Background: Mental disorders have got high prevalence and low priority among the elderly in most of the countries worldwide, of which depression being the most common treatable condition. The causes for elderly depression are multifactorial and preventable. Objective: The aim of this study is to estimate the prevalence of depression and to assess the factors associated with depression among the elderly age. Materials and Methods: A cross-sectional study was conducted among participants more than 60 years of age residing in tenements under resettlement scheme in Semmenchery, Kancheepuram district, Tamil Nadu with a sample size of 184. Systematic sampling method was adopted to collect data at participants door step. A predesigned, pretested questionnaire was used to assess the factors associated with depression, and the Geriatric depression scale-30 was used to assess depression. The data were analyzed using SPSS and Chi-square <0.05 was considered significant. Results: The overall prevalence of depression was 35.3%. The factors such as female gender, educational status, occupation, type of family, financial dependency, history of depression, smoking and medical factors such as hypertension, cardiac disease, and chronic kidney disease and life events like conflict in family, unemployment, and financial problem were statistically significant (P < 0.05). Conclusion: Loss of spouse, financial dependency, neglected care, lack of awareness about the disease were found to be barriers in reaching basic mental health care for the elderly. Depression remains one of the main causes of DALY, especially among elders. National Program for Health care of elderly provides doorstep services, so incorporation of depression screening into that can impart the effects of depression on quality of life and DALY.

Keywords: DALY, depression, doorstep health services, elderly, mental health disorders

INTRODUCTION

Government of India adopted “National Policy on Older Persons” in January 1999 which defines “senior citizen” or “elderly” as a person who is of age 60 years or above.[1] There is steady increase in the elderly population from 5.3% in 1951 to 8% in 2011[2] due to epidemiologic transition and it is expected to increase by 12.17% in 2026.[3] With increase in the proportion of elders, they are more vulnerable for dual burden of disease–communicable and noncommunicable diseases.[4] The elderly who are in the unproductive age group are being neglected.[5] As a result, they are more prone for mental disorders, especially depression. Mental disorders have got high prevalence and low priority among the elderly in most of the countries worldwide, of which depression being the most common treatable...
condition. The median prevalence of depression among the elderly in India is 21.9%. The cause for depression among the elderly is multifactorial and preventable by addressing the risk factors such as living alone, stressful life events, lack of social support, loss of partner, lower socioeconomic status, and the presence of comorbid medical illness like diabetes, hypertension, cardiac disease, arthritis.

Depression mostly manifests itself as somatic symptoms such as headache, hypertension, gastritis, heaviness among the elderly, most of them approach nonpsychiatric clinics seeking relief for their symptoms. Hence its is equally important to create awareness among the health care workers along with family and community members to prevent the misdiagnosis of depression.

This study aims to explore the prevalence the depression and factors associated with depression among the elderly population.

**Materials and Methods**

**Study setting**

The study was a cross-sectional study which was conducted among participants >60 years of age residing in tenements under resettlement scheme in Semmenchery, Kancheepuram district, Tamil Nadu.

**Study duration**

The study was conducted from June 2018 to November 2018.

**Sample size**

The sample size was estimated using the formula n = 4pq/L^2. The prevalence of depression, “p” among elderly persons was taken as 12% where “L” was permissible error with 95% confidence limits and accounting 10% for nonresponse rate, the sample size was estimated to be 184.

**Sampling method**

The total population of the study area was obtained from the household register maintained in Urban Health and Training center, Karapakkam. A total of 392 participants above 60 years of age were enumerated. Systematic random sampling was adopted to select every 3rd participant until the required sample size was achieved.

**Inclusion criteria**

(i) Residents of age ≥60 years of age. (ii) Residents of the tenements who were staying more than 1 year in the study area were included.

**Exclusion criteria**

(i) The study participants with cognitive and hearing impairment. (ii) The participants who were not present in the house at the time survey even after 3 visits were excluded.

