Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India

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Background Morbidity among elderly people has an important influence on their physical functioning and psychological well-being. Evaluation of the morbidity profile and its determinants, which have implications for elderly people, are not available. The objective of this study is to assess morbidity, co-morbidity, and patterns of treatment seeking, and to determine relationship of morbidity with disability, psychological distress, and socio-demographic variables among the elderly population in northern India.

Methods A cross-sectional survey of 200 subjects over 60 years old (100 each from the urban population of Chandigarh City and the rural population of Haryana State of India) was carried out using a cluster sampling technique. The study period was July 1999–April 2000. Various socio-demographic characteristics were recorded at baseline. A clinical diagnosis was made by a physician based on reported illness, clinical examination, and cross-checking of medical records and medications held by the subjects. Psychological distress and disability was assessed using the PGI-Health Questionnaire-N-1 and the Rapid Disability Rating Scale-2, respectively. ANOVA, Kruskal–Wallis H test, correlation coefficient, and multivariate analysis were used to assess the relationship and association of morbidity with other variables.

Results Of the total sample, 88.9% reported illness based on their perception, and of these 43.5% were seeking treatment and actually taking medicines, and 42.5% were diagnosed as having 4–6 morbidities. The mean number of morbidities among elderly people was 6.1 (SD 2.9). A total of 87.5% had minimal to severe disabilities and 66% of elderly people were distressed physically, psychologically, or both. The most prevalent morbidity was anaemia, followed by dental problems, hypertension, chronic obstructive airway disease (COAD), cataract, and osteoarthritis. Morbidities like asthma, COAD, hypertension, osteoarthritis, gastrointestinal disorders, anaemia, and eye and neurological problems were significantly associated with disability and distress. Higher number of morbidities was associated with greater disability and distress. In univariate analysis, socio-demographic variables like age, locality, caste, education, occupation, and income were important determinants of morbidity. Multivariate analysis was undertaken to find out the independent relationship of socio-demographic variables with morbidity. Morbidity was significantly associated with age (b value 0.06, 95% CI: 0.01, 0.12), sex (b value 1.03, 95% CI: 0.02, 2.05), and occupation (b value 0.20, 95% CI: 0.07, 0.33).

Conclusions A high mean number of morbidities (6.1, SD 2.9) was observed. Elderly subjects with higher morbidity had increasing disability and distress. Age, sex, and occupation were important determinants of morbidity. Assessment of the morbidity profile and its determinants will help in the application of interventions, both

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medical and social, to improve the health status and thus the quality of life of the elderly in Northern India.

Health status is an important factor that has a significant impact on the quality of life of an elderly population. The major elements of health status are perceived health, especially psychological well-being, chronic illnesses, and functional status. Various studies have shown that perceived health declines with age, and the effects of ill health impact on many areas of daily activity. Health and social services utilization is seen to be more closely related to psychological well-being or the functional status of individuals than to demographic characteristics.[1,2] Many health problems are known to increase with age and this demographic trend may lead to an increase in the absolute number of health conditions in the population.[3] In addition, because there is a growing body of evidence that older people are at risk for multiple, comorbid conditions, health-care seeking will probably also increase.[3] This is especially important when characterizing older adults, who are at greatest risk for disease and disability, dependent life, and consumption of costly health care services.[4] Studies have also suggested that older people can function successfully in spite of declining physical health and other age-related losses.[5,6]

Evaluation of the morbidity profile among elderly people, and the impact of chronic conditions and co-morbidity on functional disability and psychological well-being is required for better understanding of the relation between perceived health and chronic and disabling conditions. It will have implications for providing health care for the elderly population and its costs. There are few studies in Northern India which identify specific diseases that cause disability and consequent distress. Only three large-scale national surveys have been carried out exclusively with the aim of understanding the magnitude and pattern of various physical disabilities among the elderly population.[7–9] The Indian Council of Medical Research (ICMR), through its regional centres, carried out some regional studies on the prevalence of visual and hearing impairment.[10] Some micro-level studies have been carried out in India to assess the prevalence of chronic morbidity. However, most of these studies highlighted only the pattern, and to a certain extent the differentials, by rural-urban location, age, and sex of the elderly.[11–13] There are very few studies in India that provide information on the relationship of psychological well-being and functional status with chronic illness and other co-morbid conditions. Understanding the specific disease processes underlying disability and distress may help elucidate interventions needed to improve an older person's general health status, through delaying the progression of debilitating diseases. Therefore, the aims of the study are: (1) to assess the pattern of morbidity, co-morbidity, and treatment-seeking behaviour among the elderly population over 60 years old; and (2) to determine the relationship of specific medical conditions and co-morbid conditions with disability and psychological well-being, and also morbidity with socio-demographic variables.

