Original Article

First Aid for Burns and Burn-Related Nutrition among 2437 Inhabitants: A Nationwide Survey in Saudi Arabia

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ABSTRACT

BACKGROUND

Although burn-related injuries are serious and can cause significant morbidity and mortality, this can be alleviated through the appropriate practice of first aid for burns. We aimed to explore the practice of first aid and measure the level of knowledge of burns and burn-related nutrition in Saudi Arabia.

Methods

Data were collected using an online questionnaire, distributed among the general Saudi population between Jul and Sep 2020. It included socioeconomic and biographical data, and knowledge and practice of first aid for burns and burn-related nutrition. Data were analyzed using SPSS.

Results

Overall, 2437 people were enrolled in this study, of which 59.5% were female. More than half (51.9%) the subjects were between 19 and 25 yr of age. Younger age group (≤25 yr) showed a significantly better practices score (t=4.844; *P*<0.001). Females exhibited a significantly better knowledge score than males (*t*=-3.131; *P*=0.021). Unemployed respondents were significantly more associated with a lower knowledge score (*t*=4.796; *P*=0.007) and a lower practices score (*t*=18.375; *P*<0.001) while those with a history of exposure to burn injury had a lower knowledge score (*t*=-4.816; *P*<0.001) and a lower practices score (*t*=-3.237; *P*=0.001).

Conclusion

There is a lack of knowledge and practice of burn's first aid and burn-related nutrition. Thus, courses and training in first aid for burns and awareness campaigns are essential in order to improve the knowledge of the general Saudi population.

KEYWORDS
Burns; First aid; Practice; Knowledge; Saudi Arabia.

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INTRODUCTION

Burns result in tissue injury to the skin or other organic tissues. Burn-related injuries are considered to be one of the most serious problems affecting public health. These injuries are prevalent, being the fourth most common type of trauma around the globe, with an estimated 180,000 deaths annually worldwide[1,2]. In Saudi Arabia, burns remain a

major source of injury, especially in children from exposure to hot liquids[3].

Although most burns are minor and can be treated at home, the outcomes of more serious burns can be devastating and result in significant morbidity and mortality[4,5], as well as psychosocial and cosmetic damage. Despite advancements in the treatment of burn patients, late arrival at the hospital may limit the outcome of management. Therefore, first aid may be a valuable step in reducing complications[6].

First aid is immediate basic medical care provided to someone suffering a sudden injury or illness. Proper first aid is easy to perform, provides pain relief, decreases the severity of the injury, and positively affects subsequent specialized management[7]. First aid interventions differ according to the way the burn occurred. For instance, in the case of a flame burn, rolling on the ground then applying cool running water will significantly reduce morbidity[1].

Many people practice incorrect first aid. One of these incorrect interventions is the use of home remedies that are not supported by scientific evidence. For example, ice leads to vasoconstriction, which aggravates tissue damage[8,9]. In fact, many people use other traditional remedies that are not beneficial and may in fact be potentially harmful, such as toothpaste, egg, mud, mayonnaise, mustard, butter, lavender oil, and many others[10,11].

To our knowledge this is the first study of its type to assess the knowledge of first aid for burns across the various regions of Saudi Arabia. Burns knowledge is essential and practicing first aid in the correct way is a must. Therefore, we aimed to explore the practice of first aid and measure the knowledge of burns and burn-related nutrition in Saudi Arabia.

METHODS

Data Collection and Study Design

This qualitative, cross-sectional, anonymous questionnaire-based study was performed among the general population in Saudi Arabia. The data were collected in the period between July and Sep 2020. Participants who were living outside Saudi Arabia were excluded from the study.

The questionnaire was based on studies from the literature[12-14]. With regard to the issue of nutrition, questions were formulated and added to fulfill our study objectives. The questionnaire was composed of three parts: The first part comprised the biographical data and questions about previous exposure and knowledge of burns. The second part comprised 16 clinical scenarios to assess the participants' knowledge and perceptions regarding first aid management of burns. The last part comprised nine questions to assess the practice of burn-related nutrition.

