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STUDY OF SUDDEN NATURAL DEATHS IN MEDICO-LEGAL AUTOPSIES WITH SPECIAL REFERENCE TO CARDIAC CAUSES

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ABSTRACT

This prospective cross-sectional study was carried out at Government Medical College, Aurangabad (M.S.) during a period of one year. Most of the sudden deaths were in 41-50 years of age group. Males predominate the females among all sudden deaths with male to female ratio 4.3:1.

Cardiovascular causes were the principle cause followed by the respiratory causes among all sudden deaths. Deaths due to coronary artery disease and myocardial infarction amount to almost half of the cases of sudden natural deaths (40.25%). Confirmation of cause of death by histopathological examination was emphasized.

Keywords: sudden death, natural death, autopsy.

INTRODUCTION

The term sudden death refers to the sudden and unexpected deaths; the external examination fails to elicit cause of death. The majority of these are natural deaths. But very often, natural deaths form the basis of medico-legal investigations, if they have occurred suddenly and unexpectedly in apparently healthy persons and under the suspicious conditions. In such cases, it is usually not possible to certify the cause of death only on external examination of body. In all such cases, an autopsy is imperative to obviate the possibility of unnatural death. After the completion of autopsy the outcome may quite often reveal some natural disease, the presence of which may pose issues like association of the disease with trauma, work, crime, emotion, excitement, etc may suggest suspicion of foul play and its relative contribution towards death. The study of sudden

death helps in establishing the precise causes of death and enable in assisting the legal authorities in detection of crime, improve the mortality statistical data and pacify the bereaved and aggrieved relatives where the medical negligence was the sufficient ground for legal proceedings.

MATERIAL AND METHODS

The material for the present study consists of the cases who died suddenly and/or unexpectedly and had been subjected to medico legal autopsy .The criteria for selection of cases was as per definition- "Sudden death is a death which is not known to have been caused by any trauma, poisoning or violent asphyxia and where death occurs all of a sudden or within 24 hours of the onset of the terminal symptoms".

History about the cases was obtained retrospectively from the police record and meticulous autopsy was carried out in every case and the whole organ or pieces of organ showing gross pathologic changes were retained for histopathological examination and also for chemical analysis (CA). On the basis of histopathological report, final opinion as to cause of death was dispensed.

RESULTS AND OBSERVATIONS

Age wise distribution showed maximum number of cases belonged to 41-50 years age group with male predominance. Amongst these 159 cases, 129 cases (81%) were male and 30 (19%) were female. The male to female ratio was 4.3:1. [Table no.1]

Among the causes of sudden death, 71 cases (44.6%) were due to cardiovascular causes (CVS), remaining were due to respiratory causes (25.7%), gastrointestinal causes (11.3%), 6.2% were due to central nervous system (CNS) causes, 5 cases each (3.1%) due to genitourinary (GUT) and miscellaneous causes and 9 (5.6%) showed multiple system involvement. [Table no. 2]

Maximum cases of sudden death due to cardiac causes (44.6%) were seen in 41-50 years of age group; coronary artery disease (CAD) (71.83%) was the leading cause with male dominance. On histopathological examination, out of 13 cases of myocardial infarction, 4 cases (30.8%) showed microscopic changes suggestive of recent myocardial infarction and in 9 cases (69.2%), old healed scar of myocardial infarction was seen. It was observed that out of 71 cases of heart disease, biventricular hypertrophy was present in 15 cases (21%), solitary left ventricular hypertrophy in 32 cases (45%) and solitary right ventricular hypertrophy in 3 cases (4%). It was observed that in cardiovascular system, the minimum survival time was least (15 minutes), the mean survival time was also least 4.58 hours.

Out of 41 deaths (25.7%) due to respiratory diseases, pulmonary Koch's [18 deaths (43.90%)] account for major cause of sudden death followed by pneumonia [12 cases (29.26%)], COPD [3 cases (7.31%)], pulmonary embolism [2 cases (4.87%)], solitary lung abscess [1 case (2.43%)] and deaths due to combined TB, Pneumonia, Pyothorax and lung abscess include rest of the diseases [5 cases (12.19%)].

