

## Cognitive Impairment Among the Elderly Population

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**Keywords:** Dementia, Mild Cognitive Impairment, Population Ageing, Alzheimer's Disease, Exercise Training.

### Abstract:

Our society is aging; the number of people over 60 years of age is increasing day by day. United Nations projected a 150 million population of people over 60 years in India by the year 2050. One of the many diseases associated with old age is Alzheimer's disease (AD). It is a burdensome disease which not only the patients but also the families, caregivers, communities, and society as a whole. AD is a neurodegenerative disease and it is only diagnosed at a very advanced stage of neuro-degeneration. To date, there are no pharmacological treatment or cure for the disease. It is estimated that the number of people affected with dementia will double every 20 years unless some effective prevention strategies or curative treatments are developed. Mild Cognitive Impairment (MCI) is a gentle form of dementia, and it is found to be a bridging state between normal cognitive changes with aging and the onset of AD. 12% and 20% of patients suffering from MCI advance to dementia within a year and three years respectively. This rate can reach up to 15% annually for patients with amnesic MCI. Therefore, the focus is to screen people with MCI and try to improve their cognitive functions to prevent or rather delay the onset of AD. The 2030 sustainable development goals also outline older people as key stakeholders for the sustainable development of society, in terms of their skills, experience, and knowledge. Therefore, research and development must be promoted both for the early diagnosis and treatment of cognitive decline among the elderly population.

### Introduction:

Aging is the biological phenomenon by which a person grows older. With age, people become prone to diseases and disabilities, particularly non-communicable diseases (NCDs). These NCDs include cardiovascular diseases, hypertension, stroke, diabetes, chronic obstructive pulmonary disease, musculoskeletal disorders, dementia, depression, blindness, and visual impairments, etc. (World Health Organization, 1998). Globally NCDs are the leading cause of morbidity, disability, and mortality among those aged more than 60 years and also entail a significant number of resources for the treatment and care of affected individuals (World Health Organization, 2002).

There is no demarcated age after which a person is considered old. In India, usually, an age of 60 years and above is regarded as old age. The percentage of population of the older people is increasing every year. This is known as population aging, which is a phenomenon in which the median age of a society increases due to a rise in life expectancy or a decrease in birth rates.

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In the developed countries the population of elderly persons (aged more than 60 years) is estimated to rise from 274 million in 2011 to 418 million in 2050. As in the case of developing nations, the population aged 60 years and above is estimated to rise from 510 million in 2011 to 1.6 billion in 2050 (United Nations, 2011). By 2025, the number of persons in India over 60 is projected to reach over 150 million (World Health Organization, 2002).

Since the percentage of older people is increasing every year the concept of “Active Ageing” was put forward by the World Health Organization in the Second United Nations World Assembly on Ageing held in Madrid, Spain in April 2002. Active aging policies and programs should aim to enable older people to continue to work according to their capacities and preferences. It should also aim to prevent or delay disabilities and chronic diseases that are costly to individuals, families, and the healthcare system (World Health Organization, 2002).

A measure of the economic burden of the aging population is the dependency ratio. It is the ratio of the dependent or nonworking population (persons below 20 years and persons above 65 years) and the working population (persons ages between 21 to 64 years). The total dependency ratio of India in 2010 was more than 80% (United Nations, 2013). A healthy and working elderly population will reduce the burden on the working population.

Dementia is a collective term for a range of symptoms that are caused by disorders affecting the brain and have impacts on memory, emotion, behavior, and thinking. The most common type of dementia, Alzheimer’s disease (AD), represents around two-thirds of diagnoses (Brookmeyer et al., 2007; Duron & Hanon, 2008b, 2008a; Solfrizzi et al., 2006; World Health Organization, 2023; Haloi et al., 2023 Mukherjee et al., 2023). It is a burdensome disease which not only the patients but also the families, caregivers, communities, and society as a whole. AD is a neurodegenerative disease and it is only diagnosed at a very advanced stage of neuro-degeneration. This makes the treatment more difficult and the progress of the disease is also not checked. The existing medical management of AD is inadequate. Approved pharmacological drugs for AD therapies in the USA can only slow the progression of some symptoms but that too only for 6-12 months (Kidd, 2008). It is estimated that the number of people affected with dementia will double every 20 years unless some effective prevention strategies or curative treatments are developed. The estimated number of dementia-affected people globally by the year 2040 is 81.1 million (Ferri et al., 2005).

Mild Cognitive Impairment (MCI) is a milder form of dementia. Several studies have confirmed that MCI, if untreated advances to Alzheimer’s disease (AD). MCI can be regarded as a bridging state between normal cognitive aging and the onset of AD (Amieva et al., 2004; Busse et al., 2006; Luck et al., 2010; Luis et al., 2004; Maioli et al., 2007; Petersen et al., 2001; Schuff & Zhu, 2007; Solfrizzi et al., 2006; Tarawneh & Holtzman, 2012; Yaffe et al., 2006). MCI is identified as the stage when a person starts to lose memory to a greater extent than what is accounted for the age. 12 % and 20% of patients suffering from MCI advance to dementia within one and three years respectively (Solfrizzi et al., 2006). This rate increases to around 15% yearly for patients with dominant memory impairment (amnestic MCI) (Petersen, 2003).

The annual conversion rate of MCI to dementia (5-10%) is higher than the incidence rate of dementia from normal adults (1-2%) (Wang et al., 2013).

Since there is no effective cure for AD, efforts can be made to prevent or delay the onset of AD. MCI has been identified as the early stage of dementia. It is evident from several studies that cognitive training can improve the cognitive performance of persons with MCI (Ball et al., 2002; Ball & Owsley, 2000; Baltes & Willis, 1982; Greenberg & Powers, 1987; Rebok & Balcerak, 1989; Willis, 1987; Willis & Schaie, 1986; Yesavage, 1985). So, persons with MCI can be screened and proper cognitive training can improve their cognitive functioning and enable them to lead a healthy life.

### **Prevalence of cognitive impairment:**

Poor cognitive function was found to be correlated with ensuing cognitive decline (Yaffe et al., 1999). In a prospective study on approximately 5800 community-dwelling elderly, it was found that women who had more than 5 symptoms of depression scored significantly lower on cognitive tests than those of had 3 to 5 symptoms and 0 to 2 symptoms ( $p < 0.001$ ).

In a population-based cohort study in Italy, the overall prevalence of MCI was reported as 7.7% (95% CI=6.1-9.7). Old age and lack of education had higher odds for the incidence of MCI. The rate of incidence of MCI was found to be higher (76.8% per 1000 person-years) than baseline after a 4-year follow-up study. The multivariate-adjusted risk model was analyzed. The risk for development of Dementia from MCI was 4.78 for any dementia, 5.92 for AD, and 1.61 for Vascular dementia. For subjects with no memory impairment, no association was found (Ravaglia et al., 2008). In another study, a prevalence rate of 15.4% for MCI was found and this had a significant positive correlation with the increase in old age. Positive associations were found for vascular diseases and depressive symptoms (Luck et al., 2007).

A prospective cohort study among the elderly showed increased cases of MCI after 3 and half years of follow-up (Panza et al., 2008). In another study, the incidence rate per 1000 persons-year for MCI was found to be 13.2 (95% CI 7.79-20.91), and for AD was found to be 14.8 (95% CI 9.04-22.94). The cognitive decline was significantly affected by Education and baseline Mini-Mental State Examination (Chaves et al., 2009). Nutritional deficit (Khater & Abouelezz, 2011) and smoking (Anstey et al., 2007; Mons et al., 2013) were found to be other risk factors for the development of MCI. Ever-smokers had a significantly lower cognitive assessment score than never-smokers. The association was more prominent among the current smokers than the ex-smokers. However, persons who have quit smoking for more than 30 years scored higher in cognitive assessment than the current smokers (Mons et al., 2013).

The Indian scenario for the prevalence of MCI and dementia is also similar. A study in Kolkata found an overall prevalence of MCI of 15%. Prevalence of the amnesic type and multiple domain types was 6% and 9% respectively. Men had mostly the amnesic type while multiple domain type was found to be common among women after adjusting for age and education (Das et al., 2007). In another study on 1000 people (65 years and older), last month's

prevalence of depression was found to be around 13%. poor income, hunger, cardiac illnesses history, transient ischemic attack, previous head injury, and diabetes significantly increased the risk for geriatric depression (Rajkumar et al., 2009). In another study with 54,000 subjects (60 years and older), the crude prevalence rates of dementia were found to be 1.25%. Alzheimer's disease was the commonest subtype (55%) followed by vascular dementia (36%) (Banerjee et al., 2008). Similar results were also obtained in Kerala in a study among 2500 community-living elderly. Odds for dementia (and AD) were found high with increasing age and 9 years or more education level decreased the odds (Mathuranath et al., 2010).

### **Training Intervention to improve cognitive impairment:**

Training interventions such as exercise an effective non-pharmacological interventions for dementia or MCI. It has helped in improving the quality of life among people suffering from dementia. Studies have shown a positive relationship between high physical activity in teenagers and a lower chance of cognitive impairment in older people (Middleton et al., 2010). Improved cognitive functions were reported in a study of about 2800 persons (65-94 years of age) after the application of 3 cognitive training targeting memory, reasoning, and speed of processing. Each intervention improved the targeted cognitive ability compared with baseline (Ball et al., 2002; Singh et al., 2023).

Colcombe and Kramer performed a meta-analysis of intervention studies. It was found that the cognitive ability of sedentary healthy adults was improved by aerobic fitness training. It was found from this study that fitness training had strong but selective benefits for cognition, with the largest fitness-induced benefits occurring for executive-control processes. The length and type of the training intervention, the duration of training sessions, and the gender of the study participants affected the improvement of cognition (Colcombe & Kramer, 2003).

The effect of different types of exercise on patients with MCI or dementia was analyzed in another meta-analysis. The result showed that patients with dementia showed a delayed cognitive decline when trained with Resistance training, whereas Multicomponent Exercise has a positive effect on cognition in general and on executive functions for patients with MCI. However, this meta-analysis stressed that further Randomised controlled trials are needed to further strengthen these findings (Huang et al., 2022).

### **Conclusion:**

Dementia takes a heavy toll both on the patient and the caregivers. As the incidence of dementia is set to rise progressively, proper diagnostic tests and intervention strategies must be developed. Both the Government and Non-Government entities should make it one of their priorities to invest in research on the elderly.

The 2030 Sustainable Development Goals outlined by the United Nations Development Programme (UNDP) (Dugarova, 2017) give particular focus to older persons. Elderly people can help in the sustainable development of society with their experience, knowledge, and skills. This makes it evident that people of this age group lead healthy independent lives.

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## HOW TO CITE

Krishnendu Sarkar (2023). Cognitive Impairment Among the Elderly Population. © International Academic Publishing House (IAPH), Shubhadeep Roychoudhury, Tanmay Sanyal, Koushik Sen & Sudipa Mukherjee Sanyal (eds.), *A Basic Overview of Environment and Sustainable Development [Volume: 2]*, pp. 204-212. ISBN: 978-81-962683-8-1. DOI: <https://doi.org/10.52756/boesd.2023.e02.013>

