



PROFILE OF MEDICO-LEGAL DEATHS DUE TO DROWNING – A RETROSPECTIVE STUDY

Forensic Medicine

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ABSTRACT

Death due to drowning is almost frequent in India, so it is but natural that, medico-legal expertise is called upon for investigations. Determining the cause of death in bodies found in water is quite challenging, which can be done by thorough investigation and complete autopsy by forensic pathologist. The present study was a retrospective, which was conducted for one year during June 2016 to May 2017 considering upon history and postmortem finding of the deceased. The maximum drowning cases were of male sex (74.73%), with commonest affected age group being 21-30 years (30.64%). Most of the drowning cases were accidental (55.91%) in nature and occurred commonly in water canal (55.37%), and rivers (25.26%). The most significant findings noted on autopsy were decomposition and animal bites (gnawing effects) (54.83%) and presence of heavy, voluminous, edematous and congested lungs with c/s showing copious frothy fluid (52.15%).

KEYWORDS

Age-groups, Manner, Autopsy, Retrieval.

INTRODUCTION

One of the most classical definitions is provided by Roll: "death by drowning is the result of a hampering of the respiration by obstruction of mouth and nose by a fluid medium (usually water)".^[1]

A recent global burden of disease (GBD) study reveals global mortality from drowning to be 7% of all injury related deaths (WHO, 2010).^[2] Drowning is among the top 10 leading causes of death for children and young adults worldwide, with the drowning death rates at least three times higher in the developing countries than the developed countries.^[3]

India is a large country having plenty of water bodies' i.e. Rivers, ponds, wells and an extensive seacoast. In such a conducive environment, it is but natural that death due to drowning is a frequent event, where medico legal expertise is called upon for investigations.

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] The autopsy diagnosis of death by drowning can be one of the most difficult problems in forensic pathology because in our Indian setup the time required to complete the inquest formalities and transport of the body to the mortuary is enough for decomposition to set in, which masks most of the postmortem findings required to estimate the cause of death. Also, most of the bodies recovered from water are in various stages of decomposition.^[6]

It has been described in the literature that diagnosis of drowning is one of the most difficult in the field of forensic medicine. Also, the external examination and the autopsy findings are not specific in most of the cases and investigations of laboratory are debatable.^[7] Hence, the present study aimed to analyze the various aspects of drowning deaths whose medico-legal autopsy were conducted in the mortuary of Pt. B. D. Sharma PGIMS, Rohtak.

MATERIAL AND METHODS

The present study was a retrospective, conducted for one year during June 2016 to May 2017. Total 186 cases were included in the study. All

the dead bodies recovered from different sources of submersion irrespective of age or sex and either with fresh or decomposed bodies were included in this study.

Detailed history related to place of the incident, type of water body and other relevant findings were obtained from the previous records. During post mortem 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 tissue and samples of water collected from place of death.

OBSERVATION AND RESULTS

Table 1: Age and Gender distribution of drowning cases

Age (in years)	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
0-10	2	1.43	3	6.38	5	2.68
11-20	14	10.07	5	10.63	19	10.21
21-30	42	30.21	15	31.91	57	30.64
31-40	39	28.05	7	14.89	46	24.73
41-50	33	23.74	7	14.89	40	21.50
51-60	5	3.59	6	12.76	11	5.91
61-70	3	2.15	3	6.38	6	3.22
>70	1	0.71	1	2.12	2	1.07
Total	139	100 (74.73)	47	100 (25.27)	186	100

Table no. 1. shows, the incidence of drowning deaths were found in all age groups however, commonly seen in age groups of 21-30 years (30.64%) followed by 31-40 years (24.73%). Among the total cases, 74.73% victims were male and 25.27% were female. The male: female ratio was 2.95:1. Thus it is obvious that the majority of cases reported for postmortem examination were males.

Table 2 Manner of death

Suicidal	Accidental	Homicidal	Total
82 (44.08%)	104 (55.91%)	00	186 (100%)

Table no. 2. Shows, out of the total of 186 cases of drowning, 104 cases (55.91%) were accidental and 82 cases (44.08%) were suicidal. Significantly we did not find any case of homicidal drowning.

Table 3: Shows the external and internal features in autopsy among the subjects

S No.	Features	Number	%
External feature in autopsy			
1.	Cutis Anserina	15	8.06

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2.	Froth at the mouth and nostrils	74	39.78
3.	Soddening	93	50.00
4.	Degloving	84	45.16
5.	Congested conjunctiva	56	30.10
6.	Bluish finger nails and lips	37	19.89
7.	Animal bites and Decomposition	102	54.83
Internal feature in autopsy			
8.	Froth in trachea	27	14.51
9.	Mud in trachea	25	13.44
10.	Froth in larynx	18	9.67
11.	Presence of heavy, voluminous, edematous and congested lungs with c/s showing copious frothy fluid	97	52.15
12.	Emphysema Aquosum	25	13.44
13.	Rib markings on lungs	32	17.20
14.	Paltaufshemorrhages	20	10.75
15.	Presence of water in stomach	106	56.98

Table no. 3 shows soddening (50.00%) followed by Animal bites and Decomposition (54.83) as predominant external feature of autopsy and presence of water in stomach (56.98%) followed by presence of heavy, voluminous, edematous and congested lungs with c/s showing copious frothy fluid (52.15) as most predominant internal feature of autopsy.

Table 4: Distribution of drowning deaths as per place of retrieval of body (source of drowning)

Place of retrieval	Male		Female		Total	
	Cases	%	Cases	%	Cases	%
Well	5	3.59	3	6.38	8	4.30
River	37	26.61	10	21.27	47	25.26
Pond	19	13.66	4	8.5	23	12.36
Swimming pool	1	0.71	1	2.1	2	1.07
Water Canal	74	53.23	29	61.70	103	55.37
Water tank	3	2.1	0	0	3	1.61
Total	139	100 (74.73)	47	100 (25.27)	186	100

Table no.4 shows, most of the victims were retrieved from water canal (55.37%), followed by river (25.26%). Most of the male and female victims were retrieved from water canal (53.23%) and 61.70%) respectively followed by river (26.61%) and (21.27%) respectively. Rarely, the body was found in swimming pool and water tank.

DISCUSSION

The findings in autopsy among drowning cases is usually characteristic, supportive and is not diagnostic in multiple cases. The death mechanism of drowning is quite complicated with the involvement of asphyxia and filling of the airways with fluid along with effects at hydrostatic and osmotic level.^[8]

Male dominance in drowning deaths were shown in many other studies by Kanchan T et al, Chowdhury B L et al, Byard R W et al.^[9, 10, 11] Ardeshir-Sheikhazadi et al (2009) found male - female ratio 6.5:1 among drowning deaths in Iran.^[12] In our study it was 2.95:1.

Prabiret al (2015)^[13], Manjunath S (2010)^[14] in their study found maximum cases of drowning between 11-20 years of age. 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.^[15] However in our study it is slightly different, the incidence of drowning deaths were found commonly seen in age groups of 21-30 years (30.64%) followed by 31-40 years (24.73%).

Our findings regarding the manner of death in cases of drowning corresponded with Mukherjee AA et al, wherein (37.14 %) were accidental and (27.14%) were suicidal and in (35.72%) cases police did not ascertain the manner of death.^[16] The probable explanation to the above may be that as drowning deaths are mostly suicidal and accidental in nature.

Chidanand C et al, found the commonest place of submersion in lakes (37.6%) followed by wells (17.8%).^[17] Prabir et al, showed maximum

cases drowned in ponds 21(35%), followed by rivers 17(23%) and lakes 13(22%).^[13] In our study, we found maximum death due to drowning in water canal (55.37%) followed by river (25.26%).

CONCLUSION

This study shows that the maximum drowning cases were of male sex, with commonest affected age group being 21-30 years. Most of the drowning cases were accidental in nature and occurred commonly in water canal and rivers due to abundance of water canal system in Haryana region. Drowning is a worldwide most ignored public hazard with inclusion of child population. There should be significant unresolved and irresolvable issues which are related to the cause, mechanism and manner of death which should be encountered in the evaluation of individual cases.

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