Original Research Article

Reliability of Sachse's mobility criteria in individuals of age 18-24 years

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ABSTRACT

Background: The ability to obtain an efficient yet reliable measurement of mobility can be useful for evaluation as well as for documentation. The physiotherapists use different tools to assess each and every joints mobility. In the clinical setting assessing each joint is time consuming. Sachse's mobility criteria is the mobility assessment tool which assess all major joints of body. It is an easy and quick to perform diagnostic tool. Hence, this study is intended to estimate reliability of Sachse's mobility criteria in individuals of age 18-24 years as reliability is the prerequisite for validity.

Objectives: To estimate the intra-rater and inter-rater reliability of Sachse's mobility criteria in individuals of age 18-24 years.

Methodology: 92 participants were selected according to inclusion and exclusion criteria. Anatomical landmarks were marked by the both the examiners and removed after each assessment. Examiner 1 assessed the participant and after the interval of 30 minutes examiner 2 assessed the same participant. Examiner 1 repeated the assessment after 7 days of 1st assessment to avoid recall bias. Data analysis done and interpretations were made.

Results: Sachse's mobility criteria showed good to excellent intra-rater and inter-rater reliability ICC= 0.904 and 0.853 respectively.

Conclusion: Sachse's mobility criteria showed good to excellent intra-rater and inter-rater reliability in individuals of age 18-24 years.

KEY WORDS: Mobility, hypomobility, hypermobility.

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INTRODUCTION

Mobility is often defined as the ability of structures or segments of the body to move or be moved to allow the presence of range of motion for functional activities (functional ROM) [1]. The ability of an individual to initiate, control, or sustain active movements of the body to perform simple to complex motor skills (functional mobility) is also defined as mobility [1].

Mobility depends on two factors namely joint integrity and flexibility that is extensibility of soft tissues that cross or surround joints- muscles, tendon, fascia, joint capsules,

ligaments, nerves, blood vessels and skin which are required for unrestricted, pain-free movements of the body while performing functional tasks of daily living [1].

Muscle length in conjunction with joint integrity and extensibility of periarticular soft tissue determine flexibility. The arthrokine matics of the moving joint as well as the ability of periarticular connective tissues to deform also affect joint ROM and an individual's overall flexibility. Normal mobility is fundamental for our day-to-day functioning. If mobility is altered then it affects the quality of life of the individual.

Hypomobility is caused by adaptive shortening of soft tissues. If a soft tissue is kept in a shortened position for a long period of time, it will eventually adapt and lose its ability to lengthen without injury. It can occur as the result of many disorders or situations. Hypomobility refers to decreased mobility or restricted motion [1].

Hypermobility is defined as a condition in which most of an individual's synovial joints move beyond the normal limits taking into consideration the age, gender and ethnic background of the individual [2]. An excessive range of motion across multiple joints was usually referred to as generalized joint hypermobility (GJH) or generalized joint laxity (GJL) [3].

There are a variety of tools used to quantify mobility such as the Beighton score, Contompasis score, Hospital del Mar criteria, Lower limb assessment score (LLAS) and 5-part questionnaire. However, these assessment tools do not cover all the major joints.

The Sachse's Mobility Criteria was developed in 1969. It elaborates guidelines for the assessment of normal range of movement, and attempts to determine the concepts of hypomobility, average mobility and hypermobility, it was later modified by Kapandji in 1974 who gave total range of mobility based on X-ray examination.

The criteria consisted of assessment of the motion of peripheral joints such as Metacarpo-phalangeal joint, elbow joint, shoulder girdle, hip joint, knee joint and at spinal level Cervical spine and thoracolumbar spine respectively.

The mobility evaluation, given by the Sachse is categorized in to three levels:

Range A joint mobility within the range from hypo mobile to normal

Range B normal or slightly hypermobile joint

Range C marked joint mobility (hypermobility) [4].

However, the psychometric properties are not stated so, the study to evaluate the reliability is done as reliability is prerequisite to validity [5].

