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An epidemiological study of the morbidity and mortality pattern among the elderly people of Uttarakhand state

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Abstract
Background: Ageing is a part of the development sequences of entire life span. India is going to be having highest number of geriatric in the world by year 2025. Morbidity among elderly is a serious problem for health service utilization in India due to increase in elderly population.
Results: A total of 18,309 new patients were seen in the Government Doon hospital within the period under review. Out of these, 4054 were geriatric patients (aged 60 years and above) made up of 55.6% (n=2252) males and 44.4% (n=1802) females with male to female preponderance ratio of 1.8:1. Most of the system disorders were found to be almost equally distributed among elderly men and women. A statistically significant (p>0.05) was observed among morbidity and mortality of gender inequality in hospital admission. Out of 4054 geriatric patients, 297 (7.3%) elderly deaths were registered during the study period.
Conclusion: Awareness among the elderly population should be created for regular medical check-ups to ensure prevention and early detection of the chronic diseases. It is also essential to have geriatric units with specialised professionals along with subsidized health care services in order to address geriatric morbid conditions in a proper manner.

Keywords: Geriatric, morbidity, mortality pattern

1. Introduction

Globally, the elderly people constitute 10% of the population and the number is expected to increase up to 21% by the year 2051. In the year 2002, the number of elderly people in the world was estimated to be 605 million and is expected to rise to more than 1.2 billion by the year 2025 [1]. Population aging is a worldwide phenomenon and India is no exception. Indian population has grown three times in the past 50 years, but the elderly population has increased more than four times. In India, according to the 2001 Census, the elderly population (60+ years) accounted for 77 million; however, the elderly population has crossed the 100 million mark according to the Census 2011. It took more than 100 years for the aged population to double in most of the countries in the world, but in India, it has doubled in just 20 years [2]. In India the elderly population is 100 million forming 10% of total population and it is estimated to reach up to 150 million by the year 2020. The demographic population is rising due to better health control of communicable diseases resulting in increased longevity [3]. Expectation of life at birth has increased in recent years. The expected life projected in 2011–2016 has been 67 years for male and 69 years for female. United Nation has also indicated that 21% of the Indian population will be above 60 years by 2050. Three out of four countries projected to have the largest number of people in the year 2025 are located in Western pacific and South East Asia: China, India and Indonesia [4].

The elderly are one of the most vulnerable and high risk groups in terms of health status in any society. Evaluation of the morbidity profile will have implications for providing health care for the elderly population and its costs. The health of the aged is a public health issue and needs to be addressed. More than 75% of the elderly people are residing in rural areas; the geriatric health care should be addressed by primary health care [5]. The state of Uttarakhand, a hilly state of North India, like other Indian states, the total population growth in this decade (2011) was 18.81 percent while in previous decade (2001) it was 19.20 percent. The population of Uttarakhand forms 0.83 percent of India in 2011 [6, 7]. Population aging generates many challenges and sparks concerns about the pace of future economic growth, the operation and financial integrity of healthcare and pension systems, and the well-being of the elderly [8]. Aging leads to a generalized deterioration of many organs and systems. It leads to a lower effectiveness of physiological functions accompanied by an increase in risk factors for various diseases. A fall in bone mass leads to osteoporosis and fractures, cartilage degeneration leads to musculoskeletal problems, muscle loss leads to functional weakness, a decline in immune function cause increases in infections and cancer, and increased neuronal degeneration leads to decline of cognitive functions and dementia. Health-seeking behavior in terms of illness behavior refers to those activities undertaken by individuals in response to symptom

experience. Elderly patients are generally perceived to be more reluctant to seek health care for ailments [9, 10].

The predominantly hilly state of Uttarakhand has difficult hilly terrain, poor road connectivity and small scattered settlements, all contributing to problems of access to health services. Dehradoon, the capital city of Uttarakhand, has two major tertiary care government hospitals for males and females separately. In Dehradoon district there are no specific geriatric services in primary and secondary levels of care. Elderly living in hilly terrain may have different perceived needs and morbidity pattern. The patients therefore represent various strata of the society cutting across social classes, religions and ethnic groups. The place of residence of majority of the patients extended from close vicinity of the hospital to a distance as far as 100 km approximately. The worst affected were villagers who trekked several kilometers from the hilly terrains of the State. In view of the increasing patient load, the Uttarakhand State Government has taken the decision to convert the "Doon Hospital" to a medical college [11]. During the past decade, there are numerous studies highlighting the morbidity pattern in different geographical areas of India, but none relating to this hilly state of North India. The results of this study are expected to help policy makers in planning specialized services for elderly residing in this area of North India. With this background, we did a study to assess the morbidity pattern and study the health-seeking behavior in aged population of Dehradoon district in Uttarakhand.

2. Material and Methods

2.1. Aims & Objectives

To study the socio demographic profile and morbidity and mortality pattern among geriatric population of hospitalized patients in a secondary care hospital of Dehradoon, Uttarakhand State, India

2.2. Study population and study period

The secondary care Doon Hospital caters primarily to the population of Dehradun districts which includes urban, slum and rural areas. As per census 2011 report, the total population of Dehradun district was around 1,698,560 [males - 893,222 (52.6%), females - 805,338 (47.4%)] [12]. All the patients admitted at hospital from 1st January, 2012 to 31st December, 2012 were included for the morbidity and mortality analysis.

2.3. Study design and study settings

This was a retrospective (record based) review study. The hospital has more than 40 allopathic doctors including pediatricians, physicians, surgeons, neurophysicians, ortho-surgeons, Ear-Nose-Throat (ENT) specialists and eye surgeons besides doctors belonging to AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homoeopathy) providing medical aid. The patients are admitted under clinical disciplines of pediatrics, internal medicine, surgery, neurology, cardiac, skin, ENT, dental and ophthalmology. The admissions were done under either routine or emergency category. The discharge of a patient was based on individualized assessment and clinical outcome of the treatment administered. The hospital followed the following categories of condition at discharge: 1- Cured; 2- Relieved; 3- Referred; 4- LAMA and 5- Expired. Obstetrics and gynecology facilities are not available in Doon Hospital. There is a separate female hospital adjacent to the hospital premises for obstetrics and gynecology and other diseases. Seriously ill patients requiring higher level of care are referred to other government-funded hospitals in the district. Ambulance facilities are available at the hospital round the clock for patients use.

2.4. Hospital Management Information System (HMIS)

HMIS started functioning in the hospital from 2008 under the National Rural Health Mission. All information pertaining to out-door and in-patients are entered and stored in HMIS.

2.5. Data retrieval

The details of patients and their diagnosis were collected from the case sheets of the patients or discharge registers kept in medical records department. Relevant information pertaining to socio-demographic indicators, diagnosis, treatment, prognosis of the disease condition at discharge and cause of death etc., as recorded in the case records by the clinicians from period of 1st January, 2012 to 31st December, 2012 was retrieved from HMIS archives. Records of patients with missing information on bio-data and diagnosis were excluded from study. For those with multiple diagnoses, morbidity with the longest duration or the final diagnosis (supported by relevant laboratory investigations) was recorded as primary illness for the patient. All the information collected was cross-checked for completeness of the data from the records available at hospital (viz- patient's admission file, reports and ward registers, etc.). The World Health Organization (WHO) standards were used for analyzing and comparing the data. The abstracted data is coded by using manual of International Statistical Classification of Disease and Related Health Problems (10th revision), Volume 1 & 2, Second Edition published by the WHO, Geneva [13].

2.6. Statistical Analysis

Collected data were entered in Microsoft Excel (2010) and analyzed using SPSS version 16 (SPSS Inc., Chicago, USA). Descriptive statistical analyses were performed. Chi-square (X^2) and Z test was used to compare qualitative data. P value less than 0.05 were considered statistically significant at 95% confidence interval. Figures were illustrated by Microsoft office (97-2003).

3. Results

An in-patient is a patient who is formally admitted (or 'hospitalized') for diagnosis, treatment and/or care and stays for a minimum of one night or more than 24 hours in the hospital providing in-patient care.Table 1 shows distribution of elderly patients according to age and sex. A total of 18,309 new patients were seen in the Government Doon hospital within the period under review. Out of these, 4054 were geriatric patients (aged 60 years and above) made up of 55.6% (n=2252) males and 44.4% (n=1802) females with male to female preponderance ratio of 1.8:1. The highest number of morbidity of the elderly belongs to age group 60-64 years in both sexes (male= 684 i.e. 30.4%; female= 560 i.e. 31.1%; total= 1244 i.e. 30.7%) followed by the age group 65-69 years and above. A total of 53.9% (n=2183) of them were aged 60-69 years. Those who were 70-79 years constituted 32.6% (n=1321) while 13.57% (n=550) were those over 80 years of age (Table 1, Fig.1). The mean age of male was 70.15 (SD 7.69) and that of female it was 69.93 (SD 7.83). A statistically significant

association (9.9661, p<0.05) was found between in age group of 80-84 years and gender.

