Original Article

Factors Associated with Geriatric Depression in Rural Nepal: A Cross-Sectional Community Survey

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Objective: To estimate the prevalence and factors associated with depression among the geriatric population in rural Nepal.

Materials and Methods: A community-based cross-sectional study design was conducted in Thabang Rural Municipality of Rolpa District. A total of 405 elderly persons above the age of 60 years were interviewed. The respondents were administered through the Geriatric Depression Scale (GDS-15) and sociodemographic questionnaire. Logistic regression analysis was used to determine the factors associated with geriatric depression.

Results: The prevalence of depression was found to be 68.04%. Sociodemographic characteristics such as age (OR 2.25; 95% CI 1.27 to 3.98, p<0.005), gender (OR 2.60; 95% CI 1.27 to 3.98, p<0.005), presence of chronic disease (OR 2.79; 95% CI 1.64 to 4.76, p<0.001), income sufficiency (OR 2.81; 95% CI 1.69 to 4.68, p<0.001), and health service access (OR 4.72; 95% CI 2.75 to 8.11, p<0.001) were significantly associated with geriatric depression.

Conclusion: The present study suggests that as depression is a significant issue amongst the elderly, standard routine health screening activities should be conducted. The study suggests stakeholders to design strategies that encourage healthy aging in Nepal.

Keywords: Depression; Elderly; Rural Nepal; GDS-15

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Globally, the population of the elderly is increasing. The number of old-aged people aged 60 and over is expected to double by 2050, with the highest rise seen in lower-middle-income countries (LMICs)[1]. A recent United Nations report denoted that the current population above 65 years is 9% in 2019. The elderly population is estimated to reach 12% by 2030, 16% by 2050, and 23% by 2100[2]. These changes in the population trend can present serious obstacles for healthcare systems, as chronic illnesses, physical disorders, and psychosocial issues like depression escalate[1,3,4].

Nepal is one of the poorest nations in the South Asian region. Approximately a quarter of its population lives below the internationalized standard poverty line. According to the population census of 2011, Nepal is estimated to have around 30 million inhabitants, with 8% of its population over 60 years[5]. Although the proportion of elderly in Nepal is less than the high-income countries, the elderly population is rising steadily, partially due to decreased child and crude births[6-8].

The surge in the aging population has increased the risk of mental health problems among the elderly. Geriatric depression is considered a significant public health issue. Geriatric depression tends to impact the quality of life in families and communities. In 2017, depression was the third most prominent source of years of life lost to disability (YLD)[9]. Geriatric depression is one of the major contributing factors to high mortality rates, increased suicidal

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rates, and negatively impacts the well-being and quality of life[10]. Depression and other disorders related to mental health might also increase the use of health care services, which might be challenging to manage in low-resource countries[11]. Some recent studies conducted in Nepal suggest the prevalence of depression among the elderly in Nepal ranges from 49.2% to 65.2%[6,12] based on the GDS-15 scale for the analysis.

Most studies related to depression among the elderly have been carried out in developed countries. However, few have been conducted in LMICs[13,14]. Moreover, most studies conducted in Nepal have either been conducted in urban or semi-urban settings[15,16] or hospital-based locations[17,18], or aged-care facilities[8,19]. Limited studies regarding geriatric depression have been conducted in the community setting. Thus, previous findings would not represent a broad socio-cultural and ethnic diversity of the entire aging community of Nepal. Hence this community-based study was conducted to estimate the prevalence and correlates of depression among the geriatric population in rural Nepal.

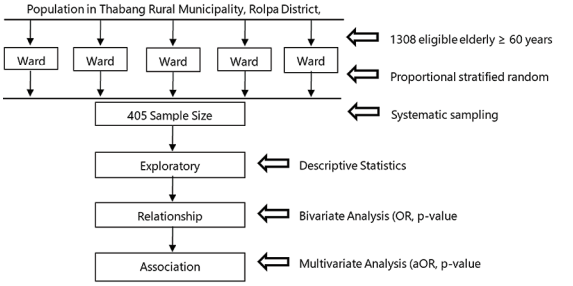

Figure 1. Study workflow.

