Effectiveness of a cognitive therapeutic program for reducing selective and focused attention disorders: empirical study

فعالية برنامج علاجي نفسي معرفي للتخفيف من اضطراب الانتباه الانتقائي والمركز: دراسة ميدانية

Efficacité d'un programme thérapeutique pour la diminution des troubles de l'attention sélective et l'attention concentré: étude empirique

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ملخص

هدفت الدراسة إلى معرفة مدى فعالية البرنامج العلاجي المعرفي في التخفيف من حدة اضطرابات الانتباه الانتقائي والمركز، حيث اعتمدت الباحثة على خطوات المنهج التجريبي واختارت العينة بطريقة عشوائية حيث قسمت إلى مجموعة ضابطة وأخرى تجريبية كل مجموعة تحتوي على عشرة مفحوصين. وتم تدريب العينة التجريبية على البرنامج خلال 24 جلسة بمعدل ثلاث جلسات أسبوعيا وتمت معالجة البيانات إحصائيا باستخدام الحزمة الإحصائية للعلوم الاجتماعية. وتوصلنا الى وجود فروق ذات دلالة إحصائية بين متوسطي درجات المجموعة التجريبية لمرضى التصلب اللويحي المتعدد في القياسين القبلي والبعدي فيما يخص اختبار الانتباه الانتقائي والانتباه المركز وبالتالي اثبت فعالية البرنامج العلاجي المقترح.

الكلمات الدالة: التصلب اللويحي المتعدد؛ البرنامج العلاجي النفسي معرفي؛ الانتباه الانتقائي؛ الانتباه المركز.

Abstract

The study aimed to determine the effectiveness of the cognitive therapeutic program in mitigating selective and focused attention disorders. The researcher relied on the steps of the experimental approach and selected the sample randomly, dividing it into one control group and one experimental group, each containing ten participants. The experimental sample of the program was trained in 24 sessions at a rate of three sessions per week. The data were statistically processed using SPSS. The researcher concluded

significant differences among the means of the experimental group in the pre and post-tests concerning selective and focused attention, therefore proving the effectiveness of the proposed therapeutic program.

Keywords: multiple sclerosis; cognitive therapeutic program; selective attention; focused attention.

Résumé

Cette présente étude vise à évaluer l'efficacité du programme d'entrainement thérapeutique cognitif proposé pour améliorer l'attention sélective et concentrée. Afin de réaliser cette étude nous avons opté pour la méthode expérimentale, l'échantillon a était choisi d'une façon aléatoire, le nombre des sujets témoins ~~été~~ était de 10 et le nombre des sujets expérimentaux était de 10. Le programme d'entrainement cognitif a été élaboré en s'appuyant sur les tests d'attention et d'ouvrages qui explique les mécanismes impliqués dans l'attention et le dysfonctionnement qui pourrait resurgir lors de la sclérose en plaques exemple (test Roger et Fisk, 1991, et test Cannon,1998). L'application du programme d'entrainement proposé sur le groupe expérimental a durée 24 séances à raison de 3 séances par semaine. La chercheuse a pu trouver des différences signifiantes entre les moyennes du groupe expérimental, dans le pré et post test concernant l'attention sélective et concentrée, ce qui démontre l'efficacité du programme thérapeutique proposé.

Mots-clés: la sclérose en plaques; le programme thérapeutique cognitif; l'attention sélective; l'attention concentrée.

Introduction

Multiple sclerosis (SEP) is a developmental disease of the central nervous system. It is caused by the hardening of the myelin sheath that coats nerve fibres in various parts of the brain, especially at the level of the spinal cord. This substance is essential for the nerve fluid flow; when it stiffens, it affects the transmission of nerve messages at the level of the central nervous system.

Symptoms and their severity may vary from patient to patient. The disease may manifest in severe fatigue, coordination disorders, speech disorders, tremors, loss of balance, stiffness, cognitive disorders...etc. The possibility of cognitive impairment in MS patients has been known since the discovery of the disease. Cruveilhier offered the first clinical description of a patient with multiple sclerosis with cognitive

disorders when he described the anatomical observations of a woman who worked as a cook at the Salpêtrière Hospital in Paris.

In recent years, interest in neuropsychiatric and cognitive disorders in multiple sclerosis grew because it affects the individual at the stage of building his social and professional life. Usually, the first symptoms appear between the age of 15 and 40 years old. Therefore, it is necessary for these symptoms to be researched and studied in order to provide treatment that help patients understand them. The essence of this study is to design a treatment program and identify its effectiveness in alleviating attention disorders in patients with multiple sclerosis, based on the idea of brain remodelling after neurological injury.

1. The theoretical and methodological framework of the study

The study of cognitive disorders in an MS patient is an urgent necessity imposed by the gravity of the symptoms and their heavy outcomes (Finger, 1998). Wever, researchers and neurologists did not pay attention to that until the late eighties, when the number of studies and research in this field increased (دماس، 2014).

These studies showed that ensuring the neuropsychological and cognitive functions represented in memory, executive functions, and attention differ in MS from that of brain trauma or neuro-developmental diseases relating to ageing (Feinstein, 2007). In the latter, the examiner tries to maintain the independence of the examinee for as long as possible by alerting his/her preserved abilities, while in the case of multiple sclerosis, cognitive abilities are not subject to a large and rapid deterioration (Defer, 2010). Attention is one of the most important cognitive processes that are affected in multiple sclerosis. Its importance lies in the fact that it is one of the main requirements for many mental processes such as perception, thinking, and learning. In the absence of attention, the individual's awareness of his/her surroundings is blurred.(دماس، 2019)

This leads to difficulties in the process of remembering, which results in many errors, both in terms of the thinking process or the awareness and implementation of behaviour (الزغلول، 2003). (Brunschweiller et al. Plohmann, Kappos, 1994) are among the researchers who concerned themselves with the neuro-cognitive aspect of attention disorder in

patients with multiple sclerosis. They studied ten cases of multiple sclerosis, five belonging to the sporadic type and five belonging to the secondary developmental type. They were all diagnosed with cognitive difficulties through neuropsychiatric testing, and were subjected to an attention-training informational program consisting of six cycles that last from forty-five to sixty minutes, four times a week. At the end of the sessions, researchers noticed a qualitative improvement. The speed of information processing increased and their scores improved in the Paced auditory serial addition test, which measures auditory attention, and also in the STROOP, which measures selective attention, designed by J. R. STROOP (1935) (Defer, and al., 2010).

After reviewing relevant literature, one can note a remarkable development in this field of study at an international scale compared to that in Algeria. The researcher's experience with these patients made her notice a set of symptoms; namely, delayed reactions during verbal interactions, frequent interruptions occurring during conversations, forgetfulness, and attention deficit. Since this disease affects people at a sensitive stage of life, it is necessary to provide care for these patients despite the difficulties represented in the novelty of the subject matter, the consequent lack of similar studies, and the absence of treatment programs models. We therefore, propose a neuro-cognitive psychological treatment tool emanating from the Algerian society that targets attention disorder in patients with multiple sclerosis.

We referred to the studies done by Solari et al. (2004) and Brunschweiller plohmann Kappos (1994), regarding the method of constructing the treatment program, and we have also relied on a set of tests that measure attention. As for the duration of treatment, there is no significant difference among scholars concerning the number of treatment sessions. The difference lies, however, in the weekly division of these treatments. Accordingly, and based on the foregoing, the research questions were identified as follows:

–How effective is the proposed cognitive neuropsychological training program in improving selective attention in remitting and secondary progressive multiple sclerosis patients?

–How effective is the proposed cognitive neuropsychological training program in improving focused attention in remitting and secondary progressive multiple sclerosis patients?

1.2 Study hypotheses

–The cognitive neuropsychological training program is effective in improving selective attention in remitting and secondary progressive multiple sclerosis patients

–The cognitive neuropsychological training program is effective in improving the ability of focused attention in multiple sclerosis of the intermittent type and the secondary progressive type.

1.3 Study Objectives

This study aims to reveal the effectiveness of the proposed therapeutic training program in reducing and alleviating attention disorders.

1.4 Study Methodology

This study was carried using the experimental method, as it is one of the most adequate means to reach reliable knowledge (Deopoldeb, Van Dalen, 1985). Accordingly, the researcher designed an experiment that included two groups, a control group and an experimental group. This division aimed to identify the extent of the influence of the independent variable, which is the cognitive neuropsychological program, on the two independent variables, which are selective attention and focused attention.

