Post-Mortem Findings in Deaths due to Drowning, a Study on Autopsied Cases at Government Medical College Hospital Jammu: A Retrospective Study

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Abstract

Background: Drowning is a significant public health problem globally. It is the third leading cause of unintentional injury death, the post-mortem diagnosis of drowning is achallenge to medico-legal experts as the exact cause of deathsdue to drowning is not very clearly understood.

Method: 100 dead bodies aged between 10-75 years death due to drowning (60 male and 40 females) were studied by autopsy. The places of drowning external and internal post-mortem findings were recorded in both sexes.

Results: 60 drowning deaths occurred in Lakes Rivers 12 in wells, 24 in house tanks, 4 in swimming pools. In the study of external post-mortem 41 cases had froth around mouth /nostrils, 4 cadaveric spasm, 25 mud/sandy body, 2 cases had mud/sandy in nails, 38 had sign of asphyxia, 50 had sign of injury. In internal findings of post-mortem, 34 had forth larynx trachea, 57 had mud/sand/salt in larynx, 83 had voluminous lungs, 23 had stomach content water, 24 had stomach content food, 10 had injury.

Conclusion: The present pragmatic study of autopsy will certainly help to medico-legal expert to differentiate homicide and suicide in drowning deaths.

Keywords: Drowning, froth, asphyxia, suicide, homicide

Introduction

India is a vast country having plenty of water resources like rivers ponds lakes, wells, house Tanks, swimming pools etc. The drowning is a significant health problem worldwide and the WHO reported that, drowning is world's third leading unintentional injury death [(1)]. Nevertheless there is still uncertainty regarding the estimate of local and global drowning deaths. In addition, the post-mortem diagnosis of drowning is challenging and the physiological mechanisms of death by drowning are complex and not very well understood.

Drowning is the process of experiencing respiratory impairment from submersion /

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immersion in liquid. It is essentially an asphyxial death [2]. The WHOs goal is to implement strategies for prevention in order to decrease these deaths particularly in children and young people[3]. Drowning deaths usually exclude intentional drowning deaths (suicide or homicide) and drowning deaths caused by flood disasters and water transport incidents[4][5]. Hence attempt was made to evaluate the post-mortem examinations to rule out the cause of drowning deaths.

Material and Method

100 (one hundred dead bodies, 60 males and 40 females) aged between 10 years to 75 years were brought to the Mortuary, Department of Forensic Medicine and Toxicology Government Medical College Hospital Jammuwere studied.

Method

Detailed information pertaining to epidemiological factors, external and internal findings such as the presence of forth, signs of asphyxia, cadaveric spasm, presence of mud/ sand on body/nail in larynx and trachea, changes in the lungs were observed and noted.

Duration of study was from July-2018 to December-2021

Statistical analysis

Various places of drowning, external post-mortem and internal post-mortem findings in both sexes were recorded. The statistical analysis was carried out in SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table 1: Study of places of occurrence of Drowning

- 60 cases in lakes / rivers, 12 in wells, 24 in house tank, 4 in swimming pools

Table 2: Study of external post-mortem findings

- 38 cases had froth around mouth / Nostrils in males and 3 in females
- 4 cases had spasm in cadavers
- 23 cases mud/sandy Body in males and 2 I females
- 1 had mud / sandy in nails in male and 1 in female cadaver
- 35 cases had sign of asphyxia in male and 3 in female
- 48 had sign of injury in males and 2 in females

Table 3: Study of internal post-mortem findings

- 31 cases had forth larynx / trachea in males and 3 in females
- 53 had mud / sand / salt etc in larynx in males and 4 cases of females
- 78 had voluminous lungs in male and 5 cases of females
- 20 had stomach content water in male and 3 in female
- 24 had stomach with content of food in males only
- 10 Internal injury observed in females

