



PREVALENCE AND PREDICTIVE VARIABLES OF COGNITIVE IMPAIRMENT AMONG ELDERLY AT ROOPNAGAR DISTRICT, PUNJAB

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Abstract

Elderly people are the integral part of the society. Aging is an evitable developmental phenomena bringing along a number of changes in the physical, psychological and social condition. Cognitive impairment is common in later life. A Cross-sectional descriptive survey was adopted to determine the prevalence and predictive variables of cognitive impairment among elderly in Roopnagar district, Punjab where interview schedule was used as a method of data collection. A total of 100 elderly were taken by quota sampling technique. Nestle Mini Nutritional assessment scale (MNA) and Folstein -Mini Mental Status Examination(MMSE) was used to assess cognitive impairment. Feasibility and sample size for main study was determined by using Power analysis on the basis of results of the pilot study. Majority of elderly having normal Nutritional status and more than half (63%) of the elderly people were having mild cognitive impairment whereas only (10%) were having moderate cognitive impairment. Likelihood ratio test (logistic regression analysis) revealed the predictive variables of cognitive impairment that include previous employment, Exercises. The study was concluded that early detection of cognitive impairment and its predictive variables may help the elderly people and their families to prepare and plan for the potential complications of this illness.

Key words: Cognitive Impairment, Predictive variables, Elderly, MMSE, MNA

INTRODUCTION

Aging is an evitable developmental phenomenon bringing along a number of changes in the physical, psychological and social condition. Old age has been problematic period of ones life and this is correct to some extent. As man grow his activities reduced and consequent decline in the cognitive functioning, may occur in older persons and the ways in which it may complicate in the community^[1].

Old age depends not only on the chronological age of people, but also on their physical and mental abilities, socioeconomic resources, educational background, and previous life experiences because age alone cannot be a

determining factor in defining old age. The United Nations has not yet proposed a clear benchmark for determining old age, but as a rule of thumb, people aged 60 or over are considered elderly [2].

Today, old age and gerontology have gained much more attention since the improved health conditions and increased life expectancy in the world have resulted in the boosting of the elderly population.^[3] The world's population according to WHO (2021) is around 7.9 billion. The number and proportion of people aged 60 years and older in the population is increasing. In 2019, the number of people aged 60 years and older was 1 billion. This number will increase to 1.4 billion by 2030 and 2.1 billion by 2050. This increase is occurring at an unprecedented pace and will accelerate in coming decades, particularly in developing countries [4].

The number and the proportion of India's elderly are growing and so programmes should intended to ensure the comfort and safety of this segment of the population. That's according to a report by the Ministry of Statistics and Programme Implementation titled 'Elderly in India 2021'. There are nearly 138 million elderly persons in India in 2021, including 67 million men and 71 million women. An increase of nearly 34 million elderly persons was seen in 2021 over the population census of 2011. This number is expected to increase by 56 million by 2031^[5].

It is crucial to understand the effect of age on cognition because of rapidly increasing number of adult over the age of 65 and increasing prevalence of age associated neurodegenerative dementias.^[6] Cognition is critical for functional independence as people age, including whether someone can live independently, manage finances, take medications correctly, and drive safely. In addition intact cognition is vital for humans to communicate effectively, including processing and integrating sensory information and responding appropriately to others. Cognitive abilities often decline with age. It is important to understand what type of changes in cognition are expected as a part of normal ageing and what type of changes often might suggest the onset of a brain disease [7].

Cognition is a combination of skills that include attention, learning, memory, language, visuo spatial skills, and executive function, such as decision making, goal setting, planning, and judgment. Older adults are the population most at risk for cognitive impairment [8].

Cognitive impairment is common in later life and may be due to the normal of ageing or associated with physical or mental disorders. As people age changes occurs within the brain Cognitive Impairment covers a wide variety of impaired brain functions in memory, judgment language and attention. Cognition like other bodily functions decreases as a result of aging. However cognitive changes as a result of disease would usually affect social, functional and occupational abilities [9]. The prevalence of age related health problems is becoming an important public health concern as proportion of older individual in population worldwide grow. Cognitive impairment is one of major causes of disability among older people. It is characterize by the global and irreversible cognitive decline that is severe enough to undermine daily functioning [10].

