



Depression as an emerging public health problem in rural India: a case study of a geriatric population in a tribal region of eastern Maharashtra, India

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ABSTRACT

Background

Geriatric mental health is emerging as a major public health concern for an increasingly ageing world population. There are few population-based studies to investigate age-related depression and its correlates in rural settings. The objective of this study was to determine the prevalence and predictors of depression among elderly people in a rural area of Central India.

Methods

A community-based cross-sectional study was conducted among 184 elderly people (aged ≥ 60 years) in Dhakani, a rural village in Gondia District, Eastern Maharashtra, Central India. Depression was assessed using the 15-item Geriatric Depression Scale (GDS-15). Data was analyzed using SPSS software version 20 and statistical association was considered significant at $p < 0.05$.

Results

The prevalence of depression among rural elderly was 13% (95% CI: 8.7-18.5%). The mean GDS-15 score of the study population was 2.46 ± 2.45 . On univariate analysis, women were found to be significantly more depressed than men [OR 3.76 (95% CI: 1.41-9.97)]. Multivariate analysis did not identify any major predictors of depression in the elderly.

Conclusion

Depression was found mainly in elderly women. We recommend that trained geriatric care counsellors be appointed from the community to regularly screen for depression among this vulnerable group, so that interventions can be initiated early to promote mental health and prevent geriatric depression.

Keywords: Depression, Rural, Elderly, Geriatric Depression Scale (GDS-15), India

INTRODUCTION

Globally, populations are ageing rapidly. The proportion of the world's population over 60 years of age is predicted to nearly double between 2015 and 2050, from 12 to 22%.¹ India, the world's second most populous country, is presently undergoing such a demographic transition² with 72 million elderly people above 60 years of age. This is expected to increase to 179 million in 2031 and further to 301 million in 2051.³ This rise in the number of elderly people will have a direct impact on the demand for healthcare services and social security.³ As a result, the elderly are at risk

of becoming more vulnerable to mental illnesses. Over 20% of elderly people are already known to suffer from a mental or neurological disorder and 6.6% of all disabilities among this age group are attributed to neurological and mental disorders.⁴ The most common neuropsychiatric disorders affecting the elderly are dementia and depression.⁴ Depression can lead to loneliness, cognitive impairment, social isolation, diminished self-esteem, suicidal tendencies and poor quality of life among the elderly.⁵ According to the World Health Organization (WHO), factors that

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can increase depression risk in older adults include genetic susceptibility, chronic disease and disability, pain, frustration with limitations in the activities of daily living (ADL), certain personality traits (dependent, anxious or avoidant), adverse life events (separation, divorce, bereavement, poverty, social isolation) and lack of adequate social support.⁶ Many studies have demonstrated relationships between depression and socioeconomic variables such as advanced age, low education, poverty and manual occupations.⁷⁻⁹ Thus, an older adult patient suffering from depression often has a combination of psychological, physical and social needs.

Many epidemiological studies on the prevalence of depression and associated risk factors in India have focused on populations in urban areas. Few studies have examined the elderly in rural settings. More epidemiological studies are needed in rural areas in order to provide baseline information for future reference, as well as for planning depression prevention, control and treatment in India. Taking into consideration the above factors, the present study was conducted in a rural village to estimate the prevalence of depression among the elderly and to assess the factors associated with depression among the rural elderly.

MATERIAL AND METHODS

A community-based, cross-sectional study was carried out over two months from April to May 2019. The study was carried out in Dhakani, a village in the Gondia District of Eastern Maharashtra, Central India. Dhakani is located in a rural field practice area under the Department of Community Medicine Tertiary Care Centre. The study area was 7km away from the researchers' teaching institute.

