



## Awareness of First Aid in Different Burn Degrees and its Surgical and Psychiatric Aspects on Patients, in Hail, Kingdom of Saudi Arabia

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### ABSTRACT

**Background:** Burn injuries are one of the most traumatizing and damaging wounds. Causing considerable mortality, prolonged hospitalization, disfigurement, disability, often with resulting social stigma, rejection, psychiatric issues in long run. We aimed to assess the knowledge of general population on first aid and surgical intervention in different degrees of burns and psychiatric aspect on patients; so, the results of this study could help to manage burn injuries. **Methods:** A descriptive cross-sectional community-based survey was conducted in shopping malls of Hail KSA. Data was collected from the audience who attended Health Awareness Campaign on Burns between 15<sup>th</sup> of December 2019 and 15<sup>th</sup> of January 2020. Data was fed and analysed by using SPSS version 23. **Results:** Forty-seven percent of the respondents have received information on burns. Half of respondents had history of either oneself being affected by burn incident or any one of their close relatives. Out of 273 burn cases, 65 had complications later. Almost 29% developed psychiatric issues after that incidence but just 8% consulted Psychiatrist. Only 2% were familiar with the surgical aspect for healing of second-degree burn. **Conclusion:** Knowledge of respondents on the burn's issues is very scanty as revealed in our results. 15%-24% of respondents did not know what to do in 1-3 degree of burns that is very alarming. Just 16% knew that there is any role of plastic surgery in 3<sup>rd</sup> degree burns. Twenty-nine percent had suffered from psychiatric problems after burn incident but just 8% consulted any Psychiatric and those were ones who had total monthly income  $\geq$  10,000 Saudi Riyals ( $p \leq 0.05$ ). These results emphasize the importance of implementing Health Awareness Campaigns in community and in institutions that could minimize burn incidents and psychiatric issues in general population.

**Keywords:** Burn, Burn awareness, First aid, Surgical intervention, Psychiatric disorders

### INTRODUCTION

Burn injuries are one of the most traumatizing and damaging injuries with physical scars that can last a lifetime [1]. Also burns cause considerable morbidity and mortality rate. In survivors, there are devastating consequences ranging from physical, functional, occupational, cosmetic issues. It could lead to prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection [2-4]. In long run it could result in immense psychosocial and emotional damage [2,3]. Age, sex, economic status, local customs, social and environmental circumstances can contribute to the cause, type and incidence of burns [5]. Burn death rates are decreasing in high-income countries due to health awareness programs and better health facilities, unlike in low-and middle-income countries where it is more than seven times higher than in high-income countries [4]. Annually more than 310,000 people die as a result of fire-related burns [6]. An estimated 6 million patients seek medical help for burns annually [3]. The incidence of burns in Saudi Arabia ranges from 112 to 518 per 100,000 per year; mortality was reported to be from 0.2 to 5.6 per

100,000 per year, with homes being the commonest location of burn injury ranging from 72% to 94% of cases [7]. A significant proportion of burn survivors develop mental disorders, primarily depression and Post-traumatic stress disorder (PTSD). Psychiatric morbidity among burn survivors increases in direct proportion to the degree of physical and psychosocial disability, decrease in social and occupational functioning, quality of life, and vitality [8].

Moreover, because of long hospitalization and rehabilitation, and costly wound and scar treatment, burns are one of the most expensive traumatic injuries [9]. Various surgical procedures, long periods of hospital stay, and intensive medical, surgical and psychiatric care are often required for burn victims that can cause an extensive burden on patients, families, and society [10,11]. In KSA, 0.3% of population are known to be affected with burn incident [12]. Paediatric burns are reported high in Saudi Arabia, mostly due to household hazards [13]. Additionally, mortality in KSA ranges from 4.4% to 9.4% [14,15].

Immediate provision of first aid after burns significantly determines the outcome, ensuring that tissue damage and subsequent morbidity is limited [16,17]. Studies have shown that if first aid is given appropriately on time, have a beneficial impact on reducing morbidity-related healthcare costs, through limiting tissue damage hence leading to a decrease need for surgical intervention [18]. International and national studies have shown that preventive measures and burn first aid have proven to reduce morbidity and mortality [18,19].

