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RESEARCH PAPER

Burden and commonest cause of sudden natural death among medicolegal autopsies in a tertiary care centre: a retrospective study

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***Background and aims**: Sudden natural death that occurred apparently to a healthy individual sometimes creates suspicions of foul play, thus subjected to medicolegal (ML) examinations. The present study aims to determine the age and sex-specific burden and identify the most typical cause of sudden natural death in ML autopsies at a tertiary care hospital. **Methods**: A retrospective study were conducted in the Department of Forensic Medicine, Gauhati Medical College & Hospital, Guwahati, Assam, including all autopsy cases of sudden natural death conducted from Jan 1, 2018, to Dec 31, 2018. The death circumstances were analyzed from the inquest report and hospital cause of death certificate. The distribution of the cases concerning various socio-demographic variables was presented as frequencies and percentages. The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 16. **Results**: Out of the total of 3574 autopsies, 243 (6.8%) were sudden natural deaths, with a male predominance of 82.2%. Maximum deaths occurred in the age group of 31 to 40 years (32.92%). The present study affected the married individuals (181/243) and urban residents (68.34%). The cardiovascular (45.27%) and gastrointestinal systems (20.16%) were the most common organ system involved. Among the cardiac causes, chronic coronary insufficiency was the most common cause (34.16%). **Conclusion**: Cardiac causes were the most typical cause of sudden natural death, particularly among the young. Medicolegal examinations can solve most of the doubts arising out of sudden natural death.*

***Keyword**: Sudden death; autopsy; cardio-vascular; cause of death.*

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INTRODUCTION

Death is an inevitable occurrence in the life of every person. Every human being wants to die naturally and peacefully. But sometimes, sudden death that occurred apparently to a healthy individual may raise many questions and create suspicion among the near and dear ones of foul play. Such incidents are most shocking and unexpected. Sudden natural deaths occupy a significant portion of deaths undergoing autopsy.[1] As in case of sudden natural deaths, it is not usually possible to identify the cause of death by external

examinations of the body, forensic medicine experts play a vital role in differentiating natural deaths from unnatural deaths and establishing an association of diseases with work, behaviour, trauma or any other events.[2]

A death that is not known to have been caused by any trauma, poisoning or violent asphyxia and occurs suddenly or within 24 hours of the onset of terminal symptoms is defined as sudden death.[3] According to the World health organization (WHO), sudden death is an unexpected non-violent death of a person usually seen within 24 hours of the onset of symptoms.[4] Whereas, death occurring due to some natural diseases or pathological conditions where the death is not intended or attempted is attributed as a natural death.[5] There is frequent or unexpected deaths with natural deaths, but sudden death is not always natural and vice versa. An autopsy can differentiate sudden natural death from sudden unnatural death.

Most reported causes of sudden natural deaths are related to the cardiovascular system followed by respiratory, neurological, digestive, infectious and genito-urinary conditions.[6,7] Almost 40-50% of cardiovascular deaths are accounted for sudden cardiac deaths.[8] As per the centre for global health research, cardiovascular diseases are the leading cause of death in India.[9] Annually, an estimated 7 lakh sudden cardiac deaths occur in India.[10] Studies suggest that unevaluated ischemic heart disease is the most significant cause of sudden cardiac deaths in developed countries.[7,10]

The northeastern region of India constitutes diverse ethnic-tribal demography with varied lifestyles and food habits. However, studies on morbidity and mortality pattern are limited in this part of the country.[11] Many studies are not available on the prevalence and cause of sudden natural deaths in northeast India.

The present study was undertaken to study the burden of sudden natural deaths among medicolegal autopsies in a tertiary care centre. The study aims to assess the socio-demographic profile of the sudden natural death cases brought for medicolegal autopsy and identify the commonest accountable cause of sudden natural death.

MATERIALS AND METHODS

The study was conducted retrospectively in the Department of Forensic Medicine, Gauhati Medical College & Hospital (GMCH), Guwahati, Assam taking all the cases of autopsy having the opinion of sudden natural death a cause of death from Jan 1, 2018, to Dec 31 2018.

All the cases of autopsy having the opinion of natural death as a cause of death and cases brought dead in casualty without evidence of unnatural cause were included. Unnatural death cases, unknown cases, natural death cases with recorded chronic illness, poisoning and decomposed cases were excluded. The death circumstances were analyzed from the inquest report and hospital cause of death certificate. All instances of sudden natural death were analyzed irrespective of age and sex.