MATERIALS AND METHODS

Approval from institute ethics committee was taken prior to the beginning of the project. Both the examiners were trained separately for the Sachse's Mobility Criteria on 20 subjects in the presence of experienced physiotherapist. The entire procedure was explained to the participants in front of the third witness. An informed written consent was taken from the participants and from third witness as well. The inclusion criteria of the study were individuals of age 18-24 years in whom we can easily palpate the bony landmarks and are able to follow commands and the exclusion criteria were current injuries or current pain in the joints since 6 months VAS > 3, Congenital anomalies such as Spina bifida, Idiopathic scoliosis, movement disorders, unable to attend the positions described in the scale.

92 participants (46 males and 46 females) were selected according to inclusion and exclusion criteria.

Participant's detailed demographic data were recorded including age, BMI, lean body mass taken. The participants wore shorts and tank tops. Privacy was maintained during the study. No warm-up sessions were given before assessment.

Anatomical landmarks were marked by both the examiners and removed after each assessment. Examiner 1 assessed the participant and after the interval of 30 minutes examiner 2 assessed the same participant.

Examiner 1 repeated the assessment after

7 days of 1st assessment to avoid recall bias. Both the examiners were blinded for their measurements.

RESULTS

Sachse's mobility criteria showed good to excellent intra-rater and inter-rater reliability ICC= 0.904 and 0.853 respectively.

In intra-rater reliability ICC for all subjects was 0.904 (95% CI: 0.859, 0.936) with p-value of <0.001. In males it was 0.985 (95% CI: 0.972, 0.991) with p-value <0.001 and in females it was 0.827 (95% CI: 0.708, 0.900) with p-value <0.001.

Table 1: Intra-rater reliability.

PARTICIPANTS	ICC	P-VALUE
92 PARTICIPANTS	0.904 (95% CI: 0.859, 0.936)	<0.001
46 MALES	0.985 (95% CI: 0.972, 0.991)	<0.001
46 FEMALES	0.827 (95% CI: 0.708, 0.900)	<0.001

In inter-rater reliability ICC for all subjects was 0.853 (95% CI: 0.786, 0.901), with p-value <0.001. In male subjects it was 0.742 (95% CI: 0.577, 0.848), with p-value <0.001 and in female subjects it was 0.961 (95% CI: 0.931, 0.968), with p-value <0.001.

Table 2: Inter-rater reliability.

PARTICIPANTS	ICC	P-VALUE
92 PARTICIPANTS	0.853 (95% CI: 0.786, 0.901)	<0.001
46 MALES	0.742 (95% CI: 0.577, 0.848)	<0.001
46 FEMALES	0.961 (95% CI: 0.931, 0.968)	<0.001

DISCUSSION

In the study normal individuals of age group 18-24 years were taken for the purpose of convenience. Terry K. Koo, Mae Y. Li in 2016 introduced a guideline of selecting and reporting intraclass correlation coefficients for reliability research. Authors have given general guideline to evaluate the level of reliability in table 3 [6].

Table 3: ICC values with interpretation.

ICC values	Interpretation
<0.5	Poor reliability
0.5- 0.75	Moderate reliability
0.75-0.9	Good reliability
>0.90	Excellent reliability

the factors which would have contributed for better results can be

i. Sachse's mobility criteria provides adequate and appropriate guidelines and definitive ranges (wide range) to categorize the subject's mobility into hypomobile, normal mobility and hypermobile.

ii. A supervised pilot study on 40 individuals (20 males and 20 females) contributed to the accuracy of the study.

iii. Adequate exposure of the joints and evaluation in the same environment also contributed to the accuracy of study.

CONCLUSION

Sachse's mobility criteria showed good to excellent intra-rater and inter-rater reliability in individuals of age 18-24 years. Sachse's mobility criteria is easy to use and its assessment is not very cumbersome and time consuming. This scale can be used to get an idea about the baseline mobility status of an individual once the validation of scale is done.

ABBREVATIONS

VAS: Visual analog scale
ICC: Interclass correlation coefficient

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