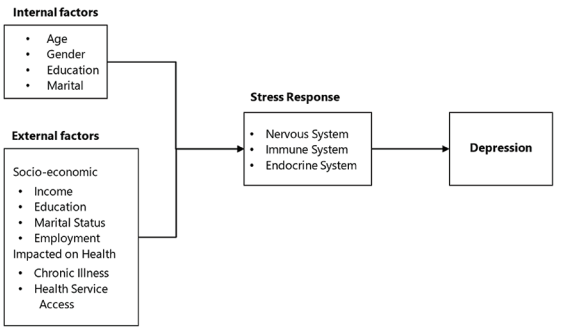

Figure 2. Stress response theory on depression.

Materials and Methods

Study area

A community-based household survey was conducted in Thabang Rural Municipality (RM) of Rolpa District. Rolpa District is one of the remotest areas of Nepal. It ranks lowest in the human development index (HDI) categories in the country (<0.40). The Thabang area of Rolpa District was the epicenter of the Maoist insurgency from 1996 to 2005. insurgency. The total population of elderly in Thabang was 1,308[20,21].

Sample size and sampling procedure

The sample was taken from all five wards of Thabang RM. Ward is the smallest administrative division in Nepal. The sampling was done by the stratified random sampling method. First, all five wards were selected to represent all areas of Thabang, with 1,308 eligible respondents. Secondly, samples were calculated proportionally based on eligible respondents in each ward. Finally, the first elderly were selected randomly at the ward level based on information obtained from the RM. Then, the remaining respondents were selected by systematic sampling. The sample size was calculated with the formula; $n = Z^2pq/d^2$ where n=sample size, p=60.0% or 0.6, assumption precision (d)=5.0% or 0.05 of p at 95% confidence interval (CI) and a non-response rate of 10.0%. Therefore, a sample size of 405 was used in the study, see Figure 1 for study workflow.

Measurements

The questionnaire was developed by researchers based on literature review and stress response theory, see Figure 2. The English version of the questionnaire was translated from English to Nepali and converted back to English for validation. The developed questionnaire was pre-tested among 30 participants in areas similar to the study area by a trained enumerator. The Cronbach alpha was found to be 0.91.

The final structured questionnaire is composed of 3 domains (i) socio-demographic characteristics (age, gender, marital status, education, income sufficiency, perceived chronic illness (hypertension, diabetic mellitus, asthma, arthritis), living arrangement, and currently working status; (ii) health service access related questions including (travel time, road or transport link to health facility and charges for health service, drugs, and supplies); and (iii) geriatric depression scale short form (GDS-15)[22].

The GDS-15 was used to measure the level of depression of the elderly[22,23]. GDS-15 has been used in various South Asian countries to measure depression, including Nepal[12,24-26]. The scale includes 15 items from which participants were asked to reply 'Yes' or No' in response to how they felt over the last

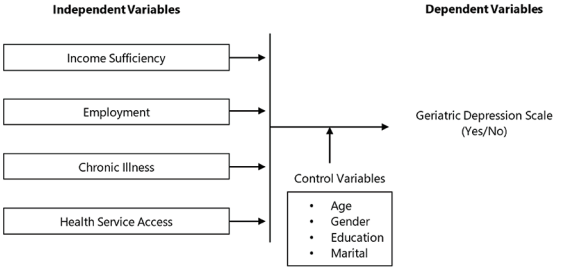

Figure 3. Conceptual framework.

week. Ten items demonstrate depression whenever the responses were positive, whereas the remainder indicates depression with a negative response.

Inclusion and exclusion criteria

The eligibility criteria for inclusion was 60 years and over. In addition, elderly people who had lost the ability to speak and had severe hearing loss were excluded from the study.

Ethical consideration

Ethical approval from the Nepal Health Research Council (NHRC) (approval number: 202/2019) was obtained before the commencement of the study. Furthermore, informed consent from individual participants by clarifying the research's concept, purpose, and procedures were taken. The privacy and confidentiality of the data and participants have been strictly maintained.

