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# Pattern of Injuries Inflicted in Cases of Child Abuse in a Tertiary Care Centre in Central India — A Retrospective Study

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## ABSTRACT

**Background:** Child abuse remains a critical public health issue worldwide, including in India. Understanding injury patterns aids early diagnosis and intervention.

**Objectives:** To study the pattern, anatomical location, and duration of injuries in confirmed cases of child abuse at a tertiary care centre in Central India.

**Methods:** A retrospective analysis was conducted over 5 years (January 2018–December 2022) on 164 confirmed cases. Variables such as age, gender, injury type, anatomical site, and duration were recorded. Statistical analysis was performed using Chi-square test; $p<0.05$ was considered significant.

**Results:** Among 164 cases, 98 (59.8%) were males and 66 (40.2%) were females. Most victims (47.6%) were aged 6–12 years. Bruises (43.9%) were the most common injury. Head and neck (37.2%) were the most frequently involved anatomical site. Acute injuries (<7 days old) predominated (69.5%). Statistically significant differences were observed in fracture patterns ($p=0.014$) and burns ($p=0.038$) between genders.

**Conclusion**: Bruises and fractures are predominant in child abuse cases, mainly involving the head and neck regions. Early identification based on injury patterns can enhance child protection

**Keyword:** *Child abuse, Injury patterns, Bruises, Fractures, Burns, Retrospective study*

## 1. INTRODUCTION

Child abuse, encompassing physical, emotional, and sexual harm, remains a significant pediatric health concern globally and nationally. As per the World Health Organization, a quarter of all adults report being physically abused as children (1). In India, the burden is immense yet often remains underreported due to socio-cultural stigma, fear of retaliation, and gaps in the healthcare reporting system (2). The Protection of Children from Sexual Offences (POCSO) Act, 2012 was enacted to address the growing menace of child abuse (3).

Physical abuse often presents as visible injuries. Recognizing specific injury patterns allows healthcare professionals to differentiate between accidental and non-accidental trauma, thereby initiating timely interventions (4,5). A systematic assessment of the nature, distribution, and chronicity of injuries assists in building a forensic case and offers critical evidence in child protection proceedings.

Global studies reveal variation in the prevalence and types of inflicted injuries (6,7). However, region-specific studies, particularly from Central India, are limited. Factors such as cultural practices, parental education, socioeconomic status, and awareness influence abuse patterns (8). This study aims to fill this lacuna by analyzing injury patterns, anatomical locations, and durations among child abuse victims at a tertiary care center in Central India

## 2. MATERIALS AND METHODS

Study Design: A retrospective descriptive study was undertaken.

Study Setting: The research was conducted in a tertiary care teaching hospital located in Central India, catering to both urban and rural populations.

Duration: January 2022 to December 2024.

Sample Size: 164 cases of confirmed child abuse.

Inclusion Criteria:

- Children aged 0–18 years with confirmed physical abuse.
- Complete clinical, radiological, and medico-legal documentation.

Exclusion Criteria:

- Cases with incomplete data.
- Accidental trauma cases without suspicion of abuse.

Ethical Clearance: Obtained from the Institutional Ethics Committee.

**Data Collection**: Medical records, medico-legal case files, and radiological imaging reports were reviewed. Details extracted included:

- Demographic information (age, gender)
- Type of injuries (bruises, fractures, burns, lacerations, others)
- Anatomical location
- Duration since injury
- Any associated findings (e.g., signs of neglect)

Statistical Analysis: Data were compiled using Microsoft Excel and analyzed using IBM SPSS v25. Categorical variables were compared using Chi-square tests. p-value <0.05 was considered statistically significant.

**Observations and Results**

Demographic Profile: Among 164 cases, 98 (59.8%) were males and 66 (40.2%) were females. The mean age of victims was 8.4 ± 3.2 years.

**Table 1: Age and Gender Distribution**

| Age Group (years) | Male (n=98) | Female (n=66) | Total (n=164) | Percentage (%) |
|---|---|---|---|---|
| 0–5 | 32 | 16 | 48 | 29.3% |
| 6–12 | 44 | 34 | 78 | 47.6% |
| 13–18 | 22 | 16 | 38 | 23.1% |