To minimize the consequence of the burn process, immediate application of running cold tap water for at least 20 minutes, removing clothing and jewellery, and covering the wound with a sterile dressing would all positively affect the outcome of burn. Cold water has shown to improve outcome in terms of healing and final cosmetic result, should be from 2°C to 15°C and applied immediately in the same time frame [20]. Use of eggs, toothpaste, mud, and other traditional remedies is a common misconception in many areas, which could certainly create a more favourable environment for infection [21]. Many studies have shown lack of awareness of first aid on burns in both developed and developing countries [20-22]. Similarly in KSA, studies have shown lack of awareness of general population regarding prevention against burn and first aid management [12-15].

We aimed to assess the knowledge of general population on first aid and surgical intervention in different degrees of burns and psychiatric aspect on patients; so, the results of this study could help to manage burn injuries.

## SUBJECTS AND METHODS

Hail City is located in northwest of KSA; the city has a population of 500,000. Survey questions were derived from interviewing the patients and attendants who came to Burns and Plastic Surgery OPDs.

A descriptive cross-sectional community-based study was done in 3 main shopping malls of Hail City between 15<sup>th</sup> of December 2019 and 15<sup>th</sup> of January 2020. Questionnaire was given to 537 attendees who attended Health Education Campaign on burns, which was arranged officially in those shopping malls in collaboration with Plastic Surgery and Psychiatry departments of College of Medicine, University of Hail.

Consecutive non-probability sampling technique was applied on all those participants who were above 18 years of age. Those who were attached to medical field were excluded from study (around 20 persons) as their pre-existing knowledge could confound the results. The objectives of the study were explained, and a verbal consent was obtained from each of the participants. Entry of identity was optional.

The questionnaire consisted of 22 different questions. Besides having questions on demographic profile of respondents, questionnaire included specific questions pertaining to knowledge on different layers of skin, degrees of burn, first aid management of a case of burn, traditional remedies, surgical interventions and psychiatric impact of burn on patients. Researchers used RaoSoft®, an online calculator, to estimate sample size. Minimum effective sample size came out to be 384, calculated at the confidence interval of 95% (RaoSoft, 2013). However, researchers were successful in achieving sample size of 537.

Data was entered and analysed by using SPSS (Statistical Package for Social Sciences, SPSS Inc., Chicago, IL, USA, version 23). All categorical variables were presented as numbers and percentages. Association between different relevant variables was calculated by applying Chi-Square Test as test of significance keeping the level of significance  $\leq 0.05$ .

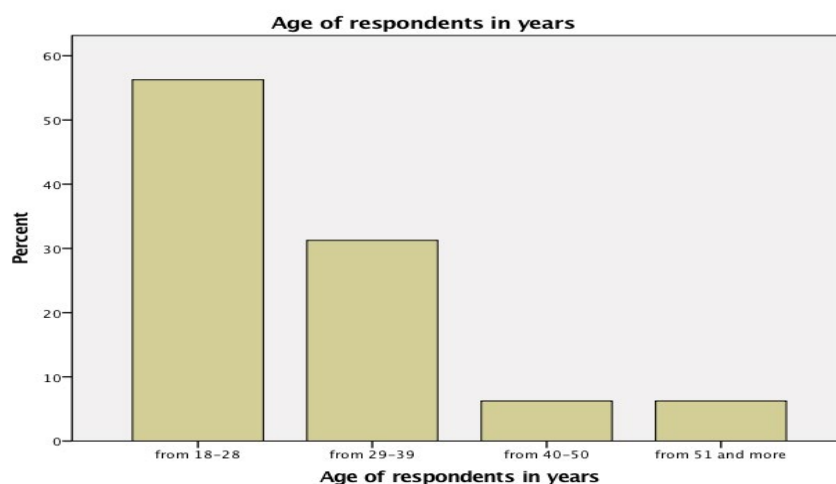
## RESULTS

Most of the respondents (57%) were females. Most of them were Saudi nationals and were studying either in High School or in University (97% and 92% respectively). Again, most of them were not married and were either working or students (62%, 39% and 35% respectively). However total monthly income of most of them (67%) was less than 5000 Saudi Riyals (Table 1).

