



E-ISSN: 2707-7020
P-ISSN: 2707-7012
JSSN 2023; 4(1): 90-93
Received: 09-12-2022
Accepted: 23-01-2023

Deepali Tamrakar
Undergraduate Physiotherapy
Student, Department of
Physiotherapy, Rajeev
Gandhi College, Bhopal,
Madhya Pradesh, India

Prachi Sathe
Ph.D., Associate Professor,
Department of Physiotherapy,
Rajeev Gandhi College,
Bhopal, Madhya Pradesh,
India

Abhinav Sathe
M.S.P.T., Associate Professor,
Department of Physiotherapy,
Rajeev Gandhi College,
Bhopal, Madhya Pradesh,
India

D Vijay Kumar
Ph.D., Head, Department of
Physiotherapy, Rajeev
Gandhi College, Bhopal,
Madhya Pradesh, India

Corresponding Author:
Prachi Sathe
Ph.D., Associate Professor,
Department of Physiotherapy,
Rajeev Gandhi College,
Bhopal, Madhya Pradesh,
India

Journal of Sports Science and Nutrition

Evaluation of flexibility in pittu players

Deepali Tamrakar, Prachi Sathe, Abhinav Sathe and D Vijay Kumar

DOI: <https://doi.org/10.33545/27077012.2023.v4.i1b.152>

Abstract

Introduction: A traditional South-Asian indigenous sport named as Pittu has a unique place in Indian culture. It is known by different names around India such as seven stones, lagori, Ellu Kallu etc. The aim of this study was to assess the flexibility in pittu players using sit and reach test. This test is a field test to measure hamstring and lower back flexibility. This test is helpful in determining a person's risk for pain and injury as well as to enhance the players performance.

Methods: A correlation study was conducted where we included 51 pittu players of both sexes between the ages of 14-24 years. In which 33 were male and 18 were female. The sit and reach test required the use of a specially constructed box which is known as sit and reach box. We conducted a sit and reach test on each participant and collected data to evaluate flexibility and demographic variables.

Results: The study represents a negative correlation between flexibility and demographic variables, specifically protein ($p=0.051$) and body water ($p=0.027$) and a positive correlation with height ($p=0.039$). A significant difference ($p<0.05$) was observed for height, weight, BMI and flexibility between males and females.

Conclusion: This study concludes that a significant relationship between flexibility and demographic variables is found in pittu players. This information might be useful to identify talent and evaluate performance in sports players.

Keywords: Pittu, flexibility evaluation, sit and reach test, indigenous sport

Introduction

India is a country of rich cultural heritage. Playing sports is very much installed in our blood^[1]. A traditional South-Asian indigenous sport named as Pittu also called as seven stone and Ellu Kallu, is very common amongst Indian children^[2]. It is a strenuous contact sport and therefore many players are subjected to injury during training as well as during match. Many body parts get injured while rebuilding the seven stones and hitting them. Most common injuries occur due to sudden twisting and turning movement and change in the direction of the player causes ligaments sprain (ACL, MCL), meniscal, ligaments tear and muscle strain, tendon strain. Overuse injuries are magnitude of impact forces in running. These are the results of training errors^[3].

Flexibility is considered as important component of physical fitness and good health which prevents pittu players from injury. It is the ability of a joint to move through an unrestricted pain free range of motion, although it varies widely from person to person^[4]. Flexibility can be static or dynamic. Static flexibility is the range of motion available to the joint. Active and passive dynamic flexibility can be measured by physical performance tests^[5]. Flexibility is an important component of players' conditioning. Flexibility helps performance, posture, promotes efficient movement, prevents in correct body alignment, prevent risk of falling, gait limitations, low back problems, maintain appropriate muscle length and balance also decreases injury risk. Every specific sport has specific flexibility patterns and even specific positions with in sports. Flexibility helps to reduce injury rates and improve performance in athletes. Flexibility is a form of warm up, the athlete who have good static flexibility has less chances to muscular tendon injury^[5, 6]. Flexibility prevent injury by protecting the myofibrillar elements from being overstretch during strenuous exercises^[7]. There are many tests which are used to test flexibility are sit and reach test, v sit test, Toe touch test, Schober test, side bending test, stand and reach, back saver sit and reach test, chair sit and reach test. Most commonly used test is sit and reach^[8].

The standard sit and reach test are generally used to measure hamstring and lower back flexibility^[9]. Sit and reach test is a field test to measure hamstring extensibility. Maintaining a good level of flexibility is thought to be an important part of health-related fitness.

