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RESEARCH ARTICLE

PEDIATRIC BURN MECHANISMS AND ITS PREVENTIONS: AN EPIDEMIOLOGICAL ANALYSISOF CHILDREN ADMITTED TO THE UHC MOHAMMED VI PLASTIC SURGERY DEPARTMENT IN MARRAKECH, MOROCCO

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Abstract

This study aims to describe the causes, mechanisms and characteristics of children burn injuries. It is a retrospective study that analyses the epidemiological particularities that are leading causes to burn injuries of a 100 cases of pediatric population and discuss different possible ways of its prevention. The pediatric cases of the UH Mohammed 6 plastic surgery department of Marrakech from January 2020 to December 2022 were retrospectively studied and the relative data were re-collected from the hospitalized patientsdigital medical records (i.e., etiology, age, gender, burn area and depth, length of stay (LOS), death). Children with burn injuries represent 40% of the admitted patients to our burn center, and this is an important percentage that should be studied and investigated in order to determine the elements that can contribute to brace prevention, which remains one of the only ways to ovecome this pathology. The average age is 3.82 years with a predilection for the age group under 5 years. Male involvement represents 62% of cases. The burn occurs at home and accidentally in more than 90% of cases. Thermal burns represent almost 92%which of scalding burns represents 68% of while Electric burns represent a relatively small proportion 6% of cases. The average total body surface area is 22.57%. The burn mainly concerns the trunk and the limbs.The average hospital admission time is 4 hours and the average length of hospital stay is 13.32%. The mortality rate is8%.

Introduction:-

Children burns are an important cause of accidental morbidity and mortality. It remains a frequent emergency in our social context.

The carelessness of children in addition to ignorance of the risk are two principle causes of the children burn injuries and it can also involves the family recklessness.

University hospital Mohammed 6 of Marrakech is the only Hospital with a burn center in south Morocco, it involves patient from all the regions and rural area.

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The objective of this work is to identify the mechanism of burns in children and the risk factors, to analyze the circumstances of their occurrence and to increase the efficiency of preventative measures.

Patients and Methods:-

This work consists of a retrospective analysis and the data were gathered on a 100 burned children under 15 years old who were admitted to UH Mohammed 6 of Marrakech between 2020 - 2022. Furthermore, the digital medical record system was used to collect all the data. The information included parameters on age, gender, types of burns, burn cause and mechanism, burn surface and depth, length of stay in hospital, death.

Microsoft Excel 2019 is used to organize and categorize data, while "Tableau Public" is used to calculate the descriptive data and analyze the statistics.

Results:-

Incidence

During the study period, 244 burn patients were admitted, of which 100 were children under the age of 15, that is40% of admissions.

Distribution during the year

The number of admissions increases during the summer time, during school holidays, and the holy month of Ramadan (Fig. 1, 2 and 3).

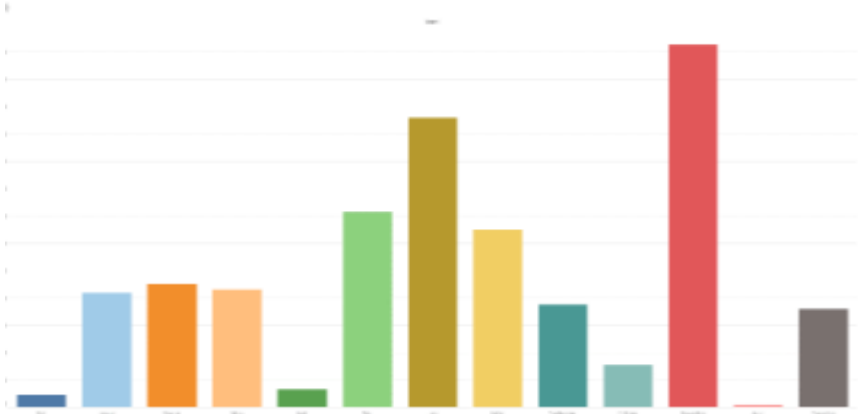

Fig.1:- Monthly distribution of burns cases of the year 2022.