In GIT, out of 18 cases, maximum number of cases of sudden death was due to liver pathology [7 cases (38.88%)]. In CNS, maximum numbers of sudden deaths were due to intracranial haemorrhage (60%) with male predominance. In GUT, out of 5 cases, 2 males (40%) died of pyonephrosis and each case of eclampsia, placental separation and pyonephrosis were responsible for female death. Miscellaneous causes of sudden death include septicemia, anemia, cerebral malaria and diabetic nephropathy, total 5 cases (3.14%) [Table no 3].

DISCUSSION

The definition of a sudden death varies according to authority and convention. In this medico legal study of sudden death, the duration of death process ranged from 1 to 20 hours, but it was difficult to determine how long the fatal symptoms had been present, as death often occurs before the victim reaches hospital, the situation in which no data on the symptoms are available for want of eye witnesses.

In the present study, incidence of sudden death was 9% amongst the medico legal autopsies conducted during the study period. The finding of incidence of sudden death in the present study is somewhat consistent with the study of Sarkoija T. et al (5%)¹ and Siboni A. et al (4.06%)². The present study do not match with that of Nordrum I. et al (27.8%)³, Meina Singh et al (2.66%)⁴, Azmak A.D. (28.98%)⁵, and Ambade V.N. (15.48%)⁶.

Age distribution for the present study showed most of the cases (30.81%) belonged to 41 to 50

years age group with male predominance (Table no.1). This finding matches with the studies of Meina Sing A. et al (34.5%)⁴ and Ambade V N. (20%)⁶.

In the present study, out of 159 total sudden deaths, 129 (81%) were male and 30 cases (19%) were female with male to female ratio 4.3:1 (Table no1). This finding is consistent with the study of Azmak A D (males 83.4%, females 16.6%)⁵ Sarkoija T. et al (males 82%, females 18%)¹, Nordrum I. et al (males 79.67%, females 20.32%)³, Thomas A.C. et al (males 73.9%, females 26%)⁷ and Ambade V. N. (males 79.27%, females 20.73%)⁶.

Although there are numerous causes of sudden death, cardiovascular causes [71 cases (44.6%)] were the principle cause among sudden death in the present study. (Table no 3). Dr Narayan Reddy¹⁰ and Apurva Nandy¹¹ stated that, most of the sudden deaths were due to cardiovascular causes, about 45 -50%. Similar findings were seen in the study of Kuller L. et al (49.5%)¹², Siboni A. et al (46.2%)², Di Maio V.J.M. et al (60.9%)¹³, Sarkoija T. et al (61%)¹, Luke J.L. et al (38%)¹⁴, Nordrum I. et al (69.15%)³, Azmak A D (55%)⁵.

Coronary artery disease was not only the principle cause among cardiovascular causes, [54 cases (76.05%)] but also important cause among all sudden deaths amounting to 33.96%, with male preponderance, which is consistent with previous studies^{1, 2,3,4,6,7,12,13,14}. This is because underlying heart disease is nearly always found in victims of sudden cardiac death. Typically in adults it takes the form of atherosclerosis or scarring from a prior heart attack. Therefore, risk factors for sudden cardiac death include similar risk factors for atherosclerosis, such as smoking, high blood pressure (B.P.), indiscriminate use of alcohol, sedentary life style, and stress and strain in life and lack of regular medical check up.

In young victims, a thickened heart muscle from any cause, typically high B.P., or valvular heart disease is important predisposing factor for

sudden cardiac death. Adrenaline released during intense physical or athletic activity often acts as a trigger for sudden cardiac death when less often, inborn blood vessel abnormalities of coronary arteries and aorta, may be present in young sudden death victims

In the present study, out of 159 cases of sudden death, 41 cases (25.78%) were due to respiratory causes. The important were pulmonary tuberculosis 18 (43.90%) and pneumonia 12 cases (29.26%) (Table no. 3). The findings of deaths due to respiratory diseases are comparatively higher as compared to all above studies^{2, 3, 4, 7,9,12,13}. Most important causes of gastrointestinal diseases in our studies were gastroenteritis, cirrhosis of liver and peritonitis. The incidence of deaths due to liver pathology, 5 cases (27.7%) in our study nearly matches with the study of Kuller L. et al¹³ (27.7%)

It is observed that in cardiovascular system, the minimum survival time was least (15 minutes); the mean survival time was also least 4.58 hours. This means that, when the lesion is in cardiovascular system the death sets in rapidly as compared to other systems.