Statistical analysis

The collected data were analyzed with IBM SPSS Statistics, version 24 (IBM Corp., Armonk, NY, USA) to determine the prevalence and the socio-demographic characteristics associated with depression.

Descriptive statistics were used to analyze the socio-demographic characteristics. GDS-15 scale was used as a dependent variable in the study. Yes was considered a case of geriatric depression, whereas No was considered to have no geriatric depression. Bivariate and multivariate logistic regression analysis with odds ratio (OR) and adjusted OR (AOR) was used with 95% CIs to identify the factors associated with geriatric depression. Results were considered statistically significant if the p-value was less than 0.05 ($p<0.05$), see Figure 3.

Results

Socio-demographic characteristics

The socio-demographic characteristics of the study population, Among the 405 participants, 204 (50.4%) were female, and 201 (49.6%) were male. The study suggested that most of the study population (64.4%) were illiterate, and (61.5%) were married. In addition, among the study population (56.3%) of the respondents had insufficient income for one year, (57.6%) lived in an extended family, (75.6%) were employed, (69.6%) had a chronic disease, and (73.3%) had low access to health facility, see Table 1.

Table 1. Socio-demographic characteristics of the elderly (n=405)

Variable	Frequency; n (%)
Age group of the respondent	
<70 years	244 (60.2)
≥70 years	161 (39.8)
Sex	
Male	201 (49.6)
Female	204 (50.4)
Education	
Literate	144 (35.6)
Illiterate	261 (64.4)
Marital status	
Unmarried/widowed/divorced	156 (38.5)
Married	249 (61.5)
Income sufficiency	
Sufficient for 1 year	177 (43.7)
Insufficient for 1 year	228 (56.3)
Living arrangement	
Nuclear family	174 (43.0)
Extended family	231 (57.0)
Employment	
Employed	306 (75.6)
Unemployed	99 (24.4)
Chronic illness	
No	123 (30.4)
Yes	282 (69.6)
Health service access	
High access	108 (26.7)
Low access	297 (73.3)

Prevalence of depression

Figure 4 and Table 2 denote the prevalence of geriatric depression in the study area. The prevalence was found to be (68.04%). (31.1%) of the elderly were found to be normal, whereas (24.9%) had mild depression, (13.1%) moderate depression, and (30.9%) severe depression.

Furthermore, the prevalence of geriatric depression was higher in the group of elderly more than 70 years (78.9% versus 62.3%), more prevalent in

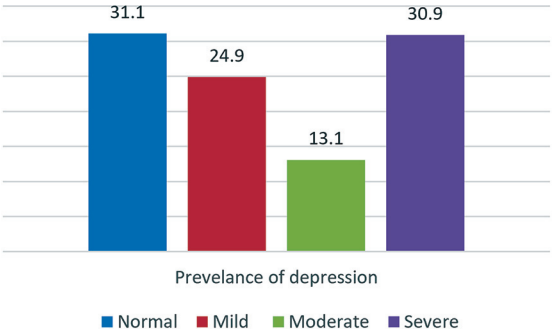

Figure 4. Prevalence of geriatric depression in percentage (n=405).

Table 2. Prevalence of geriatric depression by socio-demographic characteristics (n=405)

Variable	n	Prevalence; n (%)	95% CI
Age group of respondents			
<70 years	244	152 (62.3)	55.3 to 64.9
≥70 years	161	127 (78.9)	35.1 to 44.7
Sex			
Male	201	117 (58.2)	44.4 to 54.3
Female	204	162 (79.4)	45.7 to 55.6
Education			
Literate	144	89 (61.8)	30.6 to 40.0
Illiterate	261	190 (72.8)	60.0 to 69.4
Marital status			
Unmarried/widowed/divorced	156	114 (73.1)	33.8 to 43.2
Married	249	165 (66.3)	56.8 to 66.2
Income sufficiency			
Sufficient for 1 year	177	96 (54.2)	38.8 to 48.6
Insufficient for 1 year	228	183 (80.3)	51.4 to 61.2
Living arrangement			
Nuclear family	174	110 (63.3)	38.0 to 47.9
Extended family	231	169 (73.2)	52.1 to 62.0
Employment			
Employed	306	206 (67.3)	71.1 to 79.8
Unemployed	99	73 (73.7)	20.2 to 28.9

