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Original Research Article

Recent Trends of Unnatural Deaths Amongst the Children and Adolescents in Yavatmal Region of Maharashtra

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Abstract

Introduction: An unnatural death among children and adolescents is a shocking tragedy affecting family, friends and community. It's duty of society to protect them from unnatural tragedies. The present study was carried out to know the various causes of unnatural deaths and to analyse associated factors among 1–19 years. **Material and Methods:** A retrospective observational study by analysing medico-legal autopsy files of unnatural deaths in children and adolescents aged 1–19 years was done in the Department of Forensic Medicine of Shri V. N. Government Medical College situated at Yavatmal district of Maharashtra state (India). **Results:** This retrospective analysis revealed total 144 unnatural deaths in age 1–19 years. Majority were died due to accidents (49.31%) and suicides (42.36%). The most vulnerable age group included among accidents, suicides and homicides was adolescents between 15-19 years. Male preponderance was observed in accidents (61.97%) and homicides (91.67%), whereas females (72.13%) outnumbered the males in suicides. Road accident (38.03%) was the commonest cause of death in accidental deaths, followed by drowning (22.53%). Among suicides, consumption of poison (62.30%) was predominant cause, followed by hanging (24.59%). **Conclusion:** Ruthless driving of two-wheeler by older adolescents and unsupervised swimming in water reservoirs are the important major avoidable reasons for accidental deaths.

1. Introduction

Children and adolescents are the most vulnerable groups of society. Developmentally, childhood refers to the period between infancy and adulthood.¹ While, Adolescence is the transitional phase of

growth and development between childhood and adulthood. It's undoubted fact that, children and adolescents are the future of present society.

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They need good nurture and protection from dangers by their family and the society to achieve healthy adulthood. Unnatural death in these ages is a devastating tragedy which dramatically affects family, friends and community.

An unnatural death is a death caused by external causes (injury or poisoning) which includes death due to intentional injury such as homicide or suicide, and death caused by unintentional injury in an accidental manner.³ Accidental Deaths can be defined as any death that occurs as the result of an accident. An accident is an unplanned event that results in injury, deaths, damage to property or some other losses.⁴ Whereas, suicide is the deliberate act of taking one's own life and homicide is the killing of one person by another. In India all cases of unnatural deaths are subjected to the medico-legal autopsy.

Analysis of autopsy data is useful to know the current trends, different causes and associated reasons for unnatural deaths. All the more that the deaths under 19 years of age are mostly avoidable, analysis of trends in deaths due to possibly modifiable factors enables taking preventive measures at the national and local level and contributes to reducing future mortality.⁵ Therefore, the retrospective analysis of medico-legal autopsy data was carried out to ascertain the unnatural causes of deaths among children and adolescents (1 to 19 years). The study was also aimed to obtain useful information about modifiable circumstances to avoid such deaths in future.

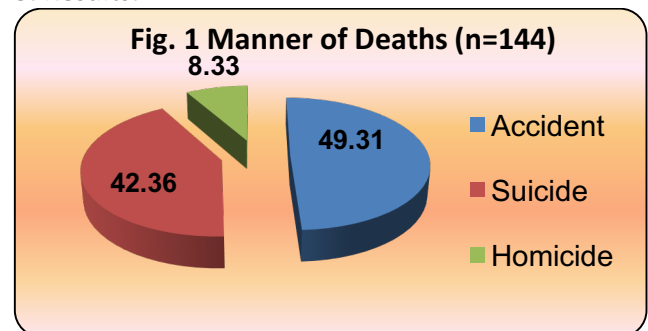
2. Materials and Methods:

The current study was conducted at the Department of Forensic Medicine of Shri V. N. Government Medical College, Yavatmal, Maharashtra state (India). The autopsy files of period January 1, 2016 to December 31, 2018 present in the Department were reviewed retrospectively. We used a pre-formed proforma to extract data from the records to ensure consistency of the whole data sample. The various epidemiological characteristics, details of the circumstances, cause and manner of death, and other relevant information were gathered.

