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ASSOCIATION OF TINETTI BALANCES PERFORMANCE WITH OBJECTIVELY MEASURE LIFESPACE IN PATIENTS WITH SUBACUTE STROKE A CROSS-SECTIONAL OBSERVATIONAL STUDY

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Abstract

Background: Stroke is a common reason for movement restrictions, including a limitation in life space. Life space is the area that a person goes across in a specific amount of time. In addition to clinical characteristics of stroke, we wanted to examine the patients' actual and self-reported living environment. The Tinetti test gauges a person's perception of stability and balance while performing daily chores as well as their fear of falling.

Objective: To determine how well Tinetti balancing performance correlates with the measurement of life space after sub-acute stroke. Evaluate the balance function of a stroke patient, determine how much the person moves around and the size of their regular living space.

Methods: All participants who had sub-acute strokes followed a two to six month treatment strategy. Patients who met the requirements for the study were contacted and invited to take part. We used 123 WHO-estimated sub-acute stroke patients. We calculated the composite score of the LSA using the German LSA by combining the attained life-space level, required equipment or personal support, and visitation frequency. The Performance-Oriented Mobility Assessment (POMA), also known as the Tinetti-test, looks at a person's perception of balance and stability while performing daily tasks as well as their fear of falling. It is a great indicator of a person's risk of falling.

Results: One hundred twenty three people, with age of 45 to 65,stroke patients receiving sub-acute care and following a 2- to 6-month treatment regimen. The POMA score correlated with Life space. Association between Life space and Tinetti balance performance was 81%. So If patients have fear of high risk of fall their life space is also affected. A statistically significant result ($P \leq 0.05$).

Conclusion: Our findings demonstrate the importance of tinetti performance assessment with life space by showing a relationship between easy-to-assess tinetti performance and life space 2 months after stroke. Life space and tinetti balance are positively correlated. Patient's fear of falling causes them to limit their functional mobility.

INTRODUCTION

The second-leading cause of death globally in 2019 was stroke, which was responsible for 11.6% [10.8-12.2%] of all fatalities. When the brain's blood flow is interrupted, a stroke, often referred to as a cerebrovascular accident, occurs. As a result, the brain cannot receive nutrients and oxygen from the blood. If sudden brain bleeding damages brain cells, a stroke may occur. An ischemic stroke is caused by a blood clot blocking blood flow to the brain, while a hemorrhagic stroke is caused by a blood vessel rupture restricting blood flow to the brain. Transient clots are the reason why TIAs, also referred to as "mini strokes," occur.(Feigin et al., 2021)

How a stroke develops depends on where the blockage is and how much brain tissue has been damaged. Because the opposite side of the body is controlled by one side of the brain, neurological issues will emerge after a stroke on that side. Life space is the volume of space a person travels through over the course of a given amount of time. The Tinetti test evaluates a person's sense of stability and balance while engaging in daily activities as well as their fear of falling. The (POMA) is another name for it.It accurately forecasts a person's danger of falling. (Harjpal, Qureshi, & Kovela, 2021)

The subacute stroke phase is a crucial post-stroke period during which significant improvements in function and capacity can be made. Health dangers could exist at this time. In the aftermath of a stroke, the sub-acute phase lasts for seven days to six months. In the subacute phase, doctors make additional distinctions. According to an authoritative source, the initial three months following a stroke are considered the early sub-acute period. 4-6 months following a stroke.(Tashiro et al., 2020)

Late subacute phase: facial, arm, or leg numbness or weakness, usually on one side of the body sudden speech difficulties, unusual vision problems in one or both eyes, A strong, incapacitating headache with no apparent cause, fatigue, instability, or loss of coordination, and sudden trouble walking. Additional signs of an acute ischemic stroke in women can include leg, arm, or facial pain, the hiccups, or vomiting..(Kleindorfer et al., 2021) chest pain, palpitations, or breathing problems. Not all stroke symptoms appear right away, and they can go away and come back. paralysis or immobilisation of the muscles. You might become paralysed on one side of your body or lose control of some muscles, such those on one side of your face or one arm. speaking or swallowing challenges.(Nair & Augustine, 2021)

Your ability to control the muscles in your mouth and throat may be compromised by a stroke, making it difficult for you to talk clearly or efficiently chew or swallow food. You can also have trouble with your language abilities, such as reading, writing, speaking, and listening. Memory loss or reasoning difficulties. Many stroke victims experience partial or complete memory loss. Others could find it difficult to reason, make judgements, or understand concepts. Stroke sufferers may struggle to control their emotions or develop depression.(Tramontano et al., 2019)

Problems with balance can occur after a stroke. Two to four weeks after a stroke, 84% of patients have some sort of balance impairment, according to reports. Stroke patients wobble more while calmly standing and perform worse on clinical balance tests when compared to non-disabled controls. Inability to walk for extended distances is also a result of balance issues, particularly in stroke survivors who walk slowly.(Nair & Augustine, 2021)

