

## Role of Physical Activities on Mild Cognitive Impairment in Old Age

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### Abstract

*Aging is a natural process and it has long been recognized that as individuals age, they face decline in many aspects of cognitive functioning. Although the repair of neurodegenerative damage associated with ageing remains experimental, rapid advances are being made in the techniques for inhibiting degeneration, promoting regenerative growth and replacing lost populations of cells. This study investigates the relationship between the amount of physical and mental activity an individual does in his/her day to day life and the level of cognitive decline he/she may encounter during the process of aging and the various factors like educational qualification, occupational status, gender differences, smoking and drinking, that may further explain this process. To study this two tools; Daily Physical Activity Scale and Mini MSE were used simultaneously on people of age 60 years and above. This study clearly reveals that a moderate level of positive relationship exists between physical activeness of the individual and the age related cognitive decline.*

**Key Words:** Cognition, Aging

### Introduction

Aging is a naturally occurring multidimensional process that involves physiological, psychological and social changes, all at the same time. With the rising level of expectancy rate all across the globe, the percentage of elderly people in the overall population is increasing. Keeping this current scenario in mind, it becomes important for a researcher to consider its future implications as old age is often accompanied with lot many issues and

responsibilities. Old age is often associated with the decline in cognitive abilities. The current research aims to study the relationship between daily physical activities and the risk of developing mild cognitive impairment in the old age.

Age associated cognitive decline or normal (usual, normative, non-pathological) cognitive ageing, is an important human experience which differs in extent between individuals. The determinants of the differences in

age-related cognitive decline are not fully understood. Progress in the field is taking place across many areas of biomedical and psychosocial sciences. Some mental capabilities are well maintained into old age.

Whatever one's age may be, physical activeness has been shown to have positive effects on both health as well as the state of mind of the individual. People who are physically active have been researched to be less prone to some forms of cancer, diabetes, stroke and heart disease. It also helps in boosting up of mood, energy, self-esteem and sleep quality, as well as in reducing one's risk of Alzheimer's disease, depression, stress and dementia. Various ways through which one can be physically active, even in the old age is by carrying out activities like buying groceries, doing yoga,

There has been growing evidence that light to moderate levels of alcohol intake in old age can be beneficial for an individual; it is often associated with better performance in cognition as compared to those who are either abstinent or heavy drinkers and may also have a protective effect against cognitive decline and dementia. The risk reduction

property of alcohol can be partly due to its protective effects on cerebrovascular and cardiovascular health. Also, it has been seen that smoking has detrimental effects on vascular disease that might be an important risk factor for causing cognitive impairment. A response effect in relation to the dosage is seen in regard of the number of cigarettes smoked during the individual's lifetime and the level of cognitive decline.

### **Methodology**

#### **Sample**

The sample was collected using purposive sampling. The investigator believes that the sample being handpicked is typical of the population or is a very good representative of the population. The sample were collected from in and around Delhi and NCR regions.

Table 1 provides a socio demographic profile of the respondents who participated in the current study. The sample comprised of 50% (N=40) males and 50%(n=40) females. Out of this, 24.7% (N=20) were suffering from some form of age related physical ailment. The educational qualification varied from 4.9% (N=4) being illiterate to 14.8% (N=12) having primary

schooling, 19.8% (N=16) having passed secondary school, 35.8% (N=29) being graduates, 8.6% (N=7) being passed from technical schools, 11.1% (N=9) being post graduates and 3.7% (N=3) having other types of qualifications.

Most of the individuals were found to be retired i.e 38.3% (N=31) while few of them were still found to be working, either under someone (1.2%) or self-employed (27.2%). Among the given sample 12.3% used to drink alcohol while 13.6% used to smoke, at some point of their lives.

**Table 1:** Demographic Profile

Dimension		N (%)
Gender	Male	40(50)
	Female	40(50)
Physical ailment	Yes	20(24.7)
	No	60(74.1)
Educational qualification	Illiterate	4(4.9)
	Primary school	12(14.8)
	Secondary school	16(19.8)
	Graduate	29(35.8)
	Technical school	7(8.6)
	Post graduate	9(11.1)
Occupation	Other	3(3.7)
	Employed	1(1.2)
	Unemployed	26(32.1)
	Retired	31(38.3)
	Self employed	22(27.2)

The objective of the study was explained to all participants and after making sure they have understood the purpose of the study, they were asked to sign the consent form. The participants were also asked to fill the demographic

details data sheet. The participants were explained that there was no right or wrong answers. It took approximately 35 minutes to complete a single administration.

