Original article

Prevalence and Associated Factors of Insomnia among Elderly People of Nepalgunj Sub-Metropolitan City, Nepal

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ARTICLE INFO

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ABSTRACT

Insomnia is a prevalent sleep-related complaint among older persons, regardless of whether it is reported as subjective symptoms or diagnosed as a sleep disorder by accepted diagnostic methods. The purpose of this study was to determine the prevalence of insomnia in the elderly, and the contributing factors to insomnia and their influence on the elderly people. A descriptive, cross-sectional research design was adopted, with a sample of 207 elderly people drawn from the Nepalgunj Sub-metropolitan City. Binary multiple logistic regression model was used to assess the factors contributing to insomnia in old aged people. The prevalence of insomnia found in the elderly was 52.3%. Among the different factors, females (OR: 3.21, 95% CI: 1.51 to 6.83), currently not working (OR: 4.25, 95% CI: 1.94 to 9.21), staying with spouse (OR: 3.26, 95% CI: 1.56 to 6.82), using sleeping pills (OR: 2.58, 95% CI:1.08 to 6.18), having chronic disease (OR: 2.67, 95% CI: 1.15 to 6.19), and physically inactive (OR: 7.93, 95% CI: 1.85 to 33.95) had significant association with insomnia. It can be inferred that more than half of the elderly people were suffering from insomnia. Females were 3.21 times more vulnerable to have insomnia as compared to males.

INTRODUCTION

Sleep is an essential daily function that allows for physical and mental wellbeing. Even though our sleep patterns change as we age, sleep is still essential. Nonetheless, it is common for older adults to grapple with sleeping 7-9 hours per night. As per academic research, 40–70% of elderly adults experience persistent chronic sleep problems, and over half of these cases go misdiagnosed [1]. Sleep deprivation or insufficient sleep can have a detrimental impact on how you perceive, respond to, and interact with others. Executive dysfunction, which impairs memory, planning, organization, emotional regulation, and impulse control, is also linked to poor sleep [2].

Regardless of whether it is described as subjective symptoms or is identified as a sleep disorder by established diagnostic criteria, insomnia is a prevalent sleep-related complaint among older adults. Depending on diagnostic criteria, it is estimated that 30 to 48% of elderly adults have insomnia symptoms, and that the prevalence of insomnia disorder is between 12 and 20% [3]. Insomnia is not only linked with negative health consequences, such as cardiovascular disease and mental disorders, but it also diminishes the overall quality of life and imposes a substantial socioeconomic encumbrance on society [4-6].

Numerous factors, including demographic, psychological, and social characteristics, have been linked to insomnia. Higher rates of insomnia in aged individuals are associated with female gender, divorce, separation, or widowhood, lower levels of education and income, smoking, alcohol use, and decreased physical activity [7]. Clinical conditions such as physical illness, depression, and some primary sleep disorders, such as obstructive sleep apnea and restless limb syndrome are also pertaining to insomnia or are comorbid [8]. However, the effects of insomnia on the lifestyle and sleep patterns of the elderly remain inadequately understood.

Amidst the senior citizens, the causes of various sleep problems are frequently multi-causal. It is plausible that alterations in senior adults' medical, social, physical, and psychological health have an effect on their sleep [9]. The sleep-wake cycle, or circadian rhythm, of adults fluctuates frequently [10]. Nearly half of patients over the age of 60 had insomnia, with poor perceived health status and the presence of depression being the strongest predictors [11].

As per the U. S. Department of Health and Human Services, insomnia is the most prevalent sleep disorder among persons over the age of 60 [12]. People with insomnia have difficulty falling sleeping and staying asleep. According to the National Institutes of Health (NIH), 20-30% of American adults suffer from insomnia symptoms, but only 6% have been diagnosed (NIH State-of-the-Science Conference Statement on manifestations and management of chronic insomnia in adults, 2005) [13]. Brief Behavioral Treatment for Insomnia (BBTI) is the most prevalent and widely accepted evidence-based therapy for insomnia. The BBTI comprises of four medical treatment sessions. The treatment for narcolepsy involves modifying awakening behaviors to facilitate sleep onset, promote restorative sleep, and enhance daytime alertness [14].

