

EPIDEMIOLOGICAL ANALYSIS OF BURN PATIENTS IN THE MILITARY HOSPITAL, RABAT, MOROCCO

Elkafssaoui S.,^{1,2} Tourabi K.,^{3*} Bouaiti E.,² Ababou K.,³ Moussaoui A.,³ Ennouhi M.A.,³ Boulmaarouf A.,³ Mrabet M.,² Quayou A.,¹ Soulaymani A.,¹ Ihrai H.³

¹ Genetics and Biometry Laboratory, Department of Biology, Faculty of Science, Ibn Tofail University, Kenitra, Morocco

² Department of Plastic Reconstructive Surgery and Burns Centre, Mohamed V Military Hospital, Rabat, Morocco

³ Department of Hygiene and Community Medicine, Mohamed V Military Hospital

SUMMARY. A retrospective study was conducted of burn patients admitted to the military hospital in Rabat, Morocco, in the 6-yr period from 2004 to 2009. This is the first multivariate study to be performed in Morocco. The epidemiological data from the 291 patients hospitalized were collected and studied. The type of burn was indicated in 284 of the patients: 94% of the injuries were thermal burns, 4% were electrical burns, and 1.5% chemical burns. In 261 cases the exact aetiology was noted: 56% of accidents were caused by flames, 38% by hot liquids, 4% by electric current, and 2% by chemicals. The distribution of the Moroccan population is as follows: 0-4 yr, 7%; 5-14 yr, 8%; 15-19 yr, 8%; 20-59 yr, 70%; over 60 yr, 7%. The male/female sex ratio was 1.63. The mean duration of hospitalization stay was 42 ± 62 days. The mean body surface area burned was $21 \pm 18\%$. Total mortality was 5%; 57% of deaths were due to septic shock. Our results were similar to data from other studies in the literature, with certain characteristics in our series, especially the age bracket most affected, the body surface area burned, and the mechanisms of injury.

Keywords: epidemiology, burn, causes, morbidity

Introduction

Considered one of the leading causes of injury throughout the world, burns are a frequent cause of hospitalization. It is estimated that 1% of the worldwide population will suffer from a serious burn sometime during their life.^{1,2} In the developing world, the incidence and mortality of burn injuries are both higher, and because of their morbidity, post-burn sequelae, and mortality, burn injuries constitute an important public health problem.³⁻⁵ The present report is a retrospective study conducted in the Burn Unit in the Department of Plastic and Reconstructive Surgery of the Military Hospital of Rabat, Morocco.

The epidemiological profile is thus based on the records of burn patients admitted to the Department between 2004 and 2009. This profile is comparable to that of European countries or North America on the circumstances, age, sex, burned body surface area, and total mortality.

Materials and methods

This retrospective analysis was conducted in the burn

unit of the Department of Plastic and Reconstructive Surgery of the Military Hospital of Morocco. The epidemiological analysis is based on data collected from the medical records and operative reports of 291 burn patients, hospitalized between 2004 and 2009. The analysis focused on various aspects: the circumstances, age, sex, burned body surface area, geographical recruitment, and analysis of total mortality. The data collected were analysed using the SPSS program with the help of a team of biostatisticians.

The surgical and anaesthesia teams were unchanged during the period. We must also point out that despite the fact that the study was conducted in a military hospital, more than half of the patients treated were civilians.

Results

Distribution of cases in relation to type of burn

The type of burn was noted in 284 cases. *Fig. 1* shows that 93.66% of the burns were thermal burns, while chemical and electrical burns were relatively rare.