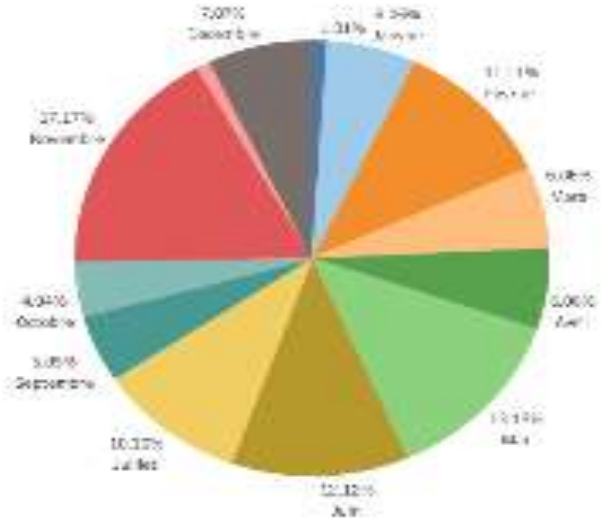

Fig.2:- Monthly distribution of burns case of the year 2021.

Fig.3:- Monthly distribution of burns case of the year 2020.

Patient characteristics

The average age is 3.82 years, with extremes from 8 month to 14 years old, and the most found age group is that of under five years (Fig. 4).

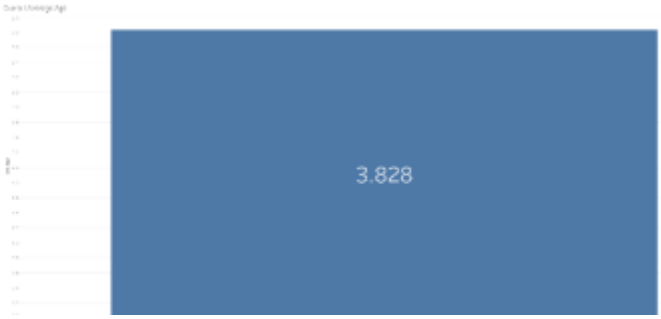

Fig. 4:- The average age.

A slight male predominance (62%) is found (Fig. 5).

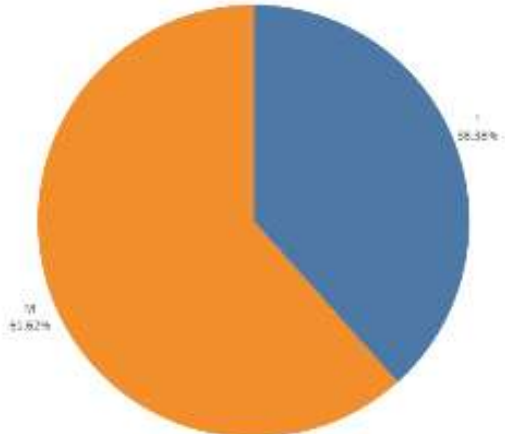

Fig. 5:- Gender percentages.

The socioeconomic level is low in 70% of cases.

Circumstances of the burn

The burn occurs accidentally inmore than 90%of cases through recklessness of children and or carelessness of parents. The home (>90%) remains the principle place where most burns happen, whatever their causes.

The burn was related to game accidents in 7% of cases, burn injurieswere relatedto violence or criminal acts in 2% of the cases and we found one case of child abuse in our sample(Fig. 6).