Sample size and study population

The study area had an elderly population of 192 individuals; they comprised 7% of the total population, which is a lower-than-average elderly population for India (8%) and for the Indian state of Maharashtra as a whole (9.3%) as per the 2011 census. Details of the study subjects were taken from the enumeration register available from the Gram Panchayat, which is basic unit of local administration under the Panchayati

Raj Institution (PRI) system of governance in India. The study population comprised all elderly individuals who were registered residents of the village and were aged ≥ 60 years. The sample size was estimated to determine the minimum number of elderly individuals in the absence of epidemiological information on depression among the elderly. A study by Pilania et al¹⁰ in 2017 showed a 14.6% prevalence of depression among the elderly in a rural population. Considering a prevalence of depression of 14.6%, a 95% confidence interval and absolute precision of 5, the minimum sample size for the study would be 192 using the formula $4pq/l^2$, and hence we included all eligible elderly in our study. Individuals who were found to have dementia or delirium; who were deaf, dumb and/or blind and those with a diagnosed psychiatric illness such as schizophrenia, mental retardation or neurological disorders such as Parkinson's Disease or brain injury were excluded from the study.

Data collection procedure and instruments

The list of households where individuals aged 60 and above resided was prepared from an initial list of all households in the village. Home visits were made for data collection in the selected households. A pre-tested interview schedule was used to collect information from the study participants. The interview schedule was administered by the principle investigator aided by a trained field team, including a medical social worker. A minimum of three attempts were made to contact the participant or primary caregiver of the participant. Participants who declined to give consent or who could not be reached during three house visits were considered non-respondents.

The house-to-house survey was conducted in the selected households by the principle investigator and trained field team, including the medical social worker. The 15-item Geriatric Depression Scale (GDS-15) developed by Yesavage et al,¹¹ which has 15 questions, was administered individually through face-to-face interviews in the participant' local language to assess depression levels within the elderly. The 15-item Geriatric Depression Scale (GDS-15) is the basic screening measure for the evaluation of depression in the elderly. It is important to assess the performance of the GDS-15 in research protocols

to establish the incidence or prevalence and also to examine the correlates of depression. The validity and reliability of the tool has been confirmed by both clinical practice and research. In a validation study comparing long and short forms of the GDS for self-rating of symptoms of depression, both were considered effective in differentiating depressed from non-depressed adults with a strong correlation ($r=0.84$, $p < 0.001$)¹². The individuals with a GDS score >5 were categorized as depressed.

Mini Mental Examination Status (MMES) and Everyday Abilities Scale for India (EASI) were also used to determine the presence of cognitive impairment and to assess activities of daily living respectively. The GDS and EASI instruments were translated into Marathi. Information was confirmed by at least one close family member, usually the spouse, adult son or daughter, or a credible person who was close to the study participant. Participants' daily functioning was assessed in the presence of their primary caregiver with the help of the Everyday Abilities Scale for India (EASI). Participants with an EASI score of >3 were classified as functionally impaired.¹³ Cognitive impairment was assessed using the Mini-Mental State Examination (MMSE). Respondents with an MMSE score of <25 were considered to be cognitively impaired.¹⁴ Individuals who were found positive for depression were referred to nearest healthcare centre for counseling and treatment.

Subjects were asked whether they are current smokers or had ever smoked in the past. Participants were also asked whether they currently drank alcohol or had regularly consumed alcohol in the past. History of comorbidities including hypertension, diabetes, heart disease, chronic obstructive pulmonary disease, musculoskeletal pain, hearing and visual problems were collected from the participant or their relatives.

Statistical analysis

Data was entered into Microsoft Excel 2010 and analyzed using SPSS software version 20.0. The associations between depression and independent variables were explored by univariate analysis. Those that were statistically significant ($p < 0.05$) in univariate analysis were considered for multivariate analysis.

BOX 1: Definitions used in the study

Elderly

For the purposes of this study, elderly is defined as individuals with a minimum age of 60 years. Study participants' age was verified by Voter ID Card, Ration Card or Old Age Pension beneficiary card.

Chronic morbidity

Chronic morbidity was taken as present if already diagnosed or self-reported by study participants. This included hypertension, diabetes mellitus, respiratory diseases, cardiac diseases, arthritis, stroke, cancer or any illness with a duration of more than six months.

Day time spent engaged in work/hobbies

This was defined as time spent during the day by elderly persons doing household work, an occupation, or hobbies such as playing cards, playing with grandchildren, socialising with neighbours etc.

Working

Study participants who were involved in economically productive work in which they earned cash for the family or themselves were defined as working.

Not-working

Those who did not earn money for the family or themselves were classed as not-working; this included homemakers and those involved in day-to-day household chores.

Physically Active

Elderly were considered physically active if they could undertake household work regularly or engaged in agriculture, labour or any other such occupation.

Physically inactive

A study participant who was able to perform daily living tasks on his/her own without needing any assistance from others but who did not perform household work or engage in any occupation.

Dependent on others for day-to-day activities

Defined as a study participant who required any sort of help from others for the activities of daily living.



RESULTS

To assess the prevalence of depression, all elderly members of Dhakani village in the Gondia District of Maharashtra were contacted through a Sarpanch, a village-level decision-maker, to whom the interview schedule was described; 192 potential study subjects were identified. Home visits were made, and this identified eight people who were not able to complete the assessments: two participants had severe hearing impairments and one was found to be seriously ill. These were excluded from the study. One participant had died. Two participants declined to participate and two could not be traced. This left a total of 184 participants to participate in the study.

Sociodemographic profiles and risk factors

Out of a total sample of 192 study subjects the participation of 184 corresponds to a response rate of 95.8%. Their median age was 65.0 years (male = 67.09 years, female = 64.50 years), with an age range of 60–92 years. Nearly three-quarters of the respondents were aged 60–70 years. They had received on average only 3.4 years of formal schooling and the illiteracy rate was 67.9%. A minority (11.4%) currently consumed alcohol or had ever done so in the past and 41.3% were current or former smokers. Nearly half of the participants (45.7%) were not physically active (defined as being unable to do household work regularly or to be involved in agriculture, labour or any other such occupation).

Nearly half of the participants (48.9%) had sleeping problems and 34.8% had hypertension. About one third of the participants reported chronic musculoskeletal pain including chronic joint pain, low back pain or neck pain. Diabetes was reported by 8.7% of the study population. Mean duration of hypertension and musculoskeletal disorder among the study participants was reported as 5.8 ± 5.14 years and 4.9 ± 3.32 years, respectively. The proportion of elderly with cognitive impairment as assessed by Mini-Mental State Examination (MMSE) was 44.5%.

Prevalence of geriatric depression and correlates

The mean GDS-15 score for this population was 2.46 ± 2.45 and the prevalence of depression was 13% (95% CI 8.7–18.5). Women had a higher GDS-15 score

than men ($p < 0.05$) and univariate analysis showed that elderly women were more likely to be depressed than men ($p < 0.05$). A statistically significant difference was found between a mean GDS-15 score of healthy individuals and individuals with depression ($p < 0.05$). A slightly higher incidence of depression was recorded amongst individuals who had at least eight years of schooling but this was not statistically significant. Separated or widowed individuals, those who were unemployed or non-working, and those who were more financially dependent on their family, were all more likely to be depressed (Table 1).

The prevalence of depression was found to be higher among individuals with cognitive impairment (62.5%) than healthy individuals, though the difference was not statistically significant. Depression was also reported by 33.3% participants who had functional impairment, as assessed by the Everyday Abilities Scale for India (EASI); subjects with an EASI score > 3 were classified as functionally impaired. Of the 24 depressed individuals, three (12.5%) were diabetic and nine suffered from (37.7%) hypertension. Three (12.5%) had currently or previously drunk alcohol and seven (29.1%) were current or former tobacco smokers (Table 1).

