



RESEARCH ARTICLE

TRUNK IMPAIRMENT SCALE AS A FUNCTIONAL PREDICTORS IN STROKE - AN OBSERVATIONAL STUDY.

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Key words:-

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Abstract

Objective: To find the Trunk Impairment Scale as a functional predictor in stroke. **Study design:** Observational study design. **Subjects:** Total of 30 subjects with Hemiparesis were taken by convenience sampling. **Interventions:** 30 subjects were assessed initially and after four weeks of first assessment and correlating the initial assessment and fourth weeks assessment. **Outcome measures:** Berg Balance scale, Functional independence measure, ten meter walk test. **Results:** Results showed Trunk Impairment Scale has positive correlation with Functional Independence measures, Berg Balance Scale scores and negative correlation with Ten Meter Walk test. **Conclusion:** Trunk Impairment Scale correlation with some specific motor results such as balance, walking speed and Functional Independence Measures. Concluded that Trunk Impairment Scale is a functional predictor in stroke patients.

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Introduction:-

The term Stroke is used synonymously with Cerebro Vascular Accident (CVA). The World Health Organization defines stroke as a condition characterized by rapid developing symptoms and signs of a focal brain lesion, with symptoms lasting for more than 24 hours or leading to death, with no apparent cause other than that of Vascular origin.¹

The impact of stroke is considerable worldwide. It is estimated that there are 4.5 millions deaths a year from stroke and over 9 millions stroke survivors. It comprises the major cause of adult disability and second cause of mortality world wide². In India the average annual incidence rate 123.57/100,000, persons among them women well affected than men³

Stroke syndromes present with various alterations in Motor, Sensory, and Cognitive function. Each unique in clinical presentation and prognosis. Although there are general principles of stroke recovery, no two patients share the same experience. Understanding the correlated Physiologic and Anatomic changes in the brain helps identify which syndromes is present and how best to institute comprehensive rehabilitation to meet the individual needs of the patients⁴

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Hemiparesis is the most frequent neurological deficit after stroke . Hemiparetic stroke patients frequently present balance abnormalities. Balance impairments increase fall risk, resulting in high economic costs and social problems⁵

Trunk movement control is a indispensable basic motor ability for the execution of many Functional tasks⁶

In comparison with limb, Trunk rehabilitation is a neglected area of strokes rehabilitation. Loss of trunk control causes limitations in breathing, speech, arm and hand function, balance and gait⁷

Balance impairment is common in stroke survivors. Balance is the ability to keep the body's center of gravity over the base of supporting surface without losing stability. Maintaining a stable seated position requires good trunk control and is essential for many activities of daily living (ADL)⁸

Difficulties in determining individual causes of balance impairment and disability are related to the diverse mechanisms involved. Decreased muscle strength, range of movement, abnormal muscle tone, motor coordination, sensory organization, cognition, and multisensory integration can contribute to balance disturbances at different levels⁵

Clinical balance tests, however, have limited value in delineating the problems that underlie the observed deficits. Consequently, subjective impressions rather than objective data typically provide the basis about the causes of balance dysfunction in patients with hemiparesis. Hence, treatment plans are aimed at improving patients balance function⁹

Although the age specific incidence of major stroke has fallen over the past few years, it is still the main cause of long term disability in adults, with a growing number of survivors being dependent for activities of daily living (ADL). Frequently identified variables predicting ADL after stroke are age and initial severity of motor and functional deficits¹⁰

Trunk performance has also been identified as an important independent predictor of ADL after stroke¹⁰

To allow efficient walking, counter rotation between the shoulder and pelvic girdle is needed. This need for proximal stabilization to allow distal movements on the one hand and the ability to selectively initiate trunk movements on the other hand has led to the abandoning of the term 'sitting balance'. Instead the terms 'trunk control', 'trunk impairment' and 'trunk performance' were introduced. Clinical measures to evaluate trunk performance¹⁰

Trunk performance after stroke has been evaluated in various ways. Methodological approaches used in previous studies included isokinetic muscle testing, manual dynamometry, electromyographic analysis, transcranial magnetic stimulation, computed tomography, and movement analysis. But still standardised clinical assessment tools are a pre requisite for scientific research and clinical practice⁷

The Trunk Impairment Scale (TIS) for patients after stroke was designed to measure Activities of Daily Living related selective trunk movements rather than participation of the trunk in gross transfer movements. The Trunk Impairment Scale assesses static and dynamic sitting balance and trunk coordination¹⁰

This study is to find out the predictive validity of the Trunk Impairment Scale and its subcomponents, together with other variables in subjects with hemiparesis.

