ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 08, pp.36140-36144, August, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

AUTOPSY STUDY OF SUDDEN UNEXPECTED DEATHS

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ARTICLE INFO

Article History:
Received 27th May, 2016
Received in revised form
23rd June, 2016
Accepted 27th July, 2016
Published online 20th August, 2016

Key words:

Sudden death,
Cardiovascular disease,
Coronary heart disease.

ABSTRACT

Introduction: WHO defined sudden death as sudden unexpected death of a person usually seen within 24 hrs of onset of symptoms. Autopsy study helps in effective evaluation of cause of death and to apply such knowledge to the prevention and treatment of disease in society.

Material and Methods: Seven years retrospective study was done in pathology department in tertiary care center in which 150 cases were studied. After performing autopsy, organs were grossly examined, representative sections were taken, routine tissue processing, H and E staining and microscopic examination of slides was done.

Result: Age ranged from 0 to 70 years with mean age of 41-50 years. Male (111) to female (39) ratio was 2.85:1. Deaths due to cardiovascular causes accounted for 60.7% followed by respiratory disease 18%, vascular pathology 5.3%, Hepatobiliary lesions 4.6%, Gastrointestinal diseases 3.4%, central nervous system diseases 3.4%, Unknown causes contributed to 4.6%. Coronary artery disease (67%)constituted most common cause of sudden cardiac death. In respiratory causes 9.4% of deaths were due to lobar pneumonia. Cirrhosis accounted for 2% in hepatobiliary lesions. 2.7% death occured due to gastrointestinal perforation. In 4.7% where cause of death could not be determined, death can be attributed to diseases like ventricular arrhythmias, coronary vasospasm.

Conclusion: Diseases of cardiovascular system are the major contributing factor for sudden natural deaths. Among these coronary artery disease is most common factor. Sudden natural deaths were associated with treatable coronary risks such as hypertension, diabetes, alcohol smoking. Pneumonia can be attributed to poor hygine, malnutrition and low socio economic status. By modifying these factors sudden deaths can be decreased.

Citation: Dr. Sunita S. Dantkale, Dr. Smita S. Pudale, Dr. Swapna V. Rakhonde, Dr. Khushboo Birla, 2016. "Autopsy study of sudden unexpected deaths", *International Journal of Current Research*, 8, (08), 36140-36144.

INTRODUCTION

"Despite the disparagement of the ignorant and the patronizing smiles of the sophisticated, the necropsy still moves along at its time – honored, steady pace, maintaining standards, contributing to knowledge and even, on occasion, stimulating the sluggard". (Gall, 2011) Death is said to be sudden, expected in a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of terminal illness. (Reddy, 2011) The term sudden has no agreed universal definition Period of upto 15 minutes, 1 hour, 6 hours, 24 hours, have all been used (Thomas *et al*., 1988). According to the WHO, sudden death is defined as sudden unexpected death of a person usually seen within 24 hours of onset of symptoms.

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Usually these deaths occur within one hour of onset of symptoms and most patients are brought dead to the hospital. Sudden death is not necessarily unexpected and unexpected death is not necessarily sudden, but very often the two combinations coexist. Autopsy including histology remains the most accurate means of determining the cause of death along with other significant and incidental findings. In those cases where no significant gross anomalies are detected, Molecular and Verbal Autopsy play a significant role in identifying the cause of death.

MATERIALS AND METHODS

This 7 year retroprospective study which was done in the department of pathology in a tertiary care centre included 150 sudden deaths. A consent was taken from ethical committee of the institute prior to the commencement of study. The clinical information regarding all sudden deaths was collected from relatives, inquest panchanama, medical case history sheet and available records. Autopsy was performed after taking consent

from the relatives. External examination of body was done. After In situ examination of organs, all organs were removed and examined grossly. Representative sections from organs were taken, routine tissue processing and H and E staining was done. Special stains were done wherever necessary. Cause of death was given on the basis of gross autopsy and histopathological findings. Clinicopathological co-relation was done wherever possible.

RESULTS

Out of 1810 medicolegal autopsies, 150 (8.3%) cases were of sudden unexpected death. Most of the sudden deaths were in the age group 41-50 years (24%). Minimum number of deaths occurred in age below 10 years (2%).Out of 150 cases, males (111 cases). Outnumbered females (39 cases) contributing 74% and 26% respectively. In present study, brought dead cases contributed to 45.3% of which asymptomatic/ unwitnessed deaths were 31.3% and remaining 14.1 % were symptomatic but died before seeking medical attention. Cardiac causes accounted for 60.7% of all sudden deaths. Among cardiac deaths, brought dead cases accounted for 52.8%, of which 37.4% were asymptomatic and in 15.4% sudden death occured before medical attention.

Majority of cardiac deaths occurred in males (77%) in age ranging from 41-60 year.29.3% were known hypertensive, 4.7% were known diabetics, and in 4.7% of sudden deaths history of both hypertension and diabetes was present. History of smoking and chronic alcohol intake was reported in 13.3% and 16.7% deaths respectively. IHD accounted for majority of sudden cardiac deaths in our study. In IHD Tripple vessel disease was seen in 54.8%. Double vessel accounted for 28.3% and single vessel involvement was seen in 16.9%. LAD was involved in most of the cases. 18% (27 cases) of death accounted for respiratory cause (n=27). Out of which changes of lobar pneumonia was seen in 5.4% (8cases) and interstitial pneumonia in 4% (6 cases). Acute respiratory distress syndrome and pulmonary hemorrhages each accounted for 3.3% (5cases) and tuberculosis was noted in 2% (3 cases) Death due to vascular causes accounted for 5.3% (n=8) of which cerebrovascular accident and gangrenous bowel each constituted 2% of sudden deaths. Dissecting aortic aneurysm was seen in 1.3% of sudden deaths. 4.6% of sudden deaths (n=7) were due to hepatobiliary causes. Cirrhosis contributed for 2% followed by hepatitis and fatty liver1.3% each. 3.4% of sudden death were attributed to Gastrointestinal cause (n=5). Out of which gastrointestinal perforation was responsible for 4 deaths and acute haemorrhagic pancreatitis was noted in single case. Central nervous system disease accounted for 3.4% of sudden death s(n=5). Acute pyogenic meningitis was found in 3 deaths and lymphocytic meningitis in 2 sudden deaths. In 4.7% cases cause of death could not be determined. Such deaths can be attributed to primary electrical diseases of heart: Ventricular arrhythmias, congenital long QT syndrome, idiopathic ventricular arrhythmias, Wolf-parkinson-white syndrome, congenital complete atrioventricular block, hypertrophic cardiomyopathy.

Table 1. Distribution of causes of Sudden Cardiac Death (n=91)

Cause Of death	No. of cases	Percentage (out of total SCD)
Coronary artery disease	61	67
Hypertensive heart disease	11	12.1
Myocarditis	6	6.6
Biventricular hypertrophy	3	3.3
Valvular heart disease	3	3.3
Left ventricular hypertrophy	3	3.3
Dilated cardiomyopathy	2	2.2
Infective Endocarditis	2	2.2
Total	91	100%

Table 2. Distribution of causes of sudden death in various studies

Cause of death	Present study	Ahmed et al. (2005)	Mittal et al. (2013)	Chaudhari et al. (2013)	Thomas et al. (1988)
Cardiac	60.7	60-70	40.7	44.6	66.2
Respiratory	18	10	15.7	25.7	17.7
Vascular	5.3	9	-	-	3.4
Hepatobiliary	4.6	3	-	-	-
Gastrointestinal	3.4	3	7.6	11.3	2.2
Ccentral nervous sysem	3.4	-	6.8	6.2	4.3
Undetermined cases/ SADS	4.6	4	-		3.4
Others	-	-	29	12.2	2.8

Table 3. Distribution of IHD cases based on coronary vessels involvement

Study	Triple vessel disease	Double Vessel disease	Single Vessel disease
Present study	54.8	28.3	16.9
Liberthson et al.(1974)	60	26	14
Rissanen et al. (1978)	56	32	12
Marwah et al. (2011)	52	22	26
Garg et al. (2011)	44.5	42.2	13.3

DISCUSSION

In present study most of the sudden deaths were in the age group of 41-50 years (24%) which was comparable with the

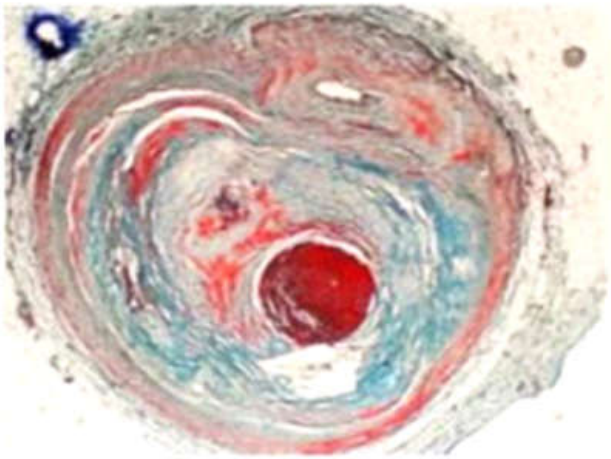
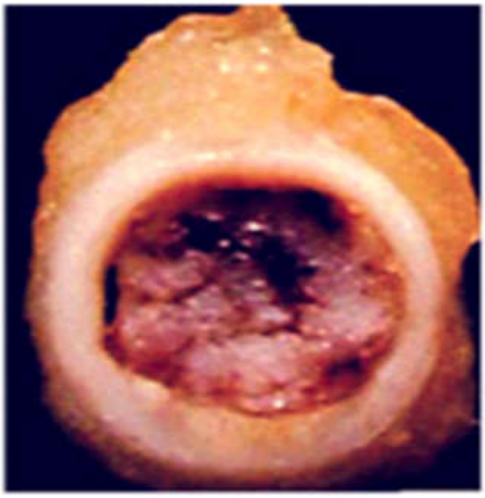


Fig. 5 Photomicrograph showing complicated atherosclerotic plaque. Intima shows thick bundles of collagen fibers. (Masson's trichrome stain, Magnification – 100x)



Gross appearance of right coronary artery with almost total obstruction due to thrombus formation

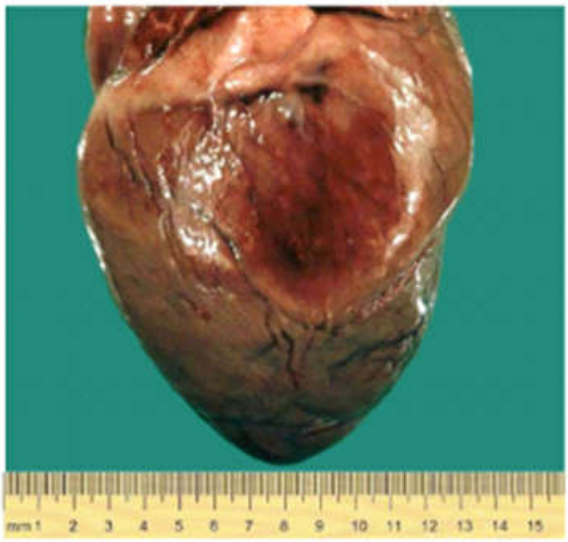


Fig. 7 showing large, dark mottled area on anterior surface of the heart in case of acute/recent myocardial infarction.

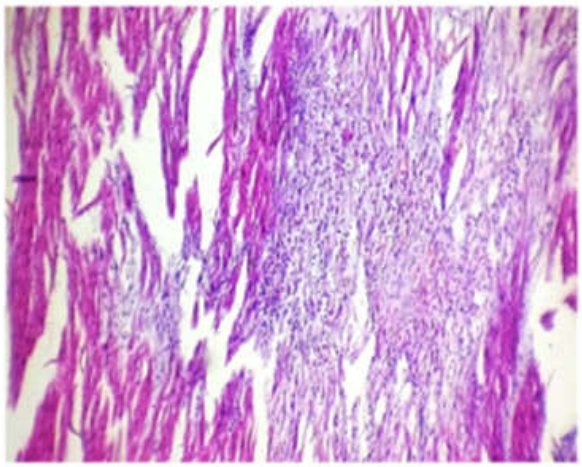


Fig. 8 – Photomicrograph showing focal area of ischaemic necrosis replacing the myocardium along with dense infiltration by acute inflammatory cells in a case of acute/recent mycardial infarction. (H & E , Magnification - 100x)

