Validity and Reliability of Prokin 252N (Tecnobody) Balance System for Assessment of Standing Balance in Individuals with Incomplete Spinal Cord Injury

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Abstract:

Background: Spinal cord injury (SCI) is a devastating condition that results in functional impairment and abrupt changes in the quality of the person's life.Prokin 252N system of Tecnobody was used to assess static and dynamic stability in subjects with stroke, MS,andacromegaly. Recovery of balance ability during standing is therefore of the primary and essential aims of rehabilitative programs in individuals with SCI.

Objective: To establish convergent, predictive validity and test-retest reliability of Prokin 252N for assessment of standing balance in subjects with incomplete spinal cord injury.

Design: Methodological study design

Method: Thirty-one individuals between 20-65 years of age with iSCIwere included in the study. Demographic characteristics of the cases were recorded including age, weight, height, and dominant extremity. Standing balance assessment evaluation of all volunteers was completed usingProkin 252N techno body balance system. Test-retest reliability was calculated using Intraclass correlation coefficients (ICC). Convergent and predictive validity was calculated using the spearman correlation coefficient.

Result: Based on the assessmentthe scores of BBS showed a moderate correlation with Limits of Stability (r = 0.570; p = 0.01), Ellipse Area Eye Open (r = -0.647; p= 0.000), Perimeter Eye Open (r = -0.493; P= 0.005), Standard Deviation Forward Backward Eye Open (r = -0.595; p=0.000), Standard Deviation Medio-Lateral Eye Open (r = 0.622; p= 0.000) and a weak correlation with Ellipse Area Eye Close (r = -0.394; p =0.0028). Perimeter Eye Close (r = -0.10; p =0.955), Standard Deviation Forward Backward Eye Close (r = -0.365; p =0.043),Standard Deviation Medio-Lateral Eye Close (r = -0.287; p =0.117).The scores of Limits of Stability showed a weak correlation with 10 MWT with (r = - 0.263; p = 0.153) for predictive validity. Test- retest reliability was found to be moderate to excellent (ICC= 0.64 - 0.93) for Prokin 252N standing balance done at a gap of 24 hours.

Conclusion: To the best of our knowledge, this study is the first to examine the measurement properties of Prokin 252N for assessment of balance in SCI individuals. Balance assessment using Prokin 252N is moderately valid and highly reliable. There was an excellent test re-test reliability which increases its usability and wide acceptance.

Keywords:Spinal Cord Injury, Prokin 252N, Balance assessment, convergent and predictive validity, test-retest reliability

Introduction:

Spinal Cord Injury (SCI) is a catastrophic condition that has an impact on a person, his or her family, and society is spinal cord injury (SCI)(1,2). In India, there are 15,000 cases of SCI on average every year, with a prevalence rate of 0.15 million (3). The World Health Organization (WHO) claims that due to rapid development and an increase in the number of automobiles, the prevalence of SCI is rising in emerging nations like India. Somatosensory abnormalities brought on by the injury typically show up the as poor balance, which increases the risk of falls. A high occurrence of falls has been reported among individuals with Spinal Cord Injury, with 34% to 75% of the studied samples reporting at least one fall. Wheelchair users typically fall during transfers, whereas ambulatory individuals fall while performing an upright activity like walking (4).

People with SCI may have alterations in sensation, muscle paralysis, and the presence of spasticity, which can impact postural control and balance in both standing and sitting (5–7). Effective balance regulation is crucial for preventing falls and depends on the combination of different sensory inputs and the body's interaction with the environment (4,8). One of the main issues after spinal cord injury is balance improvement. It interferes with daily activities like standing and walking. One of the requirements for establishing a rehabilitation program for people with SCI is balance assessment.

Maintaining, obtaining, or regaining a condition of stability while in any position or activity is required for balance or postural control (4). By integrating and regulating input from the somatosensory, visual, and vestibular systems as well as by the reflexive control of the limbs, balance is maintained. Balance issues are brought on by spinal cord injury (9).

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The berg balance scale (10), the functional reach test (11), and the timed up and go test (12) have been validated and proven to be reliable in SCI for assessing balance control. The Berg balance scale is the gold standard for balance assessment in SCI.

During quiet standing and dynamic activities, instrumented equipment like the platform is frequently employed to evaluate postural sway and weight-bearing symmetry (9). Studies on posturography have primarily used the stability index to measure body sway. The characteristics of postural stability from both static and dynamic aspects give a framework for describing patients' postural and balance instability, although very few researchers have attempted to do so (13).

