USEFULNESS OF A PROGRAM OF NEUROPSYCHOLOGICAL REHABILITATION OF MEMORY IN ACQUIRED BRAIN DAMAGE

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ABSTRACT

This study evaluated the usefulness of a cognitive and functional rehabilitation of memory program for patients with acquired brain injury. Ten participants with mild- to -moderate cognitive impairment participated in the study; five of them for four months attended a weekly rehabilitation program, while the other five did not receive any neuropsychological intervention. The results showed that the rehabilitation group improved the score in the Wechsler III Memory Scale. Similarly, it was found that the score on the memory scale of failure of the daily life only improved in the group that received rehabilitation. The results suggest that memory rehabilitation program is useful in the treatment of both cognitive and functional sequels resulting from acquired brain damage.

Key words: External memory aids, acquired brain injury, cognitive stimulation, visual imagery, neuropsychological rehabilitation
Introduction

It is widely demonstrated that the Acquired Brain Damage (DCA) brings with it various cognitive sequels (Akshoomoff, Feroleto, Doyle & Stiles, 2002; Bigler, 2001; Cooke & Kauser, 1995; Gomez, 2008; Hoskison, Moore, Hu, Osri & Dash, 2009; Junque, Bruna, Mataró, & Puyelo, 1998; Kshubla, Hanks, Casey & Millis, 2008; Rios, Muñoz & Paul, 2007), emotional (Morton & Wehman, 1995; Robinson & Szetela, 1981) and behavioral (Levin, 1998; Levin, Lester & Grossman, 1982; Morton & Wehman, 1995), that affect the functionality of the patients and their families.

At the cognitive level, it was found that attention, memory and executive functioning problems are the most frequent cases of DCA (Bennett, 2001) Hewitt, Evans & Dritschel, 2006; Hoskison et al., 2009; Lowther & Mayfield, 2004; McDowell, Whyte & D’Esposito, 1997; Rimel, Giordani, Barth & Jane, 1982; Rios et al., 2007). With respect to alterations of memory, the deficit may vary depending on the location of the lesion, being observed a decrease in the speed of the storage, also a deficit in retention or both (Bennett, 2001). It is common to find general amnesic syndrome in diffuse axonal injuries (Bigler, 2001), in both focal lesions there usually arise difficulties in more specific memory processes such as verbal memory alterations (Junque et al., 1998) Ries & Marks, 2006), visual memory (Delis, Kiefner & Fridlund, 1988; Delis, Robertson & Efron, 1986; Levin et al., 1982), semantic memory (Wilson, 1997) and the memory of the temporal order of events (Cooke & Kauser, 1995; Vakil, Sherf, Hoffman & Stern, 1998; Vakil & Tweedy, 1994).

In relation to the functional implications of the DCA, Rosenthal (1998), referring to the Neuropsychological after math, asserts that the difficulties of memory have a significant functional impact. The slowing in the process of storage diminishes learning, hindering participation in areas of education and/or training programs. When the difficulty to retain the information premiums significant problems related to everyday forgetfulness are generated. To this extent, it tends to forget when certain things have happened, what others have said and what to do in the future (prospective memory). Finally, when there are difficulties both in the acquisition as in the withholding of the information and it is not possible to compensate for the deficit, it makes it difficult for the patient to work or live independently in highly structured and changing environments, as well as the development of instrumental activities (Benett, 2001).

Considering the cognitive consequences of the DCA, the impact on independence, functional adaptation, and quality of life of those affected and their families, the rehabilitation of cognitive functions should be seen as a necessity.

In clinical practice the Neuropsychological rehabilitation programs often develop within the framework of two approaches: cognitive-didactic and/or functional-experiential (Vanderploeg et al., 2008). The cognitive approach places emphasis on the training of tasks that have little applicability to everyday situations (Raskin & Gordon, 1992). For its part, the functional-experiential approach focuses to regain the ability to engage in daily life activities in order to increase performance in the environment without this implying to necessarily work on restitution of compromised cognitive functions (Vanderploeg et al., 2008).

