

Analysis of Causes of Sudden Death on the Basis of Autopsy Findings-A Study of 40 Cases at Tertiary Care Hospital, Quetta Balochistan

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ABSTRACT

Objective: To study the spectrum of sudden death cases at Combined Military Hospital (CMH), Quetta Pakistan.

Study Design: Case series study.

Place and Duration of Study: Combined Military Hospital, Quetta Pakistan, from Jun 2014 to Jun 2019.

Methodology: The study included all the autopsies/postmortems carried out on the cases due to sudden death from June 2014 to June 2019 at Combined Military Hospital, Quetta Pakistan. Detailed postmortem, internal and external examination, and histomorphology of vital organs were done in all cases of sudden death.

Results: A total of 40 cases of sudden deaths were studied. The age of the study subjects ranged from 24 to 45 years. Maximum deaths occurred in the age group between 30 to 45 years. The cause of death in 22 cases (55%) was attributed to cardiac events, the most common cause being coronary artery disease (59.0%). The remaining 18 cases (45%) were due to other non-cardiac causes.

Conclusion: Sudden death is the most common cause seen in young adults, most of which are attributed to cardiac causes. This study highlights serious health issues in our setup and the necessity to create awareness among the young adults at risk so that sudden deaths can be averted and life expectancy can be improved.

Keywords: Autopsy, Histomorphology, Sudden death.

How to Cite This Article: Azam M, Asif N, Nasir S, Tashfeen S, Quayyum N, Gul I. Autopsy-Based Study of Sudden Death-A Study of 40 Cases at Combined Military Hospital Quetta, Pakistan. *Pak Armed Forces Med J* 2022; 72(6): 1891-1894. DOI:<https://doi.org/10.51253/pafmj.v72i6.3365>

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INTRODUCTION

Autopsy is the systemic examination of the remains of a deceased to determine the extent of the disease effect of treatment and to determine the unknown ailment which could have contributed to the death.^{1,2} Traditionally, the autopsy has been classified into two main categories: clinical/hospital autopsy and medico-legal autopsy. According to World Health Organization (WHO), sudden death can be defined as "death which occurs within twenty-four (24 hours) from the time of the start of symptoms". In other words, it can also be defined as death which is sudden, unexpected and clinically cannot be explained, or otherwise obscure, even though there needs to be no unnatural element in their causation.³ Such rapid deaths are more often attributed to cardiovascular causes. Sudden rapid deaths due to cardiovascular causes can be prevented if patients at risk are identified and referred to a cardiac physician for time management.⁴

Paradoxically, however, a global decline in the autopsy rate has been noted since 1950, which has been

of growing concern.⁵ In developing countries, the negative attitude of medical personnel, the unwillingness of patients' relatives to give consent to autopsy and the religious and cultural practices seem to be the most important factors.^{6,7}

A study was carried out in CMH Quetta to analyze the pattern of deaths among postmortem cases over five years. The objective of this study was to share the experience and to chart out various patterns of deaths, which will help take some remedial measures to prevent some sudden deaths in future. In addition, the study aimed to analyze the spectrum of sudden death, including frequency, age distribution and histopathological pattern of deaths at CMH Quetta.

METHODOLOGY

This case series study was conducted at the Histopathology Department of Combined Military Hospital, Quetta Pakistan, from June 2014 to June 2019. After approval of the institutional Ethical review board and written consent of deceased attendants, the record of all the autopsies performed from June 2014 to June 2019 was retrieved.

Inclusion Criteria: Patients of all age groups who died within 24 hours after the onset of symptoms were included in the study.

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Received: 18 Oct 2019; revision received: 25 Sep 2020; accepted: 29 Sep 2020

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Exclusion Criteria: Deaths from road traffic accidents, homicidal, suicidal and blast injuries were excluded from the study.

The patients' stay in the hospital from admission to the time of death was extracted from admission papers, autopsy registers and reports. The clinical cause of death was extracted from the history and clinical notes of the treating physician. Postmortem of all the cases was carried out in the autopsy room of CMH Quetta. External examination was performed in each case to collect information regarding time since death, presence of postmortem lividity and rigour mortis, and any significant external abnormality. A detailed internal examination was conducted to find evidence of pneumothorax, haemothorax, pericardial effusion, intestinal perforation, fluid in the peritoneal cavity, and coarctation of the aorta and aortic aneurysm. Vital internal viscera of different systems were removed for detailed gross and histomorphological examination.

Viscera for histomorphological examination were preserved in 10% formal saline and sent to the Histopathology Department of CMH Quetta. Viscera were dissected, and sections were prepared. Multiple sections were taken with 4-5 mm thickness. Tissue sections were processed, cut at a thickness of 04 μ m by microtome and stained with routine eosin and hematoxylin. Tissue slides were examined under a light microscope and histological findings were noted. The final cause of death was established according to gross and histomorphological findings. Data was collected and analyzed.

Specimens for toxicological examination of abdominal viscera (stomach and small intestine along with its contents, liver kidney) were collected in all sudden and suspicious death cases. These specimens were sent for chemical examination to Punjab Forensic Sciences Laboratory, Lahore to exclude any possibility of poisoning.