1.4.1 Study sample

In selecting the sample, the researcher adopted the random method. She examined a total number of seventy multiple sclerosis patients admitted to the Frantz Fanon Hospital in Blida at the level of the Neurology Department. The researcher also visited fifteen patients with multiple sclerosis who are being treated in other hospital home. All patients have different types of MS (intermittent type and the secondary progressive type).

Table n° 1: Distribution of the sample members in the experimental and control groups according to the type of multiple sclerosis

Sample type	Experimental sample		Control sample	
multiple sclerosis type	developmental	divided	Developmental	divided
Repetitions	5	5	6	4
Ratio	50	50	60	40

1.4.2 Data collection tools

1.4.2.1 Interview

The researcher used individual interviews with members of the research sample consisting of twenty cases with multiple sclerosis. The interview guide included targeted questions that allowed obtaining a neuropsychological summary.

1.4.2.2 Observation

The researcher relied on observation in order to verify the information obtained during the neuropsychological assessment. She also referred to the medical files of the patients.

1.4.2.3 STROOP test (GOLDEN):

The STROOP test is named after the scholar John Ridley Stroop who designed it in 1935 in the context of experimental psychological research that was concerned with studying the phenomenon of interference between stimuli. He was interested in finding out why the average person takes more time to name colours than it does to read words printed in different colours. (Albaret J.)

1.4.2.4 D2 test:

The D2 test is a performance test that contains exercises that require attention and focus on an external visual stimulus. The test was designed by the German Institute for Security in Mining, Industry and Transport, to assess the abilities of rail drivers. The first version appeared in the year (1962) and the second version appeared in (1967). The latter allowed it to be applicable on larger age group (9 to 60 years), making it a distinguishing feature from other tests (Briken Kamp.1998).

1.4.3 Experimental design:

The researcher prepared a neuro-cognitive program for attention disorders in patients with multiple sclerosis (the independent variable) aiming of those with selective attention and focused attention (the two dependent variables). In order to ensure the effectiveness of the suggested program, selective and focused attention were measured through the selective attention test (STROOP), and the focused attention test (D2) on all members of both control and experimental groups. The program was then applied on to the members of the experimental group.

1.4.3.1 Program content and timing of sessions

The proposed cognitive neuropsychological treatment program contains a set of mental training exercises that stem from the idea of the ability to reshape the brain (mental flexibility). The researcher trained the patients' attention_ of all kinds_ through repetition and activation of mental processes;

- Simple attention and information processing speed training.
- Selective attention training.
- Focused attention training.

Below we will discuss the content of the sessions.

Session one

- Encouraging the patient to talk about his experiences and feelings in a calm and comfortable atmosphere.
- Listening attentively to the patient to create a strong relationship with the examiner.
- Recognizing the patient's point of view about his/her disorder and his/her goals in life.
- Making careful observations about the patient so as to reach the real problem.
- Encouraging the patient to develop positive aspects and find solutions appropriate to him/her according to the proposed program that seeks to develop attention.

Session two to session nine

The patient is presented with several forms that contain patterns for the patient to follow. In each pattern we find 10 columns with different symbols, corresponding to 10 other columns that also contain other

symbols. These may be numbers, symbols, letters, or dots. Under the pattern, we find tables containing fields filled with symbols, numbers, dots, letters, and blank fields. The patient fills in the empty fields by referring to the form at the top of the page.

Session ten

At the beginning of the session, the examiner reviews the preceding session for 10 minutes, and allocates the remaining time to the patterns dedicated for the session. The patient is asked to transfer the symbols and numbers on the left part to the right part. The time of the session is exhausted doing so; the patient is also under constant encouragement to motivation to finish the tasks.

Session eleven and session twelve

At the beginning of the session, the examiner reviews the preceding session for 10 minutes, and allocates the remaining time to the patterns dedicated for the session. The patient is presented with patterns and is asked to pinpoint a specific target. The patient is requested for example to cross out the number (6) and enclose the number (9) in a circle; the target numbers are constantly changed. As for the letters, he/she is requested, for example, to cross out the letter (z) and to circle the letter (i); the target letters are also constantly changed.