**Table 1 Demographic profile of respondents (n=537)**

| Variable                        | Frequency (n) | Percentage (%) |
|---------------------------------|---------------|----------------|
| <b>Sex</b>                      |               |                |
| Male                            | 232           | 43%            |
| Female                          | 305           | 57%            |
| <b>Nationality</b>              |               |                |
| Saudi                           | 521           | 97%            |
| Non-Saudi                       | 16            | 3%             |
| <b>Level of education</b>       |               |                |
| Illiterate                      | 13            | 2%             |
| Basic schooling                 | 34            | 6%             |
| High school                     | 241           | 45%            |
| University                      | 249           | 47%            |
| <b>Marital status</b>           |               |                |
| Married                         | 184           | 34%            |
| Single                          | 335           | 62%            |
| Widowed                         | 5             | 1%             |
| Divorced                        | 13            | 3%             |
| <b>Job status</b>               |               |                |
| Working                         | 208           | 39%            |
| Unemployed                      | 142           | 26%            |
| Student                         | 187           | 35%            |
| <b>Monthly income in Riyals</b> |               |                |
| Less than 5000                  | 358           | 67%            |
| 5000-10,000                     | 111           | 21%            |
| 10,000-20,000                   | 50            | 9%             |
| More than 20,000                | 18            | 3%             |

Most of the respondents (57%) were between 18-28 years of age (Figure 1).



**Figure 1 Age of respondents in years (n=537)**

Knowledge of respondents on burn is shown in Table 2. Forty-nine percent of respondents have received information on burns mainly (45%) from social media. Almost half of them (56%) knew that there are 3 layers of skin. Regarding different layers of skin that are affected by 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> degree burns, almost half of them gave right answers. Regarding first A.I.D. of 1st degree burn, 37% recommended to wash the area with cold water. However, for 2<sup>nd</sup> and 3<sup>rd</sup> degree burns, 36% and 48% respectively, recommended to take the patient to nearest emergency.

**Table 2 Knowledge of respondents on burns (n=537)**

| Variable  | Frequency (n) | Percentage (%) |
|---|---------------|----------------|
| <b>Received information on first aid in case of burn</b>    |               |                |
| Yes   | 263           | 49%            |
| No  | 274           | 51%            |
| <b>Source of information (n=263)</b>                        |               |                |
| Television  | 40            | 15%            |
| Health practitioner   | 65            | 25%            |
| Social media  | 119           | 45%            |
| Relatives and friends                                       | 39            | 15%            |
| <b>Knowledge on skin layers</b>                             |               |                |
| Single layer  | 15            | 3%             |
| Two layers  | 64            | 12%            |
| Three layers  | 303           | 56%            |
| I do not know   | 155           | 29%            |
| <b>First degree burn</b>                                    |               |                |
| Effects outermost layer of skin                             | 322           | 60%            |
| Effects outer 2 layers of skin                              | 46            | 9%             |
| Effects all the 3 layers of skin                            | 70            | 13%            |
| I do not know   | 99            | 18%            |
| <b>Second degree burn</b>                                   |               |                |
| Effects outermost layer of skin                             | 27            | 5%             |
| Effects outer 2 layers of skin                              | 386           | 72%            |
| Effects all the 3 layers of skin                            | 21            | 4%             |
| I do not know   | 103           | 19%            |
| <b>Third degree burn</b>                                    |               |                |
| Effects outermost layer of skin                             | 88            | 16%            |
| Effects outer 2 layers of skin                              | 53            | 10%            |
| Effects all the 3 layers of skin                            | 254           | 47%            |
| I do not know   | 142           | 27%            |
| <b>1<sup>st</sup> A.I.D. in 1<sup>st</sup> degree burns</b> |               |                |
| Wash the area with cold water                               | 199           | 37%            |
| Apply ointment  | 147           | 27%            |
| Go to nearest medical centre                                | 96            | 18%            |
| Plastic surgery   | 15            | 3%             |
| I do not know   | 80            | 15%            |
| <b>1<sup>st</sup> A.I.D. in 2<sup>nd</sup> degree burns</b> |               |                |
| Wash the area with cold water                               | 36            | 7%             |
| Apply ointment  | 165           | 31%            |
| Go to nearest medical centre                                | 192           | 36%            |
| Plastic surgery   | 10            | 2%             |
| I do not know   | 134           | 24%            |
| <b>1<sup>st</sup> A.I.D. in 3<sup>rd</sup> degree burns</b> |               |                |
| Wash the area with cold water                               | 41            | 8%             |
| Apply ointment  | 51            | 9%             |
| Go to nearest medical centre                                | 259           | 48%            |
| Plastic surgery   | 87            | 16%            |
| I do not know   | 99            | 19%            |

Other strategies that were suggested by respondents are shown in Table 3. Forty-six percent suggested removal of clothing that get stuck to the burned area and put a clean cotton cloth over the wound. Majority also suggested rush to E.R. if the affected area involves any joint.

