted in Kashan city, Iran. Among all public and private primary, secondary

and high schools in Kashan city, 20 were randomly selected. Then, the list of teachers in each school was prepared and the number of teachers needed from each school was calculated proportionally to the total sample size. Afterward a number of teachers needed from each school were selected randomly from the concerned list. If a teacher did not agree to participate, another one from the same school was randomly replaced. The inclusion criteria were: teachers working in Kashan's school, having at least 1 year of working experience as a teacher, and willingness to participate in this study.

Sample size calculation

The sample size was calculated using the results of a previous study in which 12% of teachers demonstrated a good knowledge regarding first aid management.⁸ Then, as we were to investigate the prevalence of the teachers' good knowledge about first aid, considering a type I error of 0.05, an expected prevalence (P) of 0.12, and a *d* (i.e., a degree of precision) of 0.05, and the formula for estimating the proportion of a qualitative feature in the community (i.e. $n = Z^2 \cdot \frac{pq}{d^2} = 1.96^2 \times 0.12 \times 0.88 / 0.05^2 = 163$), a sample of 163 teachers was estimated to be enough for this study. However, to improve the representativeness of the sample, we recruited 200 teachers in this study.

Instruments and data collection

A two-part instrument was used in this study. The first part included questions about respondents' demographic characteristics, including age, gender, marital status, if married, then number of children, work experience, qualification, type of the school and the grade they teach, field of study, previous experiences of handling injured children in school, if yes, how many times and types of incidents, previous training related to first-aid, the source of information about first aid, self-evaluation of ability in first aid, liking to learn first aid managements, having a health instructor in the school, if yes, the proficiency of the health instructor in first aid managements.

The second part of the instrument included 20 questions on basic first-aid practices (one filling in the blanks, 5 multiple choice and 14 true/false questions). One point was given for each question answered correctly. The lowest and the highest possible scores were 0 and 20. Then, the sum scores 0–9, 10–16, and 17–20 were considered as weak, moderate, and good first aid knowledge, respectively. The first aid assessment questionnaire was previously designed by Sönmez and colleagues.²¹ In the present study, the original first aid assessment questionnaire was translated into Persian by two expert translators. The translated questionnaire was revised after merging and confirmed by two faculty members who taught first aid and emergencies in the nursing and midwifery faculty. The confirmed questionnaire was then back into the English language to check for any possible content inequality between the original questionnaire and its final translated version. The final version was then passed to five faculty members who taught first aid, emergencies, and nursing. In this process one of the fill in the blank questions (i.e. the phone number to be called in cases of poisoning for information) was replaced with a true and false question. Afterward, the CVR and CVI of the Persian questionnaire were calculated as 0.91 and 0.89 respectively. The final Persian questionnaire was then answered by 10 teachers (who were not included in the final sample) to elucidate its comprehensibility and readability. After two weeks, the same teachers were again answered the questionnaire and the test-retest reliability coefficient was calculated as 0.95.

After each participant agreed to take part in the study, the questionnaire was passed to them and they were asked to read and

answer the questionnaire in a private and comfortable setting and return it back to the researcher within 24 h, when the researcher back to the school to gather the completed questionnaires.

Ethical considerations

This study was approved by the review board and the research ethics committee of Kashan University of Medical Sciences (approval code: IR.KAUMS.REC.1396.56). Permissions were obtained from the authorities in the Kashan University of Medical Sciences and also from the school managers. All participants were assured that their personal information would be kept confidential. The study aim was fully expressed to all participants and they signed a written informed consent that was attached to the study questionnaire.

Data analysis

Statistical analyses were performed using SPSS 16 software. Descriptive statistics (frequency, percentage, mean and standard deviation) were calculated. Chi-square and Fisher's exact tests were used to examine the relationship between demographic information and participants' knowledge. Regression analysis was performed to examine the predicting factors for teachers' knowledge of first aid. *p* values less than 0.05 were considered significant in all tests.

Results

One hundred and ninety-six teachers returned their questionnaire (a response rate of 98%). Among all teachers 51.0% were males. The mean age of the teachers was (41.37 ± 6.35) years and 43.9% were in the age group of ≤ 40 years old. Most of the teachers were married (70.9%) and had two or more children (50.4%). Most of them (65.8%) had a Bachelor of Science degree while 5.6% were high school graduates. The mean professional working experience was (20.07 ± 7.288) years and 83.2% worked for more than 10 years. A majority of the teachers had been studied in physics, chemistry, mathematics and sciences (20.9%), worked in public schools (66.3%) and were teaching in primary and secondary schools (68.4%) (Table 1).

Totally, 40.3% of the teachers reported that they had passed courses on first aid and 48.5% confronted with situations where first-aid were required in the school environment. The most common situations requiring first-aid were respectively faint and convulsion (15.8%), wounds (14.7%), and insect bit (12.6%).

Most of the teachers (59.7%) evaluated their personal knowledge of first aid management as moderate and only 8.2% evaluated themselves as good in this regard. The most commonly reported sources of knowledge of first aid management were books (33.3%), internet (33.3%) and the media (21.2%). Most of the teachers (95.9%) reported that they were willing to learn about first-aid managements. Although 68.9% of the teachers reported that there are health instructors in their schools, but 29.6% estimated the proficiency of the health instructor in first aid as poor.

Overall, no one had good first aid knowledge, but 63.3% and 36.7% showed moderate or weak first aid knowledge, respectively. The mean score of knowledge in first-aid was found to be 10.00 ± 2.58 (ranging from 0 to 15). Teachers who had received first aid training possessed a higher mean first aid knowledge score than those who had not been trained in this regard (11.11 vs. 9.16, $p < 0.001$). Moreover, the mean score of first-aid knowledge was significantly higher in teachers who had previous confrontations with situations requiring first-aid in the school environment than those without such a history (10.62 vs. 9.41, $p < 0.001$). In addition,

the teachers who weighed up their knowledge to be good got significantly higher scores than those who appraised their knowledge as moderate or weak ($p < 0.001$). However, no significant differences were found between the teachers mean first aid knowledge scores and personal variables such as gender, age groups, marriage, number of children, etc. ($p > 0.05$ for all comparisons) (Table 1).

In regression analysis, among all variables only previous first aid training and self-evaluation of first aid ability could predict the teachers' knowledge of first aid knowledge (adjusted R^2 : 0.181) (Table 2).

Generally, 85.7% of the teachers knew the telephone number that must be called in emergency situations in Iran. Moreover, the questions with the most and least correct answers are shown in Table 3.

Discussion

In the present investigation the teachers got about half of the possible score of first aid knowledge. This finding was consistent with a previous study in Turkey in which practicing and prospective elementary and secondary school teachers demonstrated weak knowledge in first aid.²² A study in Saudi Arabia also reported that knowledge about first aid was not satisfactory among teachers of primary boys' schools.³ A study in the United States has also reported that in many schools none of the members of staff are equipped with proper knowledge and skills regarding first aid.¹³ The teachers' inappropriate knowledge of first aid will decrease the chance of students in receiving suitable and timely first aid which consequently may increase the risk complications after any incident in the school environment. However, educating even a few teachers in each school in first aid would improve the safety of everyone in the school environment. Therefore, the policymakers are responsible to plan and implement first aid teaching programs for all school teachers or at least for teachers selected from each school.

About 40% of teachers participated in this study reported that they passed previous training on first aid. Moreover, only 8% of the teachers evaluated their own knowledge of first aid as good. A study in the United States, merely in 5.4% of schools some of teachers passed first-aid training.¹³ A study in Saudi Arabia also reported that only 28 had a history of attending a course on first-aid.³ A study in India also reported that only 14% of teachers attended a specific training program about first aid.¹⁵ In a recent study in Turkey, 73% of the school teachers have received planned first-aid education, but only 15.5% of them evaluated their level of first-aid knowledge as good.²¹ Finding of the present study confirms the authorities' inattentiveness toward the importance of preparation of teachers for first aid. An individual trained in first aid will be more confident and motivated to provide helps during the incidents occurred in the school settings. However, people who did not receive any specific training in first aid would likely avoid any help in fatal accidents. Untrained persons may also attempt to inappropriate interventions that consequently may intensify the injury. Nonetheless, the perception of sufficiency of school teachers should be increased with appropriate training programs.

In the current study, the most commonly reported sources of knowledge were books and the internet. On the other hand, more than 95% of the teachers were interested in learning first aid. These findings show that the teachers are aware of the importance of having adequate knowledge of first aid. Also, teachers who had previous confrontations with situations requiring first-aid in the school possessed higher mean score of first-aid knowledge than those without such a history. In a study in Turkey, 62% of teachers had a previous training in first-aid, but more than half of the

Table 1
Distribution of the teachers' scores of first aid knowledge according to their demographic variables ($n = 196$).