Previous literature has identified socioeconomic factors, economic dependency, marital status, addiction and chronic conditions as predictors of depression. Negative impacts of alcohol and drug use and the relationship between these factors and dependence on the effectiveness of treatments for depression is well established in many research studies.¹⁵ Research has also indicated that chronic diseases such as diabetes and hypertension are risk factors for depression and anxiety.¹⁶

In our study, the only variable found to be statistically significant in univariate analysis was female gender (OR 3.76; 95% CI 1.41–9.97). We considered the ability of each of the other variables to predict depression in the logistic regression model but none were significant. No significant correlation was established between geriatric depression and its correlates after adjusting for confounding factors in multivariate analysis (Table 2).

Table 1 Prevalence of depression with sociodemographic variables of the study population

Variables	Healthy elderly (n=160)	Elderly with depression (n=24)	Total (n=184)	Odds ratio (95% CI)	P value
Sociodemographic variables					
Age group (years)					
60-64	66(89.2)	08(10.8)	74	Reference	
65-69	52(85.2)	09(14.8)	61	1.42 (0.51-3.95)	0.492
≥70	42(85.7)	07(14.3)	49	1.37 (0.46-4.07)	0.564
Sex					
Male	89(93.7)	06 (6.3)	95 (51.6)	Reference	
Female	71(79.8)	18(20.2)	89(48.4)	3.76 (1.41-9.97)	0.005
Years of education (years)					
>8	85(89.5)	10(10.5)	95(51.6)	Reference	
≤8	75(84.3)	14(15.7)	89(48.4)	1.58 (0.66-3.78)	0.295
Occupation					
Working	80 (90.9)	08 (9.1)	88 (47.8)	Reference	
Non-working	80 (83.3)	16 (16.7)	96 (52.2)	2.00 (0.81-4.93)	0.127
Marital status					
Married	102 (90.3)	11(9.7)	113 (61.4)	Reference	
Widow/separated	58 (81.7)	13 (18.3)	71 (38.6)	2.07 (0.87-4.93)	0.053
Living arrangement					
With family and children	131 (86.8)	20 (13.2)	151 (83.6)	Reference	
With spouse only	15 (83.3)	03 (16.7)	18 (9.78)	1.31 (0.34-4.93)	0.689
Alone	14 (93.3)	01 (6.7)	15 (8.15)	0.46 (0.05-3.75)	0.465
Monthly per capita income (Rupees)					
>1000	132 (86.8)	20 (13.2)	152 (82.6)	Reference	
≤1000	28 (87.5)	04 (12.5)	32 (17.4)	0.94 (0.29-2.97)	0.920
Economic dependency*					
No	82(90.1)	09(9.9)	91(49.5)	Reference	
Yes	78(83.9)	15(16.1)	93(50.5)	1.75 (0.72-4.23)	0.209
Death of close relative in the last year					
No	102 (87.9)	14 (12.1)	116 (63)	Reference	
Yes	58 (85.3)	10 (14.7)	68 (37)	1.25 (0.52-3.00)	0.608
Behavioural factors					
Alcohol user					
Never used	142 (87.1)	21 (12.9)	163 (88.6)	Reference	
Has used	18 (85.7)	03 (14.3)	21 (11.4)	1.12(0.30-4.15)	0.857
Tobacco user					
Non user	91(84.3)	17 (15.7)	108 (58.7)	Reference	
Has used	69 (90.8)	07 (9.2)	76 (41.3)	0.54 (0.21-1.38)	0.195
Physical activity**					
Active	86 (86)	14 (14)	100 (54.3)	Reference	
Inactive	74 (88.1)	10.(11.9)	84 (45.7)	0.83(0.34-1.97)	0.674
Day time spending in work and hobbies					
No	123 (89.1)	15(10.9)	138 (75)	Reference	
Yes	37 (80.4)	09 (19.6)	46 (25)	0.50(0.20-1.23)	0.129