The dramatic ageing of the Indian population will result in substantially increased numbers of elderly individuals suffering from cognitive impairment. There is a need to strengthen geriatric care services in the existing public health system so that the increasing care demands of the elderly can be met. Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases every year. Two in three people with dementia live in low- and middle-income countries [11].

Cognitive impairment frequently suffered from co-morbid psychiatric conditions (e.g., depression, wandering, agitation, insomnia, psychotic symptoms, etc.). It is commonly associated with physical diseases, such as

diabetes mellitus and cardiovascular diseases. Individuals with cognitive impairment also experience a decreased quality of life. The harmful effects of cognitive impairment are not restricted to its advanced forms such as dementia. In addition to the well-known risk of progress to dementia, mild cognitive impairment (MCI) can also cause substantial psychological symptoms in caregivers and patients^[12]. The prevalence of MCI is 12–20% in persons older than 60 years. People with MCI than those without it go on to develop Alzheimer's disease or a related dementia. An estimated 10 to 20% of people age 65 or older with MCI develop dementia over a one-year period^[13].

Dementia is one of the major causes of disability and dependency among older people worldwide. It can be overwhelming, not only for people who have dementia, but also for their carers and families, who globally provide the majority of care and support. There is often a lack of awareness and understanding of dementia, resulting in stigmatization and barriers to diagnosis and care. The impact of dementia on carers, family and society at large can be physical, psychological, social and economic^[11].

However, studies on the prevalence of cognitive impairment are less, especially in a population with low educational attainment in rural areas. Thus a researcher aimed to assess the prevalence of cognitive impairment among elderly residing in selected community areas of Ropar district Punjab.

Objectives

1. To assess the nutritional status among elderly using Nestle Nutrition Assessment.
2. To assess the cognitive impairment among elderly people using Mini-Mental Status Examination.
3. To determine the predictive variables of cognitive impairment among elderly.

Hypothesis

H₀:- The regression model is adequately fit to determine the predictive variables of cognitive impairment among the elderly people at 0.05 level of significance.

MATERIAL AND METHODS

Design and sample

This was a cross-sectional descriptive survey study carried out among elderly people equal to or above 60 years both male and female residing in community areas of district Roopnagar, Punjab. Total 500 elderly people out of them 225 males and 275 females were residing in the villages (Badli, Dhyanpura, Chetamala, Kurali) of district Roopnagar. Power Analysis was used to estimate sample size based on precision rate and confidence interval formula for infinite population. Population standard deviation (roughly estimated based on pilot study) i.e (3.34)

Standard variant (Z) at given confidence level i.e at 95% (1.96)

Precision (acceptable error) i.e 0.8 (conventional standard

$$N = \frac{(1.96)^2 (3.34)^2}{(0.8)^2} \text{ (For infinite population)}$$

$$=42.83/0.64$$

Sample size = 67

Here it was decided to take 100 samples by Quota sampling technique. Two groups were made. Group one with males (225) and group second with females (275). From both the groups 20% of subjects from each group were taken as sample. A written informed consent was obtained from the subjects before commencing the study.

Description of Tools

Nestle Mini Nutritional Assessment scale [MNA] and Folstein- Mini Mental Status Examination [MMSE] used. A semi structured proforma was used to collect the socio-demographic details of the subjects. Mini Nutritional Assessment [MNA] was developed by Nestle Nutritional Institute and is most well validated nutrition screening tool for the elderly. This comprised of 6 questions. The responses include total score ranging from 0 to 3 and has ($\alpha = .84$). The scale has proved to be a reliable and valid instrument. The screening score (maximum – 14 points). Scores of 0-7 are considered malnourished, 8-11 indicate at risk of malnutrition and 12-14 indicate normal nutrition status ^[14,15]. Folstein Mini Mental Status Examination [MMSE] is a common measurement scale used in older adults was designed to screen for cognitive impairment and is used often in geriatric research. It is a 30-point questionnaire, administration of the test takes between 5 and 10 minutes and examines functions including orientation, registration, attention and calculation, recall, language and ability to follow simple commands. Any score of 24 or more (out of 30) indicates a normal cognition. Below this, scores can indicate severe (≤ 9 points), moderate (10-18 points) or mild (19-23 points) cognitive impairment. The validity and reliability of the tool have been supported through both clinical practice and research ^[16, 17].

