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ORIGINAL ARTICLE

Burn first aid knowledge and its determinants among general population of Rawalpindi

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Abstract

Objective To assess the general knowledge and practices related to burn first aid treatment (BFAT) and to examine age, gender, socioeconomic status, education and previous history of exposure to burn (self/family member) as factors influencing burn first aid knowledge among the general population of Rawalpindi.

Study design A cross-sectional, descriptive survey.

Place and duration of study Three major tertiary care hospitals of Rawalpindi, from August 2017 to May 2018.

Methodology All consenting people ≥ 18 years of age, with or without a prior history of burn, accompanying patients to three major tertiary care centers of Rawalpindi were administered a pre-tested structured questionnaire. The questionnaire was divided into two sections; socio-demographic section and knowledge on BFAT. Those who were illiterate and could not fill the questionnaire were interviewed and their responses were marked by the researchers themselves. Data were analyzed using SPSS version 21.

Results A total of 400 participants comprising 205 (51.3%) males and 195 (48.8%) females with a mean age of 38 ± 10.3 years were included. The majority (58%) were educated up to 12th grade or higher. "Toothpaste" (47.5%) followed by "cool running water" (20.3%) were the two most frequently applied items following a burn injury. Only 8.8% respondents applied cold water for the ideal time duration. Overall, 83% of the participants provided correct answers for 25–50% of the survey questions. Socioeconomic and educational status of the participants had a significant association with burn first aid knowledge.

Conclusion A significant limitation of knowledge regarding BFAT was seen among the general population of Rawalpindi.

Keywords Burns · First aid · Knowledge · Socioeconomic factors · Demographic factors

Introduction

Burn injuries are considered to be one of the most devastating public health issues owing to its serious physical, functional and psychosocial consequences [1]. Burns are the fourth predominant cause of injury resulting in 265,000 deaths annually across the globe. An estimated 11 million people suffer from burn injuries each year worldwide [2]. According to WHO, more than 95% of these burn injuries

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occur in low- and middle-income countries (LMICs). Moreover, the death rate due to fire-related injuries in LMICs is almost six times higher than the high-income countries [3].

First aid has been defined as an emergency care or treatment given before regular medical aid can be obtained. An ideal first aid treatment is easily accessible, simple to perform and does not alter the subsequent assessment and management of the injury at a later stage [4]. The aim of burn first aid treatment (BFAT) is to halt the tissue damage, stabilize the vasculature, reduce edema and provide appropriate analgesia [5]. For past many years and even until now, people have been using a variety of topical agents for burn injuries without any proven scientific evidence. The most commonly used items include ice, natural plant remedies, oil, honey, vinegar, flour, toothpaste, eggs and even a mixture of urine and mud [1, 5]. Administration of such bizarre treatments not only worsens the injury but also promotes bacterial growth resulting in increased post burn complications. On the other hand, prompt administration of appropriate BFAT has been shown to reduce hospitalizations and decrease morbidity and mortality [1]. Current guidelines recommend immediate application of cool running water at a temperature of between 2 and 15 °C for a time period of 20 min as an adequate BFAT [6].

Various studies have been carried out to evaluate first aid practices and level of knowledge among different populations worldwide. The majority of these studies have indicated a lack of awareness regarding current recommendations of BFAT [7–10]. In Pakistan, burn injury has always remained an under-researched area and very little has been reported about it in the literature before [2]. We conducted this study with an objective to assess the general knowledge and practices related to BFAT and to examine age, gender, socioeconomic status, education and previous history of exposure to burn (self/family member) as factors influencing burn first aid knowledge among the general population of Rawalpindi. To our knowledge, this is probably the first study being carried out in Pakistan that not only aims at identifying the common first aid practices in burn-related injuries but will also help us to identify the determinants of burn first aid knowledge. The findings of this study would enable us to impart education, especially to those subgroups that demonstrate a relatively poor level of knowledge. Furthermore, the conclusions drawn from this study would also facilitate us to recognize the areas of weakness and addressing them adequately in future.

Materials and methods

This was a cross-sectional descriptive survey conducted in Rawalpindi between Aug 2017 and May 2018. The study population comprised of the general public of Rawalpindi. Keeping 95% confidence interval (CI), a 5% margin of error and a prevalence of 50%, the minimal required sample size calculated for this study was 377. A total of 400 participants were included by consecutive non-probability sampling technique. All consenting people $\geq$ 18 years of age, with or without a prior history of burn, accompanying patients to three major tertiary care centers of Rawalpindi, were included in the study. Moreover, individuals < 18 years of age and those who refused to participate in the study were excluded.

A pre-tested structured questionnaire was designed and translated into a local language that was easily comprehendible by the study participants. The questionnaire was divided into two sections; socio-demographic section and knowledge on BFAT. The first section of questionnaire comprised of age, gender, socioeconomic status, education and prior history of exposure to burn (self/family member). Moreover, the second section had questions on various first aid measures commonly employed following a burn injury (see "Appendix"). The questionnaire was distributed among study participants belonging to different socioeconomic backgrounds. Those who were illiterate and could not fill the questionnaire were interviewed and their responses were marked by the researchers themselves. An informed oral consent was taken from all the participants after explaining the study objectives. Confidentiality of participant's information was maintained properly where the participant had the choice to refuse and withdraw from the interview. The study was approved by the Ethical review board and Community Medicine department of the Rawalpindi Medical University.

All the data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 21. For categorical variables, frequencies and proportions were calculated and for continuous variables, means and standard deviations were calculated. The descriptive analysis of data was presented in the form of tables and graphs. Respondents with missing data were omitted from specific analyses where the missing values occurred. Statistical analysis was done using Chi-square test. Confident intervals were set at 95%, and p value $\leq$ 0.05 was taken as statistically significant.

Results

A total of 400 participants were included in the study comprising 205 (51.3%) males and 195 (48.8%) females. Their age ranged from 18 to 67 years with a mean age of 38 ± 10.3 years. 42% of the study participants had education below secondary level, whereas 58% of the respondents were educated up to secondary level or higher. The majority of the participants (57.25%) belonged to the lower socioeconomic group having a monthly income ranging between Rs. 5000 to Rs. 25,000 ($38.76–$193.80). 56.3% of the respondents

reported having experienced a burn injury in the past either to themselves or to a close family member (Table 1).

The results of the first aid knowledge of burn injuries among the general population are outlined in Table 2.

Assessment regarding the knowledge and preference towards the application of best first aid item revealed that "toothpaste" was the most commonly applied item (47.5%) to a burn wound in our setup followed by "cool running water" (20.3%) as the second most frequent measure adapted (Fig. 1). More females (24.61%) as compared to males (16.09%) answered correctly to this question (p value = 0.03). Similarly, participants with education level up to secondary or higher performed better (24.56%) than those with lower education level (14.28%), the result was statistically significant (p value = 0.01). Moreover, among those who applied cold water, only 8.8% applied it for the ideal time duration (15–20 min), 39.3% applied for 5–10 min, whereas 49.5% believed that water should never be applied to a burnt area.

When asked about covering the burn area, the majority (63.5%) preferred to leave the burnt area open and 31.8% covered appropriately using a clean cloth. Only 4.8% chose cling film as the best possible item to cover the skin surface following a burn injury. The proportion of males (44.39%) answering correctly to this question was higher than the females (28.20%) (p value = 0.000). Similarly, socioeconomic status (p value = 0.002) and level of education (p value = 0.01) also had a statistically significant effect on the ability of the respondents to answer this question correctly.

Following a burn trauma, 82.3% people preferred to remove accessories and clothing from the injured area. Participants with previous exposure to burn injury answered

Table 1 Characteristics of study participants

Characteristics	Subgroups		Number (n = 400)	Percent (%)
Age group (years)	18–30		193	48.3
	31–42		104	26.0
	43–54		59	14.8
	> 54		44	11.0
Gender	Male		205	51.3
	Female		195	48.8
Education level	< 12th grade (below secondary level)		168	42
	≥ 12th grade (up to secondary level or higher)		232	58
Monthly income (PKR/USD)	PKR	USD (approx.)		
	Nil	Nil	109	27.3
	< 10,000	< 77.52	63	15.8
	10,000–25,000	77.52–193.80	57	14.3
	25,000–50,000	193.80–387.60	95	23.8
	> 50,000	> 387.60	76	19.0
Previous exposure to burn (self/family member)	Yes		225	56.3
	No		175	43.8

Table 2 Results of the first aid knowledge of burn injuries among the study participants

Contents of survey	Responses			
	True		False	
	n	(%)	n	(%)
Best first aid item	81	20.3	319	79.8
Duration of water lavage	35	8.80	365	91.3
Covering the burn surface area with cling film/clean cloth	146	36.5	254	63.5
Application of cool water to a large burn surface area in winters	44	11.0	356	89.0
Best method to escape from a building on fire	82	20.5	318	79.5
Use of stairs, lift or window in case of fire in a multistorey building	270	67.5	130	32.5
Removal of accessories and clothing	329	82.3	71	17.8
Best step in case of blister formation	160	40.0	240	60.0

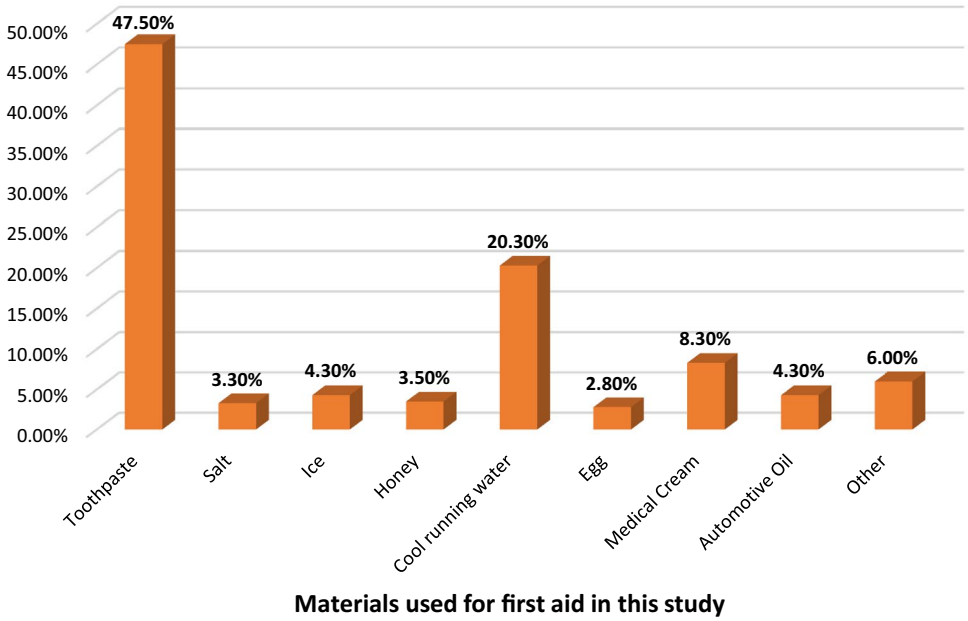

Fig. 1 Materials used for first aid in this study

correctly to this question (90.22%) as compared to those who did not have a past history of burn trauma (p value = 0.000). With regard to the application of cold water to a large burn surface area in winters, 29.8% individuals were completely unaware of the risks of hypothermia and its complications, 11.0% preferred cool towel application, whereas 59.3% chose not to apply water under these circumstances. A statistically significant association (p value = 0.03) was seen between knowledge on risks of hypothermia and level of education of the study participants.

When inquired about the best way to escape from a building on fire, only 20.5% responded correctly that they will crawl out of the building while covering their faces with a wet towel, whereas 44.5% said that they will run as quickly as possible. Again, people with a higher level of education performed better in this scenario (p value = 0.002). The majority of the people (67.5%) chose stairs as the best possible route to escape from a multistorey building on fire. However, people above 42 years of age provided the maximum number of correct answers (75.72%) for this question (p value = 0.03).

In case of blister formation after a burn injury, 37% individuals believed that one should break the blister manually for rapid healing, whereas 40% answered correctly that blister should be left alone unless it bursts naturally. Male participants performed better (45.36%) than their female counterparts (34.35%) in this question (p value = 0.02). Furthermore, the level of education (p value = 0.000) and socioeconomic status (p value = 0.003) also had a statistically significant effect on the proportion of correct answers.

Overall results of the survey are summarized in Fig. 2.