In the field of clinical neuropsychology studies have been advanced to inquire about the utility of these approaches separately in the rehabilitation of the DCA. The results of research on the usefulness of rehabilitation of memory with cognitive emphasis programs are conflicting. However, it has been found that some strategies and techniques may be helpful in the rehabilitation of the DCA; among them the strategies of repetition, centralization and Organization (Association, categorization, and semantic processing) (De los Reyes-Aragon, Arango-Laspilla, Rodríguez, Perea & Ladera, 2012; Montejo, Montenegro, Reinoso, Andrés, & Claver, 2001). Moreover, the most useful techniques include cognitive stimulation as a restitution technique (Gray, Robertson & Pentland, 1992; Kerner & Acker, 1985; Ryan & Ruff, 1988; Thomas-Stonell, Johnson, Schuller & Jutai, 1994; Twum & Parente, 1994; Wood & Fussey, 1987), the self-generation (De los Reyes-Aragón, Arango-Lasprilla, Perea, Ladera & Krch, 2012), spaced recovery (Melton & Bourgeois, 2005), the fading of tracks (Thoene & Glisky, 1995; Wilson, Baddeley, Evans & Shiel, 1994) and the visual imagery (IV) (Cermak, 1975; De Noreña et al., 2010; Jones, 1974; Kaschel et al., 2002; Richardson, 1995; Richardson, Cermak, Blackford & O’Connor, 1987; Twum & Parente, 1994; Wilson, 1995).
There are few studies of rehabilitation which took into account the functional results and social and labor reintegation in the DCA, however, some of these provide evidence of the direct effect of the use of compensatory rehabilitation techniques as the use of external aid (among these the use of agendas) in the reduction of subjective complaints of memory (Evans, Wilson, Needham & Brentnall, 2003; Hart, Buchhofer, & Vaccaro, 2004; Hart, Hawkey & Whyte, 2003; Kim, Burke, Dowds & George, 1999; Schmitter-Edgecombe, Fahy, Whelan & Long, 1995; Zencius, Wesolowski, & Burke, 1990; Zencius, Wesolowski, Krankowski & Burke, 1991) and in reducing levels of anxiety, as well as the improvement of self and interpersonal relations (Brooks, McKinlay, Symington, Beattie & Campsie, 1987; Ezrachi, Ben-Yishay, Kay, Diller & Rattok, 1991; Fabiano & Crewe, 1995; Fraser, Dikmen, McLean, Miller & Temkin, 1988; Girard, Brown & Burnett-Stolnack, 1996; Ip, Doman & Schentag, 1995).

Some works like Kaschel et al. (2002), provide evidence for the usefulness on IV in the rehabilitation of the functional purposes of memory. Other studies on the usefulness of the IV (of Noreña et al., 2010; Kaschel et al., 2002) agree that it is useful to optimize learning and facilitation of memory in patients with mild and moderate difficulties finding a positive effect, although limited in some cases, on performance in activities of daily living.

On the other hand, Vanderploeg et al. (2008) compared the usefulness of rehabilitation from the different approaches and found that teaching cognitive rehabilitation has a greater impact in the cognitive functioning, while the rehabilitation from the functional-experiential approach is more effective to work and school reintegation and improves performance in the activities of daily living. The finding as to the contribution of cognitive rehabilitation coincides with the issues raised by Rattok et al. (1992) who reported that treatments including cognitive rehabilitation produced great improvements in some cognitive abilities, including memory, but do not contribute more to functional improvement compared with treatments that do not include cognitive rehabilitation.

Cicerone et al. (2008) evaluated the effectiveness of a program of Neuropsychological comprehensive rehabilitation compared to a standard and multidisciplinary program in patients with TCE. The treatment was carried out at 15 hours per week for 16 weeks. The standard program consisted of individual multidisciplinary therapy, whereas the comprehensive rehabilitation program emphasized the integration of cognitive, interpersonal, and functional interventions in a therapeutic environment. To assess the impact of the programs, measures of community integration, perceived self-efficacy, community employment performance, perceived quality of life and neuropsychological functioning were used. The results of the study showed that Neuropsychological functioning improved in both conditions, however, it was observed better performance on measures of social functioning and perceived quality of life at the subjects who participated in the comprehensive rehabilitation in comparison with the standard program, which indicates a greater effectiveness of the first.

The evidence shows then, that it is necessary to assume an inclusive posture from which we will see the rehabilitation as a custom process that, even though it involves training in cognitive tasks, said training must find their application in daily activities so that you have a greater impact on the quality of life of patients and their families (Montejo et al., 2001; Wilson, 2002). In this way, from the rehabilitation it would be possible to systematically train patients in the knowledge, use and control of the strategies and techniques that aim to decrease the memory problems associated with the activities of daily living (Montejo et al., 2001). However, at present, no research that has evaluated comprehensive Neuropsychological rehabilitation programs that include both treatments for cognitive disorders has been found, such as interventions aimed at achieving an increase of functionality in population with DCA in Latin America.

For this reason, the objective of this research was to assess the usefulness of a comprehensive program of Neuropsychological rehabilitation of memory for the improvement of memory alterations and increased functionality in Colombian patients with mild- to- moderate cognitive impairment and DCA.
Method

Participants

The sample was composed of ten subjects with DCA (TCE or ACV) who were treated in external consultation services at the University Clinic of San Juan de Dios in Cartagena. Five subjects in the rehabilitation group and the five remaining men, who did not want to be part of the program, formed the control group. The sociodemographic characteristics and the DCA of the participants are shown in Table 1. The groups were similar in age, gender, etiology of DCA, degree of cognitive impairment and memory difficulties evaluated by cognitive and functional measures ($p > 0.05$) (Tables 1 and 2). The DCA was confirmed through medical records from the hospital, and in all cases at least five months had passed since the DCA. For their participation in the study all subjects should be between 18 and 60 years of age, show mild or moderate cognitive impairment depending on the score obtained in the NEUROPSI (Ostrosky-Solis, Ardila & Rosselli, 2001); show memory deficit according to Memory Scale by Wechsler III (WMS-III) (Wechsler, 1997); and show subjective memory complaints that affect functionality.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Socio-demographic characteristics and DCA</th>
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<tbody>
<tr>
<td>Variable</td>
<td>Rehabilitation Group</td>
</tr>
<tr>
<td></td>
<td>n = 5</td>
</tr>
<tr>
<td>Age (DE)</td>
<td>46.50 (10.71)</td>
</tr>
<tr>
<td>Years of schooling (DE)</td>
<td>11.00 (4.58)</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
</tr>
<tr>
<td>Time since the DCA in months (DE)</td>
<td>6.60 (0.89)</td>
</tr>
<tr>
<td>Type of DCA (%)</td>
<td></td>
</tr>
<tr>
<td>ACV</td>
<td>40</td>
</tr>
<tr>
<td>TCE</td>
<td>60</td>
</tr>
<tr>
<td>Cognitive impairment (%)</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>40</td>
</tr>
<tr>
<td>Moderate</td>
<td>60</td>
</tr>
</tbody>
</table>

Abbreviation: DE: standard deviation. NS: Not significant

In addition not having a history of psychiatric illness, neurological disorders, neuropsychological and/or psychological clinically demonstrable prior to the DCA, abuse of drugs, nor language disorder at the time of the evaluation; also reside in the city of Cartagena. As shown in Table 2, prior to treatment, both groups on average, presented difficulties marked on the general ability of immediate and delayed memory with greater difficulty in a visual than auditory level, as well as in the working memory. Also, they showed a performance in the low normal range in tasks involving processes of immediate and delayed auditory memory and a lower performance level of recognition of the information in the listening mode.
Table 2
Pretreatment measures

<table>
<thead>
<tr>
<th></th>
<th>Rehabilitation Group n = 5</th>
<th>Control Group n = 5</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scores on the baseline of the WMS-III (DE)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Immediate Hearing Index</td>
<td>80.80 (5.07)</td>
<td>79.60 (4.98)</td>
<td>NS</td>
</tr>
<tr>
<td>Immediate Visual index</td>
<td>72.60 (7.86)</td>
<td>65.20 (7.76)</td>
<td>NS</td>
</tr>
<tr>
<td>Immediate memory index</td>
<td>73.60 (11.39)</td>
<td>67.40 (7.09)</td>
<td>NS</td>
</tr>
<tr>
<td>Delayed Auditory Index</td>
<td>85.00 (8.00)</td>
<td>82.00 (6.78)</td>
<td>NS</td>
</tr>
<tr>
<td>Delayed Visual index</td>
<td>63.60 (8.76)</td>
<td>65.60 (11.41)</td>
<td>NS</td>
</tr>
<tr>
<td>Delayed Auditory Recognition Index</td>
<td>77.80 (7.82)</td>
<td>78.40 (9.71)</td>
<td>NS</td>
</tr>
<tr>
<td>Delayed memory index</td>
<td>68.60 (8.56)</td>
<td>68.80 (5.85)</td>
<td>NS</td>
</tr>
<tr>
<td>Working memory index</td>
<td>74.20 (9.44)</td>
<td>77.80 (6.57)</td>
<td>NS</td>
</tr>
<tr>
<td>Scores of functional scales in the baseline</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Barthel index of daily life basic activities (DE)</td>
<td>50.00 (0.00)</td>
<td>48 (4.47)</td>
<td>NS</td>
</tr>
<tr>
<td>Scale of daily life instrumental activities of Lawton and Brody (DE)</td>
<td>11.00 (0.71)</td>
<td>13.00 (5.05)</td>
<td>NS</td>
</tr>
<tr>
<td>Memory Failures Everyday Questionnaire (DE)</td>
<td>40.20 (6.01)</td>
<td>33.40 (12.32)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Abbreviations: DE standard deviation. NS: Not significant

Instruments

- **Neuropsychological and functional assessment protocol**

  - Brief neuropsychological assessment in Spanish (NEUROPSI) (Ostrosky-Solis et al., 2001). Is a test of cognitive tracking that assesses briefly the cognitive functions (temporal-spatial orientation, attention, concentration, memory, language, executive functions, visual-spatial skills, reading, writing and calculation). The ceiling of the test score is 130 and the degree of cognitive impairment varies taking into account the age and level of schooling. The results of this test allowed to exclude subjects with normal cognitive function or cognitive impairment.

  - Wechsler III Memory scale (WMS-III) (Wechsler, 1997). Is a test for the evaluation of objective memory through eight subscales: Immediate Auditory Memory (MAI), Immediate Visual Memory (MVI), Immediate Global Memory (MIG), Delayed Auditory Memory (MAD), Delayed Visual Memory (MVD), Delayed Global Memory (MDG), Delayed Auditory Recognition (RAD) and Working Memory (MT). Each scale has an index score of mean 100 and standard deviation 15. The level qualifies the performance of memory as follows: very superior, superior, normal high, medium, low normal, lower and very lower. The score of each of the subscales was used as the dependent variable.

  - Memory Failures Everyday Questionnaire (MFE) (Sunderland, Harris & Gleave, 1984). The Sunderland questionnaire of memory failures of everyday life et al. (1984) consists of 28 items on situations and activities of daily living memory, which are graded using a Likert scale with an original estimation of 9 options. The study used a simple assessment of 4 response options (0 = never, 1 = rarely, 2 = few times, 3 = frequently), taking into account the original scale has problems of various types, in particular increases the time of application and tends to generate confusion in older adults and people with DCA (Montejo, Montenegro, De Andres & Reinoso, 2008; Montejo, Montenegro, Reinoso, De Andres & Claver, 2002). With higher score on the scale, higher functional alteration related to...
memory. The score in the MFE was used as the dependent variable.

- **Barthel index of basic daily life activities (Mahoney & Barthel, 1965).** It is a scale used for the evaluation of the functionality of the patients in activities of daily living. It consists of the assessment of the patient’s ability to perform independently 10 activities of daily living. The total score ranges between 0 and 100, 100 being the highest degree of independence. The total score of the Barthel index was used as the dependent variable.

- **Scale of daily life instrumental activities of Lawton and Brody (Lawton & Brody, 1969).** It is a scale used for the evaluation of the functionality in instrumental activities of the everyday life. It consists of the assessment of the ability of patients to carry out more complex daily life activities, as the handling of Economic Affairs and cooking. The scale goes from 0 to 8, being 8 the score which indicates greater degree of independence. The total score on this scale was used as the dependent variable.

- **Neuropsychological rehabilitation Protocol of Memory and functional**

  The rehabilitation Protocol consisted of activities designed based on strategies and Neuropsychological rehabilitation techniques of memory that have proved to be useful: organizing strategies, the use of external aid of memory, visual imagery, fading of tracks and cognitive stimulation.

  The program was organized in two modules that were performed in parallel, in two individual weekly sessions of one hour, for four months: a restorative module and a functional module. In the first there were activities of cognitive stimulation, learning techniques and memory strategies, through exercises with pencil and paper, as well as computer-based exercises. Memory strategies used include the categorization, the association and link, clustering and comprehension techniques.

  At the same time in the second module, alternative rehabilitation techniques were used. The objective of this module was to improve the everyday forgetfulness by training in the use of an agenda as an external memory aid and the use of the technique of visual imagery. On the agenda the patient should record daily activities to perform and those that had been carried out. Each day was divided into two halves initially tagged, at the top were written activities to do during the day and at the bottom the activities already carried out. Different ink colors were established for this purpose. In addition to the division into sections and the use of colors, other visual cues were included in each sheet. Training in the use of the agenda was the technique of blurring, by gradually removing all tracks throughout the program, so that ultimately, the pages of the agenda were similar to those that are commonly found in the market.

  Similarly, the IV technique was used to work processes in prospective memory. Initially, it motivated to patients for the learning and use of the technique. Subsequently it assessed the ability to recreate Visual stimuli in the imagination through the rapid generation of images of objects and their verbal description. Finally, it trained in the generation and recovery from everyday situations identified as relevant by the participants and increasing complexity in the imagination.

  Family members were actively involved in the program, thus they were trained in the escort for the use of the agenda, IV exercises at home and memory cognitive stimulation activities at home.

  Each session was directed according to the following structure: delineation of objectives of the session, review of activities for the House, explanation of the strategy/technique to learn, implementation of strategy/technique, feedback and tasks for the House.

**Procedure**

Once the Ethics Committee of the Universidad del Norte de Barranquilla evaluated and approved the research project, it was proceeded to establish contact with the Clínica Universitaria San Juan de Dios de Cartagena.

The selection of participants was performed using an intentional sampling, taking into account the fulfillment of the criteria for inclusion and willing to participate of the patients admitted by outpatient at the hospital. Once the candidates are selected and contacted it is explained to...
them the procedure that would be implemented and were given an informed consent form for their processing and signature. Subsequently, an appointment was assigned to each of the participants to the neuropsychological assessment.

Of the 15 subjects who expressed interest in participating in the research, 5 desisted after the initial evaluation and 5 more wanted to continue participating in assessments, but not in the rehabilitation program and were assigned to the control group. Once the initial evaluation was done, it began the implementation of the rehabilitation Protocol. New measurements were made after two months of treatment and at the end as well.