Population and Methods

This cross-sectional study was carried out among elderly people over 60 years old in the urban population of Chandigarh City and the rural area of Haryana State in India. Using a cluster sampling technique, a sample of 200 subjects was drawn. Since no reference study has been conducted among Indian elderly people of this type, it was arbitrarily taken that 50% of subjects over 60 years would be distressed. Taking the worst acceptable estimate as 40%, the sample size necessary, with 95% CI, was calculated to be 96. Therefore, the number of elderly subjects enrolled was 100 each from Chandigarh City and the rural area in Panchkula district of Haryana state.

In Chandigarh City, there are rectangular modules called sectors, each measuring 800–1200 m. Out of a total of 56 sectors, 5 sectors were selected randomly. Each sector is divided into four parts by the city administration. From each part, one house was selected randomly. Starting from this house, every next nearest house was surveyed until five subjects were enrolled. A similar procedure was applied in remaining parts of the sector to select 20 subjects. A similar method was used in the rural area of Haryana State. Out of the 16 districts, one was chosen purposely, being nearest to Chandigarh City. Five villages were chosen randomly from one of the sectors of the Raipur Rani Community Development Block in Panchkula district. With the help of village key informants, sampled villages were geographically divided into four parts. From the centre of each geographical part, a direction was chosen at random. All houses in the chosen direction were given numbers. From these houses one house was chosen randomly and starting from this house every next nearest house was surveyed till five subjects were enrolled. The same procedure was used in other geographical parts of the village. Thus, from each sampled village, 20 subjects were selected. A similar sampling procedure was applied in the remaining four villages.

The eligible subjects who agreed to participate were interviewed at home, by a physician, between July 1999 and April 2000. After recording their socio-demographic data, the illness/disease status of the elderly subjects was inquired from their family members. The interviewees were also asked to display the containers of all the medications they were taking and to show all the medical reports they possessed. Subsequently, their symptomatology was noted and a general physical examination was carried out. Based on reported illness, clinical features, medical records, and the medication they had with them, a provisional clinical diagnosis was made and coded according to the International Classification of Diseases, Tenth Revision (ICD-10). Information on treatment-seeking behaviour, any surgical operation, and history of fall, with its outcome, after 60 years old was also obtained. Socio-demographic variables used were age, gender, marital status, education, occupation,

and family income. Since the median and mean family income of the 200 elderly subjects was Rs 6000, those with income <Rs 6000 were classified as the low-income group. Proxy interviews of family members were conducted for individuals incapable of being interviewed due to mental or physical incapacity. Four subjects refused to participate in the study without giving any specific reason for non-participation.

For assessment of disability, the standardized Rapid Disability Rating Scale-2[14] was used. It consists of 18 items divided into two parts; part A deals with activities of daily living (ADL) and focuses on eight basic activities: walking, mobility, bathing, dressing, toileting, grooming, adaptive tasks, and eating, and part B assesses the degree of disability which occurs as a result of the natural process of ageing, basically in communication, hearing, sight, diet, locomotion, continence, physical health making a person dependent on medication, and mental efficiency. According to the scale, elderly people with minimal disability are those who do not require major assistance or care, the moderately disabled are those who require some form of hospitalization for treatment, and the severely disabled are those elderly people who need to be transferred to nursing homes or other institutions to receive major care assistance or continuous supervision.

Psychological distress in the elderly subjects was assessed using a standardized, PGI Health Questionnaire-N-1.[15] This questionnaire claims to measure neuroticism among sample subjects i.e. those with anxiety, depression, hysteria, hypochondriasis, and obsessive-compulsive disorder, and is able to differentiate those psychologically distressed from normal. The questionnaire measures symptoms that are actually perceived by the subjects and are recognized by the doctors. It consists of 38 items divided into two parts. Part A assesses the physical distress and Part B assesses the mental distress among the elderly subjects.

Analysis

The proportion of elderly subjects with mild, moderate to severe, and no disability were classified. Psychological well-being among the subjects is presented as proportion of those distressed and not distressed. Subsequently the proportion with self-reported illness, the total and mean number of morbidities, treatment-seeking behaviour, and history of falls is given both by sex and locality. Based on the provisional clinical diagnosis, the morbidity profile of the subject is presented. The relationship between various socio-demographic variables and morbidity was assessed using analysis of variance (ANOVA). Multivariate analysis was carried out to find the variables that were independently associated with morbidity status after controlling for the confounding factors. Also, the relationship between morbidity and each medical condition with disability and perceived health is assessed using Kruskal Wallis H test. The χ^2 square test was used to test the significant difference in categorical variables and the unpaired 't' test was used to test significant difference in quantitative variables. Correlation coefficient was used to assess the association between number of morbidities and age, disability, and psychological distress. Analysis was done using the SPSS computer software package.

Results

The various socio-demographic characteristics of the study population are tabulated according to sex and locality (Table 1).

Table 1 Socio-demographic profile of elderly people over 60 years of age

	Urban (n = 100)		Rural (n = 100)	
Characteristics	Male	Female	Male	Female
Age group (years)				
61–72	30 (61.2)	38 (74.5)	27 (55.1)	35 (68.6)
73–84	14 (28.5)	9 (17.6)	18 (36.7)	11 (21.5)
85+	5 (10.2)	4 (7.8)	4 (8.1)	5 (9.8)
Marital status				
Married	35 (71.4)	28 (54.9)	36 (73.4)	33 (64.7)
Not married	14 (28.5)	23 (45.0)	13 (26.5)	18 (35.2)
Education status				
Illiterate	4 (8.1)	15 (29.4)	24 (48.9)	46 (90.1)
≤8 years	13 (26.5)	28 (54.9)	22 (44.8)	3 (5.8)
≥9 years	32 (65.3)	8 (15.6)	3 (6.1)	2 (3.9)
Occupation				
Household work	4 (8.2)	40 (78.4)	2 (4.1)	39 (76.5)
Cultivator	0	0	19 (38.8)	1 (2)
Service	9 (18.3)	2 (3.9)	3 (6.1)	1 (1.9)
Worker	0	0	5 (10.2)	1 (1.9)
Business	3 (6)	0	0	0
Retired	27 (55.1)	0	4 (8.2)	0
Unable to work	6 (12.2)	9 (17.6)	16 (32.7)	9 (17.6)
Family income				
Mean income Rs (SD)	12 473.46 (9755.82)	12 450.98 (7063.01)	3746.93 (4046.50	2998.03 (3169.63)
<6000	9 (18.3)	5 (9.8)	40 (81.6)	45 (88.2)
≥6000	40 (81.6)	46 (90.1)	9 (18.3)	6 (11.7)

Figures in parentheses are percentages.

Table 2 Distribution of self reported illness, morbidities diagnosed by physician, and treatment-seeking behaviour of elderly people

	Urban		Rural		Total		
	Male	Female	Male	Female	Male	Female	Total
	(n = 49)	(n = 51)	(n = 49)	(n = 51)	(n = 98)	(n = 102)	(n = 200)
Self-reported illness	42	49	39	47	81	96	177
	(85.7)	(96.1)	(81.3)	(92.2)	(83.5)	(94.1)	(88.9)
No. of morbidities (physician diagnosed)							
0	0	1	0	0	0	1	1
		(1.9)				(0.9)	(0.5)
1–3	17	9	4	3	21	12	33
	(34.6)	(17.6)	(8.1)	(5.8)	(21.4)	(11.7)	(16.5)
4–6	16	24	26	19	42	43	85
	(32.6)	(47)	(53)	(37.2)	(42.8)	(42.1)	(42.5)
7–9	14	10	5	17	19	27	46
	(28.5)	(19.6)	(10.2)	(33.3)	(19.3)	(26.4)	(23)
10–12	2	6	13	11	15	17	32
	(4)	(11.7)	(26.5)	(21.5)	(15.3)	(16.6)	(16)
13	0	1	1	1	1	2	3
		(1.9)	(2)	(1.9)	(1)	(1.9)	(1.5)
Seeking treatment	25	33	9	10	34	43	77
	(59.5)	(67.3)	(23)	(21.2)	(41.9)	(44.7)	(43.5)

Figures in parentheses are percentages.

Self-reported illness, morbidities, and treatment seeking

Table 2 presents the distribution of self-reported illness, morbidities diagnosed by the physician, and treatment seeking by elderly people. Out of the total sample, 88.9% of subjects reported illness based on their perception. A higher percentage of females (94.1%) reported illness compared with men (83.5%). Of the subjects in the urban area, 91% perceived themselves as ill whereas 85% of subjects in rural area were not well based on their perception.

The majority of subjects (42.5%) were diagnosed as having 4–6 morbidities, 23% had 7–9, 1.5% had a maximum of 13, and only 0.5% had no morbidity. The mean number of morbidities among the total elderly population was 6.1 (SD 2.9) (urban elderly 5.4 [SD 2.7], rural elderly 6.9 [SD 2.9], $P < 0.001$). The mean number of morbidities among the male elderly was 5.9 (SD 3) compared with 6.4 (SD 2.8) among females ($P < 0.05$).

Type of treatment

Out of 177 (88.9%) subjects who perceived themselves as ill, 77 (43.5%) were seeking treatment and were actually taking medicines. Higher proportions of the sick in the urban area (63.7%) were seeking treatment compared with those in the rural area (22%). Of the subjects seeking treatment, 35.5% were on allopathic treatment (based on modern western medicine), 2.5% were receiving ayurvedic treatment (a curative aspect of medicine that involves the use of herbal medicine, external preparations, physiotherapy, and diet), and 0.5% were using homeopathy. The latter is based on the principle '*similia similibus curentur*' meaning like is cured by like. It is a low cost system of therapy developed by the German, Samuel Hahnemann, which employs non-toxic drugs exclusively. Its greatest contribution lies in its successful treatment of chronic illnesses that have become difficult to manage by orthodox methods (Table 3).

