Drowning in Water Sumps (Under Ground Water Tank): A Retrospective Study

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Abstract

Drowning in India commonly occurs in rivers, ponds, lakes and wells and can be accidental, suicidal or sometimes homicidal. In cities like Bangalore deaths due to drowning takes place in tanks, water sumps, wells and swimming pools. A five retrospective study of deaths due to drowning in water sumps was undertaken in the department of Forensic medicine, MS Ramaiah Medical College, Bangalore. A total of 112 (100%) deaths were due to drowning of which 34 (30%) cases of drowning was in water sumps. The study revealed that females 19 (55.90%) outnumbered the males and children in the age group of 0-10 (55.88%) accounted for the majority of the cases, (73.3%) were mainly accidental in manners, (44.10%) had taken place between 12 noon to 6 pm. This new source of water body has been a watery grave which is very unfortunate and Supervision turns out to be the key contributor to these unfortunate preventable deaths.

Key words: Drowning, Water Sumps

Introduction

Drowning is the second most common cause of accidental death in infancy and childhood, ranking behind motor vehicle accidents, 1 and is the leading cause of death in children under the age of 5 in Australia2 and parts of the United States.3 Based on WHO data for 2005, drowning is the leading cause of unintentional injury deaths in ages 0–4 years (19%) with an average global drowning mortality rate of 7.4 per 100 000.4

Drowning in India commonly occurs in rivers, ponds, lakes and wells and can be accidental, suicidal or sometimes homicidal. The entire coastal belt of India is a risk-prone area. Owing to easy access to water bodies, the occupation of individuals, occurrence of natural calamities at frequent intervals, the risk-prone nature of young children and adolescents, drowning is common in India.5 But in cities like Bangalore deaths due to drowning takes place in tanks, water sumps, wells and swimming pools.

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Due to combination of an exploding population and the absence of a major perennial source of Water supply, Bangalore has a major drinking water problem6 hence water sumps are necessary for every house hold and at construction sites. The scarcity is acute more so due to real estate boom, compounding the need for the water sumps. There is a steady increase in the mortality rate due to drowning in water sumps. Consequently there has not been much research or interest in this area. However, the reality is that each death by drowning is still one death too many. This is especially when hindsight often shows that many death from drowning are preventable. This paper aims to review the incidence of the drowning in water sumps in Bangalore north over the past 5 years. (2004-2009) ascertain the reasons, manner, age and sex in such deaths and suggest preventive and safety measures.

Material & Methods

A Retrospective study was conducted in the Department of Forensic Medicine, M.S. Ramaiah Medical College, Bangalore North for a period of 5 years (2005-2009). A total of 112 deaths were due to drowning of which 34 cases drowning was in water sumps.

The information in cases due to drowning in water sumps were analyzed, age, sex, other ground information, cause, time and manner of death were studied.

Water sump means a large under ground water storage facility for domestic purpose and a small opening at the ground level, normally covered with a lid made of iron or wood or a cement slab, which may also have a submersible pump.

Results

TABLE-1: Incidence of Drowning in the study period

Year	Total No. Autopsies	Total No. of deaths due to drowning	Drowning in water sumps	%
2005	737	31	07	22.5%
2006	785	19	03	15.8%
2007	811	15	06	40%
2008	896	27	09	33.3%
2009	819	20	09	45%
Total	4048	112 (100%)	34 (30%)	

TABLE –2: Sex distribution

Year	Total	Male	Female
2005	07	04	03
2006	03	02	01
2007	06	02	04
2008	09	05	04
2009	09	02	07
Total	34	15	19

TABLE –3: Age distribution of water sump drowning victims

Age in year	2005	2006	2007	2008	2009	Total
00-10	05	01	01	05	07	19
11-20	01	00	01	01	01	04
21-30	01	00	01	01	01	04
31-40	00	00	01	01	00	02
41-50	00	01	00	01	00	02
51-60	00	00	01	00	00	01
61-70	00	01	00	00	00	01
71-80	00	00	01	00	00	01
81-90	00	00	00	00	00	00
91-100	00	00	00	00	00	00

