

## Autopsy review of sudden natural death cases at rural government medical college in Maharashtra

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### Abstract

**Introduction:** Sudden deaths in apparently healthy persons might raise doubt of foul play. Hence medico-legal autopsy in such cases is needed to satisfy the aggrieved relatives and it also gives a systemic view of various causes of deaths in such cases which ultimately improve mortality statistics.

**Material and Methods:** Retrospective analysis of sudden natural death cases which were brought for medico-legal autopsy at Rural Govt. Medical College & Hospital during the three year period was studied. The data was compiled, tabulated and analyzed statistically.

**Results:** The incidence of sudden natural death is 16.01%. Most common age group involved was 41-50 years followed by 31-40 years. Male predominance (77.42%) was noted. Most commonly affected system was cardiovascular system (53%) followed by respiratory system (33.64%). Among the cardiovascular system causes Coronary artery disease was accounted in 88.7% of cases. Among the respiratory system causes pneumonia was predominant with 50.69% cases.

**Conclusion:** The incidence of sudden natural death is 16.01%. Males having age 41-50 years are most commonly affected. Cardiovascular diseases contribute to most of the sudden natural deaths of which Coronary artery disease is the leading cause. Increased awareness with regular health checkups is needed among the population at risk so as to improve quality of life.

**Keywords:** Sudden natural deaths, Medico-legal autopsy, Cardio-vascular system.

### Introduction

World Health Organization (WHO) defines sudden death as “death within 24 hours from the onset of the symptoms”. It can also be defined as deaths which are sudden, unexpected, clinically unexplained, or otherwise obscure even though there needs to be no unnatural element in their causation.<sup>1</sup> Apurba Nandy defined Sudden death as a death which is not known to have been caused by any trauma, poisoning or violent asphyxia, and where death occurs all of a sudden or within 24 hours of the onset of the terminal symptoms.<sup>2</sup> It is worth mentioning that emphasis is given to the unexpected character, rather than suddenness of death. The incidence of Sudden death is approximately 10 percent of all deaths where diseases of Cardiovascular system account for about 45-50%, Respiratory system 15-23%, Nervous system 10-18%, Alimentary system 6-8%, Genito-urinary system 3-5% and 5-10% are of miscellaneous causes.<sup>3</sup>

Sudden deaths in apparently healthy persons might raise doubt of foul play.<sup>4</sup> Hence medico-legal autopsy is necessary in such cases to satisfy the aggrieved relatives and it also gives a systemic view of various causes of deaths in such cases which ultimately improve mortality statistics. So an attempt is made to know the statistics of sudden natural deaths occurring in rural region of Marathwada in Maharashtra.

### Aim and Objectives

1. To find the socio-demographic profile of sudden natural death cases.

2. To know the various causes of sudden natural deaths.

### Material and Methods

This study is a retrospective analysis of sudden natural death cases which were brought for medico-legal autopsy at Department of Forensic Medicine, Swami Ramanand Teerth Rural Govt. Medical College & Hospital, Ambajogai, Dist. Beed, Maharashtra. The duration of the study was from 1st September 2015 to 31st August 2018. Inclusion criteria-Cases of Sudden natural deaths as per WHO definition Exclusion criteria- Unnatural deaths, natural deaths after 24 hours of hospitalization, decomposed cases.

Pro-forma for study was prepared and various information and findings were collected like age, sex, and cause of death. Clinical diagnosis was considered from medical records in hospitalized deaths. Histopathological examination report of tissues was also taken into account. Additional information was derived from police investigation report. The information was compiled, tabulated and analyzed statistically.

### Observation and Results

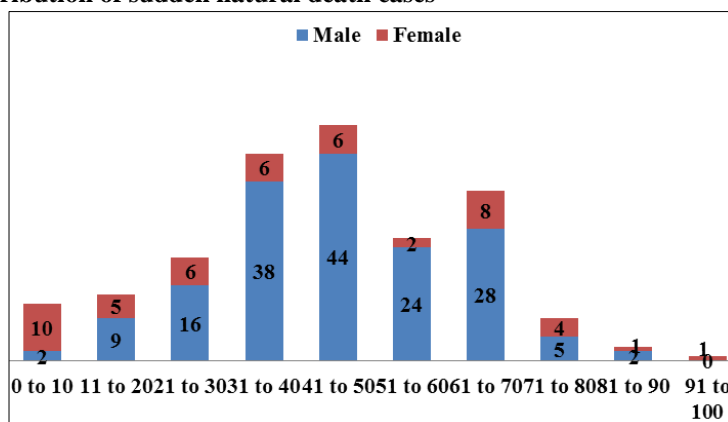
1. During the study period from 1st September 2015 to 31st August 2018, total 1355 autopsies were conducted, out of which 217 cases (16.01%) were of sudden natural deaths. (Table 1)
2. Sudden natural deaths occurred at any age and the youngest case was of a newborn of one hour old

