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Pattern of Mortality in Sudden Natural Death in North Delhi: A Prospective Autopsy Study

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Abstract

Objectives: In every population, the pattern of sudden natural deaths is often associated with the epidemiologic profile of certain common killer diseases. The common belief has been that infectious/communicable diseases are the most common reasons of mortality. However, changing lifestyle, increasing literacy level and advanced healthcare fascilities in India have impacted immensely on the causes of death. We, therefore, planned to determine the etiology and epidemiologic characteristics of sudden death at Hindurao hospital at North Delhi. The high incidence of sudden, unexpected death in the heart of the capital city is still an enigma and hence we decided to analyse the cases of sudden death in the last two years at our hospital. This study was conducted to illustrate etiolopathology, risk factors and triggers of sudden death with the aim to provide new insight in epidemiological aspects of sudden death. This should help in care of patients, and prevention of sudden death.

Method: A prospective study of 124 cases of sudden death was conducted at a tertiary care hospital at North Delhi. After evaluating detailed history from the family members, autopsy has been performed to find out cause of sudden death.

Results: The main etiology of sudden death is cardiovascular disease. Highest numbers of sudden death are in old age group. Male patients succumbed to sudden death more which may be related to multiple comorbidities in them. Sudden deaths were more encountered during winters and in morning hours. There are some autopsy negative cases, which are unexplained sudden death.

Conclusions: Cardiovascular, respiratory disorders and central nervous system were the major causes of sudden natural death. Seasonal variation of sudden death especially from respiratory causes may be attributed to rise in pollution and poor air quality during winter season in Delhi.

Keywords: *Autopsy, Sudden death, sudden cardiac death.*

Introduction

WHO defines sudden death as: "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"[1,2] . One of the earliest descriptions of a sudden death event was reported in Froissart's Chronicles in the 14th century by Leonardo de Vinci.[3] Incidence of coronary artery disease has increased in Indians during the past three to four decades. It has emerged as the single largest disease accounting for nearly one third of all deaths in India. Medico legal autopsy is done in such cases primarily to establish cause of death. Psychological and physical traumatic events, low or high body mass, arterial hypertension, old age, diabetes mellitus, smoking, and stress have been demonstrated in some studies performed in different countries as precipitants of sudden death[5]. Among all deaths, sudden death has accounted for 15- 20%. Sudden

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death has accounted for 50 to 80% of all coronary deaths[5]. Sudden cardiac deaths are accounted for >60% of all sudden deaths[6].

Method

This study was conducted prospectively at a tertiary care hospital in north Delhi over a period of 2 years (starting from 30.12.2016- 30.11.2018). During this period 124 cases of sudden death were studied.

Detailed history of the case was taken from the family members . All autopsies were conducted at department of Forensic medicine at a tertiary care hospital at north Delhi. In all cases post mortem examination was performed and all fresh viscera have been sent to the pathology department. After gross pathological examination of fresh viscera, proper cutting and fixation has been performed with 10% Formalin. After 2 days of fixation detailed examination and proper sectioning from representative sites has been done. Tissue processing was done in automated tissue processor. H and E stain was performed for microscopic examination.

Results

The aim of this study is to classify underlying causes of sudden death, to find out risk factors, associated diseases and triggers of sudden death. The data of the pathological findings, epidemiological parameters and clinical history of all 124 cases were collected , tabulated and analysed.

Table no 1- Causes of sudden death

Causes	No of cases	Percentage (%)
Cardiac cause	84	67.7
respiratory	22	17.7
Central nervous system (Hemorrhagic infarct)	9	7
Gastrointestinal	5	4
Autopsy negative	4	3

The leading cause of sudden death was found to be cardiac in 67 % and followed by respiratory and CNS hemorrhagic infarcts (table no 1). Duodenal perforation accounted for 4% of all sudden deaths. Out of 124 patients only 4 were females. Sudden death was more common in 40-60 years of age group. However cardiac sudden deaths were more prevalent in 50-70 years of age group (table no 2,3).