**Study tool**

The study tool consists of three sections.

- **Section I:** A predesigned, pretested questionnaire was used to assess sociodemographic profiles such as age, gender, educational and occupational status, financial dependency socioeconomic classification (Modified BG Prasad classification 2018).

- **Section II:** The depression was assessed using Geriatric Depression Scale-30 (GDS-30). A score of one or zero was given for each question depending upon the answer for 30 questions and the cut-off for normal was score of 0–9; for mild depression-10–19; and for severe depression-20–30.

- **Section III:** The factors associated with depression was assessed using questionnaire which comprises of the past history of depression, behavioral factors, medical risk factors, life events (past one 1).

**Ethical consideration**

The study was initiated after obtaining the Institutional Human Ethical committee (IHEC 126-06/18), Chettinad Hospital and Research Institute. The confidentiality of the collected data was maintained throughout the study.

**Data collection procedure**

The purpose and procedure of the study were explained to the participants in the local language. The data were collected at their doorsteps after obtaining the informed written consent from the participants.

**Statistical analysis**

The data were analyzed using the Statistical Package for the Social Sciences (SPSS IBM) 21 acquired by IBM corp., Armonk, United States of America. The data were expressed in mean and proportions and Chi-square test was applied (P < 0.05).

**Results**

**Distribution of depression among the study participants**

The prevalence of depression was found to be 35.3% out of which 60 (32.6%) were mildly and 5 (2.7%) were severely depressed among the study participants. 35 (19%) had the previous history of depression and 12 (34.2%) had undergone treatment for depression. 3 (1.6%) study participants have family history of depression. 12 (6.5%) had a history of other psychiatric diseases.

Table 1 shows the association between sociodemographic profile and depression among the study participants.
Among the study participants, female sex, low educational status, unemployment, nuclear family, and financial dependency were statistically associated with depression.

Table 2 shows the association between behavioral factors and depression among the study participants. Depression was significantly associated with the participants who sleeps <6 h in a night. Alcohol consumption, smoking, tobacco usage, and low or sedentary activity were statistically associated with depression among the study participants.

Table 3 shows the association between medical risk factors and depression among the study participants.

### Table 1: Association between sociodemographic profile and depression among the study participants

| Variables                      | Depression present | Depression absent | \( P \)  |
|--------------------------------|--------------------|-------------------|---------|
| **Sex**                        |                    |                   |         |
| Male                           | 34                 | 55                | 0.000*  |
| Female                         | 88                 | 7                 |         |
| **Religion**                   |                    |                   |         |
| Hindu                          | 97                 | 28                | 0.000*  |
| Muslim                         | 24                 | 25                |         |
| Christian                      | 1                  | 9                 |         |
| Others                         | 0                  | 0                 |         |
| **Educational status**         |                    |                   |         |
| Postgraduate                   | 1                  | 3                 | 0.000*  |
| Graduate                       | 2                  | 6                 |         |
| Intermediate/high school diploma | 5               | 10                |         |
| High school                    | 32                 | 8                 |         |
| Middle school                  | 21                 | 31                |         |
| Primary school                 | 59                 | 4                 |         |
| Illiterate                     | 2                  | 0                 |         |
| **Occupation**                 |                    |                   |         |
| Professional                   | 5                  | 3                 | 0.000*  |
| Semi professional              | 6                  | 17                |         |
| Clerical/shop owner            | 3                  | 5                 |         |
| Skilled worker                 | 10                 | 0                 |         |
| Semi-skilled worker            | 17                 | 9                 |         |
| Unskilled                      | 34                 | 13                |         |
| Unemployed                     | 47                 | 15                |         |
| **Socioeconomic classification** |                |                   |         |
| Upper class                    | 14                 | 5                 | 0.148   |
| Upper middle class             | 49                 | 22                |         |
| Middle class                   | 48                 | 21                |         |
| Lower middle class             | 7                  | 10                |         |
| Lower class                    | 4                  | 4                 |         |
| **Family type**                |                    |                   |         |
| Nuclear family                 | 54                 | 27                | 0.000*  |
| Joint family                   | 38                 | 35                |         |
| Three generation family        | 30                 | 0                 |         |
| **Marital status**             |                    |                   |         |
| Currently married              | 80                 | 30                | 0.031*  |
| Formerly married               | 41                 | 29                |         |
| Single                         | 1                  | 3                 |         |
| **Type of housing**            |                    |                   |         |
| Kutchha                        | 10                 | 17                | 0.001*  |
| Pucca                          | 111                | 43                |         |
| Semi-Pucca                     | 1                  | 2                 |         |
| **Financial dependency**       |                    |                   |         |
| Independent                    | 10                 | 23                | 0.000*  |
| Totally dependent              | 37                 | 20                |         |
| Partially dependent            | 75                 | 19                |         |