- and the oldest case was of age 95 years. The most affected age group in this study was between 41-50 years i.e. 50 cases (23.04%), followed by 31-40 years i.e. 44 cases (20.28%). (Chart 1)
3. There was predominance of males with 168 cases (77.42%) and 49 cases (22.58%) were females. Male: Female ratio was 3.42:1. (Chart 2)
  4. Out of the 217 cases of sudden natural deaths, in 115 cases (53%) the cause of death was related with the cardiovascular system (CVS), in 73 cases (33.64%) the cause of death was related with the respiratory system (RS), in 11 cases (5.07%) the cause of death was related with the central nervous system (CNS), in 13 cases (5.99%) the cause of death was related with the gastrointestinal system (GIT), in 3 cases (1.38%) the cause of death was related with the urinary system (US) and in 2 cases (0.92%) the cause of death was related with some other system. (Chart 3)
  5. Out of the 115 cases of sudden natural deaths due to the cardiovascular system, in 102 cases (88.70%) the cause of death was Coronary Artery Disease, in 7 cases (6.09%) the cause of death was Myocardial Infarction, in 3 cases (2.61%) the cause of death was Myocarditis, in 2 cases (1.74%) the cause of death was Rupture of Aortic Aneurysm and in one case (0.87%) the cause of death was Cardiomyopathy. (Table 5)
  6. Out of the 73 cases of sudden natural deaths due to the respiratory system, in 28 cases (38.36%) the cause of death was Lobar Pneumonia, in 21 cases (28.77%) the cause of death was Acute Pulmonary oedema, in 11 cases (15.07%) the cause of death was pulmonary Tuberculosis, in 9 cases (12.33%) the cause of death was Bronchopneumonia, in 3 cases (4.11%) the cause of death was Lung Abscess and in one case (1.37%) the cause of death was Pulmonary haemorrhage. (Table 6)
  7. Intra-cerebral Haemorrhage was noted in 11 cases, Ruptured Oesophageal Varices was present in 9 cases, perforation peritonitis was noted in 3 cases, and Pyonephrosis was present in 3 cases. Acute Pancreatitis, Leukaemia and Congenital Diaphragmatic Hernia were noted in one case each. (Table 7)

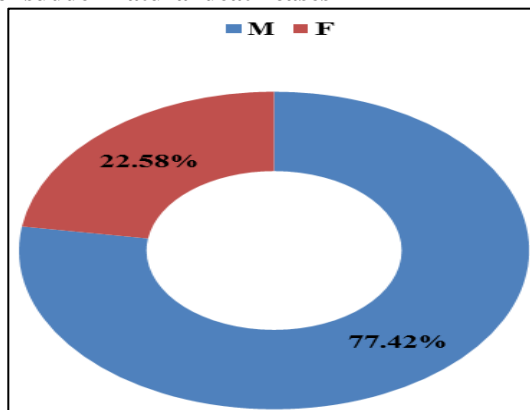
**Table 1: Total Number post-mortem examinations and number of sudden natural death cases during the study period**

Study Duration	Total No. of PME	No. of Sudden natural death cases	Percentage
September 2015 to August 2018	1355	217	16.01

**Chart 1: Age wise distribution of sudden natural death cases**



**Chart 2: Sex wise distribution of sudden natural death cases**



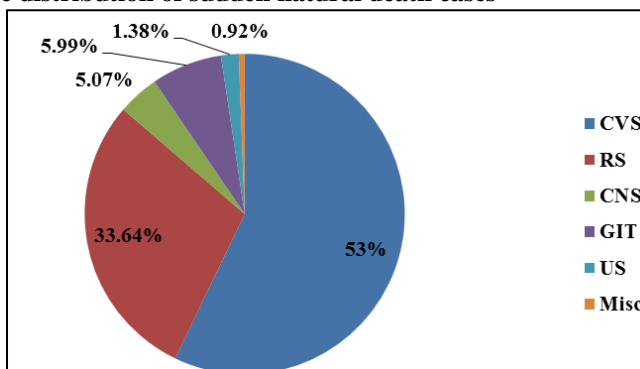
**Table 2: Age and Sex wise distribution of sudden natural death cases (n=217)**

Age (in years)	Male	Female	Total	Percentage
0 to 10	2	10	12	5.53
11 to 20	9	5	14	6.45
21 to 30	16	6	22	10.14
31 to 40	38	6	44	20.28
41 to 50	44	6	50	23.04
51 to 60	24	2	26	11.98
61 to 70	28	8	36	16.59
71 to 80	5	4	9	4.15
81 to 90	2	1	3	1.38
91 to 100	0	1	1	0.46
Total	168	49	217	100.00