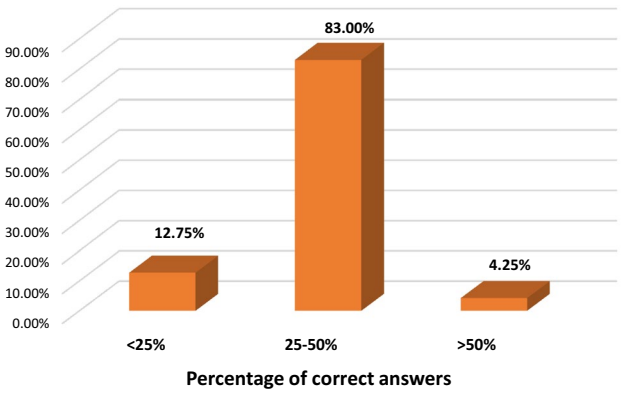

Fig. 2 Overall result of survey

Overall knowledge distribution among the subgroups revealed that males generally performed better than the females in 60% of the questions. Similarly, individuals above 42 years of age had better awareness regarding BFAT. Moreover, people with higher educational level and those belonging to the upper socioeconomic status performed consistently well than the less educated and lower socioeconomic group. However, no significant difference was seen in the overall performance of the individuals with previous exposure to burn (self/family member) when compared to those who did not have a past history of burn trauma.

Discussion

Despite the recent advances in the field of damage control and prevention, burn injuries still remain the most neglected and devastating disease of the modern era [9]. Due to lack of specialized burn care centers, burn injury has always remained an overlooked and under-researched area in Pakistan. A recent study conducted by Siddiqui et al. calculated the incidence rate of 147 per 100,000 patients presenting to the emergency services of tertiary care hospitals in Pakistan. Moreover, the mortality rate reported by the Global burden of disease 2010 is 5.8 per 100,000 Pakistani population [2]. The grave consequences of disfigurement, disability and mortality associated with fatal burn injuries demand an aggressive approach towards their prevention and initial management [9]. Several studies have proved that the initial BFAT if administered properly, expedite the healing process and improve the cosmetic outcome, thus limiting the need for surgical intervention [1, 5].

Multiple studies have reported a marked ignorance prevailing worldwide regarding the knowledge of burn prevention and first aid treatment [7–10]. Bazargani et al. in his qualitative study found that the application of cold water to burn wound was considered deleterious by the general public and they relied more on traditional remedies for better wound outcome. In addition, the majority of them did not know how to respond correctly in case of a fire emergency [8]. Similarly, recent studies conducted in Saudi Arabia, China, Australia and Cambodia also reflected the similar situation where only 5.8, 13.7, 9 and 13% of the study participants knew how to apply cold water to the burnt area, respectively [1, 11–13]. In our study, only 8.8% were aware of the recommended cold water treatment thus depicting an extreme knowledge deficit. In New York, Taira et al. surveyed 211 individuals with only 22% of participants expressing that they will cover the burn area with a dressing [14]. In our study, 63.5% of the participants were not aware of this first aid measure. The principle of "stop, drop and roll" when clothes catch fire was known by 80.7% of the population in Bangladesh and 7% in Cambodia [3, 13]. The proper way to escape from a building on fire was known by 75% of the population in Vietnam as compared to 20.5% people in our study [10]. The average rate in providing correct answers reported by Lam et al. was 67.18%. Moreover, in our study, only 4.25% of the individuals achieved the desirable score over 50% [10].

In our study, we found education and socioeconomic status as the two most significant determinants of burn first aid knowledge among the study population. However, previous studies have not established any such correlation [1, 7, 15]. Fadeyibi et al. in his study reported that 36.73% of the people who used water lavage for burn injuries were educated up to secondary level [16]. On the other hand, Kattan et al. in his study found that university graduates were more inclined towards the use of traditional remedies [1]. However, no significant association could be established in both the studies [1, 16]. Hence, the findings of this study are new and should be explored in future as well. Another important aspect highlighted in the literature is the positive effect of first aid courses on the ability of the respondents to answer survey questions correctly. It was repeatedly observed that the performance of the participants who took training courses in the past was significantly better than those who did not participate in any such courses [7, 9, 10, 15].

