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Profile of Deaths Due to Drowning among Autopsies Conducted at Autopsy Center of Rajendra Institute of Medical Sciences, Ranchi

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Abstract

Introduction: Drowningis the 3rd leading cause of unintentional injury death, accounting for 7% of all injury-related deaths. The global burden and death from drowning is found in all economies and regions. In this study we aim to find out the demographic profile of drowning among cases brought for autopsy in the Department of FMT, RIMS, Ranchi.

Material and Method: This Observational study was carried out in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi, during the period from January 2019 to December 2019, wherein a total of 3342 autopsies were conducted out of which 109 cases were of Drowning.

Results: Drowning was found to occur more commonly in rural areas (58.7%). Males are more prone to drowning (75.2%). Most common age group involved was found to be 31–40 years. Lakes were the most common place of occurrence (38.5%). Incidence of married females (66.7%) was slightly greater than married males (63.4%). Drowning was found to be most commonly accidental in nature (35.8%). Familial and financial problems (26.6%) along with depression (26.6%) accounted for most of the cases of drowning.

Keywords: Drowning; Lakes; Accidental; Familial problems; Depression.

Introduction

Drowning is a form of death in which the atmospheric air is prevented from entering the lungs by submersion of the body under water or other fluid medium. It is not necessary that there should be complete submersion. Death is sure to occur, even if the face alone is submersed so that air is prevented from entering the respiratory orifices.[1]

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In 2016, an estimated 3,20,000 people died from drowning, making drowning a major public health problem worldwide. In 2015, injuries accounted for over 9% of total global mortality. Drowning is the 3rd leading cause of unintentional injury death, accounting for 7% of all injury-related deaths.

The global burden and death from drowning is found in all economies and regions. However, as per recent report of WHO that the low- and middle-income countries account for over 90% of unintentional drowning deaths. Amongst, over half of the world's drowning occurs in the Western Pacific Region and South-East Asia Region. The drowning death rates are highest in the African Region, and are 15–20 times higher than those seen in Germany or the United Kingdom, respectively.[2]

According to latest NCRB data of 2018, rate of drowning death is 82 cases per day in India. Out of 411,824 cases of unnatural deaths, 30187 cases (7.5%) died due to drowning in which 23,690

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cases (78.47%) were male, 6496 cases (21.5%) were females and only 1 case (0.0033%) was transgender. This was the second most common cause amongst the unnatural deaths after road traffic accidents (53.4%). Amongst the total number of drowning deaths, near about 11,884 cases (39.74%) died due to accidental fall in water, 7426 cases (5.6%) died due to suicidal drowning.[3]

Accidental drowning occurs often in India, nearly 40, 000 Indians die annually from drowning. It occurs occasionally among swimmers due to their rashness in swimming, but it occurs mostly in non-swimmers who venture to go beyond their depth in the sea, rivers, canals and lakes. Many lives are lost during floods, which are so frequent. It also occurs among persons at bathing places while bathing in deep water. Females may fall accidentally into a well while drawing water from it. Children may also accidentally fall into ponds or lakes while playing near their banks. They may even fall accidentally into domestic vessels of water, such as water tanks, bathtubs and buckets.[4] Accidental drowning in shallow water is very rare, except when the individual happens to be intoxicated, insane or epileptic.[5]

Many studies have been conducted in the different parts of country. There is no any report available on the topic from this part of country therefore we have plan to conducted a retrospective study to know the profile of drowning cases in Ranchi.

Materials and Methodology

This observational study was carried out in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi, during the period from January 2019 to December 2019, wherein a total of 3342 autopsies were conducted out of which 109 cases were of Drowning. Prior permission from the institutional ethical committee was taken for conducting the study. For the study, a drowning was defined as respiratory impairment resulting from hypoxia due to protracted submersion/immersion of the bare mouth and nose in a liquid, usually water. Fatal drowning of an individual typically occurs in solitude or in situations where others are either unaware of the victim's plight, or unable to lend assistance.

Inclusion criteria:

1. All cases of deaths due to Drowning coming for post mortem.

2. Cases considered for study will include subjects of all age group of all genders.

Exclusion criteria

1. Highly decomposed bodies.

2. Cases of Postmortem Drowning.

Data collection and Analysis

Data was collected in the form of information by inquest, police authority/ administration, relatives of the deceased, and post mortem reports of the deceased. Information gathered had been entered in MS Excel software in the form of data and it was analyzed by using SPSS-23 software.

