Systematic Review

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Epidemiology of Burns in Paediatric Patients in Pakistan; A Systemic Review

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[1,2]Conception and design, Collection and assembly of data, [3,5,6]Drafting of the article, [4]Final approval and guarantor of the article

Funding Source: None
Conflict of Interest: None

Received: Feb 28, 2024
Accepted: June 04, 2024

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ABSTRACT

Burns are graded as the fourth most common trauma type globally followed by other traumas including accidents, interpersonal violence and falls. South Asian regions account for 187- 243 incidences of burns in adults per hundred thousand annually. Moreover, about 22.5% of all burns occur in children and youth. 42% of those in children between the ages of 5 to 16 years old. Whereas Pakistan lacks national data and cannot measure the burn burden annually. Due to the lack of clinical and epidemiological studies on burns in pediatrics patients in Pakistan, we performed this study. This systemic review study aimed at summarizing available Pakistan's epidemiological data, based on national studies in the past 32 years. The data of our systemic review were collected from six search engines, i.e. PubMed, Google Scholar, PakMediNet, Scopus, Springer and DOAJ. The studies which were reviewed for the article were from 1990 to 2022. The articles of nonhuman participants, duplication and lacking in primary focus were excluded. The PRISMA guidelines were used. A total of 11 articles were included out of which 4 are from Islamabad ICT, 2 from Sindh, 1 from Balochistan and 4 from Punjab. The overall gender ratio shows male dominance of 55.83 %. Scald burn were recorded at a higher percentage of 48.7%. The mean TBSA recorded in this research was 17%. The mean mortality rate of all the studies shows a percentage of 14.84%. More research studies are needed to be done in the areas lacking information about the victims of burn injuries so that policymakers know the actual figure of the injuries with whom they have to deal.

Keywords: Pediatrics, Neonatal, Burns, Prevalence, Pakistan, Epidemiology

Cite this article as: Arooj L, Kausar S, Rehan M, Iqbal T, Ain Q, Waheed U. Epidemiology of Burns in Paediatric Patients in Pakistan; A Systemic Review. Ann Pak Inst Med Sci. 2024; 20(3):207-212. doi. 10.48036/apims.v20i3.1076.

Introduction

Burns are one of the common cause of mortality and morbidity among pediatric population, mostly in undeveloped countries.[1] Furthermore, burn accounts for the third leading mechanism of accidental death in children of age ranging from 5 to 9 years.[2] A developed country like USA shows 84,000 pediatric patients under 4 years of age that needed medical treatment.[3] Whereas, the WHO accounts for an estimate of 180,000 deaths annually due to burn injuries and burn represents as the fifth common cause of non-fatal childhood injuries and most of the cases are from underdeveloped countries.[4] The high incidence of burn injuries in children is attributable to children's impulsiveness, lack of awareness, higher activity levels, natural curiosity, and total dependency on their caregiver.[5]

A study from Asia expressed that those with the age of less than 5 years are most suffered by DALYs i.e. 314 years/100,000 and children from 5 to 14 years had the highest burn rates i.e. 219 cases/100,000.[6] So the children of age less than 5 years are to be taken more care of because this is the age when child have a very low understanding of staying away from the hot objects. Most of the burn injuries are reported from developing countries that are about 80 to 90% of the total injuries, for instance an African children burns 3 times more than the average world.[7] This is a huge percentage to work on so that we can deduce the sufferings.

Pakistan have lack of available data, which is mostly scattered so no consolidated data is present thus there is no idea of the actual burn burden which made the

circumstances more difficult for the policy makers to work on the problem. [8] Also there is no separate burn center for pediatric patients in the whole country Pakistan. Another study showed the comparison of ruler and urban children which showed that rural children are more prone to burn injuries than urban.[9] This shows that due to increased literacy rates in ruler areas, the uneducated mothers were unable to look after their child.

Overall, burn injuries are more common in areas with lack of resources like Pakistan and other developing countries. Along with that we don't have any separate pediatric burn center. The actual burden of pediatric patients are not known. There is no polices for the young children to decrease mortalities and to increase their survival and quality of life after becoming a victim. Another major problem is the illiteracy rate of people from these type of injuries that makes the cases more severe and decrease the survival, if the patient survives than mostly the survivors have to live with disability.

Methodology

Data on epidemiological and demographic trends in the Pakistani population were gathered from PubMed, Google Scholar, Springer, PakMediNet, Scopus, and DOAJ in order to conduct a systematic review of peer-reviewed publications. There were articles from 1990 to 2022. In order to comply with PRISMA criteria[1], search terms for the study were burns, pediatric, neonatal, burn injuries, burn prevalence, burn epidemiology, TBSA, and Pakistan. Figure 1 shows the prisma chart of this systemic review.

The parameters to recruit articles were 4 i.e mortality, type of burn, Gender and TBSA. The references of 1,896 publications were then examined for further pertinent studies using a hand combing technique, and 11 more papers were added. Out of the total 1,907 items, 1,013 duplicates were removed.