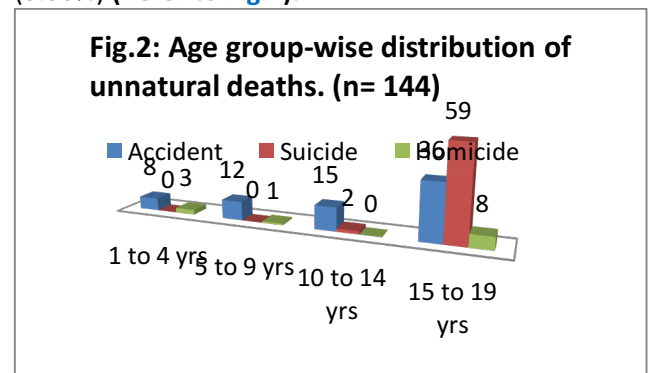
The unnatural death cases among children and adolescents aged 1 to 19 years were considered for present study. Unnatural causes of death were further categorized under accidental, suicidal and

homicidal groups. Factors such as history, information given in inquest papers and autopsy findings were taken into account while categorizing manner of death. The cases in which cause and/ or manner of death could not be ascertained were excluded from the study. Henceforth, a total 144 individuals aged 1-19 years who were definitely died due to accident, suicide or homicide were further studied comprehensively. The data on 144 cases was subsequently compiled, coded into tables and chart and analyzed in detail.

3. Results:

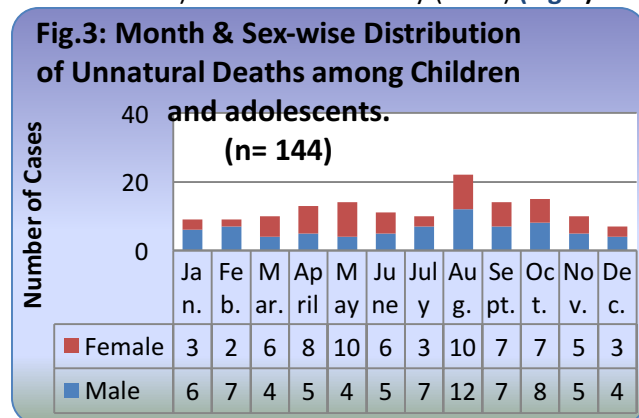


In the present study, accidental deaths were found to be most common manner of death comprising 49.31% cases, followed by suicides (42.36%) (Fig.1). Male preponderance was seen in accidents and homicides, whereas among suicides female predominance was noted. Individuals of 15-19 years were the most common age group involved including suicides (96.70%), homicides (66.66%) and accidents (50.70%). Second most common age group involved in accidents was 10-14 years (21.13%) and in homicides was 1-4 years (25%), whereas other age group contributing to the suicides was 10-14 years (3.30%) (Refer to Fig.2).



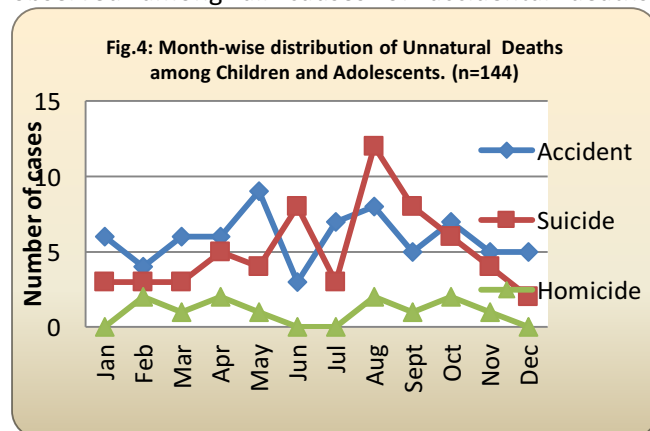
To determine whether there are any noticeable differences in occurrence of unnatural deaths at specific time point across year, month-wise

distribution of cases by sex and manner of death are studied as shown in Fig. 3 and 4. Highest mortality among boys as well as girls was found in month of August with 12 and 10 cases respectively. Males contributed more to unnatural death in month of January, February, July, October and December; whereas, in September both sex have equal number and in remaining months' females outnumbered. Males contribution peaked in month of February (M:F ratio= 1:0.286) and females in May (1:2.5) (Fig.3).



Among suicide mortality, there was a steep rise in August with 19.67% cases of total suicides, followed by a small seasonal peak in month of June (13.11%). Among accidents, highest numbers were observed in May (12.68%), followed by August (11.27%). (Fig.4)