Table 1: Study of places of occurrence

Sl No	Places of occurrence	No. of cases	Male	Female
1	Lakes / Rivers	60	40	20
2	Wells	12	10	2
3	House Tanks	24	14	10
4	Swimming pools	04	02	02

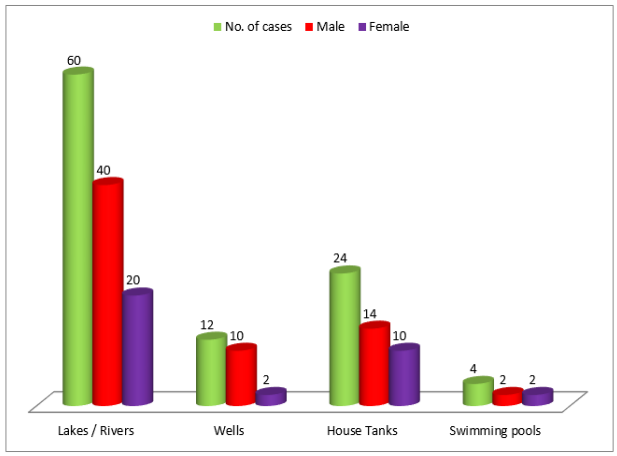


Table 2: Study of external post-mortem Findings

Sl. No	External Findings	Male (60)	Female (60)	Total (100)
1	Froth around mouth/Nostrils	38	3	41
2	Mud/Sandy Body	23	2	25
3	Mud/sandy Nails	1	1	2
4	Sign of asphyxia	35	3	38
5	Sign of injury	48	2	50

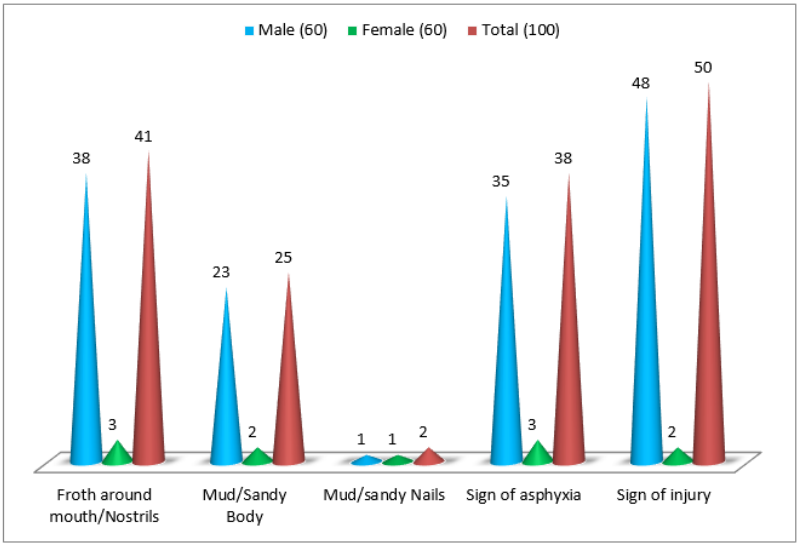
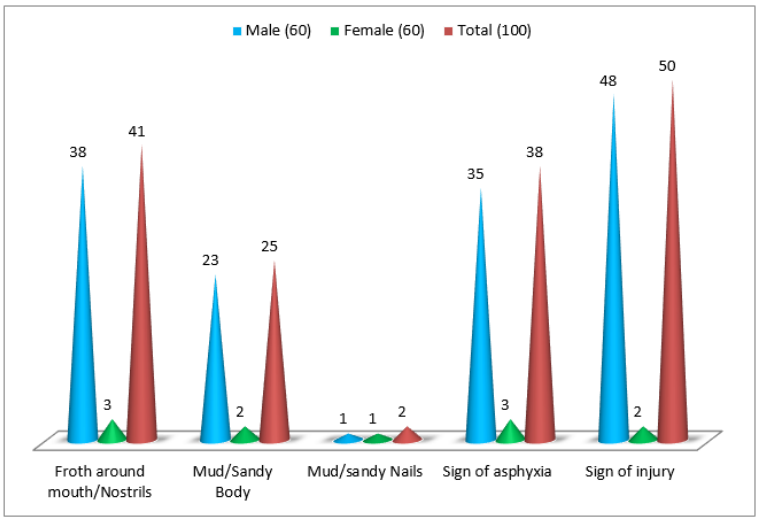


