

HISTOLOGICAL CHANGES IN LUNGS AND SPLEEN IN CASES OF DROWNING WITH DEMOGRAPHIC VARIABILITY

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ABSTRACT

Drowning has been a major concern with the health organizations throughout the world as it results in loss of appreciable number of manpower. The article relates with demographic scenario of drowning from the postmortem examinations in a tertiary care hospital in West Bengal. It also emphasizes on some relevant histological findings of lungs & spleen. The authors observed that most of the cases occurred between the age group of 0-14 years of which majority were male.

Accidental drowning among the non-swimmers were the commonest findings. Majority of the lung tissue showed alveolar dilations with thinning of septa whereas all the splenic tissue showed reactive changes.

KEYWORDS: *Drowning, Demography, Histology of lung & spleen.*

INTRODUCTION

Drowning is a major but often neglected cause of unnatural death in developing countries. A recent global burden of disease (GBD) study reveals global mortality from drowning to be 7% of all injury related deaths (WHO, 2010). The world Health Organization appraises the annual global incidence of death by drowning to be 400,000.^[1]

One of the most classical definition of drowning provided by Roll as 'death by drowning is the result of hampering of the respiration by obstruction of respiratory tract by a fluid medium (usually water)'.^[2] However huge controversies are there about immersion death other than true drowning e.g. dry drowning, immersion death, hydrocution etc.

The diagnosis of drowning is one of the most difficult in Forensic Pathology. Signs of immersion only demonstrate submersion of the body for a period of time but are not signs of drowning. The accepted best sign of drowning are froth around mouth & nostrils, sand & mud in trachea beyond bifurcation. Histology of lung shows non specific lesions i.e. 'edema aquosum', 'emphysema aquosum', alveolar edema etc.

Owing to the easy access of water bodies, occupation of the individuals, occurrence of natural calamities at frequent intervals etc.--in India drowning is common.

In view of the great magnitude of the problem, the present study undertaken over drowning cases brought for postmortem examination from April 1st to March 31st 2013 in a tertiary care center in West Bengal, to study the various epidemiological factors along with different pathological changes in organs in drowning deaths.

MATERIAL AND METHOD

In the present work material consists of dead bodies sent to R.G.Kar Medical College Police Morgue by different police stations under jurisdiction of this morgue & those referral cases underwent medico legal autopsy. The study also considered the relevant history of the cases obtained from the police inquest and interviewing the deceased near relations. The autopsy preserved histopathological samples were subjected to microscopic evaluation in collaboration with the Department of Pathology.

Criteria for case selection

Inclusion criteria: Death registered or reported as a case of drowning to police and legal authorities & those deaths suggestive of drowning by detailed postmortem examination.

The study of unknown cases brought to the R.G.Kar Police Morgue is limited to the postmortem findings only. An extensive history taking was done in each and every case from their family members among the known cases.

Exclusion criteria: Cases presented as drowning but actual cause of death found at autopsy otherwise e.g. head injury, natural disease etc.

Considering inclusion & exclusion criteria total 60 cases were studied--a cross sectional study.

OBSERVATION

Different demographic variables were considered first for the present study along with histopathological findings.

Table-1: Distribution of cases in different age groups

Age groups(years)	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Number of cases	10	16	08	13	06	05	0	02

