

Drowning Patterns in Saurashtra Region- a Retrospective Study

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Abstract

Drowning is one of form of mechanical asphyxia. It is major contributor of deaths in India and worldwide. Total 38,503 people died in India due to drowning in 2022. Gujarat reported 1959 deaths due to drowning in 2022. According to WHO approximately 300000 people died in year 2021. **The study was conducted in one year duration from January 2024 to December 2024 in forensic medicine and toxicology department of Shree M. P. Shah Government medical college and Guru Gobindsingh Government Hospital, Jamnagar, Gujarat, India. Total 64 cases of drowning were reported. In this study, male deaths were 84.37%; Age group of the 21-30 years contributing 25% of total cases; 60.94% cases were married; maximum cases belonged to Hindu community and rural area; most of cases reported in rainy season.**

Key words: Drowning; Asphyxia; Types; Age group; rainy season

Introduction

Water is life source of all living beings; humans, animals and trees alike. Water is literally the life. However the vice versa is also true when water become the reason of death.

Drowning is a form of asphyxia due to aspiration of fluid into air-passages, caused by submersion in water or other fluid. Complete submersion is not necessary, for sufficient period can cause the death from drowning. About 150,000 people die from drowning each year around the world.¹

Drowning is classified into following types²

- Typical or wet drowning - fluid or water is inhaled in lungs
- Atypical drowning - there is very little or no inhalation of water
 - Dry drowning – water dose not enter in lungs due to laryngeal spasm

- Immersion syndrome – syncope resulting from cardiac dysrhythmia or sudden contact with cold water
- Near drowning/ secondary drowning – survival beyond 24 hours, death by complications or sequelae.
- Shallow water drowning – alcoholics, drugged, children and unconscious person may die due to drowning from fall in shallow water or pit.

According to national crime record bureau's report accidental deaths and suicides in India 2022; 38, 503 people died due to drowning in India contributing 9.1% of total accidental deaths and suicides. In which 31056 were male, 7443 were female and 4 were transgender. From which 1959 people died due to drowning in Gujarat. From 1959 total, 1692 were male and 267 were female.³

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According to WHO (world health organisation) there were an estimated 300000 drowning deaths in 2021 – this is equivalent to more than 30 people losing their lives to drowning every hour of every day. Almost half of these fatalities were under the age of 29, and one quarter under the age of five.⁴ According to WHO's latest Global Health Estimates (2021) reveal that drowning is the fourth leading killer of children aged 1–4 years and the third leading killer of children aged 5–14 years. Among adolescents and young adults aged 15–29 years, drowning is the 12th leading cause of death.⁴

During the autopsy, finding of ante mortem drowning must be confirmed. In some cases, body removed after some days after the death leading to decomposition of the body. Diatom test must be done to confirm drowning. Diatom test may have some limitation and questions on its accuracy. But still it is easily available method of choice to confirm drowning.

Accidental drowning is very common in India. Suicide by drowning is also seen in many cases, however homicidal drowning occurs less commonly. It may vary from place to place; Homicidal drowning accounts for 20% of all U.S. killings. Amongst the homicidal drowning, most cases are children drowned by their parents, or wives drowned by their husbands in a bathtub.⁵

In the drowning cases, it is needed to accurately determine the cause of death and manner of death, especially in the complex scenarios where it is difficult to determine manner of death. Additionally, research into drowning prevention, such as installing barriers and teaching water safety, is essential to reduce mortality and morbidity.

The research gap in drowning cases includes inconsistent data collection, underreporting of cases, lack of targeted prevention strategies and gender differences.

Aims & Objectives

Aim of this study was to know the pattern and profile of drowning in Jamnagar and its surrounding regions, Gujarat, India and to study the demographic

parameters like age, sex, residential area and socio economic status affecting the deaths due to drowning.

Materials & Methods

This study was conducted in the forensic medicine and toxicology department of Shree M. P. Shah Government medical college and Guru Gobindsingh Government Hospital, Jamnagar, Gujarat, India. The study was conducted in one year duration from December 2024 to January 2024. Total 64 cases of drowning were reported during this period. These 64 cases were studied and all data was compiled and categorised from the documents preserved in the Department of Forensic Medicine & Toxicology, after the prior permission taken from the Head of Department. Detailed history taken from police, relatives and eye witnesses were also noted. History was cross checked with each other and from documents. All details were recorded from police documents like post mortem request letter, inquest panchnama, maranottar form and refer letter etc. In cases of decomposed drowning where the signs of drowning were unclear; bone was preserved for diatom examination and viscera preserved for chemical analysis and sent at forensic science lab. All classes of drowning in unidentified dead bodies were excluded in this study.

Result

Total 1226 autopsy was conducted during this one year of period in the department of forensic medicine department, Shri M. P. Shah government medical college, Jamnagar. Out of all these cases, total 64 cases were opined as drowning as a cause of death. It was 5.22% of total autopsy.