TecnoBody was introduced in 1994 to restore function following an injury and maintain physical condition in the field of rehabilitation. Pro-kin system is a new type of visual feedback device with a computer and balance force platform. The limitations of balance detection in earlier studies are overcome by using this method to examine static and dynamic balance(13). The number of studies using the Prokin 252N system to study balance has significantly increased. Prior studies have examined the effects of Prokin on improving static, dynamic, and pelvic stability in junior badmintonplayers (14), balance deficit with opened or closed eyes in patients with multiple sclerosis (15), assessing sensory impairments in postural control in patients with parkinson'sdisease, multiple sclerosis and stroke(16), stabilometric measures for predictingfallsin parkinsondisease(19), comparisonofuprightbalanceinstroke, Parkinson andmultiple sclerosis (17), limits of stability test in the evaluation of dynamic balance among older adults(18).

In this study we have used Prokin 252N in order to check the reliability of its scores and validation has been done using the berg balance scale and predictive validity was found using the 10-meter walk test.

Materials and Methods:

A convenient sample of 31 patients was recruited from Indian Spinal Injury Centre, Vasant Kunj, New Delhi. The individuals included were both male and female aged between 20 years and 65 years, with traumatic or non-traumatic SCI, ASIA C and D, injury from level C5 to L1, 6 months and above the duration of the injury. Subjects able to able to stand for 30 seconds without assistance and also able to walk for 10m with or without assistance and were willing to give informed consent were included in the study. Individuals with musculoskeletal injury of the lower extremity, any other neurological condition and unstable medical condition, spasticity of grade 3 or more of lower limb muscles on modified ashworth scale that limits the participation, visual or auditory impairment that impacts on the ability to participate were excluded from the study. The study was approved by the Institutional Research Review Committee and the Institutional Ethics Committee (IEC) of the Indian Spinal Injury Centre, Vasant Kunj (ISIC/RP/2022/021), and CTRI registration was done (CTRI No. CTRI/2022/04/041765).

Procedure:

The Study was first permitted by the research review committee and ethical committee of the Indian Spinal Injuries Centre. A total of 31 subjects with incomplete spinal cord injury who met inclusion and exclusion criteria were given a detailed explanation about the purpose and method of doing the study demographic data was collected, and neurological evaluation with respect to ASIA grade, level of injury, age, and time since injury.

For test re-test, the first assessment of standing balance on Prokin 252N was carried out on Day 2 and the second assessment on the Prokin 252N was done on Day 3. For convergent validity, the berg balance scale was correlated with limits of stability test, ellipse area eye open, ellipse area eye close, perimeter eye open, perimeter eye close, standard deviation forward-backward eye open, standard deviation forward-backward eye close, standard deviation mediolateral eye open and standard deviation mediolateral eye close. For predictive validity, the limit of the stability test was correlated with the 10-meter walk test. The scores obtained on BBS and 10MWT, Prokin 252N were used to determine convergent validity, predictive validity, test re-test reliability, absolute reliability, and minimum detectable change (MDC).

Procedure for Prokin 252N:

Prion 252N system of Tecno Body used to assess static and dynamic stability is equipped with four load cells and a trunk sensor for complete and accurate stability assessment (14). It consists of a forced platform that assesses the postural sway off the center of pressure. First, the test was explained to the participants, and then the device was calibrated according to each participant's age, height, and body mass.

- For static stability, Compared Bipedal was performed, following which the eclipse area and perimeter were recorded.
- The limits of the stability test, a component of stability assessment, was also performed and recorded in percentage.
- Tecnobody machine has an in-built scale that categorizes the participants to either 'poor', 'normal', or 'sportsperson' depending on their assessment.

Compared Bipedal Test:

Postural stability in bipedal stance (BS) was assessed with participants standing barefoot on the platform in standardized positions according to the x-axis and y-axis and were asked to look straight at the computer screen and keep their arms at their sides. All participants completed two tests, 30 sec each in the eye open (EO) and closed (EC) positions respectively (19).

The ellipse areas indicating the overall postural stability (measured in mm^2), anterior-posterior sway (measured in mm^2), and medial-lateral sway (measured in mm^2) were recorded (19).

Limits of Stability Test:

LOS testing required the participants to place their feet parallel to each other at a distance of 10 cm (13). The participants had to lean and move the cursor on the computer screen quickly and accurately to eight targets, which were positioned at 45° intervals around the center and highlighted one by one (20). Participants were instructed to keep their bodies in a straight line and return to the center, followed by the next target displayed on the screen. The test was completed once all the eight targets were displayed (13).

The percentage of how many participants reached the highlighted eight targets was recorded (19). The limit of stability (LOS) test, a postural stability assessment component, evaluates the center of gravity's volitional control. The LOS test is essential because it provides predictable information regarding the possible risk of falling (20).

Berg Balance Scale:

The Berg Balance Scale is an objective determiner of a person's ability (or inability) to balance during a series of predetermined tasks safely (21). It consists of 14 items, each item ranked on a five-point ordinal scale of 0 to 4, where 0 indicates the lowest functional level and four the highest level of function and takes approximately 20 minutes to complete (21).

10-meter Walk Test:

In 10MWT, individuals are asked to walk with/without an assistive device, independently for 10 meters (32.8 feet). The intermediate 6 meters (19.7 feet) of acceleration and deceleration are recorded (10). Start the timing when the toe of the loading foot crosses the 2-meter mark. The timing should be stopped when the toes of the leading foot cross the 8-meter mark (10).

Procedure for testing Test-retest Reliability:

To establish the test-retest reliability of Prokin-252N the static and dynamic balance test was administered by the rater and scores were recorded. Then, after a period of 24hrs,the subject was re-assessed and was scored.

Procedure for Testing Convergent Validity:

To assess the Convergent validity of Prokin 252N, the correlation was calculated between the:

1. Ellipse Area scores of Stabilometric test and berg balance scores
2. Perimeter scores of Stabilometric test and berg balance scores
3. Limits of stability scores and berg balance scores
4. Stability index ap/ml scores of balance on both feet test and Berg Balance scores

Procedure for testing Absolute Reliability:

The SEM was chosen to test absolute reliability and was calculated as follows:

$$SEM = SD \times \sqrt{(1 - ICC)}$$

Where *SD* is the standard deviation. A high SEM indicates a high level of error and implies the non-producibility of the measurements.

Procedure for testing MDC:

The MDC at 95 % confidence was calculated to provide clinical interpretation, as follows:

$$MDC = SEM \times 1.96 \times \sqrt{2}$$

$$MDC = 2.77 \times SEM$$

Data Analysis:

The data was analyzed using SPSS version 26. The data was determined and checked for normal distribution. Assumptions of normality were met for the limits of the stability test. Therefore, its calculations of reliability and validity were based on a parametric test, and for the rest,of the other parameters non-parametric test was used.

Convergent Validity:

To assess the Convergent validity of Prokin 252N test outcomes, the Spearman Correlation coefficient between BBS and LOS was calculated. A correlation of < 0.4 were considered weak to fair, correlation of 0.4 – 0.75 were considered moderate and correlation > 0.75 were considered strong.

Predictive Validity:

To assess the predictive validity of Prokin 252N test outcome score, the Spearman correlation coefficient was calculated between LOS and 10 MWT scores. A correlation of < 0.4 were considered weak to fair, correlation of 0.4 – 0.75 were considered moderate and correlation > 0.75 were considered strong.

Test-Retest Reliability:

Test-Retest Reliability was assessed using Prokin 252N test outcomes obtained by rater 1 on days 1 and 2 at a gap of 24 hours.Test-Retest reliability was considered to be excellent for ICC > 0.8 and considered to be high for 0.6 – 0.8 and moderate for 0.4 – 0.6.
The limit of agreement (LOA) between scores of days 1 and day 2 was calculated using Bland and Altman plots. The plot consists of upper and lower limits that help in deciding (subjectively) whether the agreement between the scores taken on days 1 and 2 is acceptable or not.
Standard Error of Measurement (SEM) values were also obtained for the scores of days 1 and 2 to test absolute reliability.Minimum Detectable Change (MDC) between the scores of days 1 and day 2 was also obtained.

Results:
A total of 31 subjects were recruited from 35 screened patients. The reason for not participating was (a) inability to stand longer, (b) unavailable, and (c) not being interested.

