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Original Research Article

PREVALENCE OF COGNITIVE IMPAIRMENT AMONG ELDERLY PEOPLE IN URBAN POPULATION IN CHENNAI

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ABSTRACT

Background: Cognitive impairment is a common health problem among older adults that adversely affects functional independence and quality of life. Early identification of cognitive impairment and its associated factors is essential for planning appropriate community-based interventions. This study assessed the prevalence of cognitive impairment and its socio-demographic correlates among elderly people residing in an urban population in Chennai.

Materials and Methods: A descriptive cross-sectional study was conducted among 120 elderly individuals aged ≥60 years from July 2022 to June 2023 using convenience sampling. Data were collected through a door-to-door survey using a semi-structured questionnaire, the General Health Questionnaire-12 (GHQ-12), and the Montreal Cognitive Assessment (MoCA). Associations were evaluated using the Chi-square test, Spearman's correlation, and binary logistic regression.

Results: Among the 120 participants, 60 (50.0%) were aged 60–69 years and 61 (50.8%) were males. Based on MoCA scores, 61 (50.8%) had normal cognition, 42 (35.0%) had mild cognitive impairment, and 17 (14.2%) had moderate-to-severe cognitive impairment, yielding an overall cognitive impairment prevalence of 49.2%. Lesser education (p=0.0028), lower and middle SES (p=0.0002) were significantly associated with cognitive impairment, whereas age, gender, diabetes mellitus, hypertension, visual aid use, hearing aid use, and psychological distress were not. No significant correlation was observed between GHQ-12 and MoCA scores (r=-0.042, p=0.6504). Multivariable logistic regression identified no independent predictors of cognitive impairment.

Conclusion: Nearly half of the elderly participants had cognitive impairment. Educational level and SES were significantly associated with cognitive status, highlighting the importance of community-based cognitive screening and early identification of vulnerable older adults to support healthy ageing.

Keywords: Aging, Cognitive impairment, Community Health, Geriatric Assessment, Mental Health.

INTRODUCTION

Population ageing has become an important public health concern across the world. Improvements in healthcare & life expectancy have increased number of older adults, resulting in a larger elderly population require long-term physical, psychological and social care. India is also facing these demographic transition. People with 60 years of age & above estimated as 8.6% of country population & this can increase upto 173 million by 2026. As older population increases, age-related health problems, such as cognitive disturbance can occur. Cognitive functions are memory, attention,

language, orientation, learning, reasoning and decision-making, these functions are necessary for independent living. Any problem in cognition can effect the daily activities & quality of life (QOL).[1-3] Cognitive impairment ranges from mild cognitive impairment to dementia. Mild cognitive impairment is an intermediate stage between normal age-related cognitive changes and dementia. Long-term follow-up studies have reported that older adults with mild cognitive impairment develop Alzheimer's disease at an annual rate of 10%–15% with more than half progressing to dementia within five years.[2,3]

Demographic, psychological & lifestyle factors can affect cognitive funtions. Depression is found to be common factor that affect cognitive function among older adults in India.[4] Cognitive functions are also affected by alcohol consumption, tobacco use, physical inactivity & limited social engagement.[5] The prevalence of cognitive impairment differs between urban and rural populations because of differences in education, socioeconomic conditions and access to healthcare.[6,7]

A community-based study involving 77 older adults from urban Chennai reported a cognitive impairment prevalence of 35.06%. The proportion of affected individuals was higher among women than men (38.88% vs. 26.08%). Cognitive impairment was also more common in older adults who lived alone and in those with lower levels of education.[8]

A more recent community-based study conducted in urban South India included 300 adults aged 60 years and above who reported a cognitive impairment prevalence of 36.67%, while 11.67% had mild cognitive impairment. Depression, dependence in activities of daily living & gait disturbance were linked with higher odds of cognitive impairment, whereas participation in leisure activities showed a protective effect.[9]

Although Chennai has a growing elderly population, community-based data on the prevalence of cognitive disturbance and its sociodemographic correlates remain limited.[5,8] Local data are necessary for planning screening programmes & community-based services for older adults. Estimating the prevalence of cognitive disturbance & identifying the sociodemographic factors related to it will help understand extent of problem in urban elderly population. The present study was undertaken to assess the prevalence of cognitive impairment among elderly people in an urban population in Chennai and to examine its sociodemographic correlates.

MATERIALS AND METHODS

A community-based descriptive cross-sectional study was carried out among older adults residing in urban areas of Chennai over a one-year period from July 2022 to June 2023.

