Psychometric properties of the Geriatric Depression Scale (Kannada version): A community-based study

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ABSTRACT

Background: Mental disorders have got high prevalence and low priority in most of the countries worldwide, of which depression among elderly population being the most common treatable medical condition. In developing countries such as India, there is a scarcity of adequately trained mental health professionals. In this context, validated Kannada version of the geriatric depression scale (KGDS)-15 is considered an alternative to screen the depression among the elderly.

Objectives: The objectives of this study are to assess the psychometric properties of KGDS-15 in an urban community.

Materials and Methods: A cross-sectional study was conducted in the urban field practice area of medical college, Bengaluru for a period of 6 months after the Institutional Ethics Committee clearance. House-to-house survey was done to enumerate the total number of the elderly; of 347 elderly, 100 elderly were selected by probability proportion to population size technique and linguistically validated KGDS-15 was applied to screen for depression, and psychiatrist assessed the depression status by clinical evaluation using the structure clinical interview for DSM-IV and dementia status using the Mini-Mental Status Examination.

Results: The KGDS-15 had 100% sensitivity and 88.8% specificity. The area under curve values for KGDS-15 was 0.98 (P < 0.0001), and the optimum cutoff score was >7, with a sensitivity of 1.0 and specificity of 0.95. The Cronbach’s alpha is 0.92 and test-retest reliability is 0.99. Conclusions: The KGDS-15 had good psychometric properties and a valid instrument for screening depression among the elderly in the urban community.

Key words: Community-based study, depression, elderly, Geriatric Depression Scale-15, psychometric properties

INTRODUCTION

Depression is a major mental health concern among the elderly population and projected to become the second leading cause of disability by the year 2020 globally.¹ Depression is the most commonly seen condition in primary care setting, associated with higher risk of morbidity, increased healthcare utilization, self-care neglect, reduced compliance to treatment plans, and higher risk of suicide and premature mortality.² In this context, a valid and reliable screening instrument can fill this gap. Among several screening tools on depression, the Geriatric Depression Scale (GDS) is one of the most commonly used instruments to screen depression worldwide designed for the elderly.³ Many studies have shown that GDS has provided valid and reliable results, and 15-item GDS is a short version of the original GDS developed by Sheikh and Yesavage and an attractive instrument for screening depression in specialized and nonspecialized settings. It has several advantages such as application is shorter and easily understandable questions with little room for different answers.⁴ All over the world, the GDS-15 has been translated in more than 12 languages, and in India, GDS-15 was translated and validated in Gujarati and Tamil languages. The GDS 15 in Gujarati has a sensitivity of 86.6% and specificity of 73.7%, and the GDS 15 in Tamil has a sensitivity of 80% and specificity of 47.6%.⁵⁻⁷

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How to cite this article: Rajgopal J, Sanjay TV, Mahajan M. Psychometric properties of the Geriatric Depression Scale (Kannada version): A community-based study. J Geriatr Ment Health 2019;6:84-7.
According to the census 2011, the proportion of elderly population in Karnataka was 7.7% and expected to increase rapidly in future.\textsuperscript{10} In the present scenario, it is difficult for the elderly to have psychiatric evaluation for depression due to the fact that there is a 62.4% deficit of adequately trained mental health professionals in Karnataka, whereas in Kerala, deficit is only 25%.\textsuperscript{9} Several studies from Karnataka in the recent past have found that the prevalence of depression among elderly population based on GDS-15 scale ranges from 34% to 44.8%.\textsuperscript{10-12} All these evidence suggest that the situation of depression and its consequences in elderly population is likely to get worse in the near future.

Kannada is an Indian classical language spoken in the state of Karnataka and linguistic minorities in the state of Maharashtra, Telangana, Andhra Pradesh, Tamil Nadu, and Kerala, and 2011 census data shown that 37.9 million Kannada speakers in India and considered the 8\textsuperscript{th} most often spoken language.\textsuperscript{13}

In this regards, there was a need to assess the psychometric properties of GDS-15 in Kannada language. Kannada version of GDS 15 will be suitable screening tool to identify depression among elderly. Hence, the present research was conducted.

