Introduction

With the development of improved treatment regimes, better life-saving drugs, better prevention of infectious diseases, life expectancy in India has increased by 5 years, from 62.3 years for males and 63.9 years for females in 2001–2005 to 67.3 years and 69.6 years, respectively, in 2011–2015 and the projected life expectancy during 2012–2025 will be 69.8 and 72.3, respectively. However, as people get older, they become vulnerable to different medical and psychological problems among which depression in this age group, needs a special mention. This problem is not new. In 1990, the World Health Organization (WHO) described depression as a major cause of disability globally. Mental and behavioral disorders are estimated to account for 12% of the burden of disease worldwide which affect approximately 450 million people. By the year 2020, depression will be the single most leading cause of disability-adjusted life years in the developing countries. The WHO estimated that the overall rate of prevalence of depressive disorders among the elderly population generally varies between

Magnitude of depression and its correlates among elderly population in a rural area of Maharashtra: A cross-sectional study

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ABSTRACT

Background: Depression is the most common psychiatric disorder among elderly population in India, yet, it is commonly misdiagnosed and undertreated. The exact burden of depression among the elderly population in rural India was not known. Objectives: To study the magnitude of depression among the elderly masses in rural Maharashtra and to find its correlates. Material and Methods: This is a cross sectional study, carried out among the elderly (≥60 years) population of both sexes residing in the field practice area of the department of community medicine. Geriatric depression scale was used for screening depression among the study population. Data collection was completed within 2 months using convenience sampling. Ethical approval was taken before beginning the study. Magnitude was expressed in percentage along with its 95% confidence interval (CI). Univariate and multivariate logistic regression was carried out to study associated correlates. Odds ratio and 95% CI was used to express association. Results: The magnitude of depression among the elderly population was found to be 41.7% (95% CI 36.1–47.4). We got the significant positive association of female sex, living without spouse, lacking in decision making capability, a victim of abuse or neglect, or suffering from chronic illnesses with depression among elderly population in univariate analysis that did not hold good in the multivariate logistic regression. Our study showed the prevalence of mild depression among elderly to be 26.72% and that of severe depression to be 15.17%. Conclusion: To deal with this huge social problem of depression among the elderly population, more enthusiastic steps should be undertaken.

Keywords: Depression, elderly, geriatric, mental illness

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Depression among the geriatric population is a neglected problem in India. Like other parts of the world, increased life expectancy, shift of disease pattern from communicable to noncommunicable, and decreased fertility rate resulted in increased number of elderly people in India. Due to modernization, people are now preferring to live in nuclear families, both in rural and urban areas, resulting in loneliness and lack of family as well as social support to the elderly, which adds on to their deteriorating health conditions, ultimately making them easy victims of depression. Although this scenario is not new, but still, depression among geriatric population remains an untold truth and is being severely neglected. Although a number of elderly friendly programs are being launched in India, but it lacks the zeal to deal with this problem of depression. Adding to it, it is unfortunate to say, in India, very few studies have been conducted in this topic resulting in lack of proper evidence of the burden of the disease. As a result of all these, the current study has been planned to be executed to know the magnitude of depression among the elderly masses in rural Wardha and to find its correlates, which may warrant for the future large-scale studies on the same topic, resulting in formulation of hardcore government initiatives to deal with the problem with iron hand.

Materials and Methods

Study settings
This is a cross-sectional study, carried out in the field practice area of the Rural Health and Training Centre (RHTC), under the Department of Community Medicine of a reputed medical college of central India which covers a population of 10,739. The RHTC runs community-owned village clinics in five different villages which provide curative, preventive, and promotive services to the rural masses. There are weekly specialist clinics at the RHTC including psychiatry. Apart from this, there are regular health awareness activities conducted in the villages by the village clinics.

Study population
The study was carried out among the elderly population (age ≥60 years) of both sexes residing in the rural area of the RHTC.

Sampling technique and sample size
Taking prevalence of depression among geriatric population to be 25%,[6,8] absolute precision of 5, the sample size required for our study was 287 (≈290) for 95% confidence level. The sample size was calculated using OPEN EPI software.[9] Concurrency sampling technique was used for the study.