Session thirteen

The examiner reviews the preceding session again for 10 minutes. The plates are presented to the examinee one by one so that he is asked each time to cross out a specific target while avoiding to cross out non-targeted letters. For example, in the first panel, we ask him to cross out the letter d with a dot from below, and in the second panel, we ask him to cross out the letter p with two dots from above, and so on until all the letters are finished.

Session fourteen

At the beginning of the session, the examiner reviews the last session for 10 minutes. In this session, the patient is presented with cards one at a time. He/she is asked to write how many times a number is repeated on the cards. For example, a card in which the number 3 was written four times, the patient has to write the number 4.

Session fifteen

After the review, a number of cards are presented to the patient one by one, and each time we ask him whether the calculations results are correct or wrong, e.g.;

5 + 2 = 7 → correct answer.

5 + 2 = 6 → Wrong answer.

5 7= x 2 → wrong answer with substitution.

The symbol (x) instead of (+).

Session sixteen

After the ten-minute review, cards are presented to the patient one by one. He/she is asked to determine whether the direction of the arrows is correct or false, for example,>right> / <middle> / <left<, or it may differ from the direction in which the word expresses, for example, <right< / <centre< / <left>.

Session seventeen and eighteen

After reviewing the preceding session for ten minutes, the patient is asked to arrange cards according to geometric shape, e.g. arranging Triangles, Squares...etc. He/she has to rearrange them after mixing them thoroughly. The patient is also required to pronounce the process if arranging the cards; for example, he says, "a green square" and then classifies it with squares, followed by "a red triangle" and classifies it also with triangles, then a blue rectangle and classifies it with rectangles, and so on until he/she finished the 20 cards.

The patient is then asked to rearrange the cards in terms of colours after mixing them thoroughly. He/she is also required to speak the process of arrangement; for example, "a red square" and classifies it with the red shapes, "a green triangle" and classifies it with the green shapes, "a blue rectangle" and classifies it with the blue shapes, and so on until all the cards are finished.

Session nineteen and session twenty

After the usual review, the examiner reads a text or a story, and asks the patient to listen to the story and pick up a target word, for example: the word wolf during the narration.

Session twenty-one

Firstly, cards with coloured circles on them are used and the patient is asked to name the colours. Secondly, the patient is asked to read the

words that appear on them, for example, to or because, without mentioning the colour of the ink with which the words were written. And lastly, he/she is asked to name the colour of ink in which each word was written without reading the word.

Session twenty-two

After the usual review, the patient is asked to read the names of the colours in the first stage. In the second stage, he/she is asked to name the colour of the ink in which the words were written.

Session twenty-three

In this session, the patient is presented with labyrinths going from simple to complex, until the ten patterns are cleared.

Session twenty-four

In this session, after reviewing the preceding one, patients are presented with passage cards going from simple to complex.

Program duration

The program was organized so that it was applied over a period of (24) sessions, at a rate of three sessions per week. Each session lasts between 30 and 45 minutes, depending on each patient. The application of the program took two months.

2 Results

2.1 Results of the experimental sample

2.1.1 The difference significance between the control and experimental sample in the pre-measurement in relation to the selective attention test "STROOP":

The results of the experimental control for the selective attention test "STROOP" with regard to the degree of variance or the (F) value of homogeneity between the experimental and control samples in the pre-measurement demonstrated that the two samples are homogeneous. As for the results of the differences significance test (t) with regard to the experimental and control samples demonstrated no significant differences, as the result was estimated at (0.97). This is shown in Table N07, which indicates that the results of the selective attention test "STROOP" did not differ in application. The bijective function between the experimental and control samples was rather close, as the arithmetic mean of the experimental sample was estimated at (28.26) and the control sample was estimated at (26.76).

Thus, there is no statistically significant difference between the averages of the experimental and control samples, and this is a prerequisite for conducting the experiment.

Table n° 2: "Pre-measurement results for the experimental and control samples regarding the selective attention test STROOP.

