

Trends in the Causes and Severity of Household Burns during the COVID-19 Pandemic: A Longitudinal Study

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ABSTRACT

Background: Burn injuries remain a global public health challenge with significant morbidity, mortality, and socioeconomic burden. The COVID-19 pandemic, through nationwide lockdowns and lifestyle alterations, influenced patterns of domestic accidents, including burns. While earlier studies examined short-term effects of lockdowns, limited literature exists on longitudinal outcomes in a metropolitan burn centre.

Objective: To assess the impact of the COVID-19 pandemic on burn epidemiology, clinical severity, and outcomes, and to compare findings across pre-COVID, COVID, and post-COVID periods.

Methods: A retrospective observational study was conducted at a major burn centre in Bengaluru from September 2018 to December 2022. The study period was divided into three 17-month intervals: pre-COVID (Sept 2018–Jan 2020), COVID (Feb 2020–Jun 2021), and post-COVID (Jul 2021–Dec 2022). Demographic data, type and etiology of burns, severity (total body surface area, TBSA), management, hospital stay, COVID-19 positivity, and mortality were analyzed.

Results: A 30% reduction in burn admissions occurred during the COVID period. A reversal in gender distribution was observed, with females outnumbering males. Age distribution showed reduced incidence in extremes and increased incidence among middle-aged adults. Thermal burns significantly increased, while scald, electrical, chemical, and cracker-related burns decreased. Severity of burns, measured by TBSA, increased during the pandemic. Accidental burns predominated, whereas suicidal and homicidal burns declined. Mortality rates increased substantially, particularly among COVID-positive burn patients who also experienced longer hospital stays. Elective burn surgeries decreased during the pandemic due to restricted healthcare capacity.

Conclusion: The COVID-19 pandemic significantly altered the epidemiology of burns in metropolitan India. Fewer admissions masked higher burn severity and mortality, underscoring gaps in access to timely burn care. Preventive measures, community education, and resilient burn management protocols are critical for safeguarding vulnerable populations during future crises.

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INTRODUCTION

Burn injuries constitute one of the most devastating forms of trauma, resulting in profound physical, psychological, and economic consequences. Globally, burn injuries account for more than 180,000 deaths annually, with low- and middle-income countries disproportionately affected. India, with its dense

population and varying socioeconomic conditions, contributes significantly to global burn morbidity and mortality.

Patterns of burn injury are influenced by environmental, cultural, and occupational factors. Traditionally, women and children represent vulnerable groups due to domestic exposure to cooking and household hazards. The epidemiology of burns in India has been well studied, yet new circumstances—such as the COVID-19 pandemic—have brought unique challenges.

The COVID-19 pandemic, declared in March 2020, led to unprecedented public health measures, including lockdowns, movement restrictions, and suspension of non-emergency healthcare services. These changes reshaped daily life, altering risk exposures and healthcare-seeking behaviours. Reports from different countries highlighted decreased trauma admissions during the pandemic, but the effects on burn epidemiology remained less clear.

Preliminary studies suggested reduced burn incidence due to limited outdoor activities. However, domestic exposures, particularly cooking-related accidents, were expected to increase. Further, pandemic-related stress and mental health challenges were hypothesized to affect suicidal and homicidal burn rates. Importantly, healthcare disruptions may have worsened outcomes for burn patients.

This study aimed to provide a comprehensive longitudinal analysis of burn epidemiology before, during, and after the COVID-19 pandemic in a major metropolitan burn centre in Bengaluru, India. By examining incidence, demographics, severity, etiology, management patterns, and outcomes, this study adds to the growing body of literature on how global crises affect vulnerable populations.

METHODS

Study Design and Setting

This was a retrospective observational study conducted at the Department of Plastic Surgery, BMCRI, Bengaluru, a tertiary-level metropolitan burn centre.

Study Period

The study spanned four years and three months, from

September 2018 to December 2022. The timeline was divided into three equal 17-month periods:

- **Pre-COVID:** September 2018 – January 2020
- **COVID period:** February 2020 – June 2021
- **Post-COVID:** July 2021 – December 2022

Inclusion Criteria

- All patients admitted with burn injuries (thermal, scald, electrical, chemical, cracker-related).
- Patients of all ages and genders.