Methodology:-

30 subjects were selected conveniently from SRM Medical College Hospital and Research Centre, Kattankulathur, MAHALAKSHMI nursing home, Neyveli, Cuddalore, Initially, Subjects with diagnosed Hemiparesis following first Cerebro Vascular Accident were conveniently selected and explained clearly about the procedure and written informed consent was taken. Inclusion criteria: Hemiparesis following first Cerebro Vascular Accident, Subjects able to sit independently, First onset of hemiparesis, Ability to follow commands, Mini Mental Status Examination scale score 24 or more. Exclusion Criteria: Patients with other neurological impairments, Hip prosthesis on either hip joint, Lack of cognitive level to complete the task, More than six weeks of stroke. Total of 30 subjects with Hemiparesis were taken by convenience sampling. All the subjects were explained about their condition & mode of assessment

and written informed consent was obtained from them Subjects were taken up for the study after they fulfilled the inclusion criteria. Trunk Impairment Scale and Functional Independence Measure were assessed initially in the Hospital

Outcome measures were reassessed after four weeks of first assessment:

- Functional measures were assessed using **Functional Independence Measures** scale
- Gait velocity was assessed using **10 meter walk test** . Patients were asked to walk at their comfortable speed, then at their maximal safe speed.
- Balance was assessed by using the **Berg Balance Scale**

Statistics:

Table 1:- Comparison Of Functional Independence Measure Scores Initially And After Four Weeks

Fim	Mean	Std.deviation	T - test	Significance
Initial	78.50	13.333	15.652	.000
4 weeks	105.30	9.278		

There is a significant increase in FIM scores initially and after four weeks.

There is a statistically significant difference in FIM scores initially and after four weeks at **p <0.001**.

Table 2:- correlation analysis of trunk impairment scale with functional independence measure scores initially, after four weeks, berg balance scores and ten meter walk test.

	TIS	FIM-INITIAL	FIM-4WEEKS	BERG BALANCE TEST	10 M WALK TEST
TIS pearson correlation	1	.878**	.783**	.815**	-.865**
Significance		.000	.000	.000	.000
N	30	30	30	30	30

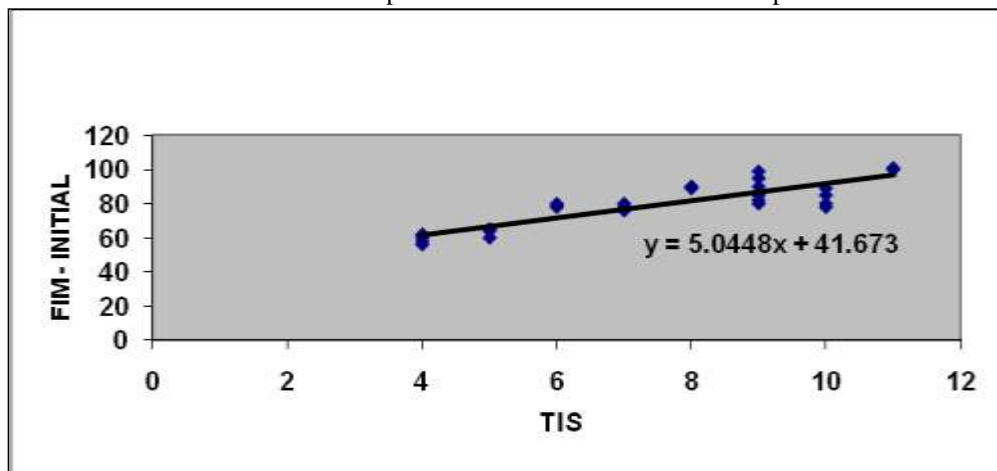
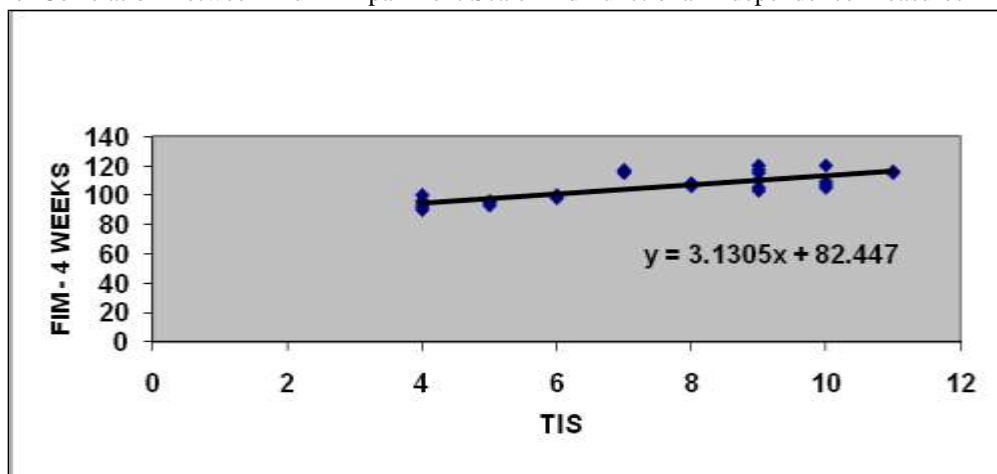
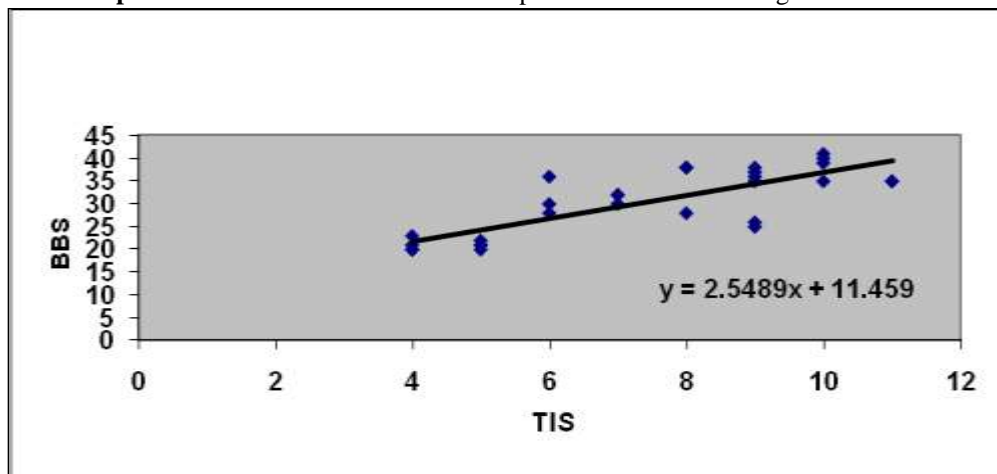
**** correlation is significant at the 0.01 level**

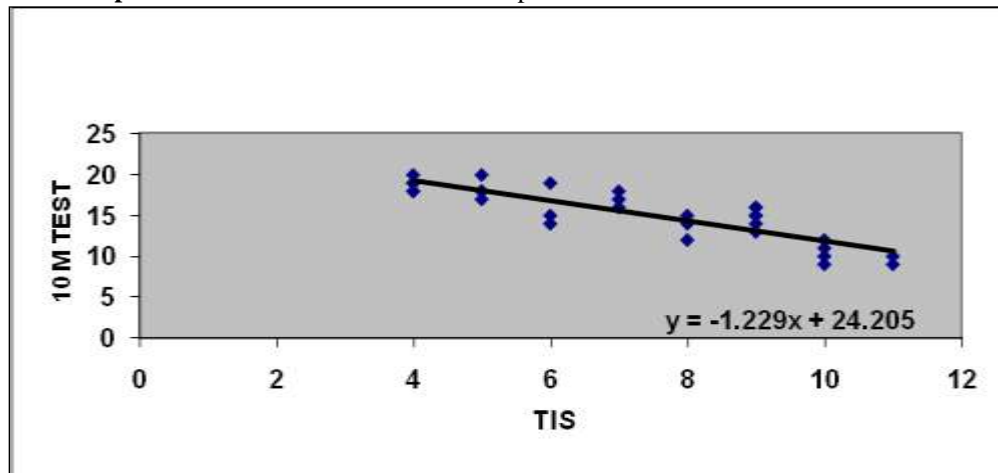
- TIS has a positive correlation with FIM scores initially and after four weeks .
- TIS has a positive correlation with Berg Balance Scores .
- TIS has a negative correlation with Ten Meter Walk Test.