Table 2 depicts the most of the system disorders were found to be almost equally distributed among elderly men and women. Diseases of symptoms signs and abnormal clinical and laboratory findings was the most commonly observed morbidity among males (R00-R99: n=528, 23.4%) than females (n=436, 24.2%). While diseases of eye, adnexa, ear and mastoid was the most commonly observed morbidity among females (H00-H81: n=532, 29.5%) than males (n=425, 18.9%).

A statistically significant difference was seen among the system involved with most common disorder reported among elderly males & females were diseases of symptoms signs and abnormal clinical and laboratory findings (R00-R99: n=964, 23.8%) followed by diseases of eye, adnexa, ear and mastoid (H00-H95: n=957, 23.1%), diseases of respiratory system (J00-J99: n=564, 13.9%), disorders of of circulatory system (I00-I99: n= 341, 8.4%), diseases of digestive system (K00-K93:n=121, 3.0%), diseases of Injury, poisoning and certain other consequences of external causes (S00-T98:n=221, 5.5%), diseases of genitourinary system (N00-N85:n=100,. 2.5%) and diseases of external causes of morbidity and mortality (V01-Y98: n= 54, 1.33 %).

No statistical difference was found among the system involved diseases of certain infectious and parasitic (A00-B89: n=273, 6.7%), diseases of neoplasms, disorder of blood and forming organs disorders (C00-D89: n=172,. 4.2%), diseases of endocrine, nutritional and metabolic disorders (E00-E90: n= 212, 5.2%), diseases of mental and behavioral disorders (ICD.10: F00-F99, n=6, 0.1%), diseases of the nervous system (G00-G99: n=40, 1.0%), diseases of the skin and subcutaneous tissue (ICD.10: L00-L99: n=18, 0.4%) and diseases of the musculoskeletal system and connective tissue(M00-M99:n= 9, 0.2%) (Table 2, Fig.2).

Table 3 provides the distribution of elderly according to condition at discharge. It was found that out of the total (n= 4054) admitted cases in hospital, 2362 elderly (58.3%) were discharged as cured, 773 (19.1%) were relieved, 510 (12.6%) left against medical advice (LAMA), 297 (7.3%) were expired during their hospital stay and remaining 112 (2.8%) were referred to other higher institute/hospital for management of diseases). A statistically significance difference (p>0.05) was seen among the discharge status and gender (Table 3, Fig.3).

Table 4 shows the distribution of mortality patterns of elderly study subjects by system involved. A total of 297 (Male= 182, 61.3%; Females= 115, 38.7%) elderly deaths were registered during the study period. A statistically significant (p>0.05) gender inequality was observed. The case fatality rate due to diseases of symptoms signs and abnormal clinical and laboratory findings external causes (R00-R99: male=50, 16.8%; female= 32, 10.8%; total=82, 27.6%) was higher followed by diseases of respiratory system (J00-J99: male=48, 16.2%; female= 20, 6.7%; total=68, 22.9%) and found statistically significant (p>0.05), diseases of circulatory system (I00-I99: male=30, 10.1%; female= 17, 5.7%; total=47, 15.8%), diseases of certain infectious and parasitic system (ICD.10: A00-B89: male=12, 4.0%; female= 13, 4.4%; total=25, 15.8%) and diseases of endocrine, nutritional and metabolic disorder (ICD.10: E00-E90: male=11, 3.7%; female= 11, 3.7%; total=22, 7.4%). Overall case fatality rate was 7.33% (Table 4, Fig.4).

