

LUMBAR RANGE OF MOTION: RELIABILITY BETWEEN SCHOBER'S TEST & MODIFIED SCHOBER'S TEST

AMPLITUDINEA DE MIȘCARE A COLOANEI LOMBARE: COMPATIBILITATEA DINTRE TESTUL SCHOBER & TESTUL SCHOBER MODIFICAT

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Keywords: lumbar spine, range of motion, assessment Schober's Test, modified Schober's Test, reliability

Cuvinte cheie: coloana lombară, amplitudine de mișcare, evaluare, testul Schober, testul Schober modificat, fiabilitate

Abstract

Background. Lumbar Spine is one of the most commonly affected segment of the spine due to numerous etiologica factors. Its accurate assessment importantly including Lumbar ROM is essential for evaluation of spina functions; seek appropriate treatment and monitor patient progress. Schober's test is the most widely used and universal test for measuring lumbar sagittal ranges. However, it was modified on observing the significant difference in the movement of the skin with respect to the underneath spinous process. Validity of these tests was established by radiography, but reliability was not confirmed.

Aim. This project was, thus, undertaken to establish the reliability between two tests – Schober's and Modified Schober's, in healthy individuals.

Method and Material. 100 healthy subjects between 15-25 yrs of age were selected randomly. Hamstring tightness of each was measured followed by recording of Schober and modified Schober's test. Reliability was then calculated using the correlation coefficient. Materials used include measuring tape and pen.

Result. It was found that in both males and females, mild to moderate hamstring tightness was noticed. The calculated correlation coefficient for flexion, as well as extension in the subjects, indicated high.

Conclusion. We conclude that both the tests – Schober's and Modified Schober's are highly reliable for the measurement of lumbar range of motion in healthy individual. *Key messages.* Lumbar range of motion (ROM), is often used to evaluate spinal function, select appropriate treatment & monitor patient's progress. There are different methods of assessment like inclinometers, goniometry, etc. Amongst others, both Schober's test & Modified Schober's test are widely used and reliable methods for evaluation of Lumbar spine.

Rezumat

Introducere. Zona lombară este una dintre cele mai afectate segmente ale coloanei, datorită factorilor etiologici multipli. Evaluarea acurată, incluzând amplitudinea lombară de mișcare este esențială pentru funcția spinală, tratamentul adecvat și monitorizarea progresului pacientului. Testul Schober este cel mai folosit pentru măsurarea amplitudinii lombare sagitale. Acesta a fost modificat pentru a observa diferențele semnificative dintre mișcarea tegumentului față de procesele spinose. Validitatea acestor teste s-a stabilit prin radiografie, dar fiabilitatea nu s-a confirmat încă.

Scop. Scopul acestui studiu este de a stabili fiabilitatea celor două teste – testul Schober și testul Schober modificat, la pacienții sănătoși.

Material și metodă. 100 de subiecți sănătoși cu vârste între 15-25 de ani au fost selectați aleator. S-a evaluat scurtarea ischiogambierilor, urmată de testul Schober și testul Schober modificat. S-a calculat fiabilitatea folosind coeficientul de corelație. Materialele folosite includ banda de măsurat și pix.

Rezultate. Atât la bărbați, cât și la femei, s-a constatat scurtarea moderată a ischiobambierilor. Coeficientul de corelație pentru flexie și extensie a fost mare.

Concluzii. Se poate afirma că ambele teste – testul Schober și testul Schober modificat prezintă o mare fiabilitate ca mijloc de măsurare a amplitudinii lombare de mișcare, la indivizii sănătoși. *Mesaj cheie:* amplitudinea lombară de mișcare (ROM), este des folosită pentru evaluarea funcției spinale, selectarea tratamentului adecvat & monitorizarea progresului pacientului. Se mai folosesc teste precum inclinometru, goniometru, etc. Testele Schober & Schober modificat sunt folosite la scară largă în evaluarea funcției coloanei lombare.

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Introduction

The adult vertebral column is a segmented, jointed, flexible rod. It supports the load of the body in the upright posture and protects the spinal cord and spinal nerves that allows considerable flexibility. It also acts as a shock absorber and serves as the axial support for the body. [1]

LUMBAR SPINE – consists of 5 lumbar vertebra with the fifth lumbar vertebra structurally adapted for articulation with the sacrum. Each consist of a body to bear weight, arches (pedicles, laminae) to protect neural elements and processes (zygapophyseal articular process, transverse process, spinous process) as outriggers to increase the efficiency of muscle action. The lumbosacral articulation forms the lumbosacral angle, which maintains the lordotic curve. [3]

