ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 7, Issue – 4, July – 2022 , Page No. : 07 - 13

A study of cardiac lesions in Forensic autopsies due to natural death in and around Visakhapatnam from April 2015 to March 2016

[1]Dr. Vinod Vamsi Kiran Omini, Assistant Professor, Department of Forensic Medicine, Maharajah's Institute of Medical Sciences, Vizianagaram.

[2]Dr. Vamsya Raj Kurimella, Assistant Professor, Department of Pathology, Maharajah's Institute of Medical Sciences, Vizianagaram.

[3]Dr. Surada Chandrika, Assistant Professor, Department of Community Medicine, Government Medical College, Srikakulam.

Corresponding Author: Dr. Surada Chandrika, Assistant Professor, Department of Community Medicine, Government Medical College, Srikakulam.

Citation this Article: Dr. Vinod Vamsi Kiran Omini, Dr. Vamsya Raj Kurimella, Dr. Surada Chandrika, "A study of cardiac lesions in Forensic autopsies due to natural death in and around Visakhapatnam from April 2015 to March 2016", IJMSIR- July - 2022, Vol – 7, Issue - 4, P. No. 07 – 13.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: Sudden, unexpected deaths can occur in all age groups; however, etiologies vary by age and in some cases by ethnicity. In India due to Illiteracy, poverty and least consciousness regarding health, the magnitude of Sudden Cardiac Death (SCD) is continued as a major public health problem.

Objectives

1. To establish the role played by cardiac causes in sudden and unexpected deaths.
2. To analyze the incidence of sudden cardiac death in relation to age and sex.
3. To analyze different cardiac diseases leading to sudden death.
4. To study histopathological findings in the morbid organ to establish the cause of death.

Methodology: A retrospective record-based medico-legal autopsy study was conducted in the Department of Forensic Medicine, Andhra Medical College, Visakhapatnam from April 2015 to March 2016. All the cases were reviewed retrospectively and cases who dies suddenly or unexpectedly due to natural cause were identified. Full autopsies were performed in all cases. The Undiagnosed deaths occurring within 24 hours of admission to hospital and the attending doctors were unable to determine the cause of death and brought dead cases brought to autopsy and the cause of death remained undiagnosed and with gross pathological finding confirmed by histopathology were included. The cases with obscure cause of death were excluded. History about the cases was obtained retrospectively from 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. Heart specimen is fixed properly before it is subjected for Histo

pathological examination in the Upgraded Department of Pathology, Andhra Medical College, Visakhapatnam. Data analysis was done by using SPSS software (trial version 21) and Microsoft Excel work sheet 2013. Categorical variables were represented as proportions /percentages.

Results: Total number of medico-legal autopsies conducted during study period was 1747, among these Natural Deaths are 70 in number in which 52(74%) are of cardiac origin. Out of 52 cardiac cases 51 cases are males and only 1 case is female. Among 52 cardiac deaths 29% of cases fall in the age group 40-49 years, 23% fall in the age group 50-59 years. Among 52 cardiac deaths which are reported 43cases (83%) are due to coronary artery disease, 8cases (15%) are due to cardiomyopathy, 3% cases are due to heart valve disease.

Conclusion: Even though we cannot change the etiology of SCDs, we can be able to decrease the incidence up to certain extent increasing the awareness about the most alarming causes of SCDs and also by providing training about Cardiopulmonary Resuscitation techniques among the common public.

Keywords: Forensic autopsies, Natural death, Sudden cardiac death,

Introduction

Natural death defines the death primarily attributed to an illness or an internal malfunction of the body, and not directly influenced by external forces. The forensic pathologists can straightforwardly identify the cause of natural death when macroscopic investigations are conclusive.[1] However, when a macroscopic cause is not evident, the final identification of causality can become tedious and complicated. Despite comprehensive macroscopic, microscopic as well as toxicological investigation, around 5%-10% of cases will remain unexplained and will be classified as sudden unexpected deaths (SUD), often defined in the report as death from a supposed arrhythmia.[2,3]

Myocarditis or myocardial inflammation is a common finding in forensic and clinical autopsies, with incidences of myocarditis in autopsy studies of sudden cardiac death ranging from 0.3% to 14.8%, including infants, children and adults.[4-8] It is however long recognized that the histopathological diagnosis of myocarditis is challenging.[8-11] Besides that, the clinical presentation of myocarditis is highly variable, ranging from subclinical "flu-like" symptoms to sudden death.[9,12,13]

