Background: Mild cognitive impairment (MCI, also known as incipient dementia, or isolated memory impairment) is a brain function syndrome involving the onset and evolution of cognitive impairments beyond those expected based on the age education of the individual, but which are not significant enough to interfere with their daily activities. The concept of mild cognitive impairment was aimed to fill the gap between normal and dementia-type pathological ageing. Also, the MCI concept assumes that a cognitive continuum exists amongst normality and Alzheimer’s disease, the main cause of dementia. The MCI criteria, as defined by Petersen et al., include the following: Absence of dementia, memory problem, objective memory disorder, Normal general cognitive function, and Absence of other cognitive disorders or repercussions on daily life.

The initial diagnostic criteria for mild cognitive impairment specified generally intact everyday functioning. The Functional abilities allude to a scope of self-initiated, multidimensional, everyday skills and activities. 

Aim: To Correlate mild cognitive impairment and functional status among elderly.

Methods: A cross sectional study conducted on 225 participants at nursing homes in Egypt. A comprehensive geriatric assessment including medical history and physical examination was carried out for each participant. Cognitive functions were evaluated using both the Arabic translation of the Mini-Mental State Examination (MMSE) and the Arabic version of the Montreal Cognitive Assessment test (MoCA). Taking in account educational level, where diagnoses of mild cognitive impairment (MCI) if MMSE≤17 for illiterates; MMSE ≤20 for primary school graduates (≥6 years of education), MMSE≤24 for junior school graduates or above (≥9 years of education) and MoCA with Score less than or equal 24 indicates MCI in illiterate. Functional assessment was done by the Activities of Daily Living (ADL) scale, and the Instrumental Activities of Daily Living (IADL) scale.

Results: This study indicates that there is no significant difference between those with MCI and those with normal cognitive function in ADL and IADL.

Conclusions: MCI is frequent in older people. Our study suggests that there is no significant difference between those with MCI and those with normal cognitive function in ADL and IADL. Further studies are needed to determine the correlation between MCI and function status.

Keywords: MCI, Cognition, Function
activities necessary for independent everyday living inside the home and community. Later an international working group on MCI suggested the inclusion of “preserved basic [activities of daily living]/some minimal impairment in complex instrumental function” in the process of diagnosis.

Another study et al suggested the presence of difficulties in everyday abilities in MCI groups has accumulated. Greater functional impairment in MCI has been connected with improved prediction of dementia and a more stable definition of mild cognitive impairment over time. Although, the guidelines related to functional changes in individuals with MCI are indistinct and reflect our currently limited, though developing, and knowledge concerning the types, extent, and nature of functional change that develops with MCI. Recently, no standard criteria exist with regard the specific or theoretical definition of minimal functional limitation in people with MCI.

Concerning the report of cognitive complaints as well as objective cognitive impairment, the clinical diagnosis of both MCI and dementia overlap with each other. The two disorders vary in the further requirement for MCI individuals to have maintained independence in functional abilities. This is typically researched by method for an exhaustive meeting with the individual and with the closest relative, and registered in terms of (ADL) activities of daily living and (IADL) instrumental activities of daily living scales. Very mild issues in instrumental ADL are mostly consistent with MCI; however basic ADL ought to be preserved. Even though, there was no constant agreement about which domains of IADL are commonly that is, typically or potentially particularly impaired in MCI and additionally which sort of instruments may distinguish those best. However, a clear trend has emerged with activities that require higher cognitive procedures being reliably influenced. Additionally, the utilization of performance-based measures as well as technology-related items appears to be promising.

### Methods

This is a cross-sectional study conducted at nursing homes at Cairo. Using sample size calculation formula

\[
n = \frac{p(1-p)z^2_\alpha}{d^2}
\]

where \(d\) is the degree of precision (assumed 5.0%), \(z\) is the value of \(\alpha\) error (assumed 5.0%), while \(p\) is the prevalence of mild cognitive impairment 16.6% ; the calculated sample size is 225

### Inclusion criteria

Elderly males and females who were 60 years and older and with an oral consent to participate and were able to answer questionnaire during the interview.

### Exclusion criteria:

Those who refuse to participate in our study, elderly who were diagnosed as having dementia and with severe hearing and visual impairment and are unable to continue the interview.