The Tinetti test gauges a person's perception of stability and balance while performing daily chores as well as their fear of falling. The Performance-Oriented Mobility Assessment, or POMA, is another name for it. It is a very reliable indicator of a person's likelihood of falling.(Jin & Xing, 2017) It is used with persons who have been given a diagnosis of Multiple Sclerosis (MS), Parkinson's, acquired brain damage, spinal cord injury, stroke, motor neuron disease, normal

pressure hydrocephalus, and the elderly, among other situations.The Tinetti test includes gait and balance scores..(Weisenburger-Lile et al., 2019)

Stroke frequently results in reduced life expectancy and mobility restrictions. The amount of space a person can occupy in a given amount of time is known as life space. The concept of life space, which is defined as an area in which people travel in daily life, has been devised to assess the mobility of specific patients from their residences to sites outside of their town or region. The Alabama and Birmingham Study of Ageing's Life-Space Assessment (LSA) questionnaire is one of many measures used to evaluate a person's typical pattern of movement in the month before the evaluation. Based on how far a person walks across five levels (from their home to out of town).(Johnson, Rodriguez, & Al Snih, 2020)

The phrase "life-space" initially appeared in the literature on geriatrics and gerontology. For various populations, there are numerous life-space measurements available. It is also possible to estimate life space using mobile devices that use global navigation satellite systems (GNSS; for example, GPS, GALILEO, GLONASS, and BeiDou). The analysis of mobility factors, such as the total distance or area covered during a certain time period, as well as the ongoing tracking of the participants' locations are made possible by specific tracking tools or applications.(Christopher, Kraft, Olenick, Kiesling, & Doty, 2021)

Subjectively assessed life space (measured by questionnaire evaluation) and physical function and activity (measured by step count) are positively correlated in stroke patients.(Ho, Lai, & Ng, 2021). to determine the relationship between Tinetti balancing ability and a subacute stroke's objectively determined life space. By examining how often they move and how much space they generally occupy, it will be possible to evaluate a stroke patient's ability to balance.(Jin & Xing, 2018)

Medical care for stroke In addition to standard physiotherapy, patients received RAGT therapy three times per week for 30 minutes over the course of six weeks. The control patients received comparable additional regular physiotherapy treatment..(Liddle et al., 2021).(Taylor, Buchan, & Van Der Veer, 2019)

A hemorrhagic stroke can occur unexpectedly and quickly get worse. For a successful recovery after an ischemic stroke, therapy must be started as soon as feasible. The extent and location of your brain haemorrhage will determine the sort of treatment you receive. To ease the strain on the blood arteries in your brain, your doctor may prescribe blood pressure medicine.(Kuspinar et al., 2020). Any blood thinners or anticoagulants that might have caused the bleeding will also be stopped taking effect for you. You can be given vitamin K to assist with stopping the bleeding, depending on the kind of medication you were taking.(Douma, Steverink, & Meijering, 2021)

After a stroke, balance issues are common in many people because of a combination of decreased trunk and limb motor control, altered sensation, and, on rare circumstances, a shift in body representation dictated from the centre that causes the person to perceive their posture incorrectly in respect to the upright. A lack of confidence, a fear of falling, and an increase in the likelihood of falling are usually brought on by balance problems. According to recent studies, exercising the trunk improves dynamic sitting balance and trunk performance.(Kuspinar et al., 2020)

People, who have weak arms or legs, particularly those with strength below antigravity, may benefit from electrical stimulation. The definition of spasticity, its physiological foundation, and its importance are all hotly debated issues.(Harrington et al., 2020) Spasticity may make it difficult to do daily tasks and may cause pain or discomfort. There is a connection between spasticity and various restrictions on arm function and mobility. Spasticity is frequent, particularly in the non-functional arm. Consistent shortenings of muscles or joints are referred to as contractures. It

typically results from persistent hypertonic spasticity in a particular muscle area. In limbs affected by spasticity, contractures are common.(Adeoye et al., 2019)

Objectives

The purpose of our study is to determine the association between subacute stroke patients' Tinetti balance performance and objectively assessed life space. The amount of space a stroke patient typically occupies and how frequently they move will help determine their balancing abilities.

