

PROFILE OF DROWNING DEATHS AMONG MEDICOLEGAL AUTOPSIES CONDUCTED AT KADAPA, ANDHRA PRADESH: A 2-YEAR RETROSPECTIVE STUDY

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Received: 02 June 2023, Revised and Accepted: 16 July 2023

ABSTRACT

Objective: Drowning kills at least 372,000 people every year and is the 3rd leading cause of unintentional deaths. In addition to the human tragedy, drowning represents a huge economic problem with direct and indirect costs, including many Disability-Adjusted Life Years lost. In India, very little is known about the epidemiology of drowning.

The objective of the study was to study the incidence, manner, and epidemiology of deaths due to drowning in and around Kadapa region.

Methods: The present study was conducted from January 2021 to December 2022 in Government Medical College, Kadapa on 154 cases to study the various epidemiological parameters of drowning.

Results: In the study period, 1246 cases of postmortem examination were done, of which 154 cases were of drowning related deaths. A maximum number of cases were seen in the age group of 21–30 years with males 70.77% dominating the study population. 50.64% of deaths were accidental in nature and occurred during the rainy season. The most common place of occurrence of drowning was river 57.14% followed by wells 14.28%. Soddening of hands and feet was the most common external feature of drowning followed by the presence of froth at mouth and nostril.

Conclusion: Drowning is a most ignored public hazard worldwide with serious implications for the society. Public awareness regarding safety measures and drowning prevention strategies suitable to the needs of geographical region should be adapted.

Keywords: Drowning, Age groups, Manner of death, Site of drowning, Seasonal variations.

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INTRODUCTION

One of the most neglected public health issues concerning the world today is drowning. Drowning kills at least 372,000 people worldwide every year and is the 3rd leading cause of unintentional injury deaths, accounting for 7% of all deaths stemming from accidents [1]. Approximately 42 drowning deaths occur every hour, every day. Drowning death toll is 2/3rd that of malnutrition and well over half of that of malaria [2].

Research work on drowning as a phenomenon poses many critical issues – Most of all, that global data concerning the number of occurrences are not accurate. Not all cases are registered, especially in low- and middle-income countries. In India, very little is known about the epidemiology of drowning.

Conceptually, “drowning” is a complex and multifaceted phenomenon, characterized as a chain of events [3].

Drowning is “The process of experiencing respiratory impairment from immersion or submersion in liquid” [4].

It has been described in the literature that diagnosis of drowning is one of the most difficult in the field of forensic medicine. Furthermore, the external examination and the autopsy findings are not specific in most of the cases and investigations of laboratory are debatable.

A vast country like India with many water bodies and a long coastline is always prone for drowning deaths. The frequent occurrence of floods in different parts of the country and heavy rainfalls in monsoons are also a major cause of drowning in India.

METHODS

The present study was a retrospective study, conducted for 1 year during January 2021–December 2022. Of the 1246 cases over which postmortem examination was conducted, a total of 154 cases were included in the study. All the dead bodies recovered from different sources of submersion were included in this study.

Detailed history related to place of incident, type of water body, and other relevant findings were obtained from previous records such as age, sex, month, time of occurrence, occupation, education, religion, marital status, cause of death, and manner of death were collected and filled in a pro forma. It was then interpreted statistically with tables and bar diagrams.

During postmortem examination condition of clothing, skin changes, examination of natural orifices, injuries on body, and cadaveric spasm were examined. All the cavities were examined. In all cases, diatoms were examined with standard protocol in tissues and samples of water collected from place of death.

In this study, the term drowning refers to immediate and delayed immersion deaths.

RESULTS

Incidence of drowning is seen in all age groups, more commonly in 21–30-year age group (37.66%), followed by 31–40 years age group (24.67%). In the present study, 70.77% were males and 29.22% were females (Table 1). The male: female ratio was 2.42. Of the 154 drowning deaths during the study period, 78 cases (50.64%) were accidental,

and 75 cases (48.70%) were suicidal deaths. Only one cases was of homicide (0.006%) (Fig. 1). Among external features of drowning, soddening (73.37%) was the most prominent feature, followed by froth at mouth and nostril (56.49%) and degloving (51.29%) (Table 2). The presence of water in stomach (59.09%) was the predominant internal finding followed by heavy, voluminous, edematous, and congested lungs (49.35%) and froth in trachea (29.87%) (Table 3). Most of the victims were retrieved from rivers (57.14%) and lesser number from Wells (14.28%) and water canal (13.63%) (Fig. 2). Month of August accounting for 34 deaths (22.07%) was the time of majority of deaths followed by October; 23 deaths (14.93%) and July, 18 deaths (11.68%) (Table 4). Majority of the victims were laborers, 66 (42.85%) followed by self-employed/businessmen, 33 (21.42%) and farmers, 25 (16.23%) (Fig. 3).