* Corresponding author: Dr K. Tourabi, Department of Plastic Reconstructive Surgery and Burns Centre, Mohamed V Military Hospital, Rabat, Morocco. E-mail: adam_tou_ben05@hotmail.com

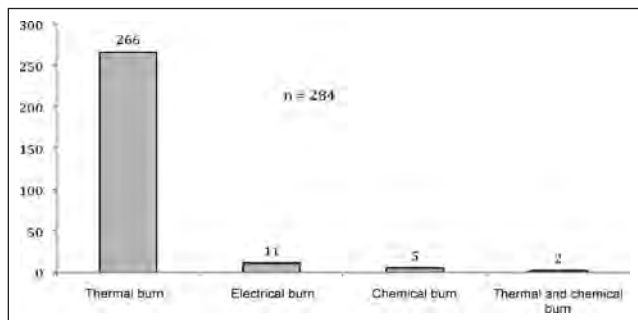


Fig. 1 - Distribution of cases in relation to type of burn.

Causative agents

The aetiology of the burns was recorded in 260 cases (Fig. 2). Over 50% of the burns were due to flames and 38% to hot liquids. Chemical and electrical burns were relatively rare.

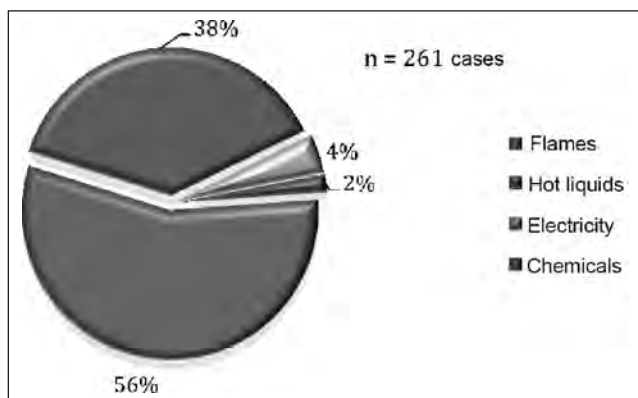


Fig. 2 - Distribution of cases in relation to cause of burn.

Distribution of cases in relation to sex

The patients' sex was reported in 291 cases (Fig. 3). Burns were common in males, with 180 cases (62%), compared to females (111 cases, 38%). The male/female sex ratio was 1.63:1.

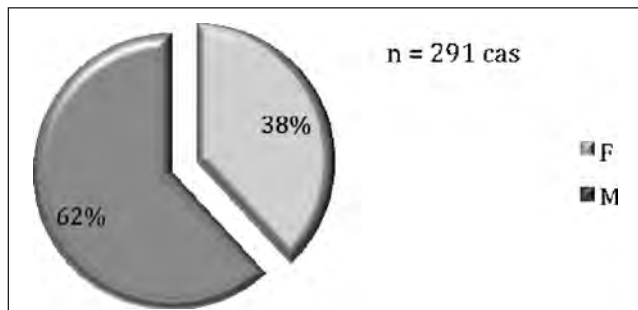


Fig. 3 - Distribution of cases in relation to sex.

Distribution by age

The patients' age was given in 270 cases. Fig. 4 shows that the age groups most affected were 15-29 yr, 30-39 yr, and 40-49 yr, with respectively 28.5%, 21%, and 20.5%, and an average age of 32.57 ± 17 yr.

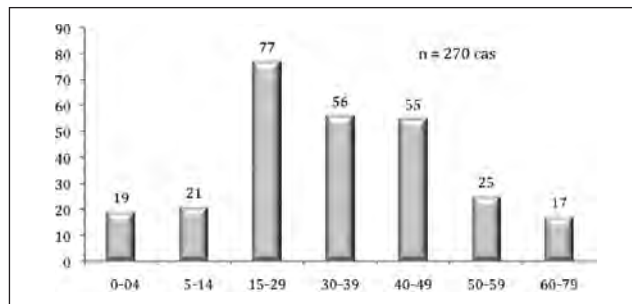


Fig. 4 - Distribution of patients by age (yr).

Distribution of patients by year

During the period 2004-09, the Department of Plastic and Reconstructive Surgery treated 291 cases of burns. Fig. 5 shows that an average number of 48.5 cases were admitted per year.

