SHORT REPORT

Intra rater reliability of Y balance test in medical students

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Abstract

The cross-sectional study was planned to assess the Y-balance test's intra-rater reliability among a sample of 59 medical students. The subjects took six trials under supervision, and the reliability of the results improved, with intra-class correlation values >0.75, indicating high reliability. Though the study had a cross-sectional design, it provided insightful data for focussed assessment. The Y-balance test was found to be an easy and reliable technique for evaluating dynamic balance.

Keywords: Balance, Muscle strength, Reliability, Intra-rater reliability, Y-balance test.

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Introduction

For those who engage in physical exercise, dynamic equilibrium is regarded as an important domain because balance problems have been studied as a predictor of lower extremity injury and fall.[1]

Dynamic balance assessment is frequently utilized to track improvement and make return-to-play decisions during the rehabilitation process. The development of precise evaluation methods is necessary given the clinical significance of dynamic balance for injury prediction, prevention, and decision-making. The star excursion balance test (SEBT) and the lower quarter Y-balance test (YBT) are two of the techniques that are most commonly used to assess the dynamic balance of the lower limb.[2]

In athletes, it is necessary to perform a lower extremity dynamic neuromuscular control test to identify individuals who are more likely to sustain an injury, to track any changes that could follow an intervention, and to evaluate athletes' readiness to return to competition. It can be used to confirm the rehabilitation of motor control deficit after an injury. Owing to the importance of balance, the assessment test has to be authentic and easy to perform in order to be beneficial in a sporting situation.[3]

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The YBT has demonstrated its validity and reliability as a technique for predicting lower limb injuries.[4,5] Furthermore, the test is budget-friendly, utilising common equipment. It evaluates various aspects, including strength, flexibility and stability. However, it is crucial to note that the YBT cannot establish cause and effect related to complex injuries.[6]

The ability of a test to consistently measure an outcome is referred to as reliability. Test scores must be consistent with unpredictable fluctuation reduced to the greatest extent.[7]

The current study was planned to assess YBT's intra-rater reliability among a sample of medical students. This assessment involved the measurement of dynamic balance and lower extremity strength. Notably, the test was administered on two separate occasions by the same rater, ensuring rigorous evaluation.

Methods and Results

This cross-sectional study was conducted in 2022 at the Akhtar Saeed College of Rehabilitation Sciences, Lahore, Pakistan, and comprised 59 medical students. The sample size was calculated using the intra-class correlation coefficient (ICC) hypothesis testing online calculator[8] with significance level 0.05, power 80%, number of raters per repetition per subject 2, minimum acceptable reliability 0.70, expected reliability 0.85, and expected dropout ratio 10%. The sample was raised using convenience sampling technique from among those aged 18-35 years and did not report having lower extremity or spinal discomfort. Those having any psychiatric issue or any disorder preventing them from working or exercising in the preceding 6 months were excluded.

After approval from the institutional ethics review committee and informed consent, the participants were assessed six times by a therapist using lower quadrant YBT by reaching in anterior, postero-lateral and postero-medial directions to evaluate the participants' kinetic balance and lower extremity strength.

The ICC value consistently exceeded 0.75 in all directions for the dominant side, ranging from 0.614 to 0.888 for both for dominant and non-dominant sides (Tables 1-2), demonstrating fair to outstanding reliability.

Table-1: Intra-class correlation coefficient values of the dominant side.

		Mean±SD	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
				Lower Bound	Upper Bound	Value	df1	df2	*p*-value
Dominant Side	Anterior	80.450 ± 28.721	0.888	0.820	0.931	16.839	59	60	<0.001
	Posterolateral	63.170±27.359	0.854	0.786	0.910	12.734	59	60	<0.001
	Posteromedial	54.934±28.086	0.860	0.777	0.914	13.302	59	60	<0.001
	Composite	73.852±23.352	0.888	0.901	0.964	16.826	59	60	<0.001

Table-1: Intra-class correlation coefficient of the non-dominant side.

		Mean±SD	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0			
				Lower Bound	Upper Bound	Value	df1	df2	*p*-value
Non Dominant Side	Anterior	80.391±28.671	0.888	0.820	0.931	16.839	59	60	<0.001
	Posterolateral	61.381±27.523	0.833	0.811	0.928	16.024	59	60	<0.001
	Posteromedial	54.588±27.337	0.808	0.699	0.881	9.423	59	60	<0.001
	Composite	76.799±23.391	0.614	0.430	0.750	4.183	59	60	<0.001

Discussion

For dominant and non-dominant sides, the current study indicated good reliability in all directions. In a study, the non-dominant composite mean only demonstrated moderate reliability.[9]

In a 2019 study, the YBT had a lowest detectable change of 0.05 and strong ICC value of 0.95 among older individuals. The test's reliability was confirmed by the study's recruitment of participants using a variety of methods.[10]

Using normalised measurements for lower leg length, a study evaluated the reliability of YBT in 2022 among runners with intellectual disability. The ICC values ranged from 0.76 to 0.87, which supported the test's validity,[11]

Using YBT to measure performance differences among asymptomatic people, a 2020 study[12] observed excellent reliability.

Conclusion

The YBT for lower extremity exhibited high consistency in repeated measurements by the same rater for both the maximum and average of 3 attempts. When the average of 3 reach trials was calculated from two sets of measurements, the measurement error reduced, leading to improved reliability in the intra-rater test-retest assessment.

Disclaimer: The text is based on an academic thesis.

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Author Contribution:
MMG: Concept, design, data acquisition, analysis and interpretation.
SS: Data interpretation, drafting and revision.
MB: Data collection and design.
MMA, MWA: Final approval.
MS: Data collection.