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ORIGINAL ARTICLE

A RETROSPECTIVE STUDY OF CARDIAC DEATHS REPORTED TO THE DEPARTMENT OF FORENSIC MEDICINE, UNIVERSITY OF PERADENIYA, SRI LANKA

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ABSTRACT

Cardiac pathologies contribute to a significant number of deaths every year worldwide. This retrospective descriptive study was to determine the associations between the sex, age, weight of the heart and the cause of cardiac death of deceased individuals who were subjected to medico-legal autopsies in a local setting. Data was collected by scrutinizing the postmortem data records available at the Department of Forensic Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka, from 1st January 2017 to 31st December 2023. Using SPSS, descriptive analyses, ANOVA and binary logistic regression were employed to explore the associations between the variables. A total of 283 autopsy cases were considered, comprising 66.8% males. Among the subjects, 31.3% belonged to the age group of 70-79 years, followed by 29.3% from 60-69 years. Causes of cardiac deaths related to coronary artery pathologies contributed to 82.7% of the cases, with ischaemic heart disease (49.8%) and myocardial infarction (25.4%) being the most common. The ANOVA test showed a statistically significant difference between heart weight among the sexes ($p<0.001$), while heart weight showed a significant difference between the age groups of 50-59 and 80 and above ($p=0.016$). A binary logistic regression approach to exploring associations between age, sex, height, and heart weight with the causes of cardiac death (coronary vs. non-coronary) revealed a limited predictive power. Preventive measures and health education should be prioritized to minimize cardiac deaths, especially those due to coronary artery pathology. The importance of further research to improve the predictive modelling of causes of cardiac deaths is also highlighted.

Keywords: *Autopsy, coronary vessels, myocardial ischaemia*

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INTRODUCTION

An estimated 17.9 million people die from cardiovascular diseases (CVD) every year, which is the leading cause of death in the modern world[1]. When considering sex, many studies have shown that there are differences in the incidence of CVD, which can be attributed to structural and physiological differences[2]. It has also been shown that the incidence of cardiac death (CD) increases with age in both men and women since the prevalence of ischemic heart disease (IHD) increases with age[3].

The weight of the heart is often considered an indicator of cardiac pathology. In conditions such as hypertensive cardiomyopathy and hypertensive heart disease, the weight of the heart is increased because of symmetric or asymmetric ventricular hypertrophy[4]. Narrowing of the lumen of coronary arteries that supply the myocardium, due to atheromatous calcification can lead to chronic ischaemia and the development of an abnormal heart rhythm[5].

OBJECTIVES

The objective of this study was to determine the associations between the sex, age, height, weight of the heart and the cause of CD of deceased individuals who were subjected to medico-legal autopsies at the Department of Forensic Medicine, University of Peradeniya, Sri Lanka, from 2017 to 2023.

METHODS

This retrospective descriptive study was conducted by scrutinizing the postmortem data records available at the Department of Forensic Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka, from 1st January 2017 to 31st December 2023. Collected data was analysed using IBM SPSS Statistics version 26. This study was exempted from ethics review (Ref. No. 2023/EC/70) by the Ethics Review Committee, Faculty of Medicine, University of Peradeniya.

RESULTS

A total of 283 autopsy cases were considered in this study, which consisted of 189 (66.8%) males and 94 (33.2%) females. The age ranged from 32 to 97 years, with a mean of 67.07. Most cases were reported from the 70–79 age group (89, 31.4%). Nearly three-fourths of the deaths (207, 73.1%) were among individuals over 60 years old. The mean height was 162.5 cm while the mean postmortem weight of the heart in the study sample was 370.6 g.

Table 1: Frequency of cause of death in the study sample

Cause of death	Frequency (%)
Ischaemic heart disease	141 (49.8)
Myocardial infarction	72 (25.4)
Haemopericardium	21 (7.4)
Hypertensive heart disease	16 (5.7)
Atherosclerotic heart disease	14 (4.9)
Coronary artery thrombosis	7 (2.5)
Valvular heart disease	6 (2.1)
Heart failure due to secondary causes	4 (1.4)
Cardiomyopathies	1 (0.4)
Acute pericarditis	1 (0.4)

The most common cause of death (COD) was ischaemic heart disease (IHD), which accounted for almost half of the sample, followed by myocardial infarction (MI), which consisted of a quarter of the cases (Table 1). In a broader classification, coronary vascular causes, including IHD, MI, atherosclerotic heart disease, and coronary artery thrombosis, accounted for 234 (82.7%) cases.