This test is helpful and determining a person's risk for future pain and injury [10]. Sit and reach test are frequent and requires simplest procedure, easy to conduct, required minimum equipments and minimal skills to evaluate hamstring extensibility [11].

Recently, Government of India has promoted many indigenous sports such as kho-kho, malkhamb, kalarippayattu, kabaddi, gatka and lagori (pittu) under the scheme of 'Fit India Movement'. These sports are played widely amongst different regions of the country and are a growing area of research. Till date no study has evaluated flexibility in the indigenous sports of pittu players. Thus, the aim of this study was to evaluate the hamstring and lower back flexibility in pittu player. The objectives of the study were focused to: (i) evaluate difference of flexibility and demographic variables between male and female pittu participants and (ii) evaluate correlation between flexibility and demographic variables amongst pittu players.

Methods

Participants: For measurements of flexibility by sit and reach test was used. The study included 51 participants of both sexes in which 33 were male and 18 were female. We involved the players who came for the 2nd Senior National Pittu Championship in Bhopal, organized by the Madhya Pradesh Pittu Association, under the Pittu Federation of India. The age of the participants ranged between 14 to 24 years. It was an experimental study and the data was collected from the Department of Physiotherapy, Rajeev Gandhi College from Bhopal (M.P.). Written informed consent was obtained from all the participants before data collection.

Equipments: The sit and reach test were used to evaluate flexibility in pittu players. The sit and reach test required the use of a specially constructed box which is known as sit and reach box (SR box). The subject removes his/her shoes and sit on the floor. The subject is asked to place both feet against the SR box with straight knees and legs together. Placing both hands together one upon another while keeping your knees, arms and finger fully extended with palms down then slowly reach forward towards the feet as much as he/she can. A measurement scale is placed on top of the SR box in a centimeter. The SR box scale ranged from 0 to 50 cm. The subjects were instructed to bend forward as much as he/she can then sliding their hands along the measuring scale on the SR box while maintain their knees, arms, fingers fully extended and hold the position for 6 second [9, 12, 13].

Demographic variable assessment: For measuring height stadiometer was used and for weight, bone mass, protein, muscle mass, body water, body fat and BMI; FITDAYS smart Bluetooth scale from health sense (Model no. BS171 manufactured in China) was used.

Pittu sport: This sport involves two teams. It is a simple game in which equipment like a tennis ball, whistle, seven stones, score sheet, stopwatch are required. A tower of seven stones is built by the players of one team and the aim is to break the tower with the ball and rebuilt it before the

opponent teams hits the players. The team who won the toss start the game. Each player gets three chances to hit the tower and if he fails to do so, another player from the same team takes the chance. The game is beneficial for the player to co-ordinate and cooperate with each other and also helps in increasing concentration, stamina level. It amplifies physical and psychological fitness, alertness and activeness. The players of the seeker team throw a ball at seven stones to destroy it. If they can then the seeker team tries to rebuilt seven stones. While the hitter team tries to hit the ball at them. If the ball touches to any player of the seeker team, then his team gets out. In the seeker team every player gets 3 chances to destroy it. If any one of the team cannot break seven stones, then they get extra chance to destroy before 3 minutes. But if seeker succeed to destroy seven stones in 2nd chance, after rebuilt the seven stone they get half point of total score. If the hitters receiving the ball, then he/she should not keep the ball in hand more than 3 second. After 6 passes, there is compulsion of 7th pass that is hit, to opponent team. The team who destroys mostly the seven stones in 6 chances that team will win the match. As rules are mandatory in the game. Rules makes game more interesting and reliable [14].

Statistical analysis: We applied Shapiro-wilk test for the evaluation of normality of the data. We found that our data was normally distributed. Therefore, we used parametric test for the analysis of our data. We use independent -sample t-test for comparing demographic variables and flexibility between males and females. Overall data of males and females was used to determine co-relation between flexibility and demographic variables using Pearson's correlations test.

Results

Our results showed that there were significances differences found in males and females in variables such as height, weight and BMI (Table 1). A significantly difference flexibility was also observed between males and females (Graph 1). Our results also demonstrated a significant correlation of flexibility with height, protein and body water (Table 2).