Study Population

The study included individuals aged 60 years and above living in the selected urban areas of Chennai.

Sample Size

A total of 120 older adults who fulfilled the eligibility criteria were enrolled in the study. Participants were selected using a convenience sampling method in this community-based descriptive study, and a formal sample size calculation was not performed.

Sampling Technique

Eligible elderly individuals satisfying the inclusion and exclusion criteria were enrolled using a door-to-door household survey in the selected urban localities. Recruitment continued until the required sample size was reached.

Inclusion and Exclusion Criteria

Older adults aged 60 years or above, as defined *under the Maintenance and Welfare of Parents and Senior Citizens Act, 2007*, who were clinically stable and provided written informed consent were eligible for inclusion.

Individuals younger than 60 years, those who were clinically unstable, unwilling to participate, had severe visual or hearing impairment, communication difficulties, or major psychiatric or neurodevelopmental disorders, those who did not provide written informed consent were excluded.

Methods

Each participant provided written informed consent before participating in study. Information on sociodemographic characteristics & relevant clinical details was collected during household visits using a semi-structured questionnaire. Family members or caregivers were interviewed when additional information was required.

Psychological distress was measured using GHQ-12. Responses were scored on a four-point Likert scale (0–1–2–3) giving a total score ranging from 0 to 36. Based on the total score, participants were grouped into three categories: no psychological distress (≤15), psychological distress (16–20), and severe psychological distress (>20).

Cognitive function was assessed using MoCA which evaluates attention, executive function, memory, language, visuospatial ability, abstraction, calculation and orientation. Cognition was graded as, Normal cognition (26–30), Mild Cognitive Impairment (18–25), Moderate–Severe Cognitive Impairment (<18).

Statistical Analysis

The statistical analyses were done using SPSS package, and categorical data were presented as frequency and percentage. Chi-square test was used for association between cognitive state and sociodemographic or clinical factors, and Spearman's rank correlation test was used for GHQ-12 score and MoCA score. Binary logistic regression analysis was applied to assess independent predictors of cognitive impairment. All findings are expressed in adjusted odd ratio (OR) along with 95% confidence interval (CI). The

assessment of model performance was made with the help of −2 Log Likelihood, Cox & Snell R^2, Nagelkerke R^2, overall model chi-square and model classification accuracy.

RESULTS

Half of participants (50.0%) were aged 60–69 years. The study population included 61 males and 59 females. Most participants were married (65.8%), and 109 (90.8%) identified as Hindu. Diabetes mellitus and hypertension were present in 53 (44.2%) and 58 (48.3%) participants respectively. Visual aids were used by 66.7% participants and hearing aids by 19.2% participants. [Table 1]

Table 1: Sociodemographic and Clinical Characteristics of the Study Participants

Variable	Category	N (%)
Age (years)	60–69	60 (50.0%)
	70–79	41 (34.2%)
	≥80	19 (15.8%)
Gender	Male	61 (50.8%)
	Female	59 (49.2%)
Marital Status	Married	79 (65.8%)
	Widowed	30 (25.0%)
	Others (Single + Divorced)	11 (9.2%)
Religion	Hindu	109 (90.8%)
	Christian	8 (6.7%)
	Muslim	3 (2.5%)
Diabetes Mellitus	Yes	53 (44.2%)
	No	67 (55.8%)
Hypertension	Yes	58 (48.3%)
	No	62 (51.7%)
Visual Aid	Yes	80 (66.7%)
	No	40 (33.3%)
Hearing Aid	Yes	23 (19.2%)
	No	97 (80.8%)

Total 86 participants had no psychological distress. Normal cognition was present in 61 participants. While 49.2% had cognitive impairment, 35.0% with mild & 14.2% with moderate to severe cognitive impairment. [Table 2]

Table 2: Distribution of psychological distress and cognitive status

Variable	Category	N(%)
GHQ	No Distress (≤15)	86 (71.7%)
	Distress (16–20)	23 (19.2%)
	Severe Distress (>20)	11 (9.2%)
MoCA Category	Normal cognition (26–30)	61 (50.8%)
	Mild Cognitive Impairment (18–25)	42 (35%)
	Moderate–Severe Cognitive Impairment (<18)	17 (14.2%)

Cognitive status varied significantly by education ($p = 0.0028$) and socioeconomic status (SES) ($p = 0.0002$) showing more cognitive impairment in lesser educated individuals belonging to lower and middle socioeconomic status. No significant relationship was observed between cognitive status and age, gender, marital status, diabetes mellitus, hypertension, visual aid use, hearing aid use, or psychological distress (all $p > 0.05$). [Table 3]