Several studies have discovered that sex and gender differences may also contribute to disparities in sleep quality [15,16]. As stated by Mong and Cusmano, women are twice as likely as men to experience sleep disorders and insomnia over the course of their lifetime [16]. Clinical research indicates that variations in poor sleep quality may be attributable to the use of libido steroids [16]. Significant associations exist between insomnia and a variety of factors, including unmarried status, depressive status, smoking, eating before bedtime, daytime lengthy naps, and irregular sleep hours. Asthma, nocturia, apnea, and the total number of daily medications were substantially linked to insomnia [17].

A number of studies conducted in Nepal indicate a high prevalence of insomnia among the elderly. A study conducted in the Lalitpur community revealed that 40.6% of the elderly had insomnia, whereas a study conducted in Palpa revealed a prevalence of 56.4% with medical ailment as a significant factor [18, 19]. Similarly, in Panchthar district, the prevalence of insomnia was greater than fifty percent, with associated factors including drinking tea and coffee before bed, using tobacco and alcohol, and eating too close to bedtime. A research conducted in Banepa found the prevalence of insomnia to be 71.1%, with significant factors including age, literacy, physical illness, and financial dependence. Similarly, a descriptive cross-sectional study conducted in an old age home in Pashupatinath reveals that 61.5% of the respondents suffered from insomnia due to factors such as age, an increased number of physical symptoms, and irregular sleep [20].

Drinking tea and coffee before bed, using tobacco and alcohol, as well as eating too close to bedtime, physical illness and financial dependence, and older adults who are divorced, separated, or bereaved are risk factors for insomnia. Thus, insomnia is a growing problem among the elderly not only in Nepal but worldwide. In spite of the rising prevalence of insomnia and its associated risk factors in Nepal, only a handful of studies on the subject have been published in various regions of Nepal. However, no published research has yet assessed the prevalence and associated risk factors of insomnia among senior citizens in the mid-western part of Nepal. That's why, this research piques the interest of a researcher to explore the contributing factors associated to insomnia among the elderly people. Thus, this study aimed to ascertain the prevalence and associated factors of insomnia among the elderly of Nepalgunj, Banke, Nepal.

METHODS

Study design, area and population

The elderly's insomnia was evaluated using a community-based, descriptive, cross-sectional research design. This research was conducted in ward 2 of Nepalgunj Sub-metropolitan City, and the study population consisted of senior citizens (60 years and older). There were a total of 23 wards, and the study was conducted in ward no. 2 from June 10 to July 3, 2023. Ward no. 2 is the inner-city ward within the Nepalgunj Sub-metropolitan city. Nepalgunj, a sub-metropolitan community in the Banke District, is located in Lumbini Province, in the mid-western part of Nepal.

Sample size calculation and sampling technique

According to the record of Nepalgunj Sub-metropolitan, there were total of 430 old aged people in selected ward. Using Slovin's formula [21] for finite population N, with margin of error (5%), the estimated sample size (n) was calculated as

$$n = \frac{N}{1+Ne^2} = \frac{430}{1+430*0.5^2} = 207.23 \approx 207$$

So, the sample of 207 participants were selected using simple random sampling method.

Research instruments and reliability

The eight-item Athens insomnia scale was used to diagnose insomnia. The first five items pertain to nighttime symptoms of insomnia, while the last three pertain to daytime effects of sleep disruption. A score of six or higher indicates the presence of insomnia. To assess the factors affecting insomnia for old aged people, self-developed questionnaire was used which was obtained from rigorous literature reviews [22].

In this research, Cronbach's alpha test was used to evaluate the internal consistency and reliability of each test item set. The reliability coefficients of this research were 0.728 for the scale. Thus, the scale of this research was reliable as alpha coefficients in the range of 0.70 and above [23].