Scoring

The participants' knowledge of dealing with burns was measured using 16 questions. Correct answers were identified and coded as 1 while incorrect answers were coded as 0. The total knowledge score was generated by adding up the answers to all 16 questions. The total score range was from 0 to 16 points, indicating that the higher the score, the higher the knowledge of dealing with burns. By using a benchmark of 50% and 75% obtained from the total score, this determines the level of knowledge. The practices related to post-burn nutrition were evaluated using 9 questions, as well as the level of first aid knowledge, the correct answers were identified and coded as 1, while the incorrect answers were coded as 0. The total practice score was calculated by adding the scores obtained from the responses to all 9 questions. The overall score ranged from 0 to 9 points. By using a benchmark of 50% and 75% obtained from the total score, participants were classified as being at a poor level if they scored 0–4 points, while 5–7 was considered moderate and 8–9 was considered good practices.

Statistical Analysis

Data were elaborated with numbers (percentages) for all qualitative variables, while mean, standard deviation, and median (min–max) were used to present all the quantitative variables. In addition to the comparison carried out, the Mann–Whitney U test and Kruskal–Wallis test were applied. Normality, statistical interactions, and collinearity (i.e., variance inflation factor) were also assessed with the Kolmogorov–Smirnov and Shapiro–Wilks tests. A P-value <0.05 was considered statistically significant. Correlation procedures were also undertaken to determine the linear agreement between knowledge and practices scores. All data analyses were carried out using SPSS ver. 21, Armonk, New York, IBM Corporation.

Ethics approval and consent to participate: This study was performed according to the ethical standards from the Institutional Research Board (IRB) at King Faisal University after all the necessary ethical criteria were satisfied. Research number is: 2020.12.07.

Patient consent for publication: At the start of the questionnaire, participants were informed about the purpose of the study and that the data will be published. Participants then were asked if would like to participate in the study, to press the button "Yes".
Informed consent: Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

RESULTS

We recruited 2,437 participants in order to evaluate their knowledge of and practices in burn first aid. Table 1 presents the socio-demographic characteristics of participants, previous history of burns, and first aid management. The most common age group was 19–25 yr old (51.9%), with approximately 60% being female.

Table 1: Socio-demographic characteristics and previous history of burns and first aid management of participants (n=2437)

Study Variables	N (%)
Age group (yr)	
• 15–18	245 (10.1)
• 19–25	1266 (51.9)
• 26–35	520 (21.3)
• 36–45	206 (08.5)
• >45	200 (08.2)
Gender	
• Male	987 (40.5)
• Female	1450 (59.5)
Level of education	
• Secondary or below	544 (22.3)
• Bachelor or higher	1893 (77.7)
Nationality	
• Saudi	2316 (95.0)
• Non-Saudi	121 (05.0)
Employment status	
• Unemployed	481 (19.7)
• Student	1150 (47.2)
• Teacher	212 (08.7)
• Office staff	175 (07.2)
• Healthcare provider	129 (05.3)
• Other	290 (11.9)
Monthly income (SAR)	
• <10,000	1199 (49.2)
• 10,000–20,000	829 (34.0)
• 21,000–30,000	262 (10.8)
• >30,000	147 (06.0)
Living with individual under 18 years	
• Yes	1894 (77.7)
• No	543 (22.3)
Received information about the burns' first aid management	
• Yes	1230 (50.5)
• No	1207 (49.5)
History of self-exposure to burn injury	
• Yes	1559 (64.0)
• No	651 (26.7)
• I don't remember	227 (09.3)
Family history of exposure to burn injury	
• Yes	1712 (70.3)
• No	455 (18.7)
• I don't remember	270 (11.1)
Performed first aid management to a burn victim	
• Yes	666 (27.3)
• No	1771 (72.7)
Residence Regions	
• Eastern region	1031 (42.3)
• Central region	744 (30.5)
• Western region	475 (19.5)
• Northern region	112 (04.6)
• Southern region	75 (03.1)

Figure 1 depicts the respondents' sources of burn first aid information. The commonly mentioned source of burn first aid information was the Internet (30.7%), while text messages were the least mentioned (2%).

