Geriatric Disability and Associated Risk Factors: A Community Based Study in a Rural Area of West Bengal, India

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Abstract

Background: Similar to developed countries, aging is increased in India. Because of the epidemiology and demographic transition phase, chronic diseases and disabilities along with health costs are increasing day by day. As social factors and chronic diseases are the major reasons for geriatric disability, the present study was done with the following objectives: to assess and compare the socio-demographic characteristics among the disabled and non-disabled geriatric population, and to find out the association between socio-demographic and chronic diseases with functional disability among the study population.

Methods: A cross-sectional study was done in a rural community of West Bengal, India. House to house visit, clinical examination, observation, and interview were done with a pre-designed, pre-tested proforma. Epi Info and SPSS software were used for statistical analysis.

Results: A total of 458 people had chronic conditions and the prevalence of disability was 17.47%. Among the socio-demographic variables, age, female sex, marital status, literacy status, and family composition and among the chronic diseases**,** tuberculosis, chronic obstructive pulmonary diseases, ischemic heart disease, osteoarthritis, neuropathy, acid peptic disorder, prostatic hypertrophy, and osteoporosis were found as risk factors of disability in binary logistic regression analysis. 71.2% of the disabilities were explained by these risk factors.

Conclusion: The data highlighted the different risk factors associated with disability. No single measure rather multi-dimensional approach should be the model for the prevention of disability.
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Introduction

The term "aging" can be defined as a progressive, generalized impairment of function resulting in a loss of adaptive response to a stress and growing risk of age-associated disease.[1] Aging is rapidly increasing in developed and developing countries including India. There are

about 605 million people aged 60 years or more in the world. It has been estimated that by the year 2025 there will be 1.2 billion older persons, with two out of each three living in developing countries.[2]

India is the second largest country in the world in terms of geriatric population. As a result of increased life expectancy, people are exposed to external behavioral and environmental factors for a longer period and that is why the chance of getting sick are more among the older people in comparison with younger counterparts.[3] Because of urbanization, younger people are leaving home from rural areas in search of jobs and older people have to live alone. Moreover, because of cultural practices, women are younger than their male counterparts leading to increased number of widows in the aging population. These factors along with social neglect, lack of awareness, unavailability and poor utilization of health care services lead to older people being more vulnerable.

Many chronic diseases are preventable and prevention of these chronic conditions and their early management mean reduction of enormous human, social, and economic cost of the country. This is especially important for developing countries such as India where the resources are scarce and limited. It has been estimated in the USA that one US dollar investment in prevention leads to cost saving of 3.2 US dollars in medical costs.[4] If the healthy elder people are increased, they can be utilized as work force and their contribution would lead to increase public revenue. Because many of these social factors and chronic diseases that are responsible for disability are preventable, the present study was undertaken with the following objectives:

1. To assess and compare the socio-demographic characteristics among the disabled and non-disabled geriatric population.
2. To find out the association between socio-demographic and chronic diseases with functional disability among the study population.

Subjects and Methods

A community based cross-sectional study was done in the Tarakeswar block, at Hooghly district, West Bengal, the rural field practice area of Medical College Kolkata, India in the year 2007. Prevalence of disability was considered as 45% (as found from previous study in India,[5]) with Confidence Interval=95% and error 10%. This leads to a 454 individuals sample size. Sampling frame was created from electoral/voter list with population >60 years old. Total number of people residing in the area in the specific age group was 13515. A total of 500 subjects were selected from the voter list by using simple random sampling without replacement. Data were collected from the study population by house to house visits using a pre-designed semi-structured proforma after taking a verbal consent. Predictor variables included socio-demographic variables such as age, gender, level of education, per capita income, religion, mother tongue, family composition, and loneliness. Outcome variables were various chronic diseases and disabilities.

Chronic disease was considered if a person was suffering from any disease for ≥ 3 months at the time of survey. Clinical examination and record analysis if available, were carried out to assess the chronic conditions, which were coded according to ICD 10.[6] Cured morbidity was excluded from the study. Based on self reporting in performing ten non-instrumental Activities of Daily Living (ADL),[6] disability was ascertained and as per ADL score the individuals were divided into three groups. Group 1 was independent with score>10, group 2 consisted of partially dependent participants with score 7–10, and group 3 included participants with score<7 who were designated as dependents. The last two groups were considered as disabled. Socio-economic status was classified according to Prasad's scale.[7]

Socio-demographic characteristics and different chronic diseases were compared among the disabled and non-disabled population using suitable statistical tests. Association between different risk factors and disability were assessed by logistic regression model. Data were analyzed using Epi Info version 3.5.1 and SPSS version 17.

Results

Among the 500 participants, 495 fully completed the proforma. Of them, 37 people with no chronic diseases were considered healthy. They were not included in the analysis. Of the remaining 458 people having chronic diseases, 80 people (17.47%) were disabled. Disability was more prevalent among the higher age group (70–79 years), women, and illiterate population than non-disabled and the difference was found statistically significant (table 1). Disability was also significantly higher among the people who were living alone.