Table-2: Distribution of study population by gender

Gender	No. of cases	Percentage
Male	48	80
Female	12	20
Total	60	100

Table-3: Manner of death amongst the studied cases

Accidental	Suicidal	Homicidal	Not known	Total
46	6	2	6	60

Table-4: Locations of drowned cases

River	Pond	Lake	Canal	Well	Sewage line
17	21	13	6	2	1

Table-5: Possible risk factors of cases

Non swimmer	Alcohol	Depression	Diseased	Unknown	Marital conflict
42	3	2	1	9	3

Table-6; Distribution of cases according to occupation

Student	Self employed	Unemployed	Service	Housewife	Unknown
20	14	10	6	4	6

Table-7: Microscopic changes in lungs

Alveolar dilation & thinning of septa	47
Alveolar edema	8
Interstitial edema	5

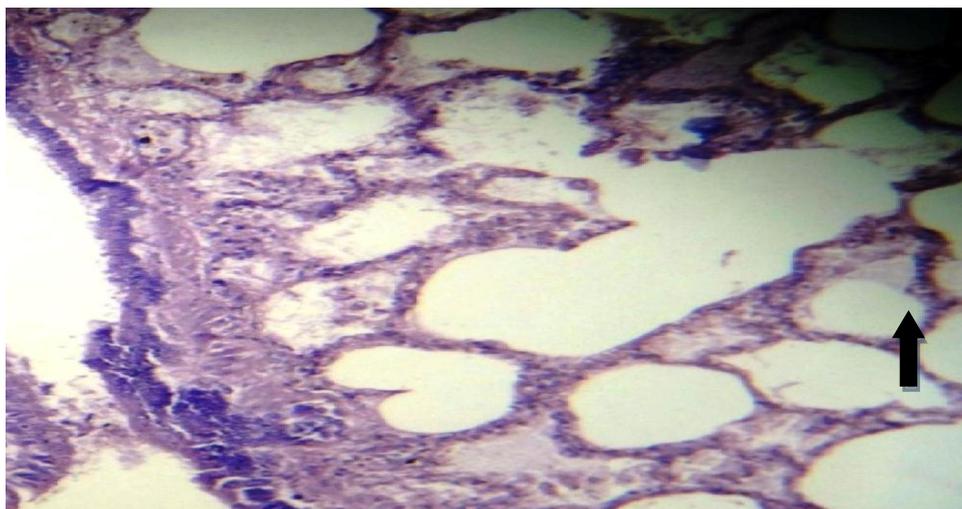


Fig 1. Histological section showing Alveolar dilation & thinning of septa

Table-8: Microscopic changes in spleen

Reactive changes	60
Other findings	Nil

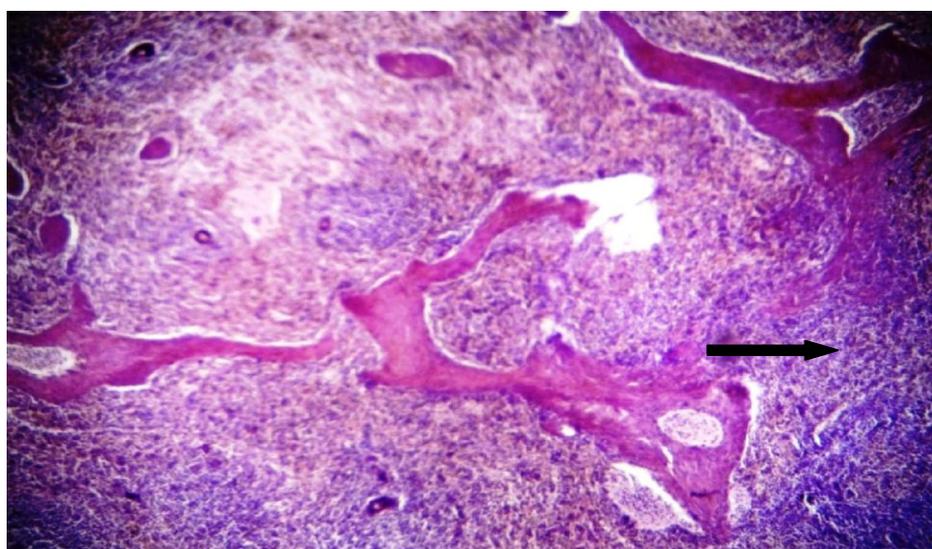


Fig 2. Histological section showing Reactive changes in spleen.

DISCUSSION

In this study distribution of cases were from newborn to 80 years of age. Most of the cases (16 cases) were in the age group of 11-20 years and 31-40 years (13 cases) age group and only 2 cases were found in the age group of 71-80 years.