**Table 3: Body System wise distribution of sudden natural death cases in males and females (n=217)**

Body System	Male	Female	Total	Percentage
CVS	96	19	115	53.00
RS	49	24	73	33.64
CNS	7	4	11	5.07
GIT	12	1	13	5.99
US	3	0	3	1.38
Misc.	1	1	2	0.92
Total	168	49	217	100.00

**Chart 3: Body System wise distribution of sudden natural death cases**



**Table 4: Age and Body System wise distribution of sudden natural death cases (n=217)**

Age (in years)	Body System						Total	%
	CVS	RS	CNS	GIT	US	Misc.		
0 to 10	1	10	0	0	0	1	12	5.53
11 to 20	2	10	0	0	2	0	14	6.45
21 to 30	8	12	0	1	0	1	22	10.14
31 to 40	26	13	0	5	0	0	44	20.28
41 to 50	33	8	6	3	0	0	50	23.04
51 to 60	13	7	4	1	1	0	26	11.98
61 to 70	24	8	1	3	0	0	36	16.59
71 to 80	5	4	0	0	0	0	9	4.15
81 to 90	2	1	0	0	0	0	3	1.38
91 to 100	1	0	0	0	0	0	1	0.46
Total	115	73	11	13	3	2	217	100.00

**Table 5: Cardiac causes of sudden natural deaths (n=115)**

Cardiac cause	Male	Female	Total	Percentage
Coronary Artery Disease	86	16	102	88.70
Myocardial Infarction	6	1	7	6.09
Ruptured Aortic Aneurysm	1	1	2	1.74
Cardiomyopathy	1	0	1	0.87
Myocarditis	2	1	3	2.61
Total	96	19	115	100.00

**Table 6: Respiratory causes of sudden natural deaths (n=73)**

Respiratory cause	Male	Female	Total	Percentage
Bronchopneumonia	2	7	9	12.33
Lobar Pneumonia	20	8	28	38.36
Pulmonary Tuberculosis	10	1	11	15.07
Acute Pulmonary Edema	14	7	21	28.77
Lung Abscess	3	0	3	4.11
Pulmonary Haemorrhage	0	1	1	1.37
Total	49	24	73	100.00

**Table 7: Other causes of sudden natural deaths**

Involved Body System	Cause	Male	Female	Total
CNS	Intra-cerebral Haemorrhage	7	4	11
GI System	Acute Pancreatitis	1	0	1
	Ruptured Oesophageal Varices	9	0	9
	Perforation Peritonitis	2	1	3
Urinary System	Pyonephrosis	3	0	3
Blood dyscrasias	Leukaemia	1	0	1
Congenital defect	Congenital Diaphragmatic Hernia	0	1	1

## Discussion

1. In the present study, the incidence of sudden death was 16.01% amongst all the medico-legal autopsies conducted during the study period. Similar incidence was found in the study conducted by Ambade V.N. (15.48%).<sup>5</sup> The incidence of sudden natural deaths in the present study is inconsistent with the studies conducted by Meina Singh A. (2.66%)<sup>6</sup>, Pandian J.R. (8.61%),<sup>7</sup> Zanjad N.P. (8.92%)<sup>8</sup> and Azmak A.D. (28.98%).<sup>9</sup>

This inconsistency might be due to the differences in selection of cases due to the difference of opinions in the definition of sudden natural death.

2. We observed that in the present study there is a predominance of males with 168 cases (77.42%) than females with 49 cases (22.58%) and the Male: Female ratio was 3.42:1. Consistent results with respect to male population were noted by Thomas A.C. (73.9%)<sup>10</sup>, Ambade V.N. (79.27%)<sup>5</sup>, Nordrum I. (79.67%)<sup>11</sup>, Sarkioja T. (82%)<sup>12</sup>, Azmak A.D.

- (83.4%)<sup>9</sup>, Zanjad N.P. (84.8%)<sup>8</sup>, Pandian J.R. (86.66%)<sup>7</sup>, Dayananda R. (86.76%)<sup>13</sup> and Meina Singh A. (94.5%)<sup>6</sup>.
- We observed that in the present study the most affected age group is between 41-50 years i.e. 50 cases (23.04%) followed by 31-40 years i.e. 44 cases (20.28%). Similar findings were noted by Pandian J.R.<sup>7</sup> where 31.67% cases belonged to 41-50 years age group and 28.33% cases belonged to 31-40 years age group. Similar results where 41-50 years age group contributed to highest cases was found in the studies conducted by Ambade V N. (20%)<sup>5</sup>, Chaudhari S.H. (30.81%)<sup>14</sup> and Meina Sing A. (34.5%)<sup>6</sup>. Zanjad N.P.<sup>8</sup> observed similar findings where 31-50 years age group contributed to 52.66% cases. Dayananda R.<sup>13</sup> observed that 64.70% cases were from 25-50 years age group. Doolan A.<sup>15</sup> noted maximum case in the age group 31-35 years.
  - Out of the 217 cases of sudden natural deaths the diseases of cardiovascular system were found in 115 cases (53%). Similar findings were noted by Chaudhari S.H. (44.6%)<sup>14</sup>, Siboni A. (46.2%)<sup>16</sup>, Kuller L. (49.5%)<sup>17</sup>, Zanjad N.P. (49.55%)<sup>8</sup>, Azmak A.D. (55%)<sup>9</sup>, Pandian J.R. (55.83%)<sup>7</sup>, Di Maio Vincent JM (60.9%)<sup>18</sup>, Sarkioja T. (61%)<sup>12</sup>, Dayananda R. (62.74%)<sup>13</sup>, Nordrum I. (69.15%)<sup>11</sup>. Our results are also comparable with the study conducted by Farb A.<sup>19</sup> and revealed that sudden natural deaths are most commonly due to cardiac diseases and most common in males.
  - Out of the 115 cases of sudden natural deaths due to the cardiovascular system, in 102 cases (88.70%) the cause of death was Coronary Artery Disease. Similar findings were noted by Dayananda R. (92.96%)<sup>13</sup>, Zanjad N.P. (86.47%)<sup>8</sup>, Chaudhari S.H. (76.05%)<sup>14</sup>. Consistent results were also noted in the studies conducted by Kuller L.<sup>17</sup>, Di Maio Vincent JM,<sup>18</sup> Luke J.L.<sup>20</sup> Nordrum I.,<sup>11</sup> Sarkioja T.,<sup>12</sup> Siboni A.,<sup>16</sup> Meina Sing A.<sup>6</sup> Ambade V.N.<sup>5</sup> and Thomas A.C.<sup>10</sup>
  - Myocardial Infarction was noted in 6.09% cases. Near similar results were noted in the studies conducted by Dayananda R. (3.12%)<sup>13</sup> and Chaudhari S.H. (14.08%)<sup>14</sup>
  - Myocarditis was found in three cases. Pandian J.R.<sup>7</sup> found two cases, Yogesh Prasad Sah<sup>21</sup> found two cases and Zanjad N.P.<sup>8</sup> found one case of myocarditis.
  - Ruptured Aortic Aneurysm was present in 2 cases. Dayananda R.<sup>13</sup> also found two cases of Ruptured Aortic Aneurysm.
  - Cardiomyopathy was found in one case. Zanjad N.P.<sup>8</sup> found three cases, Pandian J.R.<sup>7</sup> found four cases, Chaudhari S.H.<sup>14</sup> found one case and Yogesh Prasad Sah<sup>21</sup> also found one case of Cardiomyopathy.
  - Out of the 217 cases of sudden natural deaths in 73 cases (33.64%) the cause of death was related with the respiratory system. Similar findings were noted by Zanjad N.P. (27.23%)<sup>8</sup>, Chaudhari S.H. (25.78%)<sup>14</sup>, Dayananda R. (22.55%)<sup>13</sup> and Pandian J.R. (16.67%)<sup>7</sup>. The main causes were pneumonia and tuberculosis. This was comparable with the study done by Bobrowitz ID<sup>22</sup>, Zanjad N.P.,<sup>8</sup> Chaudhari S.H.,<sup>14</sup> Pandian J.R.,<sup>7</sup> Dayananda R.<sup>13</sup> and Yogesh Prasad Sah.<sup>21</sup> The principal acute complications of tuberculosis were hemoptysis and pneumothorax.
  - Intra-cerebral Haemorrhage was noted in 11 cases. Intra-cerebral Haemorrhage was also found in the studies conducted by Pandian J.R. (4 cases),<sup>7</sup> Zanjad N.P.(4 cases),<sup>8</sup> Dayananda R. (2 cases)<sup>13</sup> and Chaudhari S.H. (2 cases).<sup>14</sup>

### Conclusion

- The incidence of sudden natural death is 16.01%.
- Sudden natural death has male predominance with age group 41-50 years followed by 31-40 years.
- Maximum cases has Cardiovascular causes (53%) followed by Respiratory causes (33.64%).
- Coronary artery disease is the main cause of cardiovascular deaths and also of tops among all causes of sudden natural deaths.
- Histopathological examination helps in determining the cause of death.
- Increased awareness is needed among the population at risk. Regular health checkups may diagnose the disease or risk factors like hypertension, dyslipidaemia earlier and so quality of remaining life can be improved and it may also decrease the number of sudden natural deaths.
- We recommend the health care providers especially emergency physicians to pay attention to patients presenting with prodromal symptoms.

**Conflict of Interest:** None

**Source of funding:** None

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