In our study, the most common cause of accidental deaths was road accidents (38.03%), followed by drowning (22.54%). Other significant causes of accidental deaths were snake-bite (10 cases), electrocution (4 cases), burn (4 cases), and poisoning (4 cases). Preponderance of male sex was observed among all causes of accidental deaths



whereas, females outnumbered in accidental burn cases. Most common age group involved among children and adolescents in road accidents was 15-19

years. Individuals travelling on two-wheeler (mostly driver) were found to be most prevalent (62.96%) victims who die in road accidents. The most common cause of death in road accidents was head injury (59.25%). Male was predominant gender involved in accidental drowning (81.25%). Individuals of 15-19 years age group (61.54%) were most common victims of accidental drowning. Boys were mostly drowned while swimming with friends, whereas accidental fall in water reservoir while washing clothes was common reason among girls. Well, river and lake were the water reservoirs of drowning for all age groups except age group 1-4 years. Children of 1-4 years age group were accidentally drowned in a water/ septic tank in premises of their home. (Table 2)

In our study, poisoning (62.30%) contributed the most to suicides, followed by hanging (24.59%). Among all causes of suicide, females predominated except deaths due to drowning in which males outnumbered. Most of the suicides victims were aged 15-19 years (96.72%). Many victims of suicidal poisoning have consumed poisonous compound, mostly insecticides at their home (94.74%). Majority of individuals who consumed poison received treatment at hospital. The most common place of committing suicide by hanging was home (86.67%). Ligation materials most commonly used for hanging in adolescents were Odhani and nylon rope (7 and 4 cases, respectively). (Table 1)

In current study 12 cases of death due to homicide were observed, of which majority were male (11 cases). Sharp force and blunt force injuries jointly comprises maximum number of cases (83.33%). Adolescents aged 15-19 years were most commonly involved (66.66%) who were mostly died due to sharp force injuries inflicted by their rival. Other causes of homicides were ligation strangulation, throttling and poisoning. (Table 2)

4. Discussion:

Death of a child or adolescent is not only a shocking experience to their family but also an important social issue. Survival and morbidity free development of these individuals are always a first priority of their parents. All injury-related deaths which include accidents, suicides and homicides are preventable causes of mortality in this age group. In the present study, total 144 individuals of 1 to 19 years' age group died due to unnatural causes during

Table No. 1: Characteristics of deaths due to accidents among children and adolescents (n= 71).

Type of Accident	Sex (M:F ratio)	Age group involved	Other information
Road accident (n= 27)	M = 18 F = 9 M:F = 1:0.5	1-4 years= 2 5-9 years=5 10-14 years= 4 15-19 years= 16	Vehicular occupancy: 3- Pedestrian 17- Two-wheeler 4- Four-wheeler driver 2- Three-wheeler 1- Bicycle
Drowning (n= 16)	M= 13 F= 3 M:F = 1:3.63	1-4 years= 2 5-9 years=2 10-14 years= 4 15-19 years= 8	Place of occurrence: 6- Well 4- River 2- Lake 2- Tank
Snake-bite (n= 10)	M = 5 F = 5 M:F = 1:1	1-4 years= 2 5-9 years=2 10-14 years= 3 15-19 years= 3	Place of occurrence: 8- Home 2- Farm
Electrocution (n= 4)	M = 3 F = 1 M:F = 1:0.33	5-9 years=1 10-14 years= 1 15-19 years= 2	Place of occurrence: 1- Home 1- Farm 1- Electric pole 1- Area under construction
Burn (n= 4)	M= 1 F= 3 M:F = 1:3	15- 19 years= 4	History: 3- Stove burst 1- Fall of lamp
Others (n= 4)	M= 4 F= 4 M:F = 1:1	1-4 years= 2 5-9 years=1 10-14 years= 1 15-19 years= 4	Cause of death: 4- Poisoning 3- Head injury 1- Hanging

Table No. 02: Characteristics of deaths due to suicides among children and adolescents (n= 61).

Means of Suicide	Sex (M:F ratio)	Age group involved	Place	Other Information
Poisoning (n= 38)	M= 8 F= 30 M:F = 1:3.63	15-19 years= 38	36- Home 2- Farm	Treatment received:- Yes- 30 No-8
Hanging (n= 15)	M = 5, F = 10 M:F = 1:2	10-14 years= 2, 15-19 years= 13	13- Home 1- Farm 1- Hostel	Ligature material:- i. Odhani- 7, ii. Nylon rope- 4, iii. Saree- 1 iv. Long Handkerchief- 1 v. Not known- 2
Drowning (n= 5)	M = 3 F = 2 M:F = 1:0.66	15-19 years= 5	4- Well 1- River Dam	
Burn (n= 3)	M = 1 F = 2 M:F = 1:2	15-19 years= 3	3- Home	Treatment received:- Yes- 3 No-0

Table No. 3: Characteristics of deaths due to homicides among children and adolescents (n= 12).

