MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.10.88.90

OPEN ACCESS

Key Words
Burn injury, septicaemia, autopsy, postmortem

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Received: 25 September 2023
Accepted: 7 October 2023
Published: 8 October 2023

Citation: Kan Bapu Choudhury, T.C. Priyadarshini and Kumar Pinku Pratim, 2023. Relationship Between the Depth and Extent of Burn Injury with Sepsis: A Retrospective Study. Res. J. Med. Sci., 17: 88-90, doi: 10.59218/makrjms.2023.10.88.90

Relationship Between the Depth and Extent of Burn Injury with Sepsis: A Retrospective Study

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ABSTRACT
Burn injury is a major health issue in our country. It is devastating not only for the patients but also for their family and the country. As autopsy surgeons we come across such cases in day to day life. Conducting postmortem in these cases are more disastrous than other cases in any way. Cases of survival after having 45% burn injury also have been reported in our area and in our mortuary we have even got cases with only 10% burn injury (site included face) died due to septicaemia. We have seen cases of superficial to very deep burn. So, there might be some relationship between depth and extent of burn injury with septicaemia. In the study, we have tried to find out the same.

INTRODUCTION

The injuries that are produced by applying dry heat like flame, radiant heat, or some solid substance like metal or glass that has been heated, on the body surface are called burns. The moist heat injuries, called scalds, are produced by applying a liquid at or nearing its boiling point, to the surface of the body, or in the form of a gas, like steam. Flame, contact, radiant, scalding and chemical burn are a few modes of burn injuries. Burns were classified into 6 degrees according to Dupuytren. But modern classification only includes three degrees of burn, i.e., epidermal (which consists of first degree and second degree), dermo-epidermal (comprising third and fourth degree) and deep (consisting of fifth degree and sixth degree). According to this study, burns have been classified as superficial and deep. Here both epidermal and dermo-epidermal burns are together considered to be superficial[1,2].

Heat intensity, duration, extent and area of body exposed, age and sex of the person, are the various factors that affects the outcome of burn injury. The "Rule of Nines," is frequently used to ascertain the area of burn, which splits up the body into sections. Each section corresponds to approximately 9% of the body's surface area. By combining information about the source of the burn, the type of damage done and the extent of the body injured, the severity of burn can be determined. In addition, the location of the burn is also important[1].

One of the complication of severe infection is Sepsis. The body releases natural chemicals into the blood stream when infected. These chemicals are designed in such a way which is optimal for fighting off the infection. Sepsis develops When the body has an inflammatory response to its own chemicals generated for fighting an infection, there is development of sepsis. Sepsis is considered to be a three stage condition, according to a number of medical professionals[3]. The initial state of sepsis later develops into severe sepsis, which may then lead to septic shock[4].

Aims and objectives:

- To analyze the relationship between the severity of burn and sepsis
- To analyze the relationship between the extent of burn and sepsis
- To find out the sepsis causing factors

MATERIALS AND METHODS

Inclusion criteria: Purposive sampling, case series study was conducted among the cases of death due to burn injury, brought to the mortuary of Gauhati Medical College Hospital through a prearranged proforma.

Exclusion criteria: Decomposed body, cases with no definite history and suspected homicide cases.

Ethical clearance: Ethical clearance was taken from the Institutional ethical Committee.

Study period: 6 months.

Sample size: 200 cases.

Data analysis: Appropriate statistical methods were applied for data analysis.

RESULTS AND OBSERVATIONS

Table 1: Case distribution according to the cause of death

Death due to	No.
Sepsis	137
Shock	63
Total	200

Table 2: According to sex

Sex	Total	Septicaemia	Percentage
Male	43	31	72.0
Female	157	106	67.5
Total	200	137	

Table 2: Relation of age group and septicaemia

Age	Sepsis	Shock	Total	Sepsis cases (%)
0-10	7	1	8	87
11-20	13	13	26	50
21-30	58	19	77	75
30-40	37	11	48	77
41-50	10	5	15	67
51-60	9	8	17	53
61-70	2	3	4	40
71-80	1	3	4	25
Total	137	63	200	

Table 4: Presence or absence of facial injury

Facial injury	No.	No. of sepsis cases	Percentage
Yes	72	50	69
No	128	87	68

Table 5: Extent of burn injury i.e. total body surface area covered:

Extent (%)	Sepsis	Shock	Total	Sepsis (%)
20-30	12	3	15	80
30-40	17	2	19	89
40-50	23	1	24	96
50-60	20	2	22	91
60-70	51	4	55	93
70-80	11	13	24	46
80-90	3	38	41	7
Total	137	63	200	

Table 6: Relation of depth of burn injury and development of septicaemia

Depth	No. of cases	Sepsis	Sepsis (%)
Superficial	169	120	71
Deep	31	17	55
Total	200	137	

Table 7: Hospitalized or not

Hospitalization	No.	Sepsis	Percentage
yes	180	118	66
no	20	19	95
Total	200	137	68

Table 8: Prophylactic antibiotic received during hospitalization or not

Antibiotic received	No.	Sepsis	Percentage
Yes	180	118	66
No	20	19	95
Total	200	137	

DISCUSSIONS

- 200 burn injury cases were studied. Out of which, 137 succumbed to septicemia and the remaining 63 died due to hypovolemic or neurogenic shock secondary to burn injuries sustained.
- Despite majority being the female population constituting 157 out of 200 cases, death due to septicemia were more among male population (72%).
- 77 of the study population belonged to 21-30 years of age (majority). This is in consistent with findings of Buchade *et al*.[5] and Gupta *et al*.[6]
- The age group of 0-10 years were the main victims of septicemia (87%) and it was least common in 71-80 years age group (25%) which is in accordance to Modi's Textbook of Medical Jurisprudence and Toxocology[7]
- Septicaemia was prevalent more in the cases with facial burn.
- In this study, chances of developing septicemia was more when the burn injury covered 40-50% of the total body surface area (96%)
- Superficial burn injuries were commonly associated with septicemia (71%) compared to deep burn
- 90% were hospital admitted cases among which 66% developed septicemia despite the prophylactic antibiotic therapy received

CONCLUSION

In order to reduce the case load of burn injuries which is preventable the utmost important step is to make the public more aware regarding this issue. The treating doctor should also be judicious while giving antibiotic therapy as being an autopsy surgeon, we come across handful of cases who succumbed to burn injuries sustained despite being given prophylactic antibiotic therapy during the hospital stay. Parents must be aware about the hazardous effects of fire and other explosive substances and keep a watch on their children as chances of developing septicemia is more among children. Chances of developing septicemia are in direct proportion to the extent of burn injuries sustained. But if facial area is involved, even least extent of burn injury must be taken care of in similar manner as those of extensive burn injuries.

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