Data analysis procedure

Using IBM-Statistical Package for the Social Sciences (SPSS version 26), the collected data were input and analysed. For continuous variables, descriptive statistical measures such as mean, standard deviation, minimum, and maximum values were calculated; for categorical variables, frequencies and percentages were determined. Additionally, frequency distribution and percentages were calculated with frequency tables. Initially, a bivariate analysis was conducted between the dependent variable and each of the explanatory variables in order to determine significant candidate variables for the binary multiple logistic regression model. The Chi-square test or Fisher's exact test, as applicable, was used to discover the association between two categorical variables. In the inferential part for identifying the factor associated with insomnia binary multiple logistic regression model was adopted. The association was presented as odds ratio and 95% confidence interval. Similarly, for the test of model adequacy, Log likelihood ratio test, Omnibus test, Hosmer and Lemeshow test, and the Nagelkerke R^2 test were applied [24, 25]. Finally, if variables with P-value < 0.05 as a level of significance were considered statistically significant for a two-tailed test otherwise insignificant.

Model specification

The categories of the outcome variable insomnia are dichotomous (Absence vs Presence), a binary multiple logistic regression model with candidate variables derived from a bivariate analysis was used to ascertain the most influential factors linked to each outcome variable.

The outcome variable y_i is defined as:

$$Y_i = \begin{cases} 0, \text{if the outcome is 'no'} \\ 1, \text{if outcome is 'yes'} \end{cases}$$

Let $x_1, x_2, \ldots \ldots, x_k$ be k explanatory variables, which may be discrete or continuous or combined of both. The mathematical model for binary multiple logistic regression is as follows:

$$g(x) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right] = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots \ldots + \beta_k x_k$$

Where,

$$\pi(x) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \ldots + \beta_k x_k)}{1+\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \ldots + \beta_k x_k)}, \qquad \text{notations has usual meaning.}$$

Using the iterative weighted least square procedure, the parameter values were estimated by solving maximum likelihood equations [26]. In the final binary multiple logistic regression model, the model produced the odds ratio (OR) and the same was reported for each independent variable.

Test of overall significance of the regression coefficients

Using the log-likelihood ratio test, the overall significance of independent variables in the final binary multiple logistic regression model was evaluated, which follows chi-square distribution with k degrees of freedom. It is calculated as follows:

$$-2\log\left[\frac{L0}{L1}\right] = -2[\log(L_0-L_1)]$$
$$= -2[L_0-L_1]$$

Where L_0 = likelihood function of the model without any covariates

L_1 = Likelihood function of the full model.

Goodness of fit and R² of the model

Hosmer and Lemeshow test have been employed to examine the goodness of fit of the fitted binary multiple logistic regression model [24]. A lesser difference between the observed and predicted values or a large p-value (greater than 0.05 for a 5% level of significance) indicates that the model fits the data. The Nagelkerke R^2 has been computed and reported for evaluating the variation of the dependent variable as a result of the variation in the independent variables.

RESULTS

Among the 207 respondents 58.5% were of age group (60-70) year, followed by 31.4% were of (70-80) years and 10.1% were of age group (80-90) years. Among the respondents more than half 53.1% were female and 46.9% were male. Result showed that 62.3 % respondents' current marital status was married, whereas 33.8 % were widow, 2.9% were separated and 1.0% was never married (Table 1).

Study suggested that 58.0% respondents were illiterate and 42.0% were literate. The study shows 81.6% of respondents were Hindu, 14.5% were Muslim and 3.9% were Christian.

Regarding past occupation of the respondents 16.9% were businessman, 10.1% were government employee, 21.7% worked in private sector, 23.3% were in agriculture and 28.0% were daily wage worker. Among the respondents 57.0% of respondents were currently not earning but 43.0% still earn. Study shows more than half 53.3% responds slept only up to 6 hours and 46.4% slept more than 6 hours.