#### Measures

#### **Mini Mental Status Examination, (Folstein, 1975), adapted Hindi version**

The Hindi Mini MSE is a test administered to people who are illiterate, and is intended to only screen individuals for cognitive impairment and not for diagnostic purposes. It was a tool developed by the Indo-US Cross-National Dementia Epidemiology study, comprising of 22 items which examined various cognitive capacities like orientation to place and time, attention, memory, concentration, object recognition, comprehension and expressive speech, language function, praxis and motor function. The maximum total score possible is 30. It's simple and quick to administer, therefore it is often used as a screening test for elderly people who are illiterate.

#### **Daily Physical Activity Scale**

This test contained 17 set of questions in Hindi. It was developed under the supervision of the experts. The

activities that were included in this scale were chosen keeping in mind the Indian culture. These included walking, buying vegetables, cooking food, exercising or meditation, social work, reading, going to the workplace, gardening, recreational activities, going out with friends, playing with kids or any sport enjoyed by the individual, cleaning or dusting the house and the belongings and riding any type of vehicle. The frequency of the given activity was measured on daily or weekly basis. Activities that were done daily, were given the highest scores 3 and accordingly, activities that were not done quite often but sometimes in a week were given a score of 2 with the activities done rarely or never were given a score of **Demographic**

**Variables**

The questionnaire also contained questions that took into account the respondents age, gender, educational qualification, occupation, marital status and physical ailments, if any.

**Results**

Table 2 provides a description of the maximum and minimum scores obtained by the respondents on Mini Mental Status Examination (30 and 24 respectively) as well as on Daily

Physical Activity Scale (44 and 18 respectively). The corresponding mean was calculated as 29.06 and 30.99 with a standard deviation 1.426 and 5.531, respectively. These figures clearly denote that most of the individuals were not suffering from any kind of age related cognitive decline or more specifically mild cognitive impairment. Also, most of the individuals were physically active as they performed some kind of activity that kept them physically or mentally occupied.

**Table 2:** Mean, SD Correlation among MMSE and Physical Activity

	Minimum	Maximum	Mean	SD	
MMSE	24	30	29.06	1.426	.416 ns
Daily physical activity	18	44	30.99	5.531	

Correlation between the scores obtained on both the scales was also calculated (Table 2) ( $r = .416$ ). A positive relationship was noted between the two. Scores on both the scales were found to be directly proportionate, which indicated that people who were physically and mentally active had higher MMSE scores and lower level of cognitive decline. Orientation with time, place and self was found to be much better. Also, people who kept themselves

occupied with things like going to the work place, gardening, playing with kids, cooking, dusting and so on, had less issues related to forgetfulness.

Table 3 below shows a significant relationship between the educational qualification of the respondents and their level of cognitive decline ( $r=.45$ ,  $\rho = .000$ ). This can be

very well inferred from table 4, in which a higher level of cognitive decline could be seen in subjects with little or no educational qualification, thus indicating that respondents who were illiterate, or were primary or secondary school pass outs, were more prone to higher level of age related cognitive as compared to respondents with relatively higher educational qualification.

**Table 3: Educational Qualification & MMSE**

	Educational qualification							Total	
	Illiterate	Primary school	Secondary school	Graduate	Technical school	Post graduate	Other		
mini MSE 24	1	0	0	0	0	0	0	1	$r=.45$ $p=.00$
25	1	0	0	0	0	0	0	1	
26	1	1	1	2	0	0	0	5	
27	1	2	0	2	0	1	0	6	
28	0	1	2	2	0	0	0	5	
29	0	4	6	3	3	0	0	16	
30	0	4	7	20	4	8	3	46	
Total	4	12	16	29	7	9	3	80	

Table 4 in the right denotes that in the current research, females suffered higher levels of cognitive decline as compared to males. They encountered problems related to cognitive performance like remembering words, drawing figure and so on. But the differences were found to be non-significant ( $r = -.203$ ,  $\rho = .071$ ).