CHAPTER 3

This cross-sectional study was conducted in government hospitals in Lahore (General Hospital, Jinnah Hospital and Services Hospital) and through home visits, using a convenience sampling technique. Ambulatory sub-acute stroke patients of both genders, aged 45 to 65 years, who were following a 2- to 6-month treatment regimen were included if they could understand the study, communicate verbally, give written informed consent, and walk independently for at least 20 meters. They also needed at least one stroke-related sign or symptom that could impair gait and mobility. Patients were excluded if they could not walk unassisted (modified Rankin Scale >3), had severe cognitive impairment (MoCA ≤21, or ≤20 for those with 12 or more years of education), had an acute psychiatric disorder or terminal illness, had lower-limb orthopedic surgery in the previous year, were undergoing rehabilitation after an inpatient surgical procedure at the time of the stroke, or had severe difficulty walking or climbing stairs before the stroke. The calculated sample size was 136, and after accounting for 5% attrition, 123 patients were included. Data were collected with two tools: the Performance-Oriented Mobility Assessment (Tinetti test) and the Life-Space Assessment (LSA) questionnaire. The Tinetti test evaluates balance (maximum 16) and gait (maximum 12), with a total score of 28, and scores of ≤18, 19-23 and ≥24 indicate high, moderate and low fall risk respectively. The LSA composite score was calculated from the life-space level attained, the assistance needed, and the frequency of visits. Data were analyzed using SPSS version 25. Frequencies were used to describe participant and outcome characteristics, including LSA items by gender and age, while correlation and the chi-square test were used to assess the relationship between Tinetti performance and life-space mobility.

Results

We looked at the life-space data of 123 individuals with subacute stroke, whose ages ranged from 45 to 65 on average. The sample contained n=69 females with a valid percentage of 56.1 and n=54 males with a valid percentage of 43.9.On-site data collection for gender frequency took place on average 40 days (with a range of 45 to 110 days) after a stroke.

A significant compromise from people with a low risk of falling was seen overall in the objectively assessed life space. We work with people 45 to 65 years old.31 participants are between the ages of 45 and 50, 39 are between the ages of 51 and 55, 27 are between the ages of 56 and 60, and 26 are between the ages of 61 and 65.

Age frequencies for participants.Tinetti balance performance comprise two methods for balancing and gait analysis, and 56 participants had high fall risk frequencies. (41Participants) moderate fall risk, while 26 participants had a lower fall risk. Relationship between Tinetti and Life space association between life space and tinetti of 56.9%. Stroke patients' lives must be put at danger since they are at a high risk of falling, thus they must find the relationship between Tinetti's age and in gender and tinetti balance are correlated.

P value less than 0.005 which means result are significant. Association between tinetti and Life space were 81% which means both have positive association if patient of stroke has high risk of fall than definitely life space will also become effect. So Life space strongly affected due to risk of fall.

DEMOGRAPHICS
DISTRIBUTION ACCORDING TO AGE

Table 1

Age	Frequency	Percent	Valid Percent	Cumulative Percent
45-50	31	25.2	25.2	25.2
51-55	39	31.7	31.7	56.9
56-60	27	22.0	22.0	78.9
61-65	26	21.1	21.1	100.0
Total	123	100.0	100.0	

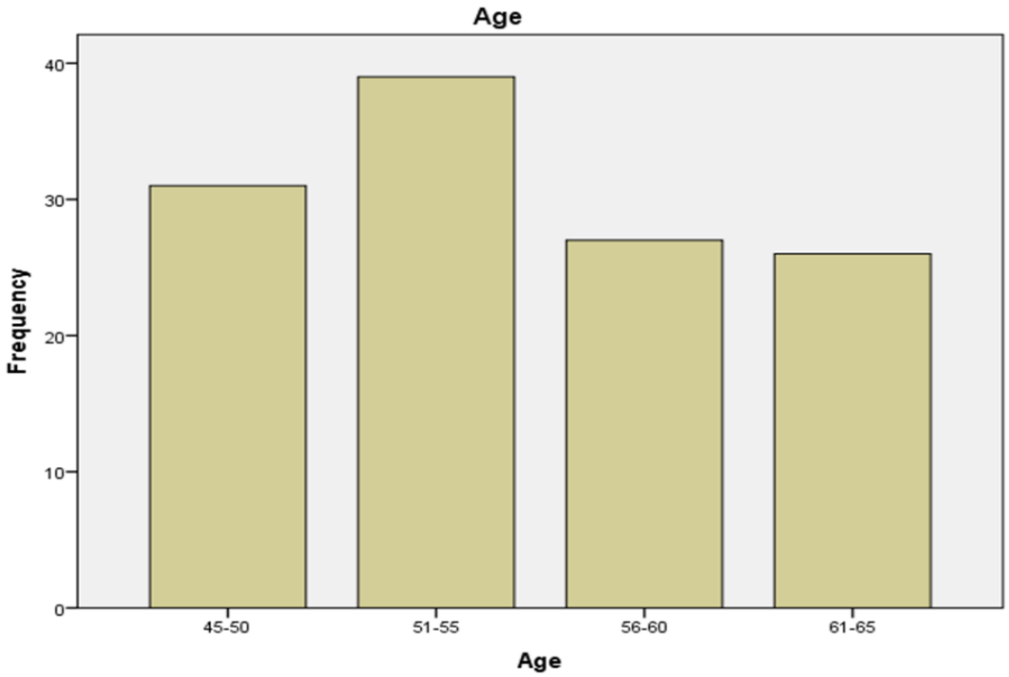


Figure 1: Age group 1 (45 to 50) have 31 participants, (51-55) are 39 participants, (56-60) have 27 patients and (61-65) have 26 patients. Most patients are in group 2.