**Table 3 Suggested strategies by respondents in case of burns (n=537)**

| Suggested strategies                                    | Frequency (n) | Percentage (%) |
|---|---------------|----------------|
| <b>Remove clothing that is stuck to the burned skin</b> |               |                |
| Agree   | 246           | 46%            |
| Disagree  | 218           | 41%            |
| I do not know   | 73            | 13%            |
| <b>Put a clean cotton cloth after removing dress</b>    |               |                |
| Agree   | 349           | 65%            |
| Disagree  | 101           | 19%            |
| I do not know   | 87            | 16%            |
| <b>Rush to E.R. if the burn is on joint area</b>        |               |                |
| Agree   | 397           | 74%            |
| Disagree  | 46            | 9%             |
| I do not know   | 94            | 17%            |

Fifty-one percent (273/537) of respondents had past history of burn, either oneself being affected or any one of their close relatives. Cause of burn was mainly boiling water (51%) followed by flame/fire of stove (34%). Mostly, it was hand (38%) that was affected followed by legs (16%). Forty-four Percent had 1<sup>st</sup> degree burn. The area was washed by cold water for just 10 minutes in 42% of cases. Most of them (57%) visited doctor and (59%) had local treatment by creams (Table 4).

**Table 4 Past history of burn (n=273)**

| Variable   | Frequency (n) | Percentage (%) |
|--|---------------|----------------|
| <b>History of burn of respondent or any of his/her close family member (n=537)</b> |               |                |
| Yes  | 273           | 51%            |
| No   | 264           | 49%            |
| <b>Cause of burn</b>   |               |                |
| Scald  | 14            | 5%             |
| Flame/Fire of stove  | 94            | 34%            |
| Electric   | 14            | 5%             |
| Boiling water  | 137           | 51%            |
| Chemicals  | 14            | 5%             |
| <b>Area of burn</b>  |               |                |
| Face   | 14            | 5%             |
| Chest  | 21            | 8%             |
| Legs   | 45            | 16%            |
| Back and thigh   | 14            | 5%             |
| Foot   | 24            | 9%             |
| Arm  | 28            | 10%            |
| Hand   | 104           | 38%            |
| Abdomen  | 23            | 9%             |
| <b>Degree of burn</b>  |               |                |
| 1 <sup>st</sup> degree   | 120           | 44%            |
| 2 <sup>nd</sup> degree   | 71            | 26%            |
| 3 <sup>rd</sup> degree   | 29            | 11%            |
| I do not know  | 53            | 19%            |
| <b>Step taken immediately</b>  |               |                |

|  |     |     |
|--|-----|-----|
| Washed the area with cold water for 10 minutes | 116 | 42% |
| Rushed to E.R.                                 | 40  | 15% |
| Put ice on the area                            | 23  | 8%  |
| Applied honey on the area                      | 14  | 5%  |
| Applied burn cream                             | 32  | 12% |
| Applied egg                                    | 14  | 5%  |
| Applied tomato-paste                           | 14  | 5%  |
| Applied tooth-paste                            | 20  | 7%  |
| <b>Visited the doctor</b>                      |     |     |
| Yes  | 156 | 57% |
| No   | 117 | 43% |
| <b>Medical intervention given (n=156)</b>      |     |     |
| Bandage with cream                             | 48  | 31% |
| Cream only                                     | 92  | 59% |
| Advised surgery                                | 16  | 10% |

Out of 273 burn cases, 65 had complications later on. 42% had full mutilation of skin however most of them had infection and hypothermic attacks (14%). Twenty-nine percent of cases developed psychological disturbance after that incidence but just 8% consulted any Psychiatrist (Table 5).

