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A Cross-Sectional Study Comparing Seated and Standing Medicine Ball Throw Performance in Young Adults

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ABSTRACT

Introduction: Muscular power is an important component of physical performance, particularly during explosive movements. Medicine ball throw tests are widely used as practical field-based measures of explosive power. Seated and standing throws differ in their biomechanical demands because standing throws involve the lower limbs and trunk in addition to the upper extremities. However, limited research has directly compared seated and standing medicine ball throw performance in young adults**.**
Aim: To compare seated and standing medicine ball throw performance among healthy young adults and determine whether body position significantly influences throwing performance.
Methodology: A cross-sectional study was conducted among 104 healthy young adults (57 males and 47 females). Each participant performed three trials of both seated and standing medicine ball throws, and the average distance was recorded. Descriptive statistics to assess the data, followed by a paired samples *t*-test to compare seated and standing throw performance. Statistical significance was set at $p < 0.05$.
Result: The mean seated medicine ball throw distance was 275.86 ± 64.48 cm, while the mean standing medicine ball throw distance was 341.65 ± 79.51 cm. The standing throw distance was 65.79 cm greater than the seated throw distance. A paired samples *t*-test demonstrated a statistically significant difference between seated and standing medicine ball throw performance ($t(103) = 20.96$, $p < 0.001$).
Conclusion: Standing medicine ball throw performance was significantly greater than seated performance in young adults, indicating that body position influences throwing performance and the contribution of the whole-body kinetic chain.

Keywords: Upper limb strength, Dynamometer, Seated medicine ball test, Standing medicine ball test.

INTRODUCTION

Muscular power is defined as the ability of a muscle or group of muscles to generate force rapidly. It represents the product of force and velocity and reflects how quickly an individual can perform a movement requiring strength. Unlike muscular strength, which refers to the maximum force a muscle can produce, muscular power emphasizes the speed at which that force is generated. Muscular power is a critical component of physical performance and plays an important role in various athletic and functional activities such as throwing, jumping, sprinting, lifting, and changing direction[1]. High levels of muscular power enable individuals to perform explosive movements efficiently and effectively. In sports, upper-body power is particularly important for activities involving throwing, striking, and pushing actions, while lower-body power contributes to running, jumping, and agility tasks. The assessment of muscular power is widely used in sports science, rehabilitation, and physical fitness evaluation to monitor performance, identify training needs, and assess functional capabilities. Reliable measures of muscular power can provide valuable information regarding an individual's physical performance and overall athletic potential[2].

Greater muscular strength is strongly associated with improved force-time characteristics that contribute to an athlete's overall performance. Much research supports the notion that greater muscular strength can enhance the ability to perform general sport skills such as jumping, sprinting, and change of direction tasks. Further research indicates that stronger athletes produce superior performances during sport specific tasks. Greater muscular strength allows an individual to potentiate earlier and to a greater extent, but also decreases the risk of injury. Sport scientists and practitioners may monitor an individual's strength characteristics using isometric, dynamic, and reactive strength tests and variables[3].

Explosive power is the ability to exert great muscular strength in a very short time (usually within 100 m)[4] which is vital for athletes to win the competition. Therefore, coaches and researchers have been concerned with how to select more efficient explosive training methods. Traditional resistance training (RT), plyometric training (PLT) and complex training (CT) have been widely used in strength and explosive training. The three training methods have different effects on explosive power[5].

Resistance training has been shown to improve a variety of performance and health-related variables. Resistance training enhancement of performance related variables can include increased maximum strength, rate of force development, power, and both low- (LIEE) and high-intensity (HIEE) exercise endurance. Changes in these variables (strength, power, etc.) as a result of resistance training have been associated with improved measures of athletic performance, such as the vertical jump, rugby tackling, sprint times, distance-running times, and change of direction. Programs incorporating strength training as an integral part of physical conditioning have also been shown to improve performance in daily and ergonomic tasks, such as lifting weighted boxes to different heights[6].

Explosive muscular power is the ability to generate high levels of force in a short period of time and is considered an essential component of physical performance. It plays a crucial role in athletic activities such as sprinting, jumping, throwing, and rapid changes of direction. Previous research has demonstrated that greater muscular strength and power are associated with improved sport-specific performance and reduced injury risk. Furthermore, muscular power contributes to functional activities of daily living, including lifting, carrying, and other tasks requiring rapid force production. Therefore, the assessment of muscular power is widely utilized in sports science, rehabilitation, and fitness evaluation[5].

