Acta Scientific Clinical Case Reports

Volume 3 Issue 4 April 2022

Research Article

A Cross-sectional Study to Examine Cognition and the Regular Behaviours Impacting it Among Individuals in their Early Years of Old Age

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Received: February 18, 2022

Published: March 03, 2022

Abstract

Background: Cognitive impairment is fairly frequent as individuals get older, and it affects their quality of life.

Objective: The goal of this study was to discover the variables that influence cognitive performance in the early years of old age.

Methods: A total of 124 people were examined in this study. The Montreal Cognitive Assessment Scale was used to assess the participants' cognitive abilities. Self-made questionnaires were used to collect socio-demographic and behaviour (habit) related data. Lawton Instrumental Activities of Daily Living was used to investigate IADL. The statistical analysis method used was the Chi square test.

Results: The findings revealed substantial disparities in cognitive performance as a function of age. Other variables were not shown to be substantially linked to cognition. MCI was shown to be more common in females (52.7%) and non-smokers (47.3%).

Conclusion: factors affecting cognitive function were age, female gender and non smoker status.

Keywords: Mild Cognitive Impairment; Cognition; Dementia; Alzheimer's Disease; Aging

Introduction

When compared to a younger individual, the brain of an 80-year-old normal person showed considerable morphological, physiological, and neuro chemical alterations. With aging, the weight of the brain diminishes. Although the brain loses hundreds of cells every day, the parts of the brain involved in language, memory, and cognition are spared from major neuron loss, according to Dickstein and colleagues and Cabeza and colleagues [1].

Many of the characteristics that must be examined as part of the clinical evaluation of the person with dementia's rehabilitation potential are influenced by both aging and illness, and therapists working with the elderly should be aware of these factors [1].

It is a fallacy that cognitive decline is a natural aspect of aging. Research on crystallized and fluid intelligence has refuted this assumption. The capacity to recognize relationships, participate in formal reasoning, and comprehend intellectual and cultural history is all examples of crystallized intelligence. The environment and the individual's mindset can influence crystallized intellect. As long as a person is alive, self-directed learning and education can develop crystallized intelligence [1].

The brain's information processing machinery produces fluid intelligence, often known as "natural mental capacity." It involves the ability for attention and memory, as well as the speed with which information is processed in thinking and performing. Fluid intelligence has been considered to deteriorate with age because it involves the cognitive functions most influenced by changes in neuro physiological state. These alterations, on the other hand, are mostly linked to processing speed, working memory, and executive function [1].

Recent research into the impact of cognitive changes in activities has revealed that older persons conduct tasks at a slower pace

and use different parts of the brain in the process than younger ones [1].

In the adult years, linguistic talents deteriorate slowly, if at all, but psychomotor ability deteriorate faster and to a greater extent (greater decline if the individual is not engaged in regular physical activity). Between the ages of 55 and 70, there is a period of transition, and many cognitive tests show some declines in ability [1].

Mild cognitive impairment (MCI) is a term used to describe people who have cognitive abnormalities that are between normal aging and early dementia. In contrast to more severe types of dementia, when fundamental daily tasks are disrupted, persons with mild dementia maintain independence in simpler activities [2].

Learning and memory, language, visuo-spatial, executive, and psychomotor functions are the five areas that cognitive functioning is divided into. To make a diagnosis of MCI, just one of these domains must be compromised, however to make a diagnosis of dementia, more than one domain must be damaged [2].

Age, educational era, gender, health life variables such as drinking and smoking, depression, social factors such as social activity and profession, history of sickness, and body mass index have all been found as factors impacting cognitive decline (BMI) [3].

Health-related and psychosocial variables, such as lifestyle, have been demonstrated to alter the cognitive performance of otherwise healthy people in previous studies. Education and sex are two more elements that are thought to be essential. Higher education appears to be a robust predictor of long-term cognitive performance and may protect against age-related deterioration [4]. Men may experience cognitive decline early in life, but at a slower rate, whereas women may go from normal cognition to dementia more quickly, but at a later age [5].

Prospective studies consistently suggest that moderate alcohol use, and probably wine drinking in particular, is linked to a decreased risk of dementia or Alzheimer's disease. One suggestion is that alcohol reduces cardiovascular risk factors, either by inhibiting platelet aggregation or by altering the serum lipid profile. Another idea is that alcohol influences cognition directly by releasing acetylcholine in the hippocampus. There's a lot of evidence that acetylcholine helps with memory and learning [6].

It is scientifically feasible that smoking has a preventive effect against Alzheimer's disease. In Alzheimer's disease, there are deficits in the cholinergic system, as evidenced by lower levels of acetylcholine and nicotinic receptors. Nicotine promotes attention and information processing by increasing acetylcholine release and increasing the number of nicotinic receptors. Smokers may have a milder cholinergic deficit and hence be protected against AD, or they may suffer a delayed beginning of the illness as a result of their nicotine intake [6].

Our reliance on smart phones and similar technology does not help us think, remember, pay attention, or manage emotion; rather, it hinders our capacity to think, remember, pay attention, and regulate emotion. Despite the fact that study into the possible cognitive effects of smart phone technology is rising, the findings are still conflicting and ambiguous. The often contradicting results show that not all smart phone usage is equal; some applications, multitasking tactics, or notification settings may modify the relationship between total smart phone use and certain cognitive functions [7].

Physical activity has the ability to improve mental and cardiovascular health as well as metabolic health. Physical activity has been shown to improve cardiovascular function, muscle function, body composition, and metabolic disorders. In comparison to less physically active individuals, physically active older persons have higher cognitive function and are less likely to develop depression and/or depressive symptoms. Physical exercise has been linked to improvements in cognitive performance [8]. Individuals of all ages benefit from exercise since it improves cognitive performance and brain health. Aerobic exercise has a positive impact on perceptual abilities, numeracy and linguistic ability, as well as IQ, in children. Aerobic exercise has been proven to improve aspects such as cognitive control, cognitive flexibility, response speed, and visual search speed in young adults. The advantages of exercise are still there in older persons, but they have a greater impact [9].

The population's rapid aging entails social and economic costs, resulting in personal and social obligations. Many degenerative disorders, including dementia, the most devastating neurological disease, are directly caused by aging. Because the deterioration in cognitive function associated with aging is gradual, pathologically determining the precise moment of dementia onset is challenging. When it progresses to dementia, however, it causes a decline in the quality of life for individuals and their families, as well as sig-

nificant medical costs, putting a significant financial strain on the individual. As a result, immediate countermeasures are required. Because there is presently no effective therapy or treatment for cognitive impairment or dementia, early diagnosis of modifiable risk factors for cognitive impairment, as well as prevention of cognitive impairment and delaying the onset of dementia by linked early intervention, is critical. When cognitive decline is viewed as a continuous process that progresses from normal cognitive function to mild cognitive impairment and dementia, identifying and managing influential factors such as demographic characteristics associated with cognitive decline, co-morbid diseases, and health habits may help to delay or prevent dementia [3].

Primary objective of the study was to measure the correlations between age and cognitive function. Secondary objectives were to document the differences in cognitive function according to the socio-demographic characteristics and to identify the habitual factors influencing the cognitive function.

Methodology

- This is a cross sectional study designed to investigate factors affecting cognitive function in the beginning years (Between 55 and 65 years) of old age.
- After obtaining clearance from the "Human Research Ethics Committee" of the Government Medical College, Surat the present study was initiated.
- Previous study regarding the evaluation of cognitive impairment in elderly, showed the prevalence to be 8% [3]. So, using this prevalence in Epi Info software, at 95% confidence level and 80% power, the required sample size is 114. Considering a 10% drop out rate, the final sample size for this study is 126.
- The purpose of the study was explained and written informed consents were obtained from all the participants on their scheduled meeting dates. The subjects were selected according to the inclusion and exclusion criteria. Inclusion criteria included people between the age of 55 and 65 years, who understands the purpose of the study and signs the informed consent form, who do not have difficulty in communication, who has no history of psychiatric illness or psychiatric symptoms and is able to fill out a questionnaire. While Exclusion criteria were who are not willing/ready to participate in the study and already diagnosed with Alzheimer's disease, Dementia, Schizophrenia, Parkinson's, Multiple Sclerosis, Cerebro-vascular Pathology.
- Purposeful recruitment of 126 participants (two of whom dropped out of the research) was carried out from various Surat old age homes, early morning visitors from gardens or jogging treks, and people recommended by the orthopaedic and medical departments of the New Civil Hospital, Surat.
- Once the consent forms were filled, he/she will be requested to fill the pre designed and pre tested questionnaire. The questionnaire was derived after expert advice and modifications from pilot study experience. It contains both closed and open ended questions including demographic information.
- The data collection was done in 3 parts during the same session using the tools like Montreal Cognitive Assessment Scale, Lawton Instrumental Activities of Daily Living (IADL), Data collection sheet and Questionnaire developed in the department. It was self administered under supervision.
- In first part, socio-demographic data, habits related questionnaire was filled. Socio-demographic data like age, gender, residency, spouse, education, occupational status and economical status. Habits related data like alcohol, smoking, tobacco, smart phone and anti depressants. In second part, Montreal Cognitive Assessment Scale was filled to assess cognitive function. In third part, Lawton Instrumental Activities of Daily Living (IADL) was filled.
- Adequate time was given to complete the questionnaire. Once all the questions were answered, it was collected on the spot from participants.