DISTRIBUTION ACCORDING TO GENDER

Table 2

Gender	Frequency	Percent	Valid Percent
Male	54	43.9	43.9
Female	69	56.1	56.1
Total	123	100.0	100.0

Table 3: QUESTION- 1

	Frequency	Percent
Yes	73	59.3
No	50	40.7
Total	123	100.0

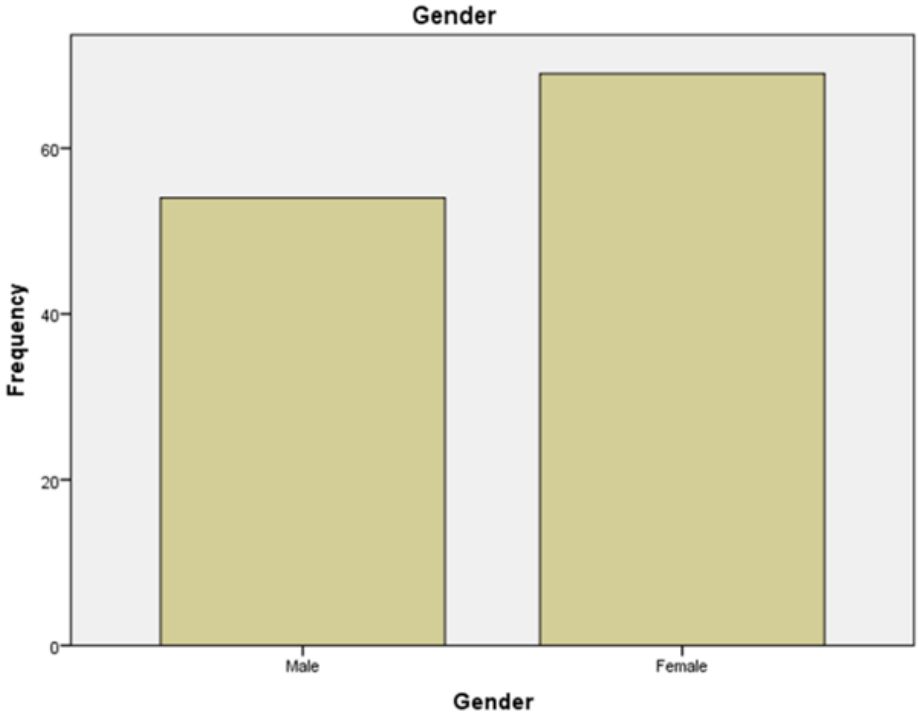


Figure 2: Total participants 123

- Male were 54
- Female were 69

LIFE SPACE ASSOCIATION FREQUENCY

Table 4 :Question -2

Responses	Frequency	Percent
Yes	64	52.0
No	59	48.0
Total	123	100.0

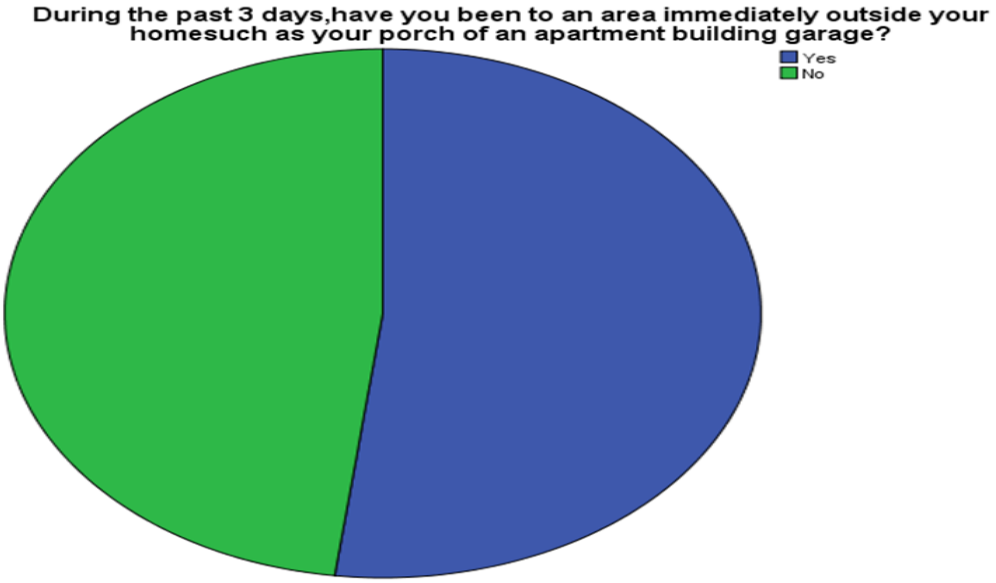


Figure 3: In this graph 52% patient respond Yes they were using walking aids for moving and 48% No they just limited themselves on bed due to fear of falling