Data analysis

Statistical Package for Social Sciences 20th version (SPSS version 20) was used to analyze the data. Frequency distribution on variable-variable basis was performed to assess the extent of and patterning of missing values. Data quality was also checked in terms of limited variability and extreme skewness. Descriptive statistics i.e. frequencies, mean, median, percentage, and standard deviation and inferential statistics i.e. Multiple nominal regression was used to analyze data. Two sided significance tests were used throughout and the level of significance was set at < 0.05 .

RESULTS

The demographic details of the study subjects are shown in Table 1.

Table 1: Distribution of demographic variables (N=100)

Demographic Variables		n	(%)
Age in years	60-64	55	55.0
	65-70	34	34.0
	70-74	02	2.0
	75-80	09	9.0
Gender	Female	55	55.0
	Male	45	45.0
Religion	Sikh	95	95.0
	Hindu	04	4.0
	Christian	01	1.0

Education	Able to read and write	36	36.0
	Primary up to 5 th	40	40.0
	Secondary up to 10 th	11	11.0
	Seniors secondary(10+2)	03	3.0
	Graduation or Above	10	10.0
Current Habitat	Rural	83	83.0
	Urban	05	5.0
	Semi Urban	12	12.0
Previous Employment	Govt. Employee	18	18.0
	Private employee	39	39.0
	Farmer/Daily Wages	08	8.0
	Business	35	35.0
Current Employment	Not working	67	67.0
	Working	33	33.0
Type of Family	Nuclear	25	25.0
	Joint	73	73.0
	Extended	02	2.0
Living with spouse	Yes	54	54.0
	No	46	46.0
Monthly income(self)in rupees	No Income	33	33.0
	Upto 5000/-	39	39.0
	Upto 10,000/-	10	10.0
	More than 10,000/-	18	18.0
Exercise	Daily	04	4.0
	2-3 time/week	19	19.0
	More than 3time /week	13	13.0
	Not at all	64	64.0
Smoking	Yes	14	14.0
	No	86	86.0
Tobacco	Yes	06	6.0
	No	94	94.0
Alcohol	Yes	07	7.0
	No	93	93.0
Family History of Psychiatry	Yes	04	4.0
	No	96	96.0
Any accident/ Head Injury	Yes	02	2.0
	No	98	98.0
Any Medical Illness	Yes	30	30.0
	No	70	70.0

Table 2: Distribution of Elderly people as per their Nutritional Assessment scores (N=100)

Level of Nutritional status	Score	%
Normal Nutritional Status	12-14	68.0
At risk of malnutrition	08-11	32.0

Table3: Distribution of Elderly people as per their Cognitive Impairment (N=100)

Levels	Scores	%
Moderate Cognitive Impairment	10-18	10
Mild Cognitive Impairment	19-23	63
No Cognitive Impairment	≥24	27

Table 3 depicts that more than half (63%) of the elderly people were having mild cognitive impairment whereas only (10%) were having moderate cognitive impairment.

PREDICTIVE VARIABLES OF COGNITIVE IMPAIRMENT AMONG ELDERLY

Part 1: Testing statistical relevancy of the regression model

Table: 4 Model Fitting information of likelihood Ratio Test for Predictive variables of Cognitive Impairment among Elderly people (N=100)

Model	Model fitting criteria		Likelihood Ratio Test	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	136.241			
Final	63.955	72.286	34	.000**

** Significant at 0.01

Table 5: Pseudo R-Squares to determine the Predictive variables of Cognitive Impairment among elderly people (N=100)

Cox and Snell	0.515
Nagelkerke	0.688
Mc Fadden	0.525

Tables (4 and 5) it was concluded that the regression model used in present study is statistically relevant to determine the predictive variables of Cognitive Impairment among elderly people.

H₀- The regression model is adequately fit to determine the predictive variables of cognitive impairment among elderly people at 0.05 level of significance

Cox and Snell value is 0.515, Nagelkerke value is 0.688 and Mc Fadden value is 0.525 which are more than the 0.05 (expected p value) hence we accept the null hypothesis and concluded that the regression model is adequately fit to determine the predictive variables of cognitive impairment among elderly people.

Part 2: Predictive variables of Cognitive Impairment

Likelihood ratio tests revealed the independent variables (predictive variables) which significantly impact the cognitive impairment among elderly people that includes previous employment (0.001*), Exercise (0.30*). Variables such as age, gender, religion, education, current habitat, current employment, type of family, living with spouse, monthly income, physical activity, tobacco use, smoking, alcohol use do not have significant predictive impact on elderly people's cognition ($P \geq 0.05$)

Table 6: Nominal regression (logistic) analysis to determine the predictive variables of Cognitive Impairment among elderly (N=100)

Effect	Model Fitting	Likelihood Ratio Tests		
	Criteria -2 Log Likelihood of Reduced Model	Chi- Squar e	df	Sig
Intercept	63.955	.000	0	.
Age	66.381	2.426	3	.489
Gender	73.502	9.547	1	.002
Religion	70.475	6.520	2	.038
Education	67.970	4.014	4	.404
Current employment	65.578	2.868	1	.444
Previous Employment	81.256	17.301	3	.001**
Type of family	66.824	69.253	2	.071
Living with spouse	63.936	63.968	1	.910
Monthly income in rupees	70.026	6.071	3	.108
Exercise	72.874	8.919	3	.030
Tobacco	64.260	.305	1	.986
Smoking	63.981	.025	1	.581
Alcohol	71.929	7.974	1	.874
Family history of Psychiatric illness	45.88	54.2	1	.100

Table 7 depicts that elderly those were govt. employees are 1.146 times (odds Ratio= 1.146) more likely to have cognitive impairment as compared to elderly with private employees, farmers and business (odds Ratio =0.776) but statistically not significant ($p=0.937$). Elderly those are doing 2-3 times/ week are 0.776 times (odds Ratio=0.776) more likely to have cognitive impairment as compared to elderly those who are doing daily and more than 3 times / week even though it was not statistically significant ($p=0$).

Table 7: Parameter estimates (regression analysis) of predictive variables of cognitive impairment among elderly people (N=100)

Cognitive Impairment Score	Variables	B	Std. Error	Wald	df	Sig	Ex(B)
Previous Employment							
	Govt. Employee	.136	1.719	.006	1	.937	1.146
	Private Employee	3.837	1.256	9.333	1	.002	.022
	Farmer/Daily wages worker	-2.433	1.619	.225	1	.1	.088
	Business	0 ^b	.	.	0	.	.
Exercise							
	Daily	-1.389	2.853	.237	1	.626	0.249
	2-3 time/ week	-.254	1.567	.026	1	.871	0.776
	More than 3 time /week	-5.465	2.314	5.577	1	.018	0.004
	Not at all Alcohol	0 ^b	.	.	0	.	.

A. The Reference category is: No Cognitive Impairment. B. This parameter is set to Zero because it is redundant.

DISCUSSION

Result of the study showed that majority of elderly people having mild cognitive Impairment whereas very few of them having moderate cognitive impairment which has consistent with **Chen H P, Cheng JS, Hui CL, Chou HC (2018)** showed that more than half of elderly with mild cognitive Impairment ^[18]. **Kaur S(2017)** reported that 26.7% have mild Cognitive Impairment and only 11.7% have severe Cognitive Impairment ^[19]. Predictive variables of cognitive impairment explored among elderly that includes previous employment and Exercise. Variables such as age, gender, religion, education, current habitat, current employment, type of family, living with spouse, monthly income, physical activity, tobacco use, smoking, alcohol do not have significant predictive impact on elderly people. (P>0.05). Somewhat similar results by **Damaris Aschwanden et al (2020)** reported that cognitive impairment was significantly related to worse subjective health, increasing BMI, smoking and physical inactivity ^[20]. **Joshua Chodosh, David B. Reuben, Marilyn S. Albert, Teresa E. Seeman (2002)** reported that the Delayed Recognition Span, which assesses non verbal memory were associated with cognitive impairment ^[21].

IMPLICATIONS

- Awareness programmes for community people regarding early symptoms and risk factors of cognitive impairment can be planned and organized.
- Administrator can supervise and guide the health workers to work effectively and efficiently for the promotion of health and prevention of disease.

LIMITATIONS

- The study was confined to 100 samples which limits the generalizability of the findings.
- The study was limited to only rural locality.

CONCLUSION

Knowing the prevalence rate of cognitive Impairment in elderly, together with the associated factors may inform policy makers and aid in designing better geriatric friendly health services. When planning elderly health services priority should be given to the elderly who are old, widowed and those who are illiterate. Early detection of cognitive impairment will help the patient and the families to prepare and plan for the potential complications of this illness.

Conflict of Interest

It is self funded research work of authors have declared no conflict of interest.

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