Original Article

Prevalence of Depression in an Urban Geriatric Population in Marathwada Region of Western India

Mamta S. Rathod, Jagannath V. Dixit[1], Akhil D. Goel[2], Vikas Yadav[3]

ABSTRACT

Background: Depression is a common problem in the elderly but is often undetected and ignored as a medical problem, leading to poor quality of life. This community-based study was conducted to know the burden and risk factors of depression among the elderly. **Subjects and Methods:** The survey was done in 2015 in Maharashtra, India as a part of an initiative addressing community mental health needs of the elderly. Total 400 elderly, aged 60 years and above, were selected through a house-to-house survey, using probability proportional to size method, and interviewed for depression using Major Depression Inventory Scale (MDI Scale), and other potential risk factors using a pretested questionnaire. **Results:** A total of 16.75% elderly had depression. Increasing age (Spearman's rho = 0.112, $P = 0.026$), illiteracy (OR = 2.23; 95% confidence interval, CI 1.22–4.07), lack of sleep (OR = 2.97; 95% CI 1.73–5.09), and leisure time spending alone (OR = 0.57, 95% CI 0.34–0.98) were found to be associated with depression. However, on multivariate analysis, only sleep duration <6 h was found to be associated [AOR = 2.6; 95% CI 1.4–4.6]. **Conclusions:** There is a considerable burden of depression in the elderly, reemphasizing the need for regular screening for this disorder and its risk factors.

Key words: *Depression, geriatric, prevalence*

INTRODUCTION

Ageing is a normal process which is associated with physical, social, and psychological changes.[1] As the age advances, there is increased morbidity and functional loss. Various life events experienced by the elderly population can greatly impact their psychological status, making them more prone to depression.[2] No wonder depression is the leading mental health problem among the elderly.[3] It refers to a range of mental problems characterized by loss of interest and enjoyment in ordinary experiences, low mood,

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Department of Community Medicine, Shree Bhausaheb Hire Government Medical College, Dhule, [1]Department of Community Medicine, Government Medical College, Latur, Maharashtra, [2]Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, [3]Department of Community Medicine, Government Medical College, Vidisha, Madhya Pradesh, India

Address for correspondence: Dr. Akhil D. Goel
Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Jodhpur, Rajasthan, India.
E-mail: doc.akhilgoel@gmail.com

and associated emotional, cognitive, physical, and behavioral symptoms.[4] Currently, depression is the third leading contributor to the global disease burden but will rise to the first place by 2030.[4] The Global Burden of Disease projections show that depression will be the single leading cause of Disability Adjusted Life Years by 2020 in the developing world.[5]

Depression in the elderly is yet to receive its due recognition in India. Few community-based studies have been conducted in India so far to address this issue.[5] Several studies in the elderly population have examined the prevalence of depression across India, with results ranging from 6% to 62%. Methodological differences may account for this variability.[6,7] Studies to assess the depression among the elderly population have not been done in the Marathwada region . Keeping in mind the different problems of the elderly, the need was strongly felt to assess the prevalence of depression and its determinants among the elderly, to plan regionally sensitive intervention strategies for engaging, and empowering the elderly against depression. The objective of this study was to assess the prevalence of depression in an elderly population of Aurangabad.

SUBJECTS AND METHODS

This cross-sectional survey was done from October 2014 to March 2015 as a part of an initiative of addressing community mental health needs of the elderly. The urban field practice area of Department of Community Medicine, Government Medical College and Hospital, Aurangabad, Maharashtra. Figure 1 includes seven administrative wards spanning a total population of 72,967 and a geriatric population of 6676.[8] For sample size calculation, we estimated a sample size of 409 subjects for an estimated prevalence of 41.1%, 5% precision, 95% confidence level, and 10%
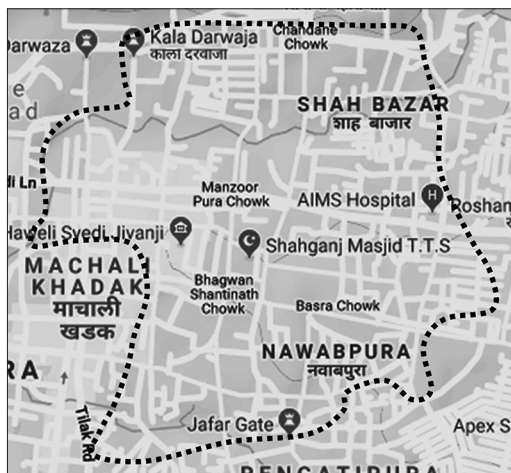

Figure 1: Map of urban field practice area of the medical college

contingency.[9] We thus planned to recruit 59 subjects from each ward by systematic random sampling. A landmark was identified in each ward where a bottle was rotated, and the house pointed by mouth-end of the bottle was selected as the first household. Thereafter, every 20th house was visited by left-hand rule, and all elderly in the household were recruited until the required sample size from that ward was obtained. Institutional Ethical Committee approval was obtained before the start of the study.

Inclusion criteria were age above 60 years and being resident of the area for more than 6 months.[10] Those who had an inability to answer the assessment questionnaire due to serious hearing problems or severe communication disorder, those who refused to participate in the study, and guests visiting the household were excluded.

After taking oral informed consent and explaining the nature of this study, each study subject was moved to a separate room in their home. They were interviewed with pretested and predesigned questionnaire, asking for the demographic profile, depression, and risk factors.[11,12] The potential risk factors were identified from various previous studies and reviews.[2,6,13-15]

Depression was assessed using Major Depression Inventory (MDI) Scale, which is a brief six-point rating scale with a score ranging from 0 to 50 and a score equal to or above the cut-off of 20 indicating depression.[16] This questionnaire was translated to Marathi and Hindi languages, and back translation was done to check the validity of the questionnaire.

When the elderly participant had difficulty in understanding the question, each question was repeated till he/she got the correct meaning of the question. Each interview was completed in approximately 30–40 min. Those reporting higher depression scores were advised to report to the hospital for complete psychiatric evaluation.

The data were collected, compiled, and analyzed using Statistical Package for Social Sciences version 20. Data were described using frequencies, percentages, means, and standard deviations to summarize characteristics of the study subjects. Association between two categorical variables was analyzed using Chi-square test, odds ratio along with 95% confidence interval (CI). Spearman rank correlation coefficient was used to determine the association of age with the level of depression. Binary logistic regression was performed to estimate unadjusted odds ratios of potential risk factors. Multivariate logistic regression was performed to control confounders. The level of significance was set at $P < 0.05$ for all analyses.

RESULTS

A total of 400 subjects were interviewed; rest nine either did not give consent or were not found at home after two more repeated visits, and the response rate is 97.8%. A total of 62% were females and 38% were males. Two-third of the participants was in the age range of 60–69 years. And 55% were Muslims and 45% were Hindus. While 35.8% were living in nuclear families and 97.75% were living with either spouse or children or other relatives. Majority of the elderly subjects were in socioeconomic class IV. And 61.75% were illiterate and 83.8% were unemployed [Table 1].

Their median depression score was 7.5 inter quartile range was 10 (IQR 10), ranging from a minimum of 2 to a maximum of 27. Of the 400 participants interviewed, 67 (16.75%) suffered from depression (MDI score ≥20). There was a positive correlation between depression scores and age (Spearman's rho = 0.112, *P* = 0.026), i.e., as age increased, the severity for depression also increased.

Geriatric depression had a significant association with illiteracy (OR = 2.2; 95%CI: 1.2–4.1), not doing any exercise (OR = 2.4; 95%CI: 1.03–5.3), sleeping less than 6 h (OR = 3.0; 95% CI: 1.7–5.1), and lesser leisure time spending with others (OR = 1.7, 95% CI: 1.02–2.9). On multivariate analysis, only the duration of sleep <6 h (AOR = 2.6; 95%CI: 1.4–4.6) was found significant which independently increased the risk of depression. Remaining all factors like sex, marital status, type of family, living condition, financial dependency, low socioeconomic status, illness in present and in past, habit of skipping meals, habit of taking breakfast, habit of smoking, alcohol consumption, or tobacco chewing were not found as significant risk factors for depression [Table 2].