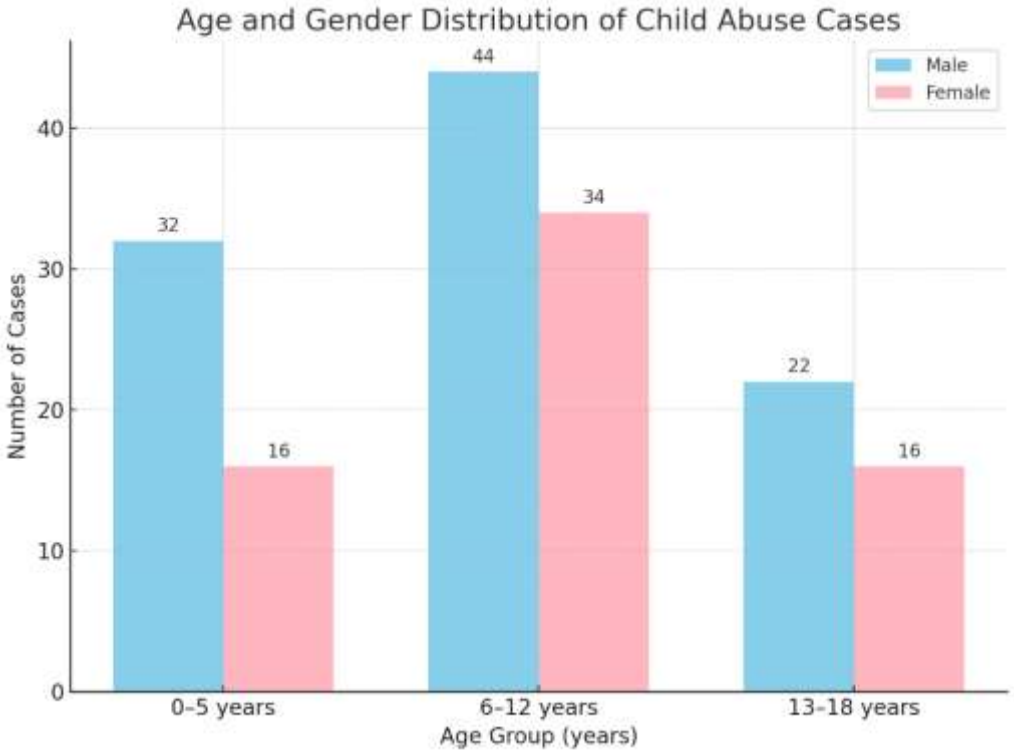


**Chart 1- Gender and age distribution (n=164)**

**Children aged 6–12 years** constituted the **largest group** (47.6%), followed by **0–5 years** (29.3%) and **13–18 years** (23.1%). **Males (59.8%)** were more commonly affected than females (40.2%) across all age groups. The **6–12 years group** showed the highest abuse prevalence for both genders, possibly reflecting increased vulnerability due to school-related or domestic factors. The **younger group (0–5 years)** also had a significant proportion, indicating that very young, non-verbal children are at considerable risk and may go unnoticed without careful clinical assessment. In adolescents (13–18 years), abuse was relatively less reported, but cases were still significant and require targeted intervention strategies.

**Pattern of Injuries:**

Bruises were the most prevalent (43.9%), followed by fractures (29.8%), burns (15.8%), and lacerations (10.5%). Multiple injuries were observed in 38% of cases.

**Table 2: Pattern of Injuries Observed**

| Injury Type | Male (n=98) | Female (n=66) | Total (n=164) | Percentage (%) | p-value |
|---|---|---|---|---|---|
| Bruises | 46 | 26 | 72 | 43.9% | 0.067 |
| Fractures | 34 | 15 | 49 | 29.8% | 0.014* |
| Burns | 9 | 17 | 26 | 15.8% | 0.038* |
| Lacerations | 9 | 8 | 17 | 10.5% | 0.221 |

(*Significant at $p<0.05$)

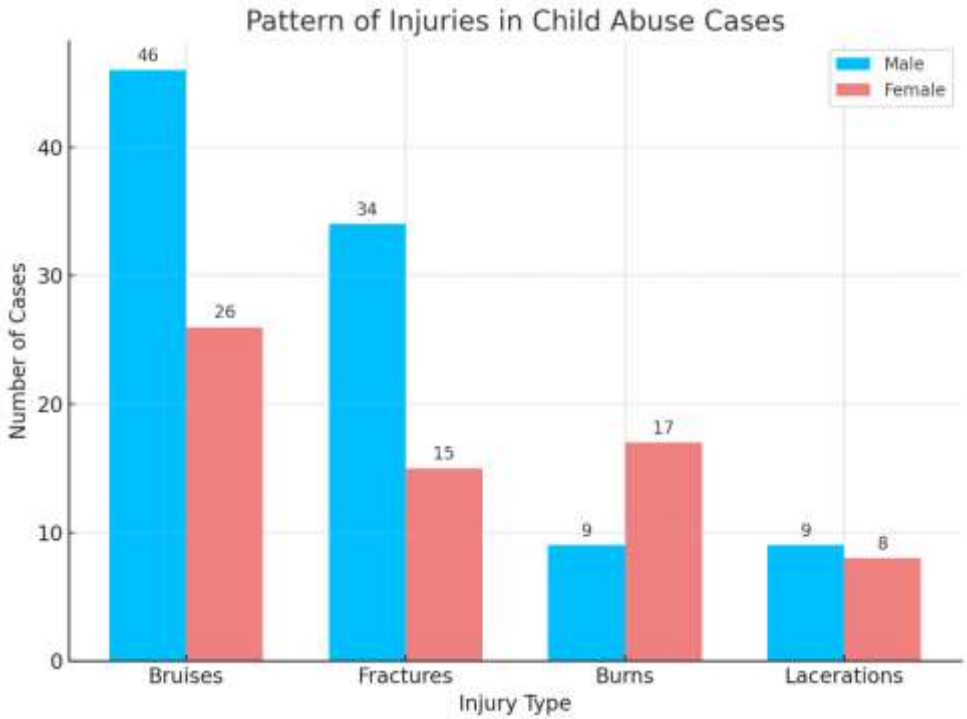


**Chart 2- Pattern of Injuries (n=164)**

Bruises were the most common injury, accounting for 43.9% of total cases. Males (46 cases) had a higher number compared to females (26 cases), though the difference was not statistically significant (p=0.067). Fractures were significantly more common in males (34 cases) than females (15 cases), with a statistically significant p-value (0.014). This suggests boys may experience more severe physical abuse leading to bony injuries. Burns were notably more prevalent among females (17 female cases vs. 9 male cases), with the difference being statistically significant (p=0.038). This may reflect different abuse modalities, such as scalding or inflicted burns, targeting female children. Lacerations were observed relatively evenly across genders without a significant difference (p=0.221).

**Anatomical Location of Injuries:**

Head and neck were the most common sites (37.2%), followed by upper limbs (23.8%), lower limbs (19.5%), trunk (14.6%), and abdomen (4.9%).

**Table 3: Anatomical Location of Injuries**

| Anatomical Site | Cases (n) | Percentage (%) | p-value |
|---|---|---|---|
| Head and Neck | 61 | 37.2% | 0.006* |
| Upper Limbs | 39 | 23.8% | 0.112 |
| Lower Limbs | 32 | 19.5% | 0.145 |
| Trunk | 24 | 14.6% | 0.233 |
| Abdomen | 8 | 4.9% | 0.564 |

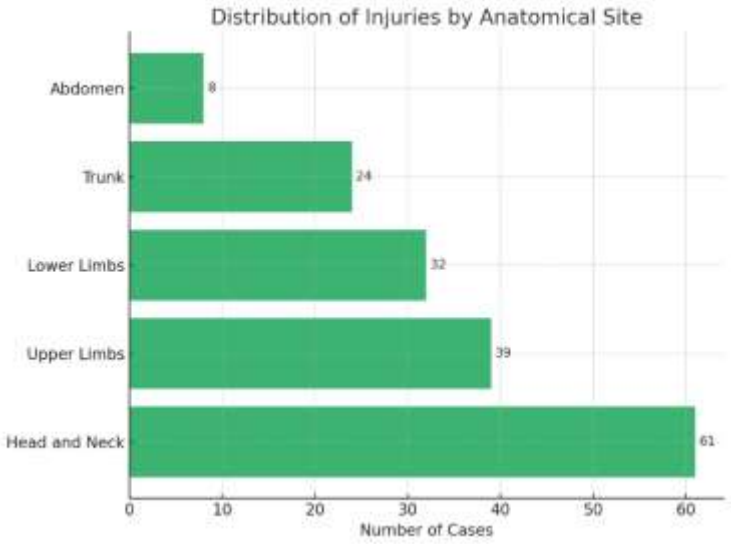


**Chart 3- Distribution of injuries (Anatomical Sites)**

Head and neck injuries were the most common, occurring in 37.2% of cases. The p-value (0.006) indicates that injuries to the head and neck are statistically significantly associated with child abuse patterns. Upper limb injuries were found in 23.8% of cases, while lower limb injuries occurred in 19.5%. However, neither showed a statistically significant association (p=0.112 and p=0.145, respectively). Trunk injuries were present in 14.6% of cases, with a non-significant p-value (0.233). Abdominal injuries were the least common (4.9%) and not statistically significant (p=0.564).

