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Sociodemographic Profile and Causes of Death in brought Dead Cases- An Autopsy Based Study.

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Abstract

Background: Brought dead (BD) cases, where individuals are declared dead upon arrival at a healthcare facility, pose significant forensic and medico-legal challenges. Determining the exact cause of death is crucial for legal, medical, and public health perspectives. This study aims to analyze the sociodemographic profile and causes of death among brought dead cases, with a focus on forensic autopsy findings at the Department of Forensic Medicine, Government Medical College, Kottayam, Kerala. ***Objectives:*** The primary objective of this study is to determine the causes of death in brought dead cases of individuals aged above 18 years. The secondary objective is to describe the sociodemographic characteristics of these cases. ***Methods:*** This observational, cross-sectional descriptive study was conducted over 18 months (June 2023 – December 2024). The study population included all brought dead cases reported for medico-legal autopsy at Government Medical College, Kottayam, meeting the inclusion criteria. Data were collected using police inquest reports (KPF 102), medical records, and interviews with relatives. A comprehensive medico-legal autopsy was performed, including external and internal examinations, histopathological analysis, and toxicology testing when necessary. The data were analyzed using SPSS software, with descriptive statistics and chi-square tests used to assess associations. ***Results:*** A total of 121 brought dead cases were analyzed. The majority (59.5%) of cases were in the 36–60-year age group, with males constituting 80% of the study population. Most individuals (86%) were married, and 57% resided in rural areas. A significant proportion (40.5%) belonged to lower socioeconomic backgrounds, as indicated by the ration card status. The leading causes of death was occlusive coronary artery disease (38.8%), followed by hanging (22.3%) and road traffic accidents (5.8%). A small fraction of cases remained undetermined despite thorough forensic examination. ***Conclusion:*** The study highlights the predominance of occlusive coronary artery disease as the major cause of death in brought dead cases. The findings underscore the need for enhanced preventive healthcare strategies, improved emergency medical response, and public health interventions targeting high-risk populations. Strengthening forensic investigative methodologies can further aid in identifying undiagnosed medical conditions and ensuring justice in medico-legal cases.

Keywords: Brought Dead Cases, Dead on Arrival, Cause of Death, Coronary Artery Disease, Hanging, Traffic Accidents.

INTRODUCTION

The study of deaths, particularly those that occur under unexplained or suspicious circumstances, is crucial for medico-legal and forensic investigations.[1] Understanding the epidemiology of death is essential for public health surveillance, forensic medicine, and law enforcement agencies. A comprehensive analysis of brought dead cases can help in identifying patterns, risk factors, and preventable causes of mortality. Deaths that occur outside of medical supervision present unique challenges in determining the exact cause, necessitating forensic autopsies for clarity.[2,3]

The determination of whether a death is natural or unnatural holds great significance in medical jurisprudence. Natural deaths occur due to underlying pathological conditions, aging, or other physiological degenerative processes.[4] On the other hand, unnatural deaths encompass those resulting from external influences such as accidents, homicides, suicides, or other violent and unexpected incidents.[5] These deaths necessitate legal scrutiny and forensic investigations to ascertain the exact cause and manner of death. The role of forensic pathologists in these cases is critical, as their findings can influence legal proceedings and public health policies.[6] Recent studies suggest an increasing trend of brought dead cases

associated with cardiovascular diseases, traumatic injuries, and substance abuse.[7-10] There is a growing need to establish robust forensic methodologies to ensure accurate determination of causes of death in brought dead cases.[5]

AIMS AND OBJECTIVES

Primary Objective

To study the causes of death in brought dead cases aged above 18 years.

Secondary Objective

To describe the sociodemographic profile in brought dead cases of aged above 18 years.
No hypothesis stated as it is a descriptive study.

MATERIALS AND METHODS

Study Design

This Observational, Cross-Sectional study was conducted in the Department of Forensic Medicine, Government Medical College, Kottayam, Kerala, for a period of 18 months after getting Institutional Review Board (IRB) clearance from June 2023 – December 2024.

