Proportion and Factors Associated with Depressive Symptoms among Elderly in an Urban Slum in Bangalore

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ABSTRACT Depression among elderly is emerging as an important public health issue in developing countries like India. Published evidence regarding the magnitude and determinants of depression among elderly hailing from urban slum is currently limited. Hence, the current study was conducted to assess magnitude of the problem and identify factors associated with depression among the elderly in an urban slum. A cross-sectional study was done to cover total of 473 elderly persons from an urban slum in Bangalore, India. They were assessed for depression using Center for Epidemiologic Studies Depression scale. The overall prevalence of depression was found to be 37.8 (95 % CI= 33.43–42.16). Multivariate analysis revealed that unemployment (self or children) (odds ratio (OR) 2.6; 95 % confidence interval (CI) 1.41–4.72), illness of self (OR 2.2; 95 % CI 1.45–3.21), female gender (OR 1.9; 95 % CI 1.19–2.89), conflicts in family (OR 1.6; 95 % CI 1.03–2.43), and marriage of children or grandchildren (OR 1.6; 95 % CI 1.02–2.68) as independent risk factors. Depression among elderly is an important health issue of this area. Psychological intervention need to be provided for all elderly persons especially at the time of being diagnosed with any kind of illness. Strategies should be targeted to the females. The stressful life events need to be identified and remedial actions taken. This facility should be made available to them at the primary level of health care. There is a need to include screening of depression in our national health programs.

KEYWORDS Depression, Elderly, Community, Urban slum, Developing country

INTRODUCTION

Epidemiologic and demographic transition coupled with improvements in health worldwide has resulted in a steady increase in proportion of elderly in India from 5.3 in 1951 to 8% in 2011.¹ This proportion of elderly is expected to increase to 12.17 % by 2026.² The rural-urban dynamics is undergoing significant metamorphosis in India due to internal migration, as a result of which the urban population is expected to be 38.21 % by 2026 in the country.³

The rise of slums as a consequence of rapid urbanization has resulted in its own set of problems. The conditions in these slums act as stressors to its residents.⁴ In India, the slum population is estimated to be 42.6 million, which makes up 15 % of

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the total urban population,⁵ and in the metropolitan city of Bangalore, nearly one-fifth are the slum population.⁶ The elderly population living in these slums faces the dual burden of both communicable and non-communicable diseases like tuberculosis, acute respiratory infections, and injuries. Altered societal and family structure and values, disintegrating joint families, poor living conditions like unsafe water, unsanitary conditions, poor housing, overcrowding, and hazardous locations create health vulnerabilities among the elderly.⁷

The increasing proportions, huge numbers, and relatively greater medical morbidity among the elderly are a matter of grave concern. Though depression, dementia, and other neuropsychiatric problems contribute to a substantial chunk of the problem, the health systems are ignorant of the same.⁸ Published studies reveal that prevalence of depression among elderly in developing countries ranges from 5.22 to 45.9 %.^{9–19} Recent estimates indicate that, in India, depression results in loss of 961,000 disability adjusted life years (DALYs) per year among elderly.²⁰

As depression is potentially treatable condition, a significant reduction in DALYs is expected. Predominant factors associated with depression among elderly include medical comorbidities,^{14,19} impairments,^{18,21} and adverse life events.^{13,19}

There is limited data about the prevalence of depressive symptoms among elderly living in urban slums of developing country. This information is essential to formulate and implement community-based mental health interventional strategies. Hence, this study was conducted in an urban slum to assess the prevalence and factors associated with depression among elderly.

MATERIALS AND METHODS

The study was undertaken over a 1-year period from April 2010 to March 2011 in Anjanappa Garden (AG), an urban slum in Bangalore, Karnataka, India. With an area of approximately 2 km², AG has a population of 46,406 living in 28 geographically demarcated localities. The slum served by the Government Urban Health Center, is also the urban field practice area for the department of Community Medicine of M.S. Ramaiah Medical College and Hospitals. Ethical clearance to the study was provided by the Institutional Ethics Committee.