In Figure 2, the most frequently mentioned home remedies to apply on burned injured areas were ice (41.7%), followed by cold compresses (36.3%) and honey (35.3%).

Per Table 2, the knowledge and practices of participants in dealing with burns is presented using 16 statements and 9 statements for knowledge and practices, respectively.

Per Table 3, the prevalence of burn first aid management and burn-related nutrition knowledge and practices is measured. Based on the results, the mean score for knowledge was 7.34 (SD 2.23) out of 16 points. For practices, the mean score was 3.62 (SD 2.44) out of 9 points.

As demonstrated in Table 4, the differences

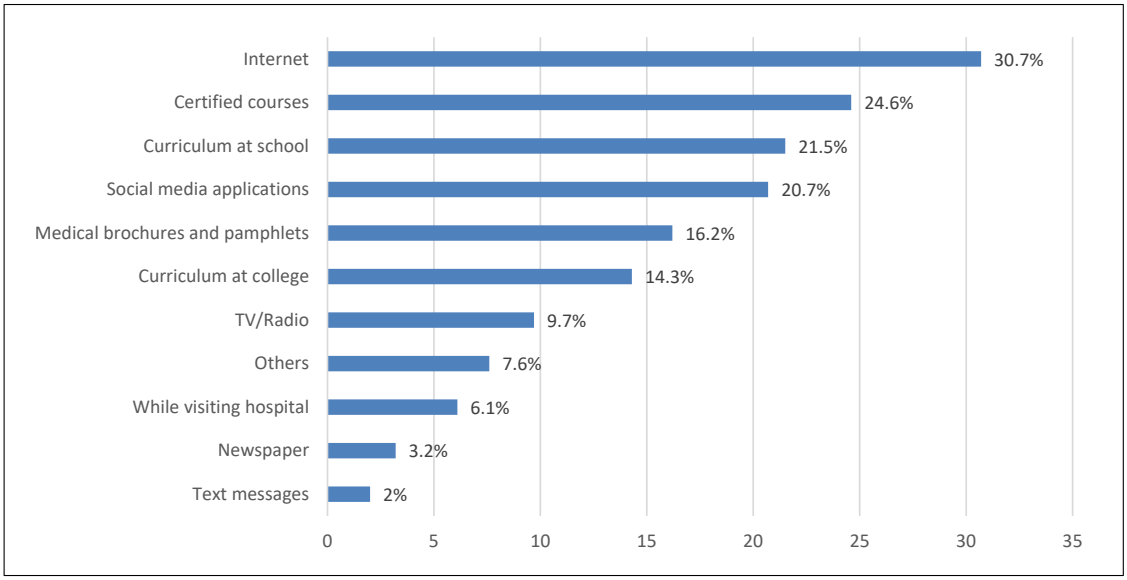

Fig. 1: Sources of burn first aid information

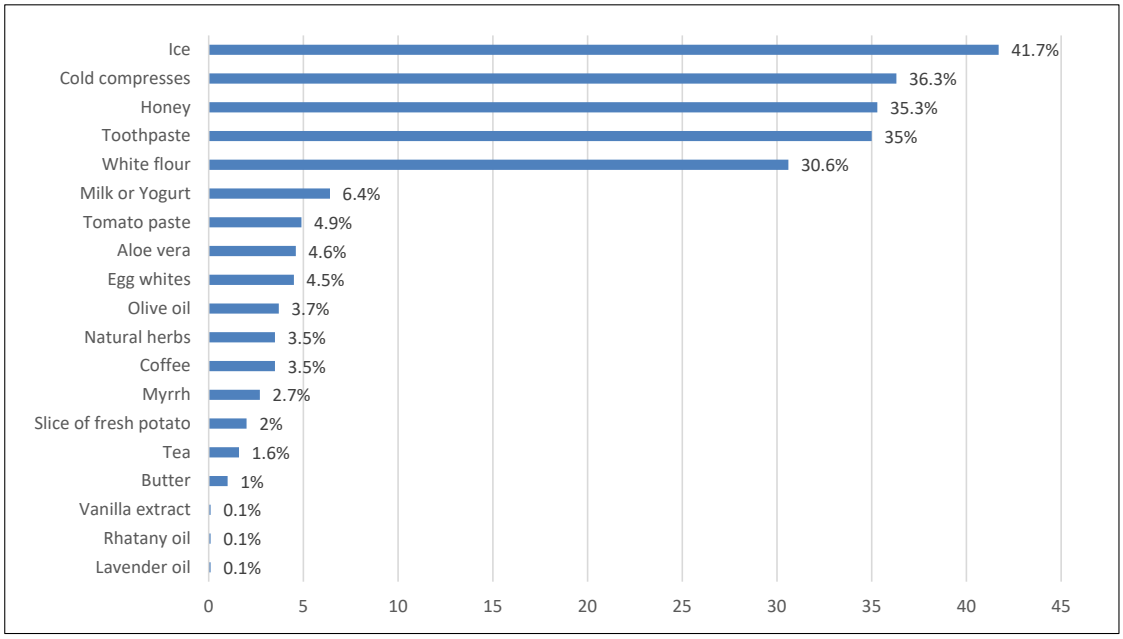

Fig. 2: Home remedies for burned injured areas

Table 2: Assessment of knowledge and practices in dealing with burns (n=2437)

Knowledge Statement	Correct Answer N (%)
1. Always seek medical help if it is a chemical or electrical burn.	2256 (92.6)
2. Always seek medical help if age of victim is <4yrs or >60 yr.	1954 (80.2)
3. If someone catches fire and is in flames, wrap the person in thick material, such as a wool or cotton coat, rug, or blanket.	1809 (74.2)
4. Always seek medical help if hands, feet, face, groin, buttocks, or a major joint is burnt.	1754 (72.0)
5. During exposure to burns, I will remove accessories and clothes that cover injured area.	1704 (69.9)
6. Do you think that home remedies can be used for burned injured area?	1398 (57.4)
7. During exposure to burns, I will apply water to injured area.	1322 (54.2)
8. In case of chemical burns, I will remove the clothes stuck to the injured area.	1055 (43.3)
9. In case of burns, I keep blowing/fanning on the burn.	992 (40.7)
10. Cover the affected areas with clean cotton cloth after removing surrounding dress.	939 (38.5)
11. Cold water temperature is needed when applying water to burns.	843 (34.6)
12. During a social meeting, boiling water spills on someone's hand, what you will do?	717 (29.4)
13. In case of flame burns, I will remove the clothes stuck to the injured area.	647 (26.5)
14. Someone's clothes catch fire during picnic, what you will do?	317 (13.0)
15. Hot boiling oil spills on chest of a child in the kitchen, what you will do?	99 (04.1)
16. More than 15 min' duration is required when applying water to burns.	94 (03.9)
Practices Statement	
1. Appropriate nutrition helps wound for faster healing and conserves the muscle mass.	1765 (72.4)
2. Appropriate nutrition contributes to support the immune system for lowering the risk of infections.	1746 (71.6)
3. Vegetables and fruits that are rich in vitamins and minerals are necessary for the burn healing process	1425 (58.5)
4. Meats in its different types, nuts, eggs and dairy products that are rich in proteins has an essential role in the burn healing process.	1022 (41.9)
5. The greater surface area of burns, the greater the need of nutrition for the burn healing process.	862 (35.4)
6. Consuming adequate amount of calories has an essential role in the burn healing process.	647 (26.5)
7. Meals that are low fat and has low calories help in burn healing.	482 (19.8)
8. Rice, breads and potatoes that are rich in carbohydrates does not play an essential role in the burn healing process.	444 (18.2)
9. Nuts, fish oil and olive oil that are rich in unsaturated fats does not play an essential role in the burn healing process.	441 (18.1)

Table 3: Prevalence of knowledge and practices related to burn first aid management and burn-related nutrition (n=2437)

Statement	N (%)
Knowledge score (mean ± SD)	7.34 ± 2.23
Level of Knowledge	
• **Low**	1263 (51.8)
• **Intermediate**	1158 (47.5)
• **High**	16 (0.70)
Practices score (mean ± SD)	3.62 ± 2.44
Level of practices	
• **Poor**	1509 (61.9)
• **Moderate**	777 (31.9)
• **Good**	151 (06.2)

in knowledge and practices arising from the socio-demographic characteristics, previous history of burn injury, and first aid management of participants is measured. It was found that the younger age group (≤25 years) showed a significantly better practices score (t=4.844; p<0.001). Also, females exhibited significantly a better knowledge score than males (t=-3.131; p=0.021). Likewise, those who performed first aid on a burn victim were significantly more associated with better knowledge (t=10.304; p<0.001) and practices (t=5.567; p<0.001).