**Table 5 Post burn condition (n=273)**

| Variable   | Frequency (n) | Percentage (%) |
|--|---------------|----------------|
| <b>Complication after treatment</b>              |               |                |
| Yes  | 65            | 24%            |
| No   | 208           | 76%            |
| <b>Complication (N=65)</b>                       |               |                |
| Full mutilation of the skin                      | 28            | 42%            |
| Loss of the burned area                          | 7             | 11%            |
| Infection  | 9             | 14%            |
| Blisters   | 5             | 8%             |
| Hypothermic attacks                              | 9             | 14%            |
| Pain in bones & joints                           | 7             | 11%            |
| <b>Difficulty in performing daily activities</b> |               |                |
| Yes  | 51            | 19%            |
| No   | 222           | 81%            |
| <b>Psychological disturbance</b>                 |               |                |
| Yes  | 78            | 29%            |
| No   | 195           | 71%            |
| <b>Visited psychiatrist</b>                      |               |                |
| Yes  | 23            | 8%             |
| No   | 250           | 92%            |

In Table 6, certain variables are cross-tabulated by applying Chi-Square test as a test of significance, keeping level of significance  $\leq 0.05$ . It shows that among respondents, there were mostly females who were studying in universities ( $p < 0.05$ ); secondly, there is a significant association of young age group with high level of education ( $p < 0.001$ ). As 97% of our respondents were Saudi nationals, this result reflects that educational level of Saudi nationals has raised and female literacy has markedly increased. However, there was a significant association of female respondents who had burn history, with psychiatric issues later in life ( $p < 0.05$ ). Visit to Psychiatrist was associated with high levels of total monthly income ( $p < 0.05$ ).

**Table 6 Association of certain variables (Applied Chi-Square Test keeping level of significance  $\leq 0.05$ )**

| Comparing variables  | p-value |
|--|---------|
| High level of education (High School and University) with sex (females) of the respondents     | <0.05   |
| High level of education (High School and University) with age (18-28 years) of the respondents | <0.001  |
| Sex (females) of the respondent with psychological impact after burn incident                  | <0.05   |
| High level of total monthly income ( $\geq 10,000$ Saudi Riyals) with visit to Psychiatrist    | <0.05   |

## DISCUSSION

In the developed countries, over the past 10 years, there is a dramatic improvement in the overall outcome for burn patients because of proper first aid, yet burns still cause substantial morbidity and mortality [16-18,22,23]. According to worldwide reports, community's first aid knowledge on burns is limited, especially in developing and underdeveloped countries [2,19-21,24]. In Saudi Arabia, the incidence of burn cases are increasing every year, though in half of the cases it is preventable and in other half, post burn complications could be minimized by simple cost effective strategies (first aid at home and proper counselling and psychiatrist consultation) [12].

Educational level represents an important factor for proper adoption of first aid practice [9,14]. A study done on Majmaah community, Saudi Arabia revealed that majority of study participants (73.8%) who had bachelor's degree were aware of first aid management of burns [25-33].

Wallace, et al. conducted a survey on 2602 adults at a sports club about first aid on burns. The report indicated that only 50% of participants had sufficient knowledge. Correct answer rate was 15% higher in groups who had been trained about first aid in the past 5 years [28]. Very few of them knew the method to extinguish a fire and to escape from fire [29]. Evaluating knowledge of family members at the English hospitals, Davies, et al. indicated that only 32% had sufficient knowledge on first aid on burns; socio-economical class, income, and age had no significant relationship with the results of the survey [32]. Same results were obtained in present study where majority of respondents were well educated but their knowledge on burn's management was not sufficient. The previous acquisition of knowledge regarding burn first aid was found in 49%, which meant that 51% of respondents has not received such information, translating to a poor penetration of awareness campaigns in the community.

Quinn, et al. investigated people with burn injuries and found that most of them attempted to go to the hospital as soon as possible irrespective of whatever degree of burn they had. In contrary in present study, most of the respondents recommended to approach nearest emergency in case of 3<sup>rd</sup> degree burns only [25].

In New South Wales, Harvey, et al. surveyed 7320 individuals through a telephone-based survey with 82% of respondents expressing that they would cool burned area with water; however, only 9.4% would do so for an optimal 20 minutes [21]. In New York, Taira, et al. studied 211 burn victims on their pre-hospital actions; the study showed that 73% cooled their burns by different methods; tap water was used by 39.9%, ice by 25.2%, cooling blanket by 8.9%, and dressings were applied by 22.2% [26]. In Kwa-Zulu Natal study, 26% washed the wound with plain tap water [27]. On the contrary, some studies have revealed that patients thought that use of cold water would cause further harm to the burned area [25,26,28]. Similarly, in present study, majority of people thought washing with cold water is the first step to be taken.