DISCUSSION

There is a growing burden of mental morbidity in geriatric population worldwide.[17] In this study, we found the prevalence of depression as 16.75%. This is a little higher than the depression estimated by Sengupta and Benjamin in Ludhiana (8.9%)[5] and Chauhan *et al.* in Telangana (9.3%).[18] However, many researchers have also reported a higher prevalence of depression like 39.04% in Surat by Vishal *et al.*,[15] 41.7% in Maharashtra by Goswami *et al.*[19] and 42.7% in Tamil Nadu by Sinha *et al.*[14] Various Indian studies have reported depression prevalence ranging from 6% to 62.2%.[6,7] Barua *et al.*, in a meta-analysis, reported a median prevalence of 21.9% for depression in India.[13] The various reasons for the difference in estimates

Table 1: Sociodemographic profile of the study population (*n*=400)

	Frequency	Percentage
Age distribution (in years)		
60-69	275	68.8
70-79	98	24.5
>80	27	6.8
Sex		
Male	152	38.0
Female	248	62.0
Religion		
Muslim	220	55
Hindu	180	45
Marital status		
Married	263	65.8
Widow/widower	137	34.3
Type of family		
Nuclear family	143	35.8
Joint family	34	8.5
Three generation family	216	54.0
Extended family	7	1.8
Coliving with ….		
Living alone	9	2.3
Living with spouse, relatives, children, etc	391	97.75
Socioeconomic status (Modified Kuppuswamy Scale)		
II – Upper middle	8	2
III – Lower middle	79	19.75
IV – Upper lower	259	64.75
V - Lower	54	13.5
Education		
Illiterate	247	61.75
Literate	153	38.25
Occupation		
Unemployed	335	83.8
Working/employed	65	16.2
Comorbid condition		
Illness in past	44	11
No illness in past	356	89
Dietary habit		
Vegetarian	44	11
Mixed	356	89
The habit of taking breakfast		
Not having the habit of taking breakfast	256	64
Having the habit of taking breakfast	144	36
The habit of skipping a meal		
Skip meal	84	21
Do not skip a meal	316	79
Do exercise		
Yes	79	19.8
No	321	80.3
Duration of sleep		
Sleep ≥6 hours	285	71.25
Sleep <6 hours	115	28.75
Leisure time spending with…		
Spending alone	219	54.8
Spending with others	181	45.3

could be the use of different scales and sampling methods.

Table 2: Association of depression with various risk factors

Variables	Depression absent (N=333)*	Depression present (N=67)*	Unadjusted odds ratio (95%CI)**	P value	Adjusted odds ratio (95% CI)†	P value
Female gender	206 (61.9)	42 (62.7)	1.036 (0.60-1.78)	0.89	0.967 (0.47-1.97)	0.93
Widow/widower	116 (34.8)	21 (31.3)	0.854 (0.49-1.50)	0.58	3.461 (0.55-21.66)	0.19
Nuclear family	115 (34.5)	28 (41.8)	1.361 (0.79-2.33)	0.26	1.219 (0.67-2.22)	0.52
Living with spouse	201 (60.4)	46 (68.7)	1.439 (0.82-2.52)	0.20	5.295 (0.88-32.05)	0.07
Illiterate	196 (58.9)	51 (76.1)	2.228 (1.22-4.07)	**0.008**	1.835 (0.91-3.68)	0.88
Financially dependent	276 (82.9)	59 (88.1)	1.523 (0.69-3.36)	0.29	1.301 (0.55-3.06)	0.55
Low SES	78 (23.4)	9 (13.4)	0.507 (0.24-1.07)	0.07	0.683 (0.29-1.57)	0.37
Presence of current illness	166 (49.8)	31 (46.3)	0.866 (0.51-1.47)	0.59	0.955 (0.53-1.71)	0.88
Presence of past illness	35 (10.5)	9 (13.4)	1.321 (0.60-2.89)	0.49	1.358 (0.56-3.27)	0.49
Skip meals	75 (22.5)	11 (16.4)	0.676 (0.34-1.35)	0.27	0.828 (0.37-1.87)	0.65
Do breakfast	124 (37.2)	20 (29.9)	0.717 (0.41-1.27)	0.25	0.983 (0.51-1.89)	0.96
Don't do any exercise	261 (78.4)	60 (89.6)	2.364 (1.03-5.26)	**0.04**	1.953 (0.80-4.76)	0.14
Habit of smoking	17 (5.1)	6 (9.0)	1.828 (0.69-4.82)	0.25	1.688 (0.49-5.71)	0.39
Habit of alcohol consumption	5 (1.5)	1 (1.5)	0.994 (0.11-8.65)	1	0.424 (0.03-5.82)	0.52
Habit of tobacco chewing	40 (12.0)	9 (13.4)	1.137 (0.52-2.47)	0.75	1.130 (0.47-2.71)	0.78
Duration of sleep <6 hours	82 (24.6)	33 (49.3)	2.971 (1.73-5.09)	**0.00004**	2.587 (1.44-4.64)	**0.001**
Leisure time spending with others	143 (42.94)	38 (56.71)	1.742 (1.02-2.94)	**0.04**	1.594 (0.88-2.85)	0.12
Time spent for leisure Activity <2 hours	182 (54.7)	45 (67.2)	1.697 (0.98-2.95)	0.059	1.789 (0.98-3.27)	0.058
Skip meals	75 (22.5)	11 (16.4)	0.676 (0.34-1.35)	0.27	0.828 (0.37-1.87)	0.65

