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Investigation on the Status and Influential Factors of Cognitive Function of Elderly People in Lalitpur

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ABSTRACT

Background : Cognitive function comprises essential mental processes that enable individuals to perceive, learn, remember, and adapt to their environment. With the rapid growth of the global elderly population (aged ≥65 years), maintaining cognitive health has become an important public health concern. This study aimed to assess the cognitive status of elderly individuals in the Lalitpur district of Nepal and to identify factors influencing cognitive function.

Methods : A descriptive cross-sectional study was conducted among 307 randomly selected elderly respondents (both males and females) from Ward No. 8 of Lalitpur district. Socio-demographic characteristics and cognitive status were assessed using a structured questionnaire and the Montreal Cognitive Assessment (MoCA) scale. Data was analyzed using SPSS version 23.0. Descriptive statistics, independent *t*-tests, one-way ANOVA, and logistic regression analysis were performed.

Results : The mean MoCA score of respondents was 20.87 ± 5.22. Overall, 78.17% of the elderly population demonstrated cognitive impairment (MoCA score < 26). Cognitive function was found to be significantly associated with age, sex, level of education, and engagement in physical exercise.

Conclusion: A high prevalence of cognitive impairment was observed among elderly individuals in Lalitpur district. Interventions targeting modifiable factors particularly education and physical activity along with gender-sensitive strategies may help reduce cognitive decline among aging populations in Nepal.

Keywords: *Cognitive function, elderly people, influencing factors, Nepal*

INTRODUCTION

Cognitive function refers to the mental processes involved in acquiring knowledge and understanding through thought, experience, and the senses. According to the cognitive process dimension, cognitive function comprises six hierarchical categories: remembering, understanding, applying, analyzing, evaluating, and creating. The global population aged 65 years and above was estimated at 962 million in 2017, and this number is projected to double by 2050, reflecting a rapid demographic shift toward population aging[1].

Nepal is experiencing a similar trend. The elderly population aged 60 years and above has increased substantially, reaching approximately 2.97 million (10.2%) in the 2021 national census, compared to 8.1% in 2011. This rise corresponds to an annual growth rate of 3.29%, largely driven by declining fertility rates and increased out-migration, indicating a rapid transition toward an aging society[2].

The continuous increase in illness among older adults, often compounded by multiple chronic conditions, has

made dementia one of the major public health burdens in modern society. As dementia progresses, symptoms such as disorientation, mood changes, confusion, memory loss, behavioral disturbances, and difficulties in communication, swallowing, and mobility commonly emerge. Dementia is a major neurodegenerative disorder among the elderly and is primarily caused by cognitive impairment.[3] It is characterized by the deterioration of memory and other cognitive abilities severe enough to interfere with daily functioning.[4]

Several factors influence cognitive function in older adults, including age, educational attainment, social participation, number of comorbid conditions, and alcohol consumption habits.[5] Evidence also suggests that social support plays a substantial role, accounting for up to 45.2% of the variance in cognitive function.[6] The prevalence of cognitive impairment has been reported at 12.6%, with a higher prevalence among females (16.7%) compared to males (7.6%).[7] Furthermore, the interaction of social, economic, and environmental factors exerts a stronger influence on population aging than any single determinant. Self-rated health status, medication history, activities of daily living, and caregiver support have also been shown to significantly affect cognitive function.[8]

The findings of this study have important implications for local communities and policymakers in addressing the challenges of population aging and ensuring the sustainability of social, economic, and environmental systems.[9]

Assessing and addressing cognitive function among the elderly is essential for strengthening community-based care systems. The study identifies critical needs that can inform targeted health education programs, support evidence-based policy formulation, and enhance local government planning for elderly care. Additionally, the findings provide a valuable foundation for future research on healthy aging and cognitive well-being.

The objective of this study was to assess the status of cognitive function and identify factors influencing cognitive function among elderly individuals residing in the community of Lalitpur District.