Exclusion Criteria

- Outpatient-managed minor burns not requiring admission.
- Patients with incomplete records.

Data Collection

Data were extracted from hospital records and included:

- **Demographics:** age, gender.
- **Burn characteristics:** type, cause, and etiology (accidental, suicidal, homicidal).
- **Severity:** Total Body Surface Area (TBSA) burned.
- **Management:** surgical interventions, elective surgeries.
- **Hospital course:** duration of stay, COVID-19 status.
- **Outcomes:** mortality rates.

Data Analysis

Descriptive statistics were used to summarise variables. Comparative analysis was performed between pre-, during-, and post-COVID periods to identify trends.

RESULTS

Admissions

Burn admissions decreased by 30% during the COVID period compared to pre-COVID levels. Admissions gradually increased during the post-COVID phase but did not return to baseline (Figure 1).

Gender Distribution

The traditional male predominance was reversed

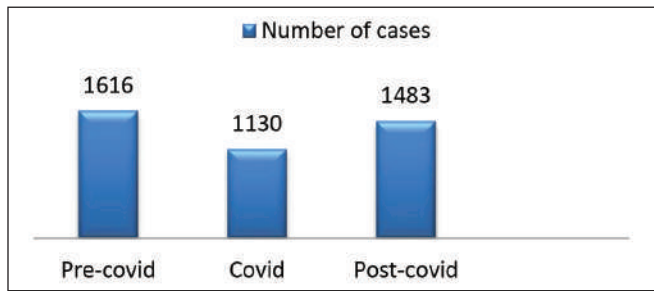


Figure 1: Burn admissions.

during COVID, with females representing the majority of admitted patients (Figure 2).

Age Distribution

There was a decrease in burn incidence among children and elderly patients, while middle-aged adults saw an increased share of admissions (Figure 3).

Burn Types

- **Thermal burns:** Increased incidence during the COVID period (Figure 4).
- **Scald burns, electrical, chemical, and crack-er burns:** All showed a notable decline (Figures 5 to 8).

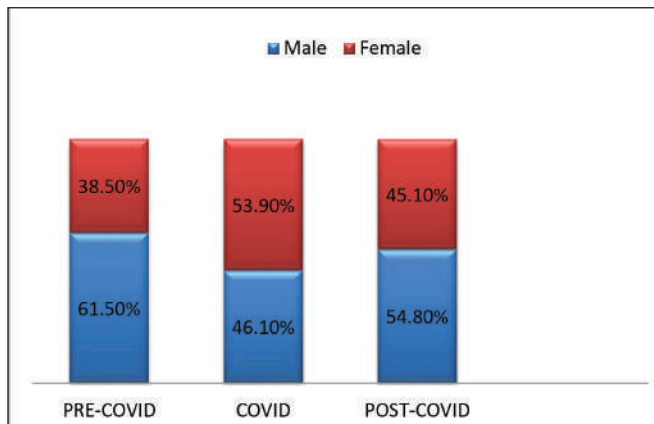


Figure 2: Gender distribution

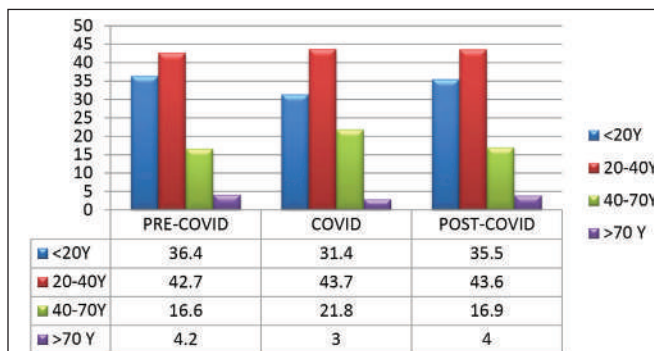


Figure 3: Age distribution.