Each participant was subjected to comprehensive geriatric assessment including medical history and physical examination.

To assess cognitive function we used the Arabic version of The Mini-Mental State Examination (MMSE) to perform global cognitive function and the Arabic version of the Montreal Cognitive Assessment (MoCA). Functional assessment was done by the Activities of Daily Living (ADL) and the Instrumental Activities of Daily Living (IADL) scale. GDS for screening of depression using the Arabic version of geriatric depression scale (GDS) in this study MMSE was used with the subjects’ education taken into account diagnosed as mild cognitive impairment (MCI) if MMSE≤17 for illiterates; MMSE ≤20 for primary school graduates (≥6 years of education), MMSE≤24 for junior school graduates or above (≥9 years of education) and MoCA with Score less than or equal 24 indicates MCI.

### Statistical Analysis

Quantitative data are presented as mean ± standard deviation (SD). Frequency and percentage for all qualitative variables were used. Comparison between quantitative variables was done using t-test to compare two groups. Comparison of qualitative variables was done using chi square test. Correlation coefficient was also done to find linear relation between different variables using Pearson correlations co-efficient. The Statistical Package for the Social Sciences (SPSS) program, version 20.0 was used as the statistical software program. \(p < 0.05\) was considered to be statistically significant.

### Results

Among the 225 participants 121 (53.8%) were males and 104 (46.2%) were females. It was found that 31.6% their age range from 60 to 64, 34.2% their age range from 65 to 70 and 34.2% their age above 70 years old. It is found that 21.3% of the participants were illiterate, 27.1% had primary graduates ≥ 6 years and 51.7% had ≥ 9 years education. The prevalence of Mild Cognitive Impairment using MMSE is 17.3%, MoCA is 24.9%, There was no significant difference between those with MCI and those with normal cognitive function regarding educational level using different screening methods. \((P=0.062\text{ using MMSE and } P=0.798\text{ using MoCA}). Both MMSE and MoCA had higher prevalence of MCI with increasing ageing in which \((P\text{-value} 0.000). There was no significant difference between those with MCI by MMSE and those with normal cognitive function regarding functional status using different screening methods. \((P=0.646\text{ for ADL and } P=0.693\text{ for IADL}). Also, there was no significant difference between those with MCI and those with normal cognitive function by MoCA regarding functional
status using different screening methods. \( P = 0.564 \) for ADL and \( P = 0.564 \) IADL.

Table 1: Prevalence of mild cognitive impairment using different screening tests

<table>
<thead>
<tr>
<th></th>
<th>MMSE</th>
<th></th>
<th>MoCA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>MCI</td>
<td>Normal</td>
<td>MCI</td>
</tr>
<tr>
<td>Age 60-64 (No = 71)</td>
<td>No.</td>
<td>67</td>
<td>4</td>
<td>63</td>
</tr>
<tr>
<td>Age 65-70 (No = 77)</td>
<td>No.</td>
<td>64</td>
<td>13</td>
<td>61</td>
</tr>
<tr>
<td>Age &gt; 70 (n No = 77)</td>
<td>No.</td>
<td>55</td>
<td>22</td>
<td>45</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>0.001</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: The relation between age, gender and MCI.

<table>
<thead>
<tr>
<th>Variables</th>
<th>MMSE</th>
<th>No.</th>
<th>%</th>
<th>MCI</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (NO=121)</td>
<td></td>
<td>98</td>
<td>23</td>
<td>90</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Female (NO=104)</td>
<td></td>
<td>88</td>
<td>16</td>
<td>79</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>P value</td>
<td>0.798</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Relation of MCI and different education levels

<table>
<thead>
<tr>
<th>Illiterate(No =48)</th>
<th>Primary school</th>
<th>Senior school</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.</td>
<td>%</td>
<td>n.</td>
<td>%</td>
</tr>
<tr>
<td>MMSE</td>
<td>Normal</td>
<td>45</td>
<td>93.8</td>
</tr>
<tr>
<td></td>
<td>MCI</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>MoCA</td>
<td>Normal</td>
<td>36</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>MCI</td>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 4: Relation of MCI and functional status using MoCA

