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Original Research Article

Comparative study of 3 tests of cognitive impairment MMSE, AD-8, GPCOG in 200 geriatric cases suspected to have cognitive impairment out of 3750 screened

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ABSTRACT

Background: Dementia is a progressive decline in cognition, function, behavior and activities of daily living. Many assessment scales are used in screening for cognitive impairment, making diagnosis of dementia and for follow-up. Assessment scales in the domains of cognition, function, behavior, quality of life, depression in dementia, care giver burden and dementia severity are used. There are many tools used to assess cognitive function.
Methods: Authors performed the 3 object recall, 3 name recall tests, and included care-giver's opinion about the patient's cognitive state as the primary screening test for cognitive impairment. After this, we tested it the patient (in whom any of the above three were impaired) with the MMSE, AD8 and GPCOG instruments.
Results: The result were compared of each of the preliminary screening test to each of these three standard tools by applying statistical test (chi square).
Conclusions: The screening tests and care giver's opinion about patient's condition (that take 2-3 minutes) have been shown to correlate with MMSE (8 minutes), AD8 (6 minutes), GPCOG (6-9 minutes). This saves the doctor's, patient's and caregiver's time. The screening can be done by trained health worker, thus sparing the geriatrician to do more advanced patient related work.

Keywords: AD8, Cognitive, Dementia, GPCOG, MMSE

INTRODUCTION

Dementia and mild cognitive impairment (MCI) are under- recognized in community settings. This may be due to less awareness and also to the lack of brief and suitable dementia screening tools available to general practitioners.

It is now recommended that routine screening of patients for cognitive impairment when they are over a certain age (e.g. 75 years) should be carried out by using one or more of the several dementia screening tools that would screen dementia early in the disease course.[1] Of course, if a test is negative, the clinical picture, caregiver's opinion and judgment of the practitioner should prompt the use of other tests, a second opinion and follow-up.

Mild Cognitive impairment (MCI) is a transitional stage between normal ageing and dementia, and reflects the clinical situation where a person has memory complaints but no evidence of impairment of activities of daily living (ADL) and not affecting much quality of life domains.

Nonetheless, research shows that both MCI/Dementia exert a substantial burden on patients' lives and the lives of those close to them.[2]

Individuals with MCI are more likely to convert to Alzheimer's disease than cognitively normal elders. Mild cognitive impairment includes subjective memory complaints, objective evidence of memory deterioration, normal general cognitive function, normal capacity to perform daily activities, and the absence of a dementia syndrome.[3,4]

Problems of learning and retention of new information are probably the earliest manifestations of dementia. Compared to non-amnestic forms, people with amnestic forms of mild cognitive impairment (MCI) are at increased risk of progression to dementia. Episodic memory deficits have been associated with neuropathological involvement of the medial temporal lobe, specifically, the hippocampus and entorhinal cortex.[4]

The prevalence of missed diagnosis ranges from 25% to 90%. Primary care physicians may not recognize mild cognitive impairment.

The Mini-Mental State Examination (MMSE) is the most widely applied test for dementia screening. Since the intellectual property rights of the MMSE were transferred to Psychological Assessment Resources in 2001, it has become less accessible.[5]

Diagnosing dementia early enables patients to plan for their future before cognitive decline impairs mental capacity and helps therapy. The ideal test needs to possess high sensitivity and specificity, be brief and acceptable to both health care providers and test subjects. The sensitivity and specificity of MMSE, the most commonly utilized cognitive instrument, ranged from 71 to 92% and 56 to 96% respectively.[1] MMSE has been proven to have low sensitivity and specificity, especially when used in mild or early disease conditions.[3]

AD8 comprises an eight-question brief informant interview focusing on functional changes due to cognitive problems. Using the cut-off ≥2, it has been shown to detect dementia with a sensitivity of 74% and a specificity of 86%.[6]

A study confirms that AD8, combined with three-item recall and intersecting pentagon copy of the MMSE, is a valid and convenient tool of good diagnostic utility for mild dementia. It is brief and easily administered, supporting its potential as a practical and inexpensive means to detect dementia, especially in resource-constrained primary care and community settings.[6]

The GPCOG is a suitable instrument for use to screen for dementia in primary care. It is simple, brief, efficient, reliable, and valid and can meet the needs of GPs.

It is cautioned that screening is only the first step in the process of detecting dementia. Supplementary education for GPs is recommended.

This should include information about how to administer the GPCOG, about the differential diagnosis of cognitive Impairment, and about dementia management principles.[7]

Probable dementia due to Alzheimer disease[8]

The patient meets criteria for dementia and has the following characteristics

- Insidious onset over months to years, not sudden over hours or days
- Clear-cut history of worsening cognition by report or observation
- Initial and most prominent cognitive deficits are evident on history and examination in one of the following categories:
- Amnestic presentation (most common presentation) - Deficits should include impairment in learning and recall of recently learned information, plus cognitive dysfunction in at least one other cognitive domain.
- Non-amnestic presentations:
- Language presentation - The most prominent deficits are in word finding, but deficits in other cognitive domains should be present.
- Visuospatial presentation - The most prominent deficits are in spatial cognition, but deficits in other cognitive domains should be present.
- Executive dysfunction - The most prominent deficits are impaired reasoning, judgment, and problem solving.

NIA-AA core clinical diagnostic criteria for all-cause dementia and dementia due to alzheimer disease[8]

Dementia

The patient has cognitive or behavioral symptoms that:

- Interfere with the ability to function at work or at usual activities.
- Represent a decline from previous levels of functioning and performing.
- Are not explained by delirium or major psychiatric disorder.

Cognitive impairment is detected and diagnosed through a combination of:

- History-taking from the patient and a knowledgeable informant.
- An objective cognitive assessment, either a “bedside” mental status examination or neuropsychological testing.

The cognitive or behavioral impairment involves a minimum of two of the following domains[8]

- Impaired ability to acquire and remember new information.

- Impaired reasoning, judgment, and handling of complex tasks.
- Impaired visuospatial abilities.
- Impaired language functions.
- Changes in personality, behavior, or comportment.