Sleeping problems					
No	84 (89.4)	10 (10.6)	94 (51)	Reference	
Yes	76 (84.4)	14 (15.6)	90 (48.9)	1.54 (0.64-3.68)	0.322
Morbidity in elderly					
Cognitive impairment (MMSE)	67 (81.7)	15 (18.3)	82 (44.6)	2.31 (0.95-5.60)	0.058
Functional disability (EASI)	27 (77.1)	08 (22.9)	35 (19)	2.46 (0.95-6.33)	0.055
Diabetes mellitus	15 (83.3)	03 (16.7)	18 (9.8)	1.38(0.36-5.17)	0.231
Hypertension	55 (85.9)	09 (14.1)	64 (34.8)	1.14(0.47-2.78)	0.764
Chronic musculoskeletal pain***	52 (86.7)	08 (13.3)	60 (32.6)	1.03 (0.41-2.58)	0.935

*A study participant was considered to be economic independent if he/she was leading an economically productive life or if he/she was getting any pension and was not dependent on any other person for their livelihood.

**Elderly were considered to be physically active if they could do household work regularly or were able to be involved in agriculture, labour or any other such occupation.

***Chronic musculoskeletal pain included chronic joint pain, low backache, neck pain (self-reported response).

Table 2 Sociodemographic and obstetric characteristics

Variables	Adjusted odds ratio (95 % CI)	P value
Female gender	2.92 (0.76-11.72)	0.106
Widowed/separated	1.73 (0.54-5.58)	0.465
Living with spouse only	14.55 (0.98-214.68)	0.067
Living alone	0.25 (0.02-2.30)	0.224
Poor	0.80 (0.22-2.88)	0.748
Economically dependent	0.90 (0.31-2.61)	0.886
Currently/has ever used alcohol	1.01 (0.16-6.10)	0.903
Currently/has ever used tobacco	0.59 (0.16-2.10)	0.413
Death of a close relative in the last year	1.28 (0.49-3.38)	0.574
Diabetes mellitus	2.55 (0.12-12.25)	0.242
Hypertension	0.72 (0.26-2.02)	0.539
Elderly with cognitive impairment	1.61 (0.55-4.11)	0.503
Elderly with functional impairment	2.24 (0.74-6.79)	0.176
Sleep problem	1.37 (0.53-3.55)	0.604

DISCUSSION

There is a growing burden of psychiatric morbidity in the geriatric population worldwide. Depression in later life is associated with disability, increased mortality and poorer outcomes from physical illness. However, epidemiological studies that assess depression in rural areas of the developing world remain scarce. This issue needs attention, as the majority of the population of developing countries like India live in rural areas. Our study investigated the prevalence of depression among a rural elderly population of India. The prevalence of depression in

the elderly in our study was 13%. Similar prevalence in rural South India (12.7%) has previously been reported by Rajkumar et al¹⁷. Another study by Abhishek et al¹⁸ reported 14.3% prevalence of depression in a community-based study. However, many researchers have also reported a higher prevalence of depression. A study by Nandi et al¹⁹ reported 52.2% prevalence in rural West Bengal, Swarnalatha et al reported 47% among rural elderly in Andhra Pradesh,²⁰ Sinha et al 42.7% in Tamil Nadu²¹ and Goswami et al 41.7% in Maharashtra.²² Recent meta-analysis on the median



prevalence rate of depression in the elderly population across all of India has estimated this to be 21.9%.²³ A SHARE study conducted among people ≥ 50 years of age from Europe found depression prevalence rates of 18–37%.²⁴ This difference in prevalence could be attributed to the different geographical areas studied, cultural differences, different assessment tools used for measuring depression, different sampling strategies, the difference in sample size and/or the different study settings. The prevalence rate of depression found in our study is within the range reported by WHO for depression in the geriatric population worldwide (10–20%).²⁵