Table 3: Study of internal post-mortem findings

Sl. No	Internal Findings	Male (60)	Female (40)	Total (100)
1	Forth larynx / trachea	31	3	34
2	Mud / sand / salt etc in larynx	53	4	57
3	Lungs voluminous	78	5	83
4	Stomach content water	20	3	23
5	Stomach content Food	24	--	24
6	Injury	10	--	10



Discussion

Present study is post-mortem findings in deaths due to drowning in Jammu. The places of downing were 60 in lakes / rivers, 12 in wells, 24 in house tanks, 4 in swimming pools (Table-1). The external post-mortem findings were 41 cases had froth around mouth / nostrils, 4 cadavers had spasm, 25 had mud/ sands on their body, 2 had mud in their nails, 38 had signs of asphyxia, 50 had signs of injury (Table-2). In the study of internal post-mortem 34 cases had froth in larynx / trachea, 57 had mud / sand / salt in larynx, 83 cases had voluminous lungs, 23 had stomach contents water, 24 had stomach content food, 10 had internal injury (Table-3). These findings were more or less in agreement with previous studies [6][7][8].

Drowning is mainly an asphyxial death with effects on multiple organ system. Nevertheless physiological mechanisms of deaths by drowning are complex and not well understood [9].

It is also reported that the effects of the resulting hypoxia on tissues, other possible mechanisms responsible for cardio-vascular alterations have been proposed, such as electrolyte changes with possible different effects between hypotonic fresh water and hypertonic salt water immersion. It is also noted that, the role of cold water is in relation to hypothermic cardio-vascular effects[10]. In small percentage of cases of drowning, deaths without apparent inhalation of waterwere reported[11].

Male's deaths were predominantly reported as compared to females as males committed more number of suicide cases. Suicide and homicidal drowning represent significant segment of drowning deaths, suicidal drowning are uncommon and percentage of suicide depending upon the geographic location and access to location to water with lakes river, wells are common locates. History of psychiatric illness and post-mortem detection of variable levels of psychiatric medications and ethanol have been reported [12]. Moreover homicidal asphyxia deaths such as strangulation were also a major cause of drowning deaths. Drowning deaths is a largely asphyxial deaths which effects on multiple organs systems include respiratory system lungs. Respiration is an involuntary process of central Nervous system in response to changes in blood and tissue oxygen and carbon dioxide levels and blood PH.

The extent of putrification in any death is largely driven by time and temperature. Water, compared to the air tends to slow the decomposition process. The time factor depends upon how quickly the body is recovered. Because most of the bodies will sink, there may be delay in recovery. If a person is not witnessed to submerge or if the submerged body is not visible, the body may be only be found many days after putrification results in gas formation in the body by the proliferating micro organism. The gas will increase the body's buoyancy and it will float to the surface. It is then more likely to be discovered.

Summary and Conclusion

Drowning is more frequently observed in men than women except for suicide where there is only a slight difference among sex. Weight of the brains, lungs are higher is salt water although these organs weights are mostly dependenton other variables such as BMI and decomposition. There are some drowning deaths with normal organ weight, heavy lungs, cerebral oedema, however continue to be identified in numerous drowning deaths. Therefore theseanatomical findings must still be interpreted in the context of the entire case investigation. This study may help the medico legal expert to diagnose drowning and also help to identify risk factors to prevent drowning deaths.

This research work was approved by Ethical committee of Government Medical College, Jammu-180001.

No conflict of Interest

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