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Pattern of Unnatural Death in Paediatric Age Group: A Retrospective Study At SMS Medical College and Hospital Jaipur

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Abstract

Background: Childhood, as defined by the Children's Bill of Rights, encompasses the period from birth to 18 years, marking a critical developmental phase from infancy through adolescence. The death of a child during this stage is a profound tragedy, highlighting deficiencies in essential healthcare and societal support systems. Childhood mortality represents not only a devastating loss but also serves as a significant indicator of a country's healthcare standards and overall development.

Aims & Objectives: To observe the patterns of unnatural deaths, socio demographic and medicolegal profile in the paediatric age group (up to 18 years) brought for medicolegal autopsy at SMS Medical College Jaipur.

Materials & Methodology: This retrospective study applied specific inclusion and exclusion criteria. Total 4,774 autopsies were conducted during the study period, out of which 487 were paediatric cases (<18year). The study was conducted at the Mortuary, SMS Medical college, Jaipur, from January 1, 2024, to December 31, 2024.

Results & Observations: The study observe 487 paediatric cases, of which 61.54% (306 cases) were male and 37.2% (181 cases) were female. The manner of death was accidental in 76% of cases, suicidal in 7.6%, homicidal in 1.6% and unknown in 14.8% at the time of autopsy. Road Traffic Accidents accounted for the majority of deaths (200 cases, 41.1%), burn in 76 cases (15.6%), followed by falls from height (73 cases, 15%) and most of subjects were belong to rural area.

Conclusion: The study underscores the critical role of parents and caregivers in supervising children to prevent incidents leading to unnatural deaths. Additionally, prompt and adequate medical care following an incident is crucial for improving survival outcomes.

Introduction

Paediatrics is the branch of medicine dedicated to the medical care of infants, children, and adolescents, with the age range typicallsy extending from birth to 18 years. As per BNS 2(3) any person below the age

of 18 years is Child.

In some regions, this limit may extend until the completion of secondary education or even up to 21 years in the United States. Childhood, as defined by the Children's Bill of Rights, encompasses the period from birth to 18 years[1].

Registration of births and deaths act, sec2(b) defines death as a permanent disappearance of all evidence of life at any time after livebirth has taken place.[2]

An unnatural cause of death results from an external cause, typically includes homicides, suicides, accidents, medical errors, alcohol intoxications and others.

Children are more prone to accidental injuries due to developmental and behavioural factors at different stages of growth. Neonates and infants have limited mobility and fragile physiology, making them vulnerable to falls, suffocation, or improper handling. Toddlers and young children, driven by curiosity and unsteady mobility, often explore without understanding risks, leading to falls, choking, or burns. Adolescents, on the other hand, are prone to injuries due to risk-taking behaviors, peer pressure, and cognitive immaturity, which impairs judgment and impulse control. Across all ages, lack of supervision, unsafe environments, and unpredictable behaviour further increase their susceptibility to accidents.

Unnatural childhood deaths are deeply associated with intense trauma, separation distress, and a broader societal failure to adequately safeguard children from harm[3]. Trauma remains one of the leading causes of mortality in paediatric populations. Childhood mortality is recognized as a crucial indicator of a country's healthcare standards and overall development. Moreover, death records and associated statistics are globally regarded as reliable tools for assessing health outcomes and policy effectiveness.

This study aims to observe the medico-legal profile of unnatural deaths in the paediatric age group, focusing on cases from birth to 18 years, to gain insights into the patterns and contributing factors associated with such tragedies.

Aim & objectives

To observe the patterns of unnatural deaths in the paediatric age group brought for medicolegal autopsy at SMS Hospital, Jaipur.

Materials and method

A retrospective analysis was conducted on all medicolegal autopsy cases at the mortuary of SMS Medical College and its affiliated hospitals, Jaipur, covering the period from January 1, 2024, to December 31, 2024.

The study focused on childhood deaths involving individuals aged 0 to 18 years irrespective of gender, residence and cause of unnatural death. Pathological deaths and body released without autopsy were excluded from the study. All required data were collected through a review of autopsy registers maintained by medical professionals over the years. The collected data was tabulated in Microsoft Excel and The data obtained from this study was analyzed

statistically by presenting the data in the form of appropriate tables and graphs with statistical comparisons of discrete variables performed using the chi-square test.