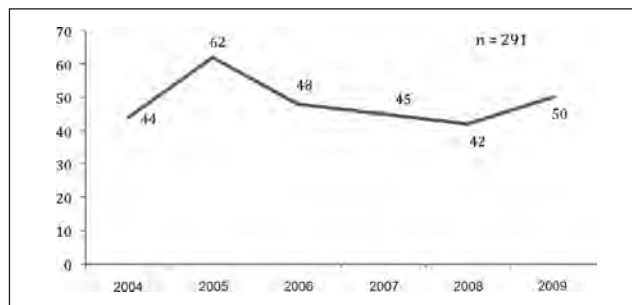


Fig. 5 - Distribution of patients by year.

Extent and depth of burns

Overall, the mean total body surface area of burns was $21 \pm 18\%$. The distribution of burns by depth (Fig. 6)

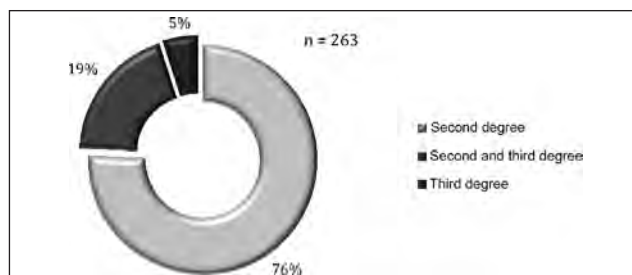


Fig. 6 - Extent and depth of burns.

shows that 76% of the burns were second degree and 19% were mosaic burns (second and third degree), while deep burns (third degree) represented only 5% of the cases.

General condition of patients on admission

The results show that 99% of patients with burns were admitted to the Department in good general condition (Fig. 7).

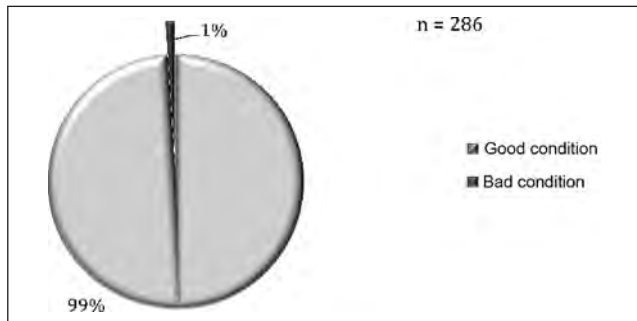


Fig. 7 - General condition of patients.

Category of patient

The patients' military or civilian category was determined in 258 cases, and 56% of patients admitted were found to be civilians (Fig. 8).

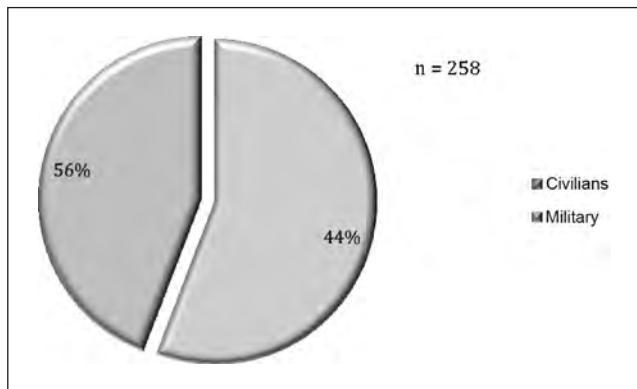


Fig. 8 - Patients' military or civilian status.

Breakdown of cases by patients' region of origin in Morocco

The number of patients transferred from other hospitals was 101. Fig. 9 shows that patients came most frequently from the south, the region of Marrakech, and Rabat, with respectively 33.67%, 16.83% and 9.9%. The reason for this distribution is the presence of a large number of military personnel protecting the Moroccan Sahara.