Table 5: Question-3

Responses	Frequency	Percent
yes	52	42.3
No	71	57.7
Total	123	100.0

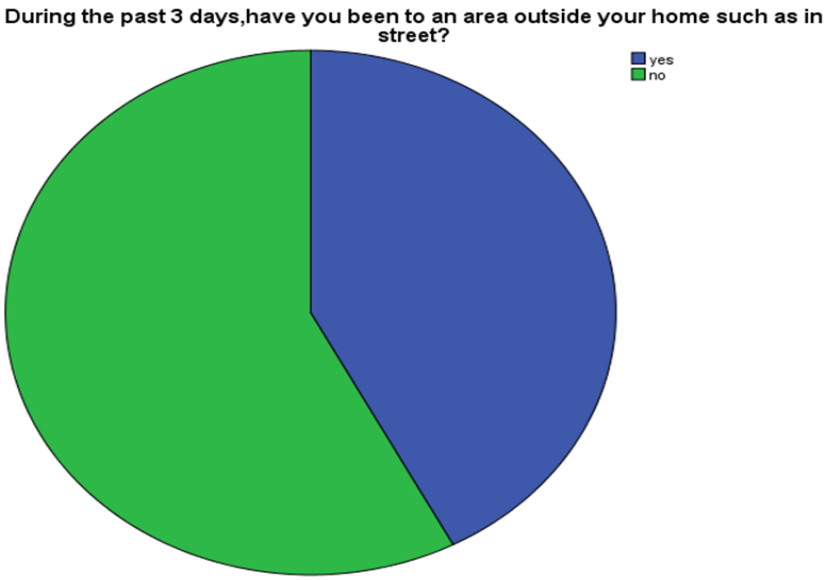


Figure 4: (52%) responses yes and (71%) said No because they did not go out from their houses they have high chance of fall.

Table 6: Question 4

Responses	Frequency	Percent
Yes	40	32.5
No	83	67.5
Total	123	100.0

Table 7: Question - 5

Responses	Frequency	Percent
Yes	33	26.8
No	90	73.2
Total	123	100.0

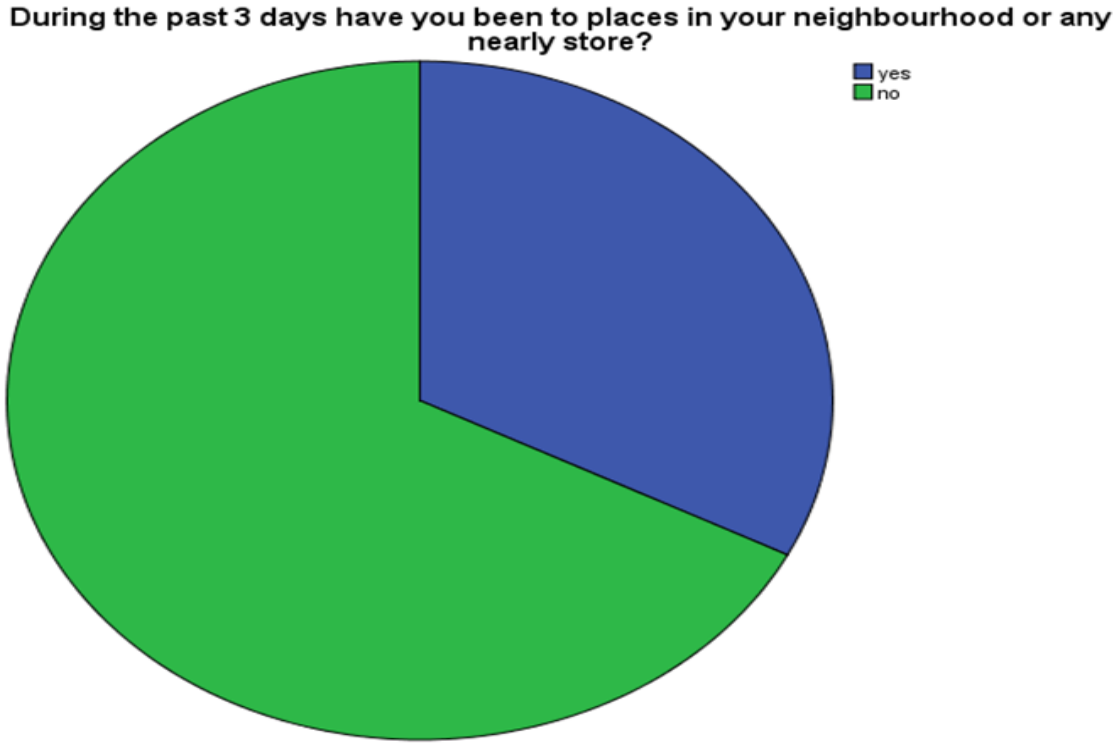


Figure 6: (40%) patient can go out in street but (83%) patients were not able to go out.