Considering other references in the same field, Manjunath S (2010) in their study at Manipal found that the age group commonly involved in drowning was 11-20 years.^[3] 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.^[4] Results of both the studies corroborated with our findings.

Incidences of drowning deaths were much higher in males (Table 2) with a male female ratio of 4:1. Male dominance in drowning deaths were shown in many other studies e.g. Kanchan T et al, Chowdhury B L et al, Byard R W et al, Davoudi-Kiakalayeh A et al and many others. Ardeshir Sheikhzadi et al (2009) found in their study in Iran that male female ratio was 6.5:1 among drowning deaths (5,6,7,4,8).

In our study with regard to manner of death accidental submersion was the most common manner, comprising of 77% of all cases [Table 3]. Zhao H et al A retrospective analysis of 105 drowning victims with psychiatric disorders found that majority of drowning deaths were accidental.^[9] This was consistent with our findings. Palimar V, Manjunath S (2010) in a 12 year study in Manipal also found that accidental drowning was the most common form of drowning.^[3]

In our study 10% (6 out of 60) cases were suicidal submersion; close to the observation made by Zhao H et al as 14% of cases were suicidal.^[9] However Stemberga V et al in Croatia showed 31% deaths in drowning were suicidal in nature.^[10] and Avis SP in Canada also found higher rate of suicidal drowning.^[11]

Homicidal submersion is rare as because of difficulties mainly related to adult victim, first may be weakened by something like alcohol or drugs. In our study only 2 homicidal cases of drowning [Table 3], representing 3% of all deaths due to submersion, were noted-consistent with the findings by Zhao H and also findings by Auer A in Finland.^[9,12]

In cases where manner of death could not be recognized, considered as unknown, comprising of 10% (6 out of 60) of total drowning deaths in our study.

In our study pond drowning were most in number (Table 4) followed by others. Absence of salt water drowning cases in our study is because of geographical location & jurisdiction of our studied area. No case of drowning was reported from bathtubs –swimming pool because of less usage of bathtubs & swimming pool and easy access of large water bodies. Patetta M J, Biddinger P W in a study in North Carolina, USA, showed 39% deaths were from fresh water drowning mainly due to submersion in lakes & ponds.^[13] Chaudhary B L, Singh D et al in their study in Sevagram, Wardha found that most of the drowning deaths were as a result

of fall in well, in consistent with our study-may be due to associated geographical variability.^[6]

Chaudhary B L et al in their study found that maximum cases of suicidal drowning observed in persons with history of some form of mental illness or chronic diseases^[6] Byard R W et al in a study based on South Australia found that alcohol use was not usual and often with a significant history of mental illness.^[7] In our study it was found that non swimmers were 70% of all deaths and mental illness constituted 5% deaths.

In our study most of the victims were students (33%) with no specific occupation and 17% victims were unemployed. So as such total 50% drowned victims were unemployed (Table 6).

Microscopic evaluation of lungs of drowned victims showed -78% cases with dilatation of alveoli & thinning of alveolar septa, 14% showed only alveolar edema and in 8% cases observed only interstitial edema. (Table 7). This observation was consistent with the opinion of Farrugia A and Ludes B.^[14]

In microscopic study of spleen in drowned victims no specific findings characteristic of drowning was observed excepting some reactive changes (Table 8). However Kotani H et al found significant relationship between red splenic arteriolar hyaline and drowning deaths and presence of red pattern had high specificity for detection of rapidly fatal cases^[15]-inconsistent with our findings.

CONCLUSION

The biggest contributors to the absolute number of drowned victims were in age group 11-20 years, mostly drowned in pond (fresh water) and commonest manner of death was accidental (77%).

At the end it may be said that the study carried out is neither easy nor noncontroversial but it is likely to open the doors for carrying on constant reconsideration, Government legislation, community participation related to proper swimming lessons, aquatic safety measures and evaluation of the problem for its improvement and throw light on the present state.

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