A total of 38.5% of elderly subjects were noted to have had surgery for some illness. Most had undergone cataract surgery

Table 3 Distribution by sex and locality of type of treatment and surgery

	Urban		Rural	
	Male	Female	Male	Female
	(n = 49)	(n = 51)	(n = 49)	(n = 51)
Type of treatment received				
Allopathic treatment	24 (48.9)	29 (56.8)	9 (18.3)	9 (17.6)
Ayurvedic treatment	1 (2)	4 (7.8)	0	0
Homeopathic treatment	0	0	0	1 (1.9)
Operation				
Cataract	15 (30.6)	14 (27.4)	13 (26.5)	12 (23.5)
Cholecystectomy	1 (2.0)	2 (3.9)	0	2 (3.9)
Prostatectomy	3 (6.1)	0	0	0
Hysterectomy	0	2 (3.9)	0	0
Appendectomy	1 (2.0)	0	0	0
Hernia	1 (2.0)	1 (1.9)	1 (2.0)	0
Pituitary macroadenoma removal	1 (2.0)	0	0	0
Lithotripsy	3 (6.1)	0	0	0
Corneal graft	0	0	2 (4.0)	0
Coronary bypass surgery	1 (2.0)	0	1 (2.0)	0
Spinal surgery	0	1 (1.9)	0	0

Figures in parentheses are percentages.

(27%) and the next most common procedure was cholecystectomy (2.5%). Sex-wise, more elderly males (43.8%) had had surgical procedures compared with elderly females (33.3%). Of the urban elderly, 46% had undergone surgery compared with 31% of rural elderly people (Table 3).

Morbidity profile

Table 4 presents, by sex and locality, the morbidity profile of the elderly based on the provisional diagnosis made by a physician after doing a general physical examination. The most prevalent morbidity among elderly people was anaemia (based on clinical impression) followed by dental problems, hypertension, chronic obstructive airway disease (COAD), cataract, osteoarthritis, skin

Table 4 Morbidity profile of elderly people according to sex and locality

| Morbidities | ICD-10[a] code | Urban | | Rural | | Total |
		Male	Female	Male	Female	%
Anaemia	D 53	19	34	40	40	66.5
Dental problems	K 05	27	26	41	32	63.0
Hypertension	I 10	23	33	18	24	49.0
COAD[b]	J 44	18	16	28	22	42.0
Cataract	H 25	11	18	26	21	38.0
Osteoarthritis (knee joints)	M 17	6	28	17	15	33.0
Skin and nail infections	L 30	7	9	22	11	24.5
Urinary incontinence	N 39	1	18	0	21	20.0
Senile pruritus	L 29	7	4	18	10	19.5
Senile deafness	H 91	13	5	10	10	19.0
Parasthesia	R 20	6	10	10	9	17.5
Prostate enlargement	N 40	11	0	23	0	17.0
Valvular heart disease	I 39	4	6	12	11	16.5
Acid peptic disease	K 27	5	3	5	16	14.5
Cervical spondylosis	M 50	2	5	3	7	8.5
Anxiety neurosis	F 41	1	9	2	4	8.0
Corneal opacity/ulcer	H 17	0	1	4	10	7.5
Asthma	J 45	5	0	2	5	6.0
Diabetes mellitus	E 14	6	2	2	1	5.5
Obesity	E 66	1	7	0	2	5.0
Conjunctivitis	H 10	0	1	3	6	5.0
Rheumatoid arthritis	M 06	0	4	2	2	4.0
Sciatica	M 54	1	2	4	0	3.5
Psychosis	F 03	3	2	0	1	3.0
Pulmonary tuberculosis	A15, A16	1	1	0	4	3.0
Haemorrhoids	I 84	0	2	3	0	2.5
Faecal incontinence	R 15	1	0	1	3	2.5

Figures under the sex and locality column are numbers.

[a] International Classification of Diseases, Tenth Revision.

[b] Chronic Obstructive Airway Disease.

and nail (fungal) infection, urinary incontinence, and senile pruritus. Most of the morbidities were more common in the rural area except for hypertension (56%), osteoarthritis (34%), anxiety (10%), diabetes mellitus (8%), obesity (8%), and psychosis (5%) which were more common in the urban area.

Among the symptoms noted in elderly subjects, most frequent was depression (feeling of sadness, 70.5% of subjects), followed by visual impairment (61%), chronic cough with difficulty in breathing (52%), joint pains (37%), tremors (33.5%), parasthesia (23%), decreased hearing (21%), generalized pruritus (19.5%), and epigastric burning sensation with flatulence (14.5%).

History of fall and its consequences

The distribution of history of fall among elderly people over 60 years old shows that, out of the total sample population, 103 (51.5%) subjects had fallen. Fracture was reported in 21.3%, and other injuries occurred in 79.6% of those who had fallen. Fractures among females (26.4%) were reported more frequently compared with males (16%) and fracture was seen more in urban subjects (29.4%) compared with rural subjects (13.4%).

