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A study of the causes of unnatural deaths among children and adolescents at a tertiary care centre in North-east India

Running title: **A study of the causes of unnatural deaths among children and adolescents**

Contributors

- 1. Nabajit Barman**, Associate Professor, Department of Forensic Medicine, Assam Medical College
 - 2. Gobil Thapa**, Assistant Professor, Department of Community Medicine, Tinsukia Medical College
 - 3. Bikram Dutta Tassa**, Professor, Department of Pharmacology, Tinsukia Medical College
 - 4. Swagata Dowerah***, Associate Professor, Department of Pathology, Tinsukia Medical College
- Department(s) and institution(s) : Department of Forensic Medicine, Assam Medical College¹, Department of Community Medicine, Tinsukia Medical College², Department of Pharmacology, Tinsukia Medical College³, Department of Pathology, Tinsukia Medical College⁴.

Corresponding Author:

Name Dr Swagata Dowerah

Address Department of Pathology, Tinsukia Medical College

Phone numbers: 9954480337

E-mail address : swagatadowerah@gmail.com

Abstract: Introduction: A study was conducted on the types and patterns of unnatural death among the children and adolescent population at a tertiary care centre in north- east India with the following objectives - 1. To analyse causes of unnatural deaths in children and adolescent 2. To study the means of suicide in this population 3.To study the demographic profile of these victims **Materials and methods:** A one year retrospective cross sectional study was conducted at a tertiary care centre in North east India. One year records of unnatural deaths which came for autopsy in the department of Forensic Medicine were included in the study. The data was analysed using descriptive statistics. **Results:** Majority of the cases were between 16-19 years of age (51.59%) followed by 11-15 years (28.12%), 1-5 years (10.72%) and 6-10 years (9.57%). Male to female ratio was 1.3:1. Accidental deaths comprised 55.65% cases, suicidal deaths 42.61% , homicides 1.74 % cases. Suicides were more common in females (62.59% vs 37.41% in males). Most common mode of suicide was hanging (57.14%) in both males and females followed by poisoning (39.46%) and a minority died by burns (3.4%). Road traffic accidents was the most common type of unnatural death (25.22%) followed by hanging(24.35%), poisoning (17.68%), drowning(15.94%), burns(7.54%), fall from height(4.35%). **Conclusion:** As the socioeconomic and cultural factors vary from state to state, understanding the ground reality of unexpected and unnatural deaths can help us to formulate effective strategies to counter these both at the individual, societal and administrative levels.

Keywords: adolescents, children , suicide, unnatural death

Introduction: Children and adolescents have certain physical and mental characteristics that render them especially vulnerable to trauma and inflicted fatal injuries. (1) This vulnerability is related to various behavioral, social and environmental factors which include alcohol and drug abuse, social and geographic trends, traffic regulations, and seasons of the year. (2) An unnatural death is a death caused by external causes (injury or poisoning) which include death caused by

injury which may be intentional as in homicide or suicide or unintentional as in an accident. (3) There is currently no international standard which differentiates natural and unnatural deaths. However some deaths due to their sudden, suspicious or unexplained nature are deemed “unnatural”. These include suicides, homicides and accidental deaths.

The government of India categorises a death as suicidal if it fulfills the following criteria (4)-

- It is an unnatural death.
- The intent to die originated within the person.
- There is a reason for the person to end his or her life. The reason may have been specified in a suicide note or unspecified.

Accidental death is a death resulting from an unusual event that was not anticipated by anyone involved and was unintended, unexpected, or unforeseeable. (5) Homicide is an unlawful death purposefully inflicted on one person by another person. (6) In India, nearly 1, 36,000 persons voluntarily ended their lives in a suicidal act as per official reports in 2011 (7) while road traffic accidents (1, 85,000 deaths; 29 per cent of all unintentional injury deaths) are the foremost cause of unintentional injury leading to death in India. (8) . Homicides are another cause of death among the adolescent population.

We therefore conducted a study on the types and patterns of unnatural death among the children and adolescent population based on post mortem records at a tertiary care centre in north- east India with the following objectives -

1. To analyse the causes of unnatural deaths in children and adolescent population
2. To study the means of suicide in this population
3. To study the demographic profile of these victims

Materials and methods: A one year retrospective cross sectional study was conducted at a tertiary care centre in North east India.

Sampling: Convenience sampling

One year records of unnatural deaths which came for autopsy in the department of Forensic Medicine were included in the study. Age, gender, mode of death, types of injury and means of committing suicide were noted from records. The data was analysed using descriptive statistics.

Ethics: Ethical clearance from the institutional ethics committee was taken prior to conducting the study.

Results: Out of 3116 cases of unnatural deaths encountered during the study period, 345 (11.07%) belonged to the age group of 1 to 19 years. Of these, majority of cases were between 16-19 years of age (51.59%) followed by 11-15 years (28.12%), 1-5 years (10.72%) and 6-10 years (9.57%). [Table 1] Male to female ratio was 1.3:1. Accidental deaths comprised 55.65% cases , suicidal deaths 42.61% while homicides were much lower at 1.74 % cases [Table 3]. Suicidal deaths were more common in females (62.59% vs 37.41% in males). On the other hand, accidental deaths and homicides were commoner in males.

