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PREVALENCE OF HEMIPLEGIC STROKE SURVIVORS EXPERIENCING TURNING DIFFICULTY

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HIGHLIGHTS

- A succession of foot motions that guide the body in a new direction is known as turning. As a result, regaining motor function in the paretic foot and leg is critical for turning effectiveness.
- This cross-sectional study was conducted to discover the prevalence of hemiplegic stroke survivors who experience turning difficulty in patients regarding the number of steps, turn duration, and balance.

ABSTRACT

Background: A succession of foot motions that guide the body in a new direction is known as turning. As a result, regaining motor function in the paretic foot and leg is critical for turning. While turning, the functions of the internal and external legs differ, with the exterior leg creating propulsion and swinging to move the body in the desired direction and the internal leg stabilizing posture. **Objective:** To discover the prevalence of hemiplegic stroke survivors who experience turning difficulty in patients regarding the number of steps, turn duration and balance. **Material and Methods:** After the research ethics committee approved the proposal, an analytical cross-sectional study was conducted in Services Hospital, Lahore within six months after approval of the synopsis. The study comprises 196 participants of both genders according to the inclusion and exclusion criteria of the study and a convenient sampling strategy was used to enroll participants in the study. The study's goal and methodology were fully explained to the participants. Verbal consent was taken from the participants and the questionnaire of the study was given to the participants through the predesigned questionnaire that include demographic data, the trunk impairment scale and the Berg balance scale. The participants were guided to answer every question correctly to prevent any biases or errors in the results of the study. After completion of the questionnaire, every questionnaire was collected and data was entered in the SPSS sheet for data analysis. Frequency and percentages were calculated for qualitative data. **Conclusion:** The study showed that in comparison to healthy people, half of the stroke patients used an inefficient step strategy, they took at least five steps and more than three seconds for each turn and showed increased instability. Their ability to turn was very weakly correlated with balance, trunk control and the level of motor recovery in their paretic lower limbs. Performance did not correspond with worry about falling when engaging in normal tasks.

Keywords: balance, hemiplegic stroke, trunk control, turning difficulty

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INTRODUCTION

A succession of foot motions that guide the body in a new direction is known as turning.[1] As a result, regaining motor function in the paretic foot and leg is critical for turning effectiveness. While

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turning, the functions of the internal and external legs differ, with the exterior leg creating propulsion and swinging to move the body in the desired direction and the internal leg stabilizing posture. When used as the inner leg, the paretic limb had unstable ankles, and when functioning as the outside leg, it had inadequate and low clearance. But, whether working as the inner or outer leg, the paretic limb could not turn with efficient function.[2,3]

Previous research has found that stroke patients take longer and take more steps to complete turns than healthy people, concluding that these patients struggle to turn.[4-6] Turning difficulties were marginally linked with a lower ability to walk and balance while regaining limb motor function after a stroke. Only one research project by Kobayashi et al. looked into the relationship between 180-degree walking turn and trunk control.[5] Researchers discovered that as patients' functional assessment for control (FAC) of trunk scores fell, they needed to take additional turns and steps.[7] Walking turns necessitated trunk stability, as evidenced by this. Not only does poor trunk control influence proximal body control, but it also affects distal limb mobility. During sitting, standing, and walking, trunk control is critical for maintaining uprightness, stability, and inter-segmental synchronization.[8,9] As a result, the ease of turning may be influenced by the trunk control function. The ability to keep one's balance while keeping their center of gravity (COG) inside their base of support in a stable position is referred to as static balance. Dynamic balancing, or having the ability to move the gravity point-COG centered on the base of support is more difficult.[10] Turning is a dynamic movement that necessitates stability to be safe. However, muscular trembling, altered tone of the muscles, decreased motor regaining & inadequate weight fluctuation is all prominent causes of balance problems in stroke patients. Turning difficulty can be caused by a lack of balance. Furthermore, when compared to other metrics, turning was more closely associated with walking capacity. Standing turn time, according to Kobayashi et al. could be used to distinguish between independent and community ambula-tory.[7] Making a turn may be more difficult than strolling in a straight line since it needs more balance and limb coordination.[11]