METHODS

A descriptive cross-sectional design was employed to investigate the status and influencing factors of cognitive function among elderly individuals residing in Lalitpur-8, Nepal. The study population consisted of community-dwelling men and women aged 60 years and above who were fully conscious and able to communicate. Using a simple random sampling technique, 307 respondents were selected from the ward number 8 voting list, with randomization performed through a random numbers table. Demographic information was collected using self-constructed questionnaires, while cognitive function was assessed using the Montreal Cognitive Assessment (MoCA) scale developed by Dr. Ziad Nasreddine in 1996. The MoCA is a 30-point instrument that evaluates eight domains of cognition, including attention, conceptual thinking, calculation, concentration, executive functions, language, memory, visuoconstructional skills, and orientation, with a score of 26 or higher indicating normal cognitive function. The English version of MoCA was translated into Nepali by bilingual experts, and content validity was established through consultation with an adviser and five subject matter experts, yielding a Scale Content Validity Index (S-CVI) of 0.73. Reliability testing was conducted with 10% of the sample (30 respondents) and repeated after two weeks in a similar setting, resulting in a Cronbach's alpha of 0.645 for MoCA and 0.833 for the final instrument, indicating good reliability. Ethical approval was obtained from the Institute Review Board of Xiangya School of Nursing, Central South University, the Nepal Health Research Council (NHRC), and the Community Development Office, Nepal. Data collection was carried out by five trained individuals who received one day of orientation. Door-to-door home visits were conducted in ward 8, during which the objectives of the study were explained to each respondent, informed verbal consent was obtained, and interviews were administered. In addition to the questionnaire, motor coordination was assessed by asking respondents to copy a picture.

Data entry was performed in SPSS version 23 by at least two individuals to ensure accuracy and confirmation. The dataset was checked and rechecked for completeness and consistency before analysis. Data were coded, recoded, classified, and manually edited prior to entry. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize demographic characteristics and cognitive function scores. To examine associations between cognitive function and selected variables, inferential statistical tests such as the t-test,

analysis of variance (ANOVA), and logistic regression analysis were applied.

RESULTS

Demographic Characteristics

Among the 307 respondents, the largest proportion (29.6%) were between 60 and 64 years of age, with a mean age of 69.93 years. Among the respondents, 46.6% were male and 53.4% were female. The majority (70.0%) were married, while approximately one-third had lost their spouse. More than half of the respondents (59.1%) were educated, whereas the remaining were uneducated. In terms of living arrangements, 62.9% resided with their children and about one-third lived with their spouse. Regarding economic status, 78.8% reported a monthly income of less than 10,000 Nepalese rupees, and most of them were still engaged in work. Lifestyle behaviors showed that 51.1% of respondents did not smoke, while 60.9% reported alcohol consumption. Similarly, 60.9% engaged in regular exercise, 39.7% walked regularly, and approximately one-third performed only household work. In terms of health status, 61.6% of respondents reported suffering from chronic diseases. Among these, 59.3% were on regular treatment, while 2.3% managed their condition through dietary control and regular exercise.

Table 1 shows that among the study respondents, 240 elderly individuals exhibited cognitive impairment, whereas 67 elderly individuals demonstrated normal cognitive function.

Table 1: Cognitive function status of elderly respondents based on MoCA scores n = 307

Cognitive Function Category	N	Mean MoCA Score	Standard Deviation (SD)	Standard Error of Mean (SEM)
Cognitive impairment	240	19.08	4.44	0.29
No cognitive impairment	67	27.28	1.35	0.16

Table 2 shows respondents' performance across MoCA cognitive domains. Orientation (4.51 ± 1.55) and attention (3.65 ± 1.71) were the highest-scoring domains, whereas delayed recall (2.49 ± 1.77) and naming (2.50 ± 0.81) were the lowest, indicating relative deficits in memory and language retrieval. Visuospatial/executive function (3.07 ± 1.51) and language (2.73 ± 0.64) showed moderate performance.

Table 2: Status of the domain of Montreal Cognitive assessment (MoCA) n =307

Cognitive Domain	Range	Minimum	Maximum	Total score	Mean	Std. Error	S.D.
Delayed recall	5	0	5	5	2.49	.101	1.766
Naming	3	0	3	3	2.50	.046	.810
Language	5	0	5	5	2.73	.036	.637
Visuospatial	5	0	5	5	3.07	.086	1.514
Attention	6	0	6	6	3.65	.097	1.707
Orientation	6	0	6	6	4.51	.088	1.550

Table 3 presents the association between cognitive function and socio-demographic characteristics among elderly respondents. Cognitive performance varied significantly by sex, age, education, marital status, living status, income, exercise, and drinking habits ($p < 0.05$). Males, younger respondents, and those with higher education or regular physical activity had higher mean cognitive scores, while respondents aged 80–89 and those with lower education showed lower scores. Chronic disease, family history of dementia, and smoking were not significantly associated with cognitive function.