**Table 4: Gender & MMSE**

		Gender		Total	
		male	female		
mini MSE	24	0	1	1	
	25	0	1	1	
	26	3	2	5	
	27	2	4	6	$R=.071$
	28	1	4	5	ns
	29	6	10	16	
	30	28	18	46	
Total		40	40	80	

**Discussion**

The current research contributes to the debate regarding the relationship of physical and mental activities with the risk of developing age related cognitive decline. The main objective of this research was to explore the relationship between the daily physical activities and the risk of developing mild cognitive impairment in old age. The relationship between educational qualifications, occupation, gender, alcohol drinking and cigarette smoking with the age associated cognitive decline was also assessed.

Many researchers (Laurin, 2001; Wilson, 2002; Dik, 2003) have worked in this sphere and have tried to understand the relationship between the kind of activities people in old age gets involved in and its direct implication on their mental wellbeing. In the year 2001, Laurin tried to explore a similar relationship and stated that regular physical activity could represent an important and protective factor for cognitive decline and dementia in elderly people. Consistent with these researches, our study found a moderate level of positive correlation ( $r = .416$ ) between daily physical activity and the

level of cognitive decline. The only difference was that the focus was more on the age related cognitive decline (mild cognitive impairment) that is seen to be a naturally occurring phenomenon in old age. Laurin's study took into account approximately 4615 subjects who were followed for 5 years, in contrast to the present study's sample size being comparatively smaller ( $N = 80$ ), who were analyzed on the day the information was provided by them. The outcome empirically validated the fact that if an individual exercised on daily/weekly basis, kept himself/herself busy in some form of activity, his/her likelihood of attaining an age related cognitive decline would be low.

A study by Wilson Hebert (2009) suggested that education was robustly associated with level of cognitive function but not with rate of cognitive decline and that the former association primarily accounted for education's correlation with risk of dementia in old age. Also, the present trend of researches (Laurin, 2001) state that no strong association exists between the educational status of the individuals and the level of cognitive decline faced by them. But in contrast to this our study

noted a moderate level of positive correlation between the two ( $r = .454$ ,  $p = .000$ ). Subjects who had never been to school showed the maximum level of cognitive decline in comparison to subjects who had completed their post-graduation and doctorate. This means that as the educational status of the individual increases, his/her likelihood of developing an age related cognitive impairment decreases. The limited number and the cultural variation of the samples could be a reason for the differences found in the present study.

A non-significant relationship was found between gender and the level of cognitive decline of the subjects. Over the last few years mixed researches have been found in regard to the role of gender in age related cognitive decline or mild cognitive impairment in more technical sense. Barnes and Wilson et al. (2003) suggested in their study that patterns of cognitive decline and incidence of AD were similar in old aged men and women. Also, Hebert et al (2000) in their study stated that the cases reported by women under problems related to cognitive impairment could be more due to the longer life expectancy of women rather than sex-specific risk

factors for the disease. In relation to this, in the existing study the correlation between the two was found to be low but positive in nature ( $r = -.203$ ,  $p = .071$ ). It was seen that females had lower scores on MMSE as compared to males which is suggestive of the fact that they faced higher level of cognitive decline in older age as compared to males but due to the limited sample, we cannot be really sure.

### **Limitations**

One of the major limitations can be the design used to study the relationship. The most prominent researches in this field have collected sample information on yearly basis (longitudinally). In contrast to this, the present study evaluated both the variables simultaneously on the spot when the information was provided to the researcher.

### **Conclusion**

The results indicated a positive relationship between the physical and mental activities done by individuals on daily or weekly basis and the level of age related cognitive decline. Cognitive decline was seen more in females as compared to males

The mean of the total scores on MMSE obtained by the subjects was

found to be 29.06, which indicates that majority of them did not suffer from any form of cognitive impairment. Also, the mean on Physical Activity Scale was found to be 30.99, which further indicates that majority of the subjects were moderately active, both physically and mentally.

Therefore, we can say that people who kept themselves busy in some form of physical or mental activity were less likely to develop mild cognitive impairment in future. Also, people who were highly educated or were still working (employed or self-employed) faced less issues with age related cognitive impairment and were therefore less likely to develop mild cognitive impairment in future.

The results support the notion that physical and mental activities in old age can be effective to combat and reduce the extent of age related cognitive decline.

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