*Original Research Article*

# A Study on Risk Factors for Mild Cognitive Impairment in Elderly

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## Abstract

**Background:** Cognition is a bodily function that is decreased by ageing when there is the impairment of memory, judgment, language, and attention. Mild cognitive impairment is a transitional stage between normal aging and dementia Mild cognitive impairment (MCI) is a measurable cognitive problem that does not disrupt daily activities. It is essential to identify the risk factors for mild cognitive impairment in elderly to possibly prevent high risk of progression to dementia. Early treatment of treatable risk factors delays progression to dementia.

**Materials and methodology:** In our study, a total of 400 individuals aged above 60 years were included. All the elderly study subjects were divided into two groups, subjects with normal cognition and subjects with mild cognitive impairment(MCI).This was done based on two scores, mini mental status examination (MMSE) and montreal cognitive assessment (MOCA). Elderly subjects with MOCA score < 26 and MMSE score < 27 were diagnosed to have MCI. Elderly subjects with MOCA score ≥ 26 and MMSE score ≥ 27 were diagnosed as subjects with normal cognition. As depression was a common cause for pseudo dementia/cognitive impairment, elderly subjects with depression were excluded using geriatric depression scale (shorter version). Relevant laboratory investigations were done to identify the risk factors for developing cognitive impairment.

**Results:** In the present study out of 400 elderly subjects, 260(65%) of them had normal cognition. 140(35%) of them had mild cognitive impairment. Subjects with MCI had prior history of diabetes mellitus (33.6%), hypertension (30%), ischemic heart disease (18.6%), Cerebrovascular accident (17.1%), renal disease (8.5%), hypothyroidism (20.7%) as compared to subjects with normal cognition. P <0.0001.

**Conclusion:** Significant risk factors for development of MCI were diabetes mellitus, hypertension, IHD, CVA, hypothyroidism, vitamin B 12 deficiency, dyslipidemia, anemia, hyponatremia and renal failure. It is even more pertinent and critically important to evaluate elderly for mild cognitive impairment, since reversible risk factors can be intervened by appropriate treatment. This constitutes an important preventive strategy to the progression of dementia which creates both a physical and an economic burden.

**Keywords:** Risk factors, mild cognitive impairment, elderly

## Introduction

Cognition is a bodily function that is decreased by ageing when there is the impairment of memory, judgment, language and attention.Mild cognitive impairment (MCI) is a measurable cognitive problem that does not disrupt daily activities. Dementia is defined as an acquired deterioration in cognitive abilities that impairs the successful performance of activities of daily living.

Mild cognitive impairment (MCI) refers to a transitional state between cognition of normal aging and mild dementia [1]. It is not an uncommon clinical manifestation affecting the elderly people.

The progression rates of MCI to dementia ranges between 5.4% and 11.7% per year [2]. MCI involve problems with memory, language, thought, and judgment that are greater than normal age-related changes, which are not significantly enough to interfere with daily activities [3]. The early intervention of cognitive impairment appears to be very important for the prevention of dementia [3]. The prevalence of MCI is about four-times greater than dementia [4]. It is forecast that number of cases in the developing world will increase by 100% between 2001 and 2040 [5] MCI is an intermediate phase between normal ageing-related cognitive decline and dementia; therefore, the identification of MCI can play an important role in early intervention, prevention [6] and proper treatments [7]. The cause of MCI is unknown, however MCI and dementia such as Alzheimer's disease (AD) have some similar risk factors, such as ischemic heart disease, hypertension and diabetes [8]. Cerebral hypoperfusion can contribute to structural and functional changes in the brain, which ultimately leads to cognitive impairment. Hypertension, coronary heart disease (CHD) and stroke (including cerebral infarction and cerebral hemorrhage) may be potential risk factors for MCI, by affecting cerebral perfusion [9]. Apolipoprotein E (APOE) e4 genotype, Vitamin D deficiency, sleep-disordered breathing [10] and prior critical illness (e.g., sepsis).

## Methodology

**Source of data:** Elderly patients aged above 60 years attending department of medicine.
**Study design:** A hospital based observational cross-sectional study.
**Sample size:** 400 who fulfilled selection criteria.

## Inclusion criteria

Elderly patients 60 years and above attending medicine OPD.

