WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH
www.wjpmr.com

PROPOSAL FOR MEMORY REHABILITATION, USING THE *PQRST*-ADAPTED METHOD, IN ILLITERATE INDIVIDUALS WITH HIV/HAND ON CART

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ABSTRACT

HIV associated neurocognitive disorder (HIV/HAND) is an increasingly present condition in individuals living with HIV on cART. This drug therapy favors longevity, but does not guarantee the individual's quality of life (especially in relation to cognitive areas, especially memory), because neurodegeneration happens even under cART. This study proposed the use of the pqrst-adapted method in illiterate individuals with HIV/HAND and the most severe form of HAND, the dementia. Two HIV+ individuals with dementia were evaluated in a period of 5 months. There was significant improvement, that is, positive memory improvement events in individuals analyzed. Neuroplasticity should be highly stimulated in individuals in which the pathogenesis does not favor an alternative topography that favor cognitive abilities.

KEYWORDS: Memory rehabilitation, pqrst-adapted method, HIV/HAND on cART, illiterate individuals.

INTRODUCTION

Cognition is a set of characteristics that promote singularities of individuals,among them, one of the most requested for the maintenance of life, the memory (Bentzen-Bilkvist et al, 2017). In individuals with HIV infection, depending oftheir state of brain stimulation, could have neurocognitive disorders associated to HIV (HAND), which promote degeneration in memory-associated brain regions. This degeneration is similar to Alzheimer's disease, due to the formation of Tau protein phosphorylation and b-amyloid plaques. Even with the use of combination antiretroviral therapy (cART), people with HIV may develop HAND (Turner et al, 2016). HIV besides to induce neurodegeneration, prevents certain regions to be stimulated to new synaptic circuits. Zhou et al (2016) reported that CCR5 suppresses the cortical plasticity in the hippocampus and in memory. Thus, it is necessary to stimulate neuroplasticity in these individuals in cognitive regions susceptible to HIV-induced degeneration (Sheppard et al, 2017).

The *pqrst* method is a simple way to rehabilitate the memory in people who have frontal lesions (Ciaramelli et al, 2015), consisting of questions and answers with the purpose of promoting the recall of semantic events, thus favoring a good performance in daily activities.

The present article aimed to propose an alternative method for the eventual improvement of memory in individuals with dementia (subtype of HAND) with HIV on cART after a period of 5 months.

MATERIALS AND METHODS

Population
Seven HIV1-infected individuals (without receiving antidepressant medication, on cART and presenting HIV-1 plasma load viral undetectable, ie, < 40 copies/mL), with age range between 22 – 68 years old were selected by the IHDS test, according to Antinori et al,[18] criteria, from a Non-Governmental Organization – GESTOS (Recife, Pernambuco, Brazil) in the period of August 2017 to November 2017. All subjects received were informed about the consent and received standardized neurological. This transversal study was approved by Ethics Committee selected through the Brazil Platform system (http://aplicacao.saude.gov.br/plataformabrasil/ login.jsf - CAAE number: 66080617.2.0000.5206), (Vasconcelos de Deus et al, 2017).

This was a longitudinal study (~ 4.5 months / 147 days) according to the results of an initial study, which analyzed the prevalence of HIV/HAND-dementia and HIV/HAND-mild from population represented by GESTOS ONG (Recife, PE, Brazil) in the year 2016. A study that prioritized the analysis of individuals (patients) without active opportunistic disease and without severe psychiatric disorders.

Two individuals (age 41 and 42 years) with HIV/HAND-dementia on cART (Antinori et al., 2007) were studied over a period of 5 months. The method pqrst was applied twice at weekly intervals.

Ray's Test (RAVLT)
The Rey Auditory Verbal Learning Test REY (RAVLT) is sensitive to verbal memory deficit and has been shown to be particularly useful in the evaluation of dementia (Wang et al., 2018).

RAVLT, one of the most used neuropsychological instruments in clinical practice to detect memory problems, dementia and dementia pre-conditions, can therefore be effective in identifying the basic principles related to the retention process of new information (De Souza et al. Gleason et al., 2018, Li et al, 2018).