Psychological well-being and disability status

Table 5 presents the psychological well-being and disability status among elderly people over 60 years old. Out of the total sample, 22% of subjects had minimal disability, 48.5% had moderate disability, and 17% suffered from severe disability, while 12.5% did not suffer from any disability. Sex-wise, differences in

Table 5 Distribution by sex and locality of disability status and psychological well being among elderly people over 60 years of age

| Characteristics | Urban (n = 100) | | Rural (n = 100) | |
	Male	Female	Male	Female
Disability status				
No disability	12 (24.4)	4 (7.8)	8 (16.3)	1 (1.9)
Minimal disability	11 (22.4)	13 (25.4)	10 (20.4)	10 (19.6)
Moderate	17 (34.6)	24 (47.0)	23 (46.9)	33 (64.7)
Severe	9 (18.3)	10 (19.6)	8 (16.3)	7 (13.7)
Psychological well-being				
Distressed	25 (51)	34 (66.6)	31 (63.2)	42 (82.3)
Not distressed	24 (49)	17 (33.3)	18 (36.7)	9 (17.6)

Figures in parentheses are percentages.

disability were found to be statistically significant ($P < 0.05$). Sixty-six per cent of elderly subjects were found to be distressed —physically, psychologically, or both.

Table 6 presents psychological well-being and disability status in relation to morbidity profile. It is seen that with an increase in the number of morbidities the psychological well-being deteriorates and disability increases. The medical conditions that were significantly related to both disability and distress were asthma, COAD, hypertension, osteoarthritis, gastrointestinal disorder, anaemia, and eye and neurological problems. Tuberculosis was noted to be significantly associated with distress; however, it was not found to be significantly associated with disability. Subjects with visual impairment (61%), hearing impairment (20%), and depression symptoms presented with higher overall

Table 6 Relationship of morbidity profile with disability and psychological distress

Morbidity	N	Disability		Psychological distress	
		Mean (SD) score	*P*-value	Mean (SD) score	*P*-value
No. of morbidities					
0–3	34	22.0 (4.6)		3.9 (4.2)	
4–6	85	24.4 (4.6)	< 0.001	8.2 (4.8)	< 0.001
7–9	46	27.4 (6.9)		13.7 (5.7)	
>9	35	32.3 (7.8)		18.3 (5.7)	
Medical condition					
Asthma					
Yes	12	30.3 (8.1)		15.9 (7.5)	
No	188	25.8 (6.5)	< 0.05	10.2 (6.8)	< 0.05
Chronic obstructive airway disease					
Yes	84	29.2 (7.7)		13.3 (6.5)	
No	116	23.7 (4.7)	< 0.001	8.4 (6.5)	< 0.001
Tuberculosis					
Yes	7	25.5 (5.7)		16.4 (8.4)	
No	193	26.1 (6.7)	0.8	10.2 (6.8)	< 0.05
Hypertension					
Yes	98	27.0 (7.1)		11.9 (7.1)	
No	102	25.1 (6.1)	< 0.05	9.0 (6.5)	< 0.01
Osteoarthritis					
Yes	66	27.1 (7.2)		12.4 (6.9)	
No	134	25.4 (6.3)	0.044	9.3 (6.7)	< 0.01
Gastrointestinal disease					
Yes	41	26.6 (5.7)		14.6 (7.3)	
No	159	25.9 (6.9)	0.096	9.4 (6.5)	< 0.001
Anaemia					
Yes	133	26.8 (6.9)		11.8 (7.1)	
No	67	24.3 (5.9)	< 0.01	7.4 (5.6)	< 0.001
Neurological problem					
Yes	58	28.7 (7.3)		14.4 (6.9)	
No	142	25.0 (6.1)	< 0.001	8.9 (6.4)	< 0.001
Visual impairment					
None	78	23.1 (4.4)		8.2 (6.8)	
A little	83	24.5 (3.3)	< 0.001	10.2 (6.0)	< 0.001
A lot	37	34.7 (7.3)		15.6 (6.3)	
Total visual loss	2	47.5 (10.6)		17.0 (4.1)	
Hearing impairment					
None	158	24.7 (5.4)		9.7 (6.6)	
A little	26	29.1 (6.4)	< 0.001	13.9 (7.4)	< 0.01
A lot	16	34.4 (10.7)		12.9 (7.8)	
Total hearing loss	0	—	—	—	
Depression symptoms					
None	59	23.0 (4.1)		5.3 (3.2)	
A little	105	25.4 (5.5)		10.5 (5.6)	
A lot	34	32.9 (8.6)	< 0.001	18.7 (6.4)	< 0.001
Extreme	2	34.0 (8.4)		22.5 (6.3)	
Others					
Yes	136	27.3 (7.1)		12.5 (6.9)	
No	64	23.5 (4.9)	< 0.001	6.3 (4.2)	< 0.001
History of falls					
Yes	103	29.0 (7.6)		13.5 (6.8)	
No	97	23.0 (3.7)	< 0.001	7.3 (5.5)	< 0.001
Frequency of falling					
≤2	152	24.6 (5.5)		8.9 (6.3)	
3+	48	30.6 (4.5)	< 0.001	15.6 (6.4)	< 0.001