## Exclusion criteria

Elderly patients who are diagnosed to have dementia.
Elderly patients who are hospitalized for acute illness.
Elderly patients with neuro infections.
Elderly patients who are on drugs for Seizure disorder and neuropsychiatric disorders.

## Methods of data collection

Detailed clinical history with special emphasis on risk factors will be taken.
Mini mental status examination (MMSE), Montreal cognitive assessment will be done in each patient.

## Interpreting the total MMSE score

Normal cognitive function = 27-30.
Mild cognitive impairment = 21-26.
Moderate cognitive impairment = 11-20.
Severe cognitive impairment = 0-10.

## Montreal cognitive assessment

A score of 26 and above is considered normal.
Add 1 point for an individual who has 12 years or fewer formal education.

## Statistical analysis

Data was entered in MS excel and analyzed using SPSS version 17.
All the quantitative parameters such as age, MMSE, etc. were expressed as mean and standard deviation.
Qualitative variables were expressed as proportions.
The differences in the mean values was tested for statistical significance by students, t test.
Similarly differences in proportions was tested by chi square test of significance.
Independent factors associated with development of cognitive impairment was assessed by logistic regression analysis.

## Results

**Table 1:** Comorbidities and MCI

| Comorbidity | Normal cognition | % | MCI | % | P value |
|---|---|---|---|---|---|
| Diabetes mellitus | 26 | 10 | 47 | 33.6 | <0.0001 |
| Hypertension | 17 | 6.5 | 42 | 30 | <0.0001 |
| IHD | 10 | 3.8 | 26 | 18.6 | <0.0001 |
| CVA | 12 | 4.6 | 24 | 17.1 | <0.0001 |
| Renal disorder | 08 | 3 | 12 | 8.5 | <0.0001 |
| Hypothyriodism | 16 | 6.1 | 29 | 20.7 | <0.0001 |

Among subjects with MCI, 33.6% were diabetics, 30% were hypertensives, 18.6% had past history of IHD, 17.1% had past history of CVA, 20.7% had hypothyroidism and 8.5% had renal disease.

**Table 2:** Risk Factors for MCI

| Risk factors | Normal cognition | % | MCI | % |
|---|---|---|---|---|
| Anaemia | 49 | 18.8 | 56 | 40 |
| Vitamin B12 deficiency | 8 | 3 | 13 | 9.3 |
| Hypercholesterolemia | 4 | 1.5 | 38 | 27.1 |
| Hypertriglyceridemia | 30 | 11.5 | 52 | 37.1 |
| Renal dysfunction | 8 | 3 | 12 | 8.6 |
| Hyponatremia | 42 | 16.1 | 84 | 60 |

Among subjects with MCI, 40% were anemic, 9.3% had vitamin B12 deficiency, 27.1% had hypercholesterolemia, 37.1% had hypertriglyceridemia, 60% had hyponatremia and 8.6% had altered RFT.

**Table 3:** Lab Investigations in Study Subjects

|  | Normal cognition | MCI | P value |
|---|---|---|---|
| Hb | 13.39±0.67 | 12.3±0.98 | <0.0001 |
| RBS | 134.69±15.39 | 162.7±38.54 | <0.0001 |
| HbA1C | 6.03±0.15 | 6.73±0.52 | <0.0001 |
| TSH | 2.84±1.28 | 3.28±1.60 | 0.002 |
| Creatinine | 0.95±0.49 | 1.24±0.35 | <0.0001 |
| Cholesterol | 135.76±18.33 | 188.73±29.25 | <0.0001 |
| Triglycerides | 115.51±27.39 | 147.18±34.26 | <0.0001 |
| Sodium | 136.99±2.21 | 133.78±1.79 | <0.0001 |
| Albumin | 3.49±0.22 | 3.31±0.30 | <0.0001 |

**Table 4:** Logistic Regression Analysis Showing Various Risk Factors and Their Odds Ratio for MCI

| Group | Odds Ratio (Or) | 95% Confidence Interval |
|---|---|---|
| Diabetes | 4.54 | 2.66 - 7.77 |
| Hypertension | 6.12 | 3.32 - 11.27 |
| IHD | 5.70 | 2.66 - 12.21 |
| Renal disease | 2.95 | 1.17 - 7.40 |
| Hypothyroidism | 3.98 | 2.07 - 7.63 |
| CVA | 4.27 | 2.06 - 8.84 |
| Vitamin b12 deficiency | 3.22 | 1.03 - 7.98 |
| Hyponatremia | 7.78 | 4.85 - 12.49 |

The odds ratio (OR) for conversion to MCI, was 4.54 in diabetics, 6.12 in hypertensives, 5.70 in patients with IHD, 2.95 in patients with renal disease, 3.98 in patients with hypothyroidism, 4.27 in patients with past history of CVA, 3.22 in patients with vitamin B12 deficiency and 7.78 in patients with hyponatremia.