Table 3: Association between Cognitive Status and Sociodemographic and Clinical Characteristics of the Study Participants

Variable	Category	Normal (26–30) n=61	MCI (18–25) n=42	Moderate–Severe (<18) n=17	p-value
Age (years)	60–69	35 (57.4)	20 (33.3)	5 (8.3)	0.309
	70–79	19 (46.3)	14 (34.1)	8 (19.5)	
	≥80	7 (36.8)	8 (42.1)	4 (21.1)	
Gender	Male	31 (50.8)	23 (37.7)	7 (11.5)	0.64
	Female	30 (50.8)	19 (32.2)	10 (16.9)	
Marital Status	Married	42 (53.2)	27 (34.2)	10 (12.7)	0.724
	Widowed	15 (50.0)	11 (36.7)	4 (13.3)	
	Others (Single + Divorced)	4 (36.4)	4 (36.4)	3 (27.3)	
Education	Low (Illiterate–Middle)	10 (27.8)	16 (44.4)	10 (27.8)	0.0028
	Middle (High School–	31 (56.4)	17 (30.9)	7 (12.7)	

	Diploma)				
	High (Graduate & above)	20 (69.0)	9 (31.0)	0 (0.0)	
SES	Lower	0 (0.0)	0 (0.0)	3 (100.0)	0.0002
	Upper Lower	5 (23.8)	11 (52.4)	5 (23.8)	
	Lower Middle	26 (55.3)	14 (29.8)	7 (14.9)	
	Upper Middle	27 (60.0)	16 (35.6)	2 (4.4)	
	Upper	3 (75.0)	1 (25.0)	0 (0.0)	
Diabetes Mellitus	Yes	24 (45.3)	20 (37.7)	9 (17.0)	0.52
	No	37 (55.2)	22 (32.8)	8 (11.9)	
Hypertension	Yes	27 (46.6)	22 (37.9)	9 (15.5)	0.662
	No	34 (54.8)	20 (32.3)	8 (12.9)	
Visual Aid	Yes	38 (47.5)	30 (37.5)	12 (15.0)	0.585
	No	23 (57.5)	12 (30.0)	5 (12.5)	
Hearing Aid	Yes	11 (47.8)	8 (34.8)	4 (17.4)	0.878
	No	50 (51.5)	34 (35.1)	13 (13.4)	
Psychological Distress	No Distress (≤15)	46 (53.5)	29 (33.7)	11 (12.8)	0.623
	Distress (>15)	15 (44.1)	13 (38.2)	6 (17.6)	

Spearman's correlation analysis in GHQ score and MoCA score showed a correlation coefficient of −0.042 (p 0.6504). [Table 4]

Table 4: Correlation between psychological distress and cognitive status among the study participants

Variable	Correlation coefficient (Spearman's r)	p-value
GHQ score vs. MoCA score	−0.042	0.6504

No independent predictors of cognitive impairment were identified in the multivariable logistic regression analysis (all p>0.05). [Table 5]

Table 5: Multivariable logistic regression analysis for predictors of cognitive disturbance

Variable	B	Adjusted OR (95% CI)	p-value
Age (years)	0.035	1.036 (0.988–1.086)	0.142
Education (ordinal)	−0.241	0.786 (0.611–1.010)	0.06
SES (ordinal)	−0.384	0.681 (0.384–1.208)	0.189
Constant	−0.214	0.807	0.909

The multivariable logistic regression model showed an overall model χ^2 of 16.263 (df=3, p=0.001), with Cox & Snell R^2 of 0.127, Nagelkerke R^2 of 0.169 & classification accuracy of 67.5%. [Table 6]

Table 6: Model fit statistics of the multivariable logistic regression model

Statistic	Value
−2 Log Likelihood	150.059
Cox & Snell R^2	0.127
Nagelkerke R^2	0.169
Overall Model χ^2	16.263 (df = 3), p = 0.001
Classification Accuracy	67.50%

DISCUSSION

Cognitive impairment is common health problem observed in older people & can lead to impaired functional independence and low QOL. This study examined the prevalence of cognitive impairment and its sociodemographic correlates among older adults residing in urban Chennai. Nearly half of the participants had cognitive impairment. Lower levels of education and lower to middle class SES were associated with cognitive impairment, whereas psychological distress and the variables included in the multivariable analysis showed no significant association.