Table 1: Age and gender distribution of drowning cases

Age (years)	Cases (%)		
	Male	Female	Total
0-10	2 (1.29)	1 (0.64)	3 (1.94)
11-20	11 (7.14)	3 (1.94)	14 (9.09)
21-30	41 (26.62)	17 (11.03)	58 (37.66)
31-40	27 (17.53)	11 (7.14)	38 (24.67)
41-50	21 (13.63)	10 (6.49)	31 (20.12)
51-60	4 (2.59)	2 (1.29)	6 (3.89)
61-70	2 (1.29)	1 (0.64)	3 (1.94)
>70	1 (0.64)	0	1 (0.64)
Total	109 (70.77)	45 (29.22)	154 (100)

Table 2: Distribution of external features of drowning

Feature	Cases (%)
Cutis anserine	12 (7.79)
Froth at mouth and nostril	87 (56.49)
Soddening	113 (73.37)
Degloving	79 (51.29)
Congested conjunctiva	41 (26.62)
Bluish fingernails and lips	23 (14.93)
Animal bites and decomposition	19 (12.33)

Table 3: Distribution of internal features of drowning

Feature	Cases (%)
Froth in trachea	46 (29.87)
Mud in trachea	17 (11.03)
Froth in larynx	39 (25.32)
Presence of voluminous, oedematous, and congested lungs with c/s showing copious frothy fluid	76 (49.35)
Emphysema aquosum	21 (13.63)
Rib marking on lungs	29 (18.83)
Paltauf's hemorrhages	13 (8.44)
Presence of water in stomach	91 (59.09)

Table 4: Distribution of cases according to month of occurrence

Month	Male	Female	Total	Percentage
January	9	4	13	8.44
February	3	1	4	2.59
March	7	3	10	6.49
April	2	1	3	1.94
May	1	0	1	0.64
June	11	3	14	9.09
July	13	5	18	11.68
August	21	13	34	22.07
September	12	3	15	9.74
October	15	8	23	14.93
November	6	1	7	4.54
December	9	3	12	7.79

DISCUSSION

The findings in autopsy among drowning cases are usually characteristic, supportive, and is not diagnostic in multiple cases. The mechanism of death in drowning is quite complicated with the involvement of asphyxia and filling of the airways with fluid along with effects at hydrostatic and osmotic level.

Males dominated the study with 109 cases when compared with 45 cases of females. Similar results were found in studies by Kanchan et al. [5], Chaudhary et al. [6], Shetty and Shetty [7]. Sheikazadi and Ghadyani [8] found male: female ratio of 6.5:1 among drowning deaths