The study participants included the elderly people of both sexes who attended the village health awareness activities conducted by the field clinics and the elderly patients who visited the field clinics and voluntarily took part in the study and signed written consent.

Measurements
Two tools were utilized for collecting the data for screening depression and their associated sociodemographic parameters.

Questionnaire for sociodemographic determinants
This questionnaire was prepared based on the standard questionnaire for the elderly given in the “The Status of Elderly in Selected states of India, 2011.[10] This questionnaire was pretested and suitably modified to meet with the study objective. Using this questionnaire, we have captured a number of sociodemographic determinants of the participants, among which, the following are worthwhile to be mentioned.

Age ≥60 years is taken as geriatric age group in this study. The age groups are divided into three, 60–69 years, 70–79 years, and ≥80 years. We have included both sexes in our study. Marital status and schooling were also noted.

The questionnaire included questions on comorbidities, that is, if the study participants were suffering from any chronic diseases or not. This was self-reported by the participants when they were interviewed regarding their current health status and any history of medication. The comorbidities mostly included the presence of hypertension, diabetes, bodyache, backache, joint pain, respiratory distress, bladder and bowel problem, eye and ear problems, cancer, etc. The comorbidities were confirmed clinically wherever possible though no biochemical tests were done.

Similarly, the questionnaire also included a question, if they were neglected or had faced any sort of violence by family members/neighbors. We did not use any objective definition for neglect or violence, but the self-reported statement of the study participants were recorded in the study.

Annual individual income of the study participant was asked in the questionnaire and whether that person was still dependent on family members financially was noted. Regarding the “Working Status,” we categorized it as “working” and “not-working.” Those study participants, who were involved in “economically productive work,” which meant, if they earned cash for the family or themselves, were regarded as “Working.” Conversely, “Not-working” were those who did not earn money for the family or themselves, which included the homemakers and those involved in day-to-day household chores.

Depression
The WHO geriatric depression scale[11] long form of 30 questions was utilized for screening the depression among the elderly population and to classify them into: (a) Normal (0–9),
(b) mild (10–19), and (c) severe (20–30) depression. This scale had already been used and validated in India.

**Data collection**

As per the curriculum of postgraduate training program in the Department of Community Medicine, the principal investigator was posted in RHTC for 2 months from October to November 2015, where he attended the village health clinics at five different villages under the field practice area of RHTC. This scope of rural posting was utilized for collection of data by interviewing the elderly (≥60 years) patients who visited the weekly field clinics and Rural Hospital and took part in the village health awareness program. Questions were asked in the language which the study subjects understood. Data collection was completed within the 2 months. In an average, 3–4 interviews were conducted per day.

**Ethical consideration**

Ethics approval was taken from the Institutional Ethical Committee before beginning the study. Written consent was taken from each participant before starting the interview. Cases of severe depression were referred to psychiatrist immediately and were later followed up. And those elderly people who were screened to have mild depression were counseled by the interviewer himself on repeated occasions.

**Analysis**

Data entry and analysis was done using EPI Info 7 Software. The prevalence was expressed using percentage and 95% confidence interval (CI). Association with various determinants was studied using Odds ratio with 95% CIs derived using univariate and multivariate logistic regression.

**Results**

Table 1 showed the age- and sex-wise distribution of the study subjects. Of the 290 study population, 129 were male and 161 females. It is seen that the maximum number of the population were in the age-group between 60 and 69 years.

In our study, 41.7% (95% CI 36.1–47.4) were suffering from depression, among which 63.7% were suffering from mild depression, and 36.37% were suffering from severe depression. In our study, the females (60.9%) were more likely to be depressed (33.3%), and it was found to be statistically significant.