Results

The present study was based on 109 medico legal autopsies of cases of deaths due to Drowning during period from 1st January, 2019 to 31st December 2019, conducted in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi. Total numbers of autopsies conducted during the same period were 3342.

The observations on various aspects were recorded and are being presented here in form of various Tables.

Table 1: District wise distribution (n=109).

Native Place	Urban (%)	Rural(%)
Ranchi	42(38.5)	47(43.1)
Hazaribagh	2(1.8)	0(0)
Ramgarh	0(0)	6(5.5)
Giridih	0(0)	3(2.7)
Chatra	0(0)	2(1.7)
Lohardagga	0(0)	3(2.7)
Bokaro	1(1)	0(0)
Koderma	0(0)	1(1)
Khunti	0(0)	1(1)
Dumka	0(0)	1(1)
Total	45(41.3)	64(58.7)

Natives of Ranchi (involving both urban and rural areas) accounted for most of the cases of Drowning (89 out of a total of 109). Least number of cases was reported from Bokaro (1), Koderma (1), Khunti (1) and Dumka (1). (Table 1).

Table 2: Age and sex wise distribution.

Age groups (in years)	Male (%)	Female (%)	Total (%)
0 to10	6(5.5)	2(1.8)	8(7.3)
11 to20	17(15.6)	4(3.7)	21(19.3)
21 to 30	13(11.9)	6(5.5)	19(17.4)
31 to 40	19(17.4)	3(2.8)	22(20.2)

41 to 50	11(10.1)	7(6.4)	18(16.5)
51 to 60	12(11.0)	2(1.8)	14(12.8)
>60	4(3.7)	3 (2.8)	7(6.5)
Total	82(75.2)	27(24.8)	109(100)

Most common age group involved was 31 to 40 years and the least common age group involved was >60 years. (Table 2).

Table 3: Distribution based on place of Incidence/Occurance.

Place of Incidence/ Occurrence	Number of cases	Percentage
Lakes	42	38.5
Well	29	26.6
Dam	16	14.7
Pond	12	11.0
Waterfall	08	7.3
Gutter(nala)	02	1.9
Total	109	100

Lakes (38.5%) were the most common place of incidence of drowning followed by wells (26.6%) and the least common was gutter (Nala) (1.9%). (Table 3)

Table 4: Distribution based on Marital Status.

Gender	Marital Status		Total
	Yes(%)	No(%)	
Male	52(63.4)	30(36.6)	82(100)
Female	18(66.7)	09(33.3)	27(100)
Total	70(64.2)	39(35.8)	109(100)

Married males and females accounted for 70 (64.2%) cases of drowning out of which males were 52 and females were 18 in number. (Table 4).

Table 5: Distribution of study population according to manner of death.

Manner of Death	Number of Cases	Percentage
Accidental	39	35.8
Suicidal	22	20.2
Homicidal	03	2.8
Unknown	45	41.2
Total	109	100

Drowning was found to be most commonly Accidental in nature (35.8%) followed by Suicidal (20.2%) and then Homicidal (2.8%) in nature. (Table 5).

Table 6: Distribution of cases as per Personal History.

Personal History	Male (%) N=82	Female (%) N=27	Total (%) N= 109
Familial and Financial Problems	23(28.1)	06(22.2)	29(26.6)
Depression	21(25.6)	08(29.6)	29(26.6)
Chronic Alcoholism	21(25.6)	03(11.1)	24(22)
Chronic Illness	10(12.2)	06(22.3)	16(14.7)
Psychiatric Illness	02(2.4)	02(7.4)	04(3.7)
Failure in Love	03(3.7)	02(7.4)	05(4.6)
Epilepsy	02(2.4)	00(0)	02(1.8)
Total	82(100)	27(100)	109(100)

Familial and financial problems (26.6%) along with depression (26.6%) were the reason behind the maximum cases of Drowning. Least common factor involved was Epilepsy (1.8%). (Table 6).

Discussion

The present study was undertaken during the period from January, 2019 to December, 2019 in the Department of Forensic Medicine and Toxicology, R.I.M.S., Ranchi to analyze the epidemiology of deaths due to Drowning.

While comparing the results of our study with other workers, many factors were taken into consideration. Firstly, this study was conducted in the Department of Forensic Medicine and Toxicology, Rajendra Institute of Medical Sciences, Ranchi. It is a tertiary Health Centre wherein cases are referred from many health centers. Hence, this study included medicolegal autopsy of deaths due to Drowning which came from various districts of Jharkhand at the mortuary of RIMS, Ranchi.