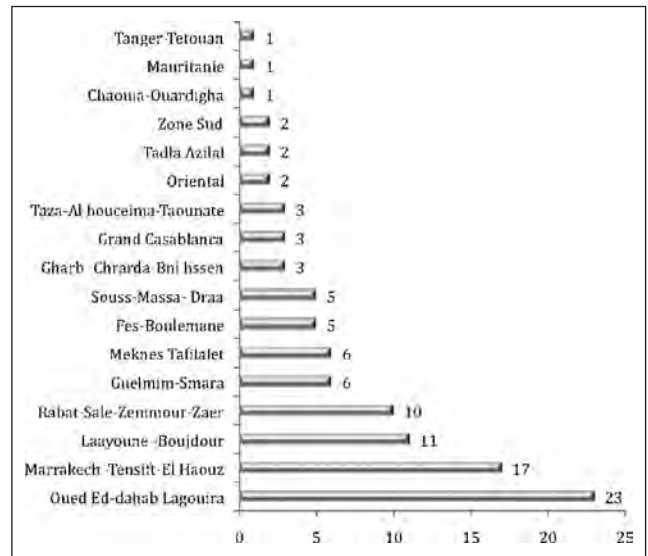


Fig. 9 - Patients' region of origin in Morocco.

Distribution of patients in relation to medical history

Of the 67 patients who reported a medical history, 31.3% were diabetic, 6% were diabetic and hypertensive, and 1.5% had heart disease (Fig. 10).

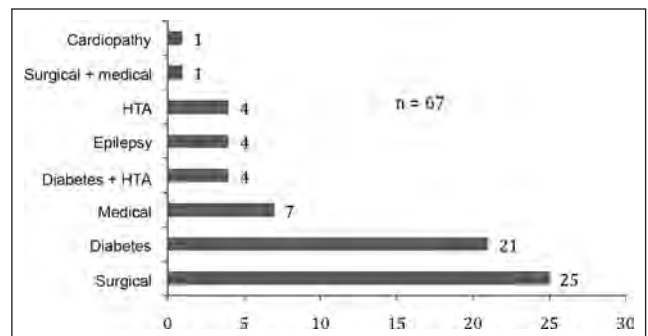


Fig. 10 - Distribution of cases in relation to patients' medical history.

Smoking and drinking

Fig. 11a shows that 88% of the patients were non-smokers, while Fig. 11b shows that 96% were non-drinkers.

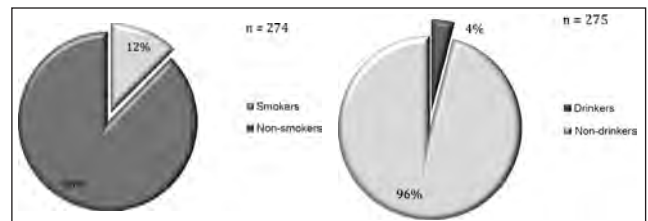


Fig. 11a,b - Patients' smoking and drinking habits.

Final outcome

The final outcome of the burn was reported in 287 cases. This was favourable in 95% of the cases.

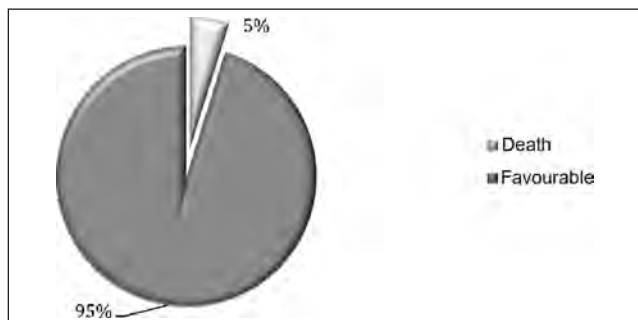


Fig. 12 - Final outcome.

Cause of death

With regard to the 14 deaths, eight patients (57%) died of septic shock and six as the result of a pulmonary embolism (Fig. 13). Our patients automatically receive anti-embolic prophylaxis, and a thoracic scan is requested for the onset of clinical signs.