No adjustment for other variables has been done in this analysis.

disability and poor health perception. Correlating morbidities with disability and psychological well-being shows increasing numbers of morbidities are associated with increasing disability (r = 0.52, d.f. = 198, *P* < 0.01) and also increasing distress ($r = 0.72$, d.f. = 198, *P* < 0.01). History of fall and fall frequency was seen to be significantly associated with disability and psychological distress. Higher disability and consequent increasing distress was noted among those with a prior history of fall

Table 7 Relationship of morbidity with socio demographic variables

Socio demographic variables	N	Univariate analysis with morbidity[a]		Multivariate analysis with morbidity[b]	
		Mean (SD) score	*P*-value	B value (95% CI)	*P*-value
Sex					
Male	98	5.9 (3.0)	0.16	1.03 (0.02, 2.05)	0.03
Female	102	6.4 (2.8)			
Age groups (years)					
61–72	130	5.5 (2.7)			
73–84	52	7.3 (2.8)	< 0.001	0.06 (0.01, 0.12)	0.01
85+	18	7.2 (3.2)			
Locality					
Urban	100	5.4 (2.7)	< 0.001	0.76 (–0.22, 1.76)	0.12
Rural	100	6.9 (2.9)			
Marital status					
Married	132	4.9 (5.9)	< 0.001	0.20 (–0.59, 0.99)	0.61
Not married	68	8.3 (7.6)			
Caste					
Schedule caste	38	7.0 (3.1)			
Schedule tribe	1	4.0 (0.0)	0.18	–0.22 (–0.56, 0.11)	0.18
Other backward caste	32	6.2 (2.7)			
Others	129	5.9 (2.9)			
Education					
Illiterate	89	7.1 (2.8)			
≤8 years	66	5.9 (2.9)	< 0.001	–0.17 (–0.40, 0.04)	0.12
≥9 years	45	4.6 (2.3)			
Occupation					
Household work	85	5.7 (2.4)			
Service (Pvt or Govt)	15	5.0 (2.8)			
Worker	6	8.8 (3.0)			
Farmer	20	5.6 (2.0)	< 0.001	0.20 (0.07, 0.33)	0.001
Business	3	3.0 (0.0)			
Retired	31	4.9 (2.9)			
Unable to work	40	8.6 (2.8)			
Family income (Rs/month)					
≤6000	99	6.9 (3.0)			
≥6000	101	5.4 (2.5)	< 0.001	–3.45 (–9.30, 2.39)	0.24

[a] No adjustment done with other socio-demographic variables.

[b] Adjustment of the concerned socio-demographic variables done against all other variables listed.

after 60 years of age and those with a history of three or more falls.

Relationship with socio-demographic variables

Table 7 presents the relationship of morbidity among elderly people with socio-demographic variables. A higher number of morbidities were observed among females; however, there was no significant difference by sex in the univariate analysis. Age-wise, higher mean morbidity was noticed in the 73–84 year age group ($P < 0.001$). Elderly people from the rural area ($P < 0.001$), those unmarried and divorced ($P < 0.001$), and those belonging to schedule and backward castes had higher levels of morbidity. Lower education was consistently observed with higher levels of morbidity ($P < 0.001$). Based on occupation, higher morbidity was seen among workers (skilled and unskilled), those unable to work, and those involved in household chores ($P < 0.001$). A family income of <Rs 6000 per month was associated with higher morbidity ($P < 0.001$). After controlling for confounding factors using multiple regression analysis, variables strongly associated with morbidity status were age (B value 0.06, 95% CI: 0.01, 0.12), sex (B value 1.03, 95% CI: 0.02, 2.05), and occupation (B value 0.20, 95% CI: 0.07, 0.33) (Table 7).

Discussion

Self-reported illness

There is an implicit assumption that disease and deterioration of ill-health are inevitably associated with chronological ageing. However, physical decline in old age is not always identical in all those in a particular age group.[16] Some elderly people are sick while others maintain good health status even into advanced age. Hence, it is important to know from the elderly person how they evaluate their health since health comprises subjective and objective evaluations. In this study, many of the elderly (88.9%) felt that they were ill and 43.5% were on some medication. It was also noticed that elderly women, in both urban and rural areas, were relatively more ill than the elderly men. Old age is usually accompanied by a decline in physical fitness and increasing experience of body aches and pains. Based on the ageing survey by Rajan and others,[17] 35% of the surveyed elderly people over 60 years old reported having some perennial health problems which seemed to increase in proportion with increase in age of the respondents. Sati[18] reported that 30.1% of respondents above 55 years old felt that they were unwell. Kind and Gudex[19] while measuring the health status in the community in residents of Wolverhampton above

15 years of age, observed that 44.5% of respondents self-reported long-standing illness and 33.7% were on regular medication.

