

Influence of Post Stroke Depression on Balance in Ambulant Stroke Survivors

Samuel SE¹, Kumar H², Shanbhag AP³

¹Professor and Principal, ³Postgraduate Student,

Laxmi Memorial College of Physiotherapy, Mangaluru, Karnataka, India.

²Professor and HOD of Community Medicine, A.J Institute of Medical Science.

Rajiv Gandhi University of Health Sciences, Karnataka.

Corresponding Author: Shanbhag AP

ABSTRACT

Background and Objective: Stroke survivors have an increased incidence of neuro- psychiatric disorders. Post stroke depression (PSD) although being a common and important complication of stroke, Post Stroke Depression is often overlooked. Static and dynamic balance is considered important for optimal ambulation as well as to decrease fall risk. Balance impairment is a long term issue post stroke. Restoration of balance is a key component of rehabilitation. Post Stroke Depression is known to influence rehabilitation and functional outcome. Studies have suggested that there could be a link between balance problems and anxiety and depression but the interactions between balance and depression are still not well known.

Purpose of the study was to assess the influence of post stroke depression on balance.

Methodology: 49 patients with stroke survivors who satisfied the inclusion criteria were recruited. Depression and balance were measured using Patient Health Questionnaire 9 (PHQ-9) and Dynamic Gait Index (DGI). Correlations between the mentioned measures were calculated using the Spearman's correlation.

Results: The PHQ-9 scores correlated moderately but significantly with the DGI ($r = -0.495$, $p = 0.001$) measurements.

Conclusion: The present study demonstrated potential association between Post Stroke Depression and balance. Post Stroke Depression has detrimental effect on balance. The finding could influence informed clinical decision making and help improve prognosis in this vulnerable population of stroke survivors.

Key Words: Stroke, depression, Post Stroke Depression, balance, stroke survivors, rehabilitation.

INTRODUCTION

Prevalence of stroke is rising in developing countries due to higher incidence, advancing age and increasing risk factors.¹ A stroke can lead to a variety of physical and psychological disorders. Depression in individuals with stroke is associated with enormous personal, social and financial costs that include poorer functional recovery and increased risk for dependence, poorer cognitive function, including impaired executive function, and reductions in social participation.² Studies have recently demonstrated that there are

other aspects such as cognition, behaviour, and emotion that greatly affect the impact that stroke will have on a patient's life.³ Within the emotional cognitive sphere, depression will be a determining factor for these patients.

Posts stroke depression is a frequent and relevant complication of stroke. The prevalence rates of PSD ranges from 18-61% in other countries. Based on Indian studies, prevalence of PSD ranges from 25%-45%. Although stroke has an impact on the physical, social, cognitive, emotional or psychological functioning of individuals,

research in this area has focused primarily on physical functioning. Psychiatric comorbidity has been relatively neglected and under recognized.^{4,5,6}

It is a longstanding notion that major depression affects the body as much as it plagues the mind.⁷ Gait and postural control depend on a complex neural regulation that involves dopaminergic pathways as well as prefrontal cortex and basal ganglia circuitry, all of which are implicated in the pathophysiology of depression. Posture, balance and gait are appraised as the final motor outputs of an extremely complex network integrating multisensory, cognitive and affective stimuli at the level of different subcortical and cortical structures.⁸ The mechanisms underlying postural, balance and gait abnormalities in adult depression are still largely understudied. Previous studies have suggested a link between depression and balance but the interactions between post stroke depression is still unknown.^{9,10}

The objective of the study was to assess the influence of Post Stroke Depression on balance in ambulant stroke survivors.

MATERIAL AND METHODS

Study was conducted in stroke survivors with age above 18 years and above clinically diagnosed with stroke. A sample size of 49 was included in the study based on inclusion and exclusion criteria. Inclusion criteria were age older than 18 years, first time stroke, diagnosed with ischemic or hemorrhagic stroke, score greater than 24 in MOCA and ability to follow commands. The exclusion criteria were patients at coma, non ambulatory or wheel chair bound patients, pre-existing diagnosis of depression.

Ethical clearance for the study was obtained from the Institutional Ethical Committee. Purposive sampling method was used to include the patients in the study. A total of 57 patients were evaluated out of which 4 were excluded due to low scores on MOCA, 2 patients were non ambulatory, and 2 were Aphasic. The final sample

included 49 stroke survivors. After a clinical evaluation, participants were enrolled for the study recruited on basis of inclusion criteria and exclusion criteria. A brief explanation about the procedure was given to all the subjects following which a written informed consent was obtained from the subjects. Each participant was then asked to complete Patient Health Questionnaire-9. Participants were examined for balance using Dynamic Gait Index scale.

Patient Health Questionnaire9: (PHQ-9):

It is a tool used to measure, diagnose and measure severity of depression. It contains 9 items from the DSM- IV used in the diagnosis of depression. PHQ-9 has been found to be a reliable and valid tool to measure depression in stroke population. Items are rated based on frequency of occurrence in the past 2 weeks.¹¹

Dynamic Gait Index (Dynamic GaSit Index):

The Dynamic Gait Index is a clinical measure that evaluates the capacity to adapt gait to complex walking tasks commonly encountered in daily life. Dynamic Gait Index is a reliable measure of balance.

The DGI is based on a person-environment model of mobility disability. Environmental demands are classified into 8 dimensions- distance, temporal, ambient, terrain, physical load, attention, postural transitions, and density. Performance on each item is evaluated using an ordinal scale with criteria based on a combination of gait pattern (GP), speed and level of assistance (LOA). Ordinal scores for each item range from 0 (severe GP impairment, unable to perform without the physical assistance of another person), with a total score range from 0 (worst/poor) to 24 (best function).^{12,13}

Statistical Analysis

Statistical analysis was conducted using the IBM SPSS version20. Descriptive statistics was used to estimate demographic characteristics and the prevalence of types and risk factors. Frequencies and cross tabulations were run to compare the risk factors. Data was analysed using

Spearman’s correlation. Statistical significance was evaluated at $\alpha=0.005$.

RESULT

A total of 57 patients were screened out of which 4 were excluded due to low scores on MOCA, 2 patients were non

ambulatory, and 2 were Aphasic. The final sample included 49 stroke survivors. Descriptive statistics was used to find out the frequency, percentage, mean and standard deviation from demographic data and variables used. Table 1 presents the characteristics of the patients.

Table 1.1: Clinical and demographic profile of the study population.

Variable	Value
Age(Years)	35-73 (58.91±6.99)
Gender (Male: Female)	35:14
Marital status (Unmarried: Married: Separated)	1:48:0
Type of family (Nuclear:Joint Family)	31:18
Socio- economic status (Upper Middle: Lower Middle :Upper Lower)	9:28:12
Type of lesion (Infarction , haemorrhage)	36:13
Side of Lesion (Left: Right)	22:27
Post stroke duration (Days)	7-3650 (452.43±733.59)
Cognitive status (MOCA)	27-30 (29.61±0.84)

All participants completed the outcome measures. Mean ±standard deviation scores of the outcome measures were as follows: PHQ-9 = 14.71 ±8.15, DGI= 16.28 ±6.59. Physical Health Questionnaire was used to detect the presence as well as levels of depression. Out of the 49 subjects, 6(12.2%) had minimal depression, 12 (24.5%) had mild depression, 8 (16.3%) had moderate depression, 4(8.2%) had moderately severe and 19 (38.8%) had severe depression levels. Dynamic Gait Index was used to find out the functional balance and indicate fall risk. In the present study 27(55.10%) had fall risk and 22(44.89%) were considered as safe ambulators.