<table>
<thead>
<tr>
<th>MoCA</th>
<th>No.</th>
<th>%</th>
<th>MCI</th>
<th>No.</th>
<th>%</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL</td>
<td>independent (6)</td>
<td>168</td>
<td>99.4%</td>
<td>56</td>
<td>100.0%</td>
<td>0.564</td>
</tr>
<tr>
<td></td>
<td>assisted (1-5)</td>
<td>1</td>
<td>0.6%</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dependent (0)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>IADL</td>
<td>independent(8)</td>
<td>163</td>
<td>96.4%</td>
<td>53</td>
<td>94.6%</td>
<td>P=0.564</td>
</tr>
<tr>
<td></td>
<td>assisted (1-7)</td>
<td>6</td>
<td>3.6%</td>
<td>3</td>
<td>5.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dependent(0)</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
</tbody>
</table>

Discussion:
The prevalence of mild cognitive impairment is increasing among both developed and developing countries. Rapid demographic ageing in both low- and middle-income countries makes it a priority to identify the people who are at the risk of developing dementia at early stages for different targeting preventive intervention. The prevalence of mild cognitive impairment that varies widely in different research can be due to the use of different definitions. Available studies indicate that the prevalence of MCI ranges from 7.7% to 42.0% depending on the diagnostic criteria used to make the diagnosis, the country where the study was conducted, the age groups under consideration, different methodology and definitions.

In this study, we found that the prevalence of MCI among elderly in geriatric homes in Cairo using MMSE was 17.3%, MOCA is was 24.9%. The MMSE was the most studied instrument used to detect MCI; there are various studies used different cut-points, had different proportions of underlying MCI. Decreasing cut point is better for detecting MCI especially in illiterate individuals. This has been used in China with the subjects’ education taken into account diagnosed as mild cognitive impairment (MCI) if MMSE ≤ 17 for illiterates; MMSE ≤ 20 for primary school graduates (≥ 6 years of education), MMSE ≤ 24 for junior school graduates or above (≥ 9 years of education), in which prevalence was 18.5%. In our study we used the same cut off points for MMSE to detect MCI taking into consideration educational level and the prevalence of MCI was 17.3% which was near to that of Su X et al.

Moreover in one population study in Quena, Egypt in which crude prevalence rate was 1.74/100, using scores 28 instead of 30 points for illiterate. In this study, the prevalence of MCI by MOCA was higher (24.9%) than that of MMSE (17.3%) this can be explained that MoCA is superior to MMSE for detection of MCI. Using scores less than or equal 24 has higher specificity 87% and accuracy 86% in detecting MCI among illiterate by MOCA. In study done by Cecato, J.F., the prevalence was 32.3 %, using MoCA test score P ≤ 23 for MCI. With regard to demographic characteristics, the most significant factor that is associated with MCI in the current study is advanced age but not sex and poor educational status.

This study indicates that mild cognitive impairment increase significantly with age (P-value 0.000), using MMSE and MoCA. This correlated with the Mayo Clinic Study of Aging which stated that the prevalence of mild cognitive impairment increases with age. Also, a number of prospective population based studies estimate the prevalence among older adults (≥ 70 years) to be between 14 and 18 percentage. Moreover, the same correlation between MCI and age is indicated in another 3 studies in et al Egypt. Although some studies indicated higher prevalence in
Regarding the functional status of MCI participants, this study indicates that there is no significant difference between those with MCI and those with normal cognitive function in ADL (P = 0.564). The fact that individuals with MCI have preserved ADL correlated with the diagnostic criteria of MCI 32. Although, the guidelines related to functional changes in individuals with MCI are indistinct and reflect our currently limited, though developing, and knowledge concerning the types, extent, and nature of functional change that develops with MCI. Recently, no standard criteria exist with regard to the specific or theoretical definition of minimal functional limitation in people with MCI 42. In the current study, there is no significant difference between those with MCI and those with normal cognitive function regarding functional status using Instrumental Activities of Daily Living (P=0.564). This agrees with studies done by Jefferson AL and Burton CL 43, 44, yet this disagrees with two Egyptian cross sectional studies in 2011 and 2012 respectively 38, 37.

References:


