

## Central Nervous System Related Causes of Sudden Death: A Retrospective Postmortem Study

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### Abstract

**Background:** The objective of medico-legal autopsies in sudden and natural deaths is to rule out the possibility of any unnatural element of death in otherwise normal individual. The aim of the present study was to study CNS related causes of sudden death. **Materials & Method:** This autopsy based retrospective research was conducted at Kasturba Medical College, Mangalore from the cases autopsied at District Wenlock Hospital, Mangalore from 2004 to 2008. **Results:** Out of 2515 autopsies conducted during the study period 274(10.89%) were of sudden death, of which 29(10.58%) were due to CNS related diseases. Out of which 86.21% were male and 13.79% were female. In our study, rupture of aneurysm leading to the subarachnoid hemorrhage was found to be the main cause of CNS related sudden death. The most common age group in which most of the CNS related sudden deaths (62%) occurred was found out to be 40-60 years. **Conclusion:** This study emphasizes need to create awareness among people about health and regular medical checkup, especially after 40 years of age.

**Key Words:** Sudden death; Central Nervous System; Autopsy.

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### Introduction

Forensic pathologists deal not only with unnatural deaths, but also with a wide range of natural deaths, especially, if they have occurred suddenly in apparently healthy individuals [1]. Suspicion usually arises when an individual is found dead in a public place, without anyone having witnessed it [2]. Death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of terminal illness (WHO) [3]. The

incidence is approximately 10 percent of all deaths [3]. The purpose of medico legal autopsy in such deaths is to determine whether poisoning or violence has been in any way responsible for the death. Absence of external evidence of injuries does not preclude death from physical violence.

Disease of any body system can result in sudden death. Diseases of central nervous system account for about 20% of sudden death. Vascular injury is a frequent component of CNS trauma and results from direct trauma and disruption of the vessel wall. Depending on the anatomic position of the ruptured vessel, hemorrhage will occur in any of several compartments (sometimes in combination): epidural, subdural, subarachnoid, and intraparenchymal.

Hemorrhages within the epidural or subdural space are typically related to trauma. Hemorrhage within the brainparenchyma and subarachnoid space, in contrast, are often a manifestation of underlying cerebrovascular

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disease, although trauma may also cause hemorrhage in these sites.

Most frequent cause of subarachnoid hemorrhage is rupture of a saccular (berry) aneurysm. Rupture of an aneurysm with clinically significant subarachnoid hemorrhage is most frequent in the fifth decade [4]. Hypertension is the most common cause of primary parenchymal (intracerebral) hemorrhage, accounting for more than 50% of clinically significant hemorrhage [4]. The aim of the present study is to study of CNS related causes of sudden death.

### Materials and Methods

This autopsy based retrospective research was conducted at Kasturba Medical College, Mangalore from the cases autopsied at District Government Hospital, Mangalore from 2004 to 2008. Autopsies of persons found dead or who died within 24 hrs after onset of terminal illness and having no history of any injury, poisoning or previous disease, were selected as cases of sudden death. During this period total 2515 autopsies were conducted, out of these 274(10.89%) were of sudden death.

After the data had been collected, it was entered manually into Microsoft Office Excel Worksheet and analysed.