TABLE -4: Time of Drowning in Sump

Year	6.00 am to 12 Noon	12 Noon to 6.00pm	6.pm to 12 midnight	12 Midnight to 6.00 a.m.
2005	01	03	01	02
2006	00	01	02	00
2007	02	02	02	00
2008	04	05	00	00
2009	01	04	04	00
Total	08	15	09	02

TABLE -5: Manner of death

Year	Suicidal	Accidental	Homicidal	Unknown
2005	02	04	01	00
2006	01	02	00	00
2007	01	05	00	00
2008	01	07	01	00
2009	01	07	01	00
	06	25	03	
	17.6%	73.3.%	08.8 %	

Discussion

The data collected in the present study reveals that (Table 1) of the total no of 112(100%) cases of drowning, 34 cases (30%) accounted for deaths in water sumps. This has turned out to be a new watery grave in the recent years which have been observed in our set up, though the need for this type of water storage body is quintessential and a need of the hour in the ever increasing populace of Bangalore city, which also has its share of water resource problems. Deaths due to submersion in water sumps are of great interest from medico legal point of view. Drowning in water sumps is not highlighted by the health authorities as a major area of concern.

On observing the sex and age distribution (table 2 and 3) females(55.90%) outnumbered the males and children in the age group of 0-10 (55.88%) accounted for the majority of the cases, which could be attributed to the kids being unattended, or were a part of the pedicide suicide pact where, in all such cases the disillusioned mother had committed suicide by drowning in the sump after the act of pedicide, followed by those in the11-20 and 21-30 years age group(11.76%) respectively which were mainly suicidal, the reasons in the other age groups as observed were due to accidental fall under the influence of alcohol, while engaged in the cleaning of an unused sump, and in one case the victim apart from features of drowning had sustained electric shock from a faulty wire in submersible pump. With regard to the medico legal etiology, three possibilities are traditionally considered; accidental submersion, suicide and homicide.7

By observing table 4, most of deaths15 cases (44.10%) had taken place between 12 noon to 6 pm, followed by 9 cases (26.5%) between 6pm to 12 mid night.

In our study on observing table 5 - 25 cases (73.3%) were mainly accidental in manner and the majority of the victims were children who had been left unattended by their parents who were

busy otherwise or had drowned on account of intoxication, followed by 6 case (17.6%) were suicidal and 03 cases (8.8%), were homicidal part of the pedicide-suicide pact. Accidental submersion constituted 73.3% of cases in this study and correlated well with that observed by Wintemute et al8, Giersten 9, Derobert 10 Copeland11 of 80-90% of deaths of drowning in general. However, there may be variation depending on the geographic zone where the study is conducted.

Conclusions

Children age less than 10 years due to either ignorance by the parents or guardians/ care takers and lack of safety measures being taken while constructing the sump. Water sumps are constructed without taking proper safety precautions and there is lack of supervision of children by parents. Safety must be ensured by the civic authorities at the time of planning sanctioning.

Accidental drowning in sumps is largely preventable and children below 10 years form the high risk group. The sumps should be adequately fenced. Children in or near any source of water are to be constantly supervised. In about 2/3rd of instances when children drown they were either alone or accompanied by another child who was incapable of rescuing the victim. Busy mothers with a large family and many children at home to care for are often unable to keep a constant vigil over the little ones. At the time of drowning of children in water sumps, most of the mothers or caretakers were either involved in household activities or were working outside. Supervision turns out to be the key contributor to these unfortunate preventable deaths.

There should be a safety alert symbol near the construction site where there are sumps. Hazard warnings are to be displayed at places where serious personal injury is anticipated. People who are under the influence of alcohol, sedatives or people with seizures have to be cautious near open water source. There is an urgent need to educate the public about the dangers of the water sumps. There is a need for new legislation for the registration and safety certification of sumps and defaulters have to be penalized.

With rain harvesting system being implemented in Bangalore, a water sump becomes essential in every household. Hence due precautions are to be taken by the users by installing water alarms which sound either when the lid is uncovered or when a object or person is in the water body. Accidental drowning is a largely preventable cause of death. Water safety organizations, the general public and legislators need adequate information about the circumstances of drowning to initiate preventive action effectively

We hope that the present study has contributed in some way towards the better understanding of this problem.

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