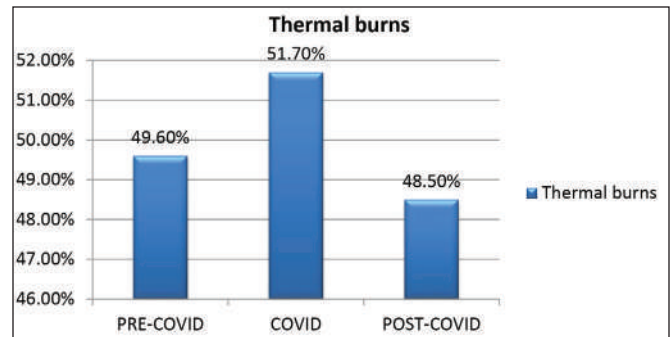


Figure 4: Thermal burns type.

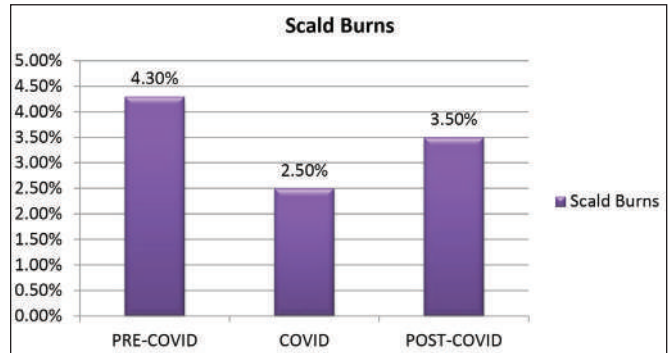


Figure 5: Scald burns type.

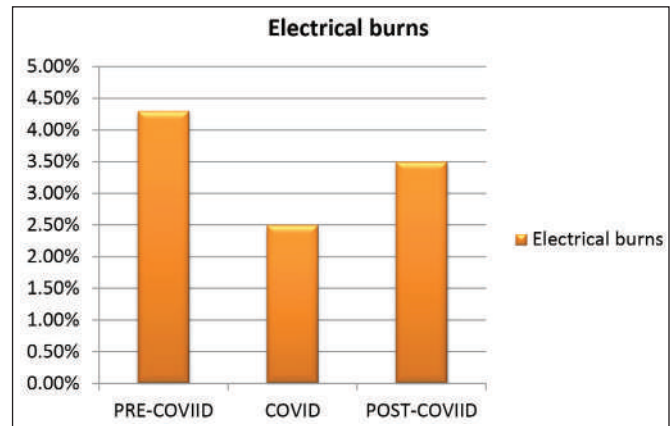


Figure 6: Electrical burns type.

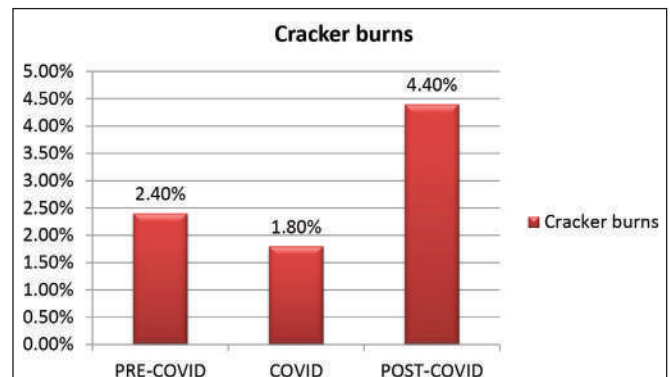


Figure 7: Cracker burns type.

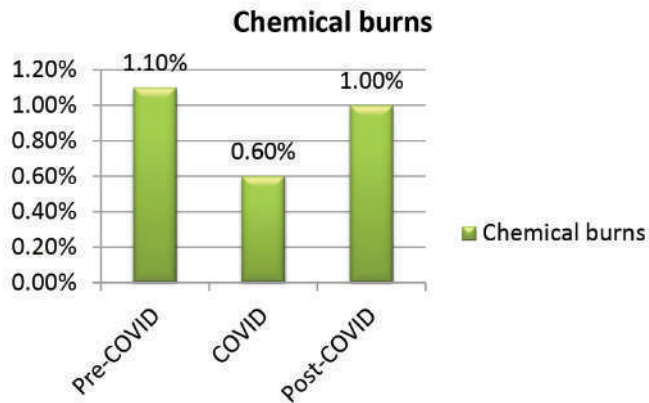


Figure 8: Chemical burns type.