*Figures in parentheses represent column-wise percentages. †Figures in parentheses represent 95% CI. CI: Confidence Intervals; SES: Socioeconomic status

There was a significant association of depression with increasing age (Spearman's correlation coefficient = 0.112, $P = 0.026$) and illiteracy [OR = 2.23, 95%CI (1.22-4.07)]. While many researchers like Sengupta and Benjamin[5] Swarnalatha[20] Barua *et al.*,[21] Rajkumar *et al.*,[22] and Jain *et al.*[23] have reported similar risk of depression with increasing age, Papadopoulos *et al.*[24] showed no significant relationship between age and prevalence of depression. The association of depression with age can be due to organic diseases but can also be due to exogenous factors as advancing age is often accompanied by loss of social support systems due to the death of the spouse or siblings, retirement, or relocation of residence.[25]

Illiteracy was found to be an independent risk factor for depression on bivariate analysis [OR = 2.228,95% CI (1.22-4.07)] but not on multivariate analysis [AOR = 1.835,95% CI (0.91-3.68)]. Others like Goyal *et al.*[26] and Jain and Aras[23] found that prevalence of depression was higher in illiterates ($P < 0.05$). A greater protective effect against mental disorders may be linked to higher education. Those from educated backgrounds are more likely to have healthy lifestyles and the resources to intellectually support them that promote mental health. Higher education can also be considered helpful in attaining more fulfilling careers and higher wages, thus leading to lower risk of depression. Education can be linked to better economic resources and a work environment that can mitigate financial stress, support healthy lifestyles, and hence promote mental health.[27]

Although lesser physical exercise showed significantly higher depression on bivariate analysis (OR = 2.364;

95% CI 1.03–5.26), on multivariate analysis no significant association was found [AOR = 1.953 (95% CI 0.80–4.76)]. Hua *et al.*,[28] Barcelos-Ferreira *et al.*,[29] Michalsen *et al.*,[30] and Strawbridge *et al.*[31] supported the protective effects of physical activity on depression for older adults. However, the mechanisms underlying the antidepressant effects of exercise remain unclear. Several credible physiologic and psychological mechanisms have been described, such as the thermogenic hypothesis, the endorphin hypothesis, the monoamine hypothesis, the distraction hypothesis, and the enhancement of self-efficacy. However, there is little research evidence to either support or refute most of these theories.[32-34]

Another important aspect would be the dose of exercise (duration) which may be the reason why the subjects in our study who reported doing exercise did not have a significantly lower depression.

Another important risk factor was a lack of adequate sleep. We found that depression was more among those who were having <6 h sleep at night (AOR = 2.587, 95% CI = 1.44–4.64). These results are supported by Dasgupta *et al.*[35] Paudel ML *et al.*[36] demonstrated that in community-dwelling older men, level of depressive symptoms had a strong, graded association with sleep disturbances. Livingston *et al.*[37] have also revealed that sleep disturbance was associated with current and future depression. Some researchers have also suggested that a diagnosis of depression in the absence of sleep complaints should be made with caution. Sleep disturbance is one of the key and often presenting symptom of depression.[38]

We did not find any significant association of depression with female gender, marital status, nuclear family, coliving, financial dependency, socioeconomic status, leisure time spending with others, current illness, eating habits, smoking, alcohol, or tobacco chewing.

A strength of the current study is the use of MDI tool for assessing depression, which covers the domains of Diagnostic and Statistical Manual of Mental Disorders (DSM IVth edition)[39] as well as International Classification of Diseases (ICD-10th revision)[40] for depression diagnosis and severity. It has a satisfactory Chronbach's alpha of 0.89[41] and has been shown to fulfill Mokken's nonparametric item response theory and Rasch's one parametric model, thus making it useful for unidimensional depression severity assessment[16] with good external and clinical validity.[42] However, MDI scale has been thought of as a relatively difficult questionnaire to understand, as it has a six point Likert scale. A simpler yes/no type of Geriatric Depression Scale (GDS) has been recommended for the elderly population, but it has more number of questions than the MDI. Moreover, the GDS is considered inaccurate in the presence of cognitive decline and for extreme age groups.[43]

Although we tried to ensure the privacy of the interviewees, this was difficult in the small houses with joint families due to which the elderly participants might have guarded their opinions. Also, social desirability bias could have resulted in an underestimation of depression prevalence.

CONCLUSIONS

The prevalence of depression was high in the urban elderly population of Northern India. Depression increased with increasing age and reducing sleep time. Identification of risk factors for depression among elderly population and using those factors to identify the individuals at higher risk for depression can help the health care providers to plan for the better care of the elderly and reduce the frequency and severity of the occurrence of depression among them.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Ranjan S, Bhattarai A, Dutta M. Prevalence of depression among elderly people living in old age home in the capital city Kathmandu. Health Renaissance 2013;11:213-8. Doi: http://dx.doi.org/10.3126/hren.v11i3.9634
2. Jariwala V, Bansal RK, Patel S, Tamakuwala B. A study of depression among aged in Surat city. Natl J Commun Med 2010;1:47-9.
3. Aiken LR. Aging: An Introduction to Gerontology. 1st ed. California, USA: SAGE Publications, Inc; 1995.
4. Penninx BW, Milaneschi Y, Lamers F, Vogelzangs N. Understanding the somatic consequences of depression: Biological mechanisms and the role of depression symptom profile. BMC Med 2013;11:129.
5. Sengupta P, Benjamin AI. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. Indian J Public Health 2015;59:3-8.
6. Rao AV. Psychiatry of old age in India. Int Rev Psychiatry 1993;5:165-70.
7. Harinder S, Minhas S, Ahmed S, Garg R. A study of depression in geriatric population in a rural area of north India. Scholars Acad J Biosci 2015;5:26-9.
8. Directorate of Census Operations-Maharastra. District Census Handbook-Aurangabad. Village and Town-wise Primary Census Abstract (PCA). In: Directorate of Census Operations-Maharashtra, editor. 2011.
9. Deshpande SS, Gadkari M, Raje SS. Screening for depression and its risk factors in geriatric population: A rural community

based study. Asian J Psychiatr 2011;4:284-7.

10. Ministry of Home Affairs, Government of India. National population register (NPR) manual. National manual of instructions for filling up of the national population register (NPR) household schedule. New Delhi: Office of Registrar General and Census Commissioner of India; 2011. Available from: http://censusindia.gov.in/2011-Common/NprManuals.html. [Last accessed on 2016 Feb 12].

11. Sozeri-Varma G. Depression in the elderly: Clinical features and risk factors. Aging Dis 2012;3:465-71.

12. Al-Shammari SA, Al-Subaie A. Prevalence and correlates of depression among Saudi elderly. Int J Geriatr Psychiatry 1999;14:739-47.

13. Barua A, Ghosh MK, Kar N, Basilio MA. Depressive disorders in elderly: An estimation of this public health problem. J Int Med Sci Acad 2011;24:193-4.

14. Sinha SP, Shrivastava SR, Ramasamy J. Depression in an older adult rural population in India. MEDICC Rev 2013;15:41-4.

15. Vishal J, Bansal RK, Patel S, Bimal T. A study of depression among aged in surat city. Natl J Commun Med 2010;1:47-9.

16. Olsen LR, Jensen DV, Noerholm V, Martiny K, Bech P. The internal and external validity of the Major Depression Inventory in measuring severity of depressive states. Psychol Med 2003;33:351-6.

17. WHO. Depression: Key Facts: WHO; 2018. Available from: http://www.who.int/news-room/fact-sheets/detail/depression. [Last cited on 2018 Apr 01].

18. Chauhan P, Kokiwar PR, Shridevi K, Katkuri S. A study on prevalence and correlates of depression among elderly population of rural South India. Int J Commun Med Public Health 2016;3:236-9.

19. Goswami S, Deshmukh P, Pawar R, Raut A, Bhagat M, Mehendale A. Magnitude of depression and its correlates among elderly population in a rural area of Maharashtra: A cross-sectional study. J Family Med Prim Care 2017;6:803-12.

20. Swarnalatha N. The prevalence of depression among the rural elderly in Chittoor District, Andhra Pradesh. J Clin Diagn Res 2013;7:1356-60.

