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Original Article

Living in rural areas is a major risk factor for severe burn injury in Turkey

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Abstract. The surroundings and lifestyle that are typical of rural areas are less safe than those of urban areas. This retrospective study analyzed risk factors of the patients with burn injuries who lived in rural areas. Between January 2000 and June 2011, 1145 patients were hospitalized in the Adana burn unit of Baskent University of whom 600 (52.5%) lived in rural areas and 545 (47.5%) lived in urban areas. The two groups were compared with respect to demographic characteristics, cause of burn injury, severity of burn injury, and length of hospital stay. The treatment methods used were recorded in the burn treatment registry. In this study, burns occurring in rural areas were deeper, larger, and caused more deaths than those occurring in urban areas, which may be due to the characteristics of the rural population, including the unavailability of transportation to the burn units. Rural burns were more frequent and more severe than urban burns, which demonstrate the importance of appropriate prevention directed at rural populations.

Key words: Burn injury, rural area, urban area, prevention

1. Introduction

Several socioeconomic factors have been associated with burn risk (1). The rates of death from burns are higher in rural communities (2, 3). Family patterns (e.g., family size), unemployment, and less education have also been associated with burn risk (2-8). Factors associated with housing also have been associated with burn risk. These factors include not owning one's home, the lack of indoor plumbing, and wood heating (9, 10). As people living in rural areas are generally less well informed than urban populations, it is possible that they are less familiar with the precautions for avoiding burns and that they therefore are exposed to burn injury more frequently. In this regard, the surroundings and lifestyle that are typical of rural areas are less safe than those of urban areas (11).

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In their study on a French population, Vidal-Trecan et al. (11) showed a higher incidence of burns in rural areas than in urban areas. In contrast, Spanish studies found similar (12) or greater (13) risks of burns in urban than in rural areas.

In Turkey, the demographic characteristics of rural populations differ from those of urban populations. Individuals living in rural areas tend to be younger, less educated, and poorer than those living in urban areas, and they are also more likely to live in large families (14).The aim of this study was to identify the factors that affect the outcomes of burn patients who live in rural and urban areas in the southern part of Turkey.

2. Materials and methods

Our burn unit at the Baskent University Adana Training and Medical Research Center was established in 1997. It serves a population of approximately three million people in the Eastern Mediterranean region. However, many patients from Eastern Turkey are also referred to our hospital. Between January 2000 and June 2011, 1145 patients were hospitalized in the Adana burn unit of Baskent University of whom 600 (52.5%) lived in rural areas and 545 (47.5%) lived in urban areas. The two groups were compared with respect to demographic

characteristics, cause of burn injury, severity of burn injury, and length of hospital stay. The treatment methods used were recorded in the burn treatment registry.

The data were expressed as mean±SEM. Differences between the two groups were analyzed using the independent Student t test and its non-parametric counterpart, the Mann-Whitney U test. Chi-square or Fisher's exact tests were used for the categorical variables when appropriate. Homogeneity of variances was calculated using Levene's test and the Lillefors significance correction test. All statistical calculations were done using the program SPSS for Windows (version 16.0; SPSS, Inc., Chicago, IL, USA) Differences were considered statistically significant at levels of probability < 0.05.

3. Results

There were no significant differences between the groups with respect to age (16.38± 0.74 for rural vs.17.17± 0.77 for urban, p=0.460) and sex. The mortality rate was significantly higher in the rural group (17.2 % vs. 11.4 %, p=0.005) (Table 1). The rural group had a significantly higher mean for the total body surface area (TBSA) burned (27.26± 0.79 vs 22.77± 0.78, p=0.000). The number of hospitals from which patients transferred before admission (1.82± 0.051 vs. 1.41± 0.048,p=0.000), hospitalization time (21.25± 0.72 vs 18.98± 0.76 days, p=0.03), the mean numbers of debridement procedures required (0.66± 0.047 vs 0.48± 0.051,p=0.000),and the mean numbers of graft operations required (0.52± 0.036 vs. 0.44± 0.033, p=0.000) were also significantly higher in the rural group (Table 2). Hot liquids were the most frequent cause of burns in both areas, followed by fire and electricity (Figure 1).

Table 1. Distribution of the patients according to the age, sex, mortality and number of hospitals transferred before admission

	Urban (n=545)	Rural (n=600)	p
Age (yrs)*	17.17± 0.77	16.38± 0.74	0.460
Male (n,%)	352 (64.6)	411(68.5)	0.161
Mortality (n,%)	62 (11.4)	103 (17.2)	0.005
Number of hospitals transferred before admission*	1.41± 0.048	1.82± 0.051	0.000

*mean±SD

Table 2. Comparison of groups, data for burn characteristics, treatment and hospitalization time

	Urban (n=545)	Rural (n=600)	p
Second degree (%)*	18.67 ±0.70	22.29± 0.74	0.000
Third degree (%)*	6.54± 0.76	8.38± 0.76	0.015
TBSA burned (%)*	22.77± 0.78	27.26± 0.79	0.000
No. of debridement operations*	0.48± 0.051	0.66± 0.047	0.000
No of graft operations*	0.44± 0.033	0.52± 0.036	0.000
Hospitalization time (days)*	18.98± 0.76	21.25± 0.72	0.030

TBSA: total body surface area, * mean±SD

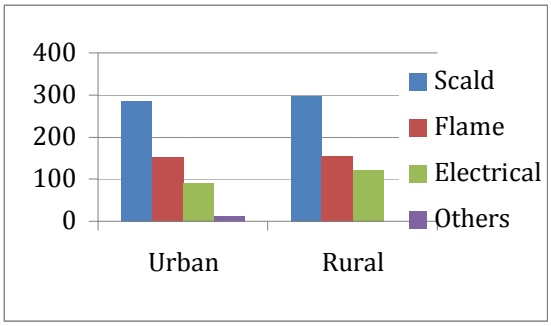

Fig. 1. Distribution of the patients according to the causes of burns (p=0.195).

In rural areas, burn patients lived mostly in slums (68% for rural vs. 32% for urban, p=0.000). The three most frequently injured areas were the upper limb, lower limb, trunk, and the head-neck region in both areas. Perineal burns were also more frequent in rural areas than in urban areas (Table 3).

Table 3. Percentages of burns in urban and rural areas according to the body region involvement

	Urban	Rural	p
Hands (%)			
No	2	0	
Single	52	54	0.550
Double	46	46	
Feet (%)			
No	2	0	
Single	44	45	0.550
Double	54	55	
Face and neck (%)	45	41	0.210
Perineum (%)	22	33	0.000

4. Discussion

In this study, burns occurring in rural areas were deeper, larger, and caused more deaths than those occurring in urban areas, which may be due to the characteristics of the rural population, including the unavailability of transportation to the burn units.

Minor variations in the causative factors of burn injury are based on geographical and cultural differences. However, in our country, scalding is the leading cause of the hospitalization of burn patients. In typical cases, the victim is scalded when hot fluid is splashed or spilled at home in the kitchen, often in the mother's presence. Tea is an extremely popular drink in Turkey. It is traditionally brewed in two narrow-bottomed pots that are stacked on top of each other. Thus, the practice of tea making is the main cause of burns in Turkish kitchens. The traditional pots are inherently unstable, and although modern kettles are advocated, they are still not widely used (15).

In general, flame burns are attributed to the use of liquid-petroleum gas containers (which do not fulfill industry safety standards), the widespread use of small indoor propane gas grills, the careless use of matches and lighters, and smoking (16-18). There is a greater need for heating, particularly of bathrooms and bathwater; greater use of traditional stacked teapots and stoves, such as the *tandir*; greater use of indoor liquid-petroleum gas heaters; and greater use of open fires and grills for everyday cooking during the winter (16).This equipment is frequently used in and around the home without any safety measures. Thus, this equipment is responsible for much of the flame and scald burns in Turkey. It is remarkable that the rates of chemical and electrical burns in our study are the lowest in both areas.

Pearson et al. (19) attributed difficulties in accessing health-care services to the low socio-economic level and educational attainment of rural populations, which was also found in this study. Thus, individuals in rural areas may be discouraged from seeking medical attention. The mean response, scene, and transport times for transfer of the patient from the scene to the hospital have been shown longer for rural incidents (20). Thus, rural victims may be more likely than urban victims to die before arriving at a hospital burn unit. Conversely, the distance between rural areas and hospitals may lead physicians in rural areas to transfer more patients to burns units than do physicians in urban areas, thereby making it less likely that the proportion of rural burns is underestimated. However, the severity of rural burns does not support this notion.

Similar to our study, burn patients were shown to be more likely to live in slums (21) or under other poor living conditions (21-23). Living in rental housing in areas with low property values was identified as burn risk factor (24, 25). Burn victims of residential fires in older homes, mobile homes, and homes without telephones were also at increased risk of injury or fatality (26, 27). Substandard housing, defined as lacking indoor plumbing, was associated with increased burn risk in one Peruvian study (5) and in two studies in the US (10, 26).

The number of hospitals from which patients were transferred before admission was significantly higher in the rural group. The area of coverage of the burn units in Turkey is insufficient, and there is still a lack of burn beds and timely transportation of burned patients to our facilities (28). Therefore, only patients with moderate-to-major burns with a high risk of mortality are admitted to our burn units. In addition, they usually present at many local hospitals and health care facilities before finally reaching our burn units, thus wasting significant time. Kut et al. (14) showed that 40% of pediatric and 28.6% of adult deaths in our units occurred within the first two days after their admission. The authors claimed that this mortality rate might be the result of delayed admission or the long transportation distance for these burned patients.

Healthcare providers should also know what major burns are and how to deal with their life-saving emergencies and safely transfer them. During the transport the patient should have written instructions for the amount of fluid to be administered. In a conscious patient oral resuscitation should be encouraged. The medico legal formalities will have to be completed at the primary center before the transfer and the patient must be shifted without unnecessary delay.

With good awareness on prevention and the correct first aid, in the long term, the incidence of major non-intentional burns can be reduced and the severity of burns will also be less. For those still injured, there should be clear guidelines for minor burns to be managed locally and others to be transported to a proper burn care facility. Transporting from remote villages and tribal areas can be a huge challenge and it may take them days to reach anywhere close to a facility, provided they are properly guided.

Burn prevention should be a national programme, designed with sensitivity, vision and care towards advocacy of changing harmful and

potentially dangerous cultural practices. Education must be combined with suggestions on some strategies of safe lifestyle. This will promote a lot of research in making their environment safe.

In conclusion, we found that rural burns were more frequent and more severe than urban burns, which demonstrates the importance of appropriate prevention directed at rural populations. Preventive measures should deal with burns that occur during indoor activities. For every day activities, educational programs and regulations concerning the restricted use of combustible fluids and hot water in individual homes should be developed. The use of open fires for cooking and heating should be discouraged, and safer heating systems should be encouraged. Educational programs could be conveyed via the mass media to both rural and urban populations. Substandard housing, including the lack of running water and crowding, increases the risk for burn. Finally, it is well known that children are at increased risk for burn and fatalities. Lack of parental education, poverty, large families, substandard housing, and delayed admission are all associated with increased risk of burns in rural areas. While many of these factors are not modifiable, future prevention efforts should be focused on children of lower socioeconomic status.

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