Table 2 showed the results of both univariate and multivariate logistic regression. In univariate logistic regression, higher odds were observed among the females (1.9 [95% CI 1.2–3.0]) as compared to the males; those elderly who were widowed or separated or divorced were also found to have higher odds (2.5 [95% CI 1.5–4.2]) when compared to the elderly population who were having spouse. Similar findings of having higher odds of 4.8 (95% CI 2.5–9.8) were found among those elderly who were suffering from any of the chronic illnesses such as hypertension, diabetes, multiple joint pains, myalgia, respiratory problems, and cancer than those who were not suffering from those diseases. Odds were also found to be higher (4.4 [95% CI 1.3–20.3]) among the study population whose role as a decision maker in the family has decreased after becoming aged compared to those, who still took important decisions of the family. And lastly, the study population who reported to have been victim of abuse or violence or neglect, mostly by family members and neighbors, were also found to have higher odds of 2.7 (95% CI 1.5–4.9) when compared to those who never suffered from abuse, violence, or neglect.

Odds of older age groups (≥70 years), illiteracy, inability to work at present, decreased individual annual income, and financial and physical dependence were not found to be significantly higher than their counterparts. After adjusting for other factors in multivariate logistic regression, none of the factors were found to be significant.

**Discussion**

In our study, magnitude of depression among the elderly population was found to be 41.7%. We also tried to look for association of depression with a number of factors such as age group, sex, marital status, schooling, working status, annual income, dependence, disease status, role as decision-maker, and whether being a victim of abuse or not. Although many of those factors showed positive correlation in univariate analysis, none of them showed a significant positive association in multivariate logistic regression.

The magnitude of depression (41.7%) among geriatric population, in our study, was found to be at par with other similar studies conducted at Salem, Kanchipuram, and Hoogly,[12,13] India. However, in a study conducted in Northern India,[14] the prevalence of depression among elderly was found to be only 8.9%, one reason for this could be the inclusion of urban population in their study. After we detected the depressed elderly people, they were referred for psychiatric consultation and counseling at the RHTC during the weekly psychiatrist visit.

In the present study, the prevalence was seen to be highest in the age group of ≥ 80 years. Although age effect was not statistically significant, similar findings were found in the prevalence studies conducted by Chi et al.,[15] Rajkumar et al.,[16] and Sengupta et al.[17] Studies conducted in different parts of India concluded that females were more likely to be depressed than the males. Elderly people who were living without their spouse, that is
either being widowed or separated or being divorced and those who were suffering from chronic illnesses were also found to be suffering from depression in the studies conducted by Radhakrishnan et al. and Maulik et al. Study conducted in Hoogly, West Bengal found that those elderly who were not involved in taking important decisions in the family had a higher prevalence of depression. In few studies,[17‑19] they significantly found a higher prevalence of depression among those elderly people who were not educated and were not working to earn for family or themselves. Maulik et al.[13] found a significant correlation of depression with no personal income that we did not get in our study.

A reason for all these differences between our study and the studies discussed might be because of different study settings and the sociocultural factors which differ in different settings. Further, the difference in findings between our current study and the other studies could be explained by Rothman’s model of causal pie.[20] In the causal pie model, outcomes result from sufficient causes. Each sufficient cause is made up of a “causal pie” of “component causes.” Several different causal pies may exist for the same outcome. Now, the outcome, here, for example, depression among the elderly population, will occur, if and only if all component causes of a sufficient cause are present, that is, the causal pie is completed. Hence, the effect of a component cause depends on the presence of the other component causes that constituted some of the causal pie. This explains why we did not get any positive correlation of depression with any of the factors that we have studied.

There have been quite a few initiatives taken by Government of India for the health of the elderly population. Notable among them are the National Policy on Older Persons[21] and