The sample size for the study was estimated considering the prevalence of depression among the elderly persons to be 31 %.¹² With an absolute precision of 4.5 % and confidence level of 95 %, it was estimated that the minimum required sample size was 406 subjects. Allowing for a 20 % non-response, the minimum sample needed for the study was increased to 466 subjects. Probability proportional to the population size (ppps) sampling procedure was adopted (Fig. 1).

The entire population of Anjanappa Garden ($n=46406$) comprising of 28 localities was divided into 3 strata based on the population size namely <1,500, 1,500–2,499, and $\geq 2,500$ population. The number of localities falling under each stratum was found to be 15, 7, and 6 with population of 14,882 (32 %), 12,896 (27.8 %), and 18,628 (40.1 %), respectively. Thus, the average size of locality in each of the stratum was found to be 992, 1,842, and 3,104, respectively. In order to obtain 513 elderly populations, it was necessary to survey 7,328 individuals as nearly 7 % of population accounted for the age group ≥ 60 years. Assuming a non-response of 20 %, the population to be surveyed was increased to 8,792. Based on the percentage distribution of population in each locality, the total sample size required for the study was proportionately divided into the various strata. The population to be surveyed in each of the stratum was found to be 2,814, 2,444, and

FIGURE 1. Flow chart of the study.

3,526, respectively. Thus, the number of households visited in each stratum was 531, 461, and 665, respectively. Employing the simple random sampling methodology from the list of localities in each stratum, three localities from stratum 1 and one each from stratum 2 and 3 were selected. The list of houses in each locality was prepared, and complete enumeration of the locality was undertaken to survey the elderly population.

Within each locality, first house number to be visited was chosen at random. All elderly in the selected house were interviewed. Moving in the right direction from this house, the nearest next house was included for the study. In case of multi-floor, multiple dwelling units, the order of enumeration of houses was from bottom to top. This way, all the houses in the randomly selected locality was surveyed for including elderly people for the study, till the required number for each locality was obtained.

In case the required number of elderly was not obtained it was decided to randomly select another locality and repeat the process till the required number is

met. Fortunately, we did not face such a situation. All persons aged above 60 years and permanent residents (operationally defined for study purpose as residents of area for past 1 year) were alone included to control for floating and migrant population.

To every eligible individual, the objective of the study was explained and the informed consent was sought. All the people whom we intended to interview participated and completed the study. Those with dementia, severe hearing impairment, and blindness were excluded from the interview process. Those with dementia were excluded as it is difficult to differentiate dementia and depression.²² Severe hearing impairment and blindness were excluded due to difficulty in conducting interview to them.

Before the questionnaire was taken for pilot study, the content validation of the questionnaire was carried out by seeking the opinion from the subject experts. A pilot study was conducted in one of the areas other than those included in main study with the objective of standardizing the questionnaire and to gain insights of possible operational difficulties that may be encountered during main study. Based on the data obtained from pilot study, Cronbach's alpha was also estimated which showed a high value of 0.80. The interview was conducted using a pre-tested semistructured questionnaire cum observational check list prepared to assess depression and associated factors. Care was taken by investigator for unbiased information elicitation determined by timing of interviews to an average time of 45 min. This time was arrived from pilot study experiences. The questionnaire included information relating to sociodemographic particulars (Modified Kuppuswamy scale),²³ assessment scales Hindi Mental Status Examination (HMSE scale),²⁴ Center for Epidemiologic Studies Depression (CESD) scale,²⁵ life events in the previous 1 year,²⁶ and information on other important issues of substance use, chronic illness. Questions pertaining to alcohol and tobacco were asked to the females also. The questionnaire was converted into local language, and it was back translated to English to confirm that the meaning of the questions did not change. Study subject was administered HMSE, and those having a score suggestive of dementia were excluded from the study. The cutoff score was 19 among illiterate and 24 among literate. All elderly who passed HMSE were administered questionnaire. The CESD questionnaire is a scale consisting of 20 items which was developed to measure symptoms of depression in community population. Any elderly getting a score 16 or higher in CESD was considered as depressed. A literate was defined in our study as any person who can both read and write with understanding in any language (they were asked about it during and not actually tested the same).²⁷

STATISTICAL ANALYSIS

Data collected was analyzed using SPSS version 18. Overall and specific prevalence rates of depression according to various factors among the study subjects were calculated. Chi-square test of significance was applied to test for association between prevalence of depression and other variables like gender, education, employment, and socioeconomic class. Using a case-control approach (all the persons identified as depressed were considered as cases and remaining as controls), univariate odds ratio were estimated along with 95 % confidence intervals for various risk factors. For statistical significance, $p \leq 0.05$ was considered. Multivariate logistic regression

analysis was employed to assess independent factors associated with depression among the elderly.

RESULTS

A total of 1,657 households were surveyed from the three randomly selected localities which provided 513 elderly subjects among whom 37 persons were excluded [dementia 28 (5.45 %), hearing impairment 5 (0.97 %), and blindness 4 (0.77 %)]. The information from three (0.58 %) persons could not be included for analysis as the information about CESD was not complete. Thus, 473 subjects were included for final analysis.

Majority of study subjects (84.4 %) were aged between 60 and 75 years (mean = 68.7 years, SD = 6.69) and 70 % ($n = 334$) were women. It was observed that 390 (76 %) of elderly were unemployed, 289 (56.3 %) were not literate, and 23 (4.5 %) were living alone.

Prevalence of Depression. The crude prevalence rate of depression among elderly was 37.8 (95 % CI = 33.43–42.16) per 100 elderly. The age standardized rate (ASR) to the world population was 39.74 (95 % CI = 36.16–43.32).²⁸ Prevalence of depression in age groups 60–69, 70–79, and 80–89 years were 34.5 % (95 % CI = 30.21–38.78), 44.7 % (95 % CI = 40.21–49.18), and 36.1 (95 % CI = 31.77–40.42), respectively, and was found to be not statistically significant ($p = 0.112$). Prevalence of depression in males and females were 28.8 % (95 % CI = 24.71–32.88) and 41.6 % (95 % CI = 41.60–37.15), respectively, which was found to be statistically significant ($p = 0.009$). The prevalence of depression among the not literates was 43.3 % which showed a reducing trend with the increasing level of education ($p = 0.034$). Among the unemployed, the prevalence of depression was 40.6 % and among the employed was 29.8 % which was found to be statistically significant ($p = 0.033$). The lower socioeconomic elderly showed a higher prevalence of depression at 39.3 % as compared to middle socioeconomic elderly and was found to be statistically significant ($p = 0.040$). Among the partially dependents and totally dependents, the prevalence of depression was found to be 41.2 and 39.8 %, respectively (Table 1).

There was a non-significant positive correlation between increasing CESD scores with age ($r = 0.08$).

FACTORS ASSOCIATED WITH DEPRESSION

In the univariate analysis, female gender, being not literate, being unemployed, consuming tobacco, visual impairment, conflicts in family, and illness of self were found to be significantly associated with depression with the univariate odds ratios ranging from 1.5 to 2.1 (Table 2). However, in the multivariate analysis factors such as gender, conflicts in family, unemployment of self or children, illness of self, and marriage of children or grandchildren revealed a statistical significance and were independently associated as risk factors (Table 2). After adjustment for other confounding variables, unemployment of self or children and illness of self revealed higher odds ratio as compared to univariate analysis.

