

## STUDY OF ACCIDENTAL DEATH IN ELDERLY AGE GROUP AT VARANASI (INDIA)

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### ABSTRACT

**Introduction:** Gerontology or geriatrics medicine which is a branch of medicine deals with disease of the old age. Aging process is inevitable, irreversible, progressive once it starts, always associated with physical and biological decline. Aging process is inevitable, irreversible, progressive once it starts, always associated with physical and biological decline. In present study we consider geriatric age (elderly)  $\geq 60$  years. **Aim of the study:** To determine the epidemiological features and highlight outcome of geriatric unnatural deaths in Varanasi area. **Material & method:** The present retrospective study has been conducted for the period of 5 consecutive years i.e. 2009 to 2013 based on autopsy record of the unnatural death cases among elderly individuals. During study period total numbers of unnatural death cases were 10195 and deaths among elderly were 1310. These cases were brought to the Department of Forensic Medicine, IMS, BHU, Varanasi and have been analyzed retrospectively. **Result:** Geriatrics autopsy 12.85% of total unnatural deaths. In present study we consider geriatric age (elderly)  $\geq 60$  years. Male to female ratio was 3.68:1. Most of the deaths were accidentals i.e. 626 cases (17.79%). Road traffic accidents 567 cases 43.28% were more common. Rural habitat out numbers 73.89% urban habitat only 4.81%. Hindu out numbers 76.03%, Muslim 2.52%. Summer season 480(36.64%), rainy season 422(32.21%) and in winter season 408(31.15%). **Conclusion:** Analysis of data for retrospective study suggests that prevalence, age, gender, manner of death, cause of death, habitat, religion and seasonal variations significantly affect community.

**Key Words:** Elderly age group, Forensic autopsy, Medico legal case, Unnatural death, Forensic medicine, Gerontology.

### INTRODUCTION:

An accident or a mishap is an incidental and unplanned event or circumstance, often with lack of intention or necessity. It usually implies a generally negative outcome which might have been avoided or prevented had circumstances leading up to the accident been recognized, and acted upon, prior to its occurrence. Injury prevention refers to activities designed to foresee and avoid accidents. Accidents of particularly common types (crashing of automobiles, events causing fire, etc.) are investigated to identify how to avoid them in the future. This is sometimes called root cause analysis, but does not generally apply to accidents that cannot be deterministically predicted. A root cause of an uncommon and purely random accident may never be identified, and thus future similar accidents remain. Physical examples of accidents include unintended collisions or falls, being injured by touching something sharp, hot, electrical or ingesting poison. Non-physical examples are unintentionally revealing a secret or otherwise saying something incorrectly, forgetting an appointment, etc. By activity: Accidents during the execution of

work or arising out of it are called work accidents. According to the International Labor Organization (ILO), more than 337 million accidents happen on the job each year, resulting, together with occupational diseases, in more than 2.3 million deaths annually<sup>1</sup>. In contrast, leisure-related accidents are mainly sports injuries. By vehicle: Aviation accidents, Bicycle accidents, Sailing ship accidents, Traffic collisions, Train wrecks, Tram accident Elderly age group is people more than 60 year of age.

Gerontology or geriatrics medicine which is a branch of medicine deals with disease of the old age. Aging process is inevitable, irreversible, progressive once it starts, always associated with physical and biological decline. For the sake of global comparison between countries, a cut-off point has been established by the United Nations at 60 years. Any individual of this age and above is regarded as elderly individual. Thus for sake of comparison, aged individuals are broadly divided

into three categories: young old up to the age of 75 years during which their biological function is almost comparable to an adult person; old-old individual up to 85 years of age during which their biological functions have declined significantly and the person has many physiological and mental limitation; and very old individual over the age of 85 years where the biological limitations are quite significant and this group most often require the help of care-giver for their daily living<sup>2</sup>.

Aging is generally defined as process of deterioration in the functional capacity of organism that after maturity resulting from structural changes and it is a consequence of the inability of the organism to restore homeostasis when given a challenge. The aging human experiences a gradual decline in almost all body functions, mainly in the cardiac performances, respiratory and functions, sensory faculties, nerve impulse conduction, muscle strength, endurance, agility and ability to maintain coordinated muscular effort, which may be due to structural and functional changes resulting in inability to restore homeostasis<sup>3</sup>.

The aging process is a biological reality and has its own dynamics, which is largely beyond human control. Each society makes sense of old age in its own constructs. In the developed world, chronological time (the age of education, working age, retirement age) play a paramount role in life<sup>4</sup>. In general, the incidence of adverse drug reactions is much higher in elderly<sup>5</sup>. Improvement in environmental and behavioral factors and the treatment and prevention of infectious diseases are

largely responsible for the 30 year increase in life expectancy since 1900<sup>14</sup>.

### AIM OF THE STUDY

To determines the factors and highlight outcome of geriatric unnatural deaths accidents at Varanasi area to detect factors influencing mortality and morbidities in geriatric age group.

### MATERIAL AND METHODS

Present study is carried out at forensic medicine department, Institute of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data like age, sex, habitat, marital status and manner of death among geriatrics have been collected from medico legal autopsy register. Data are analyzed retrospectively for periods of five years from 2009 to 2013. Total numbers of autopsy were 10195 cases. Cases were included in death among geriatric age group on the basis of confirmation by investigating officer and corroborative finding at medico legal examination.

### OBSERVATIONS AND RESULT

Total number of cases which were autopsied in the 5 year study period was 10195 out of which total geriatrics autopsy 1310 (12.85%) of total unnatural deaths. Percentage of geriatric autopsy on the basis of year wise distribution from 2009 to 2013 for 5 consecutive years were 19.31, 20.00, 19.54, 19.16, and 21.98 % respectively which is more or less static i.e. average 20.00%. Male cases were outnumbered 1030(78.63%) female 280(21.37%) i.e. male to female ratio 3.68:1 (**Table-1**).

**Table-1:** Prevalence of unnatural deaths among elderly age group

Year	Number of autopsy of elderly	% of deaths among elderly	Male elderly		Female elderly	
			No.	%	No.	%
2009	253	19.31	201	19.51	52	18.57
2010	262	20.00	209	20.29	53	18.93
2011	256	19.54	186	18.06	70	25.00
2012	251	19.16	197	19.13	54	19.29
2013	288	21.98	237	23.01	51	18.21
<b>Total</b>	1310	12.85	1030	78.63	280	21.37

Age wise distribution of unnatural death in the geriatrics age group showed that most of deaths in the 60-65 age groups i.e. 90.76% followed by 75-85 years 7.63% and in more than 85 year were 1.60% (**Table-2**).

**Table -2:** Age wise distribution of unnatural death in elderly s age

Age group	Total No. of elderly		Male elderly		Female elderly	
	No.	%	No.	%	No.	%
60-75	1189	90.76	942	91.46	247	88.21
75-85	100	7.63	70	6.80	30	10.71
>85	21	1.60	18	1.75	03	1.07
<b>Total</b>	<b>1310</b>	<b>100.00</b>	<b>1030</b>	<b>100.00</b>	<b>280</b>	<b>100.00</b>

Distribution of pattern of death in geriatrics age group showed that road traffic accidental 567 cases 43.28% followed by railways accident 99 (7.56%), burn 73 (5.57%), poisoning 60 (4.58%), drowning 50 (3.82%) etc (Table-3).

**Table- 3:** Distribution of pattern of death in elderly age group

Cause of death	No. of male elderly		No. female elderly		Total No. of elderly	
	No.	%	No.	%	No.	%
Road traffic accident	469	45.53	98	35.00	567	43.28
Railways accident	73	2.52	26	9.29	99	7.56
Burn	26	2.52	47	16.79	73	5.57
Poisoning	45	4.37	15	5.36	60	4.58
Drowning	37	3.59	13	4.64	50	3.82
Fall from height	12	1.17	8	2.86	20	1.53
Firearm injury	14	1.36	0	0.00	14	1.07
Unknown	7	0.68	4	1.43	11	0.84
Suffocation	4	0.39	4	1.43	8	0.61
Electrocution	5	0.49	1	0.36	6	0.46
Strangulation	3	0.29	1	0.36	4	0.31
Heat stroke	3	0.29	0	0.00	3	0.23
Hypothermia	3	0.29	0	0.00	3	0.23
Infected wound	3	0.29	0	0.00	3	0.23
Other (Bomb blast injury, Bull attack, Chemical burn, Lightning, Hanging, Natural cause)	326	31.5	63	22.5	357	34.67
<b>TOTAL</b>	<b>1030</b>	<b>78.63</b>	<b>280</b>	<b>21.37</b>	<b>1310</b>	<b>100.00</b>

Distribution of death among geriatrics age group according to habitat showed that rural habitat outnumbered 968 (73.89%) urban habitat only 63 (4.81%) (Table-4).

**Table- 4:** Distribution of death among elderly age group according to habitat

Habitat	Total No. of Elderly		No. male Elderly		No. of female Elderly	
	No.	%	No.	%	No.	%
Rural	968	73.89	761	73.88	207	73.93
Urban	63	4.81	47	4.56	16	5.71
Unknown	279	21.30	222	21.55	57	20.36
<b>Total</b>	<b>1310</b>	<b>100.00</b>	<b>1030</b>	<b>78.63</b>	<b>280</b>	<b>21.37</b>

Distribution of unnatural death among geriatrics age group according to religions showed that Hindu outnumbered 996 (76.03%), Muslim 33 (2.52%) and Christian only 5 (0.38%) (Table-5).

**Table -5:** Distribution of unnatural death among elderly age group according to religions

Religions	Total No. of elderly		No. of male elderly		No. of female elderly	
	No.	%	No.	%	No.	%
Christian	5	0.38	4	0.39	1	0.36
Hindu	996	76.03	779	75.63	217	77.50
Muslim	33	2.52	28	2.72	5	1.79
Unknown	276	21.07	219	21.26	57	20.36
<b>Total</b>	<b>1310</b>	<b>100.00</b>	<b>1030</b>	<b>78.63</b>	<b>280</b>	<b>21.37</b>

Distribution of seasonal variation among geriatrics age group showed that most of the cases in summer season 480 (36.64%), rainy season 422 (32.21%) and in winter season 408 (31.15%) (**Table-6**).

**Table- 6:** Distribution of seasonal variation among elderly age group

Season	Total No. of Elderly		No. of Male Elderly		No. of Female Elderly	
	No.	%	No.	%	No.	%
<b>Summer (March-June)</b>	480	36.64	385	37.38	95	33.93
<b>Rainy (July-October)</b>	422	32.21	333	32.33	89	31.79
<b>Winter (Nov.- Dec.)</b>	408	31.15	312	30.29	96	34.29
<b>Total</b>	1310	100.00	1030	78.63	280	21.37

## DISCUSSION

**Incidence of Deaths:** In our study we find that total number of autopsied in the 5 year study period was 10195 out of which total geriatrics autopsy 12.85% of total unnatural deaths. On the basis of year wise distribution geriatric autopsy from 2009 to 2013 for 5 consecutive years which is more or less static i.e. average 20.00%. Other studies find that prevalence of geriatric autopsy comparatively more i.e. 20.26% of more than 60 year of age<sup>5</sup>. Other study<sup>11</sup> find it is 7.2% for those aged  $\geq 60$  years. In Norway, 48% of medico- legal deaths were recorded in the elderly<sup>9, 12</sup>. The difference may be related to the difference in life expectancy (78.7 years in Norway versus 51.3 years in Nigeria)<sup>13</sup>. It may also reflect the value placed on the life of the elderly. Owing to the shorter life expectancy in Nigeria, investigating the cause of death in the elderly may not be considered worthwhile.

**Age of Elderly:** In present study we find that most of deaths in the young old 60-65 year age groups i.e. 90.76% followed by 75-85 years 7.63% and in more than 85 year were 1.60%.

**Sex:** In present study we find that male elder lies unnatural death cases were outnumbers 78.63%, female 21.37% i.e. male to female ratio 3.68:1. These difference are due to Men are more commonly

victims perhaps as they are generally working outdoors and are more exposed to stress, frustrations and violence and women often become victims of domestic homicides due to physical disadvantage and incapability of resistance to violence. Similar finding by other study<sup>5</sup> that every year, throughout the ten-year study period, the number of unnatural deaths in elderly males was more than elderly females.

**Cause of Death:** Regarding distribution of pattern of death in our study showed that geriatrics age group showed that road traffic accidents 567 cases 43.28% followed by railways accident 7.56%, burn 5.57%, poisoning 4.58%, drowning 3.82% etc. In other study<sup>5, 7, 10</sup> find traumas were the most common cause of death (78.71%), followed by undetermined causes (13.36%) and toxicological causes (7.93%).

**Habitat:** In our study regarding distribution of death among geriatrics age group according to habitat showed that rural habitat outnumbers 73.89% urban habitat only 4.81%. Other studies also find similar result that unnatural deaths were higher in rural than in urban areas<sup>4, 6, 8</sup>.

**Religious:** In our study we find that distribution of unnatural death among geriatrics age group

according to religions showed that Hindu outnumbered 76.03%, Muslim 2.52% and Christian only 0.38%.

**Seasonal Variation:** Distribution of seasonal variation among geriatrics age group showed that most of the cases in summer season 480 (36.64%), rainy season 422 (32.21%) and in winter season 408 (31.15%).

## CONCLUSION

**Counseling:** Problem management center at regional level to record and analysis and manage accordingly.

**To make non-violent community:** To control unnatural death manner accidental, homicidal and suicidal cases.

**Comprehensive and strict legislation** should be considered to promote an improvement of roadways as well as strict traffic laws must be proposed to control traumatic road side accidental deaths.

**Education of agrichemical workers and formers** about risk factors that lead to accidental poisoning with pesticides and insecticides should be done. Lastly, strict rules should be present to control marketing of pesticides, insecticide and pharmacologic agents. Many factors are possible contributors to the increased mortality and injury incidence rates observed among rural populations. Most injury mechanisms may occur more frequently in rural than urban populations; for example, road traffic accidents may occur more frequently on rural roadways because of their bad design as regard guiding marks, road condition and proper illumination.

**Future Scope:** Based upon the present study in future planning regarding prevention of unnatural deaths among elderly age group:-To plan effective preventive strategies regarding road traffic accident as it was most common cause of death. A need for further similar studies is stressed & maintenance of elderly medico legal certificate registers to know the pattern of old age fatalities and legal complications and further reducing the geriatric fatalities in future.

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## Reference:

1. ILO Safety and Health at Work; Inter-national Labour Organization (ILO).
2. W Selvamurthy et al. Basic geriatrics; biological process of aging; Indira Gandhi National Open University School of Health Sciences; MME 4; unit 1; PP:14-15.
3. Ashish Bose et al. Basic geriatrics; demography and epidemiology of aging; Indira Gandhi National Open University School of Health Sciences; MME 4; unit 1; PP: 5-6.
4. AB Dey et al. Basic geriatrics; aging gracefully; Indira Gandhi National Open University School of Health Sciences; MME 4; unit 1; PP:5.
5. Essam M Ali et al. A study of elderly unnatural deaths in medicolegal autopsies at Dakahlia locality; Mansoura J. Forensic Med. Clin. Toxicol; January 2007, Volume XV; No. 1; PP: 33-43.
6. Mohanty MK, Kumar TSM, Mohanram A and Palimar V. Victims of homicidal deaths - an analysis of variables". J. Clinical Forensic Med., 2005, 12: 302-304.
7. Milroy CM and Ranson, DL. "Homicide trends in the state of Victoria, Australia". Am. J. Forensic Med. Pathol., 1997, 18: 285 - 289.
8. Kumar V, Li AKM, Zaniyal AZ, Lee DA and Salleh SA. "A study of homicidal deaths in medico-legal autopsies at UMMC, Kuala Lumpur". J. Clinical Forensic Med., 2005, 12: 254-257.
9. Boland M, Staines A, Fitzpatrick P. and Scallan E. "Urban-rural variation in mortality and hospital admission rates for unintentional injury in Ireland". Inj. Prev., 2005, 11:38-42.
10. Ambade VN, Godbole HV and Kukde HG. "Suicidal and homicidal deaths: A comparative & circumstantial approach". J. Forensic and Legal Med., 2007,14 : 253-260.
11. WO Akhiwu et al. Deaths with medico- legal implications in the elderly: experience from Benin City, Nigeria; Asian Journal of Gerontology & Geriatrics Volume 6 No 1 June 2011; PP: 35-37.
12. World life expectancy chart; US Census Bureau, 2000.
13. Amakiri CN. Forensic medicine in the Rivers State of Nigeria: experience in four rural general hospitals. Med Sci Law 2000; 40:71-7.
14. KD Tripathi. Essential of medical pharmacology; Jaypee Brother's Medical Publisher (p) LTD; 4<sup>th</sup> edition; 1999, 62.

