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## Original research article

# Depression and dynamic balance recovery among stroke survivors: A preliminary investigation

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## ARTICLE INFO

## Article history:

Received 9 February 2016

Received in revised form

30 March 2016

Accepted 4 May 2016

Available online xxx

## Keywords:

Depression

Balance recovery

Cardiovascular accident

Stroke survivors

## ABSTRACT

**Introduction:** Studies have suggested that there could be a link between balance problems and anxiety and depression conditions, and that rehabilitation of the balance system could help. However, a direct link has not been established between post-stroke depression and functional recovery and balance.

**Aim:** The aim of this preliminary investigation was to investigate the occurrences of depression and to assess dynamic balance recovery status of stroke survivors as a foundational study for to a future large investigation to establish the relationship between depression and dynamic balance recovery.

**Material and methods:** A convenient sample of 18 stroke survivors was recruited from stroke patients attending the outpatient adult neurology unit of the Physiotherapy Department, University of Nigeria Teaching Hospital in a cross-sectional design. The Patient Health Questionnaire-9 and the Dynamic Gait Index / Functional Gait Assessment score were used to collect data for depression and dynamic balance recovery respectively. Associations between depression and dynamic balance recovery were determined using Chi-Square analysis at a confidence level of 95%. Analysis was done using SPSS v. 20.

**Results and discussion:** Result showed a high prevalence (55.60%) of post-stroke depression among stroke survivors. Majority of the survivors (88.90% of patients) had poor dynamic balance recovery.

**Conclusions:** There is a high prevalence of post-stroke depression among stroke survivors and they have poor dynamic balance. However, owing to small sample of participants in the present study, its premature to draw conclusion on the relationship between depression and dynamic balance recovery among stroke survivors from the result of this study.

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<http://dx.doi.org/10.1016/j.poamed.2016.05.001>

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## 1. Introduction

Severe disability and significant limitation to activities of daily living are frequent sequelae of stroke, and these greatly impact postural stability,<sup>1-6</sup> further exacerbating risk of fall among stroke survivors.<sup>7</sup> Similarly, post-stroke depression (PSD) is considered the most frequent and important neuropsychiatric consequence of stroke.<sup>8,9</sup> Approximately one-third of stroke survivors experience major depression.<sup>8</sup> Moreover this condition can have an adverse effect on cognitive function, functional recovery and survival.<sup>9</sup> Although depression is important sequel of stroke, there is yet some uncertainty regarding its relationship with functional ability and balance. There is a growing interest into research on how best to restore dynamic balance mechanism in stroke survivors. Although the importance of manipulating afferent integration has been suggested,<sup>6,10</sup> however, it remains unclear how this could be effectively implemented to gain dynamic balance.

For a full functional recovery to be achieved in a stroke patient, a holistic rehabilitative intervention putting into consideration the patient's psychological and emotional state, in addition to other necessary domains, is imperative. Research into the relationship between depression, a major psychological and emotional disorder in post-stroke patients, and dynamic balance recovery in these patients is warranted.

From the foregoing, although researchers suggested that there could be a link between balance problems and anxiety and depression conditions, and that rehabilitation of the balance system could help,<sup>1-6,9,11</sup> a direct link could not be established between depression and functional recovery and balance following stroke.

## 2. Aim

The aim of this preliminary investigation was to investigate the occurrences of depression and to assess dynamic balance recovery status of stroke survivors as a foundational study for to a future large investigation to establish the relationship between depression and dynamic balance recovery.

## 3. Material and methods

### 3.1. Research design

This is a cross-sectional research among stroke survivors attending the outpatient Adult Neurology Unit of Physiotherapy Department of University of Nigeria Teaching Hospital. A convenient sample of stroke survivors who met a prior selection criteria were the sample frame. To be included a stroke survivor must be ambulant, must not have any cognitive impairment, and consents to a voluntary participation in the research.

The University of Nigeria Teaching Hospital Health Research Ethics Committee approved the research protocol. Participants' informed consents were obtained prior to the

study. Participants' privacy and confidentiality were maintained by secluding the assessment areas, using code numbers instead of names in data presentation, keeping the records confidential.

### 3.2. Data analysis

Data were analyzed with the Statistical Package for Social Sciences (SPSS 20). Demographics and anthropometric as well as the depression and dynamic balance profiles were presented in tables of frequencies and percentage. Also, was presented in a table of frequency and percentage. Chi-square analysis was used to seek association between depression and balance recovery and between demographics, stroke characteristics on one hand and depression and balance recovery on the other hand.

### 3.3. Subjects description

A total of 18 stroke survivors comprising 13 males and 5 females participated in the study. At the end of the data collection process, they were categorized into the following groups: mildly depressed, moderately depressed and severely depressed. They were also categorized into those with good balance and those with poor balance.

### 3.4. Measurements

Portable weight scale and height meter were used to measure the weight and height of the participants to the nearest 0.1 kg and 0.1 cm, respectively. Mercury type sphygmomanometer as well as Littmann Classic Stethoscope was used to measure the diastolic and systolic blood pressures of the participants to the nearest 1 mmHg.

The Patient Health Questionnaire (PHQ-9) was used to measure the level of depression of the subjects. The PHQ-9 is a multipurpose instrument for screening, diagnosing, monitoring and measuring the severity of depression. It consists of nine questions designed to correspond to the nine diagnostic criteria for major depressive disorder. Items were rated from 0 (not at all) to 3 (nearly every day) according to increased frequency of experiencing difficulties in each area covered. Scores were summed and can range from 0 to 27. In line with a previous documentation,<sup>12</sup> PHQ-9 scores of 5, 10, 15, and 20 were respectively interpretive of mild, moderate, moderately severe and severe depression respectively.

Dynamic Gait Index/Functional Gait Assessment Scoring Form was used to measure the subjects' dynamic balance recovery. This test consists of 10 different tasks that the patients are rated on using an ordinal scale of 0-3 (0 - severe impairment, 1 - moderate, 2 - mild, 3 - normal) with the best possible total equal to 30 and the worst score equal to 0. A score of 19 or less is indicative of increased fall risk.<sup>12</sup> The tasks include the following: ambulating on a level surface, ambulating while changing speeds, ambulating with horizontal head turns, ambulating with vertical head turns, ambulating with pivot turns, stepping over obstacles, ambulating with a narrow base of support, ambulating with eyes closed, ambulating backwards and ascending/descending stairs.<sup>12</sup>

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