Sudden, unexpected deaths can occur in all age groups; however etiologies vary by age and in some cases by ethnicity. The individual's age, personal medical history, and family history can provide valuable information in developing a differential diagnosis and in directing ancillary studies at autopsy. Cardiovascular causes of death in infants and young children are typically due to myocarditis (usually viral), various congenital diseases or syndromes with either primary or secondary involvement of the heart, or congenital heart defects. Adolescents and young adults dying suddenly and unexpectedly from natural processes typically have some form of heart disease, of which hypertrophic cardiomyopathy is the most common.[14] In India due to Illiteracy, poverty and least consciousness regarding health, the magnitude of Sudden Cardiac Death (SCD) as a public health problem is highlighted by the estimate that ~50% of all cardiac deaths are sudden and unexpected, at least two-thirds of which are first cardiac events or occur among population subsets with previously known heart disease considered to be relatively low risk.[15]

Objectives

- To establish the role played by cardiac causes in sudden and unexpected deaths.
- To analyze the incidence of sudden cardiac death in relation to age and sex.
- To analyze different cardiac diseases leading to sudden death.
- To study histopathological findings in the morbid organ to establish the cause of death.

Methodology

Study design: A retrospective record-based medico-legal autopsy study

Study setting: The present study was conducted in the Department of Forensic Medicine, Andhra Medical College, Visakhapatnam.

Study period: From April 2015 to March 2016.

Study population: All the cases were reviewed retrospectively and cases who dies suddenly or unexpectedly due to natural cause were identified. Full autopsies were performed in all cases.

Inclusion criteria

- The Undiagnosed deaths occurring within 24 hours of admission to hospital and the attending doctors were unable to determine the cause of death.
- Brought dead cases brought to autopsy and the cause of death remained undiagnosed
- With gross pathological finding confirmed by histopathology.

Exclusion criteria

- Cases with obscure cause of death.

Method of data collection

History about the cases was obtained retrospectively from 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. After the removal of heart specimen from the patient, a series of processes must take place to ensure the final microscope slides are of a diagnostic quality. The journey of heart specimen to microscopic slides level begins with the dissection of heart after removal from the cadaver. The heart dissection was done opening along the path of blood flow and or Ventricular slicing. Heart specimen is fixed properly before it is subjected for Histopathological examination in the Upgraded Department of Pathology, Andhra Medical College, Visakhapatnam. The importance of a positive family history in the study sample, based on the history derived from the near relatives.

Ethical considerations

After obtaining permission from the Institutional Ethics Committee, Andhra Medical College, Visakhapatnam, Andhra Pradesh, the study was commenced.

Statistical analysis

Data analysis was done by using SPSS software (trial version 21) and Microsoft Excel worksheet 2013. Categorical variables were represented as proportions/percentages and quantitative variables were represented as means and standard deviation.

Results

Total number of Autopsies conducted in the department during study period was 1747, among them natural deaths are 70 in number (4%).

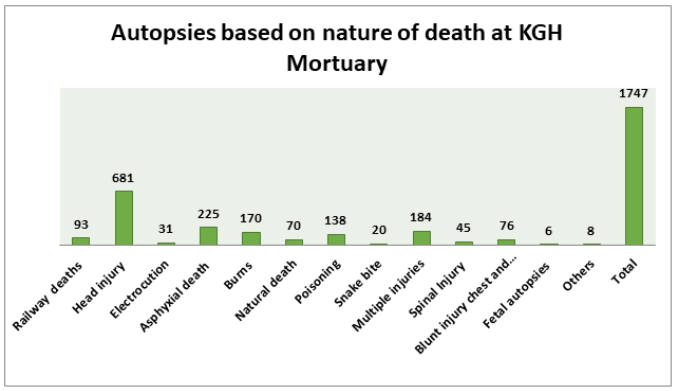

Figure 1: Number wise Autopsies based on nature of death

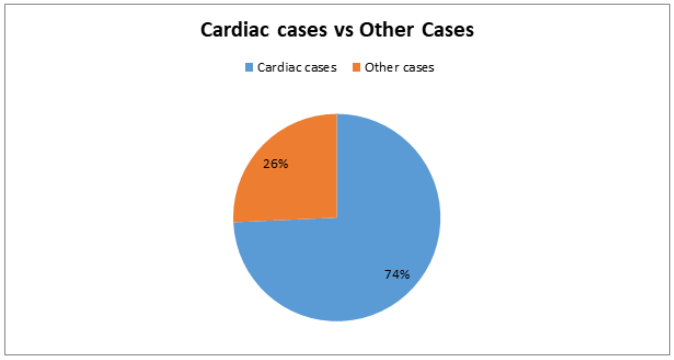

Figure 2: Cardiac cases Vs other cases

Total number of medico-legal autopsies conducted during study period was 1747, among these Natural Deaths are 70 in number in which 52(74%) are of cardiac origin. Among cardiac deaths first commonest is coronary artery disease followed by cardiomyopathies.