Table 3:- Regression Analysis Of Trunk Impairment Scale With The Functional Independence Measure, Berg Balance Scale And 10 Meter Walk Test

	r ²	t – value	significance
Constant		0.177	.000
FIM initial	0.772	3.636	.420
FIM-4 weeks	0.614	2.923	.007
BBS	0.665	0.819	.420
10 M TEST	0.749	4.280	.000

r² ranged from **(0.61-0.77)**

Graph 1:- Correlation Between Trunk Impairment Scale And Functional Independence Measures – Initial**Graph 2:-** Correlation Between Trunk Impairment Scale And Functional Independence Measures – 4 Weeks**Graph 3:-** Correlation Between Trunk Impairment Scale And Berg Balance Scale

Graph 4:- Correlation Between Trunk Impairment Scale And 10 Meter Walk Test**Results:-**

The Table-1 reveals that Mean, standard deviation, **t** value and **p** value of Functional Independence Measure scores initially and after four weeks.

There is a significant increase in Functional Independence Measure scores initially and after four weeks.

There is a statistically significant difference in Functional Independence Measure scores initially and after four weeks at **p < 0.001**.

The Table-2 reveals that.

- Trunk Impairment Scale has positive correlation with Functional Independence Measure scores initially and after four weeks.
- Trunk Impairment Scale has a positive correlation with Berg Balance Scale scores .
- Trunk Impairment Scale has a negative correlation with Ten Meter Walk test.

The Table-3 reveals that r^2 measures the extent to which change in one variable can be explained by change in another variable r^2 ranged from (0.61-0.77)

Discussion:-

The aim of this study is to find Trunk Impairment Scale as a functional predictor in stroke. Most of the tools to assess trunk described start with tasks in supine position. The first described Trunk Impairment Scale used standardised sitting position throughout the assessment. **G.Verheyden, et al**; TIS is a new tool to evaluate static and dynamic sitting balance as well as co-ordination of trunk movement. The Trunk Impairment Scale has a sufficient reliability, internal consistency and validity for use in clinical practice and stroke research. The previous studies shows that trunk control test as a functional predictor in stroke so we decided to evaluate the trunk impairment scale as a functional predictor in stroke .

E. Duarte,et al, Most of the patients (89.3%) achieve sitting in a balanced position on the edge of the bed without assistance for a duration of 30 seconds .Trunk control appears to be an obvious pre requisite for the control of more complex behavioural skills. The identification of simple clinical predictors (eg. Trunk control) of stroke outcome is of the most practical value in clinical settings. Previous studies that have addressed the capacity of trunk motor assessment to predict functional independence in stroke patients. They assessed sitting balance only and they used Barthel Index rather than FIM to assess independence so we decided to find TIS as a functional outcome by using FIM.

N.Pollak, W.Rheault et al, investigated the reliability, validity, and appropriateness of the Functional Independence Measure (FIM) in stroke patients, Their findings suggested that with certain caveats, the FIM was useful as a

functional assessment instrument for patients who had a stroke, therefore we chose FIM as a functional outcome in sub acute stroke.

In this study, we found that there was a significant increase in Functional independence measure scores and after four weeks from first assessment. We observed that the correlation of Trunk impairment Scale with initial FIM was significantly higher than TIS with FIM after four weeks because TIS score is minimal FIM score also minimal good correlation. In our study TIS also had significantly positive correlation with Berg Balance Scale.

Suzuki et al; point out that balance and muscle strength in subacute stage stroke are predictors of walking speed in stroke patients. Our study showed the negative correlation between the TIS and 10 meter walk test after four weeks. A better trunk control after four weeks of first assessment might have been the reason for an improved walking speed.

The regression equation quantify correlation further by weighing the assessment variable by their relative importance predicting stroke outcome. r^2 measures the extent to which change in one variables can be explained by change in another for one month results r^2 ranged from (0.61-0.77).

We would like to point out the trunk impairment scale is a simple test that can be used to predict functional outcome in stroke.

Conclusion:-

Stroke is one of the leading causes of disability in the population and can significantly affect aspects of a person's physical, emotional, and social life. More than 80% of individuals with stroke experience hemiparesis. The trunk makes a significant contribution to most activities of daily living (ADL), and impairments can compromise participation in many of these essential and meaningful tasks.

Trunk Impairment Scale has a higher correlation with Functional Independence Measures, Berg Balance scale, Ten meter walk test.

We conclude that Trunk Impairment Scale correlation with some specific motor results such as balance, walking speed and Functional Independence Measures. Thus we come to conclusion that TIS is a functional predictor in stroke patients

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