Type of Study

Descriptive study

Study Population

All the brought dead cases brought to the Department of Forensic Medicine, Govt. Medical College, Kottayam for medico-legal autopsy examination fulfilling inclusion and exclusion criteria during the study period.

Inclusion Criteria

All brought dead cases with age more than 18 years.

Exclusion Criteria

1. Cases in which autopsy is not conducted
2. Age group less than 18 years
3. Cases in which relatives not consenting for study

Sample Size

Sample size is calculated using the statistical formula, N=4pq/d2. Where p‘ is the prevalence in previous study
_q‘ is 100-p and _d‘ is permissible error
Based on a study conducted by Oluseyi Adegoke, Janet Ngozi Ajuluchukwu in 2019, When all three kinds of stroke (cerebral infarction, intracerebral haemorrhage, and subarachnoid haemorrhage) were combined, stroke accounted for 45.2% of cause of death in central nervous system.[4]

Hence calculating sample size with,
p = 45.2
q = 100-p = 100 - 45.2 = 54.8
d = 20% p = 9.04
Thus,

$$N = \frac{4 \times 45.2 \times 54.8}{(9.04)^2} = 121.23$$

Sample size is calculated to be 121.

Sampling Procedure

All the brought dead cases brought to the Department of Forensic Medicine, Govt. Medical College, Kottayam for medico-legal autopsy examination fulfilling inclusion and exclusion criteria during the study period after obtaining informed consent.

Sampling Technique

Consecutive Sampling

Study Procedure

1. Inquest report of police (KPF 102) - Age, sex, religion, address, place, time and date of occurrence of death.
2. Previous history of the case (using proforma) - from the relatives/friends/co-workers of the deceased.

3. Medical documents – Medical records if available.
4. Medicolegal autopsy- Cause of death is evaluated. External and internal findings are considered.

In this study, all cases that had been brought to the Department of Forensic Medicine for postmortem examination and had met the predefined inclusion criteria were selected for analysis. The selection process had been carefully undertaken to ensure that the cases aligned with the objectives of the research. Each case had been thoroughly reviewed to confirm eligibility before being included in the study.

Following data collection, a meticulous external examination of the body had been conducted as part of the standard autopsy protocol. The internal examination had been performed in accordance with established medicolegal autopsy guidelines. All major organs had been systematically dissected, examined, and assessed for pathological changes. In cases where the cause of death had remained unclear after the initial examination, samples had been collected for additional toxicological and histopathological investigations. These samples had been appropriately preserved and labeled to ensure accurate identification during laboratory analysis.

Ethical consideration

The study was conducted only after getting the clearance of the institutional review board of Government Medical College Hospital, Kottayam. The study did not cause any expense to the family of the deceased person, as all the data were collected along with routine autopsy procedure. It did not lead to any delay in releasing the body to the relatives or cause disfigurement to the corpse. An informed consent was obtained from a relative of the deceased prior to data collection. The information collected was used only for the purpose of the study and confidentiality was maintained throughout the study.

Data management and statistical analysis

The data collected were entered into Microsoft excel 2019 and the master chart was loaded into Statistical Package for Social Sciences (SPSS) version 20 for further analysis. In case of quantitative variables, mean and standard deviation were used to express the data and in case of qualitative variables, percentages were used to express the data. Bar charts and pie charts were used in case of depicting the data as diagram. The association between different categorical variables were tested using chi square test. The level of significance was fixed at p value of 0.05.

RESULTS

Among the total study population, majority (72,59.5%) belong to age category 36-60 years. Whereas 34(28.1%) belong to more than 60 years category and 15(12.4%) belong to 18-35 years. Among the total study subjects, 97(80%) were males and 24(20%) were females.