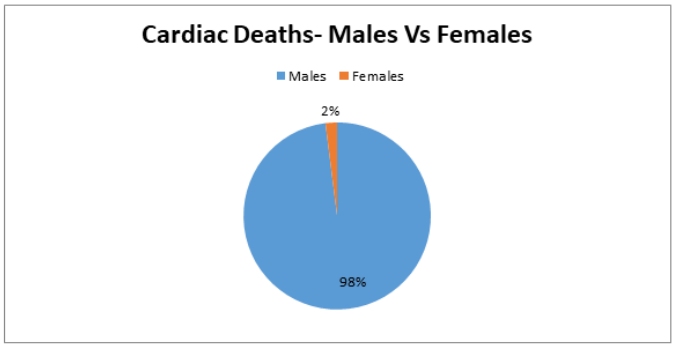

Figure 3: Gender wise distribution of cardiac deaths

On comparison of cardiac deaths among males and females, it has been noted that male victims are outnumbered then females but, in both sexes, cardiac deaths are alarming. Out of 52 cardiac cases 51 cases are males and only 1 case is female.

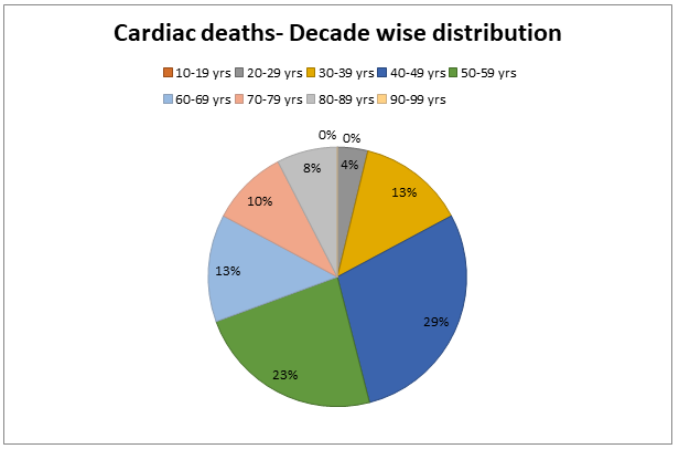

Figure 4: Age wise distribution of cardiac deaths

Among 52 cardiac deaths 29% of cases fall in the age group 40-49 years, 23% fall in the age group 50-59 years, 13% fall in age group 60-69 years, 13% fall in age group 30-39%, 10% fall in age group 70-79years, 8% fall in age group 80-89 years, 4% fall in age group 20-29 years. It is evident from the study that there are no cases reported below the age of 20 years and the number inclining decade by decade, 83% of cases are above 40 years.

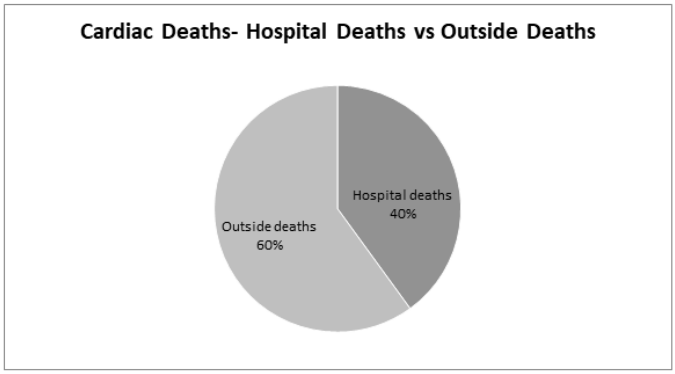

Figure 5: Cardiac deaths- Hospital Vs Outside

Among 52 cases of cardiac deaths, in 31 (60%) cases death occurred outside hospital and in 21 (40%) cases death occurred in hospital. Among the deaths which occurred in the hospital the survival time varied from 12-24 hours. This percentage matches the definition of sudden death and how cardiac pathology can take away

life of an individual in short time. To support this observation most of the cases of sudden cardiac deaths occur with an episode of syncope followed by death either immediately or within few hours.