EFFECTS OF SAGITTAL MOVEMENTS ON LUMBAR SPINE – a functional unit of the spine consists of 2 adjacent vertebrae, intervening intervertebral disc and the soft tissues that secure them. Flexion and extension are sagittal planes motions. Movement is initiated by muscular action exerting its traction effect on the functional units, which move individually and thus, move the entire spine. [4] Lumbar flexion occurs with reversal of the static lumbar lordosis and more at the L₅ – S₁ junction. [2,3,4]

Assessment

The basis of any successful treatment program is an ordered subjective and objective assessment of the problem. A thorough assessment will not only help the therapist reach an accurate diagnosis but also indicate the types of treatment that may be used in rehabilitation. (5) With the assessment of the active movement of the lumbar spine, it is of vital importance to look at the quality, as well as a range of movement. [6, 7,8] Unlike the peripheral joints, the assessment of spine is tough due to the difficulty in palpating the body's landmarks on account of excessive soft tissue, the variations in normal curvature of the spine and the presence of hip motion that may confound the spinal measurement [9]. Also, the range of flexion and extension is maximal between L4 & L5 and decreases progressively from lumbar to the thoracic region and from lower lumbar to upper lumbar level. [10]

Of the many different methods used for assessment, Schober's test [14] is the most widely used and universally accepted. Moreover, the test is repeatable and hence can be used for assessment of prognosis [15]

However Macrae and Wright modified the original Schober's method. It was based on the observation that on forward flexion, both the skin marks tend to move superiorly relative to the spinous process and the skin is more firmly tethered at a point 5cm, lower on the sacrum. The validity of this new method was established by the above authors but; reliability was not confirmed. [16]

Reliability – is the consistency or repeatability of movements, that is, the degree to which measurements are error free and the degree to which repeated movements would agree [18]. Therapists regularly perform various measurements. Reliability testing is usually performed to assess

- Instrumental reliability – for a measurement device
 - Rater reliability – for researcher, observer, etc. administering the measurement device
 - Response reliability – for the variable being measured [19]

Aim

To assess the reliability of Schober's & Modified Schober's test for assessment of Lumbar Spine Range of motion

Objectives

1. To perform Schober's test & record the readings
2. To perform Modified Schober's test & record the readings
3. To assess the reliability of the above tests

Materials and Methods

Study design: Cross-sectional Study.

Study duration: 3 months.

Place of study: Public Sector Hospital (Lokmanya Tilak Municipal Medical College and General Hospital), Mumbai, India.

Materials used: Measuring tape and pen.

Methodology

A total of 100 healthy subjects between the age group of 15 & 25 years participated in the study. The Institutional Ethics Committee approved the study, and an informed consent it obtained from all the subjects.

Inclusion Criteria

- ✓ Males and Females between 15 & 25 years of age

Exclusion Criteria

- ✓ low back pain
- ✓ severe hamstring tightness
- ✓ scoliosis in any region of the spine
- ✓ history of any surgeries in the low back
- ✓ pain in the hip, knee or ankle joint.
- ✓ sacroiliac dysfunction or sacroiliac joint pain.

Procedure

Each subject was asked to lie supine, and the examiner assessed hamstring tightness.

Subjects with severe tightness are excluded from the study. The subject was then asked to stand erect, and Schober's Test and Modified Schober's Test were carried out in the following way:

Schober's Test: This test was originally described by Schober. [14]

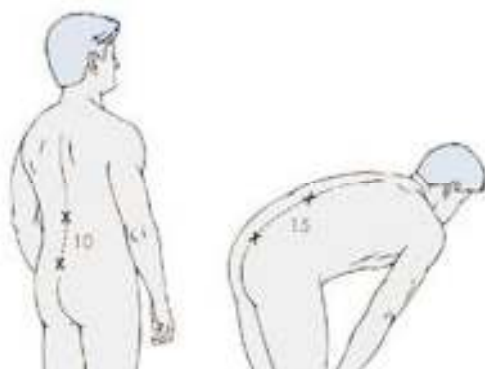


Fig. 1 Schober's Test [14]

The examiner first palpated the posterior superior iliac spine (PSIS) that corresponds to the second sacral vertebra. With this as a reference point, the examiner palpated and marked the

lumbosacral junction. Another point 10 cm superior to this point was marked. The subject was then instructed to bend forward as far as possible keeping the knees straight throughout the entire movement. When the subject had completed maximum trunk flexion, the increase in the distance between two markings was measured and recorded, and the subject was instructed to return to the upright position. Every subject performed three repetitions and for each repetition, the initial distance was subtracted from the final distance. The normal values for Schober's test for Flexion range from 3cm to 5cm.

For the extension using Schober's Test, the subject was asked to hyperextend from the lumbar spine, and a decrease in the distance between the two markings was measured and recorded.