Mean BMI in the study population is 22.42 with a standard deviation of 5.14. A total of 55.5%) subjects had normal BMI, 31(25.6%) was underweighted, 29(24%) were overweight and 6 subjects were obese. Out of the total study subjects, majority 104(86%) were married and 16 (13.2%) were unmarried and only one individual was divorced. Out of the total 121 subjects, majority (69,57 %) belonged to Hindu community, whereas 48(39.7%) were Christians and 4 were Muslims.

Majority subjects were from rural area (69,57%) followed by urban 52(43%). In the current study, 95(78.5%) belonged to nuclear family,20(16.5%) belonged to joint and 6 lived alone. The majority of the sample (90 ,74.4%) has attained secondary school education, followed by primary school education (15,12.4 %) and 14(11.6%) were graduates. In the current study, majority (47,38.8%) were self-employed and 22 (18.2%) were employed whereas 11(9.1%) were unemployed. Among the total study subjects, 113 (93.4%) followed a mixed diet and 8 were vegetarians.

Among the total study subjects, history of substance abuse was found in 59 (48.76%) subjects, out of which the most common is alcohol use alone (27,22.3%) followed by alcohol and tobacco use.

In the current study, comorbidities were observed in 36 (29.7%) subjects and among them the commonest one was hypertension (9 subjects), followed by diabetes (7 subjects).

Table 1: Distribution of study subjects based on terminal symptoms

Terminal Symptoms	Frequency	Percentage
Fever	3	2.5
Loss of consciousness	42	34.7
Vomiting	3	2.5
Breathlessness	12	9.9
Others	21	17.4
Unknown	40	33.1
Total	121	100

Among the total study subjects, majority 42 (34.7%) had loss of consciousness as the terminal symptom and among 40 subjects the terminal symptom was unknown. Also, majority 70(57.9%) experienced the terminal symptom at home followed by in transit to hospital. Most of the subjects experienced terminal symptoms from 6am to 1 pm followed by 5pm to 11pm. Out of the total 121 subjects, the majority, 60 (50%), experienced a natural death, while 55 (45%) had an unnatural death. Majority of the unnatural deaths were due to suicide (3,62%) followed by accidental (21,38%).

Table 2: Distribution of study subjects based on cause of death

Specific cause of death	Frequency	Percentage
Occlusive coronary artery disease (OCAD)	47	38.8
Hanging	27	22.3
Coronary insufficiency	1	0.8
Pneumonia	1	0.8
Upper G I Bleed	2	1.7
Intracranial bleed	2	1.7
Cardiac tamponade	1	0.8
Tumor	1	0.8
Road traffic accidents	7	5.8
Other accidents	6	5.0
Drowning	5	4.1
Poisoning	5	4.1
Burns	2	1.7
Electrocution	1	0.8
Lightening	1	0.8
Others	6	5.0
No definite opinion	6	5.0
Total	121	100.0

Out of the total 121 subjects, specific cause of death in majority, 47(38.8%) is OCAD followed by hanging (27,22.3%). Among the total study subjects, 42 (43.3%) individuals died due to OCAD were males and only 5 (20.8%) were females. This difference was statistically significant with a p value <0.05. Among the total study subjects, 19(52.8%) subjects with comorbidities died due to OCAD, while 28(32.9%) of those without comorbidities died due to OCAD. This difference was statistically significant with a p value <0.05. In the current study, death of 5 (15.6%) individuals due to RTA occurred during 5pm-11pm while only 2 deaths due to other causes occurred during this time (5pm-11pm). This difference was statistically significant with a p value <0.05.

Table 3: Natural death and presence of comorbidities

Comorbidities	Natural Death		Total	p value, Chi square value
	Yes	No		
Present	24(66.7%)	12(33.3%)	36 (100%)	p-value = 0.014
Absent	36(42.4%)	49(57.6%)	85 (100%)	
Total	60(49.6%)	61(50.4%)	121(100%)	$\chi^2 = 5.98$

Among the total study population,24(66.7%) individuals with natural death had comorbidities and 36(42.4%) without comorbidities had natural death. This difference was statistically significant with a p value <0.05.