### Table 2: Association of socio demographic characteristics and depression (n=290)

| Characteristics | Depression present (%) | Depression absent (%) | OR (95% CI) | Adjusted OR (95% CI) |
|-----------------|------------------------|-----------------------|-------------|----------------------|
| Age group in years (n) | | | | |
| 60-69 (151) | 56 (37.1) | 95 (62.9) | Reference | Reference |
| 70-79 (116) | 51 (43.9) | 65 (56.1) | 1.3 (0.8-2.1) | 0.9 (0.5-1.9) |
| ≥80 (23) | 14 (60.8) | 9 (39.2) | 0.5 (0.2-1.2) | 1.6 (0.5-5.1) |
| Sex (n) | | | | |
| Male (129) | 43 (33.3) | 86 (66.7) | Reference | |
| Female (161) | 78 (60.9) | 83 (39.1) | 1.9 (1.2-3.0) | 1.5 (0.8-2.7) |
| Marital status (n) | | | | |
| Married (206) | 73 (35.4) | 133 (64.6) | Reference | Reference |
| Widowed/separated/divorced (81) | 47 (58.0) | 34 (42.0) | 2.5 (1.5-4.2) | 1.4 (0.6-2.7) |
| Never married (3) | 1 (33.3) | 2 (66.7) | 0.9 (0.0-12.4) | 2.5 (0.2-31.9) |
| Schooling (n) | | | | |
| Attended school (157) | 62 (39.5) | 95 (60.5) | Reference | Reference |
| Not attended school (133) | 59 (44.4) | 74 (55.6) | 1.2 (0.7-1.9) | 0.6 (0.3-1.2) |
| Working status (n) | | | | |
| Not working (136) | 62 (45.6) | 74 (54.4) | 1.34 (0.8-2.1) | 0.6 (0.3-1.3) |
| Working (154) | 59 (38.3) | 95 (61.7) | Reference | Reference |
| Annual income of individual study participant in INR (n) | | | | |
| <50,000 (135) | 73 (54.0) | 62 (46.0) | 2.7 (0.6-13.4) | 1.7 (0.1-30.3) |
| 50,000-1 lac (58) | 16 (27.6) | 42 (72.4) | 0.8 (0.2-4.6) | 1.2 (0.06-21.4) |
| 1-2 lac (59) | 24 (40.7) | 35 (59.3) | 1.59 (0.3-8.2) | 1.06 (0.0-27.8) |
| ≥2 lac (10) | 3 (30.0) | 7 (70.0) | Reference | Reference |
| Don’t know (28) | 7 (25.0) | 21 (75.0) | 0.7 (0.5-4.6) | 0.4 (0.0-8.2) |
| Dependency (n) | | | | |
| Dependent (200) | 87 (43.5) | 113 (56.5) | Reference | Reference |
| Not depend (90) | 34 (37.6) | 56 (62.2) | 0.78 (0.7-1.3) | 1.2 (0.0-2.3) |
| Disease status (n) | | | | |
| Disease present (219) | 109 (49.7) | 110 (50.3) | 4.8 (2.5-9.8) | 1.9 (0.5-2.5) |
| Disease absent (71) | 12 (16.9) | 59 (83.1) | Reference | Reference |
| Role as a decision maker in the family (n) | | | | |
| Improved (15) | 3 (20.0) | 12 (80.0) | Reference | Reference |
| Remained same (116) | 34 (29.3) | 82 (70.7) | 1.6 (0.4-7.7) | 0.9 (0.2-4.0) |
| Declined (159) | 84 (52.8) | 75 (47.2) | 4.4 (1.3-20.3) | 2.3 (0.5-10.9) |
| Any abuse/violence/neglect by any person since 60 years of age (n) | | | | |
| Yes (62) | 38 (61.3) | 24 (38.7) | 2.7 (1.5-4.9) | 0.5 (0.3-1.1) |
| No (228) | 83 (36.4) | 145 (63.6) | Reference | Reference |

OR: Odds ratio; CI: Confidence interval; INR: Indian rupee
The higher prevalence of depression observed among the elderly population is a matter to think about. No clear guidelines are available regarding the routine screening of depression for the geriatric population and their counseling. It has been also found that the elderly people seldom visit a doctor or a psychiatrist or a counselor. One reason for this may be the social taboo, apart from lack of availability of counselor or psychiatrist in the villages. Another reason could be the lack of community and social support of the elderly people. In spite of its flaws, old age home for those who were staying alone could be an important measure for supporting the elders and helping them fight depression.

Although a number of schemes are available for strengthening the elderly population with financial support, as the guidelines for getting the economic benefits from government are very strict, it is not being utilized, in the way it should have been. This study may work as an eye opener for measuring the burden of depression among the elderly and to find out its causes. While treating the elderly patients, the health personnel should be aware enough to rule out depression among the elderly, as many of them come with somatic symptoms such as headache, myalgia, and tension for which patients visit the general outdoor services, instead of visiting the psychiatrists.