CI=confidence interval

females than males (79.4% versus 58.2%). Moreover, geriatric depression was higher among illiterate than literate (72.8% versus 61.8%), among unmarried, widowed, or divorced than married (73.1% versus 66.3%). Geriatric depression was more prevalent in the elderly having insufficient income for one year (80.3% versus 54.2%), living in the extended family (73.2% versus 63.2%), and elderly who were not working currently (73.7% versus 67.3%).

Correlates of geriatric depression

The correlates of geriatric depression have been presented in Table 3. In the bivariate analysis, geriatric depression was found to be associated with age (>70 years) (OR 2.26, 95% CI 1.42 to 3.57; p<0.001). It was found to be associated among female (OR 2.76, 95% CI 1.78 to 4.30; p<0.001), illiterate (OR 0.1.65, 95% CI 1.07 to 2.54; p=0.023), who had chronic illness (OR 3.65, 95% CI 2.32 to 5.73; p<0.001), who has insufficient income for a year (OR 3.43, 95% CI 2.20 to 5.32; p<0.001), those living in extended family (OR 1.58, 95% CI 1.03 to 2.42; p=0.033), who are not currently employed (OR 1.36, 95% CI 0.82 to 2.26; p=0.023), and those having low access to health service access (OR 4.90, 95% CI 3.06 to 7.86; p<0.001).

In the multivariate analysis, only five factors showed statistical significance. Geriatric depression was found significant among elderly having age more than 70 (AOR 2.25, 95% CI 1.27 to 3.98; p=0.005), those who were female (AOR 2.60, 95% CI 1.49 to 4.52; p<0.001), those who had chronic illness (AOR 2.79, 95% CI 1.64 to 4.76; p<0.001), those having insufficient income for a year (AOR 2.81, 95% CI 1.69 to 4.68; p<0.001), and having low access to health service (AOR 4.72, 95% CI 2.75 to 8.11; p<0.001).

Discussion

The study investigated the factors associated with depression among the elderly in the rural Nepalese community. The prevalence of geriatric depression among the study population was found to be 68.04%. In addition, the prevalence was 24.9%, 13.1%, and 30.9% for mild, moderate, and severe depression, respectively. The finding denotes the depression as relatively higher than suggested by a previous study conducted in Nepal[6,27-29]. These could be due to the variation in the geography as the other study's localities were predominantly urban areas. In contrast, the current research is a rural area. In addition, geriatric Depression found in the present study is higher compared to studies conducted in various countries of Asia; Thailand (27.5%), Vietnam (17.2%), and Myanmar (33.8%)[30,31].

Evidence from the present study suggests that age, gender, chronic disease, income sufficiency, and health service access are significant predictors of depression among the elderly. These findings are consistent with previous studies conducted in Pakistan, Nepal, and Sri Lanka, which showed that elderly above the age of 70 and female are at significant risk factors for depression among the elderly[6,12,24,26,32]. Moreover, these results reflect prior research conducted in Nepal and India, which have

Table 3. Bivariate and multivariate logistic regression analysis of the association of geriatric depression