Variables	n (%)	Score of first aid knowledge (Mean \pm SD)	p value
Gender			0.99
Male	100 (51.0)	10.00 \pm 2.63	
Female	96 (49.0)	10.00 \pm 2.55	
Age (year)			0.54
≤ 40	86 (43.9)	9.87 \pm 2.65	
≥ 41	110 (56.1)	10.10 \pm 2.54	
Qualification			0.96
High school diploma	11 (5.6)	10.00 \pm 3.37	
Associate degree	20 (10.2)	10.20 \pm 1.85	
Bachelor	129 (65.8)	10.01 \pm 2.43	
Master of science and doctorate	36 (18.4)	9.83 \pm 3.22	
Years of experience			0.29
< 5	14 (7.1)	9.21 \pm 2.77	
5-10	19 (9.7)	9.47 \pm 2.09	
> 10	163 (83.2)	10.12 \pm 2.61	
Field of study			0.59
Pedagogy and humanities	36 (18.4)	10.00 \pm 3.37	
Literature and theology, and instructional management	19 (9.7)	9.82 \pm 2.33	
Physics, chemistry, mathematics, sciences	41 (20.9)	10.11 \pm 2.43	
Physical education	12 (6.1)	10.20 \pm 1.85	
Others	88 (44.9)	10.00 \pm 3.37	
Type of school			0.55
Public	130 (66.3)	9.78 \pm 2.56	
Private	66 (33.7)	10.12 \pm 2.34	
Grade they teach			0.83
Primary and secondary school	134 (68.4)	10.01 \pm 2.76	
High school	62 (31.6)	9.96 \pm 2.44	
Marital status			0.65
Married	139 (70.9)	10.02 \pm 2.40	
Unmarried	43 (21.9)	9.91 \pm 2.58	
Divorced or widowed	14 (7.2)	10.02 \pm 2.40	
Number of children			0.71
0	23 (16.6)	9.92 \pm 2.48	
1–2	46 (33.0)	10.10 \pm 2.25	
> 2	70 (50.4)	10.14 \pm 2.16	
Previous first aid training			0.001
Yes	79 (40.3)	11.00 \pm 2.06	
No	117 (59.7)	9.16 \pm 2.68	
Having personal experiences with incidents at school			0.001
Yes	95 (48.5)	10.62 \pm 2.23	
No	101 (51.5)	9.41 \pm 2.76	
Types of incidents they managed ($n = 95$)			0.57
Wounds	14 (14.7)	9.98 \pm 1.99	
Burns	8 (8.4)	9.74 \pm 5.43	
Insect bite	12 (12.6)	10.02 \pm 2.40	
Poisoning	8 (8.4)	9.91 \pm 2.58	
Fractures	10 (10.5)	9.98 \pm 1.99	
Faint and convulsion	15 (15.8)	9.74 \pm 5.43	
Electrical injuries	4 (4.2)	10.00 \pm 2.39	
Nose bleeding	10 (10.5)	9.91 \pm 2.58	
Others	14 (14.7)	9.98 \pm 1.99	
Source of information about first aid ($n = 132$)			0.76
Books	44 (33.3)	9.98 \pm 1.99	
Media	28 (21.2)	9.74 \pm 5.43	
Healthcare personnel	16 (12.2)	10.02 \pm 2.40	
Other (internet)	44 (33.3)	9.91 \pm 2.58	
Self-evaluation of first aid ability			0.001
Good	16 (8.2)	11.25 \pm 1.80	
Moderate	117 (59.7)	10.58 \pm 2.25	
Weak	63 (32.1)	8.60 \pm 2.78	
Liking to learn first aid managements			0.78
Yes	188 (95.9)	10.01 \pm 2.42	
No	8 (4.1)	9.75 \pm 5.47	
Existing a health instructor in the school			0.57
Yes	135 (68.9)	10.11 \pm 2.41	
No	61 (31.1)	9.98 \pm 2.64	
Teachers' estimation of the proficiency of the health instructor in first aid ($n = 135$)			0.56
Good	95 (70.4)	10.13 \pm 2.53	
Poor	40 (29.6)	9.91 \pm 2.58	

courses were theoretical. Consequently, most of the teachers had the feeling of being incompetent in first-aid.²³ In another study in Saudi Arabia only 28% of teachers participated in a study had a

history of attending a course on first-aid. Of them, a majority reported that these courses were theoretical.³ Then, it can be concluded that establishment of workshops and practical trainings

Table 2
Results of regression analysis to determine the predicting factors of teachers' knowledge of first aid^a.

Model	Unstandardized coefficients		Standardized coefficients Beta	T	Sig.
	B	Std. Error			
(Constant)	9.956	0.914		10.898	<0.001
Self-evaluation of first aid ability	1.195	0.304	0.272	3.925	<0.001
Previous first aid training	1.332	0.359	0.257	3.706	<0.001

Adjusted R²: 0.181.

^a Dependent variable: Total score.

Table 3
The first aid questions with the most and least correct answers.

