Divergent thinking and cognitive reserve in patients affected by Mild Cognitive Impairment: an observational study

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AIMS

Divergent thinking (DT) has recently attracted researchers’ attention for its relationship with cognitive reserve (CR). Indeed, it has been observed that DT could be considered as an indicator of CR and therefore a target for cognitive stimulation programme applied on patients affected by neurodegenerative diseases. Current research showed that DT usually begins early to decrease in Alzheimer Disease’s (AD) patients; however, less is known about patients affected by Mild Cognitive Impairment (MCI). The aim of this study was to preliminary evaluate the relationships between DT, general cognition, CR and psychological state in MCI patients.

MATERIALS

The main outcome measures were:

1. General cognitive functioning and cognitive reserve:
   - Mini Mental State Examination – MMSE (Magini et al., 1996);
   - Montreal Cognitive Assessment – MOCA (Nasreddine et al., 2005);
   - Cognitive reserve index – CR (Cognitive Reserve Index – CRigq, Nucci et al., 2012);

2. Psychological measures:
   - Perceived quality of life: McGill Quality of Life Questionnaire-It - MQOL-It, (Guzzaini, Giorgi, Alesii, & Fini, 2010);
   - Depression: Beck Depression Inventory – BDI, (Beck et al., 1961);
   - Status anxiety: State Trait Anxiety Inventory X1 – STAI, (Zotti et al., 1985);
   - Apathy: Apathy Evaluation Scale – AES, (Marin et al., 1991; Starkstein et al., 1992);

3. Divergent thinking measure:
   - Creativity Index (CI): Abbreviated Torrance Test for Adults – ATTA (Goff, 2002) 3.
   - ATTA contains one verbal and two figural tasks. Stimuli are presented in the following section.

The three tasks of the ATTA test are shown in the next section.

METHODS

24 MCI patients (age, M= 75.33±5.62; educational level, M= 8.02±4.11) and 60 controls-HC (age M= 73.48±4.87; educational level M= 8.18±4.22) were enrolled in this observational study. In order to balance the numerosity of the samples, a random selection of 25 subjects from the whole control group was executed. Parametric analyses were performed in order to compare the performances of the two groups.

RESULTS

MCI patients performed worse at MMSE and MOCA and they were also under the controls’ mean in the flexibility subscore of ATTA test. No differences were found in CR scores.

<table>
<thead>
<tr>
<th>Group</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>P-value</th>
</tr>
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<tbody>
<tr>
<td>MMSE</td>
<td>HC</td>
<td>27.06</td>
<td>1.39</td>
<td>3.055</td>
<td>35.68</td>
</tr>
<tr>
<td></td>
<td>MCI</td>
<td>25.28</td>
<td>2.50</td>
<td></td>
<td></td>
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<tr>
<td>MOCA</td>
<td>HC</td>
<td>25.56</td>
<td>3.17</td>
<td>4.085</td>
<td>47</td>
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<tr>
<td></td>
<td>MCI</td>
<td>21.55</td>
<td>3.70</td>
<td></td>
<td></td>
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<tr>
<td>CRigq</td>
<td>HC</td>
<td>108.20</td>
<td>22.13</td>
<td>0.678</td>
<td>47</td>
</tr>
<tr>
<td>tot</td>
<td>MCI</td>
<td>104.25</td>
<td>18.42</td>
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<tr>
<td>ATTA</td>
<td>HC</td>
<td>2.72</td>
<td>1.40</td>
<td>2.609</td>
<td>47</td>
</tr>
<tr>
<td>Flexi</td>
<td>MCI</td>
<td>1.75</td>
<td>1.19</td>
<td></td>
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</tr>
</tbody>
</table>

Interestingly, only in the control sample, significant positive correlations were found between different DT and CRigq subscores and with educational level while moderate negative correlations were found between DT and age.

DISCUSSION

Our preliminary results showed that there were significant positive correlations between some DT and CR subscores in healthy aging subjects; however, this was not replicated in the pathological sample. These results allowed us to hypothesize that the cognitive decline, which seemed to be already in progress in MCI patients (see differences at MMSE and MOCA tests), could affect early DT abilities (flexibility) and its relationships with CR.

CONCLUSIONS

DT seemed to decrease in MCI population but only in the flexibility index, that is the ability to shift between different categories giving flexible responses. Moreover, the relationship between DT and CR seemed to be influenced by the decline of other cognitive abilities. Future research should be focused on determining the cognitive processes that could influence this relationship and consequently determine the potential positive role of DT in early cognitive stimulation programs for this type of patients.

REFERENCES