Study demonstrates the importance of histopathology in autopsy diagnosis of sudden deaths. Samples were taken for histopathological examination from the site showing gross pathological changes of heart, lung tissue, inflamed peritoneum, meninges, and brain tissue. Microscopic changes confirmed the gross diagnosis.

CONCLUSIONS

Incidence of sudden death among the total medico legal autopsies performed is 9%. Most of the sudden deaths are in the age group of 41-50 years (30.81%) with marked preponderance of males. Cardiovascular disease accounts for the maximum number of sudden deaths, in which Coronary artery disease is not only the main cause of cardiovascular deaths, but also among all sudden deaths.

Almost half of the sudden deaths show a strong correlation with chronic habits like smoking, tobacco chewing and alcoholism. The death sets in very rapidly in cardiovascular disease, as mean survival time is 4.58 hours. The most common causes of sudden deaths are coronary artery disease, tuberculosis, pneumonia and intracranial hemorrhage. Histopathological study helps in confirmation of the cause of death in sudden deaths.

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Table No. 1 Age and Sex Distribution of Cases

Age (Yrs.)	Male death	Female death	Total death
Upto 1	1	1	2(1.25%)
2-10	0	1	1(0.62%)
11-20	1	1	2(1.25%)
21-30	11	11	22(13.83%)
31-40	26	5	31(19.49%)
41-50	46	3	49(30.81%)
51-60	24	2	26(16.35%)
61-70	14	5	19(11.94%)
> 70	6	1	7(4.40%)
Total (%)	129 (81%)	30 (19%)	159 (100%)

Table No 2 System-wise affection

System affected	Male death	Female death	Total death	Percentage
Cardiovascular system	68	03	71	44.6
Respiratory system	30	11	41	25.7
GIT	15	03	18	11.3
CNS	07	03	10	06.2
Genitourinary	02	03	05	03.1
Miscellaneous	02	03	05	03.1
Multiple system involvement	05	04	09	05.6
Total (%)	129	30	159	100.0

Table no 3 Showing diseases and sex-wise distribution of cases

System & diseases	Male Death	Female Death	Total Death
A] CVS			
▪ Coronary artery disease (CAD)	50	01	51
▪ Myocardial infarction (MI)	09	01	10
▪ CAD + MI	03	--	03
▪ Aortic stenosis	03	--	03
▪ Pericarditis	01	--	01
▪ Cardiac tamponade	02	--	02
▪ Cardiomyopathy	--	01	01
B] RS. :			
▪ Pulmonary tuberculosis	15	03	18
▪ Pneumonia	07	05	12
▪ Pulmonary TB + pneumonia	02	--	02
▪ COPD	02	01	03
▪ Pulmonary TB + pyothorax	01	--	01
▪ Lung abscess	--	01	01
▪ Pulmonary TB + lung abscess	02	--	02
▪ Pulmonary embolism	01	01	02
C] GIT:			
▪ Gastroenteritis	02	02	04
▪ Cirrhosis of liver	03	--	03
▪ Fatty liver	02	--	02
▪ Peritonitis	03	--	03
▪ Hepatitis	01	01	02
▪ Hemorrhagic gastritis	01	--	01
▪ Intestinal obstruction	01	--	01
▪ Intestinal perforation	01	--	01
▪ Intestinal TB	01	--	01
D] CNS:			
▪ Meningitis	01	01	02
▪ Intracerebral hemorrhage	02	--	02
▪ Subarachnoid hemorrhage	03	01	04
▪ Cerebral abscess + meningitis	01	01	02
E] GUT:			
▪ Toxemia of pregnancy	--	01	01
▪ Placental separation	--	01	01
▪ Pyonephrosis	02	01	03
F] Miscellaneous:			
▪ Septicemia	01	01	02
▪ Anaemia	--	01	01
▪ Cerebral malaria	01	--	01
▪ Diabetic nephropathy	--	01	01
G] Multiple system involvement:			
▪ Cerebropulmonary oedema	03	02	05
▪ Meningitis + pneumonia	01	--	01
▪ Adrenal hemorrhage + pleural effusion	--	01	01
▪ Pulmonary embolism + liver abscess			
▪ Bronchitis + pyonephrosis	01	--	01
	--	01	01
Total	129	30	159