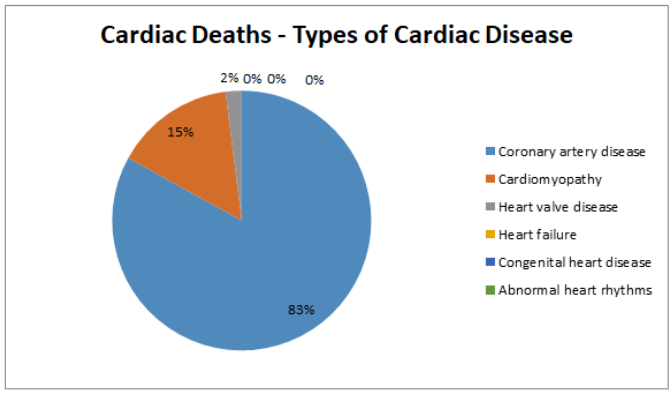

Figure 6: Distribution of type of cardiac disease in cardiac deaths

Among 52 cardiac deaths which are reported 43cases (83%) are due to coronary artery disease, 8cases (15%) are due to cardiomyopathy, 3% cases are due to heart valve disease. So death due to coronary artery disease is dominant in the present study. Coronary artery disease is a silent killer and has become a dominant cause for sudden deaths due to cardiac origin.

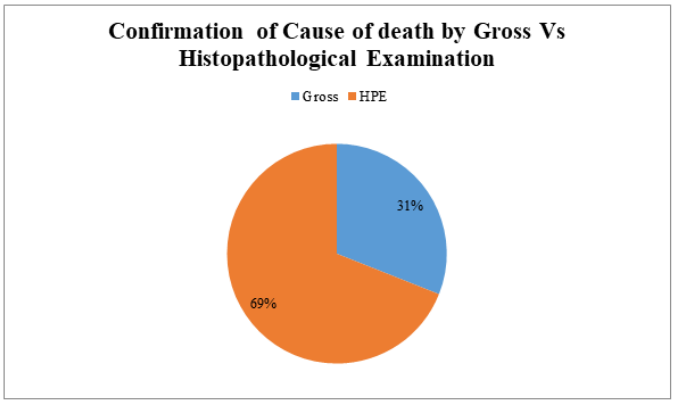

Figure 7: Confirmation of cause of death by Gross Vs Histopathological examination

In the present study 69% of cases, cause of death are confirmed by Histopathological report and 39% of my cases the cause of death is given basing on the gross findings. Gross findings include size and dimensions of heart, ischemic zones seen as reddish or bluish pale areas, dissection of cardiac chambers, dissection of coronary blood vessels for narrowing of their lumen. After reviewing the gross and Histopathological findings the most common among the coronary arteries having coronary artery disease is Left Anterior Descending (LAD) branch and closely followed by Right Coronary Artery (RCA).

Discussion

A total of 1747 autopsies were conducted during study period in the Department of Forensic Medicine and Toxicology, Andhra Medical College, among which 74% (52) were cardiac deaths. Similar findings were seen in study done by Herath JC et al.,[16] who reported that 64.1% sudden deaths were due to cardiovascular causes. The present study findings were compared with study done by Anand Mugadlimath et al.,[17] who reported that 44.6% of cases sudden deaths were due to cardiac deaths. In the present study among the cardiac deaths 98% are males and 2% were females. Similarly in a study done by Anand Mugadlimath et al.,[17] who stated that male were most commonly affected with sudden cardiac deaths. This shows a clear association of male sex with SCDs. Perusal of data collected depicts that the age wise distribution of cases where the majority of sudden cardiac deaths occurred in the age group of 40-60 years. Similar findings were observed in a study done by Anand Mugadlimath et al.,[17] who stated that maximum number of sudden cardiac deaths occurred in the age group 40 to 50 years.

Among the cardiac deaths 60% cases death occurred outside and 40% cases death occurred after hospitalization. In the present study among Sudden cardiovascular deaths, most common cause of SCDs was coronary artery disease (83%) and second most leading

cause occupied by cardiomyopathies (15%), heart valve disease (2%). Similar findings were observed in a study done by Anand Mugadlimath et al.,[17] who reported that 71.83% of cases the coronary artery disease was common cause of sudden cardiac death. Similarly in a study done by Sanchez O et al.,[18] who reported that 45.45% of cases coronary artery disease was the common cause of SCD. In the present study Among 52 cardiac cases 69% cases cause of death was confirmed by histopathology report and in 31% of cases cause of death was given basing on gross findings of the heart. Most of cases in this study had an episode of syncope among which some of them died instantaneously and some died after hospitalization.