The result of the study shows 58.5% respondent had poor appetite and 41.5% had fair appetite. Among the respondent majority 73.4% had no or irregular exercise habit, 72.0% had no afternoon nap and one fourth 25.1% used sleeping pills for sleeping. 29.5% had chronic disease and 14.0% of respondents had inactive physical conditions. Result shows just more than half 53.1 were currently non-smokers and 33.3% of respondents still drink alcohol before sleep and 44.9% respondents were regular tea or coffee drinkers.

Table 1. Frequency and percentage distribution of variables among elderly people

Variables	Category	Frequency	Percentage
Age	60-70	121	58.5
	70-80	65	31.4
	80-90	21	10.1
Gender	Female	110	53.1
	Male	97	46.9
Current Marital Status	Never Married	2	1.0
	Married	129	62.3
	Separated	6	2.9
	Widow	70	33.8
Educational Status	Illiterate	120	58.0
	Literate	87	42.0
Religion	Hindu	169	81.6
	Islam	30	14.5
	Christian	8	3.9
Past Occupation	Business	35	16.9
	Government Employee	21	10.1
	Private Job	45	21.7
	Agriculture	48	23.3
	Daily wage	58	28.0
Current Occupation	Not Working	118	57.0
	Working	89	43.0
Duration of Sleeping	Up to 6 hours	111	53.3
	More than 6 hours	96	46.4

Current Residential Status	Without Spouse	116	56.0
	With Spouse	91	44.0
Appetite	Poor	121	58.5
	Fair	86	41.5
Exercise Habit	No or irregular	152	73.4
	Regular	55	26.6
Afternoon Nap	No	149	72.0
	Yes	58	28.0
Sleeping Pills	No	155	74.9
	Yes	52	25.1
Chronic Disease	No	146	70.5
	Yes	61	29.5
Physical Activity	Inactive	29	14.0
	Active	178	86.0
Current Smoking	No	110	53.1
	Yes	97	46.9
Alcohol Before Sleep	No	138	66.7
	Yes	69	33.3
Tea/ Coffee before sleep	No	114	55.1
	Yes	93	44.9

Table 2 shows the prevalence of insomnia of old aged people of study were found to be 52.3%

Table 2. Prevalence of Insomnia

Insomnia	Frequency	Percentage
Absent	98	47.3
Present	109	52.3

The result also shows that independent variables gender, current occupation, current residential status, use of sleeping pills, chronic disease, physical activity and alcohol before sleep has significant association with insomnia (Table 3).

Table 3. Bivariate analysis of variables with insomnia

Variables	Category	Insomnia		Chi-Square
		Absent	**Present**	
Age	Up to 70	65(53.7)	56(46.3)	4.75*
	More than 70	33(38.4)	53(61.6)	
Gender	Female	44(40.0)	66(60.0)	5.077*
	Male	54(55.7)	43(44.3)	
Current Marital Status	Married	66(51.2)	63(48.8)	2.004
	Others	32(41.0)	46(59.0)	
Educational Status	Illiterate	53(44.2)	67(55.8)	1.156
	Literate	45(51.7)	42(48.3)	
Religion	Hindu	84(49.7)	85(50.3)	2.059
	Others	14(36.8)	24(63.2)	
Current Occupation	Not Working	43(36.4)	77(63.6)	13.085**
	Working	55(61.8)	34(38.2)	
Duration of Sleeping	Up to 6 hours	52(46.8)	59(53.2)	0.024
	More than 6 hours	46(47.9)	50(52.1)	
Current Residential Status	Without Spouse	41(35.3)	75(64.7)	15.237**
	With Spouse	57(62.6)	34(37.4)	
Appetite	Poor	55(45.5)	66(54.5)	0.411
	Fair	43(50.0)	43(50.0)	
Exercise Habit	No or irregular	51(33.6)	101(66.4)	1.694

