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Correlation Between Phone Screen Time and Lumbar Flexibility Among Young Adults Across Ahmedabad City

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ABSTRACT

BACKGROUND AND NEED OF RESEARCH: The number of smartphone users has significantly increased over time. Frequent smartphone usage compels individuals to maintain awkward postures, which may elevate the risk of musculoskeletal disorders and discomfort. Holding a smartphone in different positions can either enhance cervical flexion or alter the alignment of the thoracic and lumbar spine. However, research on how phone screen time influences lumbar spine flexibility remains limited.
AIM AND OBJECTIVE: This study aims to investigate correlation between phone screen time and lumbar flexibility among young adults, exploring how prolonged phone usage may affect spinal health and mobility.
METHOD: A correlation study was conducted with 56 young adults aged 18-25 years both males and females were included. Participants completed Mobile use Screen Test for phone screen time and lumbar flexibility was assessed using Modified - Modified Schober's Test.
RESULTS: Data of study shows non-normal distribution hence spearman test was applied. The result shows moderate negative correlation between phone screen time and lumbar flexibility in flexion ($r = -0.637$, $p < 0.01$) and in extension ($r = -0.686$, $p < 0.01$).
CONCLUSION: The findings indicate significant negative correlation. Specifically, higher phone screen time is associated with decreased lumbar flexibility.

Keywords: Phone screen time, lumbar flexibility, spinal health, young adults.

INTRODUCTION

The rapid evolution of digital technology and the widespread availability of digital networks have significantly transformed modern lifestyles.[1]

Smartphones have become an essential part of daily life, and their usage has consistently increased over the past few years.[2]

While smartphones provide numerous advantages, they also contribute to musculoskeletal issues due to improper posture.[3]

Prolonged smart phone usage often results in postural imbalances, such as forward head posture, slouched posture, or rounded shoulders. Maintaining such postures for extended periods can negatively impact the structural integrity of the cervical and lumbar spine, as well as surrounding ligaments.[4]

Postural adaptations are assessed based on a reference posture, where the body maintains alignment with the line of gravity. If a particular body segment shifts forward or backward from the line of gravity, other body regions adjust accordingly to maintain balance, which can lead to postural deviations.

Poor posture is considered a growing public health concern due to its widespread impact on individuals, including those engaged in professional activities. Many working professionals adopt postures that are unsuitable for their anatomical structure, which may eventually cause pain, discomfort, or even temporary or permanent disability.[5]

An ideal sitting posture involves an anterior pelvic tilt, lumbar lordosis, and relaxation of the thorax, reducing the pressure on the intervertebral discs. However, many individuals tend to sit in a slouched posture for extended periods, often leading to spinal misalignment. When the neck or trunk remains in forward position, the back extensors muscles become over-activated, increasing the likelihood of neck and back pain.[6]

Restricted spinal mobility can interfere with the essential functional tasks such as dressing and picking up objects from the floor, potentially contributing to gait abnormalities.[7]

Spinal flexibility plays a crucial role in maintaining back health, and its assessment is often used in pre- employment screenings to identify individual at risk of developing musculoskeletal disorders.[8]

Each vertebra of the spine is a separate structure forming a kinematic chain from the cervical to the sacral region; thus, smartphone use in various postures either increases cervical flexion or alter the alignment of the thoracic and lumbar spine.[9]

However, most studies examining the effects of smartphone use on the human body have focused on the neck, with limited research on its effects on lumbar flexibility. Understanding these impacts is essential especially in young adults prone to adopting poor postural habits.

MATERIALS & METHODS

The sample size was determined using a correlation sample size formula, resulting in a total of 56 participants. A correlation study was conducted with 56 young adults across Ahmedabad city. Ethical approval was obtained from the Institute's Ethical committee before initiating the study. Participant selection was based on predefined Inclusion criteria and Exclusion criteria.

Inclusion criteria:

1. Individuals aged 18-25 years residing in Ahmedabad city.
2. No history of musculoskeletal or neurological disorders affecting the lumbar spine.
3. Willingness to participate in the study.

Exclusion criteria:

1. Individuals with history of spinal surgeries or known spinal deformities.
2. Individuals currently taking physical therapy for lower back pain.
3. Individuals involved in flexibility training.

Participants were briefed about study objectives and procedures. Demographic information of participants was recorded. Participants were provided Mobile Use Screen Test (MUST) for phone screen time and each participant underwent Modified-Modified Schober's Test for lumbar flexibility.