Out of 140 subjects with MCI, 24 subjects had CVA and CT/MRI brain showed chronic infarcts.

None of them had sub dural haematoma, hydrocephalus and any space occupying lesion in brain.

**Discussion**

Mild cognitive impairment (MCI) is defined as a symptomatic predementia status on the perpetuity of cognitive decline, marked by objective deficits in cognition not severe enough to demand help in their activities of daily living. Accurate diagnosis at this stage helps in early diagnosis and treatment. There are many modifiable risk factors for MCI and dementia. So a proper search for the risk profiles is the need of the hour. Early intervention during the early pre dementia status helps in improving the quality of life of the patient. The risk profiles can also help in assessing the prognosis and in formulation of prevention strategies.

In our study a total of 400 individuals aged above 60 years who were asymptomatic for cognitive dysfunction were included. In the elderly individuals who fulfilled inclusion and exclusion Criteria, a detailed history of existing comorbidities was obtained. General physical examination was done in all study subjects. Blood pressure and body mass index (BMI) were measured. Investigations for reversible causes of MCI i.e., HbA1C, thyroid profile, serum vitamin B 12, Hb, RFT, LFT, ECG, electrolytes, lipid profile and neuroimaging were done.

All subjects were divided into two groups, subjects with normal cognition and subjects with mild cognitive impairment(MCI).This was done based on two scores, mini mental status examination (MMSE) and montreal cognitive assessment (MOCA). Elderly subjects with MOCA score < 26 and MMSE score < 27 were diagnosed to have MCI. Elderly subjects with

MOCA score ≥ 26 and MMSE score ≥ 27 were diagnosed as subjects with normal cognition. As depression was a common cause for pseudo dementia/cognitive impairment, subjects with depression were excluded using geriatric depression scale.

In this study, out of 400 elderly subjects 260(65%) of them had normal cognition 140(35%) of them had mild cognitive impairment. Among 140 subjects with MCI, 84(60%) were males and 56(40%) were females.

The mean age (in years) was higher in subjects with MCI (74.52±6.67) as compared to subjects with normal cognition (70.45±6.70) and was statistically significant. p< 0.0001.

This is accordance with study done by Tervo et al. [4], which showed that Persons with advanced age were more likely to develop MCI. Higher age was an independent risk factor for developing MCI.

In our study, subjects with MCI had prior history of diabetes mellitus (33.6%), hypertension (30%), ischemic heart disease (18.6%), Cerebrovascular accident (17.1%), renal disease (8.5%), hypothyroidism (20.7%) as compared to subjects with normal cognition in whom diabetes mellitus (10%), hypertension (6.5%), IHD (3.8%), cerebrovascular accident (4.6%), renal disease (3%) hypothyroidism (6.1%) was seen. P <0.0001.

This is in accordance with study conducted by Tervo et al. [4], Artero et al. [86] which showed that diabetes, stroke were risk factors for developing MCI.

A similar study conducted by Yumei Wang et al. [11] showed that vascular risk Factors, including stroke and diabetes, are independent risk factors of MCI.

A study conducted by Suvarna Alladi et al. [12] showed that cerebrovascular disease and cardiovascular disease are common risk factors for developing MCI.

**Conclusion**

Cognitive function clinical screening in 400 asymptomatic elders with MMSE and MOCA revealed that 140 (35%) elders had MCI. Risk factors were similar in patients with MCI as it is decribed in patients with dementia. Significant risk factors for development of MCI were age, diabetes mellitus, hypertension, IHD, CVA, hypothyroidism, vitamin B 12 deficiency, dyslipidemia, anemia, hyponatremia and renal failure. Since MCI is known to convert into full-fledged dementia, it is even more pertinent and critically important to evaluate elderly for mild cognitive impairment, even though they may be asymptomatic, since reversible risk factors can be intervened by appropriate treatment strategies.

This constitutes an important preventive strategy to the progression of dementia which creates both a physical and an economic burden.

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