Dementia screening tests: International and national status[9]

- Mini Mental Status Examination (MMSE).
- General Practitioner Assessment of Cognition (GPCOG).
- Memory Impairment Screen (MIS).
- Mini Cog.
- Montreal Cognitive Assessment (MoCA).
- Addenbrooke Cognitive Assessment (ACE).
- Clinical Dementia Rating (CDR).
- Rowland Universal Dementia Assessment Scale (RUDAS).

Education plays an important role in determining test performance of subjects on tests of cognition. The different categories of schools, curricula, and lack of uniform assessment makes it challenging to accurately determine the literacy and cognitive ability of an individual.[3] Clinicians in India commonly observe this type of inferior test performance.

Often, organic brain conditions are taken as normal aging. The stigma, caregiver effort, and embarrassment attached to the behavioral symptoms of dementia cause these symptoms to be taken as deliberate misbehavior. Due to the lack of access to any organized medical care systems for a considerable proportion of population, cases of neurocognitive ailments may not get the attention they need.

The caregiver report of the level of cognitive functioning of an individual is often ambiguous. Approximately 25% of the family members of a patient do not recognize any memory impairment. There is a general lack of awareness of the benefits of cognitive testing and rehabilitation. There is a decreased priority for research in the field of cognitive assessment in India.[3]

- Montreal cognitive assessment (MoCA) has shown better sensitivity and specificity when compared with the MMSE.[3]
- Addenbrooke's cognitive examination-III is a 100-point simple, brief, paper- and pencil-based measure of global cognitive function that can be used at the bedside.[3]
- The Community Screening Instrument for Dementia (CSI-D) is a cognitive screening tool that forms a part of the 10/66 study batteries of tests as the measure of global cognitive function. It is a 32-item cognitive test which is used to generate a global cognitive score.[3]
- World health organization's Study on AGEing and adult health Survey (SAGE) is another test that is freely available.[3]
- Multi-domain cognitive screening test (MDCST) is a sensitive and easy to administer global cognitive screening tool developed for detection of early MCI and has shown good psychometric properties for further use in demographic studies.[3]
- Dementia Assessment by Rapid Test (DART) is scored on range of scores from 0 to 4. It has been shown to have good sensitivity and concurrent validity but low specificity when compared to the MMSE.[3]
- Dementia Assessment by Rapid Test (DART) consisted of four questions/items.

The four cognitive domains are follows[9]

Repeating dissimilar words

The patient has to repeat 3 common words (elephant, bottle, and paper), to assess the domain of recent memory (Hippocampus).

Naming

The patient is asked to name as many vegetable names within 1 minute as he can. This item assesses the domain of verbal fluency (temporal lobe).

Recall dissimilar words

It was tested by asking the subject to recall 3 words spoken earlier to assess the domain of delayed memory (hippocampus and temporal lobe).

Clock drawing

This was tested by asking the patient to draw a clock showing time. This item assesses the domains of visuo-spatial and executive functioning covering both frontal and parietal lobe. (If the patient is not able to draw; then a toy clock with needles is used, where the patient has to rotate the needles and show the prescribed time).

- The SRT (Story Recall Test) is one of the most reliable measurements for distinguishing between normal cognitive aging, patients with mild cognitive impairment (MCI), and patients with AD.[10]
- Word-list learning tests - A common feature of these tests is that several lists of words are used to assess verbal memory. The participants are asked to memorize the words several times and then to complete an immediate recall test, a 20-minute delayed recall test, and a recognition test. The word-list learning test is a more sensitive tool than the SRT.[10]

All subjects were aged ≥60 years. They were required to have satisfactory vision and hearing. Satisfactory vision

was defined as being able to read newsprint, while satisfactory hearing was defined as being able to carry out a normal conversation, with or without the use of hearing aids.[6]

A study observed that the addition of a functional assessment component in the form of AD8 to MMSE resulted in a significantly improved diagnostic performance (sensitivity 91.9%, specificity 84.3%).[6]

It was also found that AD8 in combination with only three-item recall and intersecting pentagon tests (AD8+Recall+Copy) achieved diagnostic performance comparable to the AD8 with the full MMSE for screening mild dementia.[6]

Another test, the 5 Objects Test evaluates the recall of specific positions of the five objects in a more standardized way.[11]

Aim of the study was to screen as many patients as possible for cognitive impairment and try to confirm the diagnosis by using 3 standard tests for memory and cognitive impairment and to study the utility of simple 3 object 3 name recall test for screening patients.

METHODS

Initial screening

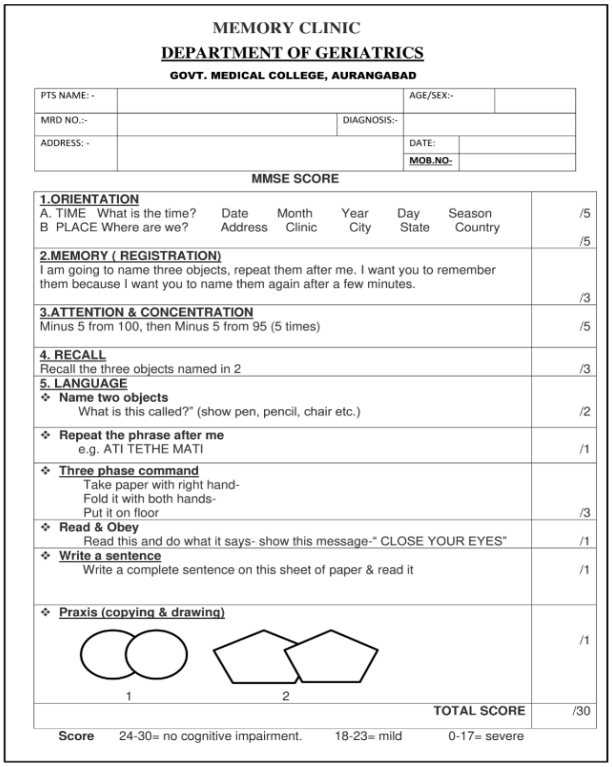
Maximum possible patients attending Geriatric OPD in our hospital are screened by health worker by preliminary tests -

- Patient is asked to give his Bio-data,
- His consent is taken for participating in questionnaire.
- Care-giver's opinion about patient's memory status is recorded.
- Recall 3 Names- patient is told to repeat 3 common names told by the investigator.
- Recall 3 objects – He is shown and asked to name 3 common objects like pen, key, mobile, coin. He is asked to remember them.