Upper-body power is a key component of athletic performance, particularly in sports involving throwing, striking, pushing, and rapid upper-extremity movements. The ability to generate force quickly through the muscles of the shoulders, chest, arms, and trunk contributes significantly to sport-specific skills and overall performance. Previous studies have demonstrated that greater upper-body power is associated with improved medicine ball throw performance, throwing velocity, and athletic capability. Furthermore, upper-body plyometric training has been shown to enhance maximal strength, medicine ball throwing performance, and sport-specific performance outcomes in young athletes. As a result, the assessment of upper-body power has become an important aspect of sports performance evaluation, rehabilitation, and conditioning programs. The seated medicine ball throw is commonly used as a practical and reliable field test to evaluate upper-body power due to its simplicity and strong measurement properties[7].

Push-up exercise is an excellent exercise to develop arms, shoulders, and upper body strength/endurance; therefore, it is widely used in physical preparation and training. For the same reason and for its ease of realization, it is also very commonly used for physical evaluation in both military and civilian sectors worldwide. Even though there are multiple push-up tests mostly oriented toward the number of repetitions during a given time interval or cadence, the general concept usually requires the examinee to hold the body straight at all times while alternately reaching the down and up[8].

The standard push-up requires a general stiffening of the knee joints, hip joints, pelvis, and spine to keep the body in a straight line from head to feet while the shoulders and elbows flex and extend to raise and lower the body and the scapulae retract and protract to facilitate glenohumeral range of motion[9].

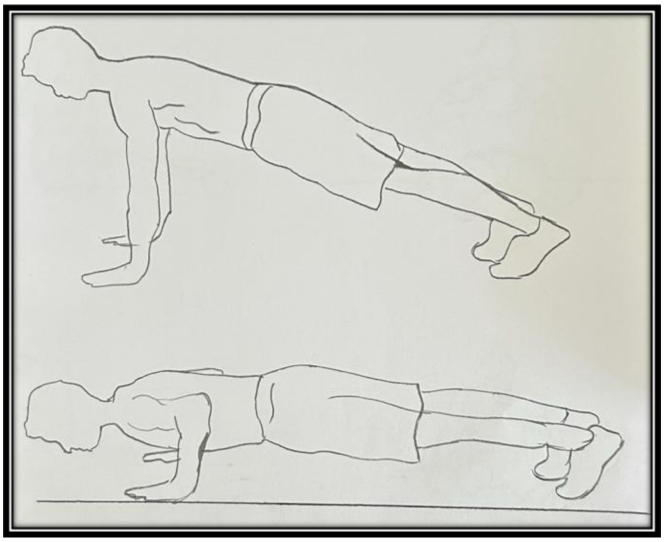


FIGURE 1: POSITION OF PUSH UP

The pull-up is a closed kinetic chain, multi-joint upper-body exercise that can improve an athlete's shoulder girdle strength, stability, and ability to produce high forces during pulling activities, such as rope climbing, rock climbing, gymnastics, rowing, and swimming. Pull-ups have traditionally been used as a physical fitness testing tool with persons who engage in activities requiring a large upper-body strength-to-body mass ratio[10].

1.3.1 Pull-up technique: exercise execution

As a general description of the pull-up, starting from a hanging position with the hands grasping a horizontal bar, the exercise requires to flex the forearms over the arms around the elbow joint, raising the body until the chin overpasses the bar[11]. Multiple aspects compose the complexity of this motor task, ranging from dynamic postural evolution to synergistic muscular activations and alignment control[12].

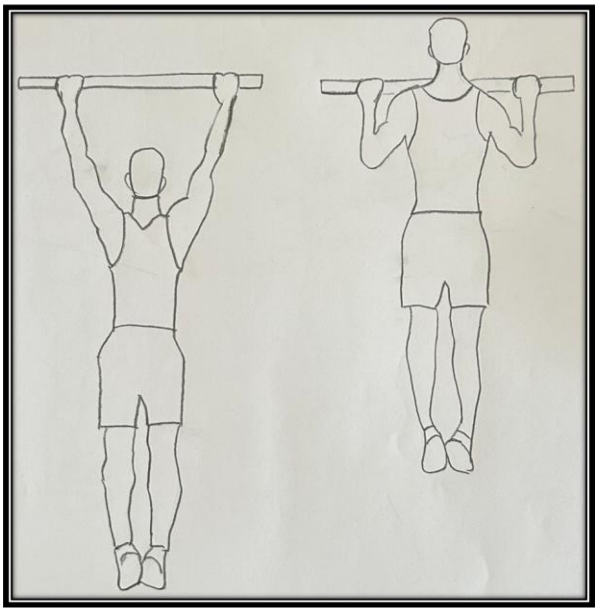


FIGURE 2: POSITION OF PULL UPS

Grip strength was measured in the dominant and non-dominant hands with a strain gauge dynamometer in three positions: lying at 30° in bed with elbows supported, seated in an armchair with elbows supported and in a chair with elbows unsupported. The average of three readings made in each position. Hand grip strength measurement is useful in functional nutritional assessment and is sensitive to short-term changes in nutritional status. There are several factors influencing the degree of strength generated and reproducibility of grip strength measurements and attempts have been made to standardise the methodology for measuring grip strength. The American Society of Hand Therapists in 1981 suggested a testing protocol in which the subject is seated with the shoulder adducted and neutrally rotated, the elbow flexed at 90° and the forearm and wrist in the neutral position13.