A total of 31 subjects participated in the study who met the inclusion criteria. The subjects recruited were from the age group of 20– 65 years with a mean of 41.23 ± 17.27. Out of 31 subjects, 22 were male and 9 were female. The no. of male patients was high (n = 22) comprising 70.97 % of the data (Table 1).

The time duration since SCI varied between 6 to 132 months with a mean of 28.90 ± 30.25 months. Subjects showed the varying neurological level of injury from C5 to L1.Subject had an ASI grading of C (n= 11), D (n = 20). Percentage distribution of ASIA scores in subjects with spinal cord injury revealed maximum (64.52) belongs to ASIA D (Table 1).

Table 1: Descriptive Details of Sample (n=31)

Variables		Mean ± SD	
Age		41.23 ± 17.27	
Time Since Injury		28.9 ± 30.25	
Gender		Frequency	Percentage (%)
	Male	22	70.97
	Female	9	29.03
ASIA			
	C	11	35.48
	D	20	64.52
Level of Injury			
	C5	6	19.35
	T4	3	9.68
	T8	1	3.23
	T10	9	29.03
	T11	4	12.90
	T12	1	3.23
	L1	7	22.58

n= sample size, SD= Standard Deviation, ASIA= American Spinal Injury Association

Convergent Validity:
The scores of BBS showed a moderate correlation with Limits of Stability (r = 0.570; p = 0.01), Ellipse Area Eye Open (r = -0.647; p= 0.000), Perimeter Eye Open (r = -0.493; P= 0.005), Standard Deviation Forward Backward Eye Open (r = -0.595; p=0.000), Standard Deviation Medio-Lateral Eye Open (r = 0.622; p= 0.000) (Table 2).
The scores of Berg Balance Score showed a weak correlation with Ellipse Area Eye Close (r = -0.394; p =0.0028). Perimeter Eye Close (r = -0.10; p =0.955), Standard Deviation Forward Backward Eye Close (r = -0.365; p =0.043),Standard Deviation Medio-Lateral Eye Close (r = -0.287; p =0.117) (Table 2).

Predictive Validity:
The scores of Limits of Stability showed a weak correlation with 10 MWT with r = - 0.263; p = 0.153.

Table 2: Validity Analysis

Study Parameters	Correlation Coefficient	P-value
LOS with BBS	0.57	0.001
EAEO with BBS	-0.647	0.000

EAEC with BBS	-0.394	0.028
PEO with BBS	-0.493	0.005
PEC with BBS	-0.10	0.955
SDFBEO with BBS	-0.595	0.000
SDFBEC with BBS	-0.365	0.043
SDMLEO with BBS	0.622	0.000
SDMLEC with BBS	-0.287	0.117
10MWT with LOS	-0.263	0.153

LOS- Limits of Stability Test, BBS- Berg Balance Score, EAEO- Ellipse Area Eye Open, EAEC- Ellipse Area Eye Close, PEO- Perimeter Eye Open, PEC- Perimeter Eye Close, SDFBEO- Standard Deviation Forward Backward Eye Open, SDFBEC- Standard Deviation Forward Backward Eye Close, SDMLEO- Standard Deviation Medio-Lateral Eye Open, SDMLEC- Standard Deviation Medio-Lateral Eye Close

Test-retest Reliability:

Limits of Stability Test:

The ICC was found to be acceptable (ICC = 0.922) (Table 3). The Bland – Altman plot revealed that only one data point lies outside the - 1.96 SD stating a high agreement. (Figure 1) The values of SEM and MDC were found to be 3.28 & 9.08. (Table 3)

Ellipse Area Eye Open:

The ICC was found to be moderate (ICC = 0.933). (Table 3) The Bland – Altman plot revealed that only one data point lies outside the +1.96SD stating a high agreement. (Figure 2) The values of SEM and MDC were found to be 7.82 & 21.66. (Table 3)

Ellipse Area Eye Close:

The ICC was found to be moderate (ICC = 0.800). (Table 3) The Bland – Altman plot revealed that only one data point lies outside the -1.96SD stating a high agreement. (Figure 3) The values of SEM and MDC were found to be 10.29 & 28.5. (Table 3)

Perimeter Eye Open:

The ICC was found to be moderate (ICC = 0.721). (Table 3) The Bland – Altman plot revealed that two data points lies outside the +1.96SD stating a high agreement. (Figure 4)The values of SEM and MDC were found to be 11.52 & 31.91. (Table 3)