Conclusion

In the present study among sudden cardiac deaths majority of the cases identified the cause of death was coronary artery disease (83%). Even though we cannot change the etiology of SCDs, we can be able to decrease the incidence up to certain extent increasing the awareness about the most alarming causes of SCDs and also by providing training about Cardiopulmonary Resuscitation techniques among the common public will help to reduce immediate deaths after the cardiac event. Regular screening of risk groups will be very helpful.

References

1. Sinard JH. Accounting for the professional work of pathologists performing autopsies. Arch Pathol Lab Med. 2013; 137:228±232.

2. Lawler W. The negative coroner's necropsy: A personal approach and consideration of difficulties. Journal of clinical pathology. 1990; 43:977±980.

3. Oliva A, Brugada R, D'Aloja E, Boschi I, Partemi S, Brugada J, et al. State of the art in forensic investigation of sudden cardiac death. Am J Forensic Med Pathol. 2011 Mar; 32:1±16.

4. Ding Z, Yang M, Wang Y, et al. Retrospective analysis of 769 cases of sudden cardiac death from 2006 to 2015: a forensic experience in China. Forensic Sci Med Pathol. 2017;13:336–341.

5. Lynge TH, Nielsen TS, Winkel BG, et al. Sudden cardiac death caused by myocarditis in persons aged 1–49 years: a nationwide study of 14 294 deaths in Denmark. Forensic Sci Res. 2019;4:247–256.

6. Vassalini M, Verzeletti A, Restori M, et al. An autopsy study of sudden cardiac death in persons aged 1–40 years in Brescia (Italy). J Cardiovasc Med. 2016;17:446–453.

7. Wu Q, Zhang L, Zheng J, et al. Forensic pathological study of 1656 cases of sudden cardiac death in Southern China. Medicine. 2016;95:e2707.

8. Nielsen TS, Nyengaard JR, Møller J, et al. Quantitative diagnosis of lymphocytic myocarditis in forensic medicine. Forensic Sci Int. 2014;238:9–15.

9. Caforio ALP, Pankuweit S, Arbustini E, et al. Current state of knowledge on aetiology, diagnosis, management, and therapy of myocarditis: a position state statement of the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases. Eur Heart J. 2013;34:2636–2648.

10. Gras Meyer S, Madea B. Immunohistochemical diagnosis of myocarditis on (infantile) autopsy material: does it improve the diagnosis? Forensic Sci Med Pathol. 2015;11:168–176.

11. Bonsignore A, Palmiere C, Buffelli F, et al. When is myocarditis indeed the cause of death? Forensic Sci Int. 2018;285:72–76.

12. Leone O, Pieroni M, Rapezzi C, et al. The spectrum of myocarditis: from pathology to the clinics. Virchow's Arch. 2019;475:279–301.

13. Casali MB, Lazzaro A, Gentile G, et al. Forensic grading of myocarditis: an experimental contribution to the distinction between lethal myocarditis and incidental myocarditis. Forensic Sci Int. 2012;223:78–86.

14. Maron BJ, Towbin JA, Thiene G, et al. Contemporary definitions and classification of the cardiomyopathies: an American Heart Association Scientific Statement from the Council on Clinical Cardiology, Heart Failure and Transplantation Committee; Quality of Care and Outcomes Research and Functional Genomics and Translational Biology Interdisciplinary Working Groups; and Council on Epidemiology and Prevention. *Circulation*. 2006 Apr 11. 113(14):1807-16.

15. . Harrison‘s Principles of Internal Medicine; 17th Edition; Part 11, section 2; chapter 267: 1707-1709.

16. Herath JC, Liu O. Sudden natural deaths in Ontario, Canada: A retrospective autopsy analysis (2012–2016). J Forensic Sci Med.2020;6:18-26.

17. Sandesh H. Chaudhari, Anand Mugadlimath, Mandar Sane, K. U. Zine, D. I. In gale, Rekha Hiremath. Study of sudden natural deaths in medico legal autopsies with special reference to cardiac causes. Int J Cur Rev.2013;5(3):37-42

18. Sanchez O, Campusano O, Fernandez- Falgueras A, Sarquella-Brugada G, Cesar S, Made Mont I, et al. (2016) Natural and Undetermined Sudden Death: Value of Post- Mortem Genetic Investigation. PLoS ONE.2016;11(12): e0167358.