MEDICINE BALL THROW TEST (MBT)

The procedures adopted for the Medicine Ball Throw Test followed protocol proposed by Vossen et al. 2019. For the test, the participant remained sat on a bench with adjustable height stabilized on the ground with the back supported against the vertical back support with thighs horizontally supported, knees flexed at an angle of 90° and ankles fixed the ground. Participants were affixed to the seat with elastic straps placed around the trunk at the level of the mid chest under the armpit. This position was standardized in all throws to ensure greater stability and minimize movements of the trunk during performance[14].

The seated medicine ball throw (SMBT) is a field test intended to assess upper-body muscular power by measuring the maximal distance an individual can throw a medicine ball from an isolated, seated position. The seated medicine ball throw has been used to assess upper-body power in various populations and to establish concurrent validity for other measures of upper-body power such as the bench press power test and the plyometric push-up. The seated medicine ball throw is less costly and simpler to incorporate into a field test battery than other upper body power assessments[15]. The standing medicine ball throw is a commonly used field test for assessing explosive power. Unlike seated throwing tests, the standing throw incorporates force generation from the lower extremities, trunk, and upper limbs, reflecting the contribution of the entire kinetic chain during explosive movements. Previous studies have demonstrated excellent reliability and validity of standing

medicine ball throw protocols, supporting their use in athletic performance assessment. Furthermore, standing medicine ball throw performance has been associated with general athletic ability and power-related tasks, making it a practical tool for evaluating whole-body explosive performance[16].
The medicine ball throw test is a field-based assessment commonly used to evaluate explosive muscular power, particularly of the upper body. It involves throwing a weighted medicine ball for maximum distance and provides an objective measure of force generation and power production. The test has gained widespread popularity because it is simple to administer, inexpensive, requires minimal equipment, and can be performed in a variety of settings. Previous studies have demonstrated excellent reliability and validity of medicine ball throw protocols for assessing explosive power. Furthermore, medicine ball throw tests are extensively used in sports science for performance evaluation, in physiotherapy for rehabilitation monitoring, and in fitness assessment to quantify upper-body power and functional performance[17].

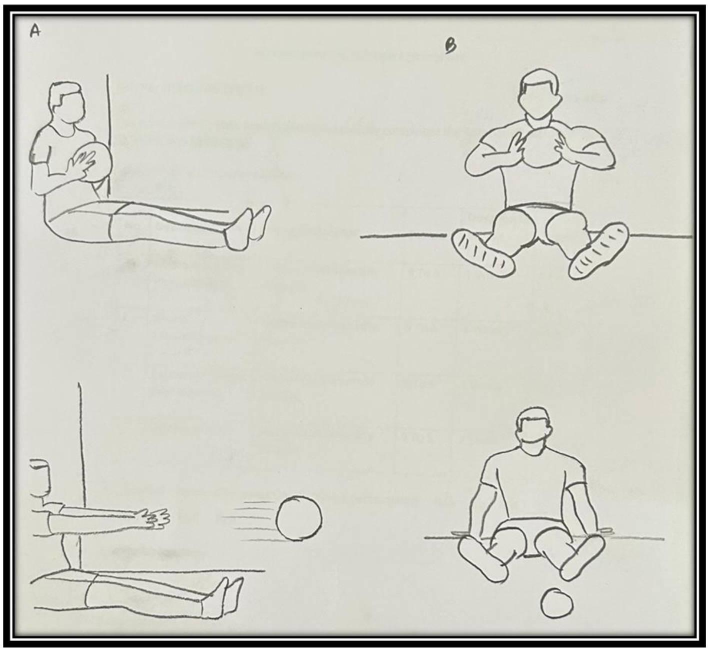


FIGURE 3: SEATED MEDICINE BALL THROW

Seated and standing medicine ball throws differ substantially in their biomechanical demands. During a standing throw, force is generated sequentially through the lower extremities, pelvis, trunk, and upper limbs, allowing efficient transfer of energy through the kinetic chain. In contrast, the seated medicine ball throw minimizes lower-limb involvement and restricts trunk contribution, resulting in greater reliance on the muscles of the upper extremities. Consequently, standing throws are expected to produce greater throw distances due to increased muscle recruitment, enhanced trunk involvement, and greater force generation from the lower limbs. These biomechanical differences may influence performance outcomes and should be considered when selecting an assessment of upper-body power[18].