Table 4: Distribution of study subjects based on age group and hanging

Age group	Hanging		Total	p value, Chi square value
	Yes	No		
18-35 years	10(66.7%)	5(33.3%)	15 (100%)	p-value = 0.001
36-60 years	9(12.5%)	63(87.5%)	72 (100%)	
>60 years	8(23.5%)	26(76.5%)	34 (100%)	
Total	27(22.3%)	94(77.7%)	121(100%)	$\chi^2 = 21.05$

Among the study population hanging was observed more among age group, 18-35 years (10,66.7%), which was statistically significant with a p value less than 0.05.

DISCUSSION

Demographic profile and age distribution

The demographic trends observed in this study are consistent with findings from various national and international research on brought dead cases. The dominance of the 36–60 year age group (59.5%) as the most affected population aligns with multiple studies highlighting this age range as highly vulnerable to sudden deaths, particularly from cardiovascular events. This group is often subject to heightened stress, lifestyle diseases, and occupational risks. For instance, Prince M. Paul et al. identified individuals aged 31–50 years as the most vulnerable demographic in brought dead cases reported in South India.[11] This similarity reflects the fact that this age group typically experiences increased work pressure, environmental stress, and unhealthy lifestyle practices, all of which are significant risk factors for sudden deaths.

The notable finding that 80% of the brought dead cases in this study where males align with well-established trends seen across forensic and public health studies. Research by Francis Adedayo Faduyile et al. reported a similar gender disparity, with males accounting for a higher proportion of brought dead cases (ratio of 1.37:1).[5] This pattern is often attributed to increased male involvement in high-risk behaviors such as alcohol consumption, outdoor occupations, and aggressive driving habits, which expose them to a higher risk of trauma and fatal incidents. The higher incidence of male deaths may also reflect lifestyle diseases such as coronary artery disease, which disproportionately affects men in middle-aged groups. In contrast, females constituted only 20% of the sample in this study, mirroring trends reported in studies from Nigeria, Ethiopia, and South Asia.[5] These patterns suggest that while women are less frequently represented in brought dead cases, their deaths may often involve domestic incidents, self-harm, or untreated chronic illnesses.

Socioeconomic and lifestyle factors

The strong link between socio-economic status and brought dead cases is evident in the present study, where a significant portion of the deceased belonged to lower-income groups, particularly those with pink (40.5%) and blue ration cards (38.8%). This observation aligns with the work of Oluseyi Adegoke et al., who emphasized that socioeconomic deprivation is a significant factor in brought dead cases.[4] Individuals from disadvantaged backgrounds often face restricted access to healthcare services, inadequate medical monitoring, and limited awareness about preventive care, contributing to undiagnosed or poorly managed health conditions.

The present study's observation that alcohol consumption (22.3%) and combined alcohol-tobacco use (16.5%) were prominent lifestyle factors associated with brought dead cases corresponds with findings from multiple studies. Research by Patel S.K. et al. and Aljoborae, S., & Al Humairi, A.K. similarly identified substance abuse as a major contributor to sudden fatalities.[2,12] Chronic alcohol use is known to increase the risk of hypertension, heart failure, and liver disease, all of which are major causes of brought dead cases. The overlap between low socioeconomic status and substance abuse highlights the importance of public health interventions targeting at-risk populations.

Occlusive coronary artery disease as a leading cause of death

Occlusive coronary artery disease (OCAD) emerged as the most common cause of death in our study, accounting for 38.8% of cases. This is consistent with numerous studies that have identified coronary artery disease (CAD), myocardial infarction, and sudden cardiac arrest as dominant factors in brought dead cases. For instance, Francis Adedayo Faduyile et al. similarly reported that cardiovascular conditions were the leading cause of brought dead deaths, often triggered by underlying conditions such as hypertension and diabetes.[5]

Research by Das, M. & Banerjee, S. also identified cardiovascular diseases as the principal factor behind sudden natural deaths, with middle-aged males (40–60 years) showing the highest vulnerability.[13] Additionally, Patil et al. emphasized that a significant number of brought dead cases involved individuals with undiagnosed ischemic heart disease, reinforcing the silent nature of CAD.[14] This aligns with our finding that many deceased individuals in our study had no prior diagnosis despite presenting with risk factors like hypertension and diabetes.

The predominance of cardiovascular deaths underscores the critical need for improved preventive healthcare strategies, including routine heart screenings, better public education on heart attack symptoms, and expanded access to emergency medical services.

Suicidal hanging as a major cause of death in young adults

Our study identified hanging (22.3%) as the second leading cause of death, particularly affecting younger individuals in the 18–35 year age group (66.7%). This aligns with trends observed in studies by Disania et al. and Sen et al., where suicide by hanging emerged as a prominent cause of unnatural deaths, especially in young adults.[15,16] Such cases are frequently linked to social stressors, economic instability, relationship issues, and mental health disorders.

A study by Carelle, L. in Johannesburg further reinforced that suicide rates are notably high in the 20–40 year age group, correlating with the age range most prone to mental health crises.[17] The prevalence of hanging in our study emphasizes the urgent need for improved mental health support systems, early intervention programs, and public awareness campaigns to destigmatize mental health issues and promote accessible counselling services.

Road traffic accidents (RTA) and other external causes

Our study highlighted RTAs (5.8%) as a significant contributor to brought dead cases, with peak incidents occurring during 5 PM – 11 PM, coinciding with evening rush hours. This pattern is consistent with findings by Aljoborae et al., who reported a surge in RTA-related fatalities during peak commuting hours.[12] Such incidents are often linked to excessive speeding, driver fatigue, and poor road conditions.

Additionally, our study observed cases involving poisoning (4.1%) and drowning (4.1%), which reflect common trends reported in forensic research. These results emphasize the importance of promoting safer road practices, improving pedestrian infrastructure, and enhancing emergency trauma response systems to reduce fatalities from external causes.

Temporal Patterns and Circumstantial Factors

Our study identified early morning hours as a critical period for cardiovascular-related brought dead cases. This aligns with findings by Prince M. Paul et al. and Lema et al., who reported that sudden cardiac deaths often peak during the early morning hours due to heightened sympathetic nervous system activity, increased blood pressure, and physiological stressors.[11,18] This underscores the need for improved emergency response readiness during early morning hours.

Medicolegal and Forensic Implications

Our study revealed that several brought dead cases required comprehensive forensic investigations, including toxicological and histopathological analysis, to determine the precise cause of death. Studies such as those by Wani et al. emphasized that forensic pathologists often reserve their opinion as -pending‖ until additional laboratory results are available in cases of unclear or suspicious deaths.[19] Additionally, Yokobori Y et al. recommended the use of automated verbal autopsy (AVA) as a complementary tool in regions where conducting full autopsies may not be feasible.[6].

CONCLUSION

This study has highlighted critical trends in brought dead cases, reinforcing the influence of age, gender, socio-economic status, and lifestyle factors on mortality patterns. The predominance of cardiovascular-related deaths emphasizes the need for improved healthcare infrastructure that prioritizes preventive screening, timely diagnosis, and access to emergency care. Since many individuals who died from cardiovascular conditions had no prior diagnosis, this underscores the "silent" nature of heart disease and the urgent need for proactive screening strategies.

The significant occurrence of suicides, particularly by hanging among younger individuals, points to the growing mental health crisis in the region. Social pressures, economic instability, and emotional distress are key contributing factors that warrant immediate attention through targeted mental health interventions, awareness campaigns, and improved access to counseling services.

The occurrence of RTA-related fatalities, especially during peak commuting hours, reveals the urgent need for improved road safety measures, stricter traffic enforcement, and enhanced trauma care systems.

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