The gender distribution of the elderly in our study was similar to the findings of other studies on the elderly in rural India, including by Hakmaosa et al.²⁶ In our study, women were 3.76 times more at risk than men of being depressed, which was found to be statistically significant ($p=0.005$). This might be because women face more mentally traumatic situations and stressful events in their lives, such as sexual harassment at work or school, abortions and miscarriages, leading to emotional distress that may eventually contribute to depression. Similar findings have been observed in other studies conducted in rural settings.²⁷⁻²⁹ However, a review of gerontological literature by Feinson³⁰ noted contradictory findings regarding the effect of gender on psychological distress. The prevalence of depression among widowed/separated individuals was found to be high in the current study relative to married elderly individuals, although it was not statistically significant ($p=0.053$). A study by Seby et al³¹ reported that married people are less likely to be depressed; our study found a reasonably high level.

Being employed keeps one active, and socially and economically empowered. The welfare of elderly people who are financially dependent is typically ignored even though financial status also dictates social status. In the present study, poverty, economic dependency and unemployment were not found to be significantly associated with geriatric depression. This could not be explored in depth in this study, however, but does warrant further research, particularly as the elderly who are economically unproductive are often at risk of suffering neglect.

Elderly people who have experienced the death of a close relative can face financial and emotional stress, which can have a significant impact on elderly individuals and creates feelings of loneliness. Although this factor was not found to be statically significant in our study, such experiences are linked with depression and are likely to influence one's mental state. Spending time in work and hobbies enhances a person's self-esteem and distracts from depressive thoughts. Our study could not establish a statistically significant association between time spent doing hobbies and depression, however.

We found no significant relationship between tobacco or alcohol use and depression in the elderly. In a 2013 study from South Africa, Peltzer and Mafuya³² also reported that tobacco and alcohol use had no significant association with depression. Some community-based studies have reported higher depression among those who did not use tobacco but this was not apparent in our study.³³

Sleep disturbance causes irritability and anxiety, which may lead to depression. Insomnia and depression have a bidirectional relationship: insomnia aggravates depression and depression has an adverse effect on sleep quality, creating a vicious circle³⁴. Despite this, our findings did not support a relationship between lack of sleep or sleep disturbance and depression, in contrast to other studies, e.g. by Hoffmann et al,³⁵ Mubeen et al.³⁶ that have shown significant associations between sleep and depression.

The present study found that none of the chronic comorbidities explored in the study contributed to geriatric depression, though other geriatric literature has shown corroborative evidence of an association between such conditions and depression. The relationship between depression and chronic comorbidities is, like its relationship with sleep, bidirectional.³⁷ Depression is itself a risk factor for the development of chronic diseases and leads to poorer health outcomes, while chronic diseases can lead to depression. Diabetes, hypertension and chronic pain were not found to be predictors for depression in our study, however, though depression and chronic pain



have been shown to be highly prevalent in elderly populations worldwide, with an estimated 13% suffering simultaneously from both conditions.³⁸

LIMITATIONS

First, the cross-sectional design of the study restricted our capability for longitudinal associations and thus does not provide an understanding of the relationship between cause and effect. Second, we relied on self-reported or already diagnosed chronic morbidities only. Therefore, the true prevalence of chronic morbidities was not assessed. Third, the main limitation of the study is its small sample size, which did not allow us to compute effect sizes of many of associated parameters. However, we ensured that the sample was sufficient to detect the prevalence of the

key variables of interest by including all elderly in Dhakani village, Gondia, Maharashtra. Finally, the small sample size limits generalizability. Larger-scale studies are needed in order to build a better picture of mental health in India's older rural population.

CONCLUSION

Depression in older adults is a substantial problem in this village, particularly among women. Family social support services need to be established for the elderly, especially women in order to ensure their well-being. A preventive model for depression that focuses on strengthening social networks and educational programmes, and which is aimed at educating the public about the risks associated with depression, may need to be developed at the primary care level.

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