Statistics / sample type	Sample size	Arithmetic average	Standard deviants	Standard error of mean	Homogeneity value of F	Significance	Value of T	Freedom degree	Significance level
Experimental sample	10	28.26	2.25	0.71	8.84	No significance	0.97	18	No significance
Control sample	10	26.76	4.32	1.36					

It is clear to us from the table that the two samples are homogeneous and that there are no statistically significant differences between the averages of the experimental and control samples with regard to the results of the selective attention test "STROOP" for the bijective function.

2.1.2 The significance of the difference between the control and experimental sample in the pre-measurement in relation to the focused attention test (D2) to the following:

With regard to the degree of variance and based on the (F) test for homogeneity, the results showed that the two samples were homogeneous. With regard to the (t) test for the differences significance concerning experimental and control samples, the differences were also insignificant, as the result of (t) was estimated at (-0.01) as shown in Table N3. Therefore, the results of the focused attention test (D2) did not differ significantly in the pre-measurement for the experimental and control samples, where the arithmetic mean of the experimental sample was estimated at (27,30), but was estimated at (27,50) with regard to the control sample. This is the requirement when conducting any experience including pre and post measurements of two groups.

Table n°3: Results of the pre-measurement of the experimental and control samples with regard to the focused attention test D2.

Statistics / sample type	Sample size	Arithmetic average	Standard deviants	Standard error of mean	Homogeneity value of F	Significance	Value of T	Freedom degree	Significance level
Experimental sample	10	27.30	32.49	10.27	0.10	No significance	-0.01	18	No significance
Control sample	10	27.50	30.75	9.72					

It is clear from the table that the experimental and control samples are homogeneous bearing no statistically significant difference between their mean, with regard to the focused attention test "D2" for the pre-measurement.

2.2 Results of the study hypotheses

2.2.1 First hypothesis:

The first hypothesis stated the following:

–The neuro-cognitive psychotherapeutic training program is effective in improving selective attention of multiple sclerosis patients of its various types.

–To examine this hypothesis, the researcher calculated the difference significance between the mean of the experimental sample and the mean of the control sample using the (t) test for the difference between the pre and post measurements as shown in Tables N04 and N05.

Table n°4: The results of the pre- and post- measurements for the experimental sample regarding the STROOP test.

statistics / sample type	Sample size	Arithmetic average	Standard deviation	Standard error of mean	Difference value between the averages	Standard deviation of the differences	Standard error of differences average	Value of T	Freedom degree	Significance level
Pre measurement	10	28.26	2.25	0.71	-15.00	5.82	1.84	-8.14	09	Significant at 0.01
Post measurement	10	27.50	30.75	9.72						

This table demonstrates that there is a statistically significant difference between the averages of the experimental group in the selective attention test "STROOP" before and after the application of the neuro-cognitive psychotherapy training program in favour of the dimensional measurement.

Table n°5: Results of the pre- and post- measurements for the control sample regarding the selective attention test STROOP.

statistics / sample type	Sample size	Arithmetic average	Standard deviation	Standard error of mean	Difference value between the averages	Standard deviation of the differences	Standard error of differences average	Value of T	Freedom degree	Significance level
Pre-measurement	10	26.76	4.32	1.36	-1.26	2.47	0.78	-1.61	09	Not significant
Post - measurement	10	28.02	3.99	1.26						

As for the control sample, Table No05 shows that there are no statistically significant differences between the means in the selective attention test "STROOP" in the pre- and post- measurements. This

verifies the first hypothesis, as these results indicate the effectiveness of the proposed neuro-cognitive psychotherapy training program in alleviating selective attention disorder among the experimental sample.

2.2.2 The results of the second hypothesis:

The second hypothesis stated the following:

- The neuro-cognitive psychotherapeutic training program is effective in improving focused attention among patients with multiple sclerosis of its various types.
- To test this hypothesis, the researcher calculated the significance of the difference between the averages of the experimental sample and the control sample using the (t) test in the pre- and post-measurements, as shown in Tables 06 and 07.

Table n°6: The results of the pre- and post- measurements for the experimental sample regarding the focused attention test D2.

Statistics / sample type	Sample size	Arithmetic average	Standard deviation	Standard error of mean	Difference value between the averages	Standard deviation of the differences	Standard error of differences average	Value of T	Freedom degree	Significance level
Pre-measurement	10	27.30	32.49	10.27	-55.00	30.84	9.75	-5.63	09	Significant at 0.01
Post - measurement	10	82.30	3.62	1.14						

According to this table, there is a statistically significant difference between the averages of the experimental group in the focused attention test "D2" before and after the application of the cognitive neuropsychological training program in favour of post-measurement.