Perimeter Eye Close:

The ICC was found to be moderate (ICC = 0.697). (Table 3) The Bland – Altman plot revealed that only one data point lies outside the -1.96SD stating a high agreement. (Figure 5)The values of SEM and MDC were found to be 9.86 & 27.31. (Table 3)

Standard Deviation Forward Backward Eye Open:

The ICC was found to be moderate (ICC = 0.907). (Table 3) The Bland – Altman plot revealed that only one data point lies outside the +1.96SD statinga high agreement. (Figure 6)The values of SEM and MDC were found to be 4.18 & 11.57. (Table 3)

Standard Deviation Forward Backward Eye Close:

The ICC was found to be moderate (ICC = 0.845). (Table 3)The Bland – Altman plot revealed that only one data point lies outside the +1.96SD stating a high agreement. (Figure 7)The values of SEM and MDC were found to be 4.87 & 13.49. (Table 3)

Parameters	Day 1 (Mean±SD)	Day 2 (Mean±SD)	p-value	ICC	SEM
LOS	49.17±16.23	50.93±15.08	0.00	0.922	3.28
EAEO	1662.42±1757.66	1746.29±1665.15	0.00	0.933	7.82
EAEC	3596.30±2406.67	3964.99±3300.02	0.00	0.800	10.29
PEO	843.59±453.82	847.29±369.22	0.00	0.721	11.52
PEC	1238.19±617.42	1251.09±668.12	0.00	0.697	9.86
SDFBEO	12.12±13.70	11.99±10.11	0.00	0.907	4.18
SDFBEC	16.56±12.37	16.29±9.52	0.00	0.845	4.87
SDMLEO	7.99±4.53	9.59±6.96	0.00	0.793	0.45
SDMLEC	13.48±8.47	14.45±7.21	0.00	0.641	5.07

Table 3: Intraclass Correlation Coefficient for test-retest reliability

LOS- Limits of Stability Test, BBS- Berg Balance Score, EAEO- Ellipse Area Eye Open, EAEC- Ellipse Area Eye Close, PEO- Perimeter Eye Open, PEC- Perimeter Eye Close, SDFBEO- Standard Deviation Forward Backward Eye Open, SDFBEC- Standard Deviation Forward Backward Eye Close, SDMLEO- Standard Deviation Medio-Lateral Eye Open, SDMLEC- Standard Deviation Medio-Lateral Eye Close

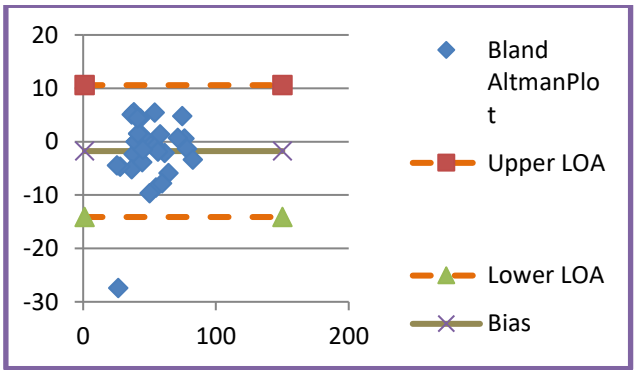


Figure 1: The Bland – Altman plot depicting LOA between Limits of Stability score for test-retest reliability

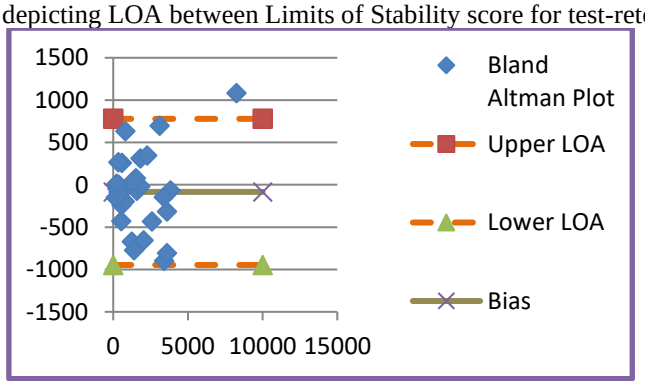


Figure2: The Bland – Altman plot depicting LOA between Ellipse Area Eye Open score for test-retest reliability