Excessive use of traditional remedies following a burn injury has always been reported in the literature. In our study, we found "toothpaste" to be the most popular household item used by the study population. Similarly, Saudi Arabia, Turkey, Cambodia and U.K have also reported "toothpaste" as a first aid item used by 53.7, 1.9, 18 and 4% of the population, respectively [1, 13, 17, 18]. Although there is no scientific evidence for using toothpaste in case of a burn injury, but its wide usage among the study participants probably stems from the fact that anecdotally it

provides instant relief from the burning sensation and pain caused by a burn injury [1, 4]. Moreover, most of the toothpastes available in the market contain peppermint which has a smoothening effect on a raw fresh burn exposed to air. However, no data supporting the application of such remedies on burned area has been found. In addition to that, various other harmful substances such as honey (69.9%), raw eggs (12.5%), urine, crushed cockroaches (80%), mud, and gentian violet paint (75%) have also been identified [1, 5, 16, 19]. Numerous studies have reported that the administration of these cultural remedies is not only associated with an increased rate of post burn complications but it also masks the severity of burn injury. Therefore, it affects wound evaluation and management at a later stage [1, 5, 16]. Kattan et al. in his study found that 33.17% of the individuals kept on using these remedies despite receiving information on BFAT, thus manifesting their rigid faith in the efficacy of these false treatments [1]. The situation is no more different in Pakistan where many patients were seen presenting with severely infected wounds requiring excision and skin grafting after failed home treatments [20]. This draws attention towards an alarming situation requiring a tremendous amount of effort by the healthcare workers to refrain people from the widespread use of these inappropriate therapies in the management of burn.

Improving first aid practices in a third world country such as Pakistan is of paramount importance since there are only a few specialized burn care centers, transfer to which takes from hours to days. Optimization of initial burn management can significantly lower the morbidity and improve the survival of burn victims. According to a study done in New Zealand, it was concluded that awareness campaigns aiming at increasing the adequacy of first aid treatment significantly lowered the inpatient and operative requirements following burn injuries. Hence, the need of the hour is to conduct simple, behavior-specific educational campaigns targeted towards high-risk groups to optimize behavioral changes [21].

Few limitations of this study need to be noted. The sample size of this study was small due to limited resources and time. There was also a relative under representation of the people above 42 years of age. Therefore, the results cannot be generalized to the population of Rawalpindi as a whole but still represents a large proportion. Moreover, the source of information about first aid for burn was not asked from the participants, hence, a community-based survey with a large sample size is strongly recommended in this regard as well.

Conclusion

The results of this study have indicated a significant limitation of knowledge regarding BFAT among the general population of Rawalpindi. It has also shed light on areas of deficiencies which specifically needs to be addressed in the future. Widespread community awareness programs should be initiated through modern information dissemination tools. Burn safety guidelines should be made an essential part of the school curriculum. Frequent training courses should be conducted for all forms of trauma on a regular basis.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix

Questionnaire for burn first aid knowledge and its determinants among general population of Rawalpindi.

General Information

Age: _____ Gender O Male O Female

Education O Nil O Primary O Secondary O Higher Secondary O Tertiary

Monthly Income (Rs)

O Nil O <10,000 O 10,000-25,000 O 25,000-50,000 O >50,000

Previous history of exposure to burn (self/family member)

O Yes O No

Knowledge on burn first aid treatment

Which of the following you think is the best item for first aid in case of a burn injury?

O Toothpaste O Salt O Ice
O Honey O Cool running water O Warm Water
O Egg O Gel/ointment O Automotive Oil
O Other

In case of water lavage, what is the ideal time duration for which it should be applied to the burn area?

O 5-10 minutes O 15-20 minutes O 25-30 minutes
O Never apply water

Can we apply cool water to a large burn area in cold weather?

O No O Using a cool towel O Can be applied as usual

What is the best way to escape from a building in fire?

O Running as quickly as possible O Running and covering your face with wet towel
O Crawling on the floor with face covered with wet towel

How to escape from multiple floor building in fire?

O Using stairs O Using Lift O Through window

Is it necessary to remove clothes and other accessories sticking to the body following a burn injury?

O Yes O No O Dont know

If a burn blisters, what should you ideally do?

O Break the blisters and apply petroleum jelly
O Apply petroleum jelly without breaking the blister
O Leave the blisters alone unless they break

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