Statistical Package for Social Sciences (SPSS) version 21.0 was used for the data analysis. Quantitative variables were summarized as Mean \pm SD and qualitative variables were summarized as frequency and percentages.

RESULTS

One hundred autopsy specimens were reviewed from June 2014 to June 2019, out of which forty cases were of sudden deaths. Age ranged from 24 to 45 years with a mean age of 35.3 \pm 3.5 years. The maximum

number of deaths was in the age group of 30-45 years (Table-I).

Table-I: Age Distribution of Sudden Deaths (n=40)

Age Range (years)	n(%)
20 to 30	7(17.5%)
31 to 35	11(27.5%)
36 to 40	14(35.0%)
41 to 45	6(15.0%)
46 to 50	2(5.0%)

Among the autopsied sudden deaths histopathologically, most of the deaths (n=22, 55%) were because of cardiovascular events. Coronary artery disease was the major cardiac cause of sudden deaths (59%) (Table-II). Other cardiac causes of sudden death were cardiomyopathies (9.1%), myocarditis (9.1%), aortic aneurysms (4.5%) and unascertained cases contributed about 18.2%. Table-III showed the various non-cardiac causes of sudden death.

Table-II: Various Cardiac Causes of Sudden Deaths (n=22)

Diseases	n(%)
Coronary artery disease	13 (59.0%)
Cardiomyopathies	2(9.1%)
Myocarditis	2(9.1%)
Coarctation of aorta	1 (4.6%)
Unascertained	4 (18.2%)

Table-III: Various Non-Cardiac Causes of Sudden Deaths (n=18)

Diseases	n(%)
Pulmonary causes	4(22.0)
Septicemia	3(16.7)
Cerebrovascular causes	3(16.7)
Enteric perforation	2(11.0)
Renal and liver failure	1(5.8)
Others	5(27.8)

DISCUSSION

The main responsibility of a pathologist is to find out the appropriate cause of death and to see the possibility of toxic drugs and other unnatural deaths. In this process, the first step is to consider the natural death followed by non-cardiac causes. The next step is to consider the gross (macroscopic) findings, e.g., plaques, embolism etc. and microscopic findings (e.g., atherosclerosis and myocarditis) in the heart. Finally, it is important to reanalyze history and do the toxicological screening.^{8,9} Among forty autopsied cases of sudden deaths in our study, 22 deaths (55%) were due to cardiovascular diseases, ischemic heart disease (IHD) secondary to coronary artery atherosclerosis being the most common cause. These results are

comparable with a study conducted by Farb *et al.*¹⁰ They also revealed that sudden deaths were most commonly because of cardiac diseases. The maximum number of cases were seen in the age group 31-40 years, which was also comparable to the study done by Doolan *et al.*¹¹ Results of our study are comparable with another study done by Luqman *et al.*¹² where sudden cardiac deaths accounted for 28% of all the deaths, in which 72% of cases were under the age of 40 years. Though CAD forms the main bulk of sudden cardiac deaths, there are a variety of other cardiac diseases like cardiomyopathies and inflammatory diseases like myocarditis which are comparable to the study conducted by Ladich *et al.* and Ahmad *et al.*^{13,14}

Sudden deaths due to neurological diseases account for four deaths (3.33%). The chief COD was due to cerebrovascular accidents. This was comparable to the study conducted by earlier.^{15,16}

It has been revealed from our study that coronary artery disease is no longer a disease of old age. It has emerged as a great challenge for the young population. Screening and preventive measures in our setup should be aimed at the young population. The campaign should be launched to make our young generation aware of risk factors for IHD. There is a need for time to change our sedentary lifestyle and eating habits. All young personnel suffering from various risk factors like hypertension, hyperuricemia, hyperlipidemia and Diabetes Mellitus or having strong family history should be instructed to have regular checkups and follow up.

Histopathologically while observing and examining various types of acute coronary events, non-occlusive mural thrombus was the most common cardiac event in most of the studies, followed by plaque rupture and occlusive thrombus.¹⁷ Plaque rupture was more common in uncalcified plaques than vulnerable calcified ones. Inflammation plays a vital role in the vulnerability of plaque. The most important feature of unstable or fragile plaques is a dense core of cholesterol, triglycerides outer thin fibrous coat, and many inflammatory cells, including foamy macrophages. The outer fibrous cap is the only plaque component that separates the blood compartments containing coagulation factors. As this fibrous cap ruptures, it allows contact of these coagulation factors with tissue factors and promotes thrombosis.¹⁸

CONCLUSION

In this study, it has been revealed that a significant number of sudden deaths occur in young personnel,

particularly in subjects over 30 years. Cardiac causes contributed the maximum number, and atherosclerosis was the main culprit. It is a real challenge for healthcare providers, and increased awareness is needed among at-risk individuals. Precautionary measures against preventable factors should be taken. Regular checkups after the age of 30 years may be mandatory so that sudden deaths can be averted and life can be improved.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MA: Conception, data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

NA: Study design, drafting the manuscript, approval of the final version to be published.

SN & ST: Drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

NQ & IG: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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