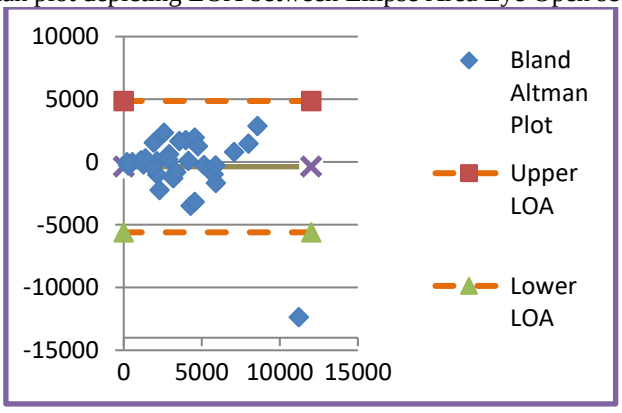


Figure3: The Bland – Altman plot depicting LOA between Ellipse Area Eye Close score for test-retest reliability

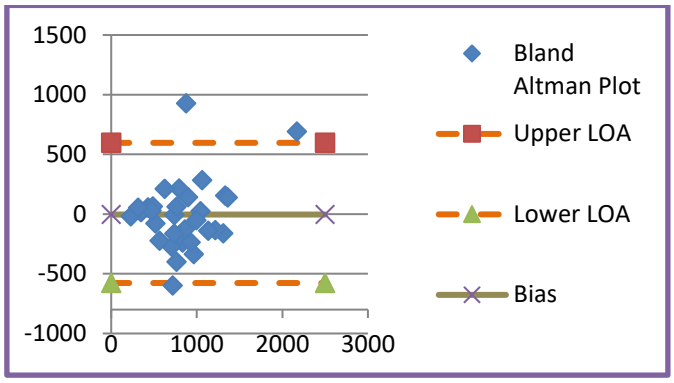
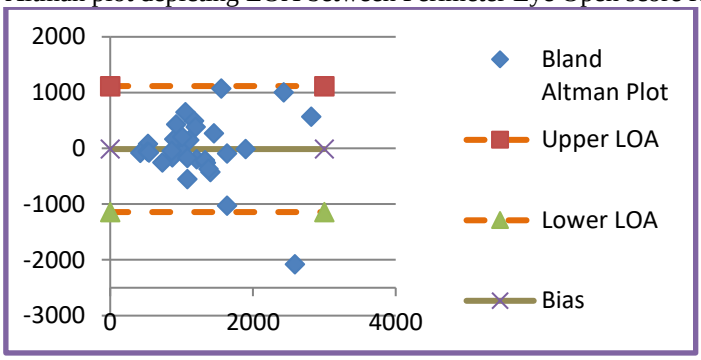


Figure 4: The Bland – Altman plot depicting LOA between Perimeter Eye Open score for test-retest reliability



Graph 5: The Bland – Altman plot depicting LOA between Perimeter Eye Close score for test-retest reliability

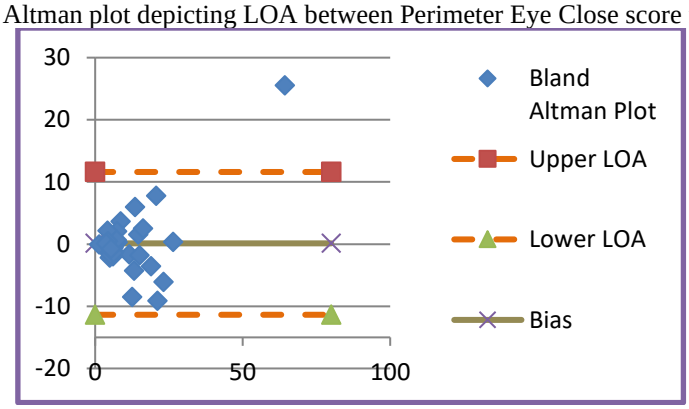


Figure 6: The Bland – Altman plot depicting LOA between Standard Deviation Forward-Backward Eye Open score for test-retest reliability