Type of assault	Sex (M:F ratio)	Age group involved	Cause of death
Sharp force	M = 5, F = 0	15-19 years= 5	Stab to chest and abdomen- 5
Blunt force	M = 3, F = 0	1-4 years= 1 15-19 years= 2	Head injury- 3
Sharp and blunt force	M = 1, F = 0	15-19 years= 1	Multiple stab with head injury- 1
Others	M = 2, F = 1	1-4 years= 2 5-9 years= 1	Strangulation- 2 Poisoning- 1

period 2016-2018; among these, accidental deaths predominated (49.31%) followed by suicides (42.36%). According to National Crime Record Bureau (NCRB) of India, accidents are leading cause of death with total 4,13,457 individuals have died due to accidents, where as suicide is second most common cause with 1,33,623 individuals committed suicides in year 2015. Maharashtra state ranked first among accidental deaths and suicides in the country.⁴ Accidents and suicides are leading causes of death in India as well as all over the World.

Among suicides, month-wise distribution had shown two peaks: a large one, in month of August followed by significant number in subsequent month of September and second small one, in month of June. Student who committed suicide due to academic problems/ failure was the reason for rise in number of suicides in month of June. In addition to aftermath of academic failure, issues related to adjustment in new environment of college for older adolescents and academic problems might be reason for steep rise among suicides in August and September. Month-wise distribution of accidents had shown a seasonal peak in May month. This is a month of summer holidays in all schools and colleges across the India. There is increase in outside activities for boys such as playing, swimming and increased involvement in household works for girls such as cooking, washing clothes which increases the subsequent risk of accidental death.

Accidental Deaths have been classified as deaths that could be due to forces/factors of the nature which have been termed as 'Natural Accidental Deaths' or could be due to deliberate or negligent conduct of human beings, which is termed as 'Unnatural Accidental Deaths' or due to causes not covered in the above two categories and with no

initial apparent cause of deaths which have been categorized as 'Other Causes of Deaths' like poisoning, sudden death etc.⁴ In the current study, no natural accidental death was observed. Road accidents were the leading cause of unnatural death for children and adolescents, representing 38.03% of accidental deaths and 18.75% of all unnatural deaths. In India, traffic accident was the major cause of unnatural accidental deaths in year 2015 contributing 52.8%. Similar findings were reported by Indian studies from Manipal⁶ and Varanasi⁷ and, International studies from Poland⁵, Japan⁸, United States⁹, Iran¹⁰, and Estonia¹¹. In contrary to our finding, a study from Ghana¹² had reported drowning as most leading for injury-related mortality among adolescents with road traffic accidents being second most common cause. However, they have not further categorized manner of these drowning deaths.

Male gender was predominantly affected in road accidents contributing 66.66% as compared to their female counterparts in the present study. NCRB of India⁴ reported that, contribution of males was 81% among individuals who aged below 18 years and died due to road traffic accidents in 2015. Similar observation of male predominance in road accidents was reported by national¹³ and international studies.^{5,8,10} Male children are frequently affected because they are more involved in outdoor activities.¹³ Maximum number of deaths were observed in 15-19 years age group; majority being boys driving two-wheelers. The finding of major contribution by older adolescents among deaths in road accidents is also reported by other researchers.^{5,7,8,10-13} Combination of risk-taking behavior which includes high speed driving, not using helmet and greater independence compared to children and younger adolescents might be the reason

for these biker's death. Similar finding of more prevalence of death among occupants of motorcycle were reported by studies from Iran and Estonia.^{10,11} Contrary to our finding, a study from Chandigarh¹³ in India and a study from Ghana¹² have reported high proportion of pedestrians in road accidents, whereas in Poland⁵ car users (43.3%) were found to be mainly affected individuals. Making use of helmet compulsory, avoiding intoxicants while driving, strict implementation of traffic rules and educating youth regarding traffic rules are useful measures which can reduce mortality among bike riders. Regarding developing preventive strategies Gradja et al.⁵ have commented that, using the best practices of countries that have the lowest rate of deaths due to accidents seems to be the right approach in taking appropriate preventive measures.