Most common mode of suicide was hanging (57.14%) in both males and females followed by poisoning (39.46%) and a minority died by burns (3.4%) [Table 4]. Overall, road traffic accidents was the most common type of unnatural death (25.22%) followed by hanging(24.35%),

poisoning (17.68%), drowning(15.94%), burns(7.54%), fall from height(4.35%). Other less common causes included homicide, electrocution, heavy object fall on the body, drug overdose, self fall, railway accidents.[Table 2]

Discussion:

In our one year study of post mortem data, unnatural deaths in childhood and adolescence comprised of 11.07% of all unnatural deaths during this period. This is similar to the study conducted by Awdhesh Kumar et al where these deaths comprised of 13.41% of unnatural deaths. (9) The most common age group affected was 16-19 years(51.6%) which correlates with the findings of Ben Abderrahim et al. who found 15-18 year age group to be most commonly affected. (5) Debata PK et al found 11-19 year olds to be most common victims of unnatural deaths comprising of 74.5% of cases. (10) In our study also victims between 11 to 19 years comprised 79.7 % cases.

Males outnumbered females at a ratio of 1.3:1. While 57% of our victims were male, around 43% were females. Similar findings were noted by Awdhesh Kumar et al (9) where males outnumbered female victims. However , Debata et al in their study noted a female preponderance of cases. (10)

Road traffic accidents(RTA) were the most common mode of unnatural deaths comprising of 25.22 % cases. Of these, 81.6% were males as compared to 18.4% female victims. Among females, RTA comprised of the fourth leading cause of unnatural deaths after hanging, poisoning and burns. A Tunisian study by Ben Abderrahim et al (5) also found accidents to be the most common cause of death in children and adolescents. Higher incidence of road traffic accidents among young males could be due to their inexperience in driving, speeding, not using safety equipment like helmets along with use of drugs, alcohol and a general sense of recklessness in this population. Although less in proportion to males, female deaths by RTA was still found to be the leading cause of death in this category in the study conducted by Khan MW where RTAs comprised 30% of unnatural deaths in the female population. (11) In our study, RTAs comprised of only 10.8% of unnatural deaths in females.

The second leading cause of unnatural deaths was by hanging (24.35% cases followed by poisoning (17.7% cases), drowning (16% cases), burns (7.54% cases), fall from a height (4.34% cases) followed by a small number of deaths due to homicide, electrocution, heavy object falling on the body ,drug overdose and railway accidents. In deaths by hanging, poisoning and burns, a greater proportion of the victims were females. Awdhesh Kumar et al (9) found RTA to be the most common cause of death followed by drowning and poisoning. In another study by Mitra et al, maximum deaths (36.6%) were attributed to poisoning, followed by burn injury (24.8%), road traffic accidents (22.8%), fall from height (6.9%) and others . (12)

Overall accidental deaths were the most common type of death comprising of 55.7 % cases followed by suicide (43% cases) and homicide (1.7% cases). Similar findings were noted by Santosh et al, Chakrabarty et al (13), Kitulwatte et al (14) in their studies. However , in the study by Mitra S et al (12), suicide was the most common type of death followed by accidents while accidents followed by homicides were the most common types of unnatural deaths in a study by Khan et al in Dhaka. (15) It was noted in our study that although accidental deaths were the most common type of death in males, in females suicide was the most common type of unnatural death. Lack of social support, the patriarchal nature of our society, early marriage often against the wish of the person, domestic violence, unwanted pregnancies could all be factors leading to increased suicides amongst females.

Hanging was the most common method employed in suicidal deaths in our study comprising of 57.14 % cases followed by poisoning and burns. All cases of burns in our study were female victims. Ben Abderrahim et al also found hanging to be the most popular method of suicide in their study. (5) In a retrospective study examining suicides from Boston Children's Hospital, an association was seen between poverty and suicide in children and teens as children living in poverty are more exposed to family conflicts, violence, social isolation, and lack of infrastructure and therefore more prone to emotional problems like depression and anxiety. (16) Since our study was a retrospective study on post mortem data, in many of the cases, the actual triggers causing suicides could not be evaluated.

Conclusion: This study was an attempt to understand the patterns of unnatural deaths in a population in the north eastern part of the country. As the socioeconomic and cultural factors vary from state to state, understanding the ground reality of unexpected and unnatural deaths can help us to formulate effective strategies to counter these both at the individual, societal and administrative levels.

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Tables:

Table 1. showing distribution of victims according to age and sex

Age (in years)	Male		Female		Total	
	No.	Percentage of cases in the age group	No.	Percentage of cases in the age group	No.	Percentage of total
1-5	20	54%	17	46%	37	10.7%
6-10	22	66.7%	11	33.3%	33	9.6%
11-15	50	51.5%	47	48.5%	97	28.1%
16-19	105	59%	73	41%	178	51.6%
Total	197		148		345	100

Table 2 showing cause of death with sex wise distribution

Cause of deaths	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
RTA	71	81.61	16	18.39	87	25.22
Hanging	37	44.05	47	55.95	84	24.35
Poisoning	19	31.15	42	68.85	61	17.68
Drowning	39	70.91	16	29.09	55	15.94
Burn	7	26.92	19	73.08	26	7.54
Fall from height	10	66.67	5	33.33	15	4.34
Homicide	5	83.33	1	16.67	6	1.74
Electrocution	5	83.33	1	16.67	6	1.74
Heavy object fall on the body	2	100	0	0	2	0.58
Drug	1	100	0	0	1	0.29

overdose						
Self fall	1	100	0	0	1	0.29
Railway	0	0	1	100	1	0.29

Table 3 showing distribution of victims according to manner of death

Manner of death	Male		Female		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
Accidental	137	71.35	55	28.65	192	55.65
Suicidal	55	37.41	92	62.59	147	42.61
Homicidal	5	83.33	1	16.67	6	1.74

Table 4 showing methods employed to commit suicide

Method of suicide	Male		Female		Total	
	No.	Percentage	No.	Percentage	No.	Percentage
Hanging	37	44.05	47	55.95	84	57.14
Poisoning	18	31.03	40	68.97	58	39.46
Burns	0	0	5	100	5	3.40
Total	55	37.41	92	62.59	147	42.61