All unidentified dead bodies were excluded because lack of data contribution in the study like age, residential area, socio economic status and religion etc.

Out of total 64 cases, 54 cases were male and 10 were female. In which male contributed 84.37% of total cases followed by female contributing 15.63% of total cases of drowning. This shows male dominances in cases of drowning.

Table No. 1

| Age group | Male | Female | Total |
|-----------|------|--------|-------|
| 0-10 | 1 | 2 | 3 |
| 11-20 | 10 | 1 | 11 |
| 21-30 | 12 | 4 | 16 |
| 31-40 | 12 | 0 | 12 |
| 41-50 | 6 | 1 | 7 |
| 51-60 | 6 | 0 | 6 |
| 61-70 | 4 | 1 | 0 |
| 71-80 | 3 | 1 | 4 |
| Total | 54 | 10 | 64 |

As seen in table no. 1 age group of 21-30 years contributes maximum cases; 16 out of 64 - 25% of total cases. Following 21-30 years age group 31-40 years provide 12 cases, 18.75% of total cases.

Table No. 2

| Marital status | Male | Female | Total |
|----------------|------|--------|-------|
| Married | 33 | 6 | 39 |
| Unmarried | 21 | 4 | 25 |
| Total | 54 | 10 | 64 |

Out of 64 cases, 39 (60.94%) cases were married and 25 (39.06%) cases were unmarried. Among the male 61.11% were married and 38.89% were unmarried. Among females 60% were married and 40 % unmarried.

Total 35 bodies out of 64 cases were in fresh condition and 29 dead bodies were in decomposed condition. Fresh bodies contribute 54.69% and decomposed bodies contribute 45.31%.

Total 43 cases out of 64 were from rural area contributing 67.19% of total cases. Maximum number of cases belongs to lower socio economic status. In this study 58 cases belonged to Hindu religion and 6 cases from Muslim religion.

Total 35 cases registered in monsoon season while 17 cases registered in summer and 12 cases registered in winter; making monsoon season biggest contributor of cases.

Discussion

Drowning cases contributes 5.22% of total autopsy; this makes drowning one of the leading

risk factors towards death. In this study male contributes 84.37% and female contributes 15.63%; showing clear male dominance in the study. Study of Pondurthi Shrinivas Rao (2021)⁶ and Sujan Kumar Mohanty (2016)⁷ also found similar results in their study. They found 88.23% and 82.2% of male cases in their study. Reason behind the male dominance in the drowning could be the high exposure of the water like fishing, irrigation and swimming.

Age group of the 21-30 years contributes 25% of total cases. This age group contains high risk of drowning because this age group contains high energy, less maturity and carelessness. Also the addiction and drunkenness also leads to drowning. This result is similar to study of Laxman Gangadhar Phad (2018)⁸ and K. Supriya (2022)⁹.

In this study 60.94% cases were married which outnumbered unmarried cases. Study of Pondurthi Shrinivas Rao (2021)⁶ Laxman Gangadhar Phad (2018)⁸ and Raut S M (2021)¹⁰ also found married persons more in number than unmarried. In some cases marital stress and responsibility leads to suicidal drowning.

In this study rural area (67.19%) contributes more cases than urban area. This may be because of occupation like fishing and irrigation; also the youngsters swimming in the river and lakes like a sport in villages. Pondurthi Shrinivas Rao (2021)⁶ and Raut S M (2021)¹⁰ also found rural area cases are more than urban cases.

In this study 58 cases (90.62%) were belong to Hindu religion; contributing maximum numbers of cases in the study. This may be due to Hindu population is more in the study area. Laxman Gangadhar Phad (2018)⁸ also found Hindu religion cases dominance in their study.

Monsoon season contributes 54.69% of total deaths due to drowning. Laxman Gangadhar Phad (2018)⁸ and K. Supriya (2022)⁹ also found in their study that rainy seasons contribute maximum number of cases. This may because flood and increased water levels in water area increase chances of drowning.

Conclusion

In this study we found that male are more prone to drowning than female. 21 to 30 years age group contributes maximum number of cases followed by 31 to 40 years age group; which make these age groups more at risk than others. Deaths due to drowning are seen more in married people than unmarried people. Drowning deaths are prominent in rural area than urban area. Deaths due to drowning are seen in maximum cases of Hindu religion followed by Muslim religion. Rainy season contribute maximum numbers of deaths due to drowning.

Recommendations

Preventive measures against the drowning must be taken. Possible sites of drowning must have some notice or sign board around the vicinity. During the rainy seasons and flood warning must be issued in advertisement, news and awareness programme.

In case of drowning in children parents must be aware and keep prevention against the drowning and keep surveillance over the kids.

If possible lifeguard must present at susceptible places. Make Life jackets mandatory on the boating activity.

Ethical Approval

No specific approval from ethical committee was taken. The approval from the Head of Department, Forensic Medicine & Toxicology was taken for conducting the retrospective study and accessing the documents related to the research.

Conflicts of Interest: None

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