1- The potential for stumbling while turning 2- the turn's inability to pivot while doing it, 3- the turning process including five stages or weight shifts or more, and 4- a three-second or longer turn duration. [2] As a result of these four indicators, it was discovered that more than half of the participating SPs had trouble turning about turn duration (53%) and how many steps were taken (57%) in terms of strategy (100%) and balance (70%).[12] Each turn took less than 2.5 seconds for all healthy people, compared to over 70% of stroke patients who took more than 2.5 seconds. Everyone is healthy taking fewer than four steps. 60% of stroke patients, on the other hand, took at least five steps to complete each turn, and none took one or two steps. Taking more steps and taking longer to finish a turn and maintaining stability throughout a turn might be accomplished by compensating or adaptive behavior. To finish a turn, the HCs generally employed the pivot technique, whereas the stroke patients primarily employed the stepping strategy. The pivot is a swift, open-looped, feed-forward action and tactic. Stepping is a closed-loop, slower move-ment that seems to increase feedback needs.[13]

Furthermore, nearly all HCs were able to turn without losing their equilibrium however most stroke patients remained unstable throughout each turn. Following more research, it was discovered that 12 out of 30 SPs in the study (40%) matched all of the criteria for turning difficulties. According to the authors, certain SPs had problems turning as they were unstable when turning.[12] The goal of this study is to assess how difficult it is for stroke patients to turn in terms of step count, turn time, and balance, as well as to observe how common it is, turning problems develop after a stroke.

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MATERIAL AND METHODS

After the research ethics committee approved the proposal, an analytical cross-sectional study was conducted in Services Hospital, Lahore within six months after approval of the synopsis. The study comprises 196 participants of both genders according to the inclusion and exclusion criteria of the study and a convenient sampling strategy was used to enroll participants in the study. The study's goal and methodology were fully explained to the participants. Verbal consent was taken from the participants and the questionnaire of the study was given to the participants through the predesigned questionnaire that include demographic data, the trunk impairment scale (TIS) and the Berg balance scale (BBS). The participants were guided to answer every question correctly to prevent any biases or errors in the results of the study. After completion of the questionnaire, every questionnaire was collected and data was entered in the SPSS sheet for data analysis.

The data were entered and analyzed using SPSS version 21. To identify the differences in demographic data between stroke patients and HCs, age, height and mass were compared using the independent t-test, while gender was compared using the chi-square test. Every turning indicator for the two groups was compared using the chi-square test (turn time, step, type and balance).

RESULTS

Data were obtained from 98 stroke patients and 98 healthy controls. They were the same height and age but varied in weight and gender in each group. There were significant changes in turn timing balance, strategy and the number of steps between stroke patients and healthy controls. The result shows that among all the participants the turning time was <2.5 sec 3 (3.1%), 2.5 to 2.9 sec was 31 (31.6%) and 3 seconds or more was 64 (65.3%) among stroke patients (Table I).

Table I: Frequency and Percentage of Turning Time of Stroke Patients

Variable		Frequency	Percentage
Turning Time of Strokes Patients	<2.5 sec	3	3.1%
	2.5 to 2.9 sec	31	31.6%
	3 sec or more	64	65.3%

The result showed that among all the participants for the turning step 39 (39.8%) took 3 to 4 steps and 59 (60.2%) took 5 steps or more. Among all the participants, 35 (35.7%) had a mixed type of turning strategy while 63(64.3%) had a steps-type turning strategy for taking a turn around (Table II).

Table II: Frequency and Percentage of Turning Step and Strategy Among Stroke Patients

Variable s		Frequency	Percentage
Turning Steps o f Stroke Patients	3-4 steps	39	39.8
	5 steps or more	59	60.2
Turning Strategy of Stroke Patients	Mixed type	35	35.7
	Steps type	63	64.3

Out of all the participants, there was 1 (1%) participant who had no balance loss, 46 (46.9%) had lost balance but self-corrected without assistance and 51 (52%) required assistance from preventing fall while turning (Table III).

Table III: Frequency and Percentage of Loss of Balance and Use of Assistance

Variable		Frequency	Percentage
Turning Balance	No loss of balance	1	1.0
	Lose balance, self-corrects without assistance	46	46.9
	Lose balance, requires guarding/ assistance to prevent fall	51	52.0

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DISCUSSION

In this study, the most significant point is the turning difficulty for stroke patients that can be reduced. In comparison to HCs, these subjects turned after extending over three seconds, took a minimum of five turn steps, and displayed a greater degree of imbalance. The extent of recovery of trunk control, balance and walking capacity in the paretic lower limbs were all connected with a patient's turning ability after a stroke however fears about falling while doing ADLs were not. Each turn took less than 2.5 seconds for all HCs compared to the more than 70% of patients that took longer than 2.5 seconds. No HC advanced more than four steps however, none of the stroke patients required just one or two steps, all of them took at least five to finish each turn expanding. There may be benefits to taking more steps and taking longer to complete a turn or it may be possible to use an adaptable technique to maintain stability during a turn.[14,15]