Chi square was applied. \( P<0.05 \) is considered as significant.
There was a statistical association between hypertension and arthritis with depression among the participants. History of diabetes, chronic kidney disease, cardiac disease, visual and hearing impairment, constipation was not statistically associated with the depression.

In Table 4, conflicts in the family and unemployment of self or children, financial problem or loss, accidental fall in the past 1 year were statistically associated with the depression among the study participants.

**DISCUSSION**

The median age of the study participants in the present study was 65 ± 3.9 years which was similar to the study conducted by Pracheth *et al.*[12] 51.6% of participants were female and 48.4% were males which was almost similar to Goyal and Kajal.[13] Majority of the participants belong to the lower and middle class which was concurrent with the reports of Manjubhashini *et al.*[14] In this study, majority of participants were partially or totally financially dependent which corresponds with the reports of Sanjay *et al.*[15] The prevalence of depression among the study participants residing in tenements was 35.3% which was almost similar to the results of Thirthahalli *et al.* and Buvneshkumar *et al.*[16,17] and its less when compared with the prevalence of Arumugam *et al.*[18] A study conducted by Mohan *et al.* showed the prevalence of elderly depression 76% which was higher than the present study.[19]

The prevalence of depression was more among females which was found significant in the present study. Similar results were reported by Thirthahalli *et al.* and Arumugam *et al.* in their studies.[16,18] This could be explained because women are the victims of more psychosocial stress compared to males, loss of support and increased life expectancy, and social isolation.[20] There is no significant association with socioeconomic class and depression which was similar to the study of Arumugam *et al.*[18]

The participants with lower education had a higher prevalence of depression which was significant in the present study, similar result was reported in Manjubhashini *et al.*[14] The depression was highly associated with the participants who are unemployed and unskilled work, Thirthahalli *et al.* exposed similar results. Financial dependency and low income to meet

| Table 2: Association between behavioral risk factors and depression among study participants |
|-----------------------------------------------|-------------------------------------------------|----------|
| Behavioral factors                           | Depression present | Depression absent | *P*     |
| Duration of sleep in a day (h)               |                    |                    |         |
| <1                                            | 78                 | 34                 | 0.088   |
| 1-3                                           | 44                 | 26                 |         |
| >3                                            | 0                  | 2                  |         |
| Duration of sleep in a night (h)             |                    |                    |         |
| <6                                            | 40                 | 8                  | 0.000*  |
| 6-8                                           | 61                 | 52                 |         |
| >8                                            | 21                 | 2                  |         |
| Alcohol consumption                          |                    |                    |         |
| Yes                                           | 98                 | 59                 | 0.000*  |
| No                                            | 24                 | 3                  |         |
| Tobacco usage                                 |                    |                    |         |
| Yes                                           | 74                 | 54                 | 0.001*  |
| No                                            | 48                 | 8                  |         |
| Smoking                                       |                    |                    |         |
| Yes                                           | 74                 | 22                 | 0.000*  |
| No                                            | 48                 | 40                 |         |
| Type of physical activity                    |                    |                    |         |
| Vigorous intensity activity                   | 22                 | 30                 | 0.004*  |
| Moderate intensity activity                   | 100                | 41                 |         |
| Low/sedentary activity                        | 112                | 56                 |         |
| Frequency of exercises                        |                    |                    |         |
| No                                            | 132                | 36                 | 0.174   |
| Daily                                         | 3                  | 1                  |         |
| 3 times in a week                             | 0                  | 0                  |         |
| >3                                            | 6                  | 6                  |         |