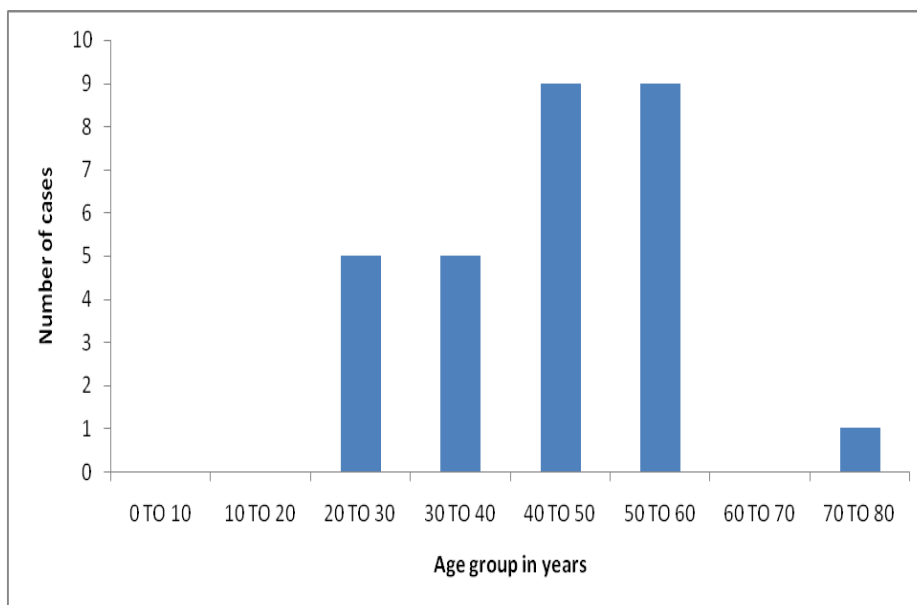
### Results

During the period of 5 years, the total 2515 autopsies were conducted, out of which 274 cases were of sudden death. Among these 274 cases of sudden death 29(10.58%) cases were due to CNS related diseases of which 25 cases (86.2%) were male and 4 (13.79%) were female.

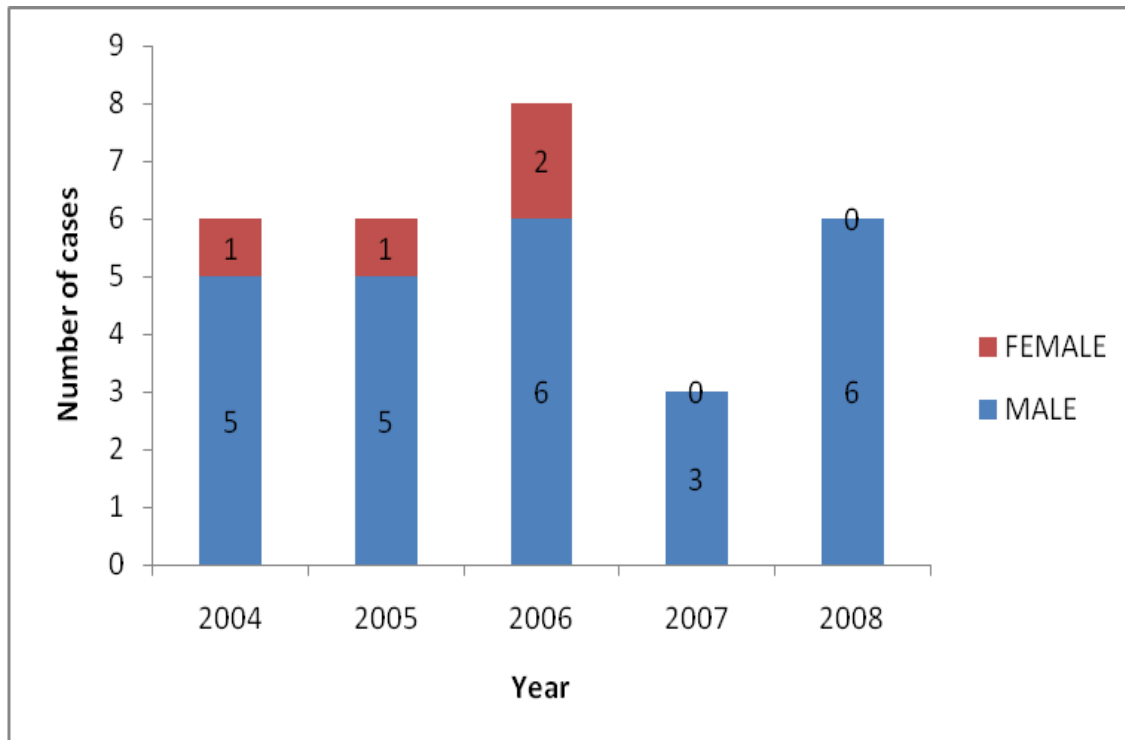
According to our study (Figure -1), the most common age group in which most of the CNS related sudden deaths (18) occurred was found out to be 40-60 years. In 20-40 years of age group there were 10 cases. In the extreme age group, above 70 years old, only 1 case was recorded.