Modified Schober's Test:

The original Schober's test was modified by Macrae & Wright. [15,16]

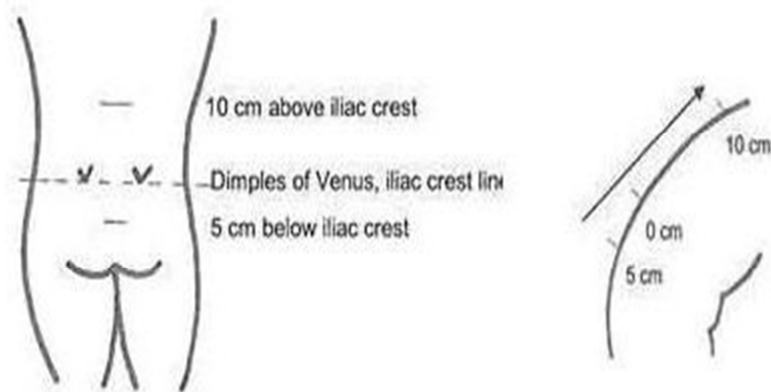


Fig 2. Modified Schober's Test ^[14]

Marking a point 10 cm above lumbosacral junction and another point 5cm below the lumbosacral junction modified the test. Now these markings with a distance of 15cm were taken for reference. The subject then had to perform lumbar flexion and extension, in the same way as was performed in Schober's test. Like the Schober's test, each subject performed three repetitions for flexion and extension movements for modified Schober's test, and the difference between the two markings before and after the movement was obtained. The subject was allowed a rest period of 1 minute after each repetition to prevent fatigability.

Statistical analysis was done using Pearson's correlation coefficient (r value) to assess the test-retest reliability of the two testing methods.

Results

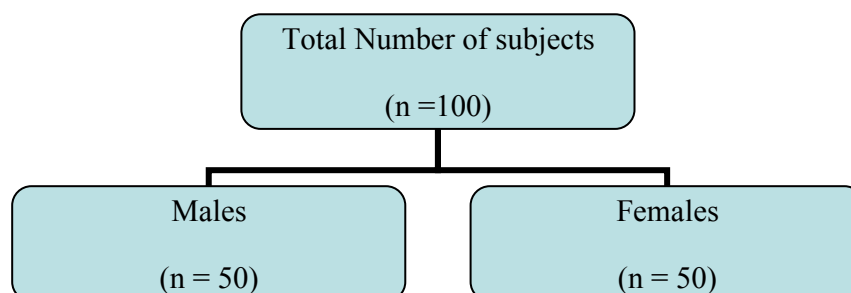
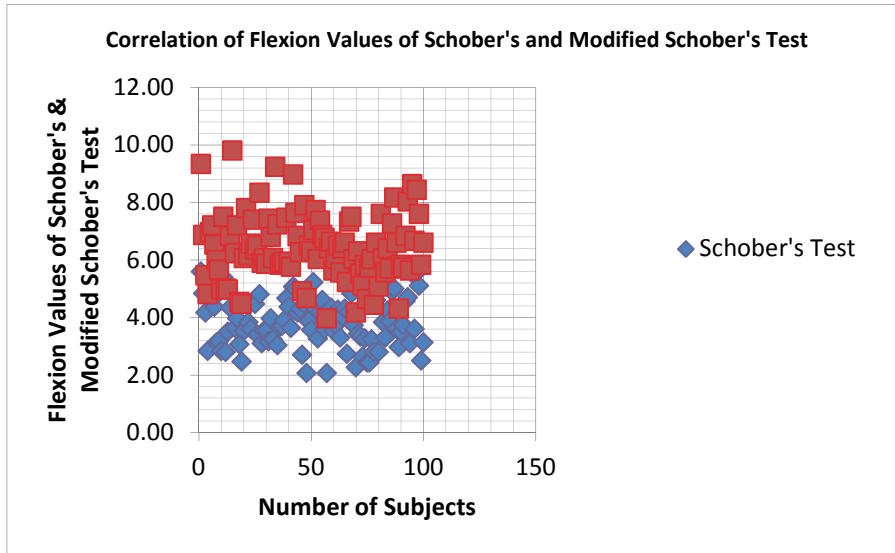


Fig 3. Characteristics of the subjects

Table 2: Correlation of Lumbar Flexion between Schober’s Test and Modified Schober’s Test