District wise distribution: As shown in Table I, a total 109 cases of Drowning were conducted in the department during the period of study and out of these,81.6% cases are from Ranchi. Other Districts like Ramgarh, Hazaribagh, Koderma, Chatra,etc contributed the remainder of the cases. It is due to the fact that local cases are autopsied in most of the Sadar Hospitals of their respective Districts and only few were referred to RIMS, Ranchi for autopsy.

Age and sex wise distribution: As shown in TABLE II, the highest incidence of deaths due to Drowning was found in the age group of 31 to 40 years (20.2%), closely followed by the age group of 11 to 20 years (19.3%)and 21 to 30 years (17.4). Predominance of male was seen in all age groups in drowning death. Among the total cases, 75.2% victims were male and 24.8% were female. The male: female ratio was 3.04:1. These findings are consistent with that of Auer,[6] Quan,[7] Suresh Kumar Shetty and Shetty,[8] Pathak and Mangal[9] and Saberi Anary et al.[10] Considering other references in same field, Prabir et al in their study in 2015 had maximum cases (13 cases) of drowning between 11–20 years of age,[11] Manjunath S (2010) in their study at Manipal found that the age group commonly involved in drowning was 11–20 years,[12] Davoudi-Kiakalayeh A et al (2008) in their study in Iran also found that more than one third of the victims were less than 20 years of age.[13] Results of these studies corroborated with our findings. The probable reason behind preponderance of 31 to 40 years age group in drowning may be due to

familial and financial problems arising in life and their inability to deal with them. This is followed by the age group of 11 to 20 years and 21 to 30 years which may be due to carelessness and adventurous nature usually seen in youngsters while swimming or doing recreational activities in or around water source leading to accidental deaths.

Distribution based on place of Incidence/Occurrence: In our study it was seen that 65.1% of Drowning cases occurred in Lakes (38.5%) followed by wells (26.6%), and then followed by Dams (14.7%) and Ponds (11%). Least common places of occurrence were waterfalls (7.3%) and gutters (1.9%). In other studies done by Chidanand C et al, the commonest place of submersion was lakes (37.6%) followed by wells (17.8%)14which is in consistence with our study. Study done by Prabir et al, showed maximum cases drowned in ponds 21(35%), followed by rivers 17(23%) and lakes 13(22%).[15]

Distribution based on Marital Status: As per the marital status is concerned, 64.2% victims were married and 35.8% were unmarried. Among the females 66.7% were married and 33.3% were unmarried, and among the males 63.4% were married and 36.6% were unmarried. The reason behind this could be over exposure of married and working people in and around water sources leading to accidental deaths. Also they prefer to commit suicide by drowning due to inability to handle familial and financial problems. Gorea and Singh[16] and Ranga Raoet al[17] in their study found 38% and 50% married victims respectively who died of drowning.

Distribution of study population according to manner of death: Since manner of death was inspected from documents for many of which investigation procedure was still in progress, manner was unknown for most of the cases (41.2%). For those of known mechanism 35.8% were accidental and 20.2% cases were suicidal in nature. Only 3 cases (2.8%) were confirmed as homicidal drowning. Similar observations were made in study done by Mukherjee AA et al, wherein 26 cases (37.14) were accidental and 19 cases (27.14%) were suicidal and in 25 cases (35.72%) police did not ascertain the manner of death.[18] The probable explanation to the above may be that as drowning deaths are mostly accidental and suicidal in nature, the age group 11– 50 yrs. are more vulnerable as this age is more prone to accidents in water during adventure sports, travels and swimming. The challenges and struggle for livelihood in adolescents, frustrations due to failure of high ambitions and failure in love affairs makes them more prone for suicide.

Distribution of cases as per Personal History: In our study, we found that 26.6% of victims of drowning death had familial and financial problems. Same was the incidence of depression (26.6%). This is followed by chronic alcoholism in 22% cases and chronic illness in 14.7% cases. Male predominance was seen in almost all the associated histories of drowning deaths. The present study is in accordance with Dietz and Baker,[19] Auer,[6] Fralick et al[20].

Conclusion

In the above study we concluded that, Male predominance seen in drowning deaths with highest incidence seen in second fourth decades. Drowning deaths are most common in rural region followed by urban region. Drowning deaths are most common in married people as compared to unmarried people. Familial and financial problems is the most common history seen in drowning deaths followed by depression, chronic alcoholism, chronic illness and psychiatric illness. Lakes are the most common place from where the bodies were retrieved followed by wells, dams and ponds. Most cases of Drowning are accidental in nature followed by suicide.

Conflict of Interest: None.

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