The difference in the proportion of self-reported illness in various studies could be due to differential access and utilization of health services by different segments of the population. Moreover, self-reporting of illness is influenced by factors such as gender, culture, language, and educational level in different regions. Also, there are certain health conditions which may have less effect on global health that might be expected, either due to a true improvement caused by treatment, or to adaptation to the disease, which would reduce the perception of its consequences.

Morbidity profile

On the whole, it was found that 83% of elderly people presented with more than three morbidities. In the rural area, 93% of elderly subjects had more than three morbidities compared with 73% in urban area ($x^2 = 13.0$, $P < 0.01$). Only 0.5% of elderly subjects presented with no morbidity, based on the subjective and objective evaluation. Overall, 38.5% elderly people were seeking treatment for their ailments/morbidities and were actually taking medicines. Fuchs et al.[20] in a study on a community-dwelling Israeli Jewish population aged 75–94 years, noted that 44.4% of elderly people had three or more morbidities, 20.1% had two morbidities, 22.2% had only one morbidity, and the rest (13.3%) had no medical problems. The mean number of morbidities among elderly people aged 75–94 years was 2.2 (SD 1.5). Fuchs et al. also noted that the mean number of morbidities among males was 1.9 (SD 1.4), and among females 2.4 (SD 1.6). The present study observed means of 5.9 (SD 3) and 6.4 (SD 2.8) morbidities in males and females, respectively. Sunder et al.[21] observed that multiple morbidities were common in 89.6% of the elderly people (65+ years) compared with 94.5% of elderly people (60+ years) in the present study.

Comparing the morbidity profile of the elderly in this study with other studies shows the variation is due to varying definitions and non-reporting of illness which might increase with age, and it also varies greatly with the disease considered. Fuchs et al. assessed the morbidity profile among Israeli residents of different origins (Europe-America, Asia-Africa, and Israel) aged 75–94 years. Comparison with this study helped in assessing, albeit crudely, the morbidity level of the Indian elderly relative to those from the rest of the world belonging to different ethnic and racial groups. In our study, 83% of the elderly over 60 years had more than three morbidities compared with 44% of the Israeli elderly who had three or more morbidities in the age group at risk of higher morbidity levels. Thus, an interpretation can be made that around 50% of the elderly people with three or more morbidities belong to the age group 75 years and above. The differences in morbidity can be partly explained by the differences in the racial and ethnic origin of the study population, and the prevailing socioeconomic differences among them. In addition, the existence of a wide range of community services and provision of home care services through the Community Long-term Care Insurance Law in Israel could be the reasons for lower morbidity compared with our study population. Also, in our study, morbidity was assessed by a physician along with other methods adopted in Fuchs et al. study, which could partly explain the reasons for higher morbidity as physician assessment generally tends to be more comprehensive. Kishore and Garg[22] reported that the commonest morbidities among the over 60s in a rural area were cataract (30%), arthritis and arthralgia (15.6%), refractory error (13.6%), anaemia (13.3%), chronic bronchitis (7.3%), dental caries (7%), hypertension (5.2%), impaired hearing (5%), and filariasis (1.5%). They also noted that the morbidity rates increased with increasing age, being maximum above 65 years of age. Garg et al.[23] said that the main cause of illness reported were anaemia (39.6%), cataract (24.3%), refractory error (20.1%), hypertension (16.5%), arthritis (14.4%), and chronic bronchitis (9%). Sunder et al.[21] reported that, in a rural area of Rohtak district of Haryana (India), the leading symptoms among the male elderly were visual impairment (65%), chronic cough with or without expectoration and difficulty in breathing (58%), joint pains (51.8%), hearing problems (18.3%), and gastrointestinal problems (9.9%) compared with the present study where depressive symptoms (70.5%) and visual impairment (61%) followed by chronic cough with difficult breathing (52%) were the commonest symptoms.

Treatment seeking

Treatment seeking was more common in the urban (58%) than the rural area (19%). A high number of morbidities, low level of treatment seeking in the rural area, and the high number of morbidities among elderly women could be linked due to a low level of literacy and health consciousness, social constraints, poverty, and poor access to health services. Thus it is possible that a person could rate their health as almost well, but on the other hand the physician may evaluate them as ill or very ill. The most popular type (system) of medicine preferred by those who were seeking treatment was allopathic, which was adopted by nearly 92.2%. The rest, 7.7% of the elderly people, rely on either ayurvedic or homeopathic medicine. Rajan[17] and others, in a national ageing survey, showed that in case of sickness, 90% of respondents, irrespective of sex, had consulted a doctor. According to Rajan's study, the most popular system was allopathic (90% of elderly people), and the rest (10%) relied on either ayurvedic medicine or homeopathy.