	Regular	47(85.5)	8(14.5)	
Afternoon Nap	No	64(43.0)	85(57.0)	4.111*
	Yes	34(58.6)	24(41.4)	
Sleeping Pills	No	80(51.6)	75(48.4)	4.513*
	Yes	18(34.6)	34(65.4)	
Chronic Disease	No	76(52.1)	70(47.9)	4.412*
	Yes	22(36.1)	39(63.9)	
Physical Status	Inactive	4(13.8)	25(86.2)	15.227**
	Active	94(52.8)	84(47.2)	
Current Smoking	No	49(44.5)	61(55.5)	0.737
	Yes	49(50.5)	48(49.5)	
Alcohol Before Sleep	No	57(41.3)	81(58.7)	6.056*
	Yes	41(59.4)	28(40.6)	
Tea/Coffee before sleep	No	52(45.6)	62(54.4)	0.304
	Yes	46(49.5)	47(50.5)	

*Significant at 5% level of significance, **Significance at 1% level of significance*

The results in table 4 shows that, females were 3.21 times (95% CI: 1.51 to 6.83) more likely to have insomnia as compared to male. Those persons who were not earning currently were 4.25 times (95% CI: 1.94 to 9.21) times more likely to have insomnia as compared to persons currently earning. The odds of being insomnia was 3.26 times (95% CI: 1.56 to 6.82) more to respondents who were currently not having spouse as compared to those who currently staying with spouse. Similarly, the result also shows that respondents using sleeping pills were 2.58 times (95% CI: 1.08 to 6.18) more likely to have insomnia as compared to those who were not using sleeping pills. The odds of being insomnia were 2.67 times (95% CI: 1.15 to 6.19) more likely to respondents having chronic disease as compared to those not having chronic disease. Similarly, physically inactive respondents were 7.93 times (95% CI: 1.85 to 33.95) times more likely to have insomnia as compared to those who are physically active.

Table 4. Result of Binary logistic regression model

Characteristics	Beta	S.E.	P-value	OR	95% CI	
					Lower	**Upper**
Gender						
Female	1.167	0.385	0.002	3.212*	1.510	6.832
Male						
Current Occupation						
Not Working	1.447	0.394	0.00	4.252**	1.964	9.207
Working						
Current Resident						
Without Spouse	1.181	0.377	0.002	3.257*	1.555	6.820
With Spouse						
Use of sleeping pills						
Yes	0.949	0.430	0.033	2.584*	1.080	6.181
No						
Chronic Disease						
Yes	0.980	0.430	0.023	2.665*	1.147	6.190
No						
Physical Status						
Inactive	2.071	0.742	0.005	7.933**	1.854	33.947
Active						

*Significant at 5% level of significance, **Significant at 1% level of significance*

As shown in table 5, p-value for Omnibus test is significant since p-value < 0.05, and by Hosmer and Lameshow test, there is no statistically significant distinction between the observed and predicted values in model since p-value is more than 0.05 at 5% level of significance. Result shows 61.8% of total variation in dependent variable has been explained

by independent variables. There is no multicollinearity (VIF less than 2.081) between explanatory variables in binary logistic regression model.

Table 5. Test of Statistics with different model

Test	Omnibus Test			Hosmer and Lameshow test			Negalkarke R^2
	Chi-Square	d.f.	p-value	Chi square value	d.f.	p-value	
Insomnia	101.754	7	0.000	7.685	7	0.361	0.618

DISCUSSION

The purpose of the study was to determine the prevalence of insomnia in elderly adults and the factors that contribute to it. The finding of the study revealed that insomnia was prevalent among 52.7% of the participants, and contributing factors were gender, working status, residence with spouse, exercise, use sleeping pills, suffering of chronic disease and physical inactivity.