Findings of our study must be looked through two limitations. First, our convenience sampling technique and secondly the cross-sectional nature of study design, as in these cases, the causal relationships could not be inferred, and results could not be generalized. As a result of this, a bigger mixed method study might be required to know the actual picture of depression among the geriatric population.

To deal with this huge social problem of depression among the elderly population, provision of screening programs and timely counseling facilities should be available in the community itself. Social security policies have to be revised, and initiatives have to be taken for community participation in dealing with this problem, so that, the younger members of the family, in spite of moving out of the family, leaving the old parents alone, may be involved in increasing the family support for them. The existing mental health program should give more stress on the problems of geriatric depression. Further, there is a great scope for the NGOs and other voluntary workers to participate in this process with a more active and enthusiastic approach.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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Questionnaire for short project

(Title: Quality of life and depression among geriatric population of rural Maharashtra)

Questionnaire Number .................... Unique ID..............................

State ........................................ District........................................

Tehsil/Taluk ....................

Locality: Rural.................... 1 Urban ....................2

City/Town/Village ..........................................................

Name of participant ..........................................................

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## Section 1: Sociodemographic profile

| Q101 | Unique ID of the respondent | Remarks |
|------|-----------------------------|---------|
|      |                             |         |

| Q102 | Sex of respondent          | Male .............. 1 |
|------|-----------------------------|---------------------|
|      |                             | Female ............ 2 |

| Q103 | Date of Birth (DD/MM/YY)   |
|------|-----------------------------|
|      | ……./……./……. |
|      | Don’t know ........ 98     |

| Q104 | Age in years                |
|------|-----------------------------|
|      |                             |

| Q105 | Current Marital Status      |
|------|-----------------------------|
|      | Never Married ....1          |
|      | Currently married ....2     |
|      | Living together........3    |
|      | Separated/left...4          |
|      | Divorced ........5          |
|      | Widowed ........6           |

| Q106 | For how many years are you married/living together? Number of years .... yr |
|------|-------------------------------------------------------------------------|
|      | Don’t know ........98                                                   |
|      | <1 year ................ 00                                             |

| Q107 | For how many years are you separated/divorced/widowed? Number of years .... yr |
|------|-------------------------------------------------------------------------|
|      | Don’t know ........98                                                   |
|      | <1 year ................ 00                                             |

| Q108 | Have you been married once or more ? Number of times .......... |
|------|----------------------------------------------------------------|
|      | Current married ....2                                               |
|      | Living together........3                                            |
|      | Separated/left...4                                                 |
|      | Divorced ........5                                                  |
|      | Widowed ........6                                                  |

| Q109 | If Q108 is >= 2, how did the 1st marriage end? Number of times .......... |
|------|----------------------------------------------------------------|
|      | Currently married ....2                                             |
|      | Living together........3                                            |
|      | Separated/left...4                                                 |
|      | Divorced ........5                                                  |
|      | Widowed ........6                                                  |

| Q110 | Years of schooling Number of years ... yrs |
|------|-------------------------------------------|
|      | No of years ........yrs                   |
|      | Not attended ........ 00                 |
|      | Don’t know ........98                   |

| Q111 | If Q110 is 00 or < 6 years, |
|------|-----------------------------|
| Now I would like you to read this sentence to me. |
| Show a sentence from the newspaper to the respondent |
| If the respondent cannot read the whole sentence, Probe : Can you read any part of the sentence to me ? |
|      | Current married ....2                                               |
|      | Living together........3                                            |
|      | Separated/left...4                                                 |
|      | Divorced ........5                                                  |
|      | Widowed ........6                                                  |

| Q112 | Religion                  |
|------|---------------------------|
|      | Hindu ..............1      |
|      | Muslim ............2       |
|      | Christian ...........3    |
|      | Jainism .........4        |
|      | Buddhism ...........5     |
|      | Others ............6      |

| Q113 | Caste                     |
|------|---------------------------|
|      | Scheduled tribe ........1  |
|      | Scheduled Caste ........2  |
|      | OBC ............3          |
|      | None of them ........4    |