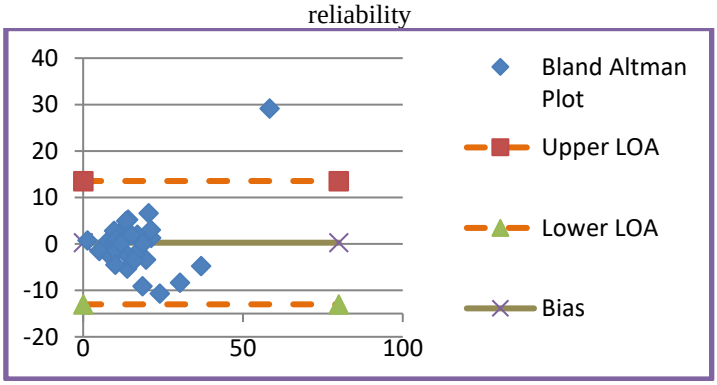


Figure 7: The Bland – Altman plot depicting LOA between Standard Deviation Forward-Backward Eye Close score for test-retest reliability

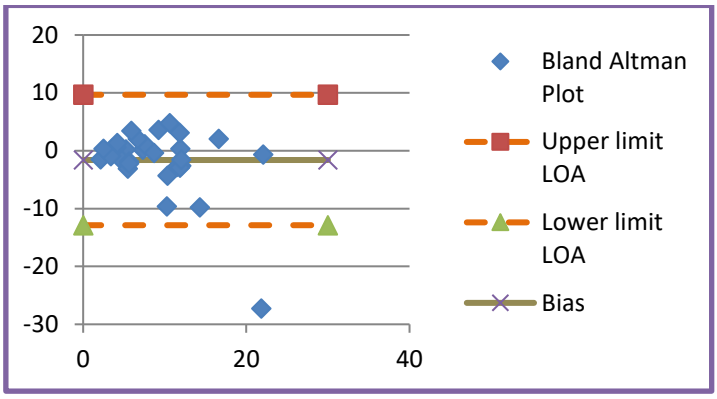


Figure 8: The Bland – Altman plot depicting LOA between Standard Deviation Medio-Lateral Eye Open score for test-retest reliability

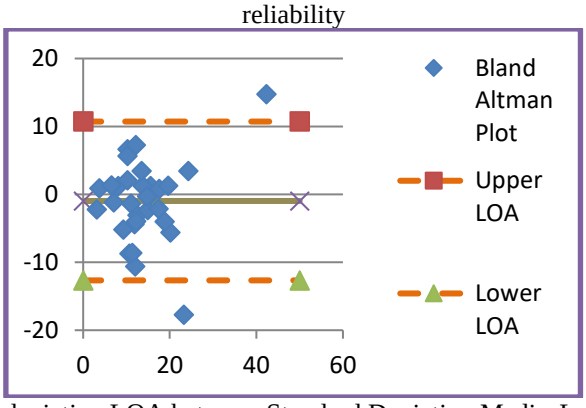


Figure 9: The Bland – Altman plot depicting LOA between Standard Deviation Medio-Lateral Eye Close score for test-retest reliability

Discussion:

The objective of this study was to find validity and reliability analysis of the Prokin 252N techno body balance system and to check whether it is valid and reliable in individuals with iSCI. In this study, we examined the correlation between berg balance score and limits of stability, ellipse area, perimeter, standard deviation ap/ml in eye open and eye close. A positive correlation was obtained for limits of stability test, standard deviation mediolateral eye open, and negative correlation was obtained for ellipse area eye open, perimeter eye open,standard deviation forward-backward eye open, ellipse area eye close,perimeter eye close, standard deviation forward-backward eye close,standard deviation mediolateral eye close. A negative correlation suggests that the participants who reported the most problematic effect of balance impairment (most negative scores) also tend to report greater severity, impact, and frequency of balance impairment.

In some previous studies, we found the same results. A study by Ga Eun Lee, et.al. (2012) reported a moderate correlation between fall index and synchronization index with berg balance score, time up and go test (r= 0.60-0.70) (22). Even if patients were standing with eyes open, postural sway was induced and transmitted to the foot plat, causing poor stability and uneven weight distribution. The patients were more dependent on visual information to compensate for somatosensory impairment. Therefore, patients' increased visual restriction decreased their general stability (22).

In addition, uneven weight distribution was more aggravated in standing with eyes closed than standing with eyes open. In other words, stability worsened when visual compensation was insufficient, and their center of gravity moved posteriorly (22).