Mobile Use Screen Test (MUST): The MUST categorizes mobile phone usage into three levels: mild, moderate, and excessive or addictive use. The test has a test–retest reliability of 0.93 and is applicable to individuals aged 18 years with high secondary school education and above. A Likert- type five-point scale was used for scoring with response options ranging from Never, Rarely, Occasionally, Frequently, to

Always. The scoring criteria for the overall cut off score were:
Below 30 - Mild use
31-49 - Moderate use
50 and above - Addictive/ excessive use [10]

Sharma, *et al.*: Mobile phone use screening test (MUST)

Mobile Use Screening Test (MUST)

Instructions: Please answer the following question about your usage of mobile phone in the last 1 month and indicate them accordingly from never to always (never, rarely, occasionally, frequently, always).

Example:

(This means the response chosen is frequently)

Sample Item	Never	Rarely	Occasionally	Frequently	Always
I keep my smartphone with me during sleep also				✓	

	Mobile Phone Use Screening Test				
	Never	Rarely	Occasionally	Frequently	Always
1. I start my day with the use of smartphone					
2. I wish I had my smartphone in my hand round the clock.					
3. I am uncomfortable without my smartphone.					
4. I can manage the day without my smartphone					
5. I experience problems in school, college, or work due to excessive use of smartphone.					
6. I experience problems at workplace due to the usage of my smartphone					
7. I experience problems in relationships due to my preoccupation with smartphone.					
8. I can reduce the usage of my smartphone.					
9. I experience sleep disturbance due to late-night usage of smartphone.					
10. Reduction of battery power on my smartphone disturbs me					
11. Whenever I have a smartphone with me, it is difficult to stop using it					
12. I indulge in smartphone usage for longer than earlier					
13. I use smartphone to feel good.					
14. Smartphone use helps me to overcome my stress					
15. I feel more confident while using my smartphone					
16. I use my smartphone as the only enjoyable activity of the day.					
17. When I can't use my smartphone, I feel like I have lost my connection with others					
18. I use smartphone to escape or avoid day to day problems					

Modified-Modified Schober's Test:
Measurement of Lumbar Flexion:
The volunteers were instructed to remove their shoes and partially disrobe, ensuring their back was exposed from gluteal fold to mid-thoracic spine with left and right PSIS fully visible. They were asked to stand upright, with their eyes looking straight ahead, arms relaxed at their sides, and feet positioned 15cm apart on a secured paper footprint. This position helped stabilize the pelvis, maintain balance and ensured consistency in measurements. Then, the therapist demonstrated the correct forward bending technique, instructing volunteers to extend their arms forward while keeping their knees straight. After verifying that the volunteers followed the instructions correctly, the therapist proceeded with the assessment. While kneeling behind the standing volunteers, the therapist located the PSIS using her thumb. A body marker and a ruler were used to mark a midline point on the sacrum (inferior mark), another mark (superior mark) was placed 15cm above this point on the lumbar spine. The therapist then aligned the tape measure between the two skin marks, ensuring zero was at inferior mark and 15cm was at superior skin mark. The tape was held firmly against the skin as volunteers were asked to bend forward while keeping the knees straight. The therapist ensured that tape remained in contact with the volunteer's back, allowing it to unwind naturally to accommodate spinal motion.[11]

Measurement of Lumbar Extension:
The same landmarks and procedure used for lumbar flexion were applied to assess lumbar extension. Volunteers stood upright with their eyes looking straight ahead, arms relaxed at their sides, and feet positioned on a designated paper footprint. The therapist aligned a measuring tape between the skin markings and held it firmly against the volunteer's skin
The therapist then instructed the volunteers: "Place your palms on your buttocks and bend backwards as far as possible". As they extended their lumbar spine, the new distance between the superior and inferior

skin markings was recorded using the tape measure. The change in the distance indicated the ROM of lumbar extension. After completing the measurement, the volunteers were instructed: "Return to a comfortable standing position". At the conclusion of data collection, all skin markings were removed using spirit. [11]