The HCs employed the pivot approach most often, whereas the SPs mainly used the stepping technique to finish a turn. A quick, open-looped movement and feed-forward tactic is the pivot. The slower, closed-looped movement of the stepping technique seems to require more feedback. The effective turn strategy was frequently given up by stroke patients in favor of more stability. The absence of a ballistic pivot could be a precursor to underlying problems that make turning challenging, claim Thigpen et al. People who had problems turning tended to compensate for their lack of motor coordination by moving more slowly and taking shorter, easier steps.[15,16] Additionally, the majority of SPs showed instability every time they turned, yet almost all HCs turned without losing balance. Additional analysis revealed that in the current investigation, 12 out of the 30 SPs (or 40%) exhibited all of the turning difficulty criteria. The authors assume that the SPs had problems rotating because they were unstable while applying a compensating mechanism throughout each turn. According to past studies, rotation after a stroke was only weakly linked with lower extremity motor recovery, spine control function, stability, and functional mobility. A turn is made by the body moving in a new direction after a series of foot motions. For this reason, turning performance depends greatly on regaining motor function in the paretic foot and leg. During turns, the inner leg helps to maintain posture, while the external leg helps to reposition the body in the desired direction by providing propulsion and swing. The inner and outer legs have separate duties during turns. However, the paretic limb had inadequate ground clearance when acting as the outer leg and when used as the inner leg, lacks stability at the ankle. Simply put the paretic limb had been unable to improve overall whether it was the internal or outside leg, it served its purpose during the turn.[17,18] Kobayashi et al. only looked at one study that examined the relationship between trunk control and walking turns that ranged from 0°C to 180°C. The research discovered that More turn times and steps were required when a functional analysis of trunk control score of the patient fell. This suggested that trunk stability was needed for turning when walking. The movement of the distal limbs is also impacted by impaired trunk control, in addition to the proximal control of the body (19). When sitting, standing, or walking, trunk control is crucial to balance, stability, and intersegment synchronization. Consequently, the ability of the trunk to control movement may potentially be a factor in turning difficulty.[8,9]

The study was conducted by Shaman S. M. Ng and Regan L. Robinson in 2018. Turning is a common occurrence in everyday life. Hemiplegics' ability to turn safely will be hampered by ongoing deficiencies in strength, balance, and coordination. As a result, recovery programs should address turning to retraining. A trustworthy clinical technique is needed to measure turning for these people. This study's objective is to investigate, the interpreter for the reliability of the interpreter, test-retest and additional 180-degree turn timed test; (ii) the correlation between

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the timed 180-degree rotation test and additional signs of deficits specific to stroke and (iii) the split time that most effectively separates people with hemiplegia from people who have had a long-term stroke and elderly individuals in good health. According to the study's findings, the timed 180 spin test is an accurate clinical method for determining a patient's ability to turn after suffering a chronic stroke if they have hemi-paresis.[20] As a result of our participants' good cognitive and communication abilities, only patients with high functional strokes may be used to generalize the results of the current investigation. According to the study, more than half of stroke survivors needed more than three seconds to turn, took at least five steps each time, and had greater instability than healthy people. These variables all pointed to turning difficulties. Therefore, it is reasonable to assume that most stroke victims might have problems in turning. For those who struggle with motor recovery, trunk control or balance, this is especially true.[12]

CONCLUSION

The study showed that in comparison to healthy people half of the stroke patients used an inefficient step strategy, they took at least five steps and more than three seconds for each turn and showed increased instability. These variables all pointed to turning difficulties. Their ability to turn was very weakly correlated with balance, trunk control and the level of motor recovery in their paretic lower limbs. Performance did not correspond with worry about falling when engaging in normal tasks. Therefore, it is reasonable to assume that most stroke victims might have problems in turning.

DECLARATIONS

Consent to Participate:
Written consent had been taken from participants. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
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Authors' contributions: All authors read and approved the final manuscript.

REFERENCES:

01- Glaister BC, Bernatz GC, Klute GK, Orendurff MS. Video task analysis of turning during activities of daily living. Gait Posture. 2007 Feb 1;25(2):289–94.