The distribution of the cases concerning various socio-demographic variables was presented as frequencies and percentages. The data were analyzed using Statistical Package for the Social Sciences version 16. Ethical clearance for the study was obtained from the Institutional Ethics Committee of Gauhati Medical College and Hospital, Guwahati, vide no. MC/190/2007/Pt-11/Jan-2019/10.

RESULTS

During the study period total of 3574 cases were brought for medicolegal autopsies to GMCH mortuary, out of which 243 cases were found to be sudden natural death constituting an overall burden of 6.8%.

Male predominance was observed among the sudden death cases as out of 243 cases, 195 cases (82.2%) were male, and 48 cases were female with a sex ratio of 4:1.

The age and gender distribution of the cases showed that most of the cases were reported from the adult age group and the commonly involved age group was 31 to 40 years (32.92%) followed by 41 to 50 years (30.86%) in both male and female. One case of sudden natural death was reported from the lowest age group of 0-10 years and the highest age group of 80-90 years. The majority of the cases were married (74.4%), as shown in **Table 1**.

Table 1 Age and gender-wise distribution of cases

Age group	No. of cases (n=243)	Percentage (%)	Male (n=195)	Percentage (%)	Female (n=48)	Percentage (%)
0-10	1	0.41	1	0.41	0	0
11-20	7	2.88	6	2.47	1	0.41
21-30	34	13.99	27	11.11	7	2.88
31-40	80	32.92	64	26.33	16	6.58
41-50	75	30.86	60	24.69	15	6.17
51-60	30	12.35	23	9.47	7	2.88
61-70	10	4.12	9	3.70	1	0.41
71-80	5	2.06	4	1.65	1	0.41
80-90	1	0.41	1	0.41	0	0
>90	0	0	0	0	0	0
Marital status						
Married	181	74.4	142	72.8	39	81.2%
Unmarried	48	19.7	43	22.0	5	10.4
Status not known	14	5.8	10	5.2	4	8.3

Sudden death is more common among the cases brought from urban residential areas, with 167 out of 243 cases (68.7%). The majority of the cases were average body mass index (BMI) with 153 (63.0%) cases. Out of the 243 cases, 24.3% (59/243) were obese, and only 12.7% had low BMI.

Table 2 Distribution of cases according to the place of death

Place of death	Number of cases (n=243)	Percentage (%)
Brought dead	131	53.9
Hospital	34	14.0
Roadside	8	3.3
Home	70	28.8

Among all cases, 53.9% of cases were brought dead to the hospital (**Table 2**).

Among the causes of sudden death, the most commonly involved organ system was the cardiovascular system (45.27%), followed by the gastrointestinal system (20.16%), respiratory system (18.11%), central nervous system (14.4%) and genitourinary system (2.06%), as shown in **Fig. 1**).

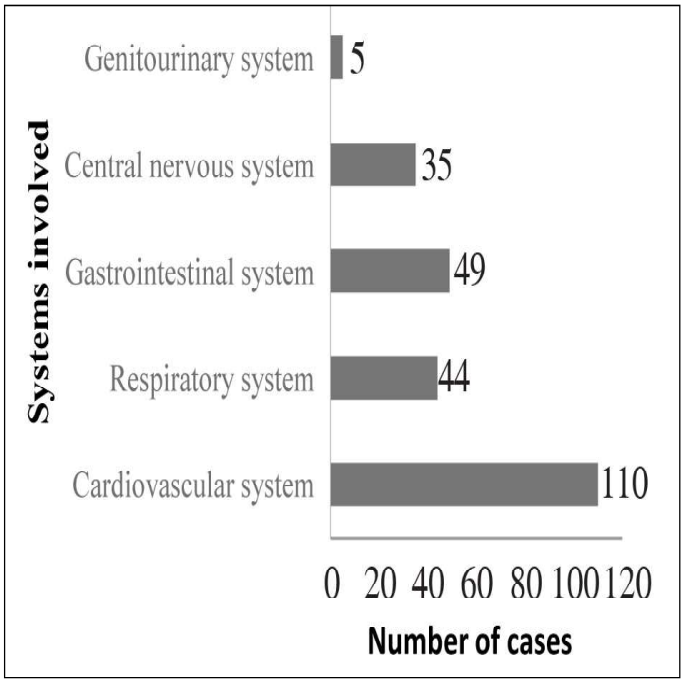

Fig. 1 Distribution of cases according to involved organ system

Among the cardiac causes, chronic coronary insufficiency is the most common cause (34.16%). Cardiac tamponade was observed in 2 (0.82%) cases. Among the gastrointestinal causes, chronic liver disease (13.58%) was reported in most cases. While among the respiratory causes, pneumonia (11.11%) was mainly observed (**Table 3**).