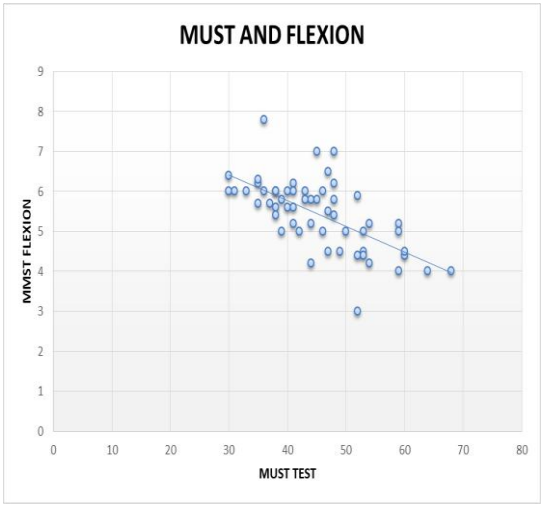
STATISTICAL ANALYSIS

The data collected from 56 participants included phone screen time- measured using the Mobile Use Screen Test and lumbar flexibility- assessed using the Modified-Modified Schober's Test. Data analysis indicates a non-normal distribution, necessitating the use of non-parametric statistical method. Spearman's rank correlation coefficient was employed to analyse the relationship between phone screen time and lumbar flexibility in both flexion and extension.

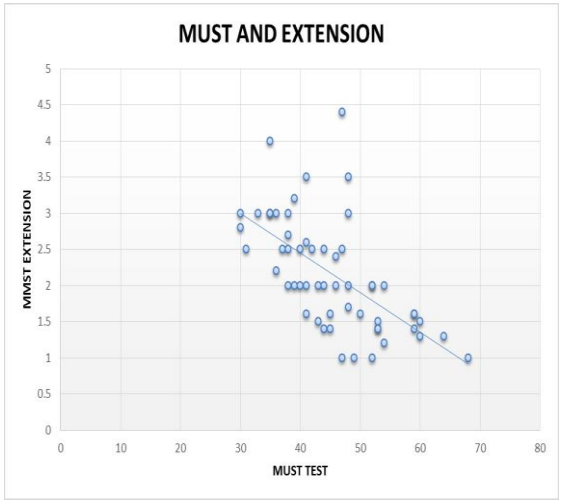
RESULT

Results show a moderate negative correlation between phone screen time and lumbar flexibility in flexion ($r=-0.637$, $p<0.01$) (Graph-1) and a moderate negative correlation between phone screen time and lumbar flexibility in extension ($r=-0.686$, $p<0.01$) (Graph-2).

Participants with higher phone screen time demonstrated reduced lumbar flexibility in both flexion and extension. The findings suggest that prolonged smartphone use significantly affects spinal flexibility, potentially leading to poor spinal health.



GRAPH -1



GRAPH -2

DISCUSSION

The present study aimed to analyse correlation between phone screen time and lumbar flexibility among young adults in Ahmedabad city and the study highlights a significant negative correlation between phone screen time and lumbar flexibility. These results suggest that prolonged phone use may contribute to musculoskeletal impairments, particularly in the lower spine, which has been an area of limited research focus compared to cervical and thoracic regions.

Panida Hanphitakphong et al conducted a study on Smartphone addiction and its association with upper body musculoskeletal symptoms among university students. Their study found that prolonged smartphone use was linked to increased prevalence of musculoskeletal symptoms in the neck and upper back, especially in female students and those aged over 20 years. This study established a relationship between smartphone use and upper body discomfort, while this study extends this research to lumbar flexibility, showing that spinal health is affected beyond the cervical region.[12]

Research by Betsch et al investigated how smartphone use influences spinal posture in

a laboratory setting. They found that prolonged smartphone uses leads to forward head posture, thoracic kyphosis, and lumbar misalignment. Betsch et al. confirmed postural deviations due to smartphone use, but their study primarily focused on postural alignment rather than spinal mobility. Our findings add a functional perspective, revealing how reduced lumbar flexibility may result from prolonged phone usage. [9]

A study by Chen et al. examined the effects of screen time inclination on musculoskeletal and visual discomfort among young smartphone users. The study found that increased screen time was linked to higher reports of musculoskeletal discomfort, particularly in the neck, shoulders and lower back. While the present study extends these findings by assessing actual changes in lumbar flexibility. This suggests that loss of mobility may occur alongside or even before pain symptoms, highlighting the need for early detection and prevention strategies. [1]

CONCLUSION

The study concludes that higher phone screen time is significantly associated with decreased lumbar flexibility, suggesting a negative impact of prolonged smartphone use on spinal health. Smartphones, while integral to modern life, act as a double-edged sword offering convenience and connectivity but simultaneously posing risks to physical health, particularly the musculoskeletal system. These findings emphasize the need for raising awareness about proper posture, reducing screen time, and adopting preventive strategies to counteract the adverse effects of prolonged mobile phone use. Encouraging ergonomic habits, incorporating regular physical activity, and educating young adults about the importance of spinal health are crucial steps to ensure long-term well-being.

Declaration by Authors

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