Variable	Bivariate		Multivariate	
	p-value	OR (95% CI)	p-value	AOR (95% CI)
Age group of respondent				
<70 years		1		1
≥70 years	<0.001*	2.26 (1.42 to 3.57)	0.005*	2.25 (1.27 to 3.98)
Sex				
Male		1		1
Female	<0.001*	2.76 (1.78 to 4.30)	0.001*	2.60 (1.49 to 4.52)
Education				
Literate		1		1
Illiterate	0.023*	1.65 (1.07 to 2.54)	0.94	0.98 (0.55 to 1.73)
Marital status				
Unmarried/widowed/divorced		1		1
Married	0.150	0.72 (0.46 to 1.12)	0.65	(0.61 to 2.18)
Chronic disease				
No		1		1
Yes	<0.001*	3.65 (2.32 to 5.73)	<0.001*	2.79 (1.64 to 4.76)
Income sufficiency				
Sufficient for 1 year		1		1
Insufficient for 1 year	<0.001*	3.43 (2.20 to 5.32)	<0.001*	2.81 (1.69 to 4.68)
Living arrangement				
Nuclear family		1		1
Extended family	0.033*	1.58 (1.03 to 2.42)	0.27	1.37 (0.77 to 2.46)
Employment				
Employed		1		1
Unemployed	0.023*	1.36 (0.82 to 2.26)	0.17	0.64 (0.33 to 1.22)
Health service access				
High access		1		1
Low access	<0.001*	4.90 (3.06 to 7.86)	<0.001*	4.72 (2.75 to 8.11)

OR=odds ratio; AOR=adjusted odds ratio; CI=confidence interval

* Statistically significant, p<0.05

found that older people with chronic health illnesses are more likely to experience high levels of depression than those older adults without any chronic medical conditions[6,26,33,34]. In addition, the odds of having geriatric depression among the participants having insufficient income throughout the year were higher, which contrasts with results from previous studies[35].

Stress response theory on depression can also explain the effect of psychological stress and social isolation on neuroimmunoendocrine communication, leading to depression in aged people[36]. Internal factors (e.g., biological age) in addition to external influences (e.g., education, employment) can impair the function of these regulatory systems and impede their communication. Under such conditions, the loss of homeostasis leads to the eventual development of diseases that might exacerbate depression. Vink et al (2008)[37] also consider these variables in their systematic assessments of risk profiles for anxiety and depression in the elderly across studies.

Contrary to the findings from previous studies, marital status, living arrangement, and employment did not significantly influence depression levels[38-40]. Though the prevalence among illiterate was higher than the literates, the difference was not statistically significant. Furthermore, the higher prevalence among the illiterates seen in the bivariate analysis did not significantly maintain in the multivariate analysis. The overall significance of the results is that the socio-demographic aspects of the elderly play an essential part in the likelihood of depression in Nepal. These substantial aspects must be addressed to achieve successful strategies on mental health reduction to encourage healthy aging.

The present study has several limitations. First, as the study is a cross-sectional study, causal associations

cannot be created. Second, the prevalence of persistent physical health conditions was dependent on self-reporting, and over-reporting or underreporting may have existed. Finally, owing to budget constraints, the authors were unable to use standardized psychiatric assessments to assess the psychological condition of participants.

Conclusion

The present study indicates that depression is exceptionally high in elderly people with significant major risk factors such as age, sex, presence of chronic illness, inadequate income, and accessibility to healthcare services. These findings suggest the necessity to incorporate depression screening in a regular health service program, which can help identify and prevent such health issues and promote healthy aging. Furthermore, community-based interventional programs integrating elderly depression issues should be implemented, such as social support programs for the elderly and increasing the elderly's participation in community-based activities and decision-making. As this seems to be a substantial public health problem, there is a need to develop a strategy for proper health care management of the elderly.

What is already known on this topic?

Globally, the world population is aging and is increasingly viewed as a worldwide burden. In Nepal, around 7% of the overall population is elderly, and this figure is steadily increasing. Depression is a widespread and severe public health issue among the elderly. According to the World Health Organization, it is the largest cause of disability globally and a significant contributor to the global disease burden. The prevalence rate of geriatric depression in the general population fluctuates and ranges between 10% and 55%, but it ranges between 34.6 percent and 77.5 percent among institutionalized elders.

What this study adds?

Globally, the increase in the population of elderly people is likely to increase mental health issues, especially geriatric depression. Despite the shift in the population pyramid and the increase in the aging population with a rapid rise in mental health issues, there are little research on older people's mental health in developing countries. This paper adds to the literature on geriatric depression issues by describing the importance of psychological health among the elderly in rural Nepal.

Conflicts of interest

The authors declare that they have no conflicts of interest to report regarding the present study.

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