After this, his medical history is recorded in brief and BP measured -in about 3-5 minutes. Now he is again asked to recall the 3 names and 3 objects he had named earlier. If he makes a mistake or if caregiver complains about forgetfulness, behavioral changes, he is referred to the Geriatrician as a cognitive impairment suspect.

Now he is screened with 3 standard Questionnaires (MMSE, AD-8 score, GPCOG).

Mini-Mental State Exam (MMSE): The maximum MMSE score is 30 points. A score of 24 to 30 suggests no dementia, 18 to 23 suggests mild dementia, and 0 to 17 indicates severe dementia (Figure 1).



MEMORY CLINIC

DEPARTMENT OF GERIATRICS

GOVT. MEDICAL COLLEGE, AURANGABAD

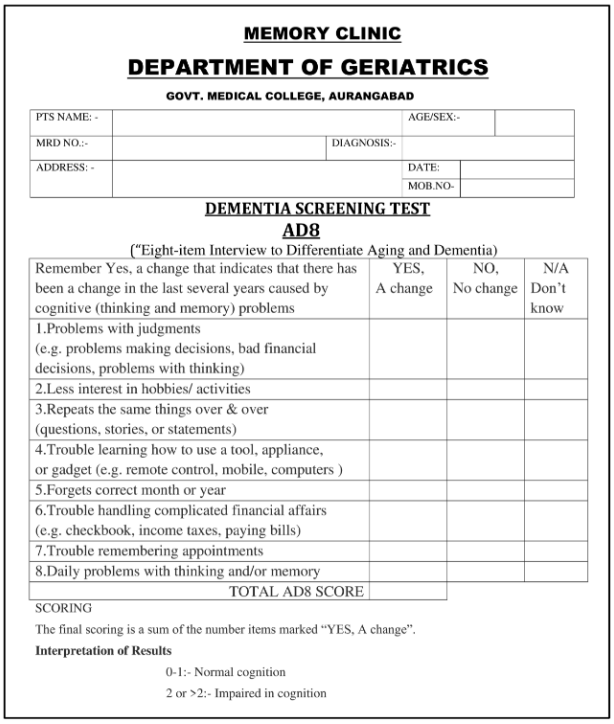
PTS NAME: -		AGE/SEX:-	
MRD NO.:-	DIAGNOSIS:-		
ADDRESS: -		DATE:	
		MOB.NO-	

MMSE SCORE

1.ORIENTATION A. TIME What is the time? Date Month Year Day Season B PLACE Where are we? Address Clinic City State Country	/5 /5
2.MEMORY (REGISTRATION) I am going to name three objects, repeat them after me. I want you to remember them because I want you to name them again after a few minutes.	/3
3.ATTENTION & CONCENTRATION Minus 5 from 100, then Minus 5 from 95 (5 times)	/5
4. RECALL Recall the three objects named in 2	/3
5. LANGUAGE ❖ **Name two objects** What is this called?" (show pen, pencil, chair etc.)	/2
❖ **Repeat the phrase after me** e.g. ATI TETHE MATI	/1
❖ **Three phase command** Take paper with right hand- Fold it with both hands- Put it on floor	/3
❖ **Read & Obey** Read this and do what it says- show this message-" CLOSE YOUR EYES"	/1
❖ **Write a sentence** Write a complete sentence on this sheet of paper & read it	/1
❖ **Praxis (copying & drawing)** 1 2	/1
TOTAL SCORE	/30

Score 24-30= no cognitive impairment. 18-23= mild 0-17= severe

Figure 1: MMSE proforma.



MEMORY CLINIC

DEPARTMENT OF GERIATRICS

GOVT. MEDICAL COLLEGE, AURANGABAD

PTS NAME: -		AGE/SEX:-	
MRD NO.:-	DIAGNOSIS:-		
ADDRESS: -		DATE:	
		MOB.NO-	

DEMENTIA SCREENING TEST

AD8

("Eight-item Interview to Differentiate Aging and Dementia)

Remember Yes, a change that indicates that there has been a change in the last several years caused by cognitive (thinking and memory) problems	YES, A change	NO, No change	N/A Don't know
1.Problems with judgments (e.g. problems making decisions, bad financial decisions, problems with thinking)			
2.Less interest in hobbies/ activities			
3.Repeats the same things over & over (questions, stories, or statements)			
4.Trouble learning how to use a tool, appliance, or gadget (e.g. remote control, mobile, computers)			
5.Forgets correct month or year			
6.Trouble handling complicated financial affairs (e.g. checkbook, income taxes, paying bills)			
7.Trouble remembering appointments			
8.Daily problems with thinking and/or memory			
TOTAL AD8 SCORE			

SCORING

The final scoring is a sum of the number items marked "YES, A change".

Interpretation of Results

0-1:- Normal cognition

2 or >2:- Impaired in cognition

Figure 2: AD 8 proforma.

Eight-item Interview to Differentiate Aging and Dementia (AD-8): The AD8 is a brief instrument to discriminate between signs of normal aging and mild dementia. Cut off score: normal cognition 0-1; impairment in cognition 2 or greater (Figure 2).