The RAVLT test was applied before (time 0 month) and after (time 5 months) of the intervention of the pqrst-adapted method. The following parameters were analyzed:

- **Measurement of Short-Term Memory (M-MST)** = Evaluates the learning curve of words over trials A1 to A5 (total words or total words discounting A1, a short-term memory measure).
- **Proactive Interference (PI)** = The proactive interference index (B1 / A1) that deals with the subject's ability to withstand the effect of proactive distractors (interference of previously learned content on learning new content).
- **Retroactive interference (RI)** = The backward interference index (A6 / A5) that assesses the interference of new content in learning of a previously learned content).
- **Forgetting Speed (FS)** = rate of forgetting (A7 / A6) that assesses the vulnerability of the content seized over time.
- **Recognition (Rc)** = Recognition of words in list A.

***Pqrst*-adapted Method**
The *pqrst* test was used by Ciaramelli et al (2015), consisting of a memory recall test, according to the use

of texts. The people studied in the present work are illiterate, so we adapted the *pqrst* method.

Condition of the *pqrst*-adapted method in illiterate individuals
1 week
Preview (P) phase= Narrated stories were presented through images (15 x 20 cm) containing a scene-figurative (image) about the daily life of fictional characters and simple situations (history chronology, space characteristics, character characteristics).

Question phase (Q) phase= Individuals were requested to elaborate two questions about the narrated story, along with the image preview. The constructed questions were noted by the researchers. In addition, the researchers also elaborated two questions (different from the individuals' questions) about the narrated stories.

Read phase (R)= Researchers requested to individuals to tell the story in as much detail as possible, and if necessary, the researchers re-remembered some situations in history that were missing from being remembered by individuals.

2 week
State phase (S): The two questions that were asked by the individuals and the two questions that were asked by the researchers (verbally) were checked the answers (if right or wrong).

Test phase (T): The text was again re-remembered by the individuals and, if necessary, re-remembered (by the researchers) situations of the story that were lacking to be reported by the individuals analyzed.

RESULTS AND DISCUSSION

During the 5 months evaluated, the illiterate individuals presented a statistically significant difference in two parameters of the RAVLT test: The M-MST and IR (Fig 01). Although the number of recognized words was not statistically significant, subjects were more able to recognize words after treatment (Table 1).
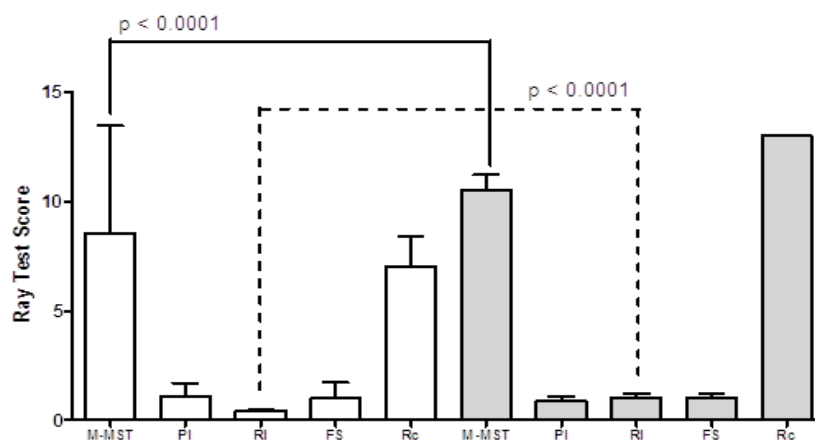

Fig. 1: Parameters analyzed according to the Ray's Test.

Table 1: Analysis of the patients before and after the intervention of the *pqrst*-adapted method.