Table 2 shows the association between different chronic diseases (as per ICD-10 classification) and disability using Z score. It was

Table 1: Basic characteristics of the study population in relation to disability

Characteristics	Disabled (n = 80)*	Non-disabled (n = 378)*	P value
Age(yrs)			
- 60–69	33.8	68.6	<0.001
- 70–79	45.0	19.8	<0.001
- ≥ 80	21.2	11.6	0.02
Gender			
- Women	77.5	52.6	<0.001
- Men	22.5	47.4	<0.001
Religion			
- Hindu	98.7	95.2	0.15
- Muslim	1.3	4.8	0.15
Literacy status			
- Illiterate	88.8	57.7	<0.001
- Literate	11.2	42.3	<0.001
Marital status			
- Married	66.3	70.9	0.41
- Widow	33.7	29.1	0.41
Family composition			
- Alone	22.4	12.7	0.02
- With spouse	11.3	15.9	0.29
- With spouse and children	55.0	55.0	-
- With children	11.3	16.4	0.25
Socio-economic class**			
- Class – I (Rs.≥2200 = ≥48.37 US$)	5.0	3.2	0.42
- Class – II (Rs.1100 – 2199 = 24.19-48.36 US$)	6.2	7.7	0.64
- Class – III (Rs.660 – 1099 = 14.51-24.18 US$)	37.5	33.6	0.50
- Class – IV (Rs. 330–659 = 7.26-14.5 US$)	28.8	27.5	0.81
- Class – V (Rs. < 330 = <7.26 US$)	22.5	28.0	0.31
Social problems			
- Loneliness	22.4	12.7	0.02
- Lack of security	21.3	31.2	0.07
- Lack of adjustment	6.3	4.0	0.36
- Not present	50.0	52.1	0.73

*Cell values are expressed in percentage. **Source – Prasad Scale – Reference[7]

Table 2: Associations between the presence of chronic diseases and functional disability in activities of daily living

Chronic diseases (ICD - 10 Code)	Disabled (n = 80)*	Non disabled (n = 378)*	P value
Anemia (D50 D53)	22.5	11.1	0.00
Cataract (H25 H26)	33.8	45.0	0.06
Deafness (H90 H91)	11.3	11.4	0.97
COPD (J44 J45)	22.5	17.5	0.29
Tuberculosis (A15 A18)	11.3	4.5	0.01
Depression (F32 F33 F34)	21.3	3.7	<0.001
Dental Carries (K02)	56.3	65.6	0.11
Osteoarthritis (M13)	66.3	37.8	<0.001
Prostatic hypertrophy (N40)	5.0	11.6	-
Diabetes (E11, E12)	22.5	9.0	<0.001
Neuropathy (G35, G37)	7.5	13.0	0.17
Hypertension (I10, I11, I15)	53.8	35.7	<0.001
Ischemic heart disease (I20, I25, I27)	20.0	10.1	0.01
Acid-peptic disorder (K25 K26 K27 K29 K30)	45.0	39.4	0.32
Osteoporosis (M80, M82)	58.8	5.0	<0.001

*Cell values are expressed in percentage

revealed that major chronic diseases among disabled population were osteoarthritis (66.3%), osteoporosis (58.8%), dental caries (56.3%), and acid peptic disorder (53.5%). Chronic diseases including anemia, tuberculosis, depression, osteoarthritis, diabetes, hypertension, ischemic heart disease and osteoporosis were significantly higher among disabled population in comparison with non-disabled population. Dental caries was high among non-disabled population. A total of 33 chronic diseases were found among the study population.

Association between disability and different risk factors such as socio-demographic characteristics and chronic diseases were analyzed by logistic regression (table 3). It was observed that age, gender, literacy status, marital status, and family composition were associated with

Table 3: Association between disability and risk factors by logistic regression analysis