Gross appearance of the kidney in benign nephrosclerosis – fine, leathery granules on cortical surface

Fig 4: Gross specimen of alcoholic cirrhosis showing diffuse nodularity on external and cut surface.

study of Gupta *et al* (25%) (2011) and Chaudhari *et al* (30.81%) (2013). Most of the sudden deaths were noted in males (74%) with male to female ratio of 2.8:1 Puranik *et al*. (2005) found males predominance 70.7% with M:F ratio of 2.41:1. Distribution of causes of sudden death in various studies is shown in table no. 2 (Ahmad *et al*., 200; Mittal *et al*., 2013; Chaudhari *et al*., 2013; Thomas *et al*., 1988) In cardiovascular causes Coronary artery disease was found in 67% (61 cases) which is comparable with study of Matoba *et al*. (1989) 77%, Ahmed *et al*. (2005) 79% and Choudhari SH *et al* (5)76%. IHD cases accounted for 58.2% which is in accordance with the study of Thomas *et al*. (1988) (59%) and Choudhari *et al*. (2013) 40%. Distribution of IHD cases based on coronary vessel involvement is shown in Table No. 3. In sudden cardiac death hypertension was reported in 29.3% which is comparable with Adabag as *et al*. 58" (Liberthson *et al*., 1974). Pneumonia constituted the most common infective cause for respiratory deaths 9.3%. Similar observations were made by Choudhari *et al*. (2013) (11.3%), Chaturvedhi (Rissanen *et al*., 1978) (12%) In present study deaths due to vascular causes accounted for 5% which was comparable to study by Kasturi as *et al* 7.69%. (Nisha *et al*., 2011) In hepatobiliary diseases deaths due to cirrhosis were observed in 2%. Chaturvedhi *et al*. (Rissanen *et al*., 1978) reported 1.6% of death due to cirrhosis.

Gastrointestinal perforation was noted as a cause of death in 2.7% cases in present study. While Chaturvedhi *et al*. (Rissanen *et al*., 1978) reported 7.8% of the same. In present study 2% deaths occurred due to central nervous system causes. Kusun *et al* (Garg *et al*., 2011) found 13% sudden death due to central nervous system causes. Sudden deaths due to undetermined cause were4.6% which is comparable to study by Bowker *et al*. (4.1%) (Adabag *et al*., 2010). Now a days for effective evaluation of causes of sudden death, concept of verbal and molecular autopsy have come forward. Molecular autopsy plays a significant role in diagnosis of sudden unexpected death in adults where no significant morphological anomalies are detected at autopsy. Such cases of sudden death can be the first manifestation of an autosomally inherited condition in a family with the risk of surviving relatives being affected by same condition. Thus retrieving relevant tissue at autopsy followed by molecular analysis may reveal the cause of death and thus benefit the survivors. Verbal autopsy provides effective information regarding causes of sudden death. It also helps in identifying risk factor for certain diseases and further investigating the outbreaks of infectious diseases and in measuring the effect of public health interventions.

Conclusion

Sudden death is an important public health problem worldwide. We conclude that disease of the cardiovascular system are the major contributing factor for sudden natural death. The higher prevalence of sudden cardiac death might also be due to absence of the "chain of survival" i.e. emergency medical services in rural areas and lack of awareness of the symptoms of myocardial infarction. Thus improving health care infrastructure, access, and utilization, implementation of emergency medical services, encouraging subjects to seek medical attention promptly on the first manifestation may have a role in decreasing sudden cardiac death, ultimately reducing sudden death. Thus autopsy study may be useful in teaching, research programes and planning of medical services on community level.

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