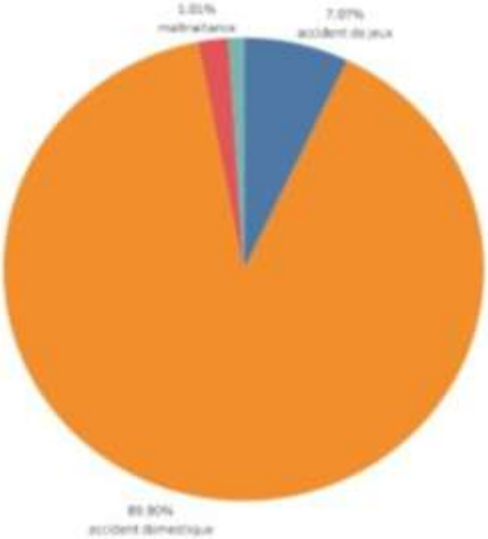

Fig. 6:- Distribution of burns cases according to the cause of burn.

Among all burns, 92% are of thermal origin, scald burns are the leading cause in 68% of cases. We noticedthat theyrepresent the most frequent cause in children under 3 years old, unlike the older children where flames are the most common cause.

6% of burns are of electrical origin and 2% of chemical origin (Fig. 7).

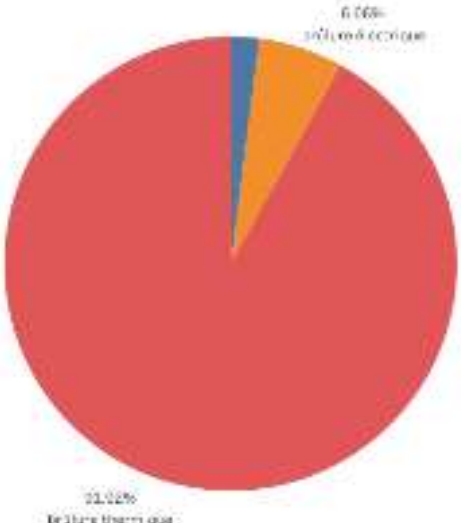

Fig.7:- Types of burns.

Clinical and Prognostic characteristics

The time taken for hospital treatment is 2 hours in 17% of the cases and is greater than 1 day in 21% of cases.

The average body surface area burned (BSA) in our patients was 22,57%, with extremes ranging from 2% to 70% (Fig. 8).

The percentage of children who have a Burned Body Surface ≥ 10, which is a major prognostic factor,was 82%.

Regardless of the burn mechanism, no region of the body is spared, with a predilection of the trunk followed by that of the upper limbs (Fig. 8).

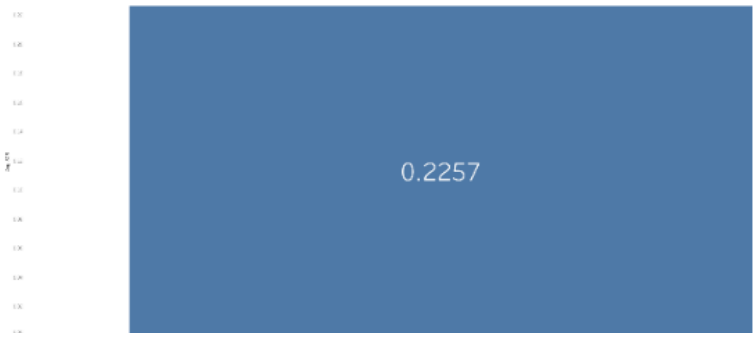

Fig.8:- The average body surface area burned (BSA).

The evaluation of the depth of the lesions reveals that second degree burns are the most prevalent (>84%)(Fig. 9).

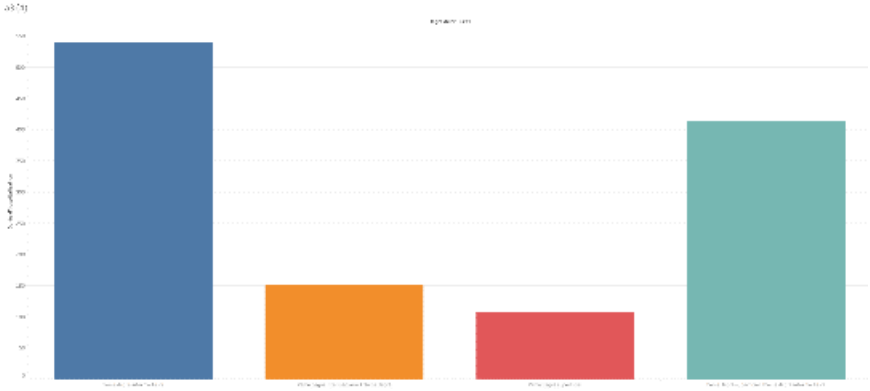

Fig. 9:- Distribution of burn degrees.