MEMORY CLINIC
DEPARTMENT OF GERIATRICS
Govt. Medical College Aurangabad

Date / /

Patient's Full Name: Age MRD Number:

Address :

Mob No. Occupation : Education:

General Practitioner Assessment of Cognition
(GPCOG)
Step 1: Patient Assessment

Unless specified, each question should only be asked once

Name and Address for subsequent recall test		
1. "I am going to give you a name and address, I want you to repeat it. Remember this name and address because I am going to ask you to tell it to me again in a few minutes: Sunil Kishan Mhaske Near Daulatabad Fort Aurangabad.		
(Please tick appropriate box ✓)	Correct ✓	Incorrect x
Time Orientation		
2. What is the date? (exact only)		
Clock Drawings — Use blank page		
3. Please mark in all the numbers to indicate the hours of a clock (correct spacing required)		
4. Please mark in hands to show a certain time ex. 11.10am.		
Information		
5. Can you tell me something that happened in the news in the last week.		
Recall		
6. What was the name and address I asked you to remember?		
Sunil		
Mhaske		
Near Daulatabad Fort		
Aurangabad		
(To get a total score, add the numbers of items answered correctly Total Correct (Score out of 9)	/ 9	
If patient scores 9, no significant cognitive impairment and further testing not necessary.		
If patient scores 5 — 8, more information required. Proceed with Step 2, carer section		
If patient scores 0 - 4, cognitive impairment is indicated. Refer to General Practitioner Follow up date:-		

Assessor Name Signature	Date Time	Designation

Figure 3: GPCOG 1 proforma.

MEMORY CLINIC
DEPARTMENT OF GERIATRICS
Govt Medical College Aurangabad

Date / /

Patient's Full Name: Date of Birth: MRD Number:

Address :

Mob No. Occupation : Education:

General Practitioner Assessment of Cognition
(GPCOG)
Step 2:

CARER INTERVIEW				
Carer's Name				
Carer's relationship to patient i.e. carer is the patient's:				
These 6 questions ask how the patient is compared to when s/he was well, say 5 -10 years ago:				
(Please tick appropriate box ✓)	Yes	No	Don't Know	N/A
Does the patient have more trouble remembering things that have happened recently than s/he used to?				
Does he or she have more trouble recalling conversations a few days later?				
When speaking, does the patient have more difficulty in finding the right words or tend to use the wrong words more often?				
Is the patient less able to manage money and financial affairs? (e.g. paying bills, budgeting)				
Is the patient less able to manage his or her medication independently?				
Does the patient need more assistance with transport? (either private or public) If the patient has difficulties due only to physical problems e.g. bad leg, tick 'no'				
	Scores			
To get a total score, only add the number of items answered 'no', don't know or Not Applicable				
Total Score (out of 6)	/6			
If patient scores 0 — 3, cognitive impairment is indicated.				

Assessor Name Signature	Date Time	Designation

Figure 4: GPCOG 2 proforma.

The General Practitioner Assessment of Cognition (GPCOG): A brief screening test for cognitive impairment. It has two sections a patient examination (GPCOG-patient part 1) with a maximum score of 9, and an care-giver interview (part 2) with a maximum score of 6. Part 1 score of 9 indicates no cognitive impairment, someone scoring 4 points or less is very likely to have cognitive impairment. There is no need to complete the informant interview. A score of 5 to 8 indicates some impairment, further testing is required with part 2(care-giver interview). The general practitioner should conduct the care-giver interview (Figure 3).

A score of 0 to 3 in the care-giver interview in conjunction with a score of 5 to 8 in the patient interview indicates cognitive impairment. Score of 4 to 6 indicates no cognitive impairment in part 2 (care-giver interview) (Figure 4). Depending on his symptoms and clinical examination, he is investigated and treated.

RESULTS

Total screened patients were 3750. Suspected to have cognitive impairment were 200.

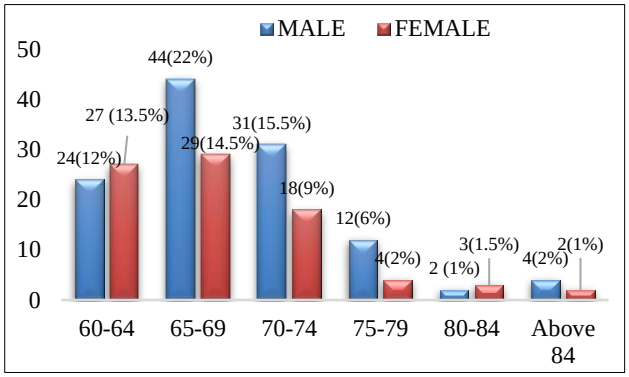


Figure 5: Age- sex distribution of suspected cognitive impairment patients.

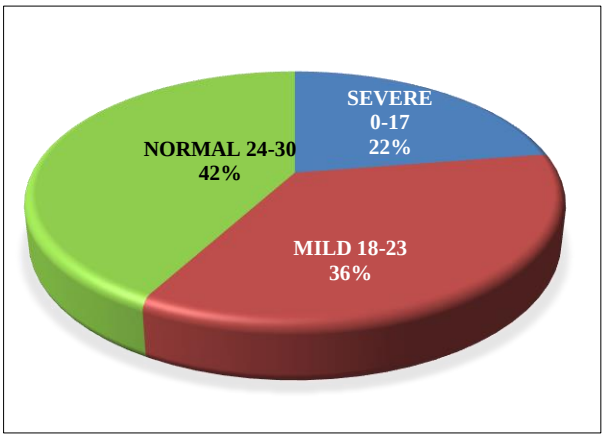


Figure 6: Cognitive impairment by MMSE Scoring system.

Figure 5 shows out of 200 cognitive impairment suspects, the maximum number of patients (73) belonged to the age group of 65-69 (36.5%) followed by 60-64 age group (25.5%).

Out of 200 cognitive impairment suspects 117 (58.5%) patients were males and 83 (41.5%) female.

Figure 6 shows out of 200 suspected we found that 58% patients had cognitive impairment and 42% patients had normal cognition.

Figure 7 shows out of 200 suspected we found that 66% patients had cognitive impairment and 34 % patients had normal cognition.

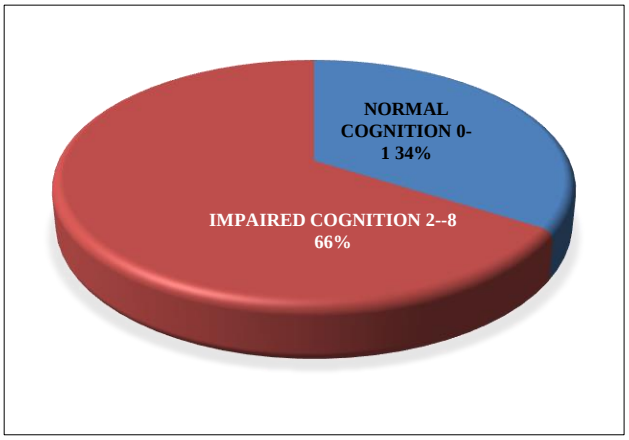


Figure 7: Cognitive impairment by AD-8 Scoring system.

Figure 8 shows by GPCOG -1 clear cut cognitive impairment found in 19% and 68% required further evaluation with GPCOG-2.

Figure 9 shows Out of 68% required GPCOG testing, 49% had cognitive impairment and 51 had normal cognition. So, total cognitive impairment by GPCOG (1 + 2) = 19% + 49%= 68%.

Figure 10 shows 68.8 % positivity of abnormal MMSE in abnormal 3 object recall test.

Figure 11 shows 84.7% positivity of abnormal MMSE in abnormal 3 name recall test. Figure 12 shows 62.5% positivity of abnormal MMSE in abnormal care-giver's opinion.

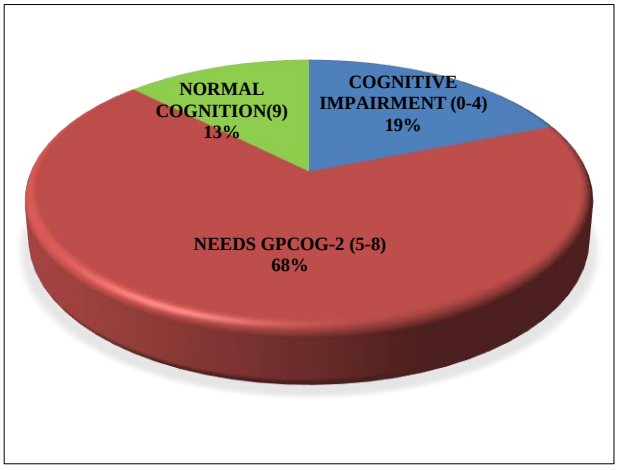


Figure 8: Cognitive impairment by GPCOG - 1.

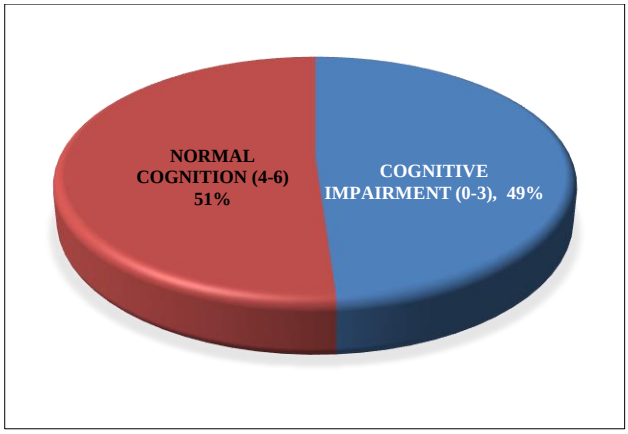


Figure 9: Cognitive impairment by GPCOG -2.

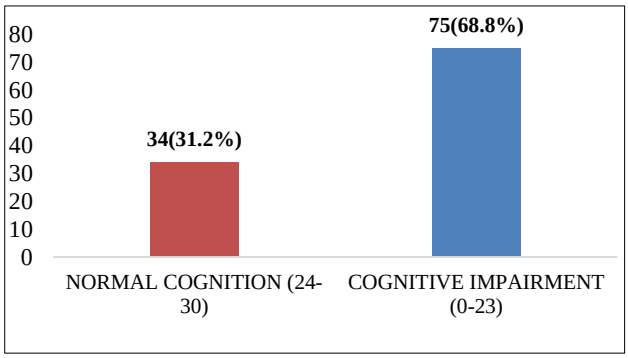


Figure 10: MMSE and 3 object recall test.

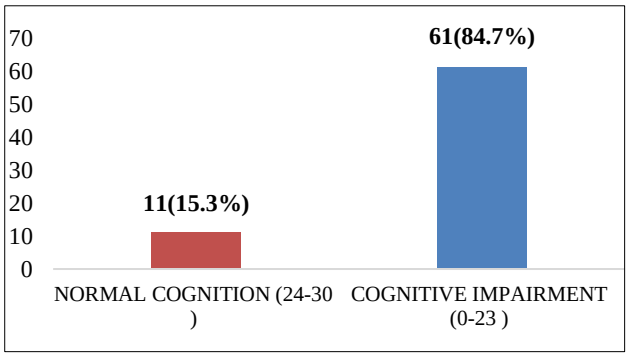


Figure 11: MMSE and 3 name recall test.

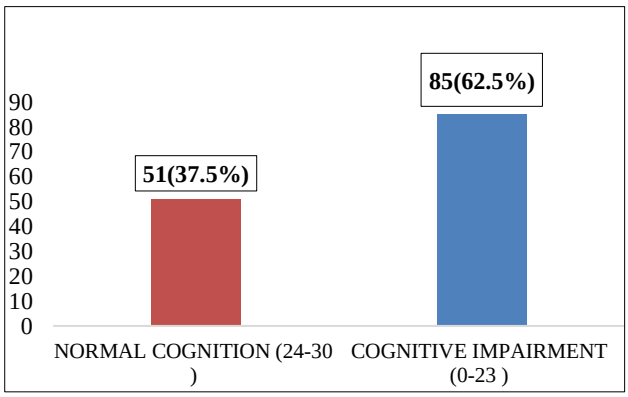


Figure 12: MMSE and care givers opinion

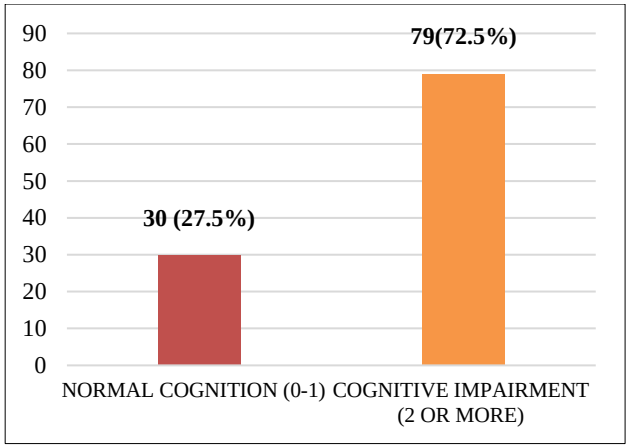


Figure 13: AD 8 and 3 object recall test.

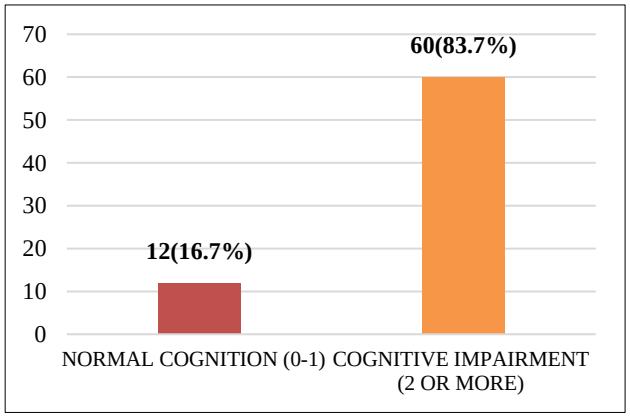


Figure 14: AD 8 and 3 name recall test.

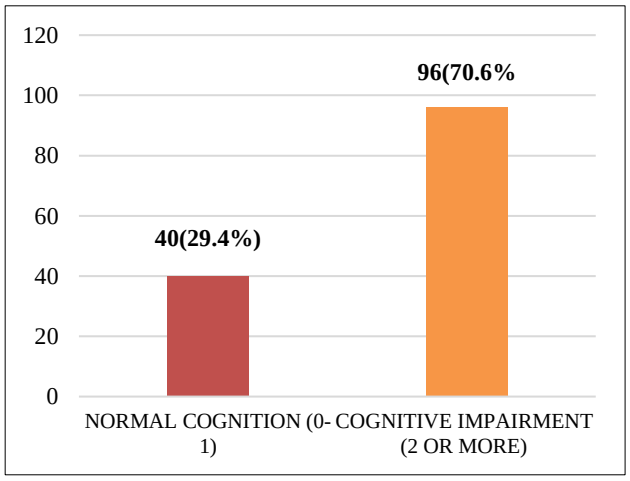


Figure 15: AD 8 and 3 care givers recall test.

Figure 13 shows 72.5% positivity of abnormal AD8 in abnormal 3 object recall test. Figure 14 shows 83.7% positivity of abnormal AD8 in abnormal 3 name recall test. Figure 15 shows 70.6% positivity of abnormal AD8 in abnormal care-giver's opinion.

Figure 16 shows 24% positivity of abnormal GPCOG-1 in abnormal 3 object recall test. Figure 17 shows 29.2% positivity of abnormal AD8 in abnormal 3 name recall test. Figure 18 shows 24.2% positivity of abnormal AD8 in abnormal care-giver's opinion.

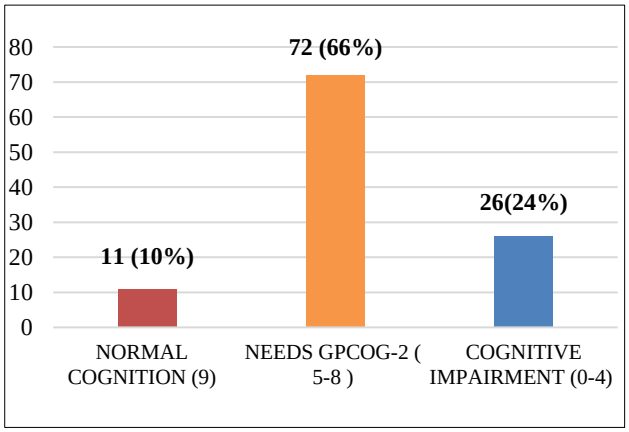


Figure 16: GPCOG1 and 3 object recall test, 3 name recall test and care givers opinion.

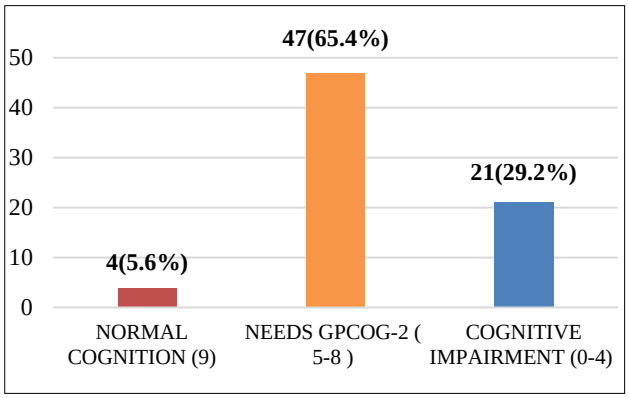


Figure 17: GPCOG1 and 3 name recall test.

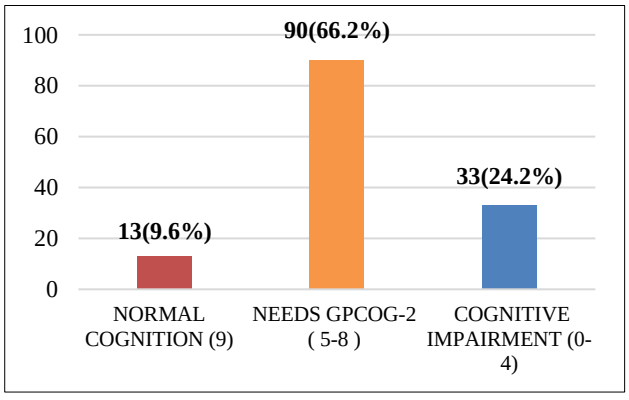


Figure 18: GPCOG1 and care givers opinion.

Figure 19 shows 50% positivity of abnormal GPCOG-2 in abnormal 3 object recall test. Figure 20 shows 63.8% positivity of abnormal GPCOG-2 in abnormal 3 name recall test.

Figure 21 shows 54.4% positivity of abnormal GPCOG-2 in abnormal care-giver's opinion. Figure 22 shows time

required to perform MMSE (8min), AD8 (6min), GPCOG (6-9minutes).

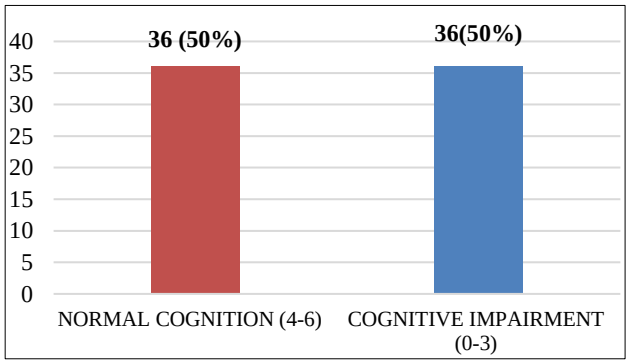


Figure 19: GPCOG2 and 3 object recall test.

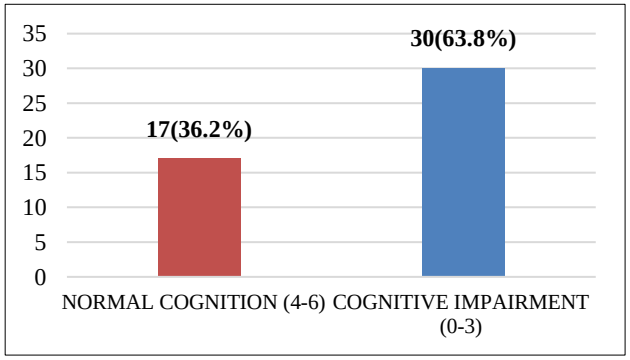


Figure 20: GPCOG2 and 3 name recall test.

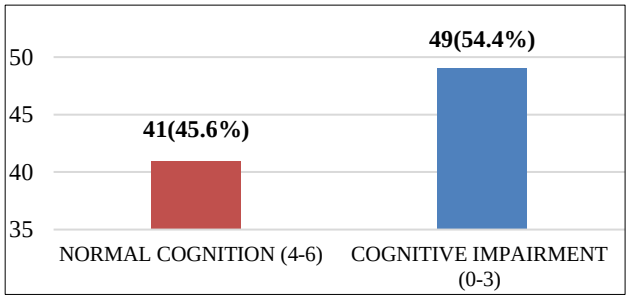


Figure 21: GPCOG2 and care givers opinion.

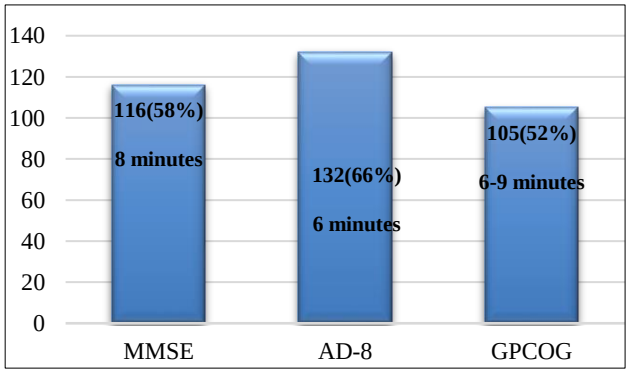


Figure 22: Cognitive impairment tools vs time required to test.

DISCUSSION

Diagnosing dementia early enables patients to plan for their future before cognitive decline impairs mental capacity and helps therapy. The ideal test needs to possess high sensitivity and specificity, be brief and acceptable to both health care providers and test subjects. The sensitivity and specificity of MMSE, the most commonly utilized cognitive instrument, ranged from 71 to 92% and 56 to 96% respectively.[1] MMSE has been proven to have low sensitivity and specificity, especially when used in mild or early disease conditions.[3]

AD8 comprises an eight-question brief informant interview focusing on functional changes due to cognitive problems. Using the cut-off ≥2, it has been shown to detect dementia with a sensitivity of 74% and a specificity of 86%.[6]

The advantages of the GPCOG over current brief screening instruments are that it combines patient and informant data, is quick to administer, has been validated in a primary care setting, and has sound psychometric properties. Psychometrically, it performed better as a screening instrument than the AMT and slightly (although non significantly) better than the MMSE but was quicker and likely to be more acceptable to GPs and patients.

The two stage procedure is time efficient (only 47.7% of cases required the care giver to be contacted) without sacrificing classificatory power and has high sensitivity, specificity, PPV and NPV. Only 7% of patients who were identified as nondemented by the GPCOG had dementia (NPV 0.933), and, of the false positives (abnormal GPCOG but no DSM defined dementia), 38% had definite cognitive impairment but did not meet diagnostic criteria for dementia. In addition, vast majority of GPs rated the GPCOG as being practical, economically feasible and acceptable to patients. Using the refined version of the GPCOG, performed cognitive testing first part in less than 4 minutes and administered the second part (interrogating the care giver) in less than 7 minutes. Further advantages of the GPCOG are that performance appeared to be independent of the patients Geriatric Depression Scale score, age, gender, years of education, and physical and mental health.

One of the strengths of the GPCOG lies in its inclusion of informant data. Clinicians specializing in the diagnosis of dementia rely heavily on family members reports about the performance of patients, but this has not been a feature of primary care practice.

The development of a systematic way of including informant data into general practice assessment represents an advance. As the general trend toward caregiver involvement increases, it is the ideal time to start educating GPs about a new approach to cognitive impairment screening.[7]

In this study authors screened 3750 patients with preliminary tests (3 object recall test, 3 name recall test, care giver's opinion regarding patients memory status). Among the screened, 200 patients were suspected to have cognitive impairment. We applied 3 standard (MMSE, AD8, GPCOG) tests to these suspected patients. Out of 200 cognitive impairment suspects, the maximum number of patients (73) belonged to the age group of 65-69 (36.5%). 117 (58.5%) patients were males and 83 (41.5%) female (Figure 5).

Out of 200 suspected authors found that 58% patients had cognitive impairment by MMSE, 66% patients had cognitive impairment by AD8 and 68% patients had cognitive impairment by GPCOG (1+2) (Graph 6,7,8,9).

Authors feel that good history taking, care giver's opinion and a combination of 2 or 3 standard clinical test may yield better results in diagnosing cognitive impairment.

Authors department participates in many large health camps in which we see on an average about 500 patients in 8 hours. Authors have an average of 150 patients in geriatric OPD per working day of which 30% are new patients. It is difficult to assess the cognition of all the patients by the lengthier standard screening tests. Hence we use preliminary screening test on all patients and subject the suspected cognitive impaired patient to a standard test (in whom the preliminary screening test were found to be abnormal. This saves the time of the patient as well as medical personnel and helps to perform comprehensive geriatric assessment.

Statistical significance

Chi-square test applied and the results of the 3 were again compared. For analysis, statistical software SPSS latest version 20.0 was used.

- MMSE score correlated with 3 objects and 3 names recall, care giver's opinion - (chi square test- less than 0.005 - significant).
- AD-8 score correlated with 3 objects and 3 names recall, care giver's opinion (chi square test- less than 0.005- significant).
- GPCOG (1 +2) - score correlated with 3 objects and 3 names recall, care giver's opinion - (chi square test- less than 0.005- significant).

CONCLUSION

The screening tests and care giver's opinion about patient's condition (that take 2-3 minutes) have been shown to correlate with MMSE (8 minutes), AD8 (6 minutes), GPCOG (6-9 minutes). This saves the doctor's, patient's and caregiver's time.

The screening can be done by trained health worker, thus sparing the geriatrician to do more advanced patient related work. Screening test for cognitive impairment-only 3 object recall test may be sufficient. Care giver's opinion is useful but often the patients come on their own or the care giver who accompanies does not stay with the patient and does not know finer details. Sometimes, the onset of dementia is so subtle that it may not be noticed by the person who stays continuously with the patient. Study shows that preliminary screening test could pick up cases of MCI well. More than 50% of the patient suspected to have cognitive impairment by screening by recalling names of objects were confirmed to have it by a standard test.

In a busy OPD or Health camp, the screening tests (3 object, 3 name recall), take 1/3rd the time and are very useful to detect mild cognitive impairment and can be followed up by lengthier standard tests like MMSE, AD8, GPCOG.

The shortcomings of the study includes clinical details and investigations of the patients are not included (as the aim was only to study the use of simple screening tests). To know whether screening rules out false negative cases, (patients had cognitive impairment but it was missed by preliminary screening, including caregiver's opinion and patient's account of himself), all the patients who are screened should also be subjected to the standard tests to see if any had cognitive impairment as shown by the standard tests were reported normal at the time of screening.

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REFERENCES

1. Yang L, Yan J, Jin X, Jin Y, Yu W, Xu S, et al. Screening for dementia in older adults: comparison of Mini-Mental State Examination, Mini-Cog, Clock Drawing test and AD8. PloS one. 2016;11(12).
2. Sheehan B. Assessment scales in dementia. Therapeutic Adv Neurol Disorders. 2012;5(6):349-58.
3. Porrselvi AP, Shankar V. Status of cognitive testing of adults in India. Ann Indian Acad Neurol. 2017;20(4):334-40.
4. Contador I, Fernández-Calvo B, Boycheva E, Rueda L, Bermejo-Pareja F. Normative Data of the Story and Six-Object Memory Recall Tests in Older

Spanish Adults: NEDICES Population-Based Cohort. Arch Clini Neuropsychol. 2017 Dec 1;32(8):992-1000.
5. Tsoi KK, Chan JY, Hirai HW, Wong SY, Kwok TC. Cognitive tests to detect dementia: a systematic review and meta-analysis. JAMA Int Med. 2015 Sep 1;175(9):1450-8.
6. Tew CW, Ng TP, Cheong CY, Yap P. A brief dementia test with subjective and objective measures. Dementia Geriatric Cognitive Disorders Extra. 2015;5(3):341-9.
7. Brodaty H, Pond D, Kemp NM, Luscombe G, Harding L, Berman K, et al. The GPCOG: A New Screening Test for Dementia Designed for General Practice. J Am Soc Geriatr. 2002;50(3):530-4.
8. Carlsson CM, Gleason CE, Puglielli L, Asthana S. Dementia Including Alzheimer Disease In: Jeffrey B, Ouslander JG, Studenski S, High KP, Asthana S, Ritchie C, Supiano MA. Hazzard's Geriatric Medicine and Gerontology. Seventh Edition. New York: McGraw-Hill Education Medical; 2017:321.
9. Swati B, Sreenivas V, Manjari T, Ashima N. Dementia Assessment by Rapid Test (DART): An Indian Screening Tool for Dementia. J Alzheimer's Dis Parkinsonism. 2015;05(03).
10. Baek MJ, Kim HJ, Kim SY. Comparison between the story recall test and the word-list learning test in Korean patients with mild cognitive impairment and early stage of Alzheimer's disease. J Clini Experimental Neuropsychol. 2012;34(4):396-404.
11. Papageorgiou SG, Economou A, Routsis C. The 5 Objects Test: A novel, minimal-language, memory screening test. J Neurol. 2014;261(2):422-31.

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