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# YOGA BASED INTERVENTIONS IN MANAGEMENT OF COGNITIVE DYSFUNCTION AND COMPLICATIONS IN ELDERLY

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**ABSTRACT**

*Population aging is an emerging global health concern. As the population ages the demand for new healthcare interventions increases. Cognitive impairment (CI) and dementia are highly prevalent in elderly. It is one of the main reasons for poor quality of life and dependency on aged people. This study aims to evaluate the efficacy of yoga based interventions in cognitive enhancement of elderly above 60 years in care homes in Kerala. No related study done in Kerala especially in elderly care settings. Aged people above 60 years without dementia or other psychological disturbances were selected. Screening for CI was done by Memory Impairment Screen (MIS) and General Practitioner Assessment of Cognition (GPCOG). 20 (12 male and 8 female) become eligible for the study. A yoga module with relaxing postures, loosening postures, breathing exercises and mediation was administered for this group for 3 months duration. End of the period CI tests (MIS and GPCOG) were reassessed to check the effect of yoga in the scores. 65 % of the study group improved their cognition in terms of improved memory, orientation, attention, organisation of knowledge and problem solving ability. This study can be further extended to larger population sizes and elderly in family settings. Yoga can be promoted as a preventive health intervention to dementia, other chronic illness and age related cognitive dysfunction in old age people.*

**KEY WORDS** – *Cognition, Elderly, Yoga, Dementia, Cognitive impairment, aged people*

## INTRODUCTION

Aging is associated by a gradual decrease in mental capacity affecting cognitive ability. The World Health Organization estimates that the proportion of the world's population aged over 60 years will increase from 12 % to 22 % between 2015 and 2050 (WHO, 2018). Aged population in India has significantly increased and is expected to increase rapidly than any other developed country.

## COGNITION IN ELDERLY

Cognitive Impairment (CI) in elderly is now a major public health concern due to under-diagnosis and lack of effective treatment. Cognitive stimulation and improved physical activity can help in restoring cognitive functions, and prevent the occurrence of dementia.

CI is a risk factor to develop dementia. This is a transitional stage between the normal aging process and dementia. In some cases a person may have objective evidence of CI and no symptoms of dementia. CI is when a person has trouble remembering, learning new things, concentrating, or making decisions that affect their everyday life. It ranges from mild to severe. With mild impairment, people may begin to notice changes in cognitive functions, but still be able to do their everyday activities. Severe levels of impairment can lead to losing the ability to understand the meaning or importance of something and the ability to talk or write, resulting in the inability to live independently. Changes in aged peoples memory and behaviour should not be ignored and it's never being always considered as part of aging. Memory or cognition problems observed or reported by patient or family members should be noted in the patient's record and it is needed for follow-ups (NIA 2021).

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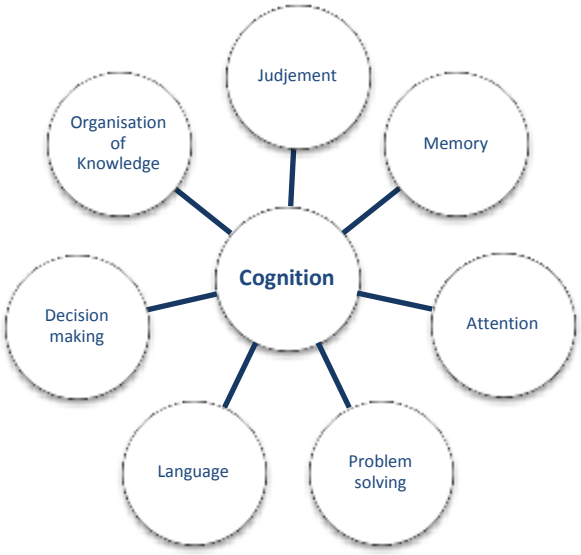


**Figure 1: Domains of cognition**

## YOGA AS A HOLISTIC HEALTH APPROACH

Yoga is an ancient scientific system originated in India. Traditional practice of yoga might be helpful in improving mental health and thus cognitive development. The Sanskrit term yoga means "the union of the individual self with transcendental self. The word 'Yoga' is derived from the Sanskrit root verb "Yuj" means bind, make union, control. Patanjali defines yoga as the stage 'attainment of total control over activities of mind'.

The practice of Yoga was started during the Indus-Sarasvati civilization in Northern India over 5,000 years ago. It was first mentioned in Rig Veda, a collection of texts that consisted of rituals, mantras, and songs which was mainly used by Brahmans, the Vedic priests. Yoga was developed slowly by Brahmans, and they clearly documented the practice system and the culture in Upanishads (part of ancient ritual books) and that has over 200 scriptures. During the Vedic times, Vedic priests were generally self-disciplined and avoided any forms of indulgence instead; they performed sacrifices which were known as yajna and used poses that most researchers believe are the precursor of the kind of yoga poses we use today in the modern world.