The average length of hospitalization was 13.32% days with extremes ranging from two days to nine months (Fig. 10).

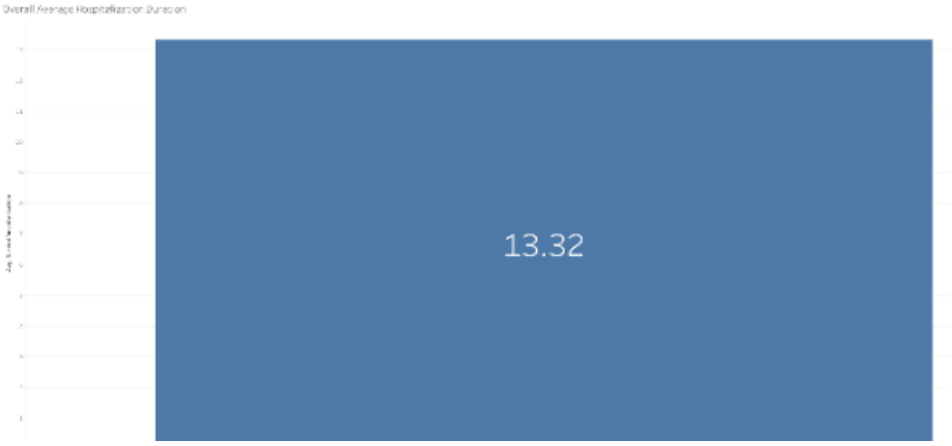

Fig.10:- The average length of hospitalization.

Death

In this work, we deplored 8 deaths among our admitted patients, which makes a mortality rate of 8%.

Discussion:-

Despite prevention and education efforts, children's cognitive abilities to recognize various risks are low. Therefore they can regularly be exposed to the dangers thatcould cause these burn accidents, in the domestic environment in particular. They can encounter in a number of cases severe burns, leading to serious functional, aesthetic, and

psychological repercussions that can irreversibly damage a child's body or could lead to serious disabilities or death in extreme cases.

To this end, a pediatric burns epidemiological survey needed to be done. How to assess the effectiveness of current burn preventive measures and adopt efficient personalized prevention approaches and tactics is the crucial link.

The burn affects both sexes, but a male predominance is found (62% vs 38%). The recklessness of young age, associated with ignorance of the risk, exposes children to accidents, especially domestic ones (>90%).

These accidents mainly occur, in our context, during summer periods and school holidays. This is explained by the absence of extracurricular activities, making the kitchen, with the absence of supervision, and the street the only refuge for playful activities.

We notice that the age group between 1 and 5 years is by far the most threatened.

Thermal burns represent the most frequently found causes (92%). The main mechanism is contact with a hot liquid (68%).

Burns from scalds are frequent due to promiscuity, with carelessness and maternal errors during food preparation (coffee, tea, milk, harira, etc.) and bathing at home or in the Moorish bath. Butane flame burns often occur in the context of collective accidents and this in connection with handling errors and sometimes leaks, mainly the small 3 kg gas bottle because of its paradoxical accessibility.

Burns from gasoline and highly flammable items represent 7% of our causes. They are explained by the accessibility and handling of these productsin the context of fun activities (bonfires and fire games during the Achoura festival).

We also need to mention candle flame burns, although rare, remain frequent due to the under-electrification in rural areas and the fact that the candle represents the main alternative in the event of a power cut in homes in urban areas.

We found in our sample that 2% of burn injuries were of violence or criminal originand one case of child abuse.

