ORIGINAL ARTICLE

Assessment and Management of Unilateral Spatial Neglect by Using Mobile Application "Visual Attention Lite" in Acute Stroke Patients

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ABSTRACT

Objective: To assess and manage Unilateral Spatial Neglect in acute stroke patients by using the mobile application 'Visual Attention Lite.'

Methods: This study was a Quasi experimental trial. Fourteen acute hemiplegic patients of Unilateral Spatial Neglect were taken in this single group study. At the Sheikh Zayed Hospital Lahore's neurological department, patients were assessed on day one using Visual Attention Lite (mobile application). On day ten same patients were reassessed after management through the same application, Visual Attention Lite. A treatment session of one hour was given to patients for ten consecutive days. The data was entered and analyzed by using SPSS 25.

Results: On the 10th day, there was a significant difference in the patient's pre and post-management assessment score in some levels of the mobile application "visual attention lite" while few levels showed no significant difference between pre and post-management assessment findings.

Conclusion: The study concluded that Visual Attention Lite is a useful tool for assessing and managing Unilateral Spatial Neglect in acute stroke patients.

Key words: Unilateral Spatial Neglect, Stroke, Virtual Reality, Visual Attention Lite

INTRODUCTION

Unilateral Spatial Neglect (USN) is the most complex cognitive impairment, becoming visible in approximately 50% of patients.[1] In most patients, Unilateral Spatial Neglect occurs after damage in the right cerebral hemisphere. In this complex disorder, a person ignores his contralateral side of the body and does not respond to contralateral stimuli.[2] Its patients may show various symptoms in everyday life, such as forget to take food from the left side of the plate, forget to put makeup on the left side of the face and shave the right side of the face only, while walking forget to watch on the left side, in short patients ignore the left side of space.

The clinical therapist vastly uses the conventional paper and pencil model to diagnose Unilateral Spatial Neglect, but these tests show many considerable limitations, as many previous studies concluded.[3] Preceding research has emphasized the use of Virtual Reality for the evaluation, assessment, and management of Unilateral Spatial[4] Neglect symptoms; these studies explored many exciting aspects of conventional pencil and paper cancellation tests technology based tasks specific to the examination of exploration of space. Some problems also emerged regarding the use of these technology-based applications. Firstly, these emerging technologies are challenging to be installed in clinical settings. The clinic should have I.T. personnel to get specific training regarding the usage of these applications. Patients should also get some training before the use of these applications.

Visual attention lite therapy application is a mobile application designed for mobile (tablets), which helps clinicians assess Unilateral Spatial Neglect in stroke survivors by creating a virtual environment. This app has two modes, i.e. test mode and practice mode.[5] Test mode of Visual Attention Lite is developed to explore patients scanning capabilities for both time and accuracy. There are ten levels in the test mode of this application one can select several attempts he could want to give to the single level. After selecting a level, the patient has to press the start button to start the test mode targets displayed on the top of the screen along with the clock. In playing fields, many targets are placed, and patients have to touch a maximum number of targets they can watch or touch. The clock will start with the first touch to a symbol or letter placed on the playing field. Instruct the patient to touch all the targets when the patient stops targeting and then press the button at the screen's top. This mobile application has many exciting features, one of which is that results can be emailed. The practice mode is developed to help patients move their eyes left to the right and top to the bottom.[6] Practice mode allows the patient to move left to right and top to bottom sequence. If the patient touches any target out of this pattern, then the application will produce a sound. The user can end the level only if he finds all the targets placed in the playing field. Both test and practice modes can be completed with a line on the left or right side of the screen to help Unilateral Spatial Neglect patients draw attention to their affected side.

Previous studies have different standardized assessments of Unilateral Spatial Neglect but still are not capturing all non-functional domains of this condition. Hence there is a need for the development and implementation of targeted management strategies. More evidence-based researches are required to explain techniques to minimize impairment and to maximize functional abilities.

METHODS

A total of fourteen acute stroke patients with unilateral neglect were recruited in this single group (Quasi-

Experimental) study from the neurological department of Sheikh Zayed Hospital, Lahore. Both males and females aged between 35 to 65 years included first or second-time attacks of acute stroke confirmed by C.T. scan or MRI. Patients with normal vision and scores on MMSE above 22 were included. Simultaneously, patients with the left cerebrovascular lesion, language comprehension difficulty, diabetic retinopathy, motor deficits that would prevent the use of the tablet were excluded.