SMS Medical College and its affiliated hospitals are among the busiest medical institutions in northern India, catering to one of the highest patients loads in the region, making it an ideal setting for such a comprehensive study.

Age groups were intrauterine death, dead born, Premature live born death, Neonates- age up to 1 month,

infant- more then 1 month to 1 year, Toddler- more than 1 year to 2 year, Early childhood- more then 2 years to 6 years of age, Middle Childhood- more than 6 years to 11 years, Early adolescence – more than 11 year to 16 years of age and late adolescence is more than 16 years up to 21 years of age but we take age up to 18 years last.

Observations and Results-

During the study period, total 4774 autopsies were conducted among them 487 were paediatric autopsies, conducted at the Mortuary, Department of Forensic Medicine, SMS Medical College and Attached Group of Hospitals Jaipur during 1 January 2024 to 31 December 2024.

Out of 487 paediatric autopsies, 370 cases (76%) were of accidental/unintentional paediatric death, 37 cases (7.6%) were suicidal, 8 cases (1.6%) were homicidal and 72 cases (14.8%) were of unknown history provided by investigating officer at time of autopsy conducted.

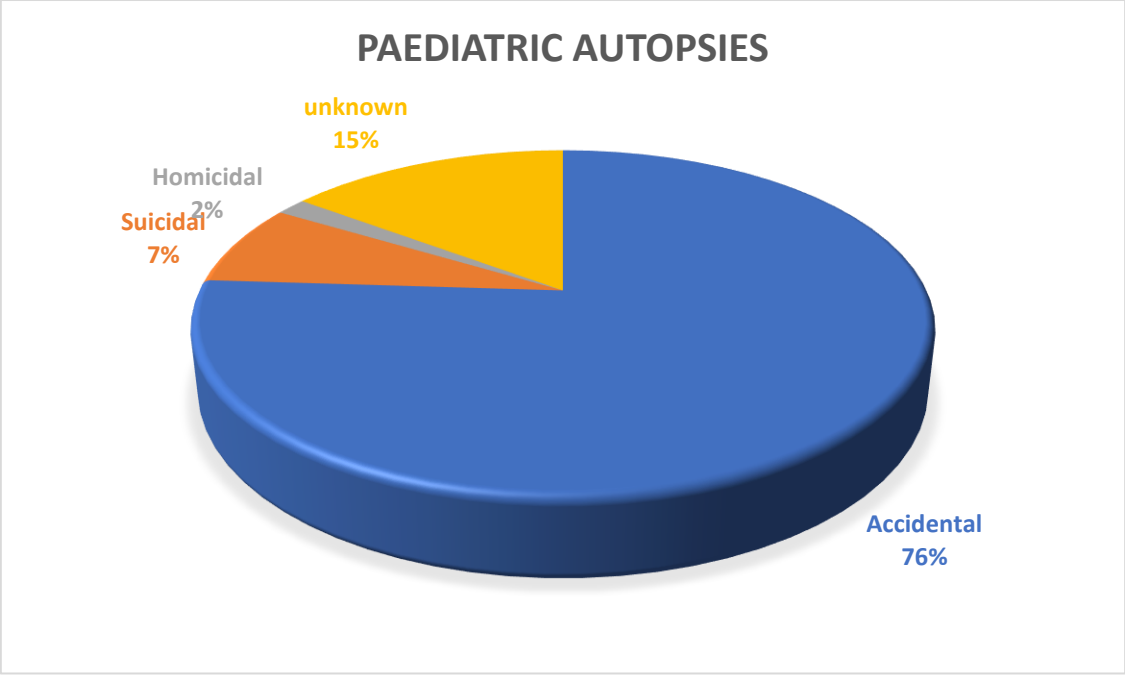

Figure 1: showing pattern of death among paediatric autopsy cases

Male children account for 62.8% (306 victims) while female account for 37.2% (181 victims). In present study 379 subject (77.8%) died even after receiving treatment at SMS Hospital and 108 subject (22.2%) were brought death to SMS emergency.

355 subjects were belong to rural area while 126 subjects belong to urban area and 4 subjects were of unknown region.

Age group	Sex	RTA	Burn	FFH	Poisoning	Hanging	Drowning	Assault	snake bite	Train	animal bite	strangulation	machine injury	unknown history	Total
Intrauterine death	M	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
	F	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Dead born	M	0	0	0	0	0	0	0	0	0	0	0	0	2	**2**
	F	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Premature live born death	M	0	0	0	0	0	0	0	0	0	0	0	0	2	**2**
	F	0	0	0	0	0	0	0	0	0	0	0	0	3	**3**
Neonates	M	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
	F	1	0	0	0	0	0	0	0	0	0	0	0	5	**6**
Infant	M	5	3	4	0	0	0	2	0	0	0	0	0	0	**14**
	F	0	2	4	0	0	1	0	0	0	1	0	0	2	**10**
Toddler	M	4	9	13	1	0	1	0	0	0	1	0	0	1	**30**
	F	2	10	10	1	0	2	0	0	0	0	0	0	1	**26**
Early Childhood	M	16	9	7	1	0	0	0	1	0	0	1	0	0	**35**
	F	14	9	8	2	0	0	0	1	1	0	0	0	0	**35**
Middle Childhood	M	17	7	5	0	0	2	0	0	0	0	0	0	0	**31**
	F	8	7	4	2	0	0	1	1	0	1	0	0	3	**27**
Early Adolescence	M	41	7	8	2	5	2	0	1	0	0	0	0	2	**68**
	F	7	3	3	10	9	0	1	0	0	0	0	1	4	**38**
Late adolescence	M	81	8	5	12	5	2	1	0	4	0	0	0	4	**122**
	F	4	2	2	15	5	0	0	2	0	2	0	0	4	**36**
Total		**200**	**76**	**73**	**46**	**24**	**10**	**6**	**6**	**5**	**5**	**1**	**1**	**34**	**487**

In present study 200 subject (41.1%) died due to Road Traffic Accident, followed by Burn includes 76 subjects (15.6%) among them 40 subjects by moist burn, 18 by dry burn and 18 by electric burn, Fall From Heightin 73 subject (15%), Poisoning in 46 subject (9.4%), Hanging in 24 subject (4.9%), Snake Bite & Assault in 6- 6 subject (1.2%) injury due to train in 5 subjects (1%), animal/unknown bite in 5 subjects, Strangulation & Machine Injury in 1-1 subject (0.2%) and in 34 subjects (7%) history was not known at time of autopsy.

Discussion

In the present study, among total 4774 autopsies, 487 were paediatric autopsies in which males constituted the majority of victims (62.8%), compared to females (37.2%), resulting in a male-to-female ratio of approximately 1.68:1. Similar findings have been reported in studies by Athani P et al., Bangalore, 2017 (55.22% male victims)[4]; Kumar A et al., Varanasi, 2014 (56.55% male victims)[5]; and Varma RK et al., Bangalore, 2021 (56% male victims)[6]. This male preponderance can be attributed to the fact that males are often more active participants in society and more frequently involved in outdoor activities, thereby increasing their exposure to risks.

In this study, 77.8% of the victims succumbed to death after receiving treatment, while the remaining 22.2% died on the spot or en route to the hospital and 355 subjects were belong to rural area while 126 subjects belong to urban area and 4 subjects were of unknown region.

In contrast, the study by Varma RK et al., Bangalore, 2021 reported that only 19% of children received treatment[7]. This highlights that availability of child specialists or other specialist at rural area, severity of injuries, availability of transportation services and primary handling of patient just after trauma at incidence place are importance factors that determine the outcome of subjects with or without medical intervention. children often fail to survive due to their limited physiological ability to recover from severe injuries. Hence, any delay in transporting an injured child to the hospital must be avoided.

Regarding the manner of death, unintentional or accidental deaths accounted for 76% of cases, with all categorized as accidental. Intentional self-harm (Suicidal) deaths were reported in 7.6% of cases,

homicidal deaths in 1.6%, and 14.8% of cases had an unknown history at the time of autopsy. The predominance of unintentional deaths underscores the need for preventive measures. Providing guidance and education to children about safety measures, such as avoiding electrical and inflammable substances, can significantly reduce these preventable fatalities. Additionally, parental advice, school-based counselling, and proper care for toddlers can contribute to reducing paediatric fatalities.

