

Comparative Study of Muscle Strength and Flexibility in Cricket, Football and Basketball Players.

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Abstract

Background: Cricket, football, and basketball are dynamic sports that require intensive training to develop strength & flexibility.

Objectives: The aim of this study is to measure and compare strength in cricket, football, basketball players, and versatility. We have measured handgrip strength, leg & back strength, and shoulder, back & ankle flexibility.

Materials and Methods: Total of 60 healthy crickets, football & basketball players (15-25 years), from the sport academy were included. They must be regularly practicing players for the last 3 years. Shoulder elevation test, modified sit & reach test (back flexibility), ankle flexibility test was done. We used an unpaired test was for comparison.

Result: There was a highly significant gap statistically in handgrip power & elbow, cricketers' back flexibility than basketball players than football players. Also, there was a highly significant difference for leg & back strength, ankle flexibility in football players than in cricket players than in basketball players.

Conclusion: The data may be helpful in future research on the selection of players and the recognition of talent in the game. So that the right sport will take place for the right athlete.

Keywords: Flexibility, Basketball, Football.

Introduction

A sport has mass participation, as it draws individuals either for fun, physical exercise, or for work. Since the past, sports have been organized at competitive levels, but rivalry in sports has now reached the highest level. Hundreds of young aspirants devote time and energy to these activities to achieve success.

Cricket, football, basketball are dynamic sports that demand intensive of training. Many studies have shown that unique anthropometric features are a significant cause of sports success.¹ Scientist around the world are trying to find a common formula that can improve the performance of professional players and discover abilities as efficiently as possible.² Because each sport has its own specific specifications, each athlete should have specific anthropometric features, flexibility, flexibility. Football is the most popular sport worldwide. The FIFA World Cup finals of 1998 attracted a million television spectators.³ The

economic benefits of having the ability to recruit talented players. Early development gains have led to the creation of 'academies' as 'centers of excellence' attached to the major professional soccer clubs worldