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An Autopsy Study of Drowning Deaths in and around Visakhapatnam

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Abstract

Introduction: According to World Health Organisation, drowning is among the ten leading causes of death for children and young people in every region of the world. Drowning amounts to an estimated incidence of about 5.6 per 100,000 of population worldwide. This study is aimed to know the incidence, manner and epidemiology of deaths due to drowning in and around Visakhapatnam.

Materials and Method: It is a one year prospective post-mortem study of drowning in and around Visakhapatnam. All the deaths due to drowning that were autopsied at the mortuary, KGH, Visakhapatnam were studied based on inquest, post mortem examination findings to know the profile of drowning deaths.

Results and Conclusion: Out of 1675 total autopsies done at our centre during the study period, 79 bodies that are found in water are studied. Males in the age group of 21-30 are the most common victims. Sea water drowning amounted for most cases of drowning in contrary to other studies. About 58% of cases of drowning were during the day. Most number of drowning deaths occurred in the month of October and monsoon season. Accidental drowning is the most common manner of death in males and suicidal manner in female drowning victims. About 32% of drowning victims in the study are from low socio-economic status. Most of the female victims are married while male victims are unmarried.

Keywords: *Drowning, Sea water drowning, season, manner of death, Socio economic status.*

Introduction

According to the World Health Organization, drowning is defined as "The process of experiencing respiratory impairment from submersion/ immersion in liquid"[1]. India is a vast country having abundant of water supplies from rivers, ponds, wells and an extensive seacoast. The world incidence of death by drowning is estimated at about 5.6 per 100,000 of population[2]. About 150,000 people die from drowning each year around the world[3]. In 2013, all India survey made by the National crime record bureau (NCRB) showed 8% of total unnatural deaths are due to drowning[4]. 25% occur in the sea and the rest in inland waters; the majority of victims are young adults and children[5]; two-third is accidental and one-third is suicidal; homicide by drowning is rare[6]. All unattended drowning cases should be presumed homicide until proven otherwise[7]. Drowning and alcohol intoxication may represent accidents or suicides. In suicidal attempts by drowning, the suicidal attempter often leaves behind a letter or a phone call before departing to jump into the water. Homicidal drowning is uncommon and requires either physical disparity between the assailant and the victim or a victim incapacitated by disease, drink or drugs or taken by surprise[5]. Disposal in water may be attempted where the victim has already been killed by other means[8].

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Aim of the Study

To study and analyze the incidence, epidemiology,

manner and the circumstances of drowning deaths reported in and around Visakhapatnam.

Materials and Method

In this study, all the autopsies done on persons died due to drowning are studied based on the requisition for conduct of autopsy, the inquest report (panchanama), the post-mortem examination and the clinical record (Hospital data) in certain cases were used to relate, correlate and to substantiate after ruling out other causes of death.

First charts were made for collecting all the information regarding the drowned body entering the details regarding age, sex, marital status, medium of immersion, history from inquest etc.,

Then individual information charts were prepared such as month wise distribution, age, sex, occupation, marital status, medium of drowning, timing and manner of drowning. Out of them the possible number of bar graphs, and pie charts were drawn to show the statistical trends in drowning.

Observations & Discussion

In the study year, a total of 1684 autopsies were done. Among these, the drowning cases reported amounts for 79 cases i.e., a percentage of 5 cases of all post-mortem examinations. The number of drowning cases occupy the sixth place among the 10 most common or frequently encountered cases during study period as shown in the bar diagram 1. It amounted to about 35% of all asphyxial deaths.

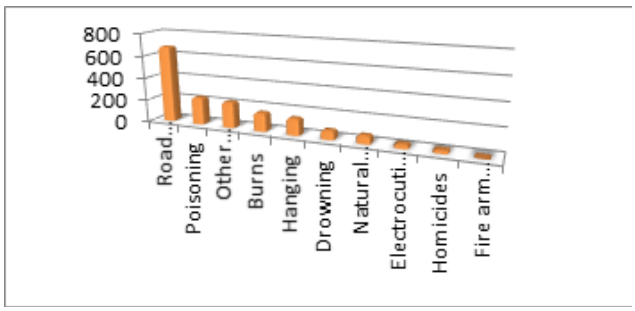

Diagram1: A Bar diagram showing Number of different autopsy cases based on cause of death during study period

During the study period, the number of cases of drowning that is reported show a male preponderance. As it is evident that nearly 76% of drowning deaths have occurred in males as opposed to a mere 24% in females. These figures further establish and correspond with the already existing data regarding more number of drowning deaths in male [9,10,11,12].

The study of age highlights that the maximum number of cases were reported in 21-30 years group i.e., 26.5% and closely competed by 31-40 and 11-20 respectively with 23 and 20%. In both males and females, the highest number of victims is from the age group of 21-30 years with 27% and 26% of cases respectively. The study further confirms and more or less matches the already established figures of previous studies in India [9,11]. The maximum number of cases occurred between 15 and 25 years of age in males there by establishing the exuberance, excitement and eagerness among the youth coupled with zeal for adventure. Whereas in females, most number of cases encountered were aged between 21-35 years. There are very minimal or negligible numbers of cases in age groups 1-10, 61-70 and 71-80.

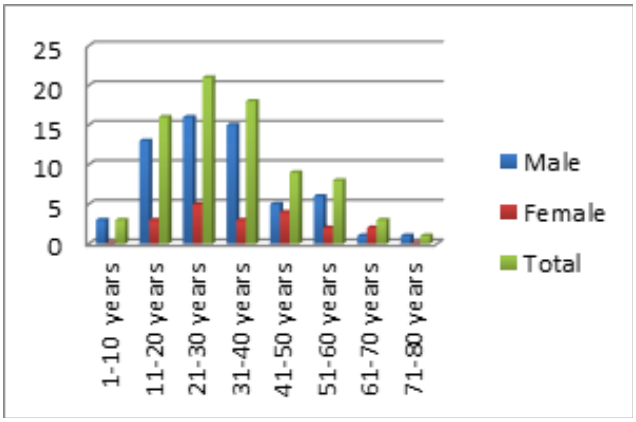

Diagram 2:A Bar diagram showing Age wise distribution of cases of deaths due to Drowning.

A large number of drowning deaths have occurred in the month of March, August and October i.e., summer month of March and monsoon months of August and October. The summer and monsoon seasons almost matched each other nearing 37% and 43% cases respectively. The summer and monsoon seasons have almost 80% of deaths occurred due to drowning. This phenomenon is denoted by the holiday season in summer, when a large number indulge in adventurous exploits and monsoon draws one towards adventure and is as well occupation related. These findings are similar to those in Phad and Dhawane study[9].

Table 1: Table showing the month wise incidence of drowning deaths.

Month	Male	Female	Total
January	4	3	7
February	2	1	3
March	7	4	11
April	4	3	7
May	6	0	6
June	3	2	5
July	4	0	4
August	10	1	11
September	4	0	4
October	11	4	15
November	4	1	5
December	1	0	1
Total	60	19	79

In our study we have found that sea water is the main culprit which amounts to 64%, fresh water 25% and alternate media for 11% of drowning deaths. There is gross disparity between the existing data and our study data [4,5,9,11,12], where the figures are reversed in relation to sea water over freshwater drowning. The main reason to be attributed to this statistic is the vast and expansive coast, easy accessibility to the sea, dependence on sea as a vocational resource, adventure and related professional pursuits.

Table 2: Table showing cases of drowning in respect to medium of immersion.

Medium of immersion	No. of cases		Percentage	
	Male	Female	Male	Female
Sea water	39	12	49.37	15.19
Well & Lake	10	5	12.66	6.33
Tanks	4	1	5.06	1.27
Pits	3	0	3.80	0
Drainage	2	0	2.53	0
Canal	1	1	1.27	1.27
Septic tank	1	0	1.27	0
Swimming pool	0	0	0	0

The manner of death in cases of drowning is of prime importance. In the study, the maximum number of deaths that were reported as drowning are as a result of an accident, next in order is suicides and one case registered as homicide although a handsome number of cases which are listed as undetermined amount to 11 i.e., nearly 20% of sum. The manner at inquest and based on circumstances, drowning deaths show accidental (41cases i.e., 68%) as most common manner in males and suicidal (10 cases 53%) as most common manner in females. These findings are in contrary to other studies [9,10,].

Table 3: Manner of death due to drowning based on Inquest & Circumstances.

	Accidental	Suicidal	Homicidal	Undetermined	Associated natural disease
Male	41	4	1	11	3
Percentage	51.90	5.06	1.26	13.92	3.80
Female	5	10	0	4	0
Percentage	6.33	12.66	0	5.06	0
Total	46	14	1	15	3
Percentage	58.23	17.72	1.26	18.99	3.80

Another important aspect of our study is to determine the relation of time with drowning deaths. A vast number of cases of drowning were reported during day time, a 15% of cases were reported during night and in about 25% of cases it appeared that the time of occurrence of the incident remained indeterminate upon inquest and circumstances.

Table 4: Table showing time of drowning based on inquest & Circumstances.

	Day (6am-6 pm)	Night (6pm – 6am)	Not known
Male	35	9	16
Female	11	3	5
Total	46	12	21
Percentage	58.23	15.19	26.58

The occupation and its relation to drowning deaths is studied based on inquest which showed a large number of accidental deaths due to drowning were seen in labourers or coolies is 25 cases i.e., 32%, fishermen is 6 cases i.e., 8% and officials 9 of which 3 cases were a result of accidental drowning at work i.e., 30%. The other indicators (occupations) students, officials, no occupation have been usually suicides and that too the large chunk of the unemployed being women.

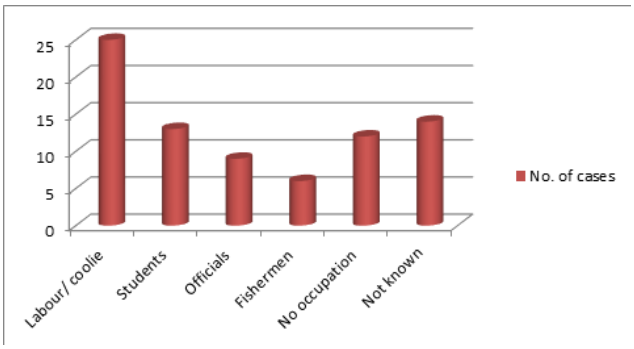

Diagram 3: A bar diagram showing Occupation of the deceased died of drowning.

The analysis of Table 5 points to almost an equal number of deaths due to drowning in married a well as unmarried males. Coming to the female sex, the number of cases of drowning among married women was reported at 9 cases while those of unmarried women amounts to 4 such cases, similarly owing to the non-establishment of identity i.e., 6 out of 60 in males and 6 out of 19 in females, their marital status could not be assessed. Of the unmarried males, the manner of such deaths was usually accidents and a few suicides, but in the females who were reportedly unmarried most of the deaths could be attributed to suicides.

Table 5: Table showing marital status of the victims died due to drowning.

Marital Status	No. of cases			Percentage
	Male	Female	Total	
Married	24	9	33	41.77
Unmarried	30	4	34	43.04
Not known	6	6	12	15.19

Conclusion

From this study it is evident that drowning amounts to significant number of deaths in young males in the age group of 21-30 years. Sea water is the commonest source of drowning medium in this study. Most of the drowning deaths occurred during day time. Most of the victims died accidentally and are labourers which denotes the lack of safety measures in the fishing industry from which they belong and the necessity of improving the safety of fisherman by providing them with safety equipment. All people particularly school going children and college going youth should be made aware of the rules of safety near and while in water and the authorities has to improve the safety at beaches by commissioning the rescue teams after identifying the places with high activity and saving these young victims. Provision of mechanical boats, monitoring systems, systems of surveillance will go a long way in aiding accident struck victims.

Ethical Clearance: There were no ethical issues involved as the study was analytical and did not violate any ethical principles.

Source of Funding: Nil

Conflict of Interest: Nil

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