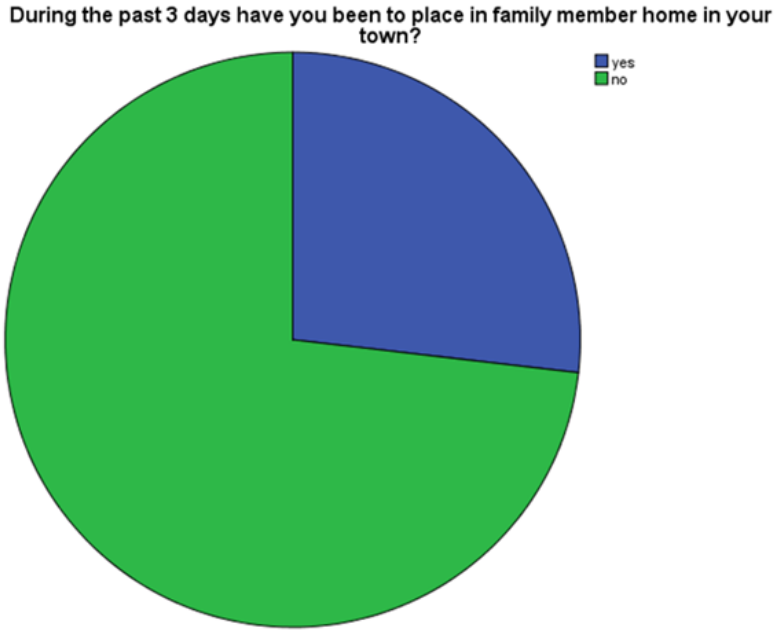


Figure 7: In this graph Yes responses became low (33%) and no responses were (90%).

Table 8: Question-6

Responses	Frequency	Percent
Yes	31	25.2
No	92	74.8
Total	123	100.0



Figure 5: (31%) Yes , (92%) No

Table 9: Question 7

Responses	Frequency	Percent
Yes	21	17.1
No	102	82.9
Total	123	100.0

Tinetti Test

Table 10

SCORE	Frequency	Percent
<19 high fall risk	56	45.5
(19-24) medium risk of fall	41	33.3
(25-28)low fall risk	26	21.1
Total	123	100.0