Statistical analysis

To determine if the rehabilitation program improved the memory capacity and functionality of the subjects with DCA analyses of variance (ANOVAs) of repeated measures of 2 x 3 were done, where there were 2 groups (Rehabilitation and control group) and three times of evaluation (initial, intermediate and final). The dependent variables were the 8 memory indexes thrown by WMS III, the scale of everyday memory failures, as well as scores in Barthel’s ABVD and the AIVD index of Lawton IADL. Additionally t tests for analysis were conducted by pairs of the interactions found.

Results

Memory rehabilitation

The results of ANOVAs on repeated measurements for the evaluation of the capacity of memory show condition interactions by time in six of the measures (Table 3), showing that the increase in scores over time occurs only in the rehabilitation group.

In four measures (MAI, MVI, MIG, MDG) it was noted that although in the initial moment the two groups were similar, the rehabilitation Group obtained a score significantly higher than the controls in the intermediate steps and final ($ps < 0.05$) (Figures 1a, 1b, 1c and 1f), while in the other two (MAD, MVD), differences were observed only in the final measure ($ps < 0.05$) (Figuras1d, 1e).

On the other hand, while the control group had a similar performance in all indexes in memory over time, the rehabilitation group improved their scores in six sizes (MAI, MVI, MIG, MAD, MVD, MDG) from intermediate measurements ($p < 0.05$).

In addition main effects of group in five of the WMS III memory indices were observed, which indicates that regardless of the time of evaluation, subjects of the rehabilitation group showed better scores in MAI ($p < 0.001$), MVI ($p < 0.05$), MIG ($p < 0.01$), MAD ($p < 0.01$) and MDG ($p < 0.05$) (Table 3). Also, main effects of time in the WMS-III rates were observed, showing that the scores improved from the intermediate measure, except in the MVI where the increase was observed only in the final measure and indexes of RAD and MT, where the scores remained stable at all times of assessment (Table 3). However, as it was already explained, these main effects can be explained by the increase in scores of the rehabilitation Group.

Functional scales

Results from the ANOVAs of repeated measurements (Table 3) for the evaluation of the functionality show the existence of an interaction group x time in the scale Memory failures everyday ($p < 0.001$), showing that this single test score significantly improved in the final measure ($p < 0.05$) of the group that participated in the program of rehabilitation (Figure 1g). Also, a main effect for time was found in the Memory failures everyday ($p < 0.05$), indicating that regardless of the group, the score on the test improved in the final measure. As in the case of memory skills, this decrease is due to the variation in the Group of rehabilitation (Figure 1). There were no main effects or interactions on measures of Barthel’s ABVD and Lawton’s AIVD.

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<table>
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<th>Variables</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>8.88***</td>
<td>Rehab. &gt; control</td>
</tr>
<tr>
<td>Time</td>
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<td>Interacción</td>
<td>30.22***</td>
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<td>9.88*</td>
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<td>1 = 2 = 3</td>
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</tr>
<tr>
<td>Interaction</td>
<td>10.08**</td>
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*p < 0.05; **p < 0.01; ***p < 0.001
Figure 1. Interactions in ANOVAs results
Discussion

The present study aimed to evaluate the effectiveness of a program of cognitive and functional rehabilitation of memory in patients with mild cognitive impairment, or moderate product of the DCA. The results show a significant improvement after intervention, both in cognitive measures, such as functional in the group that participated in the rehabilitation. This indicates that the rehabilitation program is useful to improve cognitive performance at memory and functional level in patients with mild or moderate cognitive impairment product of DCA.

The results match the findings of Vanderploeg et al. (2008) and Cicerone et al. (2008) who found a positive impact of cognitive rehabilitation with a functional component on activities of daily living, social and labor reintegration, and quality of life. Similarly, they reported cognitive benefits at a Neuropsychological level, including memory, which makes this form of intervention a valuable tool for the improvement of the quality of life of persons with DCA and their families.