Falls

In the present study, fall was defined as ending up on the floor or ground unintentionally, It is itself not a diagnosis but a symptom of multiple underlying disease like visual impairment (cataract, corneal opacity), postural hypotension, degenerative joint disease, giddiness, and depression, the effects of certain medications on homeostasis, and/or environmental hazards or obstacles that interfere with safe mobility. In the present study, 51.5% (103) of the elderly had a history of falling and of these, 21.3% (22) suffered bone fracture/joint dislocation and 79.6% received an injury. Myers et al.,[24] in a study on discriminative and evaluative properties of activities (specific balance confidence scale), noted that 56.6% of older adults (mean age 74.6 years [SD 7.5]), had a history of a fall in the last one-year period. In the present study, many more elderly women had suffered a fracture compared with elderly men, which could be attributed to the increased prevalence of underlying risk factors like osteoporosis and osteomalacia. The significance of falls among elderly people is that not only that the number of falls increases with age but the injury rate is highest among the oldest old (>80 years) subjects with history of falling more than twice. There is a

vicious cycle where, due to poor perceived health and morbidity there is increased tendency to fall which itself leads to increasing disability and distress.

Relationship of morbidity with disability and distress

The medical conditions that were related to both disability and distress are asthma, COAD, hypertension, osteoarthritis, gastrointestinal tract diseases, anaemia, neurological problems, visual impairment, hearing impairment, depressive symptoms, and others (including urinary incontinence, faecal incontinence). Similarly stroke,[25–28] respiratory diseases,[26,27] incontinence,[29] and arthritis were found to be related to disability in some studies. In our study tuberculosis was associated with distress but not with disability. Other conditions like diabetes, heart disease, and renal disease were not significantly associated with disability and distress, which implies that people with these diseases succeed in making adaptations in order to perform necessary daily activities. Similarly, other studies[25,26] also reported only a moderate impact of heart disease on disability.

In contrast to our findings, other studies have reported that conditions such as hypertension, arthritis, and gastrointestinal disease were associated with low levels of disability.[20] High disability and psychological distress related to anaemia could be due to increasing weakness and fatigue and, therefore, could affect the ability to function independently.[20]

In our study, conditions such as increasing visual impairment, hearing impairment, and depressive symptoms were strongly related to disability and consequent distress. Studies have shown that poorer self-rated health and depression symptoms contribute substantially and independently to perceived health as both are known to be more prevalent in people with chronic conditions.[30,31] Depressive symptoms in the study subjects were due to the feeling of loneliness, poor family care, poor health, recent family deaths, the psychological problems of uselessness and abandonment, and poor family harmony.

Our results were similar to other studies for the correlation of morbidity with disability and distress with a strong association between increasing number of conditions and increasing proportions of disability and distress.[20,32] Decline in physical functioning and psychological well-being are a common result of increasing morbidity among elderly people. Reduction of the burden of morbidity, through primary or secondary prevention

efforts, will depend also on the social factors, which act as a potential determinant for the application of the medical interventions. Other studies have suggested that socio-demographic variables like gender, age, race, marital status, and socioeconomic status are important determinants of physical functioning among the chronically ill.[33]

Limitations

Limitations of the study are that there are increased chances of misreporting of information by the respondents. Moreover, geriatric epidemiologists are concerned that misreporting might increase with age and varies greatly with the disease considered.[20] One possible source for biased reporting of medical conditions may arise from differential access and utilization of health care services by different segments of the population.[20] This study also did not incorporate measures of environmental characteristics which can directly or indirectly affect both functional status and psychological well-being. Some studies have found that a proxy's rating on disability was less accurate than the patient's own rating and also may bias the results due to a plausible overestimation of health problems.[20]

The strength of our study is that our results are based on random sampling and the participation rate of the subjects was quite high. Also, the study is important because it was able to show to various factors that are related to functional status and psychological well-being.

In order to improve the health status of the elderly population it is important to carry out more studies in different areas to identify various factors that are related to psychological distress and disability, which should lead to efforts to develop effective programmes in disease prevention.

Acknowledgements

KEY MESSAGES

- The mean number of morbidities among the elderly population was 6.1 (SD 2.9). Females and the rural elderly were found to have higher mean morbidity.
- The most prevalent morbidities among elderly people were anaemia, dental problems, hypertension, chronic obstructive airway disease (COAD), cataract, and osteoarthritis.
- An increasing number of morbidities was associated with disability and distress.
- Asthma, COAD, hypertension, osteoarthritis, gastrointestinal tract disorders, anaemia, and eye and neurological problems were significantly associated with both disability and distress.
- Socio-demographic variables such as age, sex, and occupation were significantly independently associated with morbidity.

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