Most participants in the present study were aged 60–69 years with an almost equal distribution of gender. Cognitive impairment was present in nearly half of participants & mild cognitive impairment was more frequent than moderate to severe cognitive impairment. Education & SES showed significant associations with cognitive status. Diwakar et al. also reported that most participants were aged 60–69 years (62.0%) with a nearly equal gender distribution (53.0% females). Their study reported a lower prevalence of cognitive impairment (36.67%) and mild cognitive impairment (11.67%) than the present study. They found that leisure activities, gait disturbances & depression were associated with cognitive impairment, whereas the present study found significant associations only with education and SES.[9] The higher prevalence of cognitive impairment in the present study could be related to the use of the MoCA, a screening tool that detects mild cognitive impairment more effectively than many conventional cognitive assessment instruments.[10,11]

Saikia and Rajendran reported that most participants (62.5%) was found to be at ages of 60 & 69 as lower

prevalence of mild cognitive impairment (22.4%). They also observed a significant association between education and mild cognitive impairment, whereas age, diabetes, and hypertension were not significantly associated. However, gender, living arrangement, alcohol consumption, sleep disturbance, and depression were identified as significant risk factors.[12] Chuang et al. reported a lower overall prevalence of mild cognitive impairment (17.3%), including a prevalence of 10.8% among urban older adults. They also identified lower educational level as a significant factor associated with mild cognitive impairment. Male gender, diabetes, and depressive symptoms were also significantly associated, whereas age and hypertension were not.[6] These findings suggest that educational attainment may influence cognitive function among older adults, while differences across studies may reflect variations in study populations and assessment methods. The association between education and cognitive impairment may be explained by the cognitive reserve hypothesis, which proposes that higher educational attainment improves resilience to age-related neuropathological changes through more efficient or compensatory neural networks.[13] In addition, individuals with higher education often have greater cognitive stimulation, better health literacy, and healthier lifestyle practices, all of which contribute to maintaining cognitive function in later life.[14] The difference in varying cognition across SES can be explained by access to education, healthcare, adequate nutrition and other social/ cognitive opportunities, which maybe less in the lower SES along with chronic health conditions and financial stress. These increase the risks of developing cognitive impairment.[16,17,18]

Psychological distress was not significantly related to cognitive impairment in the present study. Assariparambil et al. reported a significant negative correlation between cognitive function and depression among older adults ($r = -0.494$, $p < 0.05$).[15] Shetty et al. reported higher odds of cognitive impairment among participants with depression (OR = 2.64, $p < 0.001$).[16] Muhammad and Meher also reported higher odds of cognitive impairment among older adults with depression (AOR = 1.22).[4] The contrasting findings could be due to differences in the study population, study setting, and assessment methods. The present study measured psychological distress using the GHQ-12, whereas the other studies assessed depression with depression-specific instruments. Most participants in the present study had no psychological distress, which reduced the number of participants with psychological distress available for comparison.

After adjustment for other variables, age, education, and SES were not independent predictors of cognitive impairment. Muhammad et al. reported that decrease subjective SES (aOR = 2.04), decrease objective SES (aOR = 1.32), lack of education (aOR = 22.40) and Scheduled Tribe status (aOR = 1.80) were independently associated with high odds of cognitive impairment after multivariable adjustment.[17] Similarly, Shetty et al. found that age, gender, and SES were not independent predictors of cognitive impairment after adjustment, whereas low literacy remained an independent predictor (adjusted OR 3.07 for 1–7 years of schooling and 3.36 for no schooling; both $p < 0.001$), and working in old age showed a protective effect on cognitive function.[16] The factors associated with cognitive impairment differed across populations, although education remained consistently associated with cognitive outcomes.

Limitations

The cross-sectional design of the study did not allow causal relationships to be established. As participants were recruited through convenience sampling from a single urban area, the findings cannot be generalized to other populations. Cognitive impairment was evaluated using a screening tool and was not confirmed by a clinical diagnosis. The standard educational adjustment recommended for the MoCA was not applied, which may have influenced the association between education and cognitive status. The relatively small sample size and the limited number of variables included in the regression model may have reduced the ability to identify independent predictors of cognitive impairment.

CONCLUSION

Cognitive impairment was common among older adults in urban population of Chennai. Lesser education and lower to middle SES were associated with cognitive impairment, whereas psychological distress showed no significant relationship. Community-based cognitive screening & early detection can help identify older adults with cognitive impairment and support timely care.

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