| Q114 | How long you are living in this locality? Number of years ....... |
|------|----------------------------------------------------------------|
|      | Since birth ........88                                           |
|      | Since marriage ....89                                            |
|      | Don’t know ........98                                           |
Section 2: Work history and benefits

| Question | Answer |
|----------|--------|
| Q201 What is/was your occupation? | Yes ……………….1 |
| Q202 At what age do you start working? | No. 2 |
| Q203 Have you worked in last 1 year? | By choice. 1 |
| Q204 Did you work by choice or by compulsion? | Economic need ….2 |
| | Other compulsion |
| | ……..3 |
| Q205 Do you feel any physical/mental strain due to this work? | Yes ……………….1 |
| Q206 How many years before did you stop working? | No………………….2 |
| | Years. |
| | Don’t know |
| | ……..98 |
| Q207 Are you paid in cash/kind for the job you are doing now? | Cash only ………….1 |
| | Kind only. 2 |
| | Cash + kind |
| | ……..3 |
| | None. 4 |

Section 3: Income and assets

| Question | Answer |
|----------|--------|
| Q301 What are your sources of income? | Salary/wages ………….1 |
| | Employer's pension ……2 |
| | Social pension |
| | (old age/widow ).……3 |
| | Rental income……….4 |
| | Business income ……….5 |
| | Agriculture/farm |
| | Income………………….6 |
| | Returns from share/dividends/bonds …….7 |
| | Interest on savings and fixed deposits ………….8 |
| | No income ……….0 |
| | Others ………….9 |
| Q302 How much is your annual income from all the sources mentioned above? | Rs |
| | Cannot say ………….88 |
| | Don’t know ………….98 |
| Q303 Do you contribute any money to household expenses? | Yes ……………….1 |
| | No …………………….2 |
| Q304 Is your income sufficient to fulfill your basic needs? | If yes, how much do you contribute annually? |
| | (food, shelter, clothings, medicine) | Rs |
| | Yes ……………….1 |
| | No …………………….2 |
| Q305 On whom do you mostly depend for financial support to meet your basic needs? | Spouse ………….1 |
| | Son ………….2 |
| | Daughter ………….3 |
| | Son/daughter-in-law ………….4 |
| | Grandson/daughter…5 |
| | Other relatives ………….6 |
| | NGO …………………….7 |
| | Community ………….8 |
| | Others ………….9 |
### Section 4: Living arrangements

| Question | Boys | Girls | Remarks |
|----------|------|-------|---------|
| Q401     | How many children do you have? | | |
| Q402     | How many children do you have now? | | |
| Q403     | Details of the boys | Married | Unmarried | |
|          | | Staying with you | Not staying with you | Staying with you | Not staying with you |
| Q404     | Details of girls | Taking care | Not taking care | Taking care | Not taking care |
| Q405     | Has your role as a decision maker changed after you grew older? | | |
| Q406     | To what extent do you think you are important to your family? | | |
| Q407     | Ever since you are 60 years of age, have you ever faced any abuse or violence or neglect or disrespect by any person? | | |
| Q408     | From whom did you face the abuse during the last one month? (circle all relevant responses) | | |
| Q409     | Did you suffer from any health problems as a result of the abuse? | | |

### Section 5: Health status:

| Question | Excellent | Very good | Good | Fair | Poor | Better | Same | Worse | Don't know | No response |
|----------|-----------|-----------|------|------|------|--------|------|-------|-------------|-------------|
| Q501     | How do you rate your health? | | | | | | | | | |
| Q502     | Compared to the people of your age in your locality, how do you think your health is? | | | | | | | | | |
| Q503     | Is there any medications that you are taking regularly? | | | | | | | | | |
| Q504     | Are you suffering from one of the following disease? | | | | | | | | | |

|          | HTN | DM2 | Respiratory problems | Joint pains | Body aches | Others |
|----------|-----|-----|----------------------|-------------|-------------|--------|
| Yes      |     |     |                      |             |             |        |
| No       |     |     |                      |             |             |        |
From where you get the money for purchasing medicine?

- Given free from hosp …1
- Son ..........................2
- Daughter ...............3
- Spouse ....................4
- Relatives ..................5
- Neighbor .................6
- Son/daughter-in-law ....7
- Others .....................8