Different home remedies were also recommended in many relevant studies. Toothpaste and honey are widely applied as a home remedy [2,30,31]. Similarly, in present study, a substantial percentage of study participants recommended application of toothpaste, egg, honey or tomato paste. In addition to it, studies have shown that patients who believed in home remedies thought that home remedies would result in better wound healing and hence minimize risk of having scar [27,30].

Graham, et al. investigated knowledge of parents in Southern of Yorkshire, Britain, and indicated that 92% parents recommended to wrap-up burn wound by appropriate materials. Less than 40% parents did not think that body clothing and jewellery should be removed [31]. A similar study conducted in Saudi Arabia by Kattan, et al. reported that 1550 respondents had a history of burn exposure in which burn injury first aid was applied as follows: 72%

removed clothing and accessories from the injured area; water was applied by 64%; among those who applied water, 89% applied cold water; and only 6% did so for more than 15 min. Wrapping the burn area was performed by 34%, and 63% sought medical assistance [2]. Our study results regarding these variables are not different.

Hsiao et al. conducted a survey among students in Cambodia. It showed that just 7% knew how to stop fire by rolling on the ground. A similar study done in Majmaah, Saudi Arabia revealed that more than three quarters (82.6%) of study participants knew that the first thing is to stop, drop, and roll when body clothes catch fire, 43.8% knew to apply cold water if hot oil spills on hands and 41.0% knew that all burn injuries must be treated at hospital [30]. In our study no one knew that rolling on the ground could help in distinguishing fire. However, more than three-quarters of our respondents knew that clothing and accessories should be immediately removed from the area of injury, and about two-thirds suggested to wrap the area with a clean cloth. Approximately half of respondents applied water to the injured area for 5-10 min and almost all the study participants sought medical assistance. Half of the responders know the difference between the three degrees of burns. Cold water was applied initially in 1<sup>st</sup> degree burn by 37% of respondents, however for 2<sup>nd</sup> and 3<sup>rd</sup> degree burns, most of the respondents recommended to rush to nearest emergency. As shown, Hail community possesses poor knowledge on first aid on burns and almost similar results were obtained from other studies done in KSA [5,10,13,14] and in some of the western countries [29-31]. One important note is that in all countries, the vast majority of the population did not uphold the proper implementation, so that even if water was applied, it was for much less than the optimal duration, thereby limiting the benefit of the recommended measure.

Regarding knowledge on surgical intervention, in our study only 16% of study participants knew that plastic surgery is the correct intervention for 3<sup>rd</sup> degree burns. Though there is an important role of surgical intervention to complete healing in third and second-degree full-thickness burn as well which can't heal without grafting (Table 2). Most of the studies have shown that excision of blisters and debridement of necrotic tissues within 24-48 h after injury is associated with decreased blood loss, infection, length of hospital stay and increased graft acceptance [11,12]. Our study participants lack proper knowledge on surgical intervention in burn management.

In present study, out of 273 burn cases, 57% consulted a doctor, though a large majority of patients had complications (disfigurement, cosmetic and psychiatric issues) later on. Also, in this study we found about 29% of cases stated having psychological symptoms after the burn incidence. There was a significant association of female respondents who had burn history, with psychiatric symptoms ( $<0.05$ ) however just 8% visited any Psychiatrist. Our results are in concordance with the similar international prospective studies done where 45% of the patients developed psychiatric problems [33,34]. Similarly, another study done in major burn unit in Great Athens, shows psychiatric issues in 46% of cases [34]; furthermore it was shown that those whose income was high, had frequent consultations with Psychiatric Doctor [35]. Same finding is revealed in our study where level of total monthly income shows a significant association ( $p<0.05$ ) with the visits to Psychiatrist.

## CONCLUSION

Knowledge of respondents on the burn's issues is very scanty as revealed in our results. 15%-24% of respondents did not know what to do in 1-3 degree of burns that is very alarming. Just 16% knew that there is any role of plastic surgery in 3<sup>rd</sup> degree burns. Twenty-nine percent had suffered from psychiatric problems after burn incident but just 8% consulted any psychiatric and those were ones who had total monthly income  $\geq 10,000$  Saudi Riyals ( $p \leq 0.05$ ).

These results emphasize the importance of implementing Health Awareness Campaigns in community and in institutions that could minimize burn incidents and psychiatric issues in general population.

## DECLARATIONS

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### Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.



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