Patients were assessed for having unilateral neglect on day one by using Visual Attention Lite (mobile application), and their scores were measured for all ten levels. Visual Attention Lite was installed on their tablets. Patients were managed through practice mode of Visual Attention Lite (Mobile Application) for ten consecutive days. Practice session of patients was conducted for one hour per day. They were reassessed on day 11 by using the Visual Attention Lite test mode. Then their pre-practice

assessment score and post-assessment practice scores were compared to draw results. Based on the conclusion of the results was made. Data were analyzed using IBM SPSS 25. The ethical committee of Riphah International University, Lahore, approved the study.

RESULTS
There were 4(28.6%) males and 10(71.4 %) females with a mean of 1.71 and S.D (0.46) who participated in this study. Maximum participants were from the age range of 55 to 60 years, with a mean value of 2.14 and S.D. 0.66 shown in table 1.

Table 2 showed the mean and standard deviation of pre and post-treatment values. The P-value of pre-practice and post-practice assessment scores of all levels of visual attention lite is less than the level of significance 0.05 except level 9, which showed non significant results.

Table 1: Summary of demographics of participants

		Frequency(N)	Percent (%)	Mean	S.D.	Maximum	Minimum
Gender	Male	4	28.6	1.71	0.46	2.0	1.0
	Female	10	71.4				
Age (years)	50-55	2	14.3	2.14	0.66	3.0	1.0
	55-60	8	57.1				
	60-65	4	28.6				

Table 2: Descriptive and inferential statistics of all ten levels on mobile application

Levels on Visual Attention Lite (mobile application)	Pre-treatment Mean± S.D.	Post-treatment Mean± S.D.	P-value
Same Symbols (level 1)	29.75±4.07	34.56±3.66	0.03
Same Letters (level 2)	31.71±4.44	36.33±4.95	0.01
Symbols in Letters (level 3)	10.61±2.19	12.09±1.19	0.01
Letters in Symbols (level 4)	9.80±0.80	11.90±1.67	0.00
Symbols in Symbols and Letters (level 5)	9.85±1.18	12.37±1.57	0.01
Letters in Letters and Symbols (level 6)	9.80±1.54	12.33±1.43	0.00
Dissimilar Symbols (level 7)	9.85±1.23	12.80±1.48	0.00
Similar Symbols (Level 8)	9.66±1.73	12.38±1.99	0.00
Dissimilar Letters (level 9)	10.18±2.09	11.56±1.45	0.08
Similar Letters (level 10)	9.71±1.82	12.37±1.18	0.00

DISCUSSION
Philippe Azouvi, sophie Jacquin and Jacques Luaute in 2017 conducted a study that summarized at this moment; no rehabilitation procedure can be judged better than the other. A combination of various methods used according to each patient's particular deficiency is suitable.[7] The application used in this study has ten different levels constructed to address most of the symptoms of unilateral spatial neglect, making it a better tool that can be used alone.

Findings of a Study conducted by Federica Pallavicinia et al. in 2015 showed that the neglect app was as useful as a traditional test in neglect syndrome assessment.[8] Manuel Muratore conducted a study in which he discussed the possibility of virtual reality as a tool for assessing self-awareness.[9] Their conclusions find V.R. very useful in the management and assessment of degenerative disorders. Conclusions of this study found Visual Attention Lite effective in detecting patient's level of disability.[10] It gives a level-wise assessment of the patient, so the clinician can identify the patient's level of disability and make a management plan according to individual

needs[11]. Mario Bonato et al., in 2012, studied attention orientation and awareness for the contralateral hemisphere in a woman who suffered from a right-sided stroke and showed typical performance in traditional pen and pencil scale but did not perform well in everyday life.[12] They aimed to test that computer-based programs are appropriate in detecting the presence of neglect. Their study supports the current study results that computer-based resource-demanding paradigms seemed to be more sensitive in detecting attention deficits affecting stroke patients' everyday lives.

As previous studies suggested, the scoring of traditional tests is complicated because of their complexity and length.[13] Visual Attention Lite provides elementary and straightforward methods of scoring. The patient can score his performance and can quickly email it to his clinician.[14]

CONCLUSION
This study concluded that Visual Attention Lite is a useful tool for assessing and managing Unilateral Spatial Neglect in acute stroke patients.

Author's contributions

NS conceived, designed and did statistical analysis and editing of manuscript

ZH, RRK, SH and BF did data collection and manuscript writing

ZH and SR did final review and approval of manuscript

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