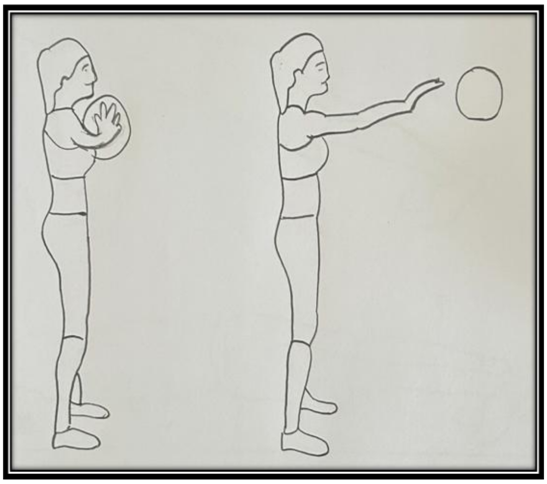


FIGURE 4: STANDING MEDICINE BALL THROW

Young adults are frequently selected for studies investigating physical performance because they generally possess mature musculoskeletal and neuromuscular systems and exhibit high levels of physical capacity. Previous research has demonstrated that muscular strength and power reach their peak during young adulthood, typically between 20 and 30 years of age, before gradually declining with advancing age. Furthermore, many athletic and functional performance characteristics are optimized during this period, making young adults an ideal population for evaluating physical performance measures. Establishing comparative data in young adults is particularly important because it provides normative reference values and enhances understanding of factors influencing performance during a period of near-maximal physical capacity[19].

The medicine ball throw test has been widely investigated as a practical measure of upper-body explosive power. Previous studies have primarily focused on establishing the reliability, validity, and feasibility of medicine ball throw protocols in various populations. Furthermore, research has supported the use of both seated and standing medicine ball throw tests as reliable assessment tools for evaluating muscular power. However, most investigations have examined these protocols independently or compared them with laboratory-based assessments rather than directly comparing seated and standing medicine ball throw performance. Additionally, limited evidence exists regarding the influence of body position on throwing performance among young adults. Since standing throws involve contribution from the lower limbs and trunk through the kinetic chain, whereas seated throws predominantly assess upper-body power, understanding the differences between these testing positions may provide valuable information for sports performance assessment and clinical practice. Therefore, further research is required to compare seated and standing medicine ball throw performance in young adults[20].

AIM OF THE STUDY

To compare seated and standing medicine ball throw performance among young adults and determine whether a significant difference exists between the two testing positions.

NEED OF THE STUDY

Medicine ball throw tests are commonly used to assess upper-body explosive power in sports science, physiotherapy, and fitness settings. While both seated and standing medicine ball throw protocols have been shown to be reliable and valid assessment tools, they evaluate different biomechanical aspects of performance. The seated medicine ball throw primarily assesses upper-body power by minimizing lower-

limb contribution, whereas the standing medicine ball throw incorporates force generation from the lower limbs, trunk, and upper extremities through the kinetic chain.
Despite the widespread use of these tests, limited research has directly compared seated and standing medicine ball throw performance in young adults. Understanding the differences between these testing positions may help clinicians, physiotherapists, coaches, and researchers select the most appropriate assessment method based on the purpose of evaluation. Furthermore, establishing comparative data in young adults may contribute to the development of normative values and improve the interpretation of upper-body power assessments.

OBJECTIVES

1. To measure seated medicine ball throw distance in young adults.
2. To measure standing medicine ball throw distance in young adults.
3. To compare the distances achieved during seated and standing medicine ball throw tests.
4. To determine whether body position (seated versus standing) significantly influences medicine ball throw performance.

HYPOTHESIS

Null Hypothesis (H_0): There is no significant difference between seated and standing medicine ball throw performance in young adults.

Alternative Hypothesis (H_1):
There is a significant difference between seated and standing medicine ball throw performance in young adults.

MATERIALS & METHODS

A total of 104 healthy young adults voluntarily participated in the present cross-sectional study, comprising 57 males (54.8%) and 47 females (45.2%). The participants had a mean age of 20.7 ± 2.3 years, a mean height of 1.66 ± 0.11 m, and a mean body weight of 61.3 ± 13.5 kg. The mean Body Mass Index (BMI) of the participants was 22.1 ± 4.4 kg/m², indicating that the study population primarily consisted of individuals with a normal body mass index.
Participants were recruited from physiotherapy colleges and the surrounding community using a convenience sampling method. Before participation, the purpose, procedures, potential risks, and benefits of the study were explained to each participant. Written informed consent was obtained from all participants before data collection.

- Study Design: Cross-Sectional study
- Study Population: Young adults
- Study setting: Shree M. M. Shah Physiotherapy College
- Study duration: 3 months

Inclusion Criteria[21]:

- Healthy young adults aged 18–30 years.
- Both male and female participants.
- Willing to participate voluntarily and provide written informed consent.
- No history of upper-limb, shoulder, neck, or trunk injury during the previous 6 weeks.
- Able to understand and follow verbal instructions.
- Refrained from strenuous upper-body exercise for at least 48 hours before testing to minimize the influence of muscular fatigue on performance.