Illiterate (n = 2)	Before the pqrst-adapted intervention					After the pqrst-adapted intervention				
	M-MST	PI	RI	FS	Rc	M-MST	PI	RI	FS	Rc
Number of individuals	2	2	2	2	2	2	2	2	2	2
Minimum	5	0.6	0.4	0.5	6	10	0.75	0.87	0.87	13
25% Percentile	5	0.6	0.4	0.5	6	10	0.75	0.87	0.87	13
Median	8.5	1.05	0.42	1	7	10.5	0.875	1.005	1.005	13
75% Percentile	12	1.5	0.44	1.5	8	11	1	1.14	1.14	13
Maximum	12	1.5	0.44	1.5	8	11	1	1.14	1.14	13
Mean	8.5	1.05	0.42	1	7	10.5	0.875	1.005	1.005	13
Std. Deviation	3.5	0.45	0.02	0.5	1	0.5	0.125	0.135	0.135	0
Lower 95% CI of mean	-35.97	-4.668	0.1659	-5.353	-5.706	4.147	-0.7133	-0.7103	-0.7103	13
Upper 95% CI of mean	52.97	6.768	0.6741	7.353	19.71	16.85	2.463	2.72	2.72	13

Both patients had an improvement in memory after 5 months. The correct response percentage graph was constructed according to correct responses for each scene-figurative session.

The points on the graph represent a positive memory improvement event (evolution over time). It was considered a positive memory improvement event in relation to patients who had prevalence above two correct responses. Among the patients, there was no statistical significance ($p = 0.3136$), Fig 02. The mean time to obtain half the correct answers was 75 days; while the mean of the correct answers was for: Patient-1 = 0.75; Patient-2 = 0.87 (Table 2).
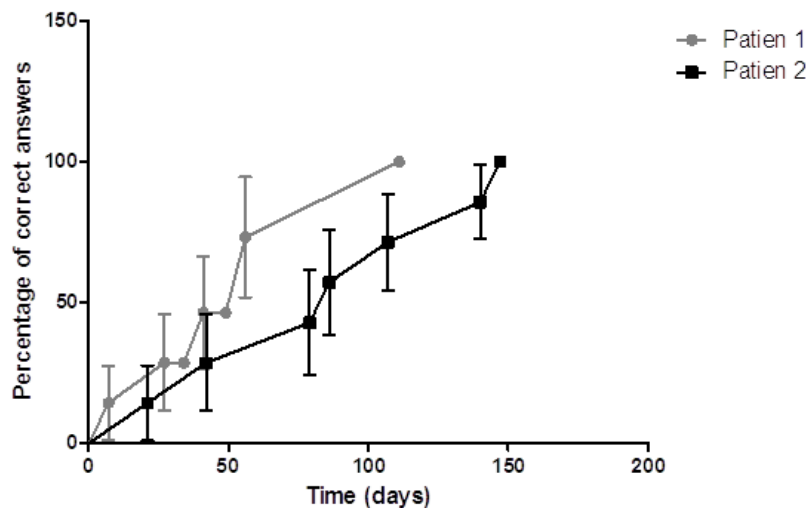

Fig 2: Percentage curve in relation to progression of memory improvement events.

Table 2: Statistical analysis of patients for the correct response curve.

	Patient 1	Patient 2
Minimum	0.0	0.0
25% Percentile	0.2500	1.000
Median	1.000	1.000
75% Percentile	1.000	1.000
Maximum	1.000	1.000
Mean	0.7500	0.8750
Std. Deviation	0.1637	0.1250
Lower 95% CI of mean	0.3630	0.5794
Upper 95% CI of mean	1.137	1.171

This is the first article that applies the principles of the pqrst method in individuals HIV+ on cART with dementia.

The pqrst method is an accessible and potentially adaptive for all ethnicities, therefore, can present a response-enhancing response in patients with pre-frontal cortex lesions (Ciaramelli et al, 2015) and in older adults (West et al, 2008).

Finding a pathway that stimulates neuroplasticity is essential in individuals living with HIV. Some studies report that some drugs of abuse or nicotine stimulate plasticity (Subba et al, 2014; Sagar et al, 2016), however, caution is necessary.

CONCLUSION

The pqrst-adapted method may be a treatment alternative for illiterate individuals with HIV-triggered memory deficits, even using cART. After 5-month period there were episodes of memory improvement in patients with HAND-HIV / cART. However, it is necessary that other researches carry out their work using the pqrst-adapted method for the purpose of experimenting with the diffusion of this method in other populations.

ACKNOWLEDGEMENTS

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