Post Stroke Neglect

Essay

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بسم الله الرحمن الرحيم

قالُوا سُبْحَانكَ لاَ علِمَ لَنَا إلاّ مَا

عَلّمْتَنَا إنَّكَ أنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

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I would like to dedicate this essay to my Professor DR: Hussein Ibrahim .I will never find adequate words to express my gratitude.

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List of Abbreviations

ACA : Anterior cerebral artery
ADL : Activities Daily living
AREC : Arrows egocentric coordinate
AROC : Arrows object-centered coordinate
BG : Basal ganglia
BIT : The Behavioural Inattention Test
BITB : The Behavioural Inattention Test behavioral task
BITC : The Behavioural Inattention Test Conventional subtest
CBS : Catherine Bergego Scale
CCD : Combined system Digital Camera
DAN : Dorsal attention network
dLPFC : Dorso lateral prefrontal cortex
DWI : Diffusion weighted imaging
EC : Egocentric coordinate
FEF : Frontal eye field
FIM : Functional Independence Measure
FOF : Fronto-occipital fasciculus
HMD : Head mounted display
IFG : Inferior frontal gyrus
IFOF : Inferior fronto-occipital fasciculus
ILF : Inferior longitudinal fasciculus
INS : Insula
IPL : Inferior parietal lobule
LPFC : Lateral prefrontal cortex
MCA : Middle cerebral artery
MRF : Mesencephalic reticular formation
MRI : Magnetic resonance image
MTG : Middle temporal gyri
NIHSS : Best medical treatment
NRT : Nucleus reticularis thalami
OC : Object-centered
OKS : Optokinetic stimulation
PWI : Perfusion weighted imaging
rTMS : Repetitive transcranial magnetic stimulation
SC : Superior colliculus
SLF : Superior longitudinal fasciculus

SMG : Supramarginal gyrus
SPL : Superior parietal lobule
STG : Superior temporal gyrus
tDCS : Transcranial direct current stimulation
TENS : Transcutaneous Electrical Nerve Stimulation
TPJ : Temproparietal junction
UN : Unilateral Neglect
VA : Visual area
VAN : Ventral attention network
vLPFC :Ventro lateral prefrontal cortex :
VR : virtual reality
WHO : World Health Organization
ZI : Zoom-in

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INTRODUCTION

According to estimate from World Health Organization there were more than 5.47 million deaths from cerebrovascular disease worldwide ***(World Health Organization ,2009)*** **.** Stroke is the second leading cause of death worldwide and the third in developed countries **(*Sarti et al., 2000)***.

However the number of stroke survivors is increasing (around 2/3rd of 700.000 stroke patients each year survive in the United States alone, according to the national institute of neurological disorders and stroke; because of the improvement in the management of acute stroke. This has resulted in a larger group of patients with important residual physical and psychological disabilities ***(Chemerinski et al., 2006*)*.***

Stroke as it can cause physical problems, it can also affect cognitive functions in which processing of raw sensory signals into complex concepts that can be remembered and used to create new ideas that can be formulated into action **(*Petersen , 2000)*.**

There are 2 main theories have been suggested to declare the association between stroke and its cognitive impairment sequelae,

the first theory claims that the cognitive impairment are psychological reactions to the subsequent post-stroke disability, the second theory postulates that post-stroke cognitive impairment symptoms are specifically due to direct brain damage and according to the damaged area the symptoms may vary, mostly frequent frontoparietal connectivity ***(Starkstein et al., 1992).***

The risk Factors of developing cognitive impairment secondary to stroke begins at age 50y, risk is highest in those persons with vascular risk factors, less physical exercise; hypertension could be as high as 8 times higher, depending on the severity of the hypertension. With cardiac disease, especially atrial fibrillation, valve lesion, Diabetes, cigarette smoking and heavy alcohol use are each associated with about the same elevation of risk to develop cognitive impairment ***(Jokine et al., 2006).***

Stroke is the second most common cause of cognitive function impairment, the accumulation of lacunar infarcts and cerebral hypo perfusion are the most common causes. Strokes predominantly affect the connections between areas of cortex that associate complex types of information, the disruption of which leads to impaired cognitive function (***Mok et al., 2005)***.

Unilateral neglect (UN) is one of the cognitive disabling features of a stroke, and is defined as a failure to report, respond, or orient to sensory stimuli presented to the side contralateral to the stroke lesion site ***(Unsworth . 2007)***.

At least one out of three people after stroke are unable to locate themselves within their environment and have spatial neglect error ***(Buxbaum et al., 2007)***. UN is more common in patients with right cortical lesions than left and parietal-frontal disconnection is specifically implicated **(Ringman et al., 2004).**

Assessment post stroke neglect in the extrapersonal space can be easily and safely detected and measured using three-dimensional immersive virtual street crossing program (**Kim et al., 2010).** And there are two bedside measures: the Behavioral Inattention Test and the Catherine Bergego scale used to diagnose spatial-motor dysfunction **(Kelly et al., 2012).**

There is evidence that intervention beginning in the first week after stroke may improve therapeutic efficacy by taking advantage of an enhanced window of plasticity (**Eleanor.2011).** Rehabilitation interventions to improve neglect may be classified into those which attempt to increase the stroke patient's awareness

of or attention to the neglected space and those which focus on the remediation of deficits of position sense or body orientation (**Pierce and Buxbaum. 2002).**

Two week course of continuous magnetic stimulation over the left hemisphere posterior parietal cortex may be a potential effective strategy in accelerating recovery from visuospatial neglect in sub-acute stroke patients, possibly counteracting the hyper excitability of the left hemisphere parietofrontal circuits ***(*Koch G and Annabel T*, 2011)*.**

Patients experiencing neglect of far space or of personal space experienced complete recovery more than neglect of peripersonal space patients. Complete recovery was seen by 6 months post stroke in 52% respectively compared with 13% of patients experiencing neglect of peripersonal space ***(Robert et al., 2011).***

Safety Issues to UN Patients should undergo with occupational and vocational rehabilitation evaluation before returning to work that involves handling machines or tools that may cause injury to self or others and other environmental risks should be removed from the homes of patients for their safety and the safety of the others ***(Hoffman et al., 2012).***