Table no 2- Sex distribution of sudden death

Number	Male	Female
124	120	4

Table no 3- Age wise distribution of sudden death

Age group (in years)	Number of cases	Percentage (%)
10-20	3	2.0
21-30	10	8.0
31-40	20	16.12
41-50	29	23.38
51-60	34	27.41
61-70	21	16.93
71-80	9	7.25

Seasonal variation of sudden deaths was observed and winters accounted for 38.7 % of all sudden deaths. Seasonal variation of death may be attributed to the fall in environmental temperature along with pollution and smog which is prevalent in this season in north Delhi (table no 4).

Table no 4 - Season wise distribution of sudden death

Season	Number of cases	Percentage (%)
Summer (March-June)	30	24.19
Rainy (July-Sept)	24	19.35
Autumn (Oct- Nov)	22	17.74
Winters (Dec- Feb)	48	38.70

Incidence of sudden deaths was little more in morning hours (6am-12 noon). However no reasons could be ascertained for this variation (table no 5).

Table no 5- Diurnal distribution of sudden death

time	Number of cases	Percentage (%)
12 AM -6 AM	15	12.09
6 AM -12 PM	41	33.06
12 PM-6 PM	35	28.22
6 PM-12 AM	33	26.61

Discussion

In the present study our aim is to find out underlying causes of sudden death and risk factors associated with it .This study revealed that most of the cases were in the middle age group of 40-60 years of age. This fact is quite disturbing as this is the most productive age group of an individual in which he is the main support of the family. It may be related to the lifestyle changes, stress, dietary food habits of taking junk foods and rise in the air pollution. All the four cases of duodenal perforation leading to sudden death were in the age group of 40-60 years which shows the impact of food intake, smoking and stressful lifestyle. As per the literature Maximum numbers of Sudden deaths due to cardiac causes are in the age group of 40 to 64 years[7].

Only 4 cases of female sudden deaths were encountered. This gender disparity may be related with the cardioprotective effect of estrogen in premenopausal women as opposed to the testosterone which is known to influence increment in the cardio vascular risk[8]. As per the study done by owada et al the male to female ratio of sudden death was 5.5[9]. However in our study the ratio was much higher. As this study was autopsy based so there might be a bias in this ratio.

The seasonal variation of sudden death was found to be significant in our study as 38.7 % of all sudden deaths were noted in the winters. Out of the 48 cases of sudden death in winters 28 were cardiac, 15 were respiratory, 3 were CNS hemorrhage and 2 with negative autospy. If we see the year wise trend of respiratory cases then out of 22 cases of respiratory deaths 15 (68%) were in winters that might have an association with the poor air quality and pollution in north Delhi during this season. A study on the annual and seasonal variations of Air Quality Index over a period of 9 years (1996-2004) based on daily averaged concentration data of criteria air pollutants has been conducted for Delhi[10]. Pollution level is gradually increasing in Delhi every year. On a scale of 0 – 500, an AQI value between 200 and 300 is considered to be 'poor', while a value between 300 and 400 is considered to be 'very poor'. Anything beyond 400 is considered 'severe'. Delhi usually encounters 'severe' air quality in November-December. In the winter of 2017, Delhi encountered a week-long spell of smog following which the AQI hit a peak of 486 on November 9. While in 2008 the average AQI in Delhi was 450. However a causal association of air quality index with sudden death is a matter of further investigation and has not been established yet.

Conclusion

Cardiovascular, respiratory disorders and central nervous system were the major causes of sudden natural death. Seasonal variation of sudden death especially from respiratory causes may be attributed to rise in pollution and poor air quality during winter season in Delhi. Middle age group people are more prone for sudden death which may be related with multiple risk factors like stress, food habits, hypertension, smoking and environmental factors.

Conflict of Interest- None

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Ethical Clearance- Not required

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