*Chi square was applied. *P*<0.05 is considered as significant.
their daily needs and health care access could explain the above results.\textsuperscript{[16]}

Sengupta and Benjamin study showed higher prevalence was seen among the participants in the nuclear family when compared to the joint family which was found coherent with the current study. Social isolation, negligence of the children, separation from the family is the major cause of depression in the residents of the nuclear family.\textsuperscript{[21]}

The participants who sleep <6 h in a day were significantly associated with depression and similar results were reported in Sengupta and Benjamin study.\textsuperscript{[21]} The lack of sleep in the night may lead to apathy, irritability, mood volatility leading to depression. The participants who smoke and consume alcohol were significantly associated with depression in the current study, Manjubhashini \textit{et al.} reported similar results.\textsuperscript{[14]} This could be explained by the longer duration of consumption of alcohol and smoking can lead to inhibition of neuron excitation in the brain leading to low mood, agitations unconcern about life leading to further consumption of alcohol and smoking.\textsuperscript{[22]}

Pracheth \textit{et al.}, significant association with depression and low or sedentary activity which is coherent with the similar study.\textsuperscript{[12]} Evidence suggests low or sedentary behavior not only leads to NCD but also causes negative emotions like depression by inhibiting serotonin pathways.\textsuperscript{[23]}

Comorbidity like Hypertension has two times and chronic arthritis has four times higher risk of developing depression among the study participants which is almost similar to the results of Buvneshkumar \textit{et al.} and Manjubhashini \textit{et al.}\textsuperscript{[14,17]} Unemployment of self or children has three times higher risk of developing depression. This could be explained that considering themselves as financial burden to their families, anxiety of the future, financial and social neglect for basic health assess leading depression in the elderly.\textsuperscript{[17]}

The severe life events that were more common in depressed subjects were the death of a spouse or

| Medical risk factors | Depression present | Depression absent | $P$     | OR (95% CI)    |
|---------------------|--------------------|------------------|---------|----------------|
| Diabetes           |                    |                  |         |                |
| Yes                | 36                 | 72               | 0.341   | 1.2 (0.6-2.2)  |
| No                 | 29                 | 47               |         |                |
| Hypertension       |                    |                  |         |                |
| Yes                | 36                 | 87               | 0.028*  | 2.1 (1.1-4.1)  |
| No                 | 29                 | 32               |         |                |
| Cardiac disease    |                    |                  |         |                |
| Yes                | 57                 | 109              | 0.340   | 1.52 (0.21-4.8) |
| No                 | 8                  | 10               |         |                |
| Chronic kidney disease |              |                  |         |                |
| Yes                | 58                 | 112              | 0.232   | 1.91 (0.64-5.77) |
| No                 | 7                  | 7                |         |                |
| Visually impaired  |                    |                  |         |                |
| Yes                | 58                 | 110              | 0.316   | 1.47 (0.52-4.16) |
| No                 | 7                  | 9                |         |                |
| Hearing impairment |                    |                  |         |                |
| Yes                | 63                 | 111              | 0.218   | 2.53 (0.55-11.69) |
| No                 | 2                  | 6                |         |                |
| Asthma             |                    |                  |         |                |
| Yes                | 50                 | 111              | 0.518   | 0.587 (0.115-2.99) |
| No                 | 15                 | 8                |         |                |
| Arthritis          |                    |                  |         |                |
| Yes                | 60                 | 111              | 0.001*  | 4.163 (1.6-10.45) |
| No                 | 5                  | 8                |         |                |
| Tuberculosis       |                    |                  |         |                |
| Yes                | 54                 | 100              | 0.806   | 1.15 (0.363-3.69) |
| No                 | 11                 | 19               |         |                |
| Constipation       |                    |                  |         |                |
| Yes                | 11                 | 19               | 0.867   | 1.072 (0.476-2.417) |
| No                 | 24                 | 130              |         |                |