Data analysis

The collected data was entered in Microsoft excel and analyzed using open epi software. The subject's socio-demographic data, habits related factors, IADL and cognition were calculated as the frequency and percentage. Differences in cognitive function according to socio-demographic data, habits related factors and IADL was analyzed using chi square test.

Results

Chart 1 show that Number of participants who exercise regularly for 30 minutes was lower than the participants who do not exercise regularly.

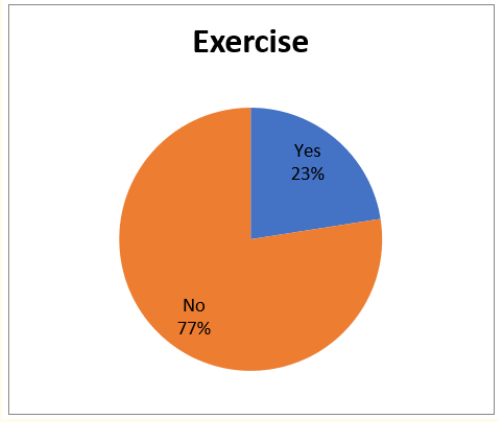

Chart 1: Distribution of study participants according to exercise.

Chart 2: Distribution of study participants according to IADL.

Chart 2 shows that majority participants were independent followed by partially dependent and only few participants were dependent.

Normal MoCA		MoCA		Total
		Mild impairment		
Age	55-60	28	42	70
	61-65	34	20	54
Gender	Male	28	24	52
	Female	34	38	72
Residency	Rest home	10	8	18
	Own home	56	50	106
Spouse	Yes	59	52	111
	No	7	6	13
Education	Illiterate	8	8	16
	Primary	34	30	64
	Middle	10	8	18
	High school	4	4	8
	Graduation	6	6	12
	PG	4	2	6

Table 1: Level of cognition according to socio demographic factors.

Table 1 shows that in the age group of 55-60 60% participants had MCI while in the age group of 61-65 37% had MCI, 46.1% male and 52.7% female had MCI, 44.4% participants living in rest homes and 47.1% participants living in their own home had MCI, 46.8% participants living with spouse and 46.1% participants living without spouse had MCI, illiterates, high school and graduate participants had equal percentage (50%) of MCI followed by primary school (46.8%), middle school (44.4%) and post graduates (33.3%).

Pearson Chi-Square	Value	Degree of freedom	Asymptotic Significance (2-sided)
Age	6.430[a]	1	.011
Gender	0.5299	1	0.4666
Residency	0.04591	1	0.8303
Spouse	0.002245	1	0.9622
Education	0.6254	5	0.9868

Table 2: Association between socio demographic factors and MoCA.

Table 2 shows that Age was significantly associated with MoCA ($\chi 2 = 6.43$, $p = 0.011$) while all other factors were not significantly associated with MoCA.

Normal MoCA		MoCA		Total
		Mild impairment		
Alcohol	Yes	3	3	6
	No	63	55	118
Smoking	Yes	7	5	12
	No	59	53	112
Smart Phone	Yes	21	19	40
	No	45	39	84
Exercise	Yes	15	13	28
	No	51	45	96

Table 3: Level of cognition according to habit related factors.

Table 3 shows higher percentage of MCI in people who consume alcohol (50%) followed by participants who don't consume alcohol (46.6%), higher percentage of MCI in people who don't smoke (47.3%) than participants who smoke (41.6%), higher percentage of MCI in participants who were using smart phones (47.5%) than participants who did not (46.4%), 46.4% participants exercised regularly and 46.8% participants who did not exercise regularly had MCI.

Pearson Chi-Square	Value	Degree of freedom	Asymptotic Significance (2-sided)
Alcohol	0.02635	1	0.8710
Smoking	0.1392	1	0.7091
Smart Phone	0.01249	1	0.9110
Exercise	0.001735	1	0.9668

Table 4: Association between habit related factors and MoCA.

Table 4 shows that habit related factors were not significantly associated with MoCA.

Normal MoCA		MoCA		Total
		Mild impairment		
IADL	Independent	51	43	94
	Partially dependent	12	12	24
	Dependent	3	3	6

Table 5: Level of cognition according to IADL.

Table 5 shows that participants who were partially dependent and dependent had highest percentage of MCI (50%) than independent participants (45.7%).

	Value	Degree of freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.1654	2	0.9206

Table 6: Association between IADL and MoCA.

Table 6 shows that IADL was not significantly associated with MoCA ($\chi 2$ value= 0.1654, p = 0.9206).

Discussion

The purpose of this study was to identify the cognitive functions and related factors of subjects in the beginning years of old age and to provide basic data for intervention studies for prevention and treatment of cognitive dysfunction.

The research has a sample size of 124 people. The proportion of participants aged 55-60 years old was greater, as was the proportion of individuals with only a primary school education. Females outnumbered males. Furthermore, the current study's findings revealed that the proportion of those who exercised regularly was low, which has been reported as a cognitive function protective factor in previous studies [3], and that smoking and drinking, which have been reported as cognitive function risk factors, were found to be less common in this study.

Looking at cognitive function scores according to cognitive variables possible risk factors were age, female gender and non smokers.

Cognitive decline is commonly seen as a natural feature of the aging process. Many prior researches have established a link between age and cognitive abilities. In a study of 578 healthy old people ranging in age from 64 to 81 years, Van Hooren et colleagues (2007) discovered that age had a significant influence on all cognitive assessments. During the study, Dore., *et al*. employed 22 different test batteries to assess cognitive performance in 945 participants ranging in age from 20 to 79 years. They discovered that as people become older, their cognitive abilities deteriorate. According to Beyza Akdag., *et al*. 48.5 percent of the older persons (n = 183) had no cognitive impairment [10]. In our study we found that age was significantly associated with cognition. 50% (n = 62) participants showed cognition impairment.

High levels of education, social activity, and job life have been shown to assist older people maintain cognitive function. Many of these research show that having a high degree of education has a good effect on cognitive studies. Education has a major influence on cognitive performance, according to Dore., *et al*. [10]. No substantial link between schooling and cognition was discovered in our research. MCI was found in comparable proportions among illiterates, high school students, and graduates. Primary school, middle school, and post-graduate students have a lower rate of MCI than those in the previous group.

While some earlier research has found that females had greater cognitive functioning than males, others have found the opposite. Females outperform males in verbal memory tasks, according to Van Hooren., *et al*. According to Dore., *et al*. sex is a minor predictor of cognitive performance. In the study conducted by Beyza Akdag., *et al*. gender was not shown to be a factor impacting cognitive function [10]. Females exhibited a larger proportion of MCI in our sample, although the difference was not statistically significant.

A few studies have compared the effects of staying at home vs nursing facilities on older people's cognitive functioning. According to Beyza Akdag., *et al*. the risk of cognitive burnout among older individuals living in rest homes was greater than that of those living at home. In their study, Engberg., *et al*. discovered that older people who live at home do better cognitively than those who live in nursing facilities. Those who relocated to nursing homes from their own homes during the 1-year follow-up period showed a regression in cognitive functioning, according to Bannister., *et al*. [10]. We believe that factors such as being away from family, depression, and economic status affect cognitive functions despite the seemingly high change in social communication in the nursing homes where many elderly live together. Residency was not found as an affecting factor of cognitive function in our study.

Few case control studies have shown that smoking reduces the risk of dementia or Alzheimer's disease. However, smoking was found to raise the risk of Alzheimer's disease in several prospective studies. There is a dispute in the linked literature, according to Almeida., *et al*. In the model utilized in their investigation, Beyza Akdag., *et al*. discovered that smoking (current or stopped) was a risk factor for cognitive deficits [10]. In our study non smokers had shown higher percentage of MCI than smokers.

There are several inconsistencies in the research on the association between physical exercise and cognitive performance in those over 50. Changes in aerobic fitness did not impact changes in cognitive function, according to Smiley Oyen., *et al*. (2008) and Nagamatsu., *et al*. (2012). Furthermore, research shows that, while exercise can help with a variety of cognitive functions, physical activity tends to have the most advantages in terms of executive function (Davis., *et al*. 2010) [9]. Men and women who exercised in their research were found to have good cognitive function, according to Miwon Kim., *et al*. [3]. We found no evidence of a link between exercise and cognition in our research.

Drinking has been linked to cognitive function in studies by Park and Song, Shin., *et al*. and Kim and Shim; however, Topiwala., *et al*. found no link between drinking and dementia in a comprehensive literature review. The effects of drinking on cognitive performance were not evident, according to Miwon Kim., *et al*. [3]. Alcohol use was not observed to be linked with MCI in our research.

The amount of research on the possible cognitive effects of smart phone technology is increasing, yet the results are still contradictory and ambiguous [7]. In our study, the use of a smart phone was not found to be substantially connected with cognition.

Conclusion

In conclusion, the results of the present study showed that factors affecting cognitive function were age, female gender and non smokers. Education, residency, exercise, alcohol, smart phone were not found significantly associated with cognition.

Limitations

Limitations of the study were only 124 participants were taken, participants between the ages of 55-65 were selected, sampling method was purposive sampling and only one outcome measure was used for cognition.

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