TABLE 1 Prevalence rate (%) of depression by various socio-demographic characteristics

Characteristics		Depression		Total examined n (%)	p value
		Present n (%)	Absent n (%)		
Education (n=473)	High school and above	15 (22.7)	51 (77.2)	66 (100)	p=0.034*
	Middle school	15 (33.3)	30 (66.7)	45 (100)	
	Primary school	36 (35.6)	65 (64.4)	101 (100)	
	Not literate	113 (43.3)	148 (56.7)	261 (100)	
Employment (n=473)	Employed	36 (29.8)	85 (70.2)	121 (100)	p=0.033*
	Unemployed	143 (40.6)	209 (59.4)	352 (100)	
Socio economic status (n=473) ^a	Middle	11 (23.9)	35 (76.1)	46 (100)	p=0.040*
	Lower	168 (39.3)	259 (60.7)	427 (100)	
Financial dependence (n=473)	Independent	19 (24.4)	59 (75.6)	78 (100)	p=0.026*
	Partially dependent	84 (41.2)	120 (58.8)	204 (100)	
	Totally dependent	76 (39.8)	115 (60.2)	191 (100)	
Overall prevalence (n=473)		179 (37.8)	294 (62.2)	473 (100)	

^aSocio economic status is based on modified Kuppuswamy classification (Kumar et al.,2007)

*p value significant at 0.05

DISCUSSION

This study examined the prevalence and factors associated with depression among the elderly in an urban slum in Bangalore employing a cross-sectional design. Realizing the limitation of such design, all efforts are made to minimize various types of biases such as information and selection bias and bias due to chance factor and confounding effects. In order to control for the inter-observer variation, the first author herself collected all the data after establishing a rapport. A study manual and a protocol were prepared before collection of data which contained operational definitions for all the items included under the study. Based on experiences from pilot study, it was also decided to limit the interview for 45 min among all subjects. The study was adequately powered to obtain unbiased estimate of prevalence of depression. Probability sampling methods were adopted for selection of appropriate sample from the population with validated tools which ensured high degree of quality control. Data entered was submitted to multiple quality check by getting it checked by two persons, investigator and data manager for coding, consistency in entry, outliers, and missing values.

The observed overall prevalence rate of depression among elderly 37.8 (95 % CI 33.43–42.16) was similar to the rates reported in a study carried out in lower socioeconomic area of Vellore, in southern part of India (31.5 %¹²). However it was lower than Mumbai study carried out in an urban slum population (45.9 %¹⁰). Studies from other developing countries report rates ranging from: 5.22 to 45.9 %^{13–19}. Nevertheless, it indicates that there is considerable morbidity due to depression among elderly in India.

In the present study, it was noted that depression was two times higher among elderly reporting any illness within the past 1 year. Contrasting findings were reported in other studies.^{13–15,19} The possible reason for this is because of experiencing depressive symptoms as a reaction to being first diagnosed to be suffering from illness, but over a period of time, adjustment with the diagnosed

TABLE 2 Univariate and multiple logistic regression analysis of predictors of depression among the elderly

Variable	Depressed	Not depressed	Univariate		Multivariate logistic regression	
			OR (95 % CI)	p	OR (95 % CI)	p value
Sex						
Male	40	99	1.0			
Female	139	195	1.76 (1.15–2.70)	0.009*	1.9 (1.19–2.89)	0.006*
Education						
Literate	66	146	1.0			
Not literate	113	148	1.7 (1.15–2.47)	0.007*		N.S
Employment						
Employed	36	85	1.0			
Unemployed	143	209	1.6 (1.04–2.51)	0.03*		N.S
Tobacco consumption						
No	117	217	1.0			
Yes	62	77	1.5 (0.99–2.24)	0.05*		N.S
Visual impairment						
No	104	199	1.0			
Yes	75	95	1.5 (1.03–2.21)	0.04*		N.S
Conflicts in family						
No	122	226	1.0			
Yes	57	68	1.5 (1.03–2.35)	0.03*	1.6 (1.03–2.43)	0.037*
Unemployment of self or children						
No	150	270	1.0			
Yes	29	24	2.1 (1.22–3.87)	0.007*	2.6 (1.41–4.72)	0.002*
Illness of self						
No	89	193	1.0			
Yes	90	101	1.9 (1.32–2.82)	0.001*	2.2 (1.45–3.21)	<0.001*
Marriage of children or grandchildren						
No	136	243	1.0			
Yes	43	51	1.5 (.95–2.38)	0.08	1.6 (1.02–2.68)	0.039*