The results of the study suggest, moreover, that the use of rehabilitation strategies, such as the cognitive stimulation, has a positive impact on the performance of the patients. It became clear that at the end of the intervention, the performance of the rehabilitation group was greater in processes of immediate memory in visual mode, as well as in the hearing. Similarly, it was observed a higher performance in the global delayed memory, specifically in the auditory modality. This is consistent with that reported by a large number of researchers (Adams, Adams & Coleman, 2006; Chen, Thomas, Glueckauf & Bracy, 1997; Middleton, Lambert & Seggar, 1991; National Institute of Health, 1998; Thomas-Stonell et al., 1994; Twum & Parente, 1994), whose results showed the usefulness of cognitive stimulation such as a restoration technique.

However, results are at cross purposes of those found by Berg, Koning-Haanstra and Deelman (1991), who concluded that the restoration of memory through repeated practice of exercises or by other procedures, is not effective. This discrepancy can be explained since the patients of that study showed a DCA with severe cognitive impairment, while in the present investigation the participants had mild and moderate DCA. In fact, there is great evidence that cognitive stimulation is often useful almost exclusively in cases of mild to moderate cognitive impairment (Arroyo, 2002; Avila et al., 2004; Bottino et al., 2005; Davis, Massman & Doody, 2001; Farina et al., 2002; Gutierrez, De los Reyes-Aragon, Rodriguez, & Sanchez, 2009; Kesslak, Nackoul & Sandman, 1997), having very limited benefits in severe cases of DCA. (De Noreña et al., 2010).

On the other hand, the implementation of the comprehensive program of rehabilitation, produced an increase of functionality related to memory problems. This reinforces the issues raised by different researchers (De Noreña et al., 2010; Rattok et al., 1992; Vanderploeg et al., 2008), those who assert that the technique of cognitive stimulation alone has little ability to generalize other cognitive processes and does not favor functional aspects.

Results also show that patients trained in the use of the agenda and the visual imagery as compensatory techniques, increased functionality related to memory. This result is attached to those found in several studies (Evans et al., 2003; Hart et al., 2004; Hart et al., 2003; Kim et al., 1999; Schmitter-Edgecombe et al., 1995; Zencius et al., 1990; Zencius et al., 1991), which demonstrate the direct effect that has the use of compensatory approaches and substitute on the reduction of the subjective complaints of memory and increased functionality.

On the other hand, the results found in this research have important clinical implications in the treatment of the disorders of memory, since they suggest the need to combine different forms of rehabilitation to get not only cognitive but also functional improvements. In addition, the nature of the program of rehabilitation and its low cost, allows this to be used by health institutions lacking a big infrastructure technology or computer, every time that the tasks do not require it. On the other hand, training to the patient and his family in work for the House, allows that the rehabilitation process is continuous and does not depend on the exclusive way of work in sessions. These last two aspects are particularly important in Latin American countries, where access to health services specialized in this type of rehabilitation is quite low (Mejia-Mejia, Sanchez - Gandur & Tamayo-Ramirez, 2007).

The results must be analyzed taking into account limitations. First, the small size of sample, the sampling rate and the lack of follow-up once completed the program; they
do that by now the results only can be generalized to this type of population and the evaluated time period. Future research should be experimental designs involving larger samples, selected randomly and with long-term follow-up measures. Secondly, it has been shown that adherence to the use of the agenda may vary from a subject to another, depending on factors that were not controlled, such as awareness of disease, the perception of usefulness of the agenda, the personal preferences of the subjects and the degree of involvement of the memory (Evans et al., 2003). Similarly, because of the lack of control over the family support received by the patient during the realization of the tasks at home, it was impossible to determine if some of the participants of the rehabilitation Group had benefitted even more from the program, if they had received more support from their caregiver. Future research should control all variables to be able to specify their impact on treatment; similarly, these investigations should include the joint work of clinical psychologists, enabling to carry out interventions parallel to any fluctuation in mood of the patients and their families, since this can influence the normal development of their activities.

References


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