Figure 2 shows the total number of death caused by CNS diseases in last 5 years (2004-2008). The year 2007 had the least number of CNS death cases. It comprised only 3 cases. The highest CNS death rate was recorded in the year 2006 (8 cases). In rest of the year same number of CNS death cases (6) was recorded.

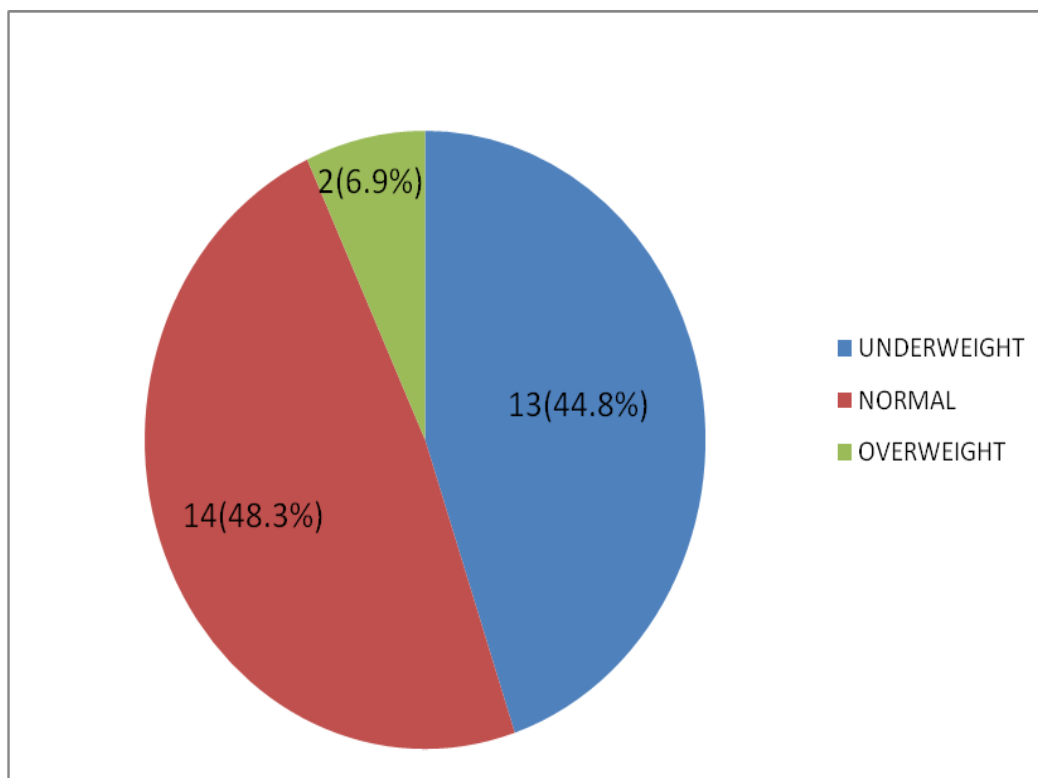
**Fig 1: Total number of CNS related death according to age group**