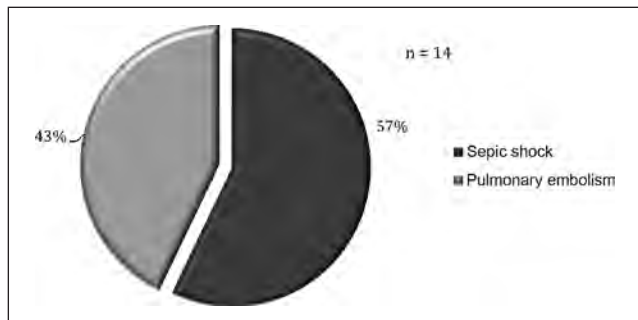


Fig. 13 - Causes of death.

In hospitalized patients the duration of hospital stay was between 2 and 665 days, with a median of 26 days, i.e. the length of hospital stay was less than 26 days in half of the hospitalized patients and more than 26 days in the other half.

Discussion

Our department is Morocco's first specialized centre for the treatment of burns and is currently the only centre for burn patients in Moroccan military hospitals, which treat both the military and civilians.

Our study is the first epidemiological multivariate analysis of burn patients in Morocco. The results show a

male:female sex ratio of 1.63:1, which is significantly reduced compared to previous studies^{6,7} but still with a male predominance.^{6,8} This study is limited to the recruitment of the military hospital in Rabat.

The most affected age group in our study was that of 15 to 29 years - the series reported by Frans' described a younger age group. There was also a relatively high percentage of burned children aged between 0 and 14 years compared to other studies,^{6,7} but this may have been secondary to the predominance of domestic accidents and parental negligence and to differences in socioeconomic levels between countries.⁹⁻¹¹ Our patients' mean age was similar to that reported in the literature.^{6-8,12}

We found that most admissions were secondary to domestic accidents, while studies by other authors found more accidents to professional workers.⁶

Most of our patients were referred from other hospitals all over the Kingdom of Morocco, mainly from the south of the country, with a small percentage of patients admitted directly from the emergency department of our own hospital; other studies found that the majority of patients were admitted in an emergency.

The average hospital stay of 41.76 days was similar to findings from other studies,^{1,3,6} which in our opinion poses a major management problem because of the scarcity of specialized burn centres in Morocco. This underlines the need for other specialized centres and for more care and attention in order to prevent such accidents, starting with the education of the population.

In our study the commonest cause of burns was hot liquids or flame, as in other studies,^{6,7} plus a particular aspect, typical of our country and secondary to the explosion of the small gas bottle (Fig. 14) invariably used in Moroccan kitchens. This gas cylinder is a veritable time bomb in every house all over the Kingdom of Morocco.



Fig. 14 - Small gas cylinder responsible for the majority of dramas.

The study shows a large predominance of second-degree burns, as in other studies.^{1,3,6,7}

The 67 cases we studied included a history of diabetes, hypertension, and heart disease. Some rare patients had toxic habits (alcohol and tobacco). Fourteen of our patients died, the remainder (95%) having been pronounced as having a favourable evolution.

The leading causes of death were pulmonary embolism and septic shock, while deaths from inhalation injury, as quoted in the study by Chong,⁶ were rarer in our series because of the availability of our hyperbaric room and the rarity of the occurrence of burn injuries in closed localities. Hyperbaric treatment was used every time the patient was transportable: it has no contra-indications and could be beneficial for wound healing.

Conclusion

Burns are a major public health problem, requiring protracted hospitalization in intensive care units and general wards. The objectives of epidemiological studies are to identify risk factors for burn injuries and to provide a starting point for the establishment of an effective prevention plan.

Some risk factors were identified in our study, such as the use of small, unsafe gas bottles, the general public's lack of education with regard to the risk of burns, and the associations of other factors that exacerbate burn patients' general state (history of diabetes, cardiovascular risk factors, extreme age).

Our study may be regarded as a preliminary study that opens up the way to other further analysis.