21. Barua A, Ghosh MK, Kar N, Basilio MA. Socio-demographic Factors of Geriatric Depression. Indian J Psychol Med 2010;32:87-92.

22. Rajkumar AP, Thangadurai P, Senthilkumar P, Gayathri K, Prince M, Jacob KS. Nature, prevalence and factors associated with depression among the elderly in a rural south Indian community. Int Psychogeriatr 2009;21:372-8.

23. Jain RK, Aras RY. Depression in geriatric population in urban slums of Mumbai. Indian J Public Health 2007;51:112-3.

24. Papadopoulos FC, Petridou E, Argyropoulou S, Kontaxakis V, Dessypris N, Anastasiou A, *et al.* Prevalence and correlates of depression in late life: A population based study from a rural Greek town. Int J geriatr Psychiatry. 2005;20:350-7.

25. Charles ST, Carstensen LL. Social and emotional aging. Annu Rev Psychol 2010;61:383-409.

26. Goyal A, Kajal KS. Prevalence of depression in elderly population in the southern part of punjab. J Family Med Prim Care 2014;3:359-61.

27. Bauldry S. Variation in the protective effect of higher education against depression. Soc Ment Health 2015;5:145-61.

28. Hua Y, Wang B, Wallen GR, Shao P, Ni C, Hua Q. Health-promoting lifestyles and depression in urban elderly Chinese. PloS One 2015;10:e0117998.

29. Barcelos-Ferreira R, Nakano EY, Steffens DC, Bottino CM. Quality of life and physical activity associated to lower prevalence of depression in community-dwelling elderly subjects from Sao Paulo. J Affect Disord 2013;150:616-22.

30. Michalsen A, Grossman P, Acil A, Langhorst J, Ludtke R, Esch T, *et al.* Rapid stress reduction and anxiolysis among distressed women as a consequence of a three-month intensive yoga program. Med Sci Monit 2005;11:CR555-61.

31. Strawbridge WJ, Deleger S, Roberts RE, Kaplan GA. Physical activity reduces the risk of subsequent depression for older adults. Am J Epidemiol 2002;156:328-34.

32. Craft LL, Perna FM. The benefits of exercise for the clinically depressed. Prim Care Companion J Clin Psychiatry 2004;6:104-11.

33. Schuch FB, Morres ID, Ekkekakis P, Rosenbaum S, Stubbs B. A critical review of exercise as a treatment for clinically depressed adults: Time to get pragmatic. Acta Neuropsychiatr 2017;29:65-71.

34. Blake H, Mo P, Malik S, Thomas S. How effective are physical activity interventions for alleviating depressive symptoms in older people? A systematic review. Clin Rehabil 2009;23:873-87.

35. Dasgupta A, Mukhopadhyay M, Das S, Majumdar S, Das A. Are our elderly really depressed?: A cross sectional study on depression among geriatric population in a slum of Kolkata. Int J Health Sci Res 2014;4:25-30.

36. Paudel ML, Taylor BC, Diem SJ, Stone KL, Ancoli-Israel S, Redline S, *et al.* Association between depressive symptoms and sleep disturbances in community-dwelling older men. J Am Geriatr Soc 2008;56:1228-35.

37. Livingston G, Blizard B, Mann A. Does sleep disturbance predict depression in elderly people? A study in inner London. Br J Gen Pract 1993;43:445-8.

38. Nutt D, Wilson S, Paterson L. Sleep disorders as core symptoms of depression. Dialogues Clin Neurosci 2008;10:329-36.

39. American Psychiatric Association. The Diagnostic and Statistical Manual of Mental Disorders. Washington D.C.: American Psychiatric Association; 1994.

40. World Health Organization. International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). Diagnostic Criteria for Research. Geneva: World Health Organization; 1993.

41. Cuijpers P, Dekker J, Noteboom A, Smits N, Peen J. Sensitivity and specificity of the Major Depression Inventory in outpatients. BMC Psychiatry 2007;7:39.

42. Bech P, Timmerby N, Martiny K, Lunde M, Soendergaard S. Psychometric evaluation of the Major Depression Inventory (MDI) as depression severity scale using the LEAD (Longitudinal Expert Assessment of All Data) as index of validity. BMC Psychiatry 2015;15:190.

43. Beer C, Flicker L, Horner B, Bretland N, Scherer S, Lautenschlager NT, *et al.* Factors associated with self and informant ratings of the quality of life of people with dementia living in care facilities: A cross sectional study. PloS One 2010;5:e15621.