Superscript figures (1, 2, 3, 4 and 5) are representing the rank order to age groups

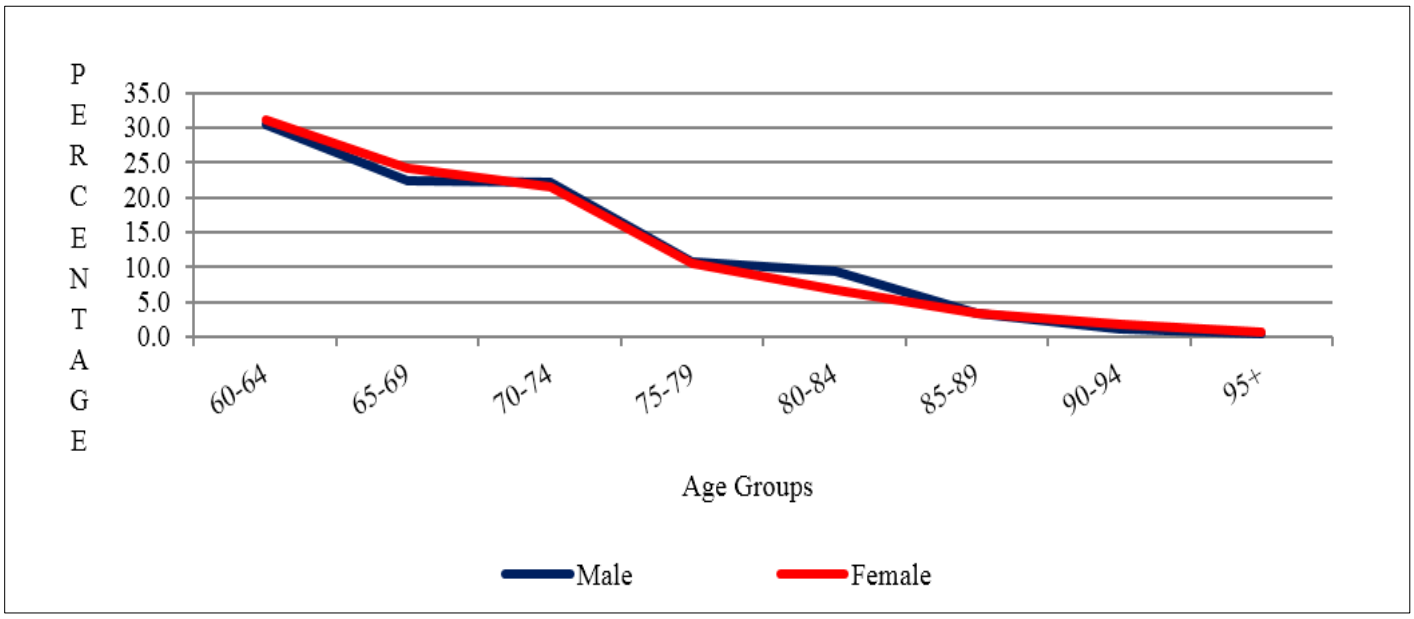

Fig 1: Age-specific proportions for all causes of morbidity among elderly by sex

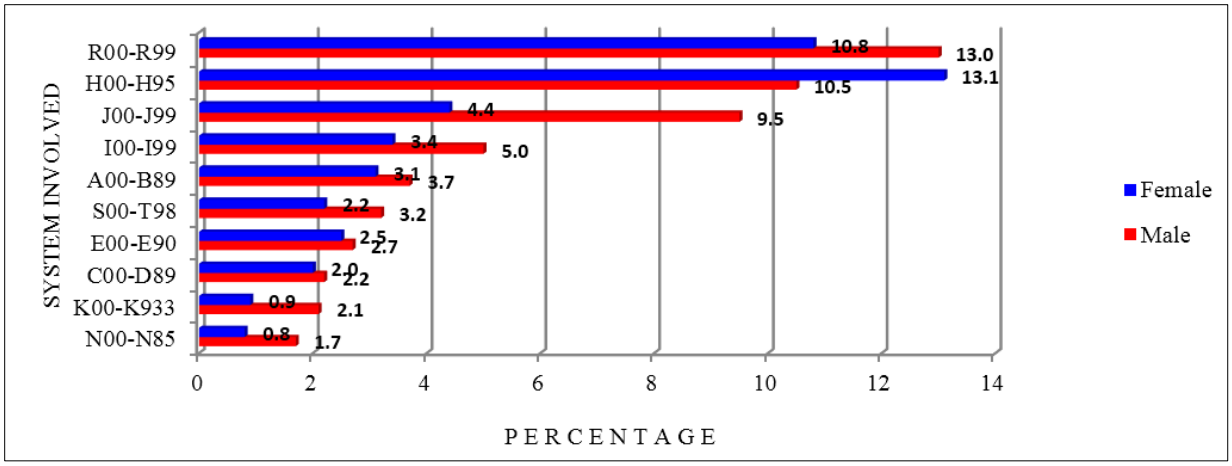

Fig 2: Ten leading disorders of morbidity system involved in elderly by sex

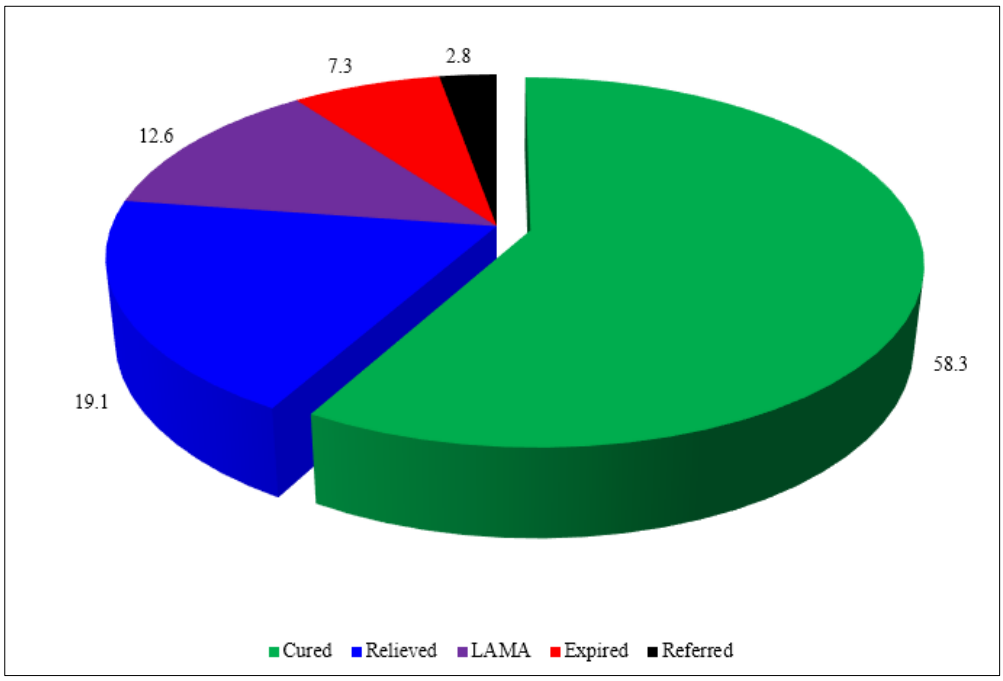

Fig 3: Percentage distribution discharge status in elderly, total

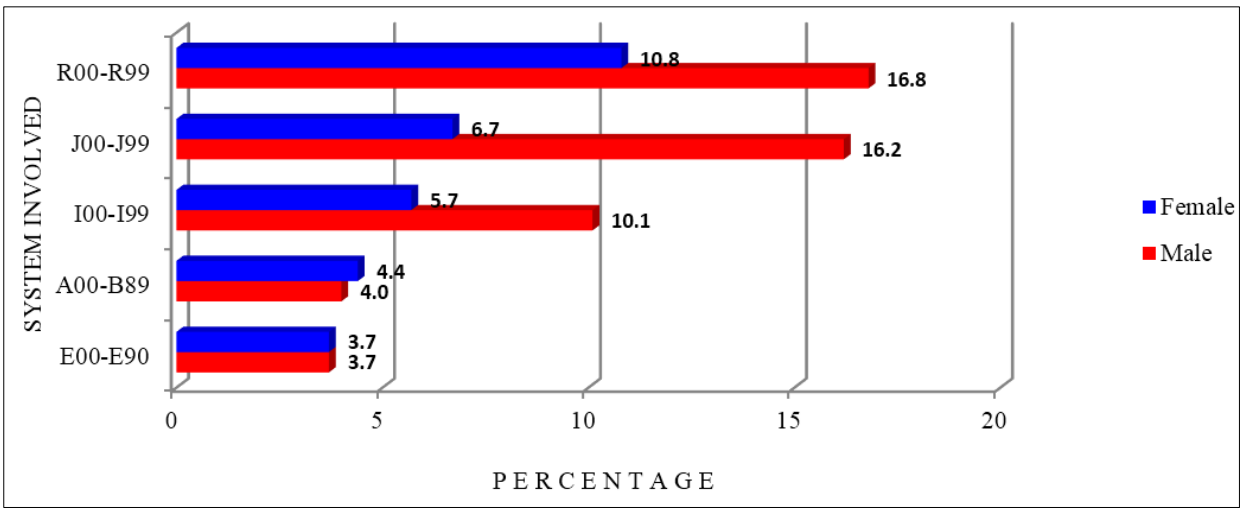

Fig 4: Leading disorders of mortality in elderly by sex

Table 1: Distribution of elderly patients according to age and sex

Age group in years	Male		Female		Total		Chi-square statistic and p value
	#	%	#	%	#	%	
60-64	684[1]	30.4	560[1]	31.1	1244[1]	30.7	0.233, p-value is 0.629328, not significant at p <0.05
65-69	504[2]	22.4	435[2]	24.1	939[2]	23.2	1.7417, p-value is 0.18692 not significant at p <0.05.
70-74	499[3]	22.2	390[3]	21.6	889[3]	21.9	0.1554, p-value is 0.69347 not significant at p <0.05.
75-79	243[4]	10.8	189[4]	10.5	432[4]	10.7	0.0959. p-value is 0.75676 not significant at p <0.05
80-84	213[5]	9.5	121[5]	6.7	334[5]	8.2	9.9661, p-value is 0.00159 Significant at p <0.05.
85-89	74	3.3	63	3.5	137	3.4	2.3912, p-value is 0.122018not significant at p <0.05.