When the ANOVA test was applied to compare heart weights across age groups, there was a statistically significant difference ($p=0.021$) in heart weight between at least two age groups at a 95% level of confidence. Furthermore, Tukey's HSD test showed that the mean heart weight between the age groups of 80 years and above and 50-59 years showed a significant difference ($p=0.016$). Comparison of heart weight across the two sexes using ANOVA showed that there was a statistically significant difference in heart weight between males and females ($p<0.001$).

Binary logistic regression was used to explore associations between age, sex, height, and heart weight with the identified causes of CD (coronary vs. non-coronary). It revealed limited predictive power regarding the identified causes of CD as binary variables of coronary and non-coronary causes. Therefore the model's ability to distinguish between coronary and non-coronary causes of death would be limited.

DISCUSSION

In this study sample, two-thirds of the deceased individuals were males. It had been previously observed that there can be differences in the incidence of cardiac pathologies between males and females[2]. Similarly, in the Sri Lankan context, it has been observed that male CDs are more frequent[6], which was evident in this study as well. It had also been previously studied that males are likely to develop a cardiac disease as a first event, while females are more prone to developing heart failure or a cerebrovascular event first[7]. However, in the limited scope of this study, it was challenging to address that issue. In relation to the sex and the weight of the heart, the literature shows that males have heavier hearts[8], as was the case in this study as well.

Manifestations of cardiac disease are more likely to appear at older ages and therefore CDs are more common among the older age groups[7]. It has also been shown that, in both sexes, the incidence of CD increases with age, together with the prevalence of heart disease, and the peak of CD is between 45 and 75 years[3]. In our study also, the highest number of deaths and the peak were reported in similar age groups. Age is considered a factor that influences the weight of the heart[9]. Similarly, in our study, there was a significant difference between the weight and age of the subjects.

Weight of the heart is often associated with cardiac pathologies and death, especially in cardiomyopathies and hypertensive heart disease[4]. In our study, such an association could not be established, emphasizing the need for wider studies.

Previously published literature reviews on CD reveal that pathologies in coronary vasculature account for around 70-80% of all CD[10], which is also reflected in our study sample as well. However, the use of a binary logistic regression model was unsuccessful since it could not demonstrate significant associations between the COD and other variables. A reason for this issue could be that there might be individuals with more than one cardiac pathology present, but only one pathology had been documented as the COD, as the immediate COD in the World Health Organisation format for determining the COD in CDs.

CONCLUSIONS

The findings of the study revealed that the incidence of CDs is higher among males and in older age groups, while the coronary artery pathologies contributed to most of the CDs in the said sample. While the two sexes had significant differences in heart weight, only two age groups showed a significant difference in heart weight. The binary logistic regression approach to explore the association between age, sex, height of the deceased, and heart weight with coronary and non-coronary CODs showed poor predictive accuracy.

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None.

CONFLICTS OF INTEREST

The author declared no conflicts of interest.

DISCLOSURE

EMKBE and ANV are members of the Editorial Board of the Sri Lanka Journal of Forensic Medicine, Science & Law. Therefore, they did not participate in any way in the publication/decision-making process of this submission, as per journal policy.

ETHICAL ISSUES

This study was exempted from ethics review (Ref. No. 2023/EC/70) by the Ethics Review Committee, Faculty of Medicine, University of Peradeniya.

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None.

AUTHOR CONTRIBUTIONS

EMKBE: Conception and design of the work; the acquisition, analysis, and interpretation of data for the work; drafting the work and revising it critically for important intellectual content; and final approval of the version to be published. **ND:** Conception and design of the work; the acquisition, analysis, and interpretation of data for the work; drafting the work and revising it critically for important intellectual content; and final approval of the version to be published. **ANV:** Conception and design of the work; the

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