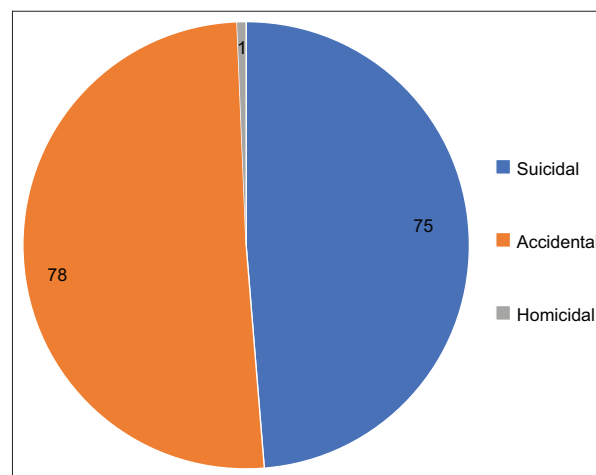


Fig. 1: Manner of deaths

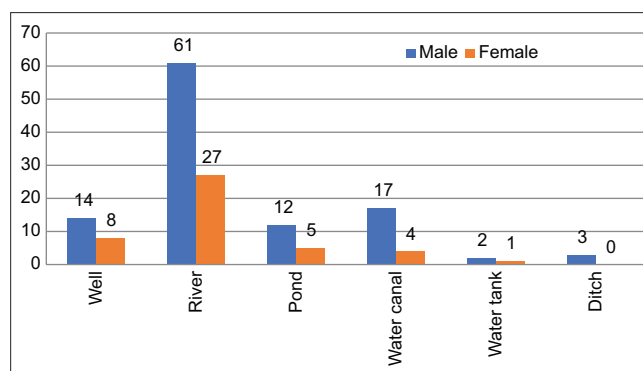


Fig. 2: Distribution of cases according to place of drowning

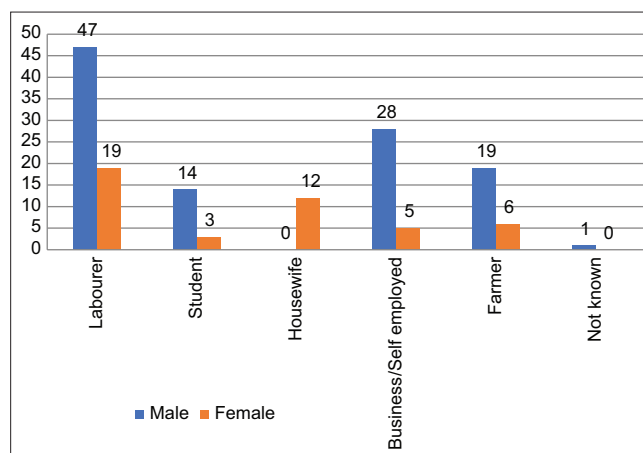


Fig. 3: Distribution of cases according to occupation

in Iran. In our study, it was 2.42:1. Male predominance is probably multifactorial as men have exposure to activities where submersion is possible.

Maximum cases of drowning were seen in the age group of 21–30 years (58%) followed by 31–40 years age group. Similar results were seen in studies by Shetty and Shetty [7], Sheikhzadi and Ghadyani [8]. Probable reason for this preponderance of 21–30-year age group is due to carelessness, adventurous nature, and intoxication, whereas swimming or during recreational activities in or around water source. Drowning in 31–40 years age group may be due to familial and financial problems and not finding any solutions to them. Contrasting results were found in the study conducted by Selvaraj and Rama [9].

Maximum cases of death were accidental (78,) followed by suicidal (75,) and homicidal (01.). Similar results were seen in studies by Uppu *et al.* [10], Kumar *et al.* [11]. One case of homicide was reported in our study where a male was thrown into water after tying the body with a boulder.

The majority of drowning victims were retrieved from rivers 88 (57.14%), followed by wells 22 (14.28%), water canals 21 (13.63%). This can be attributed to the presence of river in the vicinity of the city and people entering river for recreation and during religious festivals. Similar findings were noted in the study by Selvaraj and Rama [9] and contrasting findings were noted in studies by Fralick *et al.* [12] and Rao *et al.* [13].

Soddening of hands and feet was the major external finding in our study, 113 (73.37%), followed by froth at mouth and nostril, 87 (56.49%) and degloving, 79 (51.29%). The presence of water in stomach was the prominent finding, 91 (59.09%), followed by the presence of heavy and voluminous lungs, 76 (49.35%) and froth in trachea 46 (29.87%). Similar findings were noted in the study of Kumar *et al.* [11].

Maximum cases of drowning deaths occurred in the month of August, 34 (22.07), followed by October 23 (14.93%) and July 18 (11.68%). The findings are almost similar to the studies conducted by Phad and Dhawane [14]. Most of the deaths occurred in rainy season.

Most of the victims were laborers, 66 (42.85%) followed by business and self-employed individuals, 33 (21.42%) and by farmers, 25 (16.23%). This is in contrast to the study conducted by Phad and Dhawane [14] where most common victims of drowning deaths were the students, but in our study, laborers had higher preponderance. This could be attributed to the fact that most of them were daily wage laborers and lack of day-to-day work leads to financial stress on them.

CONCLUSION

The present study demonstrates the magnitude of drowning deaths and the threat it poses to the public health systems. Young adults are more prone to drowning deaths. This highlights the need for accurately assessing local data to effectively target at-risk populations. Drowning prevention is of paramount importance and is the ultimate motivation

for understanding drowning injury data. It is preventable but neglected relative to its impact on families, communities, and livelihoods. Most of them died by accidents or by committing suicide which denotes the lack of safety measures in the canals/water bodies. This can be rectified if people are employed in the canals/surrounding water bodies with watchers and improve safety by committing rescue teams after identifying the places with high activity and save those victims.

AUTHORS CONTRIBUTION

Author 1: Conceived and Designed the analysis, Critical revision of the article. Author 2: Collected the data, performed analysis. Author 3: Drafting the article, Data analysis and interpretation, performed analysis. Author 4: Collected the data, performed analysis. Author 5: Collected the data, performed analysis, Critical revision of the article.

ETHICAL CLEARANCE

It is a retrospective study and identity of the deceased is nowhere disclosed. Therefore, the approval of Institutional Ethics Committee is not required.

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