The exclusion of all those articles were done that did not fulfil the basic four parameters because of limited data available like season of injury, treatment outcome, length of stay at hospital, hospital cost, non-human subjects, research concentrating on antimicrobial medication therapy, and full-text article accessibility were also applied to the remaining 870 articles during the screening process. Following this assessment, 220 articles remained after 650 were removed. The exclusion criteria, which included lacking a central focus and an epidemiological statistical analysis, were applied to screen these 220 papers. Consequently, 82 articles were included after 138 articles were disqualified based on these criteria. Seventy-one of these eighty-two publications were eliminated because they included specific populations, such as adults and duplicates, and were not based on data that was generalized. Word Processing System was used for all data extraction and cleaning. Periodically, data were reviewed, resulting in 11 articles in total.

The primary areas of interest were mortality, burn mechanism, gender, and TBSA. This info was taken out using a template. Each study article's data was taken and entered into a statistical Package for Social Sciences (SPSS) spreadsheet and trends were identified from tables in tabulate form. After that, the facts were transformed into descriptions.

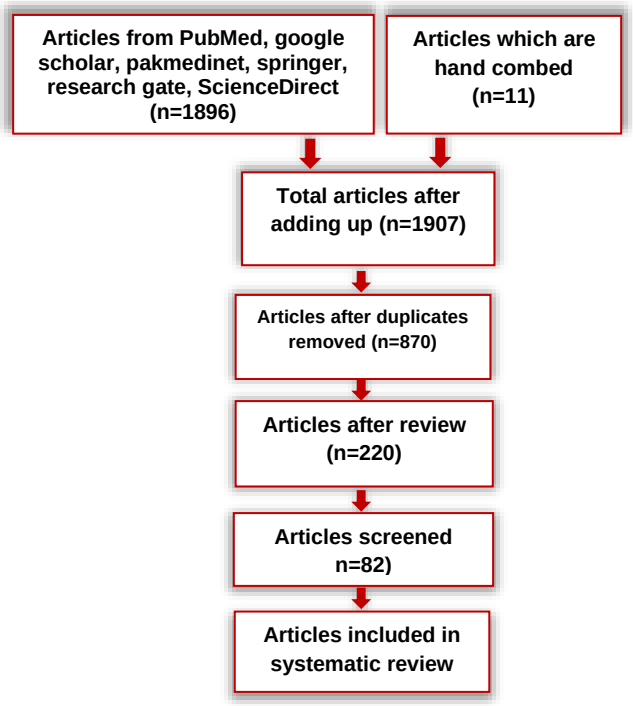

Figure 1. PRISMA CHART representing articles at various screening stages.

Results

The outcomes of the 5 set parameters i.e, TBSA, Sample size, Mortality rate, Gender and Type of burns are shown the table I and II.

The 11 studies of this systemic review showed 17% of mean TBSA value. One of our included studies of Khaliq et al showed that the increased hospital stay is directly affected by the percentage of TBSA burned. The maximum TBSA was shown by the study of Aslam et al i.e. 40% whereas the minimum TBSA was shown by Iqbal et al 2011 i.e 9.37%.[10]

Table I: Percentage of TBSA involved, Sample size and Mortality rate.

Sr no	Author	TBSA	Sample Size	Mortality	Gender Male %: Female%
1	Aslam et al[10]	40%	504	21.6%	53.57%:46.43%
2	Shahid et al[11]	15.5%	115	0%	44%:56%
3	Khaliq et al[12]	24.7%	25	26%	56.6%:43.4%
4	Hhashimi et al[13]	36.3%	516	4.5%	58.3%:41.7%
5	Iqbal et al[14]	10.6%	2221	1.5%	47.58%:35.71%
6	Ahmad et al[15]	12.9%	44	2.3%	56.81%:43.18%
7	Naumeri et al[16]	21.7%	3958	2.4%	38.3%:61.7%
8	Tariq et al[17]	30.5%	300	8%	70.3%:29.6%
9	Shah et al[18]	18.2%	1112	2.3%	49.2%:50.8%
10	Iqbal et al[19]	9.4%	1725	67.5%	66.84%:33.15%
11	Saaiq et al[20]	18.7%	11	27.2%	72.7%:27.3%

Table II: Percentage of type of Burns.

Sr no	Author	Scald	Flame	Electric	Chemical	Others
1	Aslam et al[10]	75.6%	18%	4.16%	2.2%	0.04%
2	Shahid et al[11]	48.2%	0%	51.8%%	0%	0%
3	Khaliq et al[12]	8%	48%	44%	0%	0%
4	Hashimi et al[13]	48.5%	24.7%	26.5%	0.15%	0%
5	Iqbal et al[14]	42.5%	39%	10%	0%	8.5%
6	Ahmad et al[15]	43.2%	11.4%	16%	2.3%	27.3%
7	Naumeri et al[16]	45.7%	51.1%	3.2%	0%	0%
8	Tariq et al[17]	71.3%	18.6%	7.3%	2.6%	0%
9	Shah et al[18]	54.5%	28%	6.7%	10.7%	0%
10	Iqbal et al[19]	70.3%	7.7%	8.3%	0.2%	13.5%
11	Saaiq et al[20]	27.2%	18.1%	18.1%	0.3%	36.3%