Table 3 Distribution of cases according to various types of the cause of death

System		Disease	Number of cases	The percentage among total sudden death	The percentage among total autopsies
Cardio-vascular	110	Chronic coronary insufficiency	83	34.16	3.08
		Cardio-myopathy	25	10.29	
		Cardiac tamponade	2	0.82	
Gastro-intestinal	49	Chronic liver disease	33	13.58	1.37
		Rupture of oesophagal varices	7	2.88	
		Acute haemorrhagic pancreatitis	5	2.06	
		Intestinal perforation	4	1.65	
Respi-ratory	44	Pneumonia	27	11.11	1.23
		Tuberculosis	17	6.70	
Central nervous	35	Spontaneous intracranial haemorrhages	35	14.40	0.98
Genito-urinary	5	Chronic parenchymal disease of kidneys	5	2.06	0.14

DISCUSSION

Deaths of unnatural, suspicious and unexpected manner necessitate an autopsy as a portion of the evidence-gathering process.[12] In sudden death investigation, sequential autopsy examination investigates the underlying cause of death and answers the suspicion of foul play regarding those unexpected deaths.[13]

Among 3574 autopsies during the study period, 243 were sudden natural deaths implying an overall burden of 6.8%. Other studies from northeast India reported the incidence of sudden natural death of 8.6% to 9.2%.[14,15] Meanwhile, the incidence of sudden natural death in other parts of India is reported as low as 0.74 to as high as 13.5%.[1,2,16-18]

Among all cases, males are seen to be affected mostly (80.2%) with an M: F ratio of 4:1. Male predominance in sudden natural deaths was observed in many other similar studies from India and around the globe.[2,7,15,18-22] The majority

of the deaths were observed among married males and from urban areas. A recent study reported marriage dissatisfaction as a significant risk factor of sudden cardiac deaths among males.[23] Urbanization as a factor of cardiovascular mortality was reported in a study from Brazil.[24] This might be due to an increasingly sedentary and stressful urban lifestyle.

Maximum cases of sudden death in both sexes were in the 31 to 40 years age group followed by 41-50 years. Several studies reported a higher incidence of sudden natural deaths among young adults in the 30-50 years age zone.[1,2,18,22,25]

Most cases were reported in average BMI persons (62.96%), followed by obsessed persons. A similar finding was observed in the study of Tyagi et al.[26] According to the present study; most cases were brought dead to the hospital (53.91%) followed by death at home (28.81%). The majority of sudden natural deaths occurring outside the hospital setting was concordant with a review.[27]

The majority of the sudden natural deaths in the present study was related to the cardiovascular system (45.27%). Various studies reported cardiac origin as the most common cause of sudden deaths in both genders, specifically among the adult male population.[19,20,22,28,29] Chronic coronary artery disease was the most reported cardio-vascular ailment (34.16%). The finding is in agreement with some other studies.[2,19,22,25]

Several studies[2,20,22,28,30] reported respiratory system ailments as the second prevalent cause of sudden death; however, in the present study, gastrointestinal system problems, particularly chronic liver diseases (13.58%), were reported second most cause of death. Pneumonia was the most common respiratory cause (11.11%). The cause of death in the only child below ten years old is pneumonia. Pneumonia is considered the prime cause of death among children below five years, accounting for almost 16% of child deaths.[31]

CONCLUSION

The present study reveals that cardiac causes are the most common cause of sudden natural death among the adult population in the study site. Increased frequency of sudden deaths among urban, married and adult male populations might be due to sedentary lifestyles in urban areas and increased stress among married individuals due to workload and family responsibilities, indicating a physical and mental disequilibrium in modern times resulting in this type of unexpected deaths. A thorough postmortem and histopathological examination can solve most of the doubts arising from sudden death among the common population.

Conflict of interest: No conflict of interest is associated with this work.

Contribution of authors:

(1) The article is original with the author and does not infringe any copyright or violate any other right of any third party.

(2) The article has not been published (whole or in part) elsewhere and is not being considered for publication elsewhere in any form, except as provided herein.

(3) All authors have contributed sufficiently in the article to take public responsibility for it and

(4) All authors have reviewed the final version of the above manuscript and approved it for publication.

Ethical clearance: Taken.

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