Risk factors	Odds Ratio	95% C.I	Coefficient	S.E	Z-Statistic	P Value
Acid Peptic disorder	109.243	15.8985-750.637	4.6936	0.9834	4.773	<0.01
Age	0.8357	0.7674-0.91	-0.1795	0.0435	-4.1272	<0.01
Anemia	4.3274	0.4848-38.6278	1.465	1.1169	1.3117	0.19
Cataract	1.7509	0.4284-7.1556	0.5601	0.7183	0.7799	0.44
COPD	6.6687	1.3377-33.244	1.8974	0.8196	2.315	0.02
Deafness	0.2718	0.0436-1.6959	-1.3026	0.9341	-1.3945	0.16
Dental caries	0.2236	0.0439-1.1379	-1.498	0.8302	-1.8043	0.07
Depression	0.543	0.1363-2.1639	-0.6106	0.7054	-0.8657	0.39
Diabetes	1.5947	0.2721-9.3461	0.4667	0.9022	0.5172	0.61
Family composition	2.3933	1.0632-5.3878	0.8727	0.414	2.1079	0.04
Hypertension	0.7171	0.2052-2.5055	-0.3326	0.6383	-0.521	0.60
Ischemic heart disease	7.838	1.7486-35.1324	2.059	0.7654	2.6901	0.01
Literacy	175.224	18.8817-1626.09	5.1661	1.1367	4.5448	<0.01
Marital status	0.2549	0.083-0.783	-1.367	0.5726	-2.3872	0.02
Neuropathy	0.0192	0.0016-0.2231	-3.9536	1.2518	-3.1584	<0.01
Osteoarthritis	445.731	73.5825-2700.04	6.0997	0.9191	6.637	<0.01
Osteoporosis	15.9405	5.2216-48.6631	2.7689	0.5694	4.8625	<0.01
Prostatic hypertrophy	0.0102	0.0009-0.1139	-4.5874	1.2323	-3.7226	<0.01
Sex	0.0719	0.0178-0.2902	-2.6323	0.7119	-3.6977	<0.01
Socioeconomic class	0.9377	0.591-1.4879	-0.0643	0.2356	-0.273	0.78
Social problem	0.7783	0.5343-1.1339	-0.2506	0.192	-1.3055	0.19
Tuberculosis	18.1891	2.6306-125.769	2.9008	0.9866	2.9403	<0.01
Constant	*	*	-5.1706	6.457	-0.8008	0.42

C.I: Confidence interval, S.E: Standard error

disability. Among the chronic diseases, association was also found between COPD, tuberculosis, osteoarthritis, osteoporosis, acid peptic disorder, ischemic heart disease, neuropathy, and prostatic hypertrophy and disability. Other socio-demographic factors such as socio-economic class, social problems and chronic diseases such as anemia, cataract, deafness, hypertension, and depression were also analyzed but no association was found. Among the risk factors of disability considered for this study 71.2% could be explained by logistic regression.

Discussion

In the present study we identified the factors associated with disability among people with chronic diseases. Univariate analysis revealed that age, gender, literacy status, and living alone were the important social correlates. About two third of disabled persons belong to age group ≥70yrs, while reverse was true for non-disabled group (<70yrs, 68.6%).

Significantly more women were vulnerable for disability. Literacy was also an important factor with significantly more illiterates in disabled group. People who were living alone had significantly more chance of suffering from disability.

Some specific chronic diseases were associated with disability in our study, namely anemia, tuberculosis, depression, osteoarthritis, diabetes, ischemic heart disease, and osteoporosis. They were significantly higher among disabled population in comparison with non-disabled population.

The data were further analyzed by logistic regression. Important social factors such as age, female sex, and illiteracy showed a positive association with disability. It also showed that chronic diseases such as osteoarthritis, osteoporosis, tuberculosis, COPD, acid-peptic disorder, and neuropathy were significantly affecting the disabled group. Similar to our study, association of socio-demographic variables such as age, gender, and literacy status with disability was also reported in different studies.[8-11] In two other studies, one among Great Lake American Indians,[12] and the other at the Johns Hopkins Functional Status Laboratory among community-dwelling volunteers by Chapleski and colleagues,[13] no association was found between disability and gender, educational status, marital status, and the people in the age group 55 years or higher. Nonetheless, similar to the findings of the present study, Chapleski and co-workers observed significant disability in the higher age group.[13]

On review of literature, multiple studies of the associations between different geriatric

conditions and disability were found. However, studies regarding association between different risk factors and disability using logistic regression analysis were scarce, especially in India. The findings of the present study were compared with different studies regarding the association between different chronic diseases and disability and the associations would largely be dependant on the objectives and methodology of that particular study. In a cross-sectional study among the population aged 70 and more, living in Ospitaletto Brescia, northern Italy,[14] similar association with diabetes, hypertension, and heart disease was reported. Joshi and colleagues,[15] in a cross-sectional study at rural and urban area of Chandigarh (India), found that morbidities including asthma, COPD, hypertension, osteoarthritis, gastrointestinal disorders, anemia, and eye and neurological problems were significantly associated with disability but in our study we could not find any association between cataract and anemia with disability. The association between different chronic diseases and disabilities was also observed in other studies,[16,17] but it was observed that the number of chronic conditions associated with disability varied in the studies.

Our findings have several limitations. 71.2% of the risk factors of disability were explained by the present study. There may be other factors for disability which were not identified in this study. Because this study was cross-sectional one, it could not explain whether these risk factors preceded or resulted from disability. Moreover, the factors found as associated with disability could only be suggestive. More analytical studies in different geographical areas with large sample would be able to identify various causal factors for disability. However, the present study identified that social factors such as age, female sex, illiteracy, and chronic diseases including osteoarthritis, osteoporosis, tuberculosis, COPD, acid-peptic disorder and neuropathy were significantly associated with disability. This analysis emphasises on consideration of both social factors and chronic diseases for the prevention of disability. Adequate treatment of such chronic diseases at early stage would reduce the medical cost and economic burden of the country and improve quality of life of the geriatric population. National programs and policies on prevention of chronic diseases and risk factors among the geriatric population should be prioritized.

Conflict of Interest: None declared

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