Table 3: Association between cognitive function and socio-demographic characteristics n =307

Variable	Category	N	Mean ± SD	Test	p-value
Sex	Male	143	23.74 ± 4.26	t = 10.45	<0.001*
	Female	164	18.37 ± 4.68		
Chronic Disease	No disease	118	21.11 ± 5.71	t = 0.63	0.530
	Yes	189	20.72 ± 4.90		
Family History of Dementia	No	302	20.90 ± 5.21	t = 0.81	0.420
	Yes	5	19.00 ± 5.91		
Age (years)	60–69	152	22.70 ± 4.52	F = 31.66	<0.001*
	70–79	116	20.04 ± 5.48		
	80–89	72	16.20 ± 4.81		
Marital Status	Married	215	21.89 ± 4.86	F = 20.18	<0.001*
	Divorce/single	11	22.72 ± 4.24		
	Widowed	81	17.90 ± 5.16		
Educational Level	Uneducated	150	18.26 ± 4.79	F = 49.28	<0.001*
	Informal	66	20.86 ± 4.33		
	Primary school	61	24.85 ± 3.06		
	Middle school & above	30	25.86 ± 3.71		
Living Status	Alone	13	18.30 ± 5.21	F = 3.48	0.032*
	Couple	101	21.78 ± 4.94		
	With children	193	20.56 ± 5.29		
Income (NRs/month)	No income	29	20.24 ± 4.77	F = 9.62	<0.001*
	<10,000	242	20.35 ± 5.23		
	10,000–20,000	17	26.41 ± 2.12		
	>20,000	19	23.47 ± 4.22		
Exercise Habit	None	120	19.14 ± 5.35	F = 6.77	<0.001*
	Yoga	19	21.15 ± 3.35		
	Medication	16	21.31 ± 5.37		
	Walking	122	22.50 ± 4.82		
	Other	30	20.76 ± 5.21		
Drinking Habit	Never	61	19.34 ± 5.23	F = 3.31	0.038*
	Current	187	21.24 ± 5.08		
	Past	59	21.27 ± 5.45		
Smoking Habit	Never	157	20.39 ± 5.01	F = 1.34	0.261
	Current	60	21.38 ± 5.26		
	Past	90	21.36 ± 5.52		

** p-value significant at < 0.05*

Table 4 present multiple logistic regression analysis identifying factors associated with cognitive impairment among elderly respondents. Increased odds of cognitive impairment were observed among respondents aged 70–79 years and females, while education, higher income (≥20,000) and yoga practice were significantly associated with reduced odds.

Table 4: Multiple logistic regression analysis of factors associated with cognitive impairment n =307

Variable	B	S.E.	Wald χ^2	Df	*p* value	Adjusted OR (Exp B)	95% CI for OR
Age (70–79 vs 60–69)	2.568	1.139	5.079	1	0.024*	13.04	1.40–121.65
Sex (Female vs Male)	1.700	0.488	10.547	1	0.001*	5.47	1.96–15.26
Divorced/Single vs Married	0.296	0.561	0.279	1	0.598	1.35	0.45–4.04
Educated vs Uneducated	−1.782	0.645	7.638	1	0.006*	0.17	0.05–0.60
Income ≥ 20,000 vs No Income	−1.953	0.965	4.095	1	0.043*	0.14	0.02–0.94
Yoga practice vs No exercise	−1.735	0.674	6.627	1	0.010*	0.18	0.05–0.66
Under treatment for ≥1 Disease (Yes vs No)	0.719	0.378	3.617	1	0.057	2.05	

** p-value significant at < 0.05*

DISCUSSION

This study assessed cognitive function among elderly individuals using MoCA scores. The MoCA is a 30-point instrument that evaluates eight domains of cognition, including attention, conceptual thinking, calculation, concentration, executive functions, language, memory, visuoconstructional skills, and orientation, with a score of 26 or higher indicating normal cognitive function.[10] In this study, 78.2% of elderly respondents were classified as cognitively impaired, with a mean MoCA score of 19.08, while 21.8% demonstrated normal cognition (mean 27.28). These findings are consistent with previous research reporting a mean cognitive score of 18.7, with 71% of older adults considered cognitively impaired.[11] The high prevalence observed in Nepal aligns with regional studies, where community-based data indicate that 72% of older adults exhibit some degree of cognitive decline, particularly among those with low educational attainment and limited social engagement.[12]

Analysis of MoCA cognitive domains revealed that orientation (mean 4.51 ± 1.55) and attention (3.65 ± 1.71) were the best-preserved functions among respondents, whereas delayed recall (2.49 ± 1.77) and naming (2.50 ± 0.81) were the lowest-scoring domains. Visuospatial/ executive function (3.07 ± 1.51) and language (2.73 ± 0.64) showed moderate performance. These findings suggest that memory and language retrieval are more vulnerable to age-related decline, while attentional and orientation abilities remain relatively intact, consistent with previous studies in older adults.[10,13]

The present study identified age, sex, education, income status, physical activity (yoga), and comorbidity status as important factors associated with cognitive impairment among elderly respondents. Cognitive performance declined with age, with respondents aged 80–89 years showing the lowest MoCA scores, consistent with age-related neurodegenerative changes.[13,14] Similar associations have been reported in population-based studies from South Asia and elsewhere, where advancing age remains the strongest predictor of cognitive impairment and dementia.[14]

Males had higher cognitive scores than females, likely due to disparities in education and occupational exposure, supporting findings from other low- and middle-income settings.[15,16] Female respondents had significantly higher odds of cognitive impairment compared with males. Similar gender differences have been reported in previous studies, potentially attributable to longer life expectancy, hormonal changes after menopause, and gender disparities in education and socioeconomic opportunities among older cohorts.[17]

Education strongly protected against cognitive impairment, while higher income was associated with better cognitive function, reflecting access to healthcare, nutrition, and cognitively stimulating environments.[12] Education emerged as a strong protective factor against cognitive impairment. Elderly individuals with formal education had significantly lower odds of cognitive impairment compared to those who were uneducated. Similar findings have been reported in studies conducted in Nepal, India, and other developing countries, where illiteracy remains a key risk factor for late-life cognitive impairment.[18]

Income level was also significantly associated with cognitive impairment, with higher income (≥20,000 Nepalese rupees) reducing the odds of impairment. Economic security may improve access to healthcare, nutrition, social engagement, and cognitively stimulating environments, all of which contribute to better cognitive health.[19, 20]

Regular yoga practice was found to be significantly protective against cognitive impairment. Previous interventional and observational studies have reported beneficial effects of yoga on memory, attention, and executive function among older adults that supports the findings of the present study.[21, 22]

Although respondents undergoing treatment for one or more chronic diseases showed higher odds of cognitive impairment, this association did not reach statistical significance. Chronic conditions such as hypertension, diabetes, and cardiovascular diseases are known contributors to cognitive decline through vascular and metabolic mechanism.[23, 24] The lack of statistical significance in the present study may be due to sample size limitations or variations in disease severity and treatment adherence.

Overall, the findings emphasize the multifactorial nature of cognitive impairment in older adults and highlight the importance of modifiable factors such as education, income, and physical activity. Public health strategies focusing on healthy ageing, promotion of physical activity, social and economic support may play a crucial role in reducing cognitive decline among the elderly population.

LIMITATIONS

This study was conducted among elderly individuals living in a single community, which may limit the representativeness of the findings. Consequently, the results cannot be generalized to the broader elderly population. Additionally, the cognitive assessment tool used in this study may have posed challenges for uneducated respondents, potentially affecting the accuracy of cognitive function measurement.

RECOMMENDATION

Future studies should be conducted with a larger and more diverse sample to enhance the generalizability of findings. Qualitative research approaches are also recommended to explore specific domains of cognitive impairment and to gain deeper insights into contextual and subjective experiences of cognitive decline among the elderly.

CONCLUSION

This study demonstrates a high prevalence of cognitive impairment among elderly individuals living in the community. Cognitive function was significantly associated with age, sex, income status, living status, and educational level. Older age, female sex, lower income, lower educational attainment, and certain living arrangements were linked to poorer cognitive outcomes. These findings highlight the importance of addressing socioeconomic, educational, and lifestyle-related factors when designing strategic interventions aimed at preventing or alleviating cognitive impairment among the elderly. Community-based programs focusing on health promotion, social support, education and physical activity may contribute to improved cognitive health and quality of life in older populations.

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