In metropolitan cities like Bangalore, the increased number of deaths can be attributed to intense parental work schedules and a lack of qualified childcare. School-aged children also face significant academic and societal pressures, leading to stress and depression. Rash driving by adolescents further contributes to road traffic accidents (RTA). These fatalities could be substantially reduced through appropriate care, supervision, and education.

In the present study, RTAs were the leading cause of death, accounting for 200 cases (41.1%), followed by burns in 76 cases (15.6%), falls from height in 73 cases (15%), poisoning in 46 cases (9.4%), hanging in 24 cases (4.9%), drowning in 10 cases (2.1%), snake bites and assaults in 6 cases each (1.2%), animal bites and train-related injuries in 5 cases each (1%), and machine injuries in 1 case (0.2%). The cause of death was unknown in 34 cases at the time of autopsy. Similar findings were observed in Kumar A et al., Varanasi, 2014 (RTA: 41.33%)[5]. However, in the study by Varma RK et al., Bangalore, 2021, hanging was the predominant cause of death (42%), followed by RTAs (40%) and burns and drowning (8% each)[6]. Athani P et al., Bangalore, 2017 reported RTAs in 26.04% of cases, hanging in 33.33%, and drowning in 15.63% of cases[4].

Regarding the immediate cause of death, coma was observed in 154 cases (31.6%), shock in 98 cases (20.1%), asphyxia in 21 cases (4.3%), and sepsis in 32 cases (6.6%). In other cases, the cause of death was reserved or determined based on treatment records.

In traumatic cases, head injury was the most common and sufficient injury to cause death in the ordinary course of nature. In poisoning cases, the poison was often unidentified, leading to delayed or ineffective treatment. Organophosphorus compounds were the most commonly identified poison, known for their high fatality rates.

Findings of sexual assault were suspected in three female victims. one victim of age 10 year was present with history of burn at her town outside jaipur and during treatment there was suspicious history of sexual assault for that examination was done. Patient died due to shock due to 65% extensive burn. Burn area also includes genitalia but on careful examination multiple abrasions were also present there. Appropriate samples were taken for FSL. Another victim of age 15 years of jaipur city was admitted with unknown history having multiple bodily injuries including genital injuries. Appropriate samples were taken for FSL including nails scraping. Parents and guardians should also teach there children how to protect themselves.

In early childhood, the most common causes of injuries are falls from heights and burns. This suggests that young children, being unaware of potential dangers and lacking a fear of harmful situations, often injure themselves unintentionally.

In contrast, during late childhood and adolescence, elevated dopamine levels contribute to increased aggression, impulsivity, and distractibility. Additionally, this age group often faces emotional and psychological challenges such as romantic relationships, breakups, and academic pressures. Road Traffic Accidents (RTAs) are the most common cause of injuries in this age group, followed by incidents with suicidal intent, such as poisoning or hanging.

Conclusion

The analysis of paediatric unnatural fatalities aimed to explore various aspects of these tragic incidents and establish a comprehensive profile of paediatric deaths encompassing both rural and urban areas. Preventing such fatalities requires a multifaceted approach, combining effective techniques, education, technological advancements, and stringent regulations. Preventive measures to reduce fatalities from the identified causes include enforcing stricter traffic laws, promoting road safety awareness, and improving road infrastructure to mitigate RTAs. For burns, safe cooking practices, fire safety protocols in workplaces, and access to burn management are crucial. Falls can be reduced by securing high-risk areas and supervising children. Safe storage of chemicals and awareness campaigns can prevent poisoning, while mental health support and suicide prevention programs are essential to address hanging cases. Drowning risks can be minimized through water safety measures and swimming education. Snake and animal bites require community awareness and better access to emergency care, while train and machine-related injuries can be reduced through workplace safety protocols and enhanced railway precautions. These interventions collectively target the primary causes of preventable deaths. Parents and caregivers bear a significant responsibility in supervising and protecting children from potential hazards. In cases where prevention is not possible, it is crucial to ensure that the victim receives immediate and appropriate care to maximize the chances of survival.

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