N.S nonsignificant

*p value significant at 0.05

chronic illness may have led to reduction of depressive symptoms. Hence, psychological intervention may be required for all elderly especially at time of being diagnosed with any illness as this may be associated with occurrence of depressive symptoms.

Previous studies^{11,17} indicate that increasing age is associated with depressive symptoms among elderly. In our study, no such observations were observed as nearly 37 % in both under 75 and above 75 were depressed. This could be because of more subjects in the age group of 60–75 years (87.31 %) and very few subjects above the age of 76 years (12.69 %) reported depressive symptoms. But percentage wise, both group had similar proportion of depressed individuals.

In our study, females suffered more depression than their male counterpart which was similar to other community-based studies.^{10,11,19,21,29} In our study, 70 % were females and among them, 69.9 % were widows. The probable reason for this high number of females in our study is due to enhanced longevity among females. It is an established fact that depression is more common among females. The females have contributed to 78 % of observed depression prevalence with males contributing to 22 % of depression. Hence, strategies aimed at reducing overall prevalence in community should be specifically targeted to the females as their contribution to total case load is higher than males. Screening for depression should be included for all menopausal females. Gender is significant in both univariate and multivariate analysis because of all the factors discussed above.

In Brazil and Sri Lankan study,^{14,17} low income was associated with depression, but in our study, we did not find such an association; the probable reasons could be that 90.3 % of our population were from low socioeconomic status which was distributed equally among depressed and not depressed individuals.

In all age groups, recent stressful life events are associated with poor mental health.^{13,19,21,30} In our study, life events such as conflicts in family, unemployment of self or children, illness of self, marriage of children or grandchildren are significantly associated with geriatric depression. The marriages of children or grandchildren were considered as stressful life events as they were a financial burden to the family. As previously explained, though presence of chronic physical illnesses did not appear to be associated with depression, but recent onset of physical illness was associated with it. Similarly, long-standing unemployment did not appear to be associated with depression, but recent unemployment was associated with depression. This finding was consistent with previous studies.^{13,29,31,32} Recent stressful life events should be identified and suitable support, self-help groups, and counseling need to be in place in the community.

The prevalence of depression was not found to be significant among those with history of death of family member in the past 1 year when compared to the others; this is in contrast to the observations made in Udupi.¹¹ Literacy status of study subjects was not associated with depression. In multivariate analysis, the various significant factors in univariate were probably neutralized due to effect from other factors.

The limitation of this study is that the CESD scale criterion validity was not done. The CESD tool has been used to identify a person as having depressive symptom and not depression which needs clinical diagnosis. The CESD scale has not been validated in Indian population.

CONCLUSION

In summary, we report that the overall prevalence of depression in elderly in urban slum of Bangalore was 37.8 (95 % CI=33.43–42.16). Female gender, conflicts in family, unemployment of self or children, illness of self, and marriage of children or grandchildren were associated with depression in this population. The findings of the study suggest that psychological intervention may be provided for all elderly especially at the time of being diagnosed with any illness as this may be associated with occurrence of depressive symptoms. Strategies should be specifically targeted to the females as their contribution to total case load is higher than males and specifically screening for depression should probably be included for all menopausal females. There is a need to identify the stressful life events and take remedial actions that will prevent the occurrence of depression. This facility can possibly be made available to them at the primary level of health care. There is a need to include screening of depression in our national health programs like National Program for the Health Care of the Elderly (NPHCE), National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS), National Health Mission (NHM), and National Mental Health Program (NMHP).

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