The overall sample size of our 11 included articles were 10,531. Highest pediatric population of our study is shown by Noumeri et al i.e. 3958 and the minimum included sample was from Saaiq et al study i.e. 11,

The overall mortality rate of 11 included articles of this systemic review were 14.84%. The mortality rate in all the 11 studies were fluctuating, i.e, Shahid et al study showed the minimum mortality rate of 0% whereas the highest mortality percentage was shown by 2011 study of Iqbal et al i.e. 67.47%. Those studies ie shahid et al, Khaliq et al, Iqbal et al (2013 and 2011) and Naumeri et al studies included adult data along with pediatric population, so we excluded the adult data and calculate the pediatric data separately.[11,12, 16]

Sex ratio of this pediatric systemic review shows male dominance of 55.83% whereas female population showed mean value of 44.17%. The highest value of male population being affected by burns was shown by Saaiq et al ie 72.70% whereas the same study showed female population depicting minimum cases affected by burn i.e. 27.30%.

Type of burns include four different types of burn injuries. Among the mentioned types of injuries scald burns accounts for the maximum burn victims.

Discussion

Burn injury always remained a major problem throughout the world. Pediatric injury account for fourth of all burn injuries and majority of them are under the age of 5 years.[21] Unintentional injury is a leading cause of death among children under age 5. [22]

This systemic review showed percentage of TBSA, mortality, gender ratio and the type of burn injuries among the pediatric population of Pakistan. From the 11 different studies which were included in this systemic review, the sample size of pediatric population over the time period of 32 years (1990-2022) was recorded ie 10531. The 11 studies are from all the provinces of Pakistan i.e. 1 from Balochistan, 4 from Federal, 2 from Sindh, 3 from Punjab and 1 from KPK. Despite collecting researches from all the regions, no studies are found from AJK and GB which negatively affected the generalizability of our data.

Among the different types of burn injuries in the article of our systemic review, the highest percentage of the types of burns in pediatric population was scald injury that accounts for 48.7% of the total injuries. This result showed similarity with the study of fomukong et al which also showed scalding as a predominate type of injury with 45.5% of patients affected with it.[23] Similarly, another study of tiruneh et al showed the highest cause of burn was scald burn with the percentage of 69.4%. In contrary to this, a study tirmizi et al showed flame injuries are the leading cause of burn injuries in children with the percentage of 48.48%.[3]

The gender ratio of male and female of this systemic review showed male dominancy with a percentage of 55.87%. According to the study of fomukong et al, the male pediatric population showed predominance with 55.65%[23] that is in accordance to our systemic review results. Male children are at higher risk of burn-related death and injury than female children, and children ages 4 and under and children with a disability are at the greatest risk of burn-related death and injury, especially from scald and contact burns.[24] A study of Nguyen NL et al demonstrates that scald burn was commonest type of burn in preschool children and male children are predominantly injured.[25] About 75% of all scalding in children are preventable.[26]

The mortality rate of this systemic review does not have any specific trend. The majority of pediatric burns mortality and morbidity result from simple domestic accidents that are preventable.[27] The overall mortality rate of the 11 included article were 14.84%. Another study of lisanu et al from 2024, showed the mortality rate of 3.2% in the pediatric population.[28] The study of Saudi Arabia showed a decline in mortality rates of burn patients from 015 to 2020.[29] According to the study of jumanah et al, 3.8% of the under study children died due to burn injuries (30). Similarly, a study of RL Sheridan et al, shows that mortality rate following major burn injuries only account for less than 3%.[31] The early excision and grafting of skin in burn patients decreases the hospital stay and will also result in decline in mortality rates. [32,33]

Tiruneh CM et al mentioned in his study that the burnt total body surface area greater than 20% and poor conditioning of life is a major cause of pediatrics burn mortality. [34] Another study from north India also directly correlates TBSA with the mortality in pediatric burns. [35]

A number of researches can be done from the major regions of the country like; Azad Jammu and Kashmir (AJK) and Gilgit Baltistan (GB). Also various other parameters can be studied like season of injury, treatment outcomes, length of stay in a hospital and hospital cost.

Limitations: The main limitation of the study is lack of data available from Azad Jammu and Kashmir (AJK) and Gilgit-Baltistan (GB), which affects the generalizability of the findings.

Conclusion

We demonstrated a significant burden of burn injuries that are not addressed by specialized burn centers. Additionally, there is a critical need for ongoing research and surveillance on burn patients in Pakistan to broaden the evidence base on the epidemiology of these injuries and the outcomes of patients following discharge. Such information, if available in future studies, will inform programs and policy emphasizing primary prevention, short-term treatment, and long-term management of burn injuries in low-resource settings such as Pakistan where these efforts are extremely deficient. Also this systemic review lacks the data from AJK and GB because of the limited researches done from these regions. More articles can be written on various other parameters that lack the data.

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