MATERIALS AND METHODS

This community-based study was conducted in a locality, which comes under urban field practice area of Community Medicine, Bengaluru, for a period of 6 months after the approval from the Institutional Ethics Committee.

A total of 347 elderly (>60 years) (151 males and 196 females) living in the locality were identified based on the inclusion and exclusion criteria by conducting the household survey and line listed in the alphabetical order.

The prevalence of depression, “p” among the elderly was taken as 46%,\textsuperscript{14} with a relative precision of 10%. The sample size was estimated to be 99 and rounded of to 100. From the total, 100 elderly participants (44 males and 56 females) were selected by probability proportion to population size technique.

The original GDS-15 in English version was translated into Kannada language using the translation and back-translation method by independent bilingual experts, and both the original and the back-translated English version were compared. Finally, with the help of third reviewer in the reconciliation meeting, consensus version was developed.

The households of the elderly were visited by trained investigator, after explaining the purpose of the research and getting informed consent, the elderly were interviewed separately in their residence. The data were collected regarding sociopersonal profile, and KGDS-15 was applied, which consist of 15 “yes” and “no” items. Each question attracts a score of either 0 or 1 according to the scoring system. The score between 0 and 4 was considered as no depression, 5 to 10 as mild depression, and ≥11 as severe depression. After the interview, the elderly were brought to psychiatrist at the urban health training center in the same locality for the assessment of depression by psychiatrist using clinical evaluation based on Structured Clinical Interview for DSM-IV (SCID), after evaluating for cognitive impairment using the Mini-Mental Status Examination. The psychiatrist and the elderly were blinded to the outcome of the KGDS-15 scale results, and all the study participants underwent both steps sequentially on the same day.

In the current study, validity was assessed by sensitivity, specificity, accuracy, predictive value of positive and negative test, positive and negative likelihood ratio, the receiver operating characteristic (ROC) curve for diagnostic performance, Cronbach’s alpha, and test-retest reliability.

The data were analyzed using Open Epi version 2.3.1, Sullivan, Atlanta, GA, USA.

RESULTS

In the present study, of 100 elderly participants, 56% were female, 44% were male, and 70% of the participants were in the age group of 60–69 years. The mean age was 67.6 years with standard deviation of 6.6 years, and age ranges from 60 to 88 years. Most of the elderly participants, 76% were literates, 77% not working, 83% belong to high standard of living index, 52% married, 70% lived in joint and three-generation family, and 64% of participants were suffering from comorbidity [Table 1].

The magnitude of depression according to KGDS-15 and DSM-IV criteria was 36% and 28%, respectively. The KGDS-15 had shown 100% sensitivity and 88.8% specificity. Predictive value of positive test and negative test was 77.7% and 100%, respectively. The accuracy of the scale was found to be 92%. The percentage of false positives was 11.1%, and positive likelihood ratio is found to be 9 [Table 2].

The results of the ROC analysis shown that area under curve (AUC) values for KGDS-15 were 0.98 (\textit{P} < 0.0001). The optimum cutoff score was >7 in differentiating
nondepressed from depressed with a sensitivity of 100%, specificity of 95.8%, and positive predictive value of 0.95 [Graph 1 and Table 3]. Both the >7 and >8 cutoff scores gave a good balance between sensitivity (100% and 95.8%, respectively) and specificity (89.3% and 97.2%, respectively) [Table 4]. The Cronbach’s alpha measured for internal consistency observed the value of 0.92 and test-retest reliability of 0.99.

**DISCUSSION**

The evaluation of psychometric properties of KGDS-15 and its comparison with the gold standard assessment by clinical evaluation using SCID has shown perfect sensitivity of 100% and specificity of 88.8%. Similarly, previous study has found that the sensitivity and specificity were 97% and 95%, respectively.[16] Contrary to these findings, another study found a sensitivity of 71.8% and specificity of 78.2%.[16] These differences in sensitivity and specificity between the studies could be due to the differences in settings in which study being conducted and sociocultural background. The high sensitivity and moderate degree specificity of KGDS-15 in the present study could be due to a high number of female participants and high proportion of literacy (76%), not working (77%), and comorbidity (64%).

The AUC was 0.98 according to ROC curve of KGDS-15 against DSM-IV which was found to be statistically significant ($P < 0.0001$). This result is supported by the finding of AUC of 0.87 and 0.98 in a studies conducted elsewhere.[6,15] For good discrimination, AUC of the screening tool should be >0.5. These findings strengthen the fact that KGDS-15 is as good as DSM-IV, and ROC curve in this study indicates that KGDS has good property in discriminating between cases and noncases.

The optimum cutoff score using ROC was >7 with sensitivity of 100% and specificity of 95%. In a study conducted on Gujarathi version of GDS observed cutoff of 7.5 with sensitivity of 86.6% and specificity of 73.7%,[6] and Tamil version of GDS also found similar cutoff with sensitivity of 80% and specificity of 47.6%.[7] Even though GDS score of ≥5 is considered as depression, the higher cutoff scores in the present study could be due to severe depressive symptoms among elderly participants. In such cases, use of higher cutoff score may be more accurate for screening depression.

The present study revealed that the internal consistency measured by Cronbach’s alpha was 0.92. Similarly, previous studies also found the Cronbach’s alpha of 0.86 and 0.83.[17,18] These results indicate that the questions included in the KGDS-15 assess the depression in a coherent and useful way.

The current study had shown test-retest reliability of 0.99, and a study on Hindi Version of GDS found reliability of 0.87.[6] These findings indicate that KGDS-15 is reliable, and there is a positive association between the scores.

Regarding the strength of this study, it was the first translated and validated version in Kannada language conducted in elderly population living in the community and limited by its small sample size.

In the light of high burden of depression, with a low detection rate and poor referral due to lack of awareness coupled with a scarcity of trained mental health professional, KGDS-15 can become a valid public health instrument because of its good psychometric properties. The study calls for regular use of KGDS-15 in community settings to screen for depression to create the awareness and its consequences to reduce the risk of morbidity, suicides, premature mortality, thereby minimizing healthcare cost and also recommends for wide usage in other settings.

**CONCLUSIONS**

The present study found that KGDS-15 has good psychometric properties and is a valid tool for screening depression among Kannada speaking elderly in the community.

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**Table 2: Validity of Kannada version of the Geriatric Depression Scale-15 scale**

| Screening test (KGDS-15) | Gold standard (SCID) | Total |
|-------------------------|----------------------|-------|
| Depression              | 28 (100)             | 36    |
| 8 (11.1)                |                      |       |
| No depression           | -                    | 64    |
| 64 (88.9)               |                      |       |
| Total                   | 28                   | 100   |

| SCID: Structure Clinical Interview for DSM-IV, KGDS-15: Kannada version of the Geriatric Depression Scale |

**Table 3: Area under the receiver operating characteristic curve (area under curve)**

| Characteristics | Values          |
|-----------------|-----------------|
| Area under the ROC curve (AUC) | 0.984 |
| SE              | 0.010           |
| 95% CI          | 0.936-0.999     |
| Z statistic     | 44.901          |
| Significance level $P (area = 0.5)$ | <0.0001 |

CI: Confidence interval, ROC: Receiver operating characteristic, AUC: Area under curve, SE: Standard error

**Graph 1: Receiver operating characteristic curve**
Acknowledgment
We would like to acknowledge the staff of UHTC, KIMS, Bengaluru, India, for their support and co-operation during the study.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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