A moderate negative correlation was found between post stroke depression and balance (Spearman’s correlation coefficient $r= -0.495$); and the correlation was statistically significant ($p= 0.001$)(Table 2) (Figure 1.1)

Table 1.2: Correlation between Post Stroke Depression and Balance

		PHQ-9	DGI
PHQ-9	Spearman Correlation	1	-.495**
	Sig. (2-tailed)		.001
	N	49	49
DGI	Pearson Correlation	-.464**	1
	Sig. (2-tailed)	.001	
	N	49	49

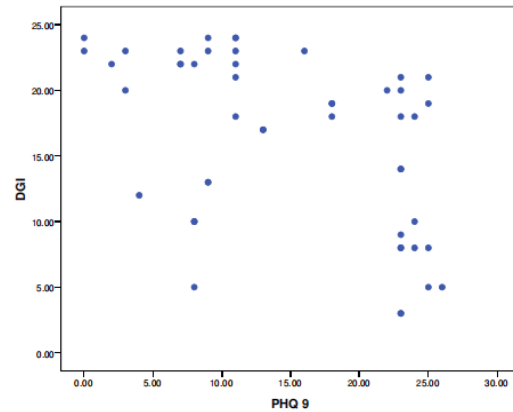


Figure 1.1: Correlation between Post Stroke Depression and Balance.

DISCUSSION

A cross sectional study design with purposive sampling technique was used in this study to determine the influence of Post stroke Depression on balance in ambulant stroke survivors. Correlational analysis showed a significant association between Post Stroke Depression and balance in ambulant stroke survivors.

The stroke survivors in the present study belonging to fall risk group had greater levels of depression when compared to safe ambulators. In the present study 27 stroke survivors were in the fall risk category out of which 6 were in minimal range, 1 was in mild depression, 5 were in moderate depression and the majority (14,15) were in severe depression. Among the 22

safe ambulators 5 were in minimal range, 6 in mild depression, 7 were in moderate depression and 4 were in severe depression. Few studies have investigated the relationship between PSD and balance. One previous study found that poor balance is a principal predictor of recurrent falls by stroke patients while another study reported that poor balance is significantly associated poor quality of life.^{9,10}

The present study found that 55% of stroke survivors belonged to fall risk category. According to a study by Lamb SE et al approximately 40% of stroke survivors have a risk of fall.¹⁶

The present study DGI scores were lower in the acute phase stroke survivors when compared to sub acute and chronic phase stroke survivors which could be due to low motor function and adaptability of chronic stroke survivors. The reasoning for the finding was explained by the study conducted by Bhatt T et al, which demonstrated chronic stroke survivors were able to acquire and retain adaptive reactive balance skills to reduce fall risk.¹⁷

All the stroke survivors were able to ambulate with an assistance device or independently but reported to find it difficult in complex task such as moving in crowded environments. The findings were consistent with the study by White J H et al who found that although good scores in terms of ADL, stroke survivors experienced limitation in various domains.¹⁸

The present study found a moderate negative correlation between balance and depression in stroke survivors which was consistent with the study Alghwiri AA et al.¹⁰

CONCLUSION

The present study showed detrimental influence of Post Stroke Depression on balance. Post Stroke Depression was associated with poor balance. Stroke survivors with higher Post Stroke Depression levels demonstrated lower balance ability.

This study has several limitations because of the nature of the study population: for example, the limited sample size, unequal gender distribution, exclusion of patients with aphasia and lower cognition. Future studies with larger sample size may be necessary to substantiate the findings.