02- Thigpen MT, Light KE, Creel GL, Flynn SM. Turning difficulty characteristics of adults aged 65 years or older. Phys Ther. 2000;80(12):1174–87.

03- Danielli Coelho de Morais Faria C, Fuscaldi Teixeira-Salmela L, Nadeau S. Effects of the Direction of Turning on the Timed Up & Go Test with Stroke Subjects. Top Stroke Rehabil. 2009 May 1;16(3):196–206.

04- Ahmad RY, Ashburn A, Burnett M, Samuel D, Verheyden G. Sequence of onset latency of body segments when turning on-the-spot in people with stroke. Gait Posture. 2014 Mar 1;39(3):841–6.

05- Leigh Hollands K, Hollands MA, Zietz D, Miles Wing A, Wright C, van Vliet P. Kinematics of Turning 180° During the Timed Up and Go in Stroke Survivors With and Without Falls History. Neurorehabil Neural Repair. 2010 May 1;24(4):358–67.

06- Appelros P, Stegmayr B, Terént A. Sex differences in stroke epidemiology: a systematic review. Stroke. 2009;40(4): 1082–90.

07- Association of performance of standing turns with physical impairments and walking ability in patients with hemiparetic

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stroke [Internet]. [cited 2022 Apr 13]. Available from: https://www.jstage.jst.go.jp/article/jpts/27/1/27_jpts-2014-363/_article/-char/ja/

08- Karthikbabu S, Chakrapani M, Ganeshan S, Rakshith KC, Nafeez S, Prem V. A review on assessment and treatment of the trunk in stroke. Neural Regen Res. 2012 Sep 5;7(25):1974–7.

09- Patla AE, Adkin A, Ballard T. Online steering: coordination and control of body center of mass, head and body reorientation. Exp Brain Res. 1999 Dec 1;129(4):629–34.

10- PJ PADBR, Paul JP. What is balance. Clin Rehabil. 2000;14(4):402–6.

11- Chisholm AE, Qaiser T, Lam T. Neuromuscular control of curved walking in people with stroke: Case report. J Rehabil Res Dev. 2015;52(7):775–84.

12- The Percentage of Occurrence of Turning Difficulty in Hemiplegic Stroke Survivors — Taipei Medical University [Internet]. [cited 2022 Apr 13]. Available from: https://tmu.pure.elsevier.com/en/publications/the-percentage-of-occurrence-of-turning-difficulty-in-hemiplegic-

13- Martino D, Espay AJ, Fasano A, Morgante F. Disorders of Movement [Internet]. Berlin, Heidelberg: Springer; 2016 [cited 2022 Apr 13]. Available from: http://link.springer.com/10.1007/978-3-662-48468-5

14- Physical Activity and Aging: Retrospections and Visions for the Future in: Journal of Aging and Physical Activity Volume 2 Issue 3 (1994) [Internet]. [cited 2022 Jul 16]. Available from: https://journals.humankinetics.com/view/journals/japa/2/3/article-p233.xml

15- Spirduso WW. Physical Activity and Aging: Retrospections and Visions for the Future. J Aging Phys Act. 1994 Jul 1;2(3):233–42.

16- Mills Charlesk. Unilateral Ascending Paralysis and Unilateral Descending Paralysis. Their Clinical Varieties and their Pathologic Causes. J Am Med Assoc. 1906 Nov 17;XLVII(20):1638–45.

17- Chen IH, Yang YR, Cheng SJ, Chan RC, Wang RY. Neuromuscular and biomechanical strategies of turning in ambulatory individuals post-stroke. Chin J Physiol. 2014;57(3):128–36.

18- The Effects of Two Different Ankle-Foot Orthoses on Gait of Patients with Acute Hemiparetic Cerebrovascular Accident [Internet]. [cited 2022 Jul 16]. Available from: https://www.hindawi.com/journals/rerp/2014/301469/

19- Verheyden G, Nieuwboer A, Mertin J, Preger R, Kiekens C, De Weerdt W. The Trunk Impairment Scale: a new tool to measure motor impairment of the trunk after stroke. Clin Rehabil. 2004;18(3):326–34.

20- Ahmad RY, Ashburn A, Burnett M, Samuel D, Verheyden G. Sequence of onset latency of body segments when turning on-the-spot in people with stroke. Gait Posture. 2014;39(3):841–6.