Table 4: Statistical mean differences of knowledge and practices in relation to the socio-demographic characteristics, previous history of burn injury, and first aid management of participants (n=2437)

Factor	Knowledge Total Score (16) Mean ± SD	Practices Total Score (9) Mean ± SD
Age group [a]		
• **≤25 yr**	7.32 ± 2.19	3.81 ± 2.49
• **>25 yr**	7.38 ± 2.28	3.32 ± 2.32
T-test; P-value	***-0.589; 0.267***	***4.844; <0.001*** **
Gender [a]		
• **Male**	7.17 ± 2.31	3.58 ± 2.52
• **Female**	7.46 ± 2.16	3.66 ± 2.38
T-test; P-value	***-3.131; 0.021*** **	***-0.742; 0.430***
Level of education [a]		
• **Secondary or below**	7.24 ± 2.19	3.69 ± 2.37
• **Bachelor or higher**	7.38 ± 2.24	3.60 ± 2.46
T-test; P-value	***-1.305; 260***	***0.799; 0.373***
Employment status [b]		
• **Unemployed**	7.09 ± 2.27	3.24 ± 2.36
• **Employed**	7.48 ± 2.25	3.41 ± 2.38
• **Student**	7.36 ± 2.18	3.93 ± 2.48
T-test; P-value	***4.796; 0.007*** **	***18.375; <0.001*** **
Monthly income (SAR) [a]		
• **<10,000**	7.17 ± 2.29	3.47 ± 2.44
• **≥10,000**	7.56 ± 2.17	3.73 ± 2.40
T-test; P-value	***-4.211; <0.001*** **	***-2.577; 0.010*** **
Living with individual under 18 yrs. [a]		
• **Yes**	7.41 ± 2.23	3.69 ± 2.44
• **No**	7.11 ± 2.19	3.39 ± 2.43
T-test; P-value	***2.789; 0.003*** **	***2.585; 0.014*** **
Residence region [a]		
• **Inside Eastern region**	7.52 ± 2.18	3.82 ± 2.43
• **Outside Eastern region**	7.22 ± 2.25	3.48 ± 2.43
T-test; P-value	***3.258; 0.003*** **	***3.325; 0.001*** **
Received information about burns' first aid management		
• **Yes**	7.86 ± 2.08	4.03 ± 2.39
• **No**	6.81 ± 2.25	3.21 ± 2.41
T-test; P-value	***11.952; <0.001*** **	***8.346; <0.001*** **
History of self-exposure to burn injury		
• **Yes**	7.06 ± 2.25	3.41 ± 2.50
• **No/I don't remember**	7.51 ± 2.19	3.74 ± 2.39
T-test; P-value	***-4.816; <0.001*** **	***-3.237; 0.001*** **
Performed first aid management to a burn victim		
• **Yes**	8.09 ± 2.08	4.07 ± 2.22
• **No**	7.07 ± 2.22	3.46 ± 2.49
T-test; P-value	**10.304; <0.001** **	**5.567; <0.001** **

[a] *P*-value has been calculated using Mann Whitney U test.

[b] *P*-value has been calculated using Kruskal Wallis test.

** Significant at *P*<0.05 level.

DISCUSSION

This study included 2437 respondents, most of whom were females. As shown in Table 1, the highest number of participants were from the Eastern region, followed by the Central region. In comparison, in a similar study conducted in Saudi Arabia that included 2758 participants, the majority of respondents were from the Central region, and only (9.6%) were from the Eastern region[12].

Level of education plays an important role in the proper implementation of burn first aid. In our

study, half of the participants (51.9%) were in the age group of 19–25. Half of the participants were students. The majority of the respondents possessed a bachelor's degree or higher.