**Fig 2: Total number of death caused by CNS diseases with its association with both the sex**



**Fig 3: The association of Body Mass Index (BMI) with death due to CNS related diseases**



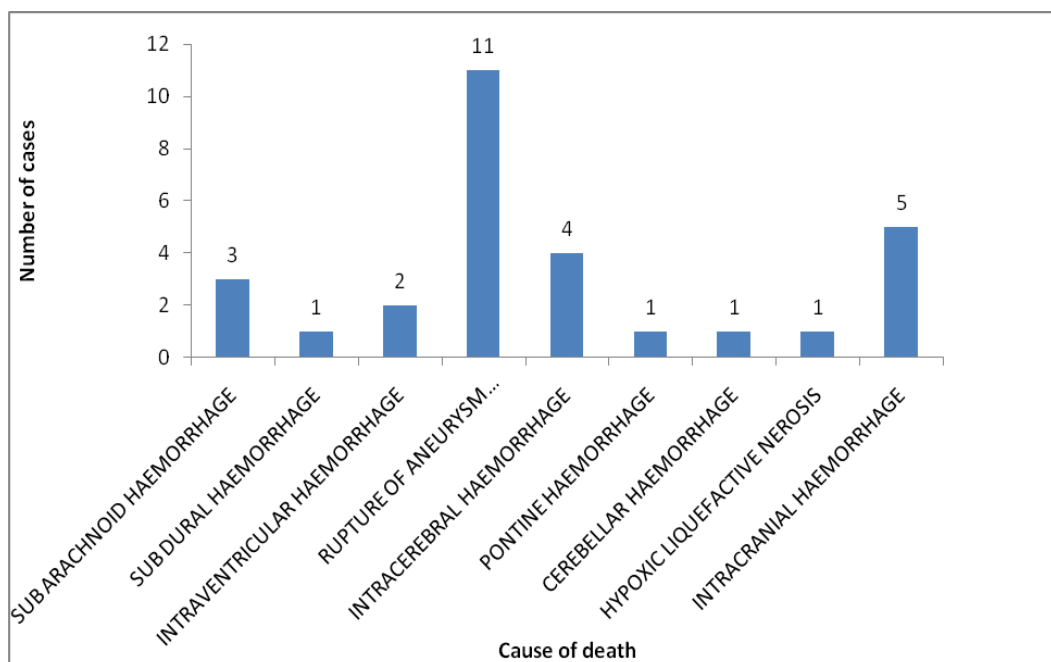
**Fig 4: Cause of Death**

Figure 3, shows the association of body mass index (BMI) with death due to CNS related diseases. 13(44.8%) of those died of CNS diseases were underweight with BMI less than 18.5. 14(48.3%) of people with normal BMI (18.5-23.0) died of CNS diseases. Only 2(6.9%) were overweight (23.0- 30.0).

Rupture of aneurysm leading to the subarachnoid hemorrhage was found to be the main cause of CNS related sudden death. Subarachnoid hemorrhage was found in 13 cases. Intracerebral hemorrhage was found to be the second major cause of death comprising of 7 cases (Figure 4).

## Discussion

Out of 2515 autopsies conducted during the study period 10.84% were sudden death among which CNS related causes accounted for 10.58%. In a study on sudden death done by Pande A.K.et. al. [5] death due to pathology in CNS accounted for (13.59%) while it was 4.3% in another study done by Thomas A et. al.(1988) [6]. This suggests that CNS is an important contributor to sudden death cases.

In the study, Male: Female ratio was 6.25: 1 thus showing a clear male predominance.

Sixty two percent deaths occurred in age group of 40-60 which points out the preponderance of this age group for CNS related sudden death fatalities. Fatalities were equally distributed in underweight as well as among people with normal BMI, while unlike CVS related sudden death cases overweight people appears to be less affected.

In most of cases, rupture of aneurysm leading to the subarachnoid hemorrhage was found to be the main cause of CNS related sudden death followed by subarachnoid hemorrhage and intracerebral hemorrhage. In a study on sudden death, done by Pande A.K. et.al.<sup>5</sup>, 31 CNS cases (13.59%) were reported and out of these 31 cases 17 cases (54.8%) were due to subarachnoid and intracerebral hemorrhage.

## Conclusion

1. Sudden natural death occurred more commonly in males with male-female ratio as 6.25:1.

2. Frequency was higher between 40-60 years.
3. Subarachnoid hemorrhage (44.8%) was found to be the leading cause of CNS related sudden deaths.
4. Sudden death due to CNS related diseases were more in underweight people than overweight people.
5. Hypertension is a major cause of intracranial hemorrhage so there is need to create awareness among people about health and regular medical checkup, especially after 40 years of age.
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