Electrical burns (6% of causes) mainly affect adolescents, mainly during playful accidents out of ignorance of the risk during holidays (climbing pylons carrying high voltage lines). In this cases, the lesions caused are often small but serious due to their unpredictable evolution with a high mortality rate.

There are limitations to this study, as mentioned below:
- Outpatients were excluded from the analysis of patients,despite their higher number than inpatients.
- There was an insufficient sample size (7 deaths) to investigaterisk factors for mortality.

We note that a number of patients have applied on the burn lesions some unhealthy products (biafine, honey, henna, toothpaste, unknown …), others have used some cooling methods (water), these percentages could not be evaluated.

These findings confirm the results of previous studies carried out in Morocco. (3;19) However, the burn mechanismsmay vary from one country to another, depending on their level of education and awareness on one hand, and cooking and heating methods on the other hand.(4-6;15) Moreover, culture plays a crucial rule when it comes to burn mechanisms since it involves traditions and customs that can cause these types of accidents (rituals, holidays, celebrations…). (9-11;14)

The rapidity of the management of a burnt child, based on a good assessment of the severity of the lesions and an appropriate initial pre-hospital management (cooling) can condition the prognosis, both vital and functional.

Nevertheless, only active prevention could effectively contribute to reducing the incidence if not the severity of these injuries.

The current pediatric burn treatmentand prevention are beneficial, although at a low level, implying thatmore advancedpreventative strategies should be implemented.

For this purpose, we came up with some tips for children burns prevention:

1. Keep hot liquids out of reach: Make sure hot drinks, such as coffee or tea, are kept out of reach of children. Don't leave them on low tables or near the edge of counters.
2. Adjust water temperature: Always test the water temperature before putting a child in the bath or shower. The water shouldbe warm, not hot.
3. Secure stove knobs: Keep stove knobs out of reach of children in order to prevent children from accidentally turning on the burners.
4. Use back burners: When cooking on the stove, use the back burners whenever possible. This will help prevent children from accidentally touching hot pots or pans.
5. Keep appliances unplugged: Keep appliances such as hair straighteners, irons, and toaster ovens unplugged when not in use. They can get very hot and cause serious burns.
6. Keep matches and lighters out of reach: Matches and lighters should be kept out of reach of children. Store them in a secure place where children cannot access them.
7. Teach fire safety: Teach children about fire safety, including what to do if there is a fire in the home, especially how to get out of the house safely.
8. Always supervise children and never leave them alone in the kitchen or around hot appliances or objects.

Prevention measures can also be done through a health education and awareness programs through audiovisual bodies, by imposing safety standards for dangerous products (gas cylinders, electrical outlets and extension cords, electrical pylons, flammable products, etc.), by teaching the general public what to do in the event of burns in order to reinforce positive behavior to reduce the initial severity of the burn and also by training more specialists in burn medicine and increasing the number of burn centers within the Kingdom of Morocco.

A description of the pediatric burns epidemiologyand clinical characteristics was presented in this article, whichincludes prevalence, age, genderdistribution, etiology, severity, complications and LOH ofpediatric burns from 2020 to 2022.

The following conclusions ofthis article can be drawn. In total, 0–5 years of age is theprimary age of onset of pediatric burns. Scald burns areconsidered the main prevention target. Therefore, preventionand treatment strategies should be based on the risk factorsabove. First, education regarding safety should be graduallyincreased for guardians. Second, dangerous elements (e.g., scald,flame, and electricity) should be kept away from children. Third, the level of medical care for pediatric burns should becontinuously improved.

Conclusion:-

Children burns remain a frequent emergency in our daily practice and present certain particularities. The lesions caused can be often shallow but serious in extent.

The care of a burnt child requires a good assessment of the severity of the lesions, and the conditioning of the patient obeys simple but often misunderstood rules. Good initial pre-hospital management can reduce morbidity and mortality linked to delayed care.

However, only active prevention could effectively contribute to reducing the incidence if not the severity of these lesions.

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