Question	Correct answer, n (%)
When foreign body such as a knife is stuck in a child's body, he/she should be transported to the nearest hospital without pulling out the foreign body.	170 (86.7)
_____ should be called for transportation of injured/patient in Iran	168 (85.7)
A child with head trauma should be kept awake.	165 (84.2)
A child who has been struck by electricity would not be contacted directly.	160 (81.6)
In case of fracture, the ends of fractured bone should be pushed inside, if they are out.	13 (6.6)
The organ with pain should be forced to move to understand if there is fracture in a child who has been injured after falling	21 (10.7)
A child who has been struck by electricity who has open consciousness does not need to be taken to hospital.	29 (14.8)
What would you do for a child with consciousness whose airway is fully obstructed (ingested foreign body) and who cannot cough	33 (16.8)
When a foreign body entered the child's eye, the affected eye must be irrigated with running cold water and then be pressed till the foreign body is expelled out from the eye.	34 (17.3)
A child who has fallen from a high level should be laid down in the supine position and the head should be turned sideways.	43 (21.9)

on first aid can not only improve the teachers' knowledge and skills of first aid, but also improve their confidence to intervene in emergency incident both in school and in the public settings. Considering the teachers' answers to the questions related to first-aid knowledge, issues such as caring for children with seizures, primary care of wounds and bleeding, and primary care needed in insect bites, electrical injuries, falling of height, and head traumas, should specially be included in the teachers in-service training programs.

More than two third of the teachers in this study reported health instructors are accessible in their schools, but about one third evaluated them as poorly efficient in providing first aid. A previous study of primary school health teachers' knowledge regarding the emergency treatment of avulsed permanent teeth in Hamadan reported that primary school health teachers' knowledge of dealing with avulsion was not at a high level.²⁰ Given these findings and due to the vital importance of prompt access to experts in first aid in the school settings, training and employing professional experts in first aid and school health should be considered as a priority by the ministries of education, and health. Moreover, in-service first aid trainings must be held for retraining the existing school health instructors.

In the present study, no significant relationships were found between the teachers' first aid knowledge and their characteristics such as gender, age, marriage, number of children, qualification, years of professional experience, field of study, type of the school and the grade they were teaching, source of information about first aid, interest in learning first aid, and having a health instructor in the school.

Two studies in Turkey found a negative correlation between age and teachers' knowledge of first aid. However, these studies found no significant relationship between teachers' first-aid knowledge and professional working time.^{17,21} The difference in our findings and the aforementioned studies might be attributed to the differences in the study samples, settings and teacher preparation and in-service programs in different countries.

In regression analysis of our data, only previous first aid training, and self-evaluation of first aid ability, could predict the teachers' knowledge of first aid. Therefore, urgent action seems necessary to be implemented by the authorities and policymakers towards training teachers on first aid through in-service training programs. Moreover, the curriculum of prospective teachers in all subjects should be revised so that all prospective teachers receive first aid training.

A number of limitations are worth discussing. First, it was a self-report study and conducted in a city. Therefore, further large and multicenter studies are recommended to investigate the teachers' first aid knowledge countrywide, and assess their educational needs in this important issue. In this study, teachers reported their estimation about the proficiency of the schools' health instructors in first aid. However this is a subjective estimation and can be enhanced by an actual testing of the health instructors' knowledge of first aid in future studies. Moreover, due to the descriptive nature of this study, it is not possible to determine a cause and effect relationship between variables. Despite these limitations, the findings provide a framework for the further studies of specific educational needs of teachers about first aid.

In conclusion, most of the teachers participated in the present study had insufficient first-aid knowledge. They mostly did not pass any training on first aid and get their own knowledge of first aid mostly from books and the internet. However, almost all teachers were interested in learning first aid. In regression analysis, only previous first aid training, and self-evaluation of first aid ability, could predict the teachers' knowledge of first aid. Therefore, urgent action seems necessary to be implemented by the authorities and policymakers towards training teachers on first aid through in-service training programs. Moreover, the curriculum of prospective teachers in all subjects is suggested to be revised so that all prospective teachers receive first aid training. The mass media should also help by communicating the importance of first aid. Perhaps, training and recruiting school nurses, is the best way for providing better health care for students while at school, as many western countries did it.

Funding

This study was supported by the research deputy of Kashan University of Medical Sciences, Kashan, Iran.

Acknowledgements

The authors would like to acknowledge of all teachers who participated in this study.

Ethical statement

This study was approved by the review board and the research ethics committee of Kashan University of Medical Sciences (approval code: IR.KAUMS.REC.1396.56).

Conflicts of interest

The authors certify that there is no relationship between a commercial party and material contained in this manuscript that might represent a potential conflict of interest.

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