In our study population, the most common source of burn first aid information was the internet, while text messages were the least common source of information, which is similar to a previous study conducted in Saudi Arabia[13]. On the other hand, two other studies conducted in New South Wales and Saudi Arabia showed that first aid books and official courses were the commonly mentioned sources of burn first aid information[9, 12].

Moreover, the commonly selected home remedy to be applied on a burn injured area was ice; on the contrary, vanilla and Rhatany oil were the least selected home remedies (Figure 2). This is in accordance with several existing studies[11-14]. On the other hand in China, the most commonly used home remedy was toothpaste[15].

Our study findings suggest that seeking medical help in case of burn injury was the most commonly reported answer, which aligns with the previous article[15]. Furthermore, more than half (57.4%) of our respondents reported that different types of remedies could be used in burn first aid. This reported percentage was higher than that of a Saudi (32%)[13]. More than three-fourths of the respondents (88.6%) of a previous study reported that they would apply cold water on the burn area, which is much higher than what was noted in our study (34.6%)[12]. Most of the participants in a previous study responded that they would remove accessories and clothing from the burned area, which is similar to our findings[16].

It is scientifically proven that patients who suffer from burn injuries require more caloric intake, in general, to compensate for the drive of the hypermetabolic state and help achieve better healing. Moreover, patients who suffer a burn injury need the following: higher carbohydrate content in their diet, as it helps in wound healing; higher protein content in their diet, as it has an essential role in the immune function and minimizes the lean body mass loss; lower fat content in their diet is generally recommended to prevent essential fatty acid deficiency; and higher amounts of vitamins and trace elements in their diet, as it helps in faster wound healing, immune function, and protein synthesis[17-19].

Nevertheless, it is observed in Table 2, the practice statement section, that good practice was observed in statements 1, 2, and 3 and poor practice in statements 7, 8, and 9. With that being said, the fact that our community lacks the practical knowledge of proper nutrition after sustaining a burn injury can be attributed to one or more of the following: lack of public awareness campaigns regarding nutrition generally and after burn injuries specifically, lack of interest, lack of official courses, lack of nutrition knowledge in the educational curriculum, and lack of brochures and pamphlets.

It is observed in our study (Table 3) that only 16 individuals (0.7%) were considered to have a high level of knowledge and were well aware of the burn cases that were presented. On the other hand, more than half of the respondents had a low level of knowledge regarding first aid management of burn cases and were not able to deal with the cases properly. In Riyadh and Majmaah, there was a general lack of knowledge about burn first aid management[12,16]. This emphasizes the importance of conducting campaigns and courses for burn prevention as well as proper first aid management.

As demonstrated in Table 4, female participants had significantly higher scores compared to males, while unemployed individuals had lower scores. In addition, individuals who received information about burn first aid management as well as performed it had significantly higher knowledge scores. This aligned with the outcomes of an existing study[20]. This proves the significance of offering courses to the general population on proper first aid management of burns. However, unlike several studies from the literature[12,16,21] that found that higher education level is significantly associated with better first aid management, in our study, this was not the case.

Limitations

A few limitations of this study should be noted. Despite the large and representative sample size, there is a potential selection bias risk for certain questions. Moreover, as with most cross-sectional studies, a correlation was found, but not the causation, for this lack of knowledge. Nevertheless, this study could be used as a baseline to further investigate the problem in the future.

CONCLUSION

More than half of our respondents have poor knowledge and practices when it comes to burn first aid management. It also suggests that they have a

habit of using home remedies as first aid following burn trauma. Furthermore, there is a statistically significant association between the knowledge and practices of the respondents; therefore, better knowledge of the participants regarding burn first aid treatment and burn-related nutrition results in better practices, which in turn, result in better outcomes. Finally, the authors recommend lectures, campaigns, and/or hands-on training courses on burn first aid treatment and burn-related nutrition to improve the understanding of this concept among Saudi inhabitants.

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CONFLICT OF INTEREST

The authors declare that no conflict of interest.
Availability of data and materials: All data generated or analyzed during this study are included in this published article.

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