Drowning was the second most leading cause of accidental death in which boys aged 15-19 years predominated. Most of the accidentally drowned boys were swimming with their same aged friends in water reservoirs. Moreover, in an incident two boys aged 9 years were accidentally drowned in a well. In rural areas swimming is learnt in water reservoirs which are actually not meant for this purpose and lacking safety measures. The reduction of the mortality due to accidental drowning among children and adolescents can be achieved by increased parental supervision when they are in the water or by the water, safeguarding water reservoirs, using instruments that facilitate safe movement in water, educating the public regarding the dangers in children near water reservoir and first aid education.^{5,14}

Childhood is the time for children to be in school and at play, to grow strong and confident with the love and encouragement of their family and an extended community of caring adults.¹⁵ Electrocution and snake-bite were the other causes which are undoubtedly accidents whereas, poisoning, burns, head injury resulting from fall were other important causes of accidental deaths which needs investigation to determine its exact manner. Majority of death due to burns categorized as accidents were females who fall in the 15-19 years' age group. Burns is a leading method of suicide among females of India. In the present study, history provided by the parents in female victims of accidental burns was of stove-burst while cooking. In these cases, the investigation did not proceed beyond formal inquiry as there was no

controversy/ allegation regarding manner of burns. There are chances that, the family member's might have hesitated to disclose actual manner due to social stigma attached with suicide in this age group.

Suicide is the final outcome of the complex interaction of biological, genetic, psychological, sociological and environmental factors.¹⁶ A high proportion of suicide victims in our study did so by consumption of poison (62.30%), followed by hanging (24.59%). Incidence of suicide and the methods used vary from country to country due to the variations in cultural, religious and social background.¹⁷ All over India, hanging (45.6%) is leading methods of suicide, followed by consumption of Poison (27.9%). The contribution of poisoning cases among suicide in the present study is well above the national percentage. The method adopted for committing suicide depends on convenience and availability of equipments.^{2,18} Yavatmal is a rural district, also known as cotton-belt in Maharashtra and insecticide compounds are in common use. Insecticides are kept at farm or home before and after spraying crops. In addition, there is no practice of keeping these compounds in lock and key for safety purpose whether at home or farm which leads to it's easy availability for adolescents. The most common ligature material used for committing suicide by hanging was Odhani. The ligature material used by the victim for hanging may be anything available at that moment, which includes any household article or belongings of the victim. Odhani is a part of commonly worn costumes by girls in this region and major contribution of females among suicidal hanging is a self explanatory reason for this finding.

When youth find themselves in the midst of a major life-crisis without any way out, suicide may become an option as a solution to their overwhelming problems.¹⁹ In this study, suicidal deaths were more common in 15-19 years age group, whereas only 2 cases were noted in 10-14 years age group. Similar findings with higher incidence of suicides in 15-19 years of age group among adolescents were reported by various researchers.^{2,5,8,10,20-23} The less incidence of suicide among younger adolescents and children could be associated with many factors such as: lack of cognitive maturation, high extent of parental care, good relation with parents, lack of development of indistinct ideas of nature and definitiveness of death and less exposure to risk factors.¹⁷ Also they receive

more autonomy and less supervision and social support from parents, which may increase the opportunity for disconnection and make recognition of imminent risk less likely.²⁴

Females (72.13%) outnumbered male victims among adolescent suicides. Female predominance in suicide among adolescent was reported by Indian studies^{2,20,25,26} and study from Tunisia²¹. As per NCRB of India⁴, the male preponderance was present among overall suicides (68.5%), but girls aged below 18 years were outnumbered (54.35%) boys among suicides. This could be due to psychological disorders like anxiety and depression occurs more often in girls. Both biological and social factors account for the greater prevalence of depressive disorders in women.²⁷ However, studies from other parts of the world observed male predominance among suicidal deaths.^{5,8,10,22,23}

Two common age groups involved among homicidal deaths were 1-4 years and 15-19 years. Among these, individuals aged 1-4 years were killed by blunt force injuries, strangulation and poisoning. Childhood is a precious time in which they should live free from fear, safe from violence and protected from abuse and exploitation. Victims of homicide in 15-19 years of age were males died mostly due to sharp force injuries. These incidents might be due to their Behavior traits that are associated with increased injury risk include hyperactivity, aggression, and antisocial behavior.²⁶

5. Conclusions:

Road accidents, accidental drowning, suicidal and accidental poisoning are the key areas to reduce unnatural mortality among children and adolescents. Use of Helmet, driving under parental supervision, strict implementation of traffic rules and increasing public awareness are key measures to decrease death in road accidents in this age group. Intensified parental supervision, use of instruments which facilitate movement in water and safeguarding water reservoirs are the steps to reduce deaths due to accidental drowning, whereas counseling, and identification and early psychiatric consultation of high-risk adolescents are possible useful measures for the prevention of deaths due to suicides. Moreover, safeguarding insecticide compounds under lock and key at homes and farm is a key step to prevent deaths due to suicidal poisoning.

Abbreviations:

NCRB - National Crime Record Bureau

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