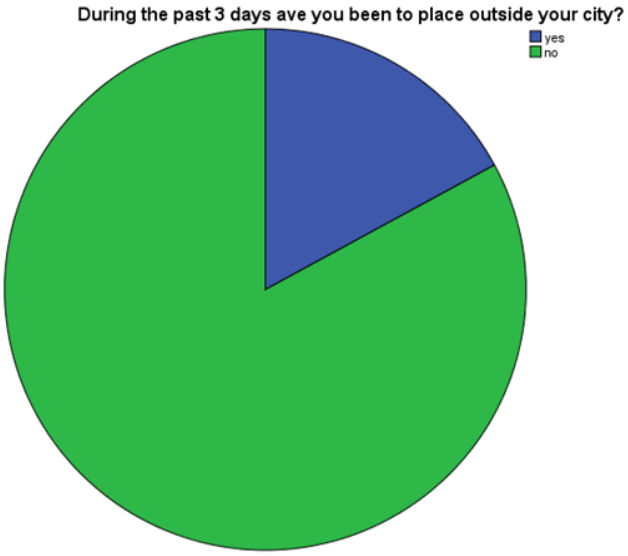


Figure 6: (17.1%) Yes, (82.9%) No

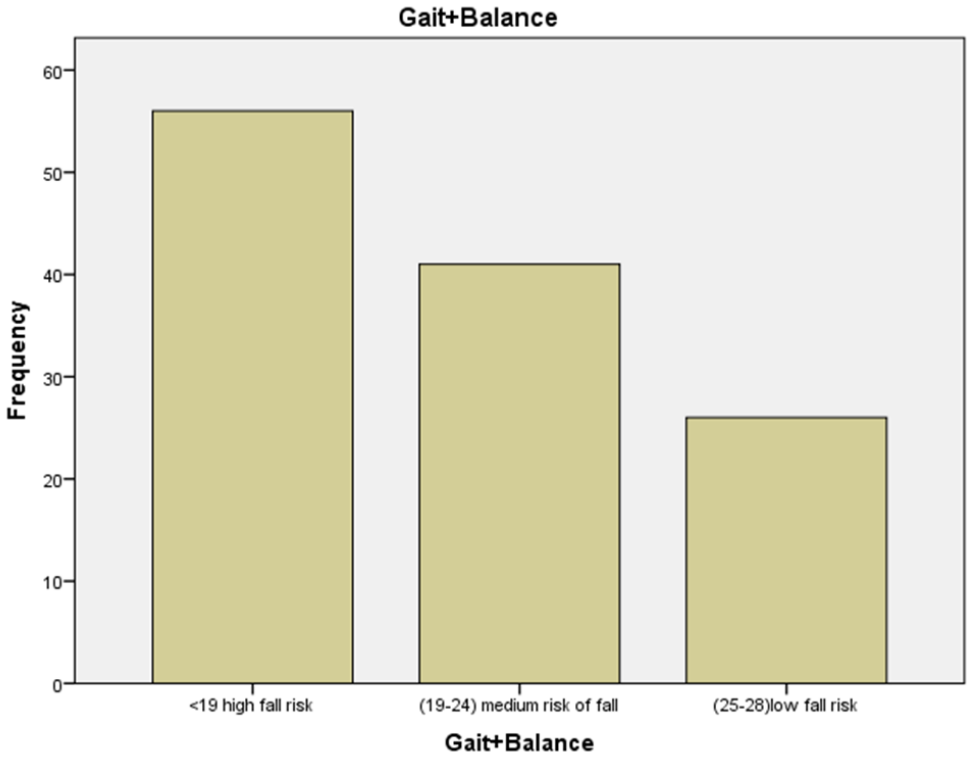


Figure 7: The test consists of a gait score and a balance score. It uses a 3-point ordinal scale of 0, 1 and 2. Gait is scored over 12 and balance is scored over 16 making a total of 28.

Correaltion of Age with Tinetti Test

Table 11 Correlation of tinetti with life space

Age * Gait Balance Cross tabulation

		Gait Balance			Total
		<19 high fall risk	(19-24) medium risk of fall	(25-28)low fall risk	
45-50	Count	15	10	6	31
	% within Age	48.4%	32.3%	19.4%	100.0%
	% within Gait Balance	26.8%	24.4%	23.1%	25.2%
	% of Total	12.2%	8.1%	4.9%	25.2%
	Residual	.9	-.3	-.6	
	Std. Residual	.2	-.1	-.2	
51-55	Count	18	10	11	39
	% within Age	46.2%	25.6%	28.2%	100.0%
	% within Gait+Balance	32.1%	24.4%	42.3%	31.7%
	% of Total	14.6%	8.1%	8.9%	31.7%
	Residual	.2	-3.0	2.8	
	Std. Residual	.1	-.8	1.0	
56-60	Count	9	13	5	27
	% within Age	33.3%	48.1%	18.5%	100.0%
	% within Gait+Balance	16.1%	31.7%	19.2%	22.0%
	% of Total	7.3%	10.6%	4.1%	22.0%
	Residual	-3.3	4.0	-.7	
	Std. Residual	-.9	1.3	-.3	
61-65	Count	14	8	4	26
	% within Age	53.8%	30.8%	15.4%	100.0%
	% within Gait Balance	25.0%	19.5%	15.4%	21.1%
	% of Total	11.4%	6.5%	3.3%	21.1%
	Residual	2.2	-.7	-1.5	
	Std. Residual	.6	-.2	-.6	
Total	Count	56	41	26	123
	% within Age	45.5%	33.3%	21.1%	100.0%
	% within Gait Balance	100.0%	100.0%	100.0%	100.0%
	% of Total	45.5%	33.3%	21.1%	100.0%

Table 12 Gait+Balance * Life Space Crosstabulation

			Life Space								Total
			1	1	1	1	2	2	2	2	
Gait+ Balance	<19 high fall risk	Count	0	0	0	0	0	1	4	27	32
		% within Gait+Balance	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	12.5%	84.4%	100.0%
		% within Life Space	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	57.1%	96.4%	60.4%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	7.5%	50.9%	60.4%
		Residual	-1.8	-1.2	-.6	-.6	-3.0	-2.6	-.2	10.1	
		Std. Residual	-1.3	-1.1	-.8	-.8	-1.7	-1.4	-.1	2.5	
	(19-24) medium risk of fall	Count	0	1	1	1	5	5	3	1	17
		% within Gait+Balance	0.0%	5.9%	5.9%	5.9%	29.4%	29.4%	17.6%	5.9%	100.0%
		% within Life Space	0.0%	50.0%	100.0%	100.0%	100.0%	83.3%	42.9%	3.6%	32.1%
		% of Total	0.0%	1.9%	1.9%	1.9%	9.4%	9.4%	5.7%	1.9%	32.1%
		Residual	-1.0	.4	.7	.7	3.4	3.1	.8	-8.0	
		Std. Residual	-1.0	.4	1.2	1.2	2.7	2.2	.5	-2.7	
	(25-28)low fall risk	Count	3	1	0	0	0	0	0	0	4
		% within Gait+Balance	75.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Life Space	100.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.5%
		% of Total	5.7%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.5%
		Residual	2.8	.8	-.1	-.1	-.4	-.5	-.5	-2.1	
		Std. Residual	5.8	2.2	-.3	-.3	-.6	-.7	-.7	-1.5	
Total		Count	3	2	1	1	5	6	7	28	53
		% within Gait+Balance	5.7%	3.8%	1.9%	1.9%	9.4%	11.3%	13.2%	52.8%	100.0%
		% within Life Space	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

	% of Total	5.7 %	3.8%	1.9 %	1.9%	9.4 %	11.3 %	13.2 %	52.8 %	100.0 %

Table 13
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	81.051[a]	14	.000
Likelihood Ratio	65.256	14	.000
Linear-by-Linear Association	40.388	1	.000
N of Valid Cases	53		

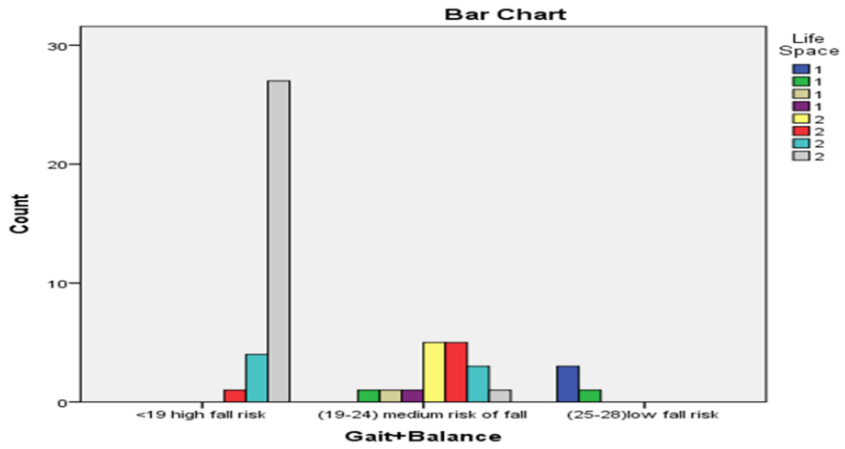


Figure 8

Discussion:

Several distance- and area-related measures of life space and Tinetti performance were shown to be positively correlated, and there was also a marginally significant correlation between LSA scores and Tinetti performance. According to our research, none of the life space metrics had statistically significant correlations. Consistent with previous research on questionnaire-based assessments of living space in stroke patients, individuals with better physical function had higher values for living space (i.e., greater distance from home and area-based measurements). Being able to move about in one's life requires the ability to stand up from a chair and walk. Consequently, living space can be understood as a requirement for physical function.(Tramontano et al., 2019)
Compared 66 people with stroke (mean age 64.9 ± 6.6 years) with 65 healthy elderly people (mean age 67.0 ± 7.0 years) [20]. They assessed life space using the LSA and compared values in healthy older people with and without depressive symptoms. They found a significant correlation of LSA composite score with Fugl-Meyer Assessment of Lower Extremities score (rs = 0.31), Five Times Sit to Stand Time (rs = − 0.43), and French Activities Index score (RS = − 0.43). (Reported. = 0.48). It studies positive associations between multiple distance- and area-related life-space measurements and tug performance and a borderline significant association between LSA scores and tug performance. They did not observe statistically significant associations with NIHSS or mrS for any of the life span measures. They did not observe statistically significant association of any life space measure with the NIHSS or mrS but our study show significant relationship between stroke and life space(Rössler et al., 2023).

Most of the people suffering from paralysis had limited mobility in their living space. Living space mobility was associated with ability to perform activities of daily living, walking speed, and fear of falling. These findings may contribute to the development of rehabilitation interventions to regain life space mobility in the individual with stroke and our study also demonstrates the association. (Tashiro et al., 2020)

In total, 48 studies were included (4595 stroke survivors): at least 1319 (29%) reported symptoms of VSN. VSN was associated with reduced freedom during sitting, with asymmetric posture toward the affected body. For standing balance, we revealed a significant negative correlation between VSN and moderate stability and weight change, whereas only daily life-related VSN activity during static stance was associated with weight-bearing coordination. While walking, VSN patients tend to get out of their way late. Results regarding other aspects of mobility were inconclusive. The relationship between VSN and balance/mobility appeared to decrease over time.(Embrechts et al., 2021)

CONCLUSION

Our findings demonstrate the importance of tinetti performance assessment with life space by showing a relationship between easy-to-assess tinetti performance and life space 2 months after stroke. Life space and tinetti balance is positively correlated. Patient's fear of falling causes them to limit their functional mobility.

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