Severity of Burns

The mean TBSA was higher during the COVID period, reflecting more severe injuries at presentation (Figure 9).

Etiology of Burns

- **Accidental burns:** Increased significantly.
- **Suicidal and homicidal burns:** Both decreased during the pandemic (Figure 10).

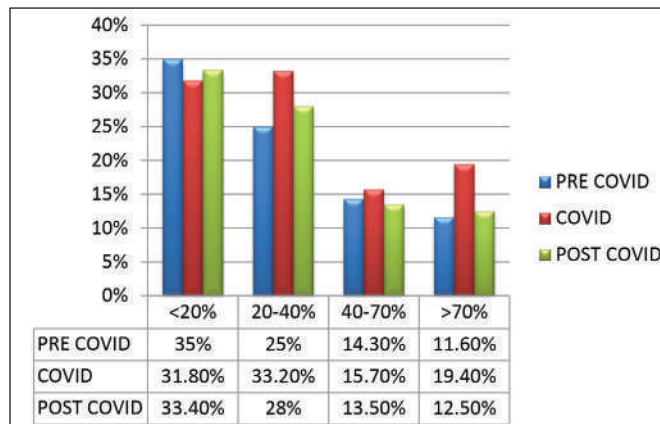


Figure 9: Burns severity.

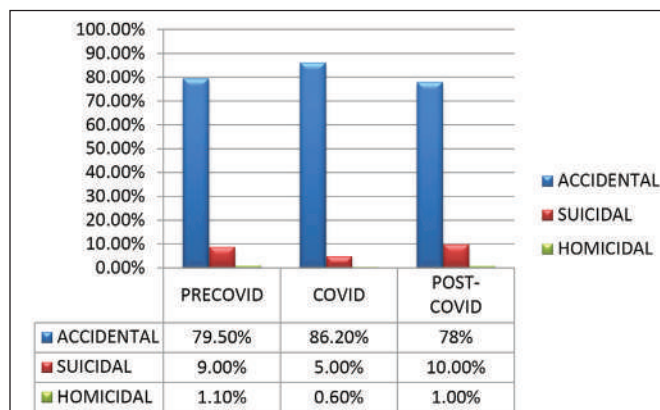


Figure 10: Etiology of burns.

COVID Positivity

A subset of burn patients tested positive for COVID-19. These patients had longer hospital stays and higher mortality (Figure 11).

Management

Elective surgeries for burn contractures and reconstructions declined sharply due to the healthcare system prioritization of COVID-19 care (Figures 12A to D).

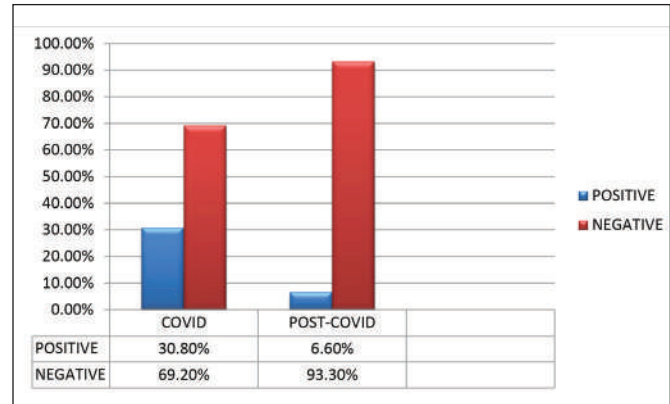


Figure 11: Covid positivity.

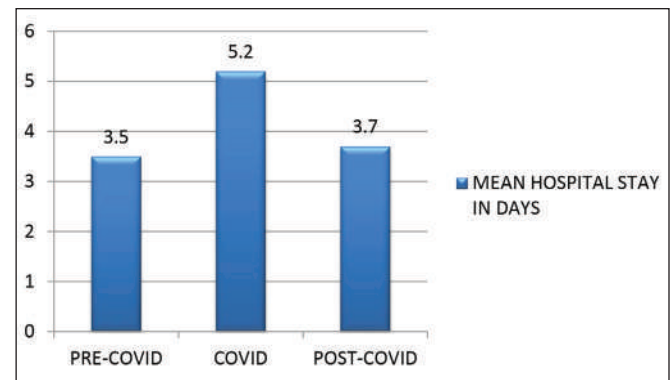


Figure 12A: Mean hospital stays (days).

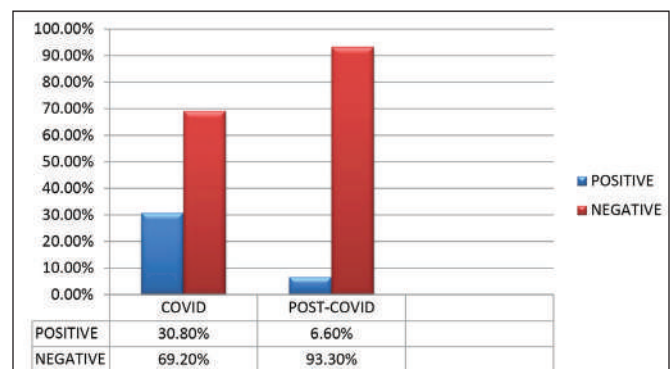


Figure 12B: Covid positivity.

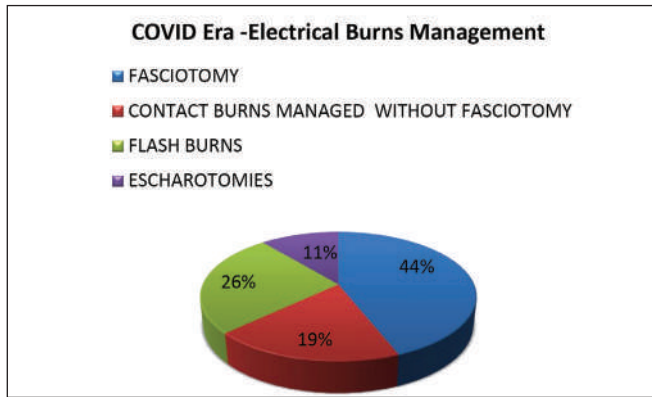


Figure 12C: COVID Era -Electrical Burns Management.

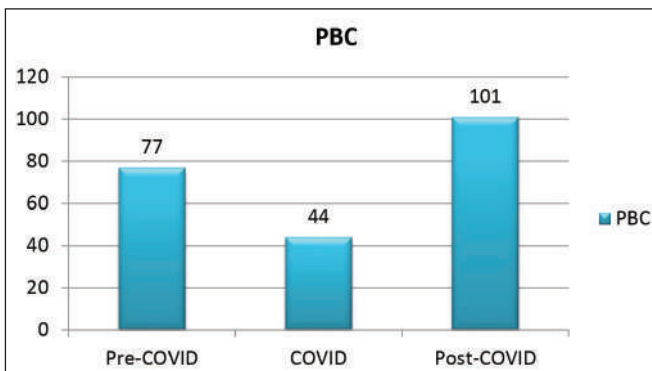


Figure 12D: Primary Biliary Cholangitis Status.

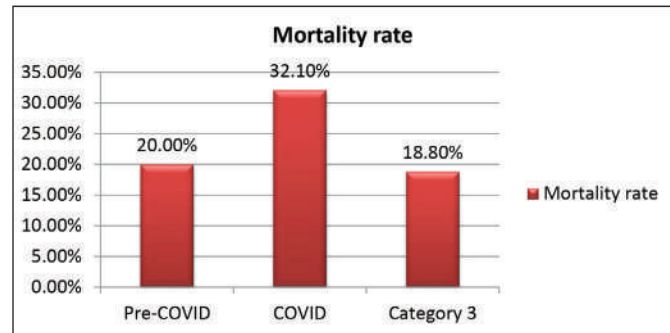


Figure 13: Mortality rates during the Pandemic.

Mortality

Mortality rates increased during the pandemic period, correlating with higher burn severity and comorbid COVID infection.

DISCUSSION

This longitudinal study highlights the multifaceted impact of the COVID-19 pandemic on burn epidemiology and outcomes.