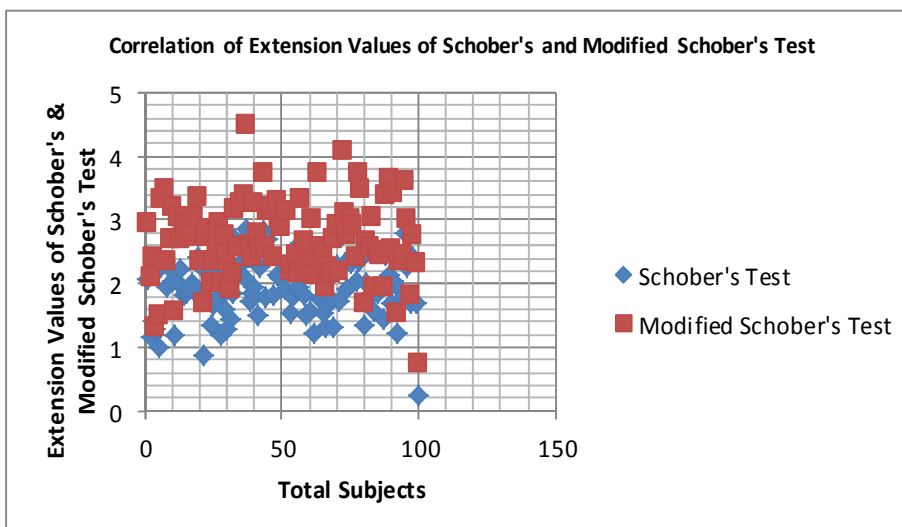
Test	Average Flexion (x + SD)
Schober’s Test	3.9 +- 0.89
Modified Schober’s Test	6.4+-1.15
r value	0.87
p-value	<0.00001



Graph 2: Correlation of Lumbar Flexion between Schober’s Test and Modified Schober’s Test

Table 3: Correlation of Lumbar Extension between Schober’s Test and Modified Schober’s Test

Test	Average Extension (x±SD)
Schober’s Test	1.90+-0.45
Modified Schober’s Test	2.68+-0.61
r value	0.84
p-value	<0.00001



Graph 3: Correlation of Lumbar Extension between Schober’s Test and Modified Schober’s Test

Discussion

Reliability is the extent to which similar information is obtained when a measurement is performed more than once. The most commonly used are- Interrater and Intrarater. While interrater reliability assesses the degree of agreements between two or more raters with their appraisals; intrarater reliability assesses the degree to which test scores are consistent from one test administration to the next. Measurements are gathered from single rater who uses the methods or instruments and the same testing conditions. [20]

A thorough evaluation of the lumbar spine is the key component for successful treatment of the lumbar spine. Correct diagnosis depends on knowledge of functional anatomy, accurate patient history, diligent observation, and examination. [13]

The examination entails subjective as well as objective physical measurements, which consists of various tests for different parameters. [13, 21]

Accurate assessment of a lumbar range of motion is of great value for both evaluating lumbar functions and monitoring treatment progress. Reliable methods of measuring lumbar range of motion are important in assessing spinal function. [6,11] The purpose of this study was, thus, to determine the intra-rater reliability of lumbar flexion and extension measurements using the Schober's test and Modified Schober's technique.

Table 1 shows the demographic data, which represents the sample characteristics.

Table 2 shows the correlation of flexion values of Schober's and Modified Schober's Test. The correlation coefficient(r) is 0.86 and p -value is <0.00001 . [23] This is highly significant. This suggests that both these tests have high reliability for measuring lumbar flexion range.

Table 3 shows the correlation of extension values of Schober's and Modified Schober's Test. The correlation coefficient (r) is 0.83 and p -value is <0.00001 which is highly significant. This implies that both these tests are highly reliable to use for measurement of lumbar extension.

Our results are supported by studies done by various researchers done in the past decade. Gill et al. [24], 1988 in their study concluded that modified Schober's method was most repeatable and recommended it for a routine, non-invasive, clinical evaluation of lumbar spinal motion.

Fitzgerald et al. [25] performed a study on 17 physical therapy students to measure lumbar range of motion by modified Schober's test with the reliability of 1.00 for lumbar flexion and 0.88 for lumbar extension. A study by Beattie et al. [26] also reported a high reliability for measuring lumbar extension by modified Schober's test. FFD and the Schober test showed excellent intertest reliability. [27] Meritt et al. studied the lumbar flexibility of 25 healthy subjects by examining lumbar flexion and extension measurements using fingertip-to-floor, single inclinometer and modified Schober's methods. They concluded that the modified Schober's demonstrated good reproducibility. [28]

With highly significant values, we mean that the Schober's and Modified Schober's test when performed with the same examiner on the same subjects, the results were negligibly different. In other words, both these tests can be used interchangeably with a statistically insignificant error.

Conclusion

This study concludes that both Schober's test and Modified Schober's test are equally reliable for measuring lumbar flexion and extension ranges.

Acknowledgements

We thank god almighty, the Dean of the institution, the Head of physiotherapy department and last but not the least, the subjects who participated in the study without whose cooperation this study would not have been possible.

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