Table n°7: The results of the pre- and post- measurements for the control sample regarding focused attention test D2.

Statistics / sample type	Sample size	Arithmetic average	Standard deviation	Standard error of mean	Difference value between the averages	Standard deviation of the differences	Standard error of differences average	Value of T	Freedom degree	Significance level
Pre-measurement	10	27.50	30.75	9.72	-1.20	5.67	1.79	-0.66	09	Not significant
Post - measurement	10	28.70	31.48	9.95						

As for the control sample, Table N07 shows that there is no statistically significant difference between the averages in the focused attention test "D2" in pre- and post- measurements. This verifies the second hypothesis, as the findings indicate the effectiveness of the proposed therapeutic training program in alleviating focused attention disorder among the experimental sample members.

3. Result discussion in light of the study hypotheses

The current study aimed to ascertain the effectiveness of the therapeutic training program proposed by the researcher in alleviating the disorders that affect selective attention and focused attention. We relied on the selective attention test "STROOP" and the focused attention test "D2" to measure attention as a cognitive ability. The concluded findings support the hypotheses of the study since the results are better than the results of the members of the control sample in the post-measurement.

The results showed the effectiveness of the suggested program in alleviating attention disorders with regard to the experimental sample members in favour of the post-application. The result of the (t) test regarding the first hypothesis related to the effectiveness of the proposed program in alleviating selective attention disorder was equal to (6,03), i.e. a function at the level (0,01). As for the second hypothesis, which is related to the effectiveness of the proposed program in alleviating focused attention disorders, the result of the t-test is equal to (5,34), a function at the level of (0.01) too. Therefore,

the program is statistically effective. This agrees with numerous previous studies in the field of neuropsychology, such as the study of Brunnschweller; Plohmann; Kappos (1994), which aimed to treat attention disorders in a sample of 10 cases suffering from multiple sclerosis. They applied the STROOP test to diagnose disorders at the level of selective attention and paced auditory serial addition test for divided attention.

After treatment using the program, which was conducted during six sessions lasting from forty-five to sixty minutes, four times a week, patients' information processing improved, and they obtained higher scores in the aforementioned tests. It agrees with the current study regarding the diagnostic test used, which is the selective attention test "STROOP" designed by (STROOP) in 1935. This is consistent with our study regarding the possibility of treating disorders that affect attention through a proposed treatment program. (Defer, Grochet, Pellettier, 2010)

One can also mention the study (Plohmann et al., 1998) to verify the effectiveness of the training program that aims to alleviate attention disorders by training each component of attention (caution, divided attention, selective attention, and vigilance). In this study, a set of assessment tests for attention components were applied three times, with an interval of three weeks for each application. The results of the study demonstrated that the components that patients had no prior training on improved, which means that the treatment benefited them.

This study also proved that the effect of cognitive training stabilizes within 9 weeks, because the evaluation tests that were applied later did not differ much from the evaluation that took place in the ninth week (Plohmann et al, 1998). However, the researcher disagrees with this study, namely concerning the division of attention into its components,as we see that the treatment is done through training in his college, and this was proven by the study Solari (2004) and his colleagues. This latter aimed to ascertain the effectiveness of both general cognitive training and specific cognitive training in improving cognitive abilities.

The researchers evaluated the cognitive abilities of their research sample through dividing them into two groups. The first group was trained on visual constructivist exercises and visual motor exercises, while the second group was trained on exercises related to attention

and memory. The training sessions were scheduled twice a week for a total of 8 weeks and each session lasted 45 minutes. After the completion of the treatment, the Brief Repeatable Battery of Neuropsychological Tests (BRB-N) was used to obtain a post-measurement, through which it was found that the results of both groups improved. Therefore, mental training in general and specific training for attention and memory gives similar results (Solari, et al, 2004).

This study is considered one of the most accurate studies in the field of cognitive neuropsychological guaranty regarding multiple sclerosis, and it agrees with the current study regarding the effectiveness of cognitive neuropsychological treatment. It was also found through this study that the exercises that targeted memory training had a positive effect on attention; this is called non-special training or the effect of a non-special care.

Conclusion

Charcot addressed the disorders that may affect the cognitive abilities of patients with multiple sclerosis more than a century ago, but the interest in these symptoms, whether in terms of diagnosis or treatment, did not begin until the last two decades. That was after the development of brain imaging techniques for this disease, especially functional magnetic resonance imaging (FMRI), which enabled researchers to discover dysfunction in the functional connections of MS patients at the onset of the disease. It manifests in the breakdown of white matter fibres that connect the various interfering cortical areas when performing a specific cognitive activity (Defer, 2010).

The development in the field of brain imaging prompted the researcher in the field of neuropsychology to study the defect in the cognitive abilities and the possible ways address it. This is an especially urgent case since this disease affects young adults at a stage where one is in dire need of one's cognitive abilities to build one's professional and social life. For this purpose, studies related to cognitive neuropsychological care have begun to appear through specialists in the field of neuropsychology suggesting tools that measure cognitive abilities in patients with multiple sclerosis. An example of that is the work of Rao et al. (1991) when they proposed a diagnostic tool for cognitive difficulties specific to this segment of patients. They did so within the framework of a comparative study between the results of

patients suffering from MS and the results of a control sample that does not suffer from MS in answering a broad battery (consisting of 31 scores) that measures verbal fluency, short-term memory, attention, and thinking.

As for the current study, it does not differ from the previous studies. We have included in this study a neuro-cognitive psychological program using papers and pens, since we decided that our program should be informative so that all specialists can use it, and since computers are not considered essential in Algerian hospitals. After investigating the scholarly direction of the subject matter abroad, we found that researchers in the United States of America publish the results of their study, during which they proposed neuropsychological treatment programs.

We also relied to a large extent on a number of tests that measure the ability attention; hence, we took samples from the original tests and then modified them and varied the stimuli. After presenting the program to a group of patients, we studied its effectiveness in alleviating the disorders of selective attention and focused attention.

The study sample was randomly identified; patients were diagnosed with attention disorders by means of the selective attention test "STROOP" and the focused attention test "D2". The sample was then randomly divided into two groups; a control group that did not receive any care, and an experimental group that benefited from a treatment using the psychotherapeutic program we suggested. The treatment required24 sessions, three times a week for 45 minutes. With regard to the post-measurement, the differences came using the (t) test as a function of the control and experimental sample, and this proves the effectiveness of the program. Accordingly, we came up with the following suggestions to contribute to the field of study;

- Open training courses for psychologists who deal with these patients to improve care.
- Apply the proposed program to a larger sample to make the results more clear.
- Adapt the proposed program of "paper and pen-based therapies" into computer software.

References

1. Albaret J. M., Migliore L., *Test de stroop*, les éditions de centre de psychologie appliquée.
2. Bricken Kamp R., 1998. « D2 test d'attention concentrée » les éditions du centre de psychologie attaquée, paris.
3. Defer G., Grochet B., Pelletier J., 2010. *Neuropsychologie de la sclérose en plaques*. édition Masson. France.
4. Feinstein A., 2007. *Changements cognitifs et sclérose en plaques*, éd., Green Wood Tamad Inc, canada,
5. Finger S., 1998. *A happy state of mind: a history of mild elation, denial of disability, optimism, and laughing in multiple sclerosis,* Arch neurol, USA.
6. Solari A., Motta A., Mendozzi L., et al, 2004. Computer-aided retraining of memory and attention in people with multiple sclerosis: a randomized, double-bind controlled trial, J. Neurol Sci .USA.

7. الزغلول ر. ن.، الزغلول ع.، 2003. علم النفس المعرفي. الشروق.

8. دماس منال، 2014. تناول نفسي عصبي علاجي لاضطراب الانتباه لدى المصاب بالتصلب اللويحي المتعدد اقتراح برنامج تدريبي علاجي نفسي عصبي معرفي، رسالة دكتوراه، كلية العلوم الاجتماعية. جامعة الجزائر2.

9. دماس منال، بن بوزيد مريم، 2019. التصلب اللويحي من منظور نفسي عصبي معرفي، شركة دار الأكاديميون للنشر والتوزيع، الاردن.