REFERENCES

1. Ovbiagele B, Nguyen-Huynh MN. Stroke epidemiology: advancing our understanding of disease mechanism and therapy. *Neurotherapeutics*. 2011 Jul 1;8(3):319
2. Lui SK, Nguyen MH. Elderly stroke rehabilitation: overcoming the complications and its associated challenges. *Current gerontology and geriatrics research*. 2018 Oct;2018.
3. Llorca GE, Castilla-Guerra L, Moreno MF, Doblado SR, Hernández MJ. Post-stroke depression: an update. *Neurología (English Edition)*. 2015 Jan 1;30(1):23-31.
4. Singh AJ, Lenin R, Wangjam K, Singh LN. Post Stroke Psychiatric Morbidity Among Hemiplegics in Manipur. *Depression*. 2006;12:24.
5. Srivastava A, Taly AB, Gupta A, Murali T. Post-stroke depression: prevalence and relationship with disability in chronic stroke survivors. *Annals of Indian Academy of Neurology*. 2010 Apr;13(2):123.
6. Rajashekaran P, Pai K, Thunga R, Unnikrishnan B. Post-stroke depression and lesion location: a hospital based cross-sectional study. *Indian journal of psychiatry*. 2013 Oct;55(4):343.
7. Belvederi Murri M, Ekkekakis P, Magagnoli M, Zampogna D, Cattedra S, Capobianco L, Serafini G, Calcagno P, Zanetidou S, Amore M. Physical exercise in major depression: reducing the mortality gap while improving clinical outcomes. *Frontiers in psychiatry*. 2019 Jan 10;9:762.
8. Takakusaki K. Functional neuroanatomy for posture and gait control. *Journal of movement disorders*. 2017 Jan;10(1):1.
9. Park GY, Im S, Lee SJ, Pae CU. The association between post-stroke depression and the activities of daily living/gait balance in patients with first-onset stroke patients. *Psychiatry investigation*. 2016 Nov;13(6):659.

10. Alghwiri AA. The correlation between depression, balance, and physical functioning post stroke. *Journal of stroke and cerebrovascular diseases*. 2016 Feb 1;25(2):475-9.
11. de Man-van Ginkel JM, Hafsteinsdóttir T, Lindeman E, Burger H, Grobbee D, Schuurmans M. An efficient way to detect poststroke depression by subsequent administration of a 9-item and a 2-item Patient Health Questionnaire. *Stroke*. 2012 Mar;43(3):854-6.
12. Shumway-Cook A, Taylor CS, Matsuda PN, et al. Expanding the scoring system for the Dynamic Gait Index. *Phys Ther*. 2013;93:1493–1506
13. Jonsdottir J, Cattaneo D. Reliability and validity of the dynamic gait index in persons with chronic stroke. *Archives of physical medicine and rehabilitation*. 2007 Nov 1;88(11):1410-5.
14. Mackintosh SF, Hill KD, Dodd KJ, Goldie PA, Culham EG. Balance score and a history of falls in hospital predict recurrent falls in the 6 months following stroke rehabilitation. *Archives of physical medicine and rehabilitation*. 2006 Dec 1;87(12):1583-9.
15. Baseman S, Fisher K, Ward L, Bhattacharya A. The relationship of physical function to social integration after stroke. *Journal of Neuroscience Nursing*. 2010 Oct 1;42(5):237-44.
16. Lamb SE, Ferrucci L, Volapto S, Fried LP, Guralnik JM. Risk factors for falling in home-dwelling older women with stroke. *Stroke*. 2003;34(2):494-501.
17. Bhatt T, Dusane S, Patel P. Does severity of motor impairment affect reactive adaptation and fall-risk in chronic stroke survivors?. *Journal of neuroengineering and rehabilitation*. 2019 Dec;16(1):1-3.
18. White JH, Alston MK, Marquez JL, Sweetapple AL, Pollack MR, Attia J, Levi CR, Sturm J, Whyte S. Community-dwelling stroke survivors: function is not the whole story with quality of life. *Archives of physical medicine and rehabilitation*. 2007 Sep 1;88(9):1140-6.

How to cite this article: Samuel SE, Kumar H, Shanbhag AP. Influence of post stroke depression on balance in ambulant stroke survivors. *Int J Health Sci Res*. 2020; 10(9):90-94.