90-94	26	1.1	32	1.8	58	1.4	
95+	9	0.4	12	0.7	21	0.5	
Total	2252	100.0	1802	100.0	4054	100.0	3.7053, p-value is. 447354 not significant at p <0.05
% (All cases)	55.6		44.4		100.0		
Average age in yrs	70.1		69.9		70.0		

Table 2: Distribution of morbidity patterns in elderly by system involved (ICD10) and gender

ICD 10	System involved	Male		Female		Total		Z statistics(p value)
		#	%	#	%	#	%	
A00-B89	Diseases of certain infectious and parasitic	149[5]	3.7	124[5]	3.1	273[5]	6.7	z-value- 1.5, p-value 0.1301 not. sig (p>0.05)
C00-D89	Diseases of neoplasms, disorder of blood and forming organs	91[8]	2.2	81[8]	2.0	172[8]	4.2	z-value- 0.8, p-value 0.4476 not. sig (p>0.05)
E00-E90	Diseases of endocrine, nutritional and metabolic	109[7]	2.7	103[6]	2.5	212[7]	5.2	z-value- 0.4, p-value 0.6836 not. sig (p>0.05)
F00-F99	Mental and behavioural disorders	2	0.0	4	0.1	6	0.1	z-value- 0.8, p-value 0.4377 not. sig (p>0.05)
G00-G99	Diseases of the nervous system	25	0.6	15	0.4	40	1.0	z-value- 1.5, p-value 0.125 not. sig (p>0.05)
H00-H95	Diseases of eye, adnexa, ear and mastoid process	425[2]	10.5	532[1]	13.1	957[2]	23.6	z-value- 3.4, p-value< 0.0006 stat. sig (p>0.05)
I00- I99	Diseases of circulatory system	203[4]	5.0	138[4]	3.4	341[4]	8.4	z-value- 3.4, p-value 0.0006 stat. sig (p>0.05)