Reduced Admissions, Increased Severity

A paradox emerged: while overall burn admissions declined, severity (TBSA) increased. Similar findings

Emergency Procedure [<24 Hours]	Urgent Procedure [< 72 Hours]	Procedures that could be deferred upto 4 Weeks	Procedures that could be deferred upto 3 Months
● Tracheostomy	● Amputation	● Joint contractures causing functional impairment	● Scar revision
● Endotracheal intubation	● Debridement	● microstomia	● Elective skin grafting
● Fasciotomy	● Deep dermal burns with exposed critical structures	● Eyelid ectropion with corneal exposure	● Elective flap surgeries
● Escharotomy			● Scalp alopecia correction
● Central venous access			● Expander placement
● Chest tube insertion			

Parameters	Our study	Farroha <i>et al.</i>	Usha Sethuraman <i>et al.</i>	Codner <i>et al.</i>
Decrease in admissions - burns	30.0% 36.4% 31.4%	50.0%	35%	5.8%
Suicidal burns	9.0% vs 5.0%	Nil		
Homicidal burns	1.1 vs 0.6%			2.2 % vs 1.0%
Male during pre-COVID and COVID	61.5% vs 46.1%	46% vs 75%		65.9% vs 62.5%
Etiology Thermal Scald	49.6% vs 46.7% 4.3% vs 2.5%	44% vs 62% 34% vs 38%		
Severity of Burns	25%vs 33.8%		14.8% vs 2.6%	10.5% vs 26.4%
Mortality	20% vs 32%			3.2% vs 0.6%

were reported by Codner et al. in a U.S. metropolitan centre, where delayed presentation contributed to worse outcomes. Restricted mobility, fear of infection, and overwhelmed healthcare systems likely deterred patients from seeking early care, resulting in more advanced presentations.

Gender and Age Trends

The reversal in gender ratio, with female predominance, aligns with increased domestic exposure due to lockdowns. Women, often primary cooks in Indian households, faced greater risk of kitchen-related thermal burns. Meanwhile, children and elderly saw reduced incidence, likely due to heightened supervision at home and reduced exposure to outdoor hazards.

Burn Etiology

The increase in thermal burns during COVID reflects greater domestic cooking and use of fire-related appliances. The decline in scald, electrical, and chemical burns may be attributed to school closures, reduced industrial activity, and fewer festive gatherings (limiting cracker-related burns).

Mental Health and Intentional Burns

Interestingly, suicidal and homicidal burns decreased. This contrasts with reports of increased psychological distress during lockdown. Possible explanations include reduced social interaction opportunities, family presence at home acting as a protective factor, and underreporting due to restricted healthcare access.

Burn Patients with COVID

Burn patients who contracted COVID-19 had poor outcomes. The dual physiological stress of infection and major burn injury compounded systemic inflammatory response, immune compromise, and respiratory vulnerability. Walters *et al.* similarly documented increased mortality among COVID-positive burn patients.

Healthcare System Impact

The pandemic necessitated diversion of resources to COVID care, leading to reduced elective burn surgeries. Contracture release and reconstructive procedures were delayed, prolonging disability and rehabilitation timelines.

Comparison with Global Literature

- Farroha (UK) observed reduced admissions during lockdown, but stable severity.
- Sethuraman (USA) noted a shift toward increased household scalds among children.
- Saha (India) highlighted logistical difficulties in managing burns during COVID. Our findings echo these patterns while adding a longitudinal post-COVID perspective.

Public Health Implications

The pandemic exposed systemic vulnerabilities in burn care. Public health strategies should prioritize:

- Community education on burn prevention during home confinement.
- Strengthening telemedicine and early triage for burns.
- Protocols for managing burn patients during pandemics or healthcare crises.
- Maintaining essential burn services even amidst systemic disruptions.

CONCLUSION

The COVID-19 pandemic significantly influenced the epidemiology of burn injuries in metropolitan India. While overall admissions declined, severity and mortality increased, particularly among women and middle-aged adults. The predominance of thermal burns and the rise in accidental injuries reflect lifestyle changes during lockdown. COVID-19 positivity compounded morbidity and mortality.

Future preparedness requires robust preventive strategies, early access to care, and resilient burn management systems capable of functioning during global crises. Burns remain preventable, especially among vulnerable groups, underscoring the need for sustained public health efforts.

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