Exclusion Criteria[21]:

- Any current pain or discomfort affecting the upper extremities, neck, or trunk.
- History of fracture, surgery, or dislocation involving the upper or lower extremities within the previous six months.
- Neurological disorders affecting coordination, muscle strength, or balance.
- Vestibular disorders or any condition affecting postural control.

- Cardiovascular or respiratory conditions contraindicating maximal physical exertion.
- Any medical condition that could interfere with safe participation in the medicine ball throw tests.
- Performed strenuous upper-body exercise within 48 hours before testing.

INSTRUMENTATION USED IN THE STUDY:

FIGURE 5: INSTRUMENTS USED IN THE STUDY

- JAMAR Hydraulic Hand Dynamometer
- Weighing Scale
- Stadiometers
- Measure tape
- Medicine ball (3 and 5 kg)
- Assessment form
- Consent form
- Stationary Items
- Plinth

OUTCOME MEASURE COLLECTION:
1. Seated medicine ball throw
2. Standing medicine ball throw
3. Grip Strength

SEATED MEDICINE BALL THROW TEST

Seated Medicine Ball Throw is also called the medicine ball chest pass. Purpose of this test measures upper body strength and explosive power. Intention is to test the strength of the arms only. Equipments required were a medicine ball, 3 kg and 2 kg medicine ball for boys and girls with the back resting against a wall. The medicine ball is held with the both the hands in front of respectively. As per the procedure, the athlete sits on the floor in long sitting position, feet 60 cm apart and the chest. The forearms are positioned parallel to the floor. The participant throws the medicine ball as vigorously, far and straight forward as she/he can. The back should not move away from the wall during this time. The distance from the heal to where the ball lands are recorded. The measurement is recorded to the nearest centimeter. The best result of three throws was taken[22].

FIGURE 6: SEATED MEDICINE BALL THROW TEST

STANDING MEDICINE BALL THROW TEST

Equipments required were a medicine ball, 3 kg and 2 kg medicine ball for boys and girls accordingly. Stand with feet hip-to-shoulder-width apart in an athletic, stable base. Hold the medicine ball with both hands at chest level, keeping elbows bent and pointing outward. Slightly shift weight to back foot or hinge at the hips to load glutes and core. Brace core and powerfully push the ball forward and upward using chest, shoulders, and arms. Ensure your wrists stay straight. The distance from the heal to where the ball lands are recorded. The measurement is recorded to the nearest centimeter. The best result of three throws was taken.

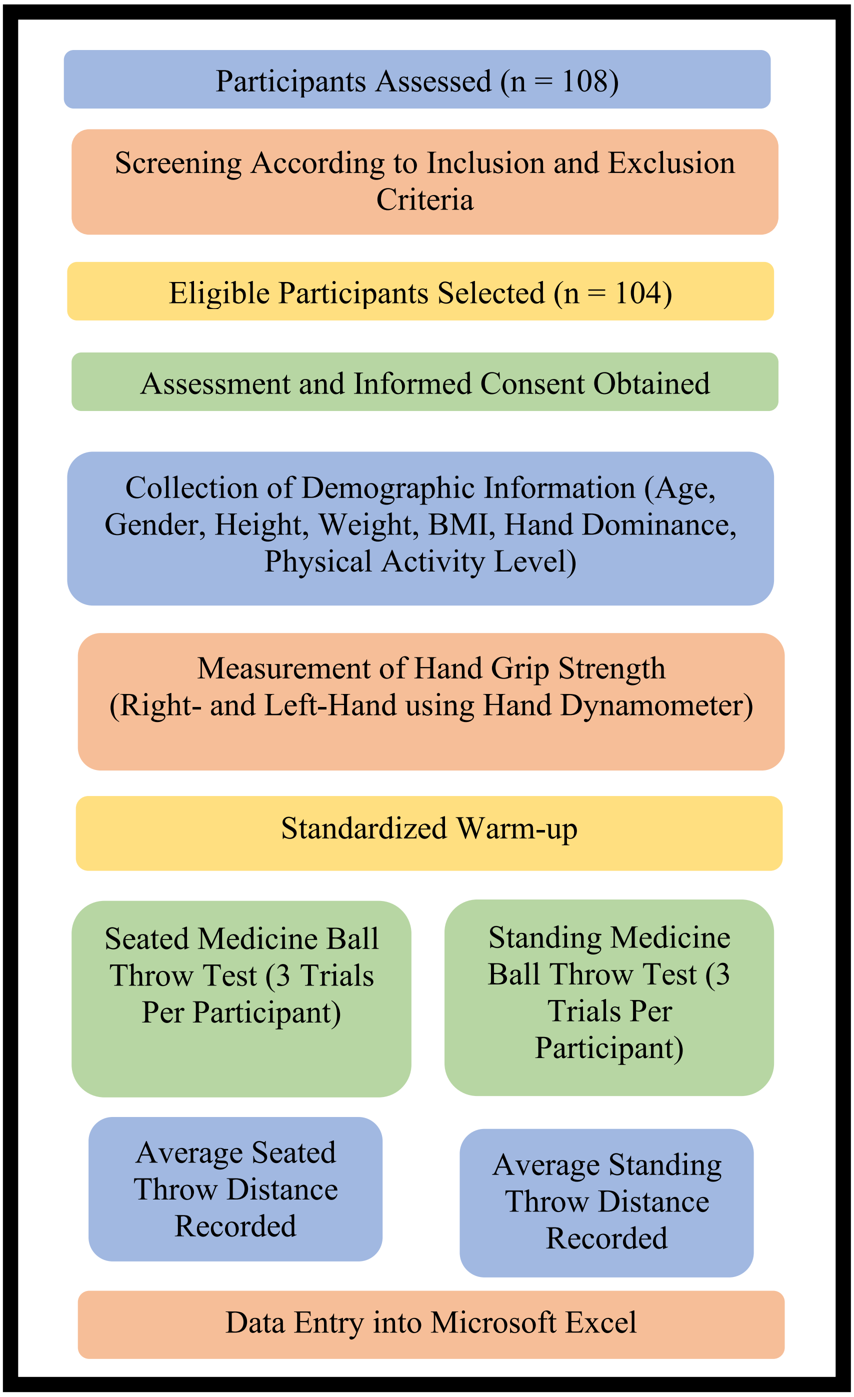
FIGURE 7: STANDING MEDICINE BALL THROW TEST

GRIP STRENGTH

Peak grip strength each hand was taken using Digital Dynamometer, with the subject seated upright with feet completely resting on the ground, hip as far back in chair as possible, and the hip and knees positioned approximately at 90o angle. The elbow was on the armrest at approximately 90° and the shoulder of gripping arm was maintained in adduction; the elbow was flexed at ease between about 90° angle and 120°angle. The wrist was positioned between 0o and 30o of extension, and between 0° and 15° ulnar deviation. The dynamometer was held with index finger at the top of the grip, while keeping all fingers on the grip band. Subjects were instructed to exhale during the grip exertion and the grip was held for 3 seconds. A rest period of 15 seconds was allowed between the grip repetitions. The grip strength score was recorded in nearest Kg from the dynamometer. Three repetitions were taken; the maximum reading was noted as the peak grip strength of each hand. Dominant hand was tested first and, the same process was repeated on the other hand, each hand was tested alternately. The total grip strength was calculated by adding the average of best performance of each hand in Kg[53].

FIGURE 8: GRIP STRENGTH MEASUREMENT BY JAMAR DYNAMOMETER

FLOW CHART



RESULT

Table 1. Demographic Characteristics of Participants

VARIABLE	MEAN ± SD
Age (years)	20.7 ± 2.3
Weight (kg)	61.3 ± 13.5
Height (m)	1.66 ± 0.11
BMI (kg/m²)	22.1 ± 4.4
Right Hand Grip (kg)	34.6 ± 11.8
Left Hand Grip (kg)	33.9 ± 11.6

Table 1 presents the demographic characteristics of the study participants. The mean age of the participants was 20.7 ± 2.3 years, indicating that the study population consisted of young adults. The mean body weight was 61.3 ± 13.5 kg, while the mean height was 1.66 ± 0.11 m. The average Body Mass Index (BMI) was 22.1 ± 4.4 kg/m², which falls within the normal BMI range according to the World Health Organization classification. The mean right-hand grip strength was 34.6 ± 11.8 kg, whereas the mean left-hand grip strength was 33.9 ± 11.6 kg. The slightly higher right-hand grip strength may be attributed to right-hand dominance among most participants. Overall, the demographic characteristics indicate that the participants were healthy young adults with normal anthropometric measurements and comparable bilateral hand grip strength.

Table 2. Gender Distribution

GENDER	FREQUENCY	PERCENTAGE
Male	57	54.8
Female	47	45.2

Table 2 presents the gender distribution of the participants included in the study. Of the total 104 participants, 57 (54.8%) were male and 47 (45.2%) were female. The study population consisted of a slightly higher proportion of male participants than female participants, although both genders were well represented. This distribution provided an appropriate sample for comparing seated and standing medicine ball throw performance among young adults.

Table 3. Comparison of Seated and Standing Medicine Ball Throw

Variable	Mean ± SD
Seated Medicine Ball Throw (m)	275.8 ± 64.5
Standing Medicine Ball Throw (m)	341.6 ± 79.5

Table 3 presents the comparison of the mean distances achieved during the seated and standing medicine ball throw tests among the participants. The mean distance for the Seated Medicine Ball Throw was 275.8 ± 64.5 cm, whereas the mean distance for the Standing Medicine Ball Throw was 341.6 ± 79.5 cm. The mean standing medicine ball throw distance was higher than the mean seated medicine ball throw distance. Additionally, the standard deviation for the standing throw (79.5 cm) was greater than that of the seated throw (64.5 cm), indicating greater variability in standing throw performance among the participants.

Table 4. Paired t-test

Variable	Mean ± SD (cm)	Mean Difference (cm)	t-value	df	p-value
Seated Medicine Ball Throw	275.86 ± 64.48	65.79	20.96	104	<0.001
Standing Medicine Ball Throw	341.65 ± 79.51				

Table 4 presents the results of the paired samples *t*-test comparing seated and standing medicine ball throw performance among the participants. The mean distance achieved during the seated medicine ball throw was 275.86 ± 64.48 cm, whereas the mean distance achieved during the standing medicine ball throw was 341.65 ± 79.51 cm. The mean difference between the two tests was 65.79 cm, indicating that participants threw the medicine ball farther in the standing position than in the seated position. The paired samples *t*-test revealed a statistically significant difference between seated and standing medicine ball throw performance ($t = 20.96$, $df = 103$, $p < 0.001$). Since the p-value was less than 0.05, the null hypothesis was rejected, indicating that body position significantly influenced medicine ball throw performance.

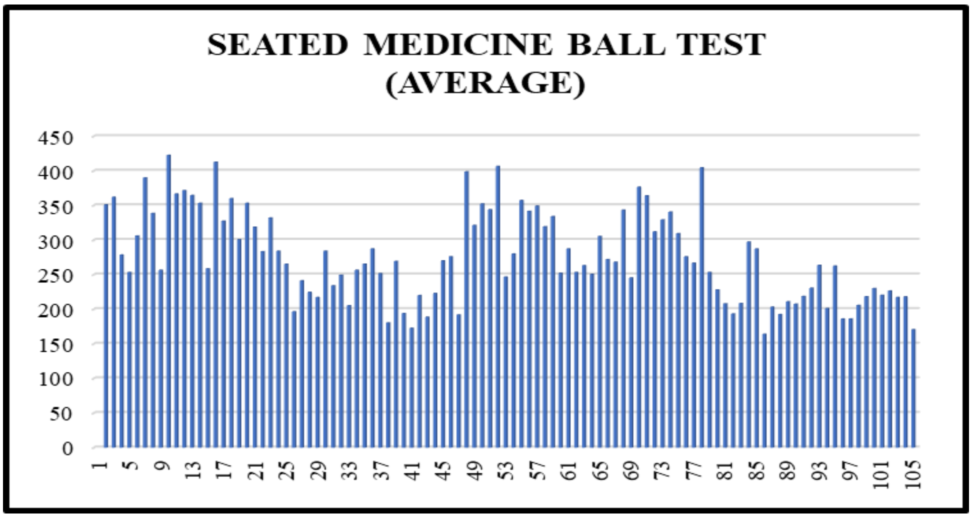
Participants demonstrated significantly greater throw distances in the standing position compared with the seated position.

Table 5. Calculation Summary of the Paired Samples t-test

QUANTITY	VALUE
Number of participants (n)	104
Mean difference ($\bar{d}$)	65.79 cm
Standard deviation of differences (s_d)	32.02 cm
Standard error	3.14 cm
t-value	20.96
Degrees of freedom	103
p-value	<0.001

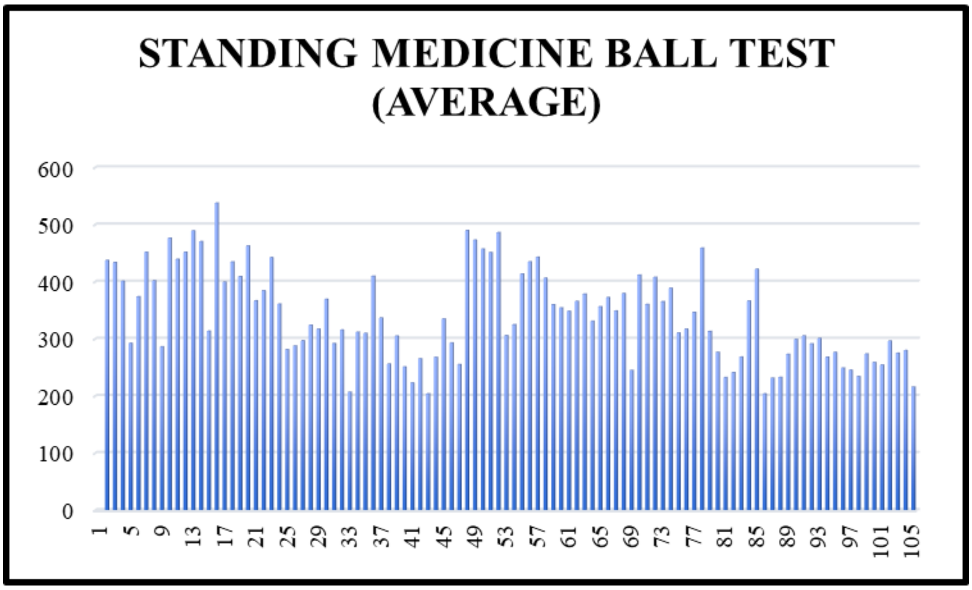
Table 5 presents the calculation summary of the paired samples *t*-test used to compare seated and standing medicine ball throw performance among the participants. A total of 104 participants were included in the analysis. The mean difference between standing and seated medicine ball throw distances was 65.79 cm, indicating that, on average, participants threw the medicine ball 65.79 cm farther in the standing position than in the seated position. The standard deviation of the paired differences was 32.02 cm, reflecting the variability in the differences between the two test conditions. The standard error of the mean difference was 3.14 cm, representing the precision of the estimated mean difference. The calculated *t*-value was 20.96 with 103 degrees of freedom, and the corresponding p-value was less than 0.001. These findings indicate a highly statistically significant difference between seated and standing medicine ball throw performance, leading to the rejection of the null hypothesis. Therefore, body position had a significant influence on medicine ball throw performance, with participants demonstrating superior performance in the standing position.

Graph 1 illustrates the average seated medicine ball throw distances achieved by each of the 104 participants included in the study. The throw distances varied among participants, with values ranging from approximately 170 cm to 423 cm. Most participants achieved throw distances between 200 cm and 350 cm, while a few participants demonstrated distances exceeding 400 cm. The variation in throw performance reflects differences in upper-body explosive power among the participants. The overall mean seated medicine ball throw distance was 275.86 ± 64.48 cm, indicating moderate variability in seated throwing performance.



Graph 1: Distribution of Average Seated Medicine Ball Throw Distances Among the Participants

Graph 2 illustrates the average standing medicine ball throw distances achieved by each of the 104 participants included in the study. The standing medicine ball throw distances ranged from approximately 204 cm to 538 cm.



Graph 2: Distribution of Average Standing Medicine Ball Throw Distances Among the Participants

DISCUSSION

The present study was conducted to compare seated and standing medicine ball throw performance among healthy young adults. A total of 104 participants completed both tests, and the results were analyzed using descriptive statistics and a paired samples *t*-test. The findings demonstrated a statistically significant difference between seated and standing medicine ball throw performance, with greater throw distances achieved in the standing position.

The study included 104 healthy young adults with a mean age of 20.7 ± 2.3 years. The mean BMI was 22.1 ± 4.4 kg/m², indicating that the participants were generally within the normal weight range. This age group was selected because muscular strength and power are near their peak during young adulthood, making it appropriate for evaluating explosive upper-body performance.

The principal finding of the present study was that the standing medicine ball throw distance (341.65 ± 79.51 cm) was significantly greater than the seated medicine ball throw distance (275.86 ± 64.48 cm). The paired samples *t*-test confirmed that this difference was statistically significant (t (103) = 20.96, $p < 0.001$). These findings indicate that body position significantly influences medicine ball throw performance.

The greater throw distance observed during the standing medicine ball throw can be explained by the contribution of the lower limbs, pelvis, and trunk through the kinetic chain. During standing throws, force is generated from the lower extremities and transferred through the trunk to the upper limbs, resulting in greater overall power production. In contrast, the seated medicine ball throw restricts lower-limb involvement and primarily evaluates upper-body explosive strength[16].

The present findings are consistent with Stock Brugger and Haennel (2001), who reported that standing medicine ball throw is a valid measure of whole-body explosive power due to the involvement of multiple body segments[16].

Similarly, Harris et al. (2011) reported that the seated medicine ball throw primarily assesses upper-body explosive power by minimizing lower-limb contribution[41].

Trasolini et al. (2022) emphasized that throwing performance depends on efficient force transfer through the kinetic chain, supporting the greater throw distances observed during the standing medicine ball throw[18].
Thus, the findings of the present study support the existing literature and demonstrate that standing medicine ball throw performance is significantly greater than seated medicine ball throw performance among healthy young adults.

CONCLUSION

The present cross-sectional study compared seated and standing medicine ball throw performance among healthy young adults. The findings demonstrated that the standing medicine ball throw distance was significantly greater than the seated medicine ball throw distance.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

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