In the 3rd Century BCE, the word "yoga" became common in other religions like Jain, Hindu, and Buddhist writings. In the 5th century, yoga was meant for meditation and religious use, but not as a form of workout. The primitive form of yoga was meant for doing rituals and it was practised based on core values. The first core value analyzed an individual's perception and cognitive state while understanding the cause of suffering and eventually using meditation to solve the issue. The second core value focused on boosting consciousness, and the third was used as a way of achieving transcendence. The fourth value was full of mystery because it used Yoga to penetrate into other people's bodies and act supernaturally. Yoga later became widely valued because of the Indian nationalist movement as a way of building up pride and cultural identity. The practice of yoga was then popularised by families, institutions and government until India attained its independence in 1947.Today, Yoga is practiced worldwide by millions of people in many forms and variations.

Yoga has multiple physical, mental and spiritual benefits and holds that the influence of the mind on the body is far more powerful than the influence of the body on the mind. Yoga helps in gentle and automatic massaging of internal organs and thus helps in enhancing functioning of the digestive system, circulatory system, respiratory system, endocrine system, nervous system, and excretory system. It is not simply stretching postures and breathing exercises.

Yoga is being popularised all over the world as a relaxing form of exercise and involves assuming and holding postures that stretches the muscles involved. In fact Yogic practice classically aims to unite the mind with the body for a better cognition. Therefore scientific practice of yoga can bring significant health benefits. Regular practice of yoga can bring increased physical flexibility and reduced internal stress. Thus yoga is a health promoting practice.

COVID 19 pandemic had shown its adverse sudden impact on physical health and mental

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wellbeing. Depression and anxiety are highly prevalent as COVID related restrictions are still continuing in many part of the world. This situation demands the urgent need of addressing the mental health dimensions of the pandemic. Yoga had shown its significant impact on physical and mental well being amidst the pandemic. The message of yoga itself is the physical and mental health of humanity. Now there is a growing trend of people across the world adopted yoga as a routine to stay healthy, rejuvenated to fight against the isolation and depression imparted by the pandemic. Yoga plays a major role in the rehabilitation of COVID-19 patients in quarantine and isolation. It helps to remove their fear and anxiety.

Recognizing its universal appeal, on 11 December 2014, the United Nations proclaimed 21 June as the International Day of Yoga by resolution 69/131. The International Day of Yoga aims to raise awareness worldwide of the many benefits of practicing yoga. The draft resolution establishing the International Day of Yoga was proposed by India and endorsed by a record 175 member states. Recognising the important role of yoga, this year the International day of yoga had focused on the theme "Yoga for well-being " that means how the daily practice of yoga can promote the holistic health of all across world.

This study aims to evaluate the efficacy of yoga based interventions in CI on people above 60 years.

## LITERATURE REVIEW

Hariprasad et al (2013) in National Institute of Mental Health and Neurosciences conducted a randomised control study on elderly of old age homes in Bangalore city. Standard neuropsychological tests were done to assess the cognitive impairment. Validated yoga module administered to selected 87 subjects (yoga=44, control=43). Follow up assessments were done for 6 months duration. The Yoga group had significantly better scores on neuropsychological assessments at the end of the study.

Anita Verma et al (2015) conducted a study on residential school children in age group 11-15 year, which showed that the adolescent's practised yoga had shown significant improvement in concentration levels and memory

A study by Brunner D et al (2017) tested the efficacy of short yoga programs on enhancement of cognition. Participants were randomly selected above 18 years old without physical illness. Working memory (WM) maintenance, WM manipulation and attentive mindfulness were tested before and after 6 yoga sessions. Program showed significant improvement in manipulation and maintenance of WM as well as improved mindfulness scores.

A population based random control sampling study by practice of yoga and meditation found tangibly enhancing cognitive performance pertaining to higher level cognitive skills of sustained and divided attention and concentration, short term memory, visual information processing and working memory, and complex cognitive speed and flexibility over that of non practicing people. (Uthaman, S et al 2017).

## MATERIALS AND METHODS

This was a random sampling study with subjects selected from two elderly homes in Kollam, Kerala. Introductory lectures were carried out in these elderly homes to convey the details of the study. Interested people were subjected to a screening for inclusion criteria. After providing adequate information about the nature and need of study, written consent was obtained from all participants.

All candidates aged above 60 years were eligible for the study. Exclusion criteria were subjects with dementia, or other neurodegenerative disorder, stroke, major depressive disorder, psychosis, anxiety disorder, severe hearing and visual impairment and inability to perform yogic practices. Detailed information about the socio demographic variables, current medication and status of chronic illness were recorded.

Subjects screening with Geriatric Depression Scale (GDS -15) and Mini Mental State Examination (MMSE) were performed to exclude dementia, depression and other psychiatric disorders. Screening for CI was done by Memory Impairment Screen (MIS) and General Practitioner Assessment of Cognition (GPCOG). MIS tests the impairment in a patient's memory by allowing free recall and cued recall after a distractive activity. The maximum score for the MIS is 8, 5-8 No cognitive impairment, $\leq 4$ Possible cognitive impairment. GPCOG involves 2 steps, step 1 patient examination and step 2 informant examination of patient. In step 1, orientation of the patient is tested. This includes a recall test, time orientation, and information sessions. If the patient scores 9, no significant cognitive impairment and further testing is not necessary. If a patient scores 5-8, more information is required. Proceed with Step 2, informant section. If a patient scores 0-4, cognitive impairment is indicated. Both tests were carried out for selection of subjects.

After the screening test 20 subjects with significant CI (8 female and 12 male) become eligible for Yoga interventions. They were subjected to follow a set of yoga practices for a period of 3 months (12 weeks). MIS and GPCOG scores reassessed after intervention to analyse the change

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and improvement after yoga practice. Based on the therapeutic benefits a yoga module adopted from Patanjali yoga tradition. It includes Yogāsana, (loosening exercises), Sukshmavyayāma (physical postures), Prānāyāma, (breathing exercises) and meditation in the form of Nādānusandhāna (OM meditation). Subjects received 60 min yoga sessions daily for 1 month. After that they were encouraged to practice by themselves for the next 2 months under supervision. Ensured that all participants practised yoga procedures at least 3-4 times / week.

**Table 1: Yoga module components**

| Procedure | Duration |
|---|---|
| **Sukshma Vyayama** (Loosening exercises)<br>Kanta Griva Sanchalana ( Neck exercise)<br>Kati Sanchalana(Hip exercises)<br>Janu sancalana (Knee Exercises)<br>Pada sancalana (Ankle & Feet Exercises) | 10 Minutes |
| **Yogāsana**<br>Tadasana, Bhujangasna, matsyendrasana,<br>ardha chakrasana, Badha -Konasana<br>Ardhasalabhasana, Pavanamukthasana<br>Sethubandhasana,Savasana | 20 Minutes |
| **Pranayama**<br>Kapalabhati, Nadisudhi, Suryanuloma- viloma<br>Chandranuloma- viloma, Bhastrika, Bhramari | 15 Minutes |
| **Tradaka & meditation**<br>Jyothi tradaka,Nadanusandhana(Om chanting) | 15 Minutes |

## RESULTS

20 subjects participated in the study, completed one month training and 2 months follow-up. All subjects were monitored for the 3 months and participation ensured throughout the study period. Among the 20 subjects, male participants were more (12). After 12 weeks the MIS and GPCOG were rechecked to analyse the difference in score obtained after intervention. All 20 subjects selected for the study had MIS score ≤ 4 and GPCOG score was between 0-4 before yoga practice. After intervention, the number of subjects with MIS score ≤ 4 was reduced to 8 in number (5 male and 3 female) and GPCOG score 0-4 was reduced to 6 (4 male and 2 female). Results show regular yoga practice can contribute to cognitive enhancement in elderly population. Within the sample selected, on average 65% subjects improved their cognition after completion of the study. 60% participants were male 40 % were females. 58.33% male subjects and 75 % female subjects improved their condition.

**Table 2: Test Score before Intervention (BI) and After Intervention (AI)**

| TEST SCORE | Number( %) BI | Number( %) AI |
|---|---|---|
| **MIS ≤ 4** | 20(100) | 8(40) |
| **GPCOG - Step 2 0-4** | 20(100) | 6(30) |

## CONCLUSION

Yoga based interventions have a positive impact on elderly patients with cognitive dysfunctions like delayed recall of verbal or visual memory, attention, organisation of knowledge and language delivery. This was a random sampling study excluding major psychotic symptoms and dementia. Old age homes are the place where the elderly population live separated from their family and society. This can further catalyse decline in the mental wellbeing of aged people. CI and subsequent complications of dementia are becoming more

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prevalent across the world and not an exception in India. This study selected two old age homes in Kerala where 20 subjects were identified with CI. This finding suggests that more community based interventions are needed in this emerging public health issue. Yoga practice for 3 months time duration showed notable improvements in more than half of the participants. This study had limitations of a confined study group. It can be further extended to larger population size and to be done in elderly living in family settings.

## RECOMMENDATIONS

- Result analysis of this study reveals, woman who participated in the yoga intervention had more improvement in cognition than men. Even though in this particular study number of male participants was higher. This significant results demands further study on large population size with more neuropsychological tests to get a clear conclusion.
- It is high time to take healthy steps for healthy aging. Yoga can be a health promotive and restorative tool for an aging population. It is advisable to appoint a qualified yoga trainer in elderly homes.
- Yoga sessions should be arranged in primary health centres in Kerala, all the senior citizens visiting OPD should be registered for yoga programmes. After examination of prevailing disease conditions, the most suitable yoga module should be adopted. After mandatory knowledge transfer to the patients, advise them to come and practise yoga on a fixed day's schedule. Follow up should be ensured.
- Elderly can be grouped according to their disease condition, like Diabetes group, Dementia group, CI group, Respiratory illness group. Then customised yoga modules can be adopted for each group for more health outcomes.
- More participation can be ensured by personalised approach. Trained health workers can conduct home visits to create awareness about benefits and the need of practising Yoga.
- Yoga is not popularised in the majority of the rural population in India. Yoga could be the cost effective health approach to rural and marginalised communities. Government can implement policies which clearly advocate yoga as a part of primary healthcare.
- Cognitive impairment and Dementia in elderly is not like other physical ailments. Improvements with medication are rare. Therefore yoga can be mainstreamed as a treatment option.
- Mental health decline is a global health concern and is more prevalent from a very young age. Aging of the brain starts earlier than generations before. Sustainable solution to physical and mental well being is a time demand. Yoga is the holistic approach to all age groups for physical and mental fitness.

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## ANNEXURE

Adopted from Cognitive assessment tool kit by Alzheimer's Association (www.alz.org).

**GPCOG (**General Practitioner Assessment of Cognition) **Screening Test**

Step 1: Patient Examination 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. After I have said it, 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: ..... (Allow a maximum of 4 attempts).
2. Time Orientation Correct Incorrect
   What is the date? (exact only)
3. Clock Drawing – use blank page
   Please mark in all the numbers to indicate the hours of a clock (correct spacing required) Please mark in hands to show 10 minutes past eleven o'clock (11.10) Information
4. Can you tell me something that happened in the news recently?
   (Recently = in the last week. If a general answer is given, eg "war", "lot of rain", ask for details. Only specific answer scores).
5. Recall
   What was the name and address I asked you to remember .....
   To get a total score, add the number of items answered correctly Total correct (score out of 9)
   If patient scores 9, no significant cognitive impairment and further testing is not necessary. If patient scores 5-8, more information is required. Proceed with Step 2, informant section. If patient scores 0-4, cognitive impairment is indicated. Conduct standard investigations.

**STEP 2 : Informant Interview**

Date: _____ Informant's name: _____ Informant's relationship to patient, i.e. informant is the patient's: _____

1. These six questions ask how the patient is compared to when s/he was well, say 5 – 10 years ago Compared to a few years ago: Don't Know,Yes, No, N/A
2. Does the patient have more trouble remembering things that have happened recently than s/he used to?
3. Does he or she have more trouble recalling conversations a few days later?
4. When speaking, does the patient have more difficulty in finding the right word or tend to use the wrong words more often?
5. 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?
6. 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')

(To get a total score, add the number of items answered 'no', 'don't know' or 'N/A') Total score (out of 6) If patient scores 0-3, cognitive impairment is indicated. Conduct standard investigations.

**Memory Impairment Screen (MIS)**

1. Show patient a sheet of paper with the 4 items to be recalled in 24-point or greater uppercase letters (on other side), and ask patient to read the items aloud.

2. Tell patient that each item belongs to a different category. Give a category cue and ask patient to indicate which of the words belongs in the stated category (eg, "Which one is the game?"). Allow up to 5 attempts. Failure to complete this task indicates possible cognitive impairment.

3. When patient identifies all 4 words, remove the sheet of paper. Tell patient that he or she will be asked to remember the words in a few minutes.

4. Engage patient in distracter activity for 2 to 3 minutes, such as counting to 20 and back, counting back from 100 by 7, spelling WORLD backwards.

5. FREE RECALL — 2 points per word: Ask patient to state as many of the 4 words he or she can recall. Allow at least 5 seconds per item for free recall. Continue to step 6 if no more words have been recalled for 10 seconds.

6. CUED RECALL — 1 point per word: Read the appropriate category cue for each word not recalled during free recall (eg, "What was the game?").

The maximum score for the MIS is 8.

- 5-8 No cognitive impairment
- ≤ 4 possible cognitive impairment