OR: Odds ratio, CI: Confidence interval, *Chi square was applied $P<0.05$ is considered as significant
child, serious physical illness, life-threatening illness to someone close, severe financial loss and enforced change of residence as a result of a demolition program. Major social difficulties lasting 2 or more years were also significantly associated with depression. One of the important factors associated with depression is “life-events” because the impact of life-events can be minimized by various methods including stress management techniques. Moreover, there is no such study from India, where the proportion and the number of elderly in the population are rising rapidly. Hence, it was decided to study the life events before the onset of depression in the elderly.[24]

### Conclusion

The overall prevalence of depression among the elderly in the study was 35.5% in which 32.6% had mild depression and 2.7% had severe depression. Female gender, low educational status, unemployment, nuclear family, tobacco and alcohol consumption, smoking, sedentary activity, conflicts in family, unemployment of self or children, comorbidities like hypertension and arthritis were significantly associated with the depression. Geriatric depression has emerged as public health problem due to epidemiological transition and trend leading toward urbanization and nucleation of families. Considering the high burden of the disease, more prioritization should be given for screening of depression at their doorsteps for early detection and treatment through the National program for health care of the elderly and creating awareness among their family members to help the needed senescence.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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### Table 4: Association between life events in the past 1 year and depression among the study participants

| Life events                   | Depression present | Depression absent | P      | OR (95% CI) |
|-------------------------------|--------------------|-------------------|--------|------------|
| Conflicts in family           |                    |                   |        |            |
| Yes                           | 17                 | 68                | 0.000* | 3.7 (1.94-7.26) |
| No                            | 48                 | 51                |        |            |
| Unemployment of self/children |                    |                   |        |            |
| Yes                           | 47                 | 106               | 0.004* | 3.1 (1.41-6.89) |
| No                            | 18                 | 13                |        |            |
| Illness of self               |                    |                   |        |            |
| Yes                           | 25                 | 47                | 0.891  | 1.0 (0.5-1.94) |
| No                            | 48                 | 51                |        |            |
| Illness of family members     |                    |                   |        |            |
| Yes                           | 39                 | 76                | 0.605  | 1.1 (0.63-2.19) |
| No                            | 31                 | 63                |        |            |
| Death of family members       |                    |                   |        |            |
| Yes                           | 34                 | 56                | 0.463  | 0.81 (0.44-1.48) |
| No                            | 31                 | 63                |        |            |
| Death of close relative       |                    |                   |        |            |
| Yes                           | 58                 | 101               | 0.410  | 0.67 (0.26-1.71) |
| No                            | 7                  | 18                |        |            |
| Financial problem or loss/DEBT|                    |                   |        |            |
| Yes                           | 56                 | 77                | 0.002* | 0.29 (0.13-0.65) |
| No                            | 9                  | 42                |        |            |
| Construction or purchase of home |                |                   |        |            |
| Yes                           | 65                 | 116               | 0.197  | 0.64 (0.57-0.7) |
| No                            | 0                  | 3                 |        |            |
| Accident/fall                 |                    |                   |        |            |
| Yes                           | 65                 | 114               | 0.054* | 0.6 (0.5-0.71) |
| No                            | 0                  | 5                 |        |            |

*Chi-square test applied (P < 0.05). OR: Odds ratio, CI: Confidence interval.
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