Prevalence of insomnia 52.7% which is similar to the study conducted in old age home of Pashupati showing prevalence of insomnia 61.1% [20]. Also study conducted in Banepa shows slightly higher prevalence of insomnia which is 71.1% [27]. In this research, age is found to be significant factor for insomnia which is similar to the study conducted by Ohayon showing symptoms of insomnia increases with increase in age [7]. In this study, 60.0% of the female population was affected by insomnia. This finding is comparable to that of a study conducted in an old age home in Pashupati, which found that 67.9% of the female population had insomnia [20]. Also Mong and Cusmano, state females are twice more likely to experience sleep problems and insomnia in their life time than males [16].

The study revealed that more than half (64.7 %) of the respondents living without spouse had insomnia. The findings closely resemble those of the Zagazig study, where insomnia was most prevalent among divorced, widowed, and single elderly individuals with 66.7% [17]. The study showed that prevalence of insomnia is higher 63.9% among the respondents with chronic disease which is similar to the study conducted old aged home of Pashupati which shows 88.5% respondents had insomnia with chronic disease and taking drugs for it [20].

The study shows prevalence of insomnia is higher among the respondents who are currently not working or not having their own income which is also similar to the study conducted in Banepa [27]. This outcome is also consistent with research conducted in Canada [28]. Also, the study in Nigeria showing insomnia is higher among respondent who are not employed [29].

CONCLUSION

As per the study's findings, it can be inferred that more than half 52.3% of the elderly people of selected were suffering from insomnia. Females were 3.21 times more vulnerable to have insomnia as compared to males. Similarly, elderly people with no occupation, elderly people with no spouse, irregularity in exercise, use of sleeping pills, suffering of chronic disease and physical inactivity were found to be major contributing factors of insomnia.

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انتشار الأرق والعوامل المرتبطة به بين كبار السن في مدينة نيبالغونج الفرعية، نيبال

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قسم الإحصاء، جامعة تريبهوفان، حرم ماهيندرا المتعدد، نيبالغونج، نيبال

المستخلص

الأرق هو شكوى شائعة تتعلق بالنوم بين كبار السن، بغض النظر عما إذا تم الإبلاغ عنه كأعراض ذاتية أو تم تشخيصه على أنه اضطراب في النوم عن طريق طرق التشخيص المقبولة. كان الغرض من هذه الدراسة هو تحديد مدى انتشار الأرق لدى كبار السن، والعوامل المساهمة في الأرق وتأثيرها على كبار السن. تم اعتماد تصميم بحثي وصفي مقطعي، مع عينة مكونة من 207 من كبار السن تم اختيارهم من مدينة نيبالغونج الفرعية. تم استخدام نموذج الانحدار اللوجستي الثنائي المتعدد لتقييم العوامل التي تساهم في الأرق لدى كبار السن. وبلغت نسبة انتشار الأرق لدى كبار السن 52.3%. من بين العوامل المختلفة، الإناث (نسبة الأرجحية: 3.21، فترة ثقة 95%: 1.51 إلى 6.83)، لا تعمل حاليًا (نسبة الأرجحية: 4.25، فترة ثقة 95%: 1.94 إلى 9.21)، تقيم مع الزوج (نسبة الأرجحية: 3.26، فترة ثقة 95%: 1.56 إلى 6.82)، باستخدام الحبوب المنومة (نسبة الأرجحية: 2.58، نطاق ثقة 95%: 1.08 إلى 6.18)، الإصابة بمرض مزمن (نسبة الأرجحية: 2.67، نطاق ثقة 95%: 1.15 إلى 6.19)، وغير نشط بدنيًا (نسبة الأرجحية: 7.93، نطاق ثقة 95%: 1.85 إلى 33.95) كان له ارتباط كبير بالأرق. ويمكن الاستدلال على أن أكثر من نصف كبار السن كانوا يعانون من الأرق. وكانت الإناث أكثر عرضة للإصابة بالأرق بنسبة 3.21 مرة مقارنة بالذكور.

الكلمات الدالة. الأرق، كبار السن، نموذج الانحدار اللوجستي الثنائي، فترة الثقة، نسبة الأرجحية.