**Duration of Injuries:**

Most injuries were acute (<7 days old, 69.5%), suggesting a relatively recent assault.

**Table 4: Duration of Injuries**

| Injury Duration | Cases (n) | Percentage (%) | p-value |
|---|---|---|---|
| Acute (<7 days) | 114 | 69.5% | 0.023* |
| Healing (7–21 days) | 36 | 22.0% | - |
| Chronic (>21 days) | 14 | 8.5% | - |

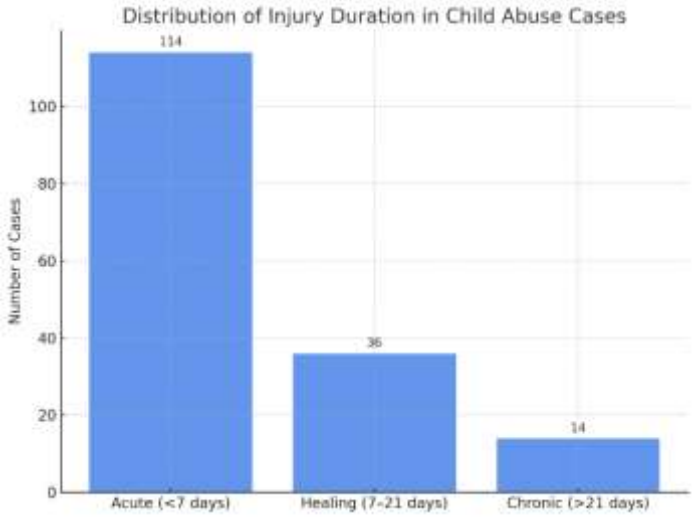


**Chart 4- Injury Duration (n=164)**

Acute injuries (<7 days old) were the most common, found in 69.5% of cases. The associated p-value (0.023) indicates a statistically significant finding. This suggests that most victims present shortly after injury, either due to the severity of symptoms prompting medical attention or detection by observant caregivers, teachers, or healthcare workers Healing injuries (7–21 days old) were present in 22.0% of cases. This group reflects injuries that were sustained but not immediately brought to medical attention. Healing bruises of varying colors, partially healed fractures, and resolving burns are indicators of abuse in this category. It also implies possible *delayed reporting* or *missed earlier opportunities* to identify and intervene. Chronic injuries (>21 days old) accounted for 8.5% of cases. Chronic injuries, such as poorly healed fractures, scarring, or deformities, suggest long-standing, repeated abuse and a failure of early detection systems like family, community, or healthcare services.

## 3. DISCUSSION

Child abuse presents with a wide spectrum of injuries, often distinguishable from accidental trauma by their location, type, and multiplicity (16,17). Our study underscores bruises as the most common finding, consistent with previous literature (18,19).

Fractures, particularly spiral fractures and rib fractures, were significantly more common in males. Burns were significantly more frequent among females, hinting at possible gender-based violence, including scald burns and inflicted thermal injuries (20,21).

Head and neck injuries predominate due to the vulnerability of these areas during abusive episodes (22,23). Similar findings have been reported in Western and Asian studies (24).

Early and accurate identification of child abuse injuries plays a crucial role in legal interventions and rehabilitation. Healthcare providers should maintain a high index of suspicion, especially in the absence of a plausible history (25).

Social determinants such as poverty, parental unemployment, substance abuse, and mental health issues were frequently associated but beyond the scope of this retrospective analysis.

Clinical Implications:

- Routine screening for child abuse in all injury cases.
- Multidisciplinary management involving paediatricians, forensic experts, psychologists, and social workers.
- Mandatory reporting of suspected cases.

Recommendations for Future Research: Prospective multicentre studies evaluating socio-economic and psychological variables along with injury patterns will further enrich the understanding of child abuse dynamics.

Limitations:

- Retrospective study design.
- Potential underreporting.
- Single-center data.

## 4. CONCLUSION

Physical abuse among children predominantly results in bruises and fractures, primarily affecting the head and neck region. Early detection based on clinical vigilance, coupled with mandatory reporting and psychosocial interventions, is key to safeguarding vulnerable children. There is an urgent need for public health campaigns, capacity building of healthcare providers, and robust child protection systems.

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**Conflict of Interest** None declared.

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