Xia-Hua Liu (2020) among SCA3 concluded that there is a moderate correlation between static standing balance parameters of Prokin and SARA scores. The study also depicted the function of visual afference affects postural control in SCA3 patients; these patients have predominant instability in the AP plane and prefer performing ML direction postural adjustments; the distribution of the center of gravity in SCA3 patients is asymmetrical, and they have a worse ability to shift the weight forward; notably, SCA3 patients have a decreased proprioception function, mainly in the knee and ankle joints(23).

The predictive validity has been established in this study by evaluating correlation between 10MWT and limits of stability test. This this study, we found weak correlation between these two measures. A study by Monica Busse (2014) et.al found 10MWT and 6MWT were not were significant predictors of the Functional Assessment Scale in individuals with Huntington's Disease(24). These tests may be measuring a unique construct related to walking ability. Walking is an important functional skill that may not be sufficiently measured in current disease-specific scales, such as the Total Motor Score, which is more heavily weighted towards involuntary movements and other varied constructs(24).

Jau-Hong Lin (2010) et.al, found moderate correlation (r= 0.75) among the scores of the Dynamic Gait Index, the 4-item Dynamic Gait Index, and the Functional Gait Assessment indicating that the 3 measures have satisfactory predictive validity on activities of daily living function. These findings further confirm the predictive validity and clinical use of the 3 measures(25).
Lower extremity was crucial to walk properly. It had significantly correlated with predictive parameters of ambulation. It has been one of the prime factors influencing postural balance. The limit of stability used to predict a possibility to ambulate, and measure independence of people with incomplete spinal cord injuries. Past studies have reported that postural instability could cause a dependency of daily activities, and a deterioration in the quality of life (22).

Test re-test reliability of Prokin 252N static balance test parameters was established (ICC=0.70- 0.92) in individuals with incomplete spinal cord injury. D Cattaneo et.al (2008), found the same results similar to our study. Moderate to excellent correlation of static balance test on technobody platform (ICC= 0.77-0.93) in individuals with multiple sclerosis (26). One possible explanation for these results could be the quality of information that arrives to the CNS. Neural signals are inherently noisy, thus limiting the reliability of information (27). Reliability is further limited by the precision of the sensory receptors (28).
Marlene Mauch&XaverKälin (2013) concluded for the intra- as well as the inter-day reliability significant differences for the perimeter and the ellipse between the respective sessions were found, indicating a better stability(29). The Bland-Altman-Plot illustrates the bias and agreement of the test-retest situation. The next step is the interpretation of the limits of agreement. Some researchers such as DeJong et al. (1996) have concluded acceptable measurement error by observing that only a few of the test-retest differences fall outside the 95% limits of agreement(30). In our results only 1-2 subjects out of 31 are beyond these limits for all the observed variables indicating good reliability of the measurement instrument. Muehlbauer et al. (2010) showed similar results with even a slightly wider range of the limits of agreement in the test-retest variability declaring an excellent intra- and intersession reliability(31).

Atkinson et al. 1998 who postulate to interpret the limits regarding the practical use. In the recent study the limits show a wide range for both intra- and inter-day differences, which have a clear effect for the interpretation of the results. Muehlbauer et al. 2010 showed similar results with even a slightly wider range of the limits of agreement in the test-retest variability declaring an excellent intra- and intersession reliability. That study can be directly compared to the recent one since testing procedures were completely adapted.

Balance impairment is common among iSCI population. The purpose of this study was to find test-retest reliability and validity of Prokin 252N in measuring standing balance in individuals with Spinal Cord Injury. As Spinal Cord Injury individuals prioritize restoration of standing for minimizing their dependency over others for performing daily living tasks. The evaluation of balance function is crucial aspect of rehabilitation in individuals with Spinal Cord Injury. The Prokin 252N is an innovative tool that can provide clinicians a valid means to objectively quantify balance assessment on the same tool which is already been used for balance training.

One limitation is the study results are limited to Spinal Cord Injury population and results cannot be generalized to other population. Only convergent and predictive validity were assessed. More studies would be required for other psychometric properties. Static balance was established, dynamic balance could not be determined in this test. Furthermore, our result suggests to extend the validity of this tool can be established in other populations. More software can be designed for measuring fall index, postural sway etc for Prokin 252N.Normative values of standing balance can be established in Spinal Cord Injury using Prokin 252N.

Conclusion:
This study showed that Prokin 252N has moderate validity and an excellent test- retest reliability. This study also showed strong correlation across a period of time thus making it a reliable tool. Thus, the result of the data analysis of the study justified the hypothesis.

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