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TRENDS AND DETERMINANTS OF MORTALITY AMONG ELDERLY POPULATION (50+) OF CENTRAL DELHI: A 5 – YEARS RETROSPECTIVE STUDY

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ABSTRACT

Objectives: *To determine the magnitude, manner and causes of death in elder people who were above 50 years of age.*

Material & Method: *Retrospectively analysed the medico-legal post-mortem reports, performed in the Department of Forensic Medicine, Lady Hardinge Medical College, New Delhi, from 2006 to 2010.*

Findings: *Total 2773 autopsies were performed during this period, out of that, 494 cases were of above 50 years older at the time of death. The male and female ratio was 7.98:1. Out of total 494 cases, 180 (36.43%) cases were unidentified/ unknown; 158 (87.77%) male and 22 (12.22%) female. Elderly deaths were categorized as due to un-natural and natural events, constituted 220 (44.53%) and 274 (55.46%) respectively. The pulmonary peumonitis (n=137, 27.73%) was the major cause of natural deaths followed by coronary artery disease (n=65, 13.16%) in identified and unidentified elderly collectively. RTA was the most common (n=126, 25.50%) lethal accident in elderly and followed by Suspected poisoning (n=54, 10.94%). Hanging was the most common mode of suicidal deaths with male predominance whereas homicide is uncommon (n=10, 2.02%). In identified elderly population coronary artery disease (n=60, 50.42%) was the major cause of sudden natural death followed by pulmonary pneumonitis (n=32, 26.89%), tuberculosis (n=17, 14.28%) and in unnatural events RTA (n=110, 58.82%) was most common cause followed by suspected poisoning (n=50, 26.73%).*

Key Words: *Autopsy, elderly, suicide, accidental, homicide, cause of death, unnatural death.*

INTRODUCTION

Elderly or old age consists of ages nearing or surpassing the average life span of human beings. The boundary of old age cannot be defined exactly because it does not have the same meaning in all societies. Government of India adopted National Policy on Older Persons in January, 1999, the policy defines 'senior citizen' or 'elderly' as a person who is of age 60 years or above. The elderly population (aged 60 years or above) accounted for 77 million which is 7.4% of total population in 2001. For males it was marginally lower at 7.1%, while for females it was 7.8%. Among states the proportion vary from around 4% in small states like Dadra & Nagar Haveli, Nagaland Arunachal Pradesh, Meghalaya to more than 10.5% in Kerala. Both the share and size of elderly population is increasing over time. From 5.6% in 1961 it is projected to rise to 12.4% of population by the year 2026. The sex ratio among elderly

people was as high as 1028 in 1951 but subsequently dropped to about 938 in 1971 and finally reached 972 in 2001. Population of Central Delhi in 2001 was 646,385, and now in 2011 is 578,671 with -10.48 Percentage decadal growth rate of population. According to 2011 census [3], Central District stands 2nd in population density (23147 people per square kilometer) after North- East District of Delhi. As per survey conducted under National Sample Survey [1] 60th round during Jan and June 2004, the survey estimated the number of aged persons (60+) as 829917, account for 5.49% of the total population of Delhi. And 50+ people were about 1877393 (12.42% of Delhi's population). The elderly population (aged 60 years or above) constituted 578671 population of central Delhi as per 2011 census.

The life expectancy of Indians has increased from 56.6 to 63.7 during the last two decades. With marginal success in control of communicable and infectious diseases along with improved standards of living, the number of elderly people has been on the increase. Consequently, people are living longer and elderly population has been increasing. Nearly 8% of Indian population is comprised of people in 60 + years [3]. As per United Nations estimates, nearly 9% (117 million) of population will be elderly by the year 2015 in India [4]. The city of Bengaluru has an estimated 3,00,000 persons beyond 60 years [3].

MATERIALS AND METHODS

In this retrospective study, the data was collected from medico-legal post-mortem reports, based on forensic examinations performed in the Department of Forensic Medicine, Lady Hardinge Medical College, New Delhi (India), from 2006 to 2010. During this period, total 2773 medico-legal autopsies were performed. Medical and other investigative data from the police requisition reports were available in each case. The inclusion criteria were that the deceased was more than 50 years at the time of death, and that the manner of death was considered unnatural upon forensic examination. The manner of death was registered as natural, accidental, suicidal, homicidal, or unknown, after evaluation of all available information. All deaths further subcategorized according to the different case specifics of each incident according to age, sex, year, manner and cause of death and whether deceased was identified or unidentified.