J00-J99	Diseases of respiratory system	384[3]	9.5	180[3]	4.4	564[3]	13.9	z-value- 8.1, p-value <0.0001 stat. sig (p>0.05)
K00-K93	Disease of digestive system	86[9]	2.1	35[9]	0.9	121[9]	3.0	z-value- 4.3, p-value <0.0001 stat. sig (p>0.05)
L00-L99	Diseases of the skin and subcutaneous tissue	11	0.3	7	0.2	18	0.4	z-value- 0.9, p-value 0.3579 not. sig (p>0.05)
M00-M99	Diseases of the musculoskeletal system and connective tissue	3	0.1	6	0.1	9	0.2	z-value- 1.0, p-value 0.3418 not. sig (p>0.05)
N00-N85	Disease of genitourinary system	68[10]	1.7	32[10]	0.8	100[10]	2.5	z-value- 3.4, p-value 0.0007 stat. sig (p>0.05)
Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities	0	0.0	2	0.0	2	0.0	NA
R00-R99	Diseases of symptoms signs and abnormal clinical and laboratory findings	528[1]	13.0	436[2]	10.8	964[1]	23.8	z-value-3, p-value-0.003 stat. sig (p>0.05)
S00-T98	Injury, poisoning and certain other consequences of external causes	131[6]	3.2	90[7]	2.2	221[6]	5.5	z-value- 2.7, p-value 0.0066 stat. sig (p>0.05)
V01-Y98	External causes of morbidity and mortality	37	0.9	17	0.4	54	1.3	z-value- 2.5, p-value 0.0108 stat. sig (p>0.05)
Total		2252	55.6	1802	44.4	4054	100.0	z-value- 7.1, p-value <0.0001 stat. sig (p>0.05)

Table 3: Distribution of elderly according to condition at discharge and gender

Condition at discharge	Male		Female		Total		Z statistics (p value)
	#	%	#	%	#	%	
Cured	1223	54.3	1139	63.2	2362	58.3	z-value-1.7, p-value- 0.0804 not sig (p>0.05)
Relieved	484	21.5	289	16.0	773	19.1	z-value- 6.8, p-value- <0.0001 Stat. sig (p>0.05)
LAMA	291	12.9	219	12.2	510	12.6	z-value- 3.2, p-value- 0.0015 Stat. sig (p>0.05)
Expired	182	8.1	115	6.4	297	7.3	z-value- 3.8, p-value- 0.0001 Stat. sig (p>0.05)
Referred	72	3.2	40	2.2	112	2.8	z-value- 2.9, p-value- 0.0036 Stat. sig (p>0.05)
Total	2252	100.0	1802	100.0	4054	100.0	z-value- 7.0, p-value- <0.0001Stat. sig (p>0.05

Table 4: Distribution of mortality patterns of elderly study subjects system involved (ICD10)

ICD.10	System involved	Male		Female		Total		Z statistics (p value)
		#	%	#	%	#	%	
A00-B89	Diseases of certain infectious and parasitic	12[4]	4.0	13[4]	4.4	25[4]	8.4	z-value-0.2, p-value- 0.8416 not sig (p>0.05)
C00-D89	Diseases of neoplasms, disorder of blood and forming organs	5	1.7	8	2.7	13	3.4	z-value-0.8, p-value- 0.4191 not sig (p>0.05)
E00-E90	Diseases of endocrine, nutritional and metabolic	11[5]	3.7	11[5]	3.7	22[5]	7.4	z-value-0.0, p-value- 1 not sig (p>0.05)
F00-F99	Mental and behavioural disorders	0	0.0	1	0.3	1	0.3	NA
G00-G99	Diseases of the nervous system	3	1.0	4	1.3	7	2.4	NA
I00-I99	Diseases of circulatory system	30[3]	10.1	17[3]	5.7	47[3]	15.8	z-value-1.8, p-value- 0.0682 not sig (p>0.05)
J00-J99	Diseases of respiratory system	48[2]	16.2	20[2]	6.7	68[2]	22.9	z-value-3.1, p-value- 0.0017 Stat sig (p>0.05)
K00-K93	Disease of digestive system	4	1.3	1	0.3	5	1.7	NA
L00-L99	Diseases of the skin and subcutaneous tissue	1	0.3	1	0.3	2	0.7	NA
N00-N85	Disease of genitourinary system	6	2.0	3	1.0	9	3.0	NA
R00-R99	Diseases of symptoms signs and abnormal clinical and laboratory findings	50[1]	16.8	32[1]	10.8	82[1]	27.6	z-value-1.9, p-value- 0.0517 not sig (p>0.05)
S00-T98	Injury, poisoning and certain other consequences of external causes	7	2.4	3	1.0	10	3.4	NA
V01-Y98	External causes of morbidity and mortality	5	1.7	1	0.3	6	2.0	NA
Total		182	61.3	115	38.7	297	100.0	z-value-3.8, p-value- 0.0001 Stat. sig. (p>0.05)

4. Discussion

To the best of our knowledge there is no such detailed data available from any previous publication/ official sources in either the state of Uttarakhand or the surrounding states. This study only analyzed hospital admissions, which did not include elderly seen in the emergency and outpatients' department (OPD). Similar results would be expected if OPD elderly were to be included, since most of them presented for post-hospitalization follow-up, although some elderly with more acute problems are referred directly to the OPD. Despite limitations associated with the validity of hospital records, (e.g. omissions, inaccurate recording of diagnosis at the same time of admission, etc.). Statistically significant difference was found between the age groups and sex. Significantly more males than females were admitted during the study period.

In our study, majority of the elderly were in the age group of 60-64 years of age (30.7%) followed by 65-69 years of age (23.2%) and 70-74 years of age (21.9%). Study conducted by Choudhary M *et al* [14] had reported that elderly were in the age group of 71-75 years of age (28%) followed by 60-65 years of age (21%). Study by Shraddha K *et al* [15] also revealed that 31.9% of study population belonged to age group of 60-64 years and 14.9% belonged to age group 70-74 years. As per Bhatia, *et a*l [16] out of total 361 aged person, 152 (43.76%) were males & 209 (57.89%) were females**.** Kishore & Garg [17] found 55% of females & 45% of males in the village Anji of Wardha district. Chauhan P, Chandrashekar V [18] showed that 33.8% of the study subjects were males and 66.2% were females.

In our study, the most common morbidity pattern among geriatric people were diseases of symptoms signs and abnormal clinical and laboratory findings (23.8%) followed by diseases of eye, adnexa, ear and mastoid (23.1%), diseases of respiratory system (13.9%), disorders of of circulatory system (8.4%), diseases of digestive system (3.0%), diseases of Injury, poisoning and certain other consequences of external causes (5.5%), diseases of genitourinary system (2.5%) and diseases of external causes of morbidity and mortality (1.33 %). Shraddha K, Prashantha *et al.* [19] reported that prevalence of endocrine, nutritional & metabolic diseases was 38.4%, diseases of circulatory system were reported by 33.1% of the elderly, CVS disorders, prevalence of hypertension was observed among 29.3% which was seen more among elderly females than males**.** Similar findings were noted by Sushma Batra *et al.* [20, 21] Study conducted by Mehta P. *et al* [22]. Noted that the prevalence of respiratory diseases were 10.2% among the aged. Similar findings were found by Sharma *et al.* [23, 24].

In our study, a total of 4054 elderly patients were hospitalized in the Geriatric unit of Doon hospital, Dehradun between January 2012 and December 2012. Of these patients, 297 (7.3%) elderly deaths were registered during the study period. A statistically significant (p>0.05) gender inequality was observed. Overall case fatality rate was 7.33%.In our study the most common cause of fatality was due to diseases of symptoms signs and abnormal clinical and laboratory findings external causes (27.6%) followed by diseases of respiratory system (22.9%) and found statistically significant (p>0.05), diseases of circulatory system (15.8%), diseases of certain infectious and parasitic system (15.8%) and diseases of endocrine, nutritional and metabolic disorder (7.4%). There are only a very few studies on elderly patients who were hospitalized to know the impact of mortality. Study conducted by LIMA, Danielle Pessoa *et al.* [25] noted that delirium is associated with higher post-discharge mortality but not as an independent predictor. Inouye SK, *et al*. reported that it is a frequent problem in hospitalized older patients, with a prevalence of 14–56%, and with a hospital mortality rate of 25–33% [26]. A Brazilian study found that delirium is a mortality predictor among older patients [27].

5. Limitation

Some limitations are noted in this study. Being a retrospective (record based) study, extraction of final diagnoses from patient's folders who presented with multiple

complaints/morbidities/mortalities could alter the actual prevalence of the disease entities so recorded. Secondly we relied on the clinical soundness of the attending physician in making the diagnoses recorded for each patient.

6. Recommendation

The elderly should be encouraged to undergo periodic medical checks at a clinic for routine appraisal of their health status, so as to allow early detection and treatment of their morbidities. More studies on the morbidities of elderly patients presenting at hospitals in developing countries are needed to formulate a longitudinal frontline health care plan for the elderly.

7. Conclusion

This study has demonstrated that the elderly present with multiple morbidities and under-report their health problems, which they often attribute to ageing. Elderly need help and support of the medical fraternity. Geriatric assessment should be done regularly. Among elderly; oldest old and female elderly, are the vulnerable group that need more attention. Present study highlighted that most of the elderly people don't go for regular health check-ups. So awareness among the elderly population should be created for regular medical check-ups to ensure prevention and early detection of the chronic diseases.

8.1 Conflict of interest

The authors do hereby declare that we have no competing interests in this work.

8.2 Ethical approval/Permission

Specifying that written permission for conducting the study was obtained prior to collecting the data from the additional health secretary and mission director, NRHM, Director General of Health Services (DGHS) of the Uttarakhand state and also from Medical Superintendent of the Doon Hospital by explaining the purpose of the study.

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