ANALYSE ÉPIDÉMIOLOGIQUE DES PATIENTS TRAITÉS À L'HÔPITAL MILITAIRE, RABAT, MAROC. RÉSUMÉ.

Les auteurs ont effectué une étude rétrospective des patients brûlés traités à l'hôpital militaire de Rabat, Maroc, pendant la période de 6 ans de 2004 à 2009. Cette étude est la première à plusieurs variables à être réalisée au Maroc. Les données épidémiologiques des 291 patients hospitalisés ont été recueillies et analysées. Le type de brûlure était indiqué dans 284 des cas: 94% des brûlures étaient de type thermique, 4% de type électrique et 1,5% de type chimique. Dans 261 cas l'étiologie exacte a été notée: 56% des accidents ont été causés par les flammes, 38% par des liquides chauds, 4% par l'électricité et 2% par des produits chimiques. La répartition de la population marocaine est comme suit: 0-4 ans, 7%; 5-14 ans, 8%; 15-19 ans, 8%; 20-59 ans, 70%; plus de 60 ans, 7%. Le sex-ratio homme/femme était de 1,63/1. La durée moyenne de l'hospitalisation était de 42 ± 62 jours. La surface corporelle brûlée moyenne était de $21 \pm 18\%$. La mortalité totale était de 5%, causée dans 57% des cas par le choc septique. Nos résultats sont comparables aux données d'autres études dans la littérature, mais avec certaines caractéristiques de notre série, surtout pour ce qui concernera la tranche d'âge la plus touchée, la surface corporelle brûlée et les circonstances de l'accident.

Mots-clés: épidémiologie, brûlure, causes, morbidité

BIBLIOGRAPHY

1. Frans FA, Keli SO, Maduro AE: The epidemiology of burns in a medical center in the Caribbean. *Burns*, 34: 1142-8, 2008.
2. Arturson G: Analysis of severe disasters. In Masellis M, Gunn S (eds): "The Management of Mass Burn Casualties and Fire Disasters: Proceedings of the First International Conference on Burns and Fire Disasters", 24-33, Kluwer Academic Publishers, Dordrecht, 1992.
3. Ganesamoni S, Kate V, Sadasivan J: Epidemiology of hospitalized burn patients in a tertiary care hospital in South India. *Burns*, 36: 422-9, 2010.
4. Jayaraman V, Ramakrishnan KM, Davies MR: Burns in Madras, India: An analysis of 1368 patients in 1 year. *Burns*, 19: 339-44, 1993.
5. Subrahmanyam M: Epidemiology of burns in a district hospital in Western India. *Burns*, 22: 439-42, 1996.
6. Chong SL, Song C, Tan TW et al.: Multivariate analysis of burns patients in the Singapore General Hospital Burns Centre (2003-2005). *Burns*, 35: 215-220, 2009.
7. Song C, Chua A: Epidemiology of burn injuries in Singapore from 1997 to 2003. *Burns*, 31: S18-26, 2005.
8. Ngim RCK: Epidemiology of burns in Singapore children - an 11-year study of 2288 patients. *Ann Acad Med Singapore*, 21: 667-71, 1992.
9. Pegg SP, Gregory JJ, Hogan PG et al.: Epidemiological patterns of adult burn injuries. *Burns*, 5: 326-34, 1978.
10. Rajpura A: The epidemiology of burns and smoke inhalation in secondary care: A population-based study covering Lancashire and South Cumbria. *Burns*, 28: 21-30, 2002.
11. O'Connor P, Cripps R: Needs and opportunities for improved surveillance of burns. Canberra: Australian Institute of Health and Welfare, 1998.
12. Lau YS: An insight into burns in a developing country: A Sri Lankan experience. *Public Health*, 120: 958-65, 2006.
13. Pegg SP: Burn epidemiology in the Brisbane and Queensland area. *Burns*, 31 (suppl. 1): S27-31, 2005.

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