RESULTS

This is 5 years (2006 – 2010) retrospective study based on post-mortem records, conducted in the Department of Forensic Medicine & Toxicology of Lady Hardinge Medical College, New Delhi. During this period total 2773 medico-legal autopsies were conducted, 494 (17.81%) cases were of above 50 years. Males were outnumbered 439 cases (88.86%) and remaining 55 cases (11.13%) were females. Male and female ratio was 7.98:1. Elderly deaths were categorized as due to un-natural and natural events, constituted 220 (44.53%) and 274 (55.46%) respectively. Out of 494 cases, 180 cases were unidentified /unknown whom identity could not establish and they were homeless. The male and female deaths in unidentified population constituted 158 cases (87.77%) and 22 cases (12.22%) respectively. The results of study measures in following categories:

NATURAL DEATHS

There were 274 (55.46%) deaths due to natural events, pulmonary pneumonitis contributed in highest number 137 cases (27.73%) followed by Coronary artery disease 65 cases (13.16%) and tuberculosis 57 cases (11.54%) of overall deaths. Out of 274 cases, 155 (56.56%) cases were unidentified homeless and remaining 119 (43.43%) cases were identified and their identity was established. Coronary artery diseases were major cause of death in identified population contributed in 60 cases (21.89%) but pulmonary pneumonitis (n= 105, 38.32%) was leading cause of sudden death in unidentified homeless population. Pulmonary tuberculosis was also a major natural event of cause of death in identified and unidentified population. Tuberculosis was contributed in 40 cases (14.59%) of unidentified population and in 17 cases (6.20%) of identified population. There were 7 deaths due to intracranial haemorrhage, 3 hepatic-renal failure, 3 oesophageal varices and 2 cases of meningitis. Male predominately (n=253, 92.33%) died due to natural reasons. The male and female ratio of natural deaths is 12.62:1.

Pulmonary peumonitis (n=137, 50%) was the major health problem in elderly people which is a leading cause of sudden unexpected deaths. Pulmonary pneumonitis predominantly affected to the male constituted 127 cases (92.70%) and females were only 10 cases (7.29%). After pulmonary pneumonitis, tuberculosis was second leading cause of death in natural events that is contributing 57 (20.80%) cases in which only two were females. Coronary artery diseases were contributing 65 (23.72%) deaths of all natural deaths; 59 males and 6 females. The ratio of male and female was 9.83:1. Males were highly susceptible to death due to coronary artery diseases as more prone to smoking and alcohol consumption.

UNNATURAL DEATHS

A. Accidental

126 (25.50%) deaths in elderly were reported due to road traffic accidents out of 494 total elderly deaths during 5 year period from 2006 to 2010. Out of 126 victims, maximum 110 (87.30%) RTA victims were identified and only 16 (12.69%) victims of RTA were unidentified and homeless. All of the road traffic accidents had occurred within the city and commonly (n= 41 cases, 32.53%) during evening hours between 6 pm to 12 mid night followed by morning hours (n= 33 cases, 26.19%) between 6 am to 12 noon. Pedestrians were the most commonly affected group and hit by heavy vehicles like buses, cars, trucks and van / jeeps resulted in nearly half of deaths. In case of RTA, head injury contributed commonest cause of death in 93 (73.44%) cases and followed by haemorrhage and shock in 24 (19.30%) cases. Fall from height was the second leading cause for injury and death among elderly, 13 persons had died due to direct effect of fall from height followed by 12 cases of accidental burn injuries. Only 2 victims of burn injuries and 1 of fall from height were unknown unidentified homeless. The commonest methods of burns were due to clothes catching fire accidentally of the individual. We reported one death due to electrocution and one death due to chocking.

B. Suicide

In the age group of 50 plus years, suicides were reported among few deaths. The commonest mode of suicide was self poisoning in 54 individuals constituted 10.93% of total elderly deaths. The exact type poison was not found out, the organophosphorus compounds poisoning was commonest suspected to kill themselves. The financial burden and family dispute was most common reason for committing suicide revealed in police inquest report. All cases had occurred at home when the person was alone without the care of immediate family members. Only 4 elderly were homeless those committed suicide by consuming poison. In our study, the hanging was mode of suicide in 3 cases only.

C. Homicide

Out of 494 deaths total 10 (2.02%) elderly person were victim of violence of homicide and had killed by various means. Three elderly people were killed by stab injuries and three were victim of bomb blast. Two were strangulated and one had died due to blunt force injuries and one was shot by gun in head. Almost all elderly (8 out of total 10) were identified and known victims.

DISCUSSION

In this present study, 494 (17.81%) cases were of above 50 years. Males were outnumbered (88.86%). As per the National Sample Survey organization, 39% of elderly above 60 years are likely to be suffering from one or the other health problem [1]. It is estimated that 1.7% and 1% suffer from visual disability, 1.5% and 1.3% hearing and 2.7% and 2.8% loco motor difficulties in rural and urban areas respectively [2]. Data from National Crime Records Bureau–2006 [5] indicate that 34,594 elderly individuals lost their life due to an injury. Some epidemiological surveys on aged population indicate that 1.7% was affected with injuries [6]. Previous studies from NIMHANS on traumatic brain injuries and road traffic injuries reveal that 5 – 8 % of deaths and hospitalisations are among elderly people [7]. Among the various types of injuries, road traffic injuries and falls are found to be the leading causes of injury. One-year (2007) data from Bengaluru injury surveillance programme showed that 360 individuals above 60 years died and 2643 elderly people brought to hospitals due to injuries. Majority of those killed or hospitalized belonged to middle-income families [8]. The male to female distribution was almost equal with 198 men and 162 women in contrast to our study where males were outnumbered 439 cases (88.86%).

In our study, elderly autopsy (50+) cases accounted for 17.81% (55.46% natural deaths and 44.53% un-natural deaths) of the total medico-legal autopsies conducted in the morgue of Lady Hardinge Medical College (LHMC), New Delhi. In the study by Haluk et al. [9], this rate was 7.8%. Homicide and suicide origins accounted for 18.9% which can be considered as higher compared with the literature. In Osaka [10], during 1994-1998, this rate was 13.2%. In another study by Collins et al [11], this rate was 12.4%. In our study, stabbing was the most common method in homicide cases, while gunshot is the most common method in other studies [12, 13]. In our study, male/female proportion was 3:1 and this was concordant with other Turkish studies [9, 14]. Psychiatric illnesses were associated with suicide tendency [10]. In the elderly, 19% of the female and 9% of the male victims had a history of previous

suicide attempts [15]. In our study, poisoning was the most common method among suicide cases (47.1%). In another study held in Aydin this result was hanging [16, 17]. Hanging is the most frequently suicide method used by the elderly also in Austria [18] and many other countries [9, 17]. Using poisoning was very common in our study and this was concurrent to Pritchard and Hansen's study [17]. The most common wound site was the head region in road traffic accidents and this is concordant with other studies [17, 20]. The elderly victims had a higher rate of chest injuries and the commonest method of suicide was hanging and followed by organophosphate poisoning [19].

CONCLUSION

With an ageing population and emergence of injuries are a major public health problem. The interventions need to be integrated in a comprehensive manner to reduce the occurrence of injuries among elderly, focus on provision of effective trauma care services in the event of an injury and rehabilitation after an injury. The findings clearly reveal that road safety and home safety needs strengthening for improving health of the elderly. All programmes aiming at improving the health of the elderly should have a component of safety promotion and injury prevention. Some of the common measures like appropriate speed management strategies, better design of roads, antiskid flooring traffic calming, traffic separation, greater emphasis on public transportation, safe pedestrian walking and crossing facilities, reducing drinking and driving, improving visibility of roads and people, etc., are likely to reduce pedestrian deaths and injuries. Strengthening pre-hospital care services for early care of the injured and efficient care when they reach a hospital will help in reducing the impact of injuries. Capacity strengthening and training of all professionals (especially police, transport, health, education, public works etc involved in safety promotion and health care of the elderly. With increasing globalization, motorization and an ageing population, Indian cities and districts would face a major problem of injuries among the elderly in the years to come.

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Table -1: Distribution of natural and Un-natural deaths in elderly (50+) population

Cause of death ↓	**Natural Deaths**													
	Male						**Female**						Grand Total	%
Year >	2006	2007	2008	2009	2010	Total	2006	2007	2008	2009	2010	Total		
Pulmonary Pneumonitis	23	09	27	15	53	127	1	0	2	2	5	10	137	50.00
Tuberculosis	8	03	12	8	24	55	0	0	1	1	0	2	57	20.80
Coronary Artery Disease	15	11	13	13	7	59	03	0	0	0	3	6	65	23.72
Intracranial Hemorrhage	03	01	0	2	0	6	0	0	0	1	0	1	07	2.55
Meningitis	0	0	0	1	0	1	0	0	0	1	0	1	02	0.72
Hepato-ranal failure	0	01	0	0	0	1	0	0	0	0	0	0	02	0.72
Alcoholic liver disease	0	01	0	0	0	1	0	0	0	0	0	0	01	0.36
Esophageal varices	0	01	0	2	0	3	0	0	0	0	0	0	03	1.09
Total	**49**	**27**	**52**	**41**	**84**	**253**	**4**	**0**	**3**	**5**	**8**	**20**	**274**	**100**
	Un-Natural Deaths													
	Male						Female						Grand Total	Per centage
RTA	2006	2007	2008	2009	2010	Total	2006	2007	2008	2009	2010	Total	**126**	**57.27**
Suspected Poisoning	8	15	11	0	15	49	01	03	01	0	0	**5**	**54**	**24.54**

Fall from height	03	0	04	0	2	**9**	02	0	0	0	2	**4**	**13**	**5.90**
Burn injuries	0	03	0	1	3	**7**	0	01	0	2	2	**5**	**12**	**5.45**
Hanging	0	01	0	1	0	**2**	0	01	0	0	0	**1**	**03**	**1.36**
strangulation	0	01	01	0	0	**2**	0	0	0	0	0	**0**	**02**	**0.90**
Stab injury	01	0	0	1	0	**2**	0	01	0	0	0	**1**	**03**	**1.36**
Bomb blast	0	0	03	0	0	**3**	0	0	0	0	0	**0**	**03**	**1.36**
Assault (blunt force)	0	0	01	0	0	**1**	0	0	0	0	0	**0**	**01**	**0.45**
Gun shot	0	0	01	0	0	**1**	0	0	0	0	0	**0**	**01**	**0.45**
choking	0	0	01	0	0	**1**	0	0	0	0	0	**0**	**01**	**0.45**
Electrocution	0	01	0	0	0	**1**	0	0	0	0	0	**0**	**01**	**0.45**
Total	**25**	**47**	**50**	**27**	**36**	**185 (84.09 %)**	**8**	**11**	**4**	**6**	**6**	**35 (15.90 %)**	**220 (100%)**	**100**
Grand total (Natural + Un-natural deaths)	**75**	**74**	**102**	**68**	**120**	**439**	**12**	**11**	**07**	**11**	**14**	**55**		

Table -2: Distribution of natural deaths

Natural deaths in five years= 274/494X100= 55.46%	**Cause of death**	**Identified/known**	**Unidentified/unknown**	**Total**
	PNEUMONITIS	32	105	137 (27.73%)
	CORONARY ARTERY DISEASE	60	5	65 (13.16%)
	Tuberculosis	17	40	57 (11.54%)
	INTRA-CRANIAL BLEED	6	1	07 (1.42%)
	HEPATO-RENAL FAILURE	1	2	03

	ESOPHAGIAL VARICES	3	0	03
	MENINGITIS	0	2	02
TOTAL		**119**	**155**	**274 (55.46%)**

Table – 3(a): Distribution of unnatural deaths

Unnatural deaths other than homicide=210/494X100 = 42.51%	**Nature of death**	**Identified**	**Unidentified**	**Total**
	TRAFFIC ACCIDENT	110	16	126 (25.50%)
	SUSPECTED POISONING	50	4	054 (10.93%)
	BURN	10	2	012 (2.43%)
	FALL FROM HEIGHT	12	1	13 (2.63%)
	HANGING	3	0	03
	CHOKING	1	0	01
	ELECTROCUTION	1	0	01
TOTAL		**187 (89.4%)**	**23 (10.95%)**	**210 (42.51%)**

Table – 3(b): Distribution of homicide deaths

Homicide deaths in five years = 10/494X100= 2.02%	**Nature of death**	**Identified**	**Unidentified**	**Total**
	STAB	2	1	03
	BOMB BLAST	3	0	03
	STRANGULATION	1	1	02
	GUN SHOT	1	0	01
	BLUNT FORCE	1	0	01
TOTAL		**8**	**2**	**10 (2.02%)**

Table – 4 (a): Time of incidence of RTA

Time of incidence	**No. of RTA deaths**	**%**
0-3 am	11	8.73
3-6 am	13	10.31
6-9 am	16	12.69
9 am -12 noon	17	13.49
12-3 pm	13	10.31
3-6 pm	15	11.90
6-9 pm	22	17.46
9pm-12 night	19	15.07
Total	**126**	**100**

Table -4 (b): Cause of death in RTA

Cause of death	**No. of deaths**	**Percentage**
Head Injury	93	73.44
Haemorrhage & Shock	24	19.30
Septicaemia	6	5.31
Spinal Injury	3	1.94
Total	**126**	**100**

Table -6: Distribution of elderly deaths in unidentified persons

Manner of death	**Male**	**Female**	**Total**	**percentage**
RTA	11	5	16	8.88
Fall from height	1	0	1	0.5
Burn injuries	2	0	2	1.11
Strangulation	1	0	1	0.5
Stab injuries	1	0	1	0.5
Viscera preserved	3	0	4	2.22
Pulmonary pneumonitis	92	13	105	58.33
Tuberculosis	37	3	40	22.22
Coronary artery diseases	5	0	5	2.77
Intra cranial haemorrhage	1	0	1	0.5
Renal failure	1	0	1	0.5
Meningitis	2	1	3	1.66
Liver Cirrhosis	1	0	1	0.5
Total	**158 (87.77%)**	**22 (12.22%)**	**180 (100%)**	**100**