Table 1: Demographic variables

Sr. no		Male (Mean±S.D)	Female (Mean±S.D)	t-value	p-value
1	Age	19.42±2.48	19.33±2.08	-0.132	.896
2	Height	169.60±9.75	163.55±9.16	-2.160	.036
3	Weight	61.39±10.13	52.55±15.39	-2.469	.017
4	Bone mass	6.142±.6759	6.144±.5669	-.011	.991
5	Protein	26.76±3.44	27.52±3.57	-.746	.459
6	Body water	56.34±5.06	55.47±4.96	-.586	.560
7	Muscle mass	109.56±15.40	103.85±15.72	-1.256	.215
8	Body fat	14.18±8.24	12.72±9.16	-.582	.563
9	BMI	21.366±3.44	18.58±2.84	-2.919	.005

The table shows variations in height, weight and BMI. We found a significant difference ($p < 0.05$) between males and females in pittu players for the variables of height, weight and BMI which are represented with bold values.

Table 2: Correlation between demographic variables and flexibility performed

		Age	Height	Weight	Bone mass	Protein	Body water	Muscle mass	Body fat	BMI
Flexibility	Persons's value	-.056	.290*	-.050	-.109	-.093*	-.155*	-.192	.201	.122
	p-value	.697	.039	.725	.447	.051	.027	.178	.157	.394

The table shows the correlation between various demographic variables by using Pearson's value. Our results showed a negative correlation between flexibility and demographic variables specifically protein, body water

whereas a significant positive correlation between flexibility and height was found. '*' shows the significant values ($p < 0.05$).



Graph 1: Demographic variable in flexibility of Pittu player

The table shows a comparison of mean flexibility between males and females. We found a significant difference ($p < 0.05$) between males and females in pittu players for flexibility, assessed by the sit and reach test.

Discussion

The aim of our study was to evaluate flexibility in pittu players. Flexibility in pittu game has not been studied in any of the published research. We compared flexibility and demographic variables between males and females. We also evaluated correlation between flexibility and demographic variables. The result of this study demonstrated a significant difference in demographic variables between males and females. A significant correlation was also shown in our result, which is described below in detail.

As a component of physical and motor fitness, flexibility plays a significant role in enhancing performance in pittu game. Although the optimal level of flexibility is determined by sport specific and individual factors, other determinants such as Age, gender, genetics, body composition, activity level, muscle strength, injury or surgery, posture, stress, medical conditions also play a role in determining and maintaining flexibility [15]. Thus, we evaluated the relationship of flexibility with demographic variables and their difference in male and females. We found a significant difference in anthropometric variables such as height, weight, bone mass, protein, body water, muscle mass, body fat, BMI and flexibility between males and females. Evaluation of correlation between flexibility and anthropometric variables showed a positive significant correlation between height and flexibility and a significant negative correlation between flexibility and body water and protein.

Flexibility is the ability to shift muscle and joint through the full range of motion it also define as the ability to perform movement with greater range of motion or large amplitude. Males had a greater flexibility as compared to females, because males in our study had a greater height as compared to females. Therefore, they could reach forward to a greater extent as compared to females. However, previous

researches have shown that females possess greater flexibility as compared to males [16]. The reason for the difference in these findings from our finding is that we included adolescents and young adults of teenage group. In this age group muscle stiffness does to reach to an extent as that of a matured statured young adult. Thus, these results can be justified in our subjects.

A significant correlation between flexibility and water content of the body was found in our research. It indicates that appropriate water content is important to maintain muscle flexibility. Lesser water content that is dehydration can affect flexibility negatively, as it can cause muscles and joints to become stiff and less pliable. When the body is dehydrated, the muscles and joints can't move as easily, which can lead to reduced flexibility and mobility. This is because water is essential for lubricating joints, making them more flexible, and for keeping muscles pliable and elastic. On the other hand, over-hydration, or having too much water in the body, can also negatively affect flexibility. When there is excess water in the body, it can cause swelling, which can make it difficult to move joints and limit flexibility [17].

While protein is necessary for muscle growth and repair, having higher levels of body protein does not necessarily lead to increased flexibility. However, if the body lacks sufficient protein, it can affect muscle strength and recovery from exercise, which in turn can affect flexibility. Muscles that are weak or damaged due to a lack of protein may not be able to move through their full range of motion, leading to reduced flexibility despite of higher protein content. In addition to protein intake, other factors such as stretching, joint mobility, and overall fitness level can also influence flexibility. Regular stretching exercises, such as yoga or Pilates, can help improve flexibility by lengthening muscles and improving joint mobility. Overall, while protein is important for maintaining muscle health and function, its relationship with flexibility is complex and dependent on several other factors. It is important to maintain a balanced diet that includes adequate protein, as well as engage in regular exercise and stretching to maintain flexibility and

overall physical health^[18]. It's important to note that these factors are not mutually exclusive, and some may interact with each other to affect flexibility. By addressing these factors through proper nutrition, exercise, stretching, and lifestyle modifications, individuals can work to improve their flexibility and maintain overall physical health.

Conclusion

In conclusion, the measurement of flexibility is an important component of health-related fitness. The present study shows that negative correlation between flexibility and demographic variables specifically in protein, body water and positive correlation in height. Also, our results demonstrated a significant difference in demographic variables such as: height, protein, body water and flexibility between males and females. Sit and reach test is reliable for measurement of flexibility. The findings of this study add to our knowledge about the significance of the sit and reach test in predicting the performance of Pittu players. A similar study can be conducted on a broad population in various sports.

Acknowledgement

We would like to acknowledge Palak Sen, Khushboo Pathak and Maneesha Shrivastava for helping us in data collection. We acknowledge Pittu players for their participation and their valuable time.

Conflict of interest: None

Bibliography

1. https://fairgaze.com/fgnews/pittu-a-soulful-game_82248.html
2. Santhosh D, Shanthi AG, Ruckmani VS. Neuropsychological Perspective of South Indian Folk Games-Insight.
3. Pal S, Kalra S, Kumar S, Pawaria S, Rishi P. A Literature Review on Common Injuries and Their Prevention in Kabaddi. *European Journal of Sports & Exercise Science*. 2020;9(1):01-09.
4. Corbin CB, Noble L. Flexibility: A major component of physical fitness. *Journal of Physical Education and Recreation*. 1980 Jun 1;51(6):23-60.
5. Gleim GW, McHugh MP. Flexibility and its effects on sports injury and performance. *Sports medicine*. 1997 Nov;24(5):289-299.
6. Ingraham SJ. The role of flexibility in injury prevention and athletic performance: have we stretched the truth. *Minnesota medicine*. 2003 May 1;86(5):58-61.
7. Hedrick A. Flexibility: Flexibility and the Conditioning Program. *Strength & Conditioning Journal*. 1993 Aug 1;15(4):62-67.
8. Wadhwa G, Garg C. Comparison of Sit and Reach test, Back Saver Sit and Reach test and Chair Sit and Reach test for measurement of hamstring flexibility in female graduate and undergraduate physiotherapy students. *National Editorial Advisory Board*. 2014 Oct;8(4):4230.
9. López-Miñarro PA, Sáinz de Baranda P, Rodríguez-García PL, Yuste JL. Comparison between sit-and-reach test and V sit-and-reach test in young adults. *Gazzetta Medica Italiana*. 2008 Aug;167(4):135-142.
10. Cuberek R, Machová I, Lipenská M. Reliability of V sit-and-reach test used for flexibility self-assessment in females. *Acta Gymnica*. 2013 Dec 18;43(1):35-39.
11. Muyor JM, Vaquero-Cristóbal R, Alacid F, López-Miñarro PA. Criterion-related validity of sit-and-reach and toe-touch tests as a measure of hamstring extensibility in athletes. *The Journal of Strength & Conditioning Research*. 2014 Feb 1;28(2):546-555.
12. Baltacı G, Un N, Tunay V, Besler A, Gerçeker SE. Comparison of three different sit and reach tests for measurement of hamstring flexibility in female university students. *British journal of sports medicine*. 2003 Feb 1;37(1):59-61.
13. Hui SC, Yuen PY. Validity of the modified back-saver sit-and-reach test: a comparison with other protocols. *Medicine and science in sports and exercise*. 2000 Sep 1;32(9):1655-1659.
14. <https://www.scribd.com/document/489428969/Rules-Lagori>.
15. Pollock ML, Gaesser GA, Butcher JD, Després JP, Dishman RK, Franklin BA, *et al*. ACSM position stand: the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. *Journals AZ> Medicine & Science*. 1998 Jun;30(6)
16. Nalin K. A Study to Assess Static Flexibility Using SIT and Reach Test among Normal Individuals (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
17. Ullucci PA, Casa DJ, Matthews TD, Rosene JM. Dehydration reduces posterior leg and trunk flexibility and increases stiffness in male collegiate age runners.
18. Naseeb MA, Volpe SL. Protein and exercise in the prevention of sarcopenia and aging. *Nutrition research*. 2017 Apr 1;40:1-20.