DOI: 10.21088/ijfmp.0974.3383.18425.4

Indian Journal of Forensic Medicine and Pathology
Volume 18, Number 4, October - December 2025

ORIGINAL ARTICLE

An Analysis of Sociodemographic Patterns in Sudden Natural Deaths in a Tertiary Care Postmortem Center in Mumbai Region

Karthika J.[1], Bhalchandra Chikhalkar[2], Prabha K.[3]

HOW TO CITE THIS ARTICLE:

Karthika J., Chikhalkar B., Prabha K. An Analysis of Sociodemographic Patterns in Sudden Natural Deaths in a Tertiary Care Postmortem Center in Mumbai Region. Indian J Forensic Med Pathol. 2025 Oct-Dec; 18(4): 233-237.

ABSTRACT

Background: Medico-legal autopsy is often warranted in cases of sudden and unexpected deaths. In the present study period, 2,267 such autopsies were carried out, with 222 cases (9.79%) identified as sudden and unexplained deaths. The analysis considered all natural deaths occurring within 24 hours from the onset of symptoms, as per the WHO definition.

Aim: The primary aim of this study is to examine the sociodemographic characteristics associated with sudden natural deaths.

Objectives: To study the predominant age group involved, gender predominance, and to know about the socioeconomic groups in sudden death cases.

Material: This prospective study was carried out in the Department of Forensic Medicine, Government Medical College, Mumbai, spanning a two-year duration from January 2020 to December 2022.

Results: A total of 2,267 cases were brought for medicolegal autopsy to the mortuary, of which 222 were identified as sudden natural deaths, accounting for 9.79% of the total. All autopsy cases where the cause of death was certified as natural, along with those brought dead to the casualty without any evidence of unnatural cause, were included in the study. The distribution of these cases across various sociodemographic variables was examined, and all data were analysed using appropriate statistical methods with SPSS software.

AUTHOR'S AFFILIATION:

[1] Assistant Professor, Department of Forensic Medicine and Toxicology, Chettinad Health and Research Institute, Padur, Chennai, Tamil Nadu, India.

[2] Professor and Head, Department of Forensic Medicine and Toxicology, GMC Mumbai, Maharashtra, India.

[3] Assistant Professor, Department of Forensic Medicine and Toxicology, Trichy SRM Medical College and Research Institute, Irungalur, Tamil Nadu, India.

CORRESPONDING AUTHOR:

Karthika J., Assistant Professor, Department of Forensic Medicine and Toxicology, Chettinad Health and Research Institute, Padur, Chennai, Tamil Nadu, India.

E-mail: jayasreemeenu9@gmail.com

➢ **Received:** 08-08-2025 ➢ **Accepted:** 12-12-2025

Conclusion: Sudden deaths can occur at any age, but the most common age group is 51-70 years, and it is more common in the Hindu religion and among the people of the lower middle class; therefore, raising awareness of associated risk factors and promoting early intervention may help mitigate the occurrence of such deaths.

KEYWORDS

• Sudden Death • Sociodemographic Patterns • Medico-Legal Autopsy

INTRODUCTION

According to the World Health Organization, sudden death is characterized as a fatal event occurring within 24 hours of the onset of symptoms, in the absence of any apparent violent or immediate cause.[1] It is further defined as an unexpected demise, often in individuals without a known history of serious illness, trauma, or poisoning, and may occur within minutes of symptom manifestation, thereby necessitating a medico-legal autopsy to establish the precise cause.

In certain cases, death may not be instantaneous but occurs several hours following the onset of terminal manifestations. Such events are also frequently encountered in the elderly, typically under circumstances that do not initially arouse suspicion.[11] In these situations, the attending medical officer should abstain from issuing a death certificate and is mandated to notify the police, after which the body must be forwarded for a medico-legal autopsy.

Epidemiological estimates suggest that sudden deaths account for approximately 10% of all mortality.[3] The unexpected death of an apparently healthy individual at any age is considered unusual and may generate suspicion of foul play. In most instances, such fatalities are attributable to undetected cardiovascular pathology. These cases frequently require a forensic autopsy, particularly when the deceased was insured at the time of death.

In the majority of presentations, due to the acute nature of the event, essential emergency diagnostic procedures such as electrocardiography and chest radiography are not undertaken. Furthermore, in the absence of reliable eyewitness accounts or close relatives, a detailed clinical history is often unavailable.[11]

Comparative evaluation of sudden death cases across various geographic regions is necessary to delineate patterns related to gender distribution, predominant age groups, and organ systems most commonly implicated. These variations may be attributed to differences in disease prevalence, environmental exposures, socioeconomic status, genetic predisposition, and dietary practices.[11]

The skills and experience of an autopsy surgeon facilitate law enforcement agencies in the administration of justice and bring the guilty to justice.[15]

METHODOLOGY

The present investigation was undertaken in the Department of Forensic Medicine and Toxicology, GGMC, Mumbai, over two years (January 2020 to December 2022). Data were systematically analysed using appropriate statistical methods with the aid of SPSS software. During this interval, a total of 2,267 medico-legal autopsies were conducted, of which 222 were categorized as sudden deaths and formed the study cohort. Among these, 214 cases involved hospitalized patients, while 8 were brought-dead cases. The study material comprised all instances in which the deceased had succumbed suddenly and/or unexpectedly and had subsequently undergone a medico-legal autopsy.[13]

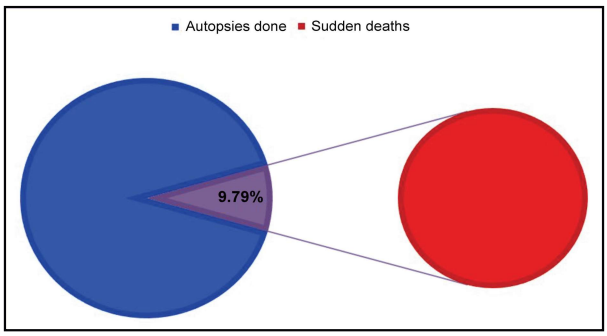
Inclusion criteria:

- Cases where death occurred within 24 hours of the onset of symptoms in hospitalized individuals.[11]
- All brought-dead cases submitted for medico-legal postmortem examination.

Exclusion criteria:

- Cases where death occurred more than 24 hours after the onset of symptoms and subsequent hospitalization.
- All hospitalised cases in which death has been certified by the treating physician.
- All unnatural deaths.

RESULTS



Graph 1: Frequency of sudden deaths among all post mortem cases

Table 1: Gender wise distribution

Gender	Number of cases	Total %
Males	146	66
Females	76	34
Total	**222**	**100**

Out of 222 total sudden deaths, 146 cases (65. 77%) were males and 76 cases (34. 23%) were females, and the male-to-female ratio is 1.9:1.

Table 2: Age group and gender wise distribution

Age (years)	Female	Male	Total	
	N	N	N	%
0-10	2	6	8	3.60
11-20	2	5	7	3.15
21-30	6	7	13	5.86
31-40	8	21	29	13.06
41-50	9	24	33	14.86
51-60	19	38	57	25.68
61-70	18	27	45	20.27
71-80	9	17	26	11.71
81-90	2	1	3	1.35
>90	1	0	1	0.46
Total	**76**	**146**	**222**	**100**

The analysis revealed that the highest proportion of sudden natural deaths occurred in the 51–60 year age group, accounting for 57 cases (25.68%), comprising 38 males and 19 females. This was followed by the 61–70 year age group with 45 cases (20.27%), including 27 males and 18 females. Of the total 222 sudden deaths, 146 (65.77%) were males and 76 (34.23%) were females, yielding a male-to-female ratio of 1.9:1. The youngest case recorded was a one-day-old neonate, whereas the oldest was a 91-year-old individual. Overall, the majority of sudden natural deaths were concentrated in the 51–60 year age group, followed by those aged 61–70 years.[11]

Table 3: Religion-Wise Distribution

Religion	Female	Male	Total	
	N	N	N	%
Hindu	57	116	173	77.93
Christian	2	2	4	1.80
Muslim	17	27	44	19.82
Not known	0	1	1	0.45
Total	**76**	**146**	**222**	**100**

In the present study, a predominance of cases was observed among individuals belonging to the Hindu religion. Of the 222 sudden death cases analysed, 173 (77.93%) were Hindus, followed by 44 cases (12.16%) from the Muslim community, while 4 cases (1.80%) were Christians.[11]

Table 4: Socio-Economic Status (SES) wise distribution

(SES)	Female	Male	Total	
	N	N	N	%
Lower	18	26	44	19.82
Upper lower	0	0	0	0.00
Lower middle	56	111	167	75.23
Upper middle	2	9	11	4.95
Upper	**0**	**0**	**0**	**0.00**

Most of the cases belong to the lower middle class (167 cases, 75.23%), followed by 44 cases (19.82%) that belong to the lower class, and 11 cases (4.95%) that belong to the upper middle class. In the present study, a significant proportion of sudden deaths were observed among individuals from the lower-middle socioeconomic group.

Table 5: Distribution of cases according to co morbidities

Co morbidities	Female	Male	Total	
	N	N	N	%
HTN	12	24	36	16.22
DM	9	16	25	11.26
HTN &DM	12	21	33	14.86
Total	**33**	**61**	**94**	**42.34**

Among the 222 cases of sudden deaths examined, 94 individuals were identified as having associated comorbid conditions. Of these, 36 cases (16.22%) had a documented history of hypertension, 25 cases (11.26%) had diabetes mellitus, while 33 cases (42.34%) presented with both hypertension and diabetes.[11]

DISCUSSION

During the study period, a total of 2,267 medico-legal autopsies were performed. Of these, sudden and unexplained deaths constituted 9.79% (222 cases). The study focused on these 222 cases of sudden natural deaths recorded over the two-year period. Among them, 146 (65.77%) were males and 76 (34.23%) were females, yielding a male-to-female ratio of 1.9:1. The youngest case documented was a one-day-old infant, while the oldest individual was 91 years. The highest frequency of sudden natural deaths was noted in the 51–60 year age group (57 cases, 25.68%; 38 males and 19 females), followed by the 61–70 year group (45 cases, 20.27%; 27 males and 18 females).[11]

With respect to religion, the majority of victims were Hindus (173 cases, 77.93%), followed by Muslims (44 cases, 12.16%) and Christians (4 cases, 1.80%), demonstrating a predominance of Hindu cases in the present study.[11]

Socio-economic stratification showed that most cases belonged to the lower-middle class (167 cases, 75.23%), followed by 44 cases (19.82%) from the lower class and 11 cases (4.95%) from the upper-middle class. Hence, a considerable proportion of sudden deaths were observed in individuals from the lower-middle socioeconomic background.[11]

The proportion of sudden deaths in the present study (9.79% of total autopsies) aligns with the findings of Rao Dinesh *et al*. (8.67%)[4], Zanjad *et al*. (8.92%)[9], and Ambade *et al*. (15.48%).[10] Male predominance was also observed, with 65.77% of cases being male and 34.23% female (M:F ratio = 1.9:1), consistent with the studies by Zanjad *et al*.[9] and Rao *et al*.[4]

Age-wise distribution revealed that the majority of victims belonged to the 51–70 year age group (102 cases, 45.94%). This could be attributed to lifestyle-related risk factors and comorbidities such as diabetes mellitus and hypertension.[11]

Comparable results have been documented in prior literature. In a study by V.A. Chaudhari *et al*.[11], 230 natural deaths (7.98% of total) were classified as sudden, with the majority (88.70%) occurring in individuals above 30 years, peaking in the 51–60 year group (25.65%). The mean age was 51.04 years, with males accounting for 82.61% and females 17.39%, yielding a male-to-female ratio of 4.75:1, which is in agreement with the present findings.[5] Similarly, Gaiwale D. Sanjay *et al*. reported 112 cases of sudden natural deaths attributed to cardiac and coronary causes, with peak incidence in the 51–60 year group; 75% were males and 25% females, paralleling the present study.[6] B. Shanthi *et al*. also reported analogous observations.[7]

In another study, Chaudhari H. Sandesh found the majority of cases in the 41–50 year age group, with a male predominance of 81% (129 out of 159 cases), giving a male-to-female ratio of 4.3:1, which resonates with the present study findings.[8] Furthermore, Karthikeyan N. documented 100 sudden death cases, with the highest number (42%) in the 36–40year group, followed by the 30–35years group (29%). Male victims accounted for 81%, again demonstrating a male predominance similar to the current study.[14]

CONCLUSION

The findings of the present study indicate that sudden deaths may occur across all age groups, with the highest incidence observed between 51–70 years. A predominance was noted among individuals of the Hindu religion and those belonging to the lower-middle socioeconomic class. These results highlight the significant influence of demographic and lifestyle factors, including age, sex, religion, occupation, and socioeconomic status, on the occurrence of sudden deaths. Consequently, increasing public awareness regarding modifiable risk factors and encouraging timely preventive interventions may contribute to reducing the incidence of such fatalities.

Acknowledgement: Nil

Conflict of interest: Nil

Source of funding: Nil

Ethical clearance: The study has been approved by the Institutional Ethical Committee, Ref no. IEC/PG/44/2020 dated:06/02/2020

REFERENCES

1. WHO, Definition of sudden death, International Classification of Diseases and related health problems, version 10 of 2010.
2. Bardale Rajesh, Principles of Forensic Medicine and Toxicology, Jaypee Medical Publications, 1 st edition, 2011: 164.
3. Reddy K.S. Narayan. Essentials of Forensic Medicine & Toxicology 26th edn. Jaypee brother medical publications, Hyderabad: K. Sugunadevi. 2007: 278-293.
4. Rao D.S., Yadhukul. Sudden and unexpected natural deaths four-year autopsy review. JPAFMAT. 2008; 8(2): 21-3.
5. Chaudhari, A. Vinod, Mohite, C. Shailesh, ''Current trends in sudden deaths", Journal of Forensic Medicine and Law, Journal of Medicolegal Association of Maharashtra, Vol 21(1) Jan–June 2012.
6. Gaiwale D. Sanjay, Petkar. R. Madhusudhan, Gundla S. Vandana. Sapate. B. Ashwinikumar, Ghangale L. Ajay. "Autopsy profile of sudden cardiac deaths reported in Mumbai region of Maharashtra", Indian Journal of Forensic Medicine and Pathology, Vol 2019, 12(1)
7. Shanthi B., Saravanan. S., Shiva Elangovan. R, etal, International Journal of Scientific Study, July 2016 Vol 4(4): 176-179.
8. Mandar Sane, Zine U. Kailas, Mugadlimath Anand, *et al.*, "Study of sudden natural deaths in an medicolegal autopsies with special reference to cardiac causes", International Journal of Current Research Review, 2013: Vol 5(3).
9. Zanjad N.P., Nanadkar S.D. Study of Sudden Unexpected Deaths In Medico-Legal Autopsies. JIAFM. 2006; 28(1): 27-30.
10. Ambade VN. Study of natural deaths in the Nagpur Region. J Medicolegal Association of Maharashtra. 2002; 14(1-2):11-4.
11. V.A. Chaudhari, S.C. Mohite, Current Trends In Sudden Natural Deaths, Journal of Forensic Medicine, Science and Law, Jan-Jul 2012; Vol 21(1).
12. Vanrajsinh K. Rathva, Rajeshkumar R. Bhoot, Assessment of Sudden Natural Deaths in Medicolegal Autopies at teritary care teaching hospital; Indian Journal of Forensic Medicine and Toxicology: Vol 17(4); Oct-Dec 2023: 25-29.
13. Digvijay Vaghela, Dushyantkumar Barot, Tapan J. Mehta; "Suicidal Hanging: A Taboo"; Indian Journal of Forensic Medicine and Toxicology; Volume 17 (4); October-December 2023.
14. Anand Mugadlimath *et al*; Study Of Sudden Natural Deaths In Medico-Legal Autopsies With Special Reference To Cardiac Causes, Int J Cur Res Rev, Feb 2013: Vol 05 (03); 39.
15. Ramalingam S., Narendar R., Profile of Medico-Legal Cases which are Brought for Autopsy in the year 2015 in The Institute of Forensic Medicine, Madras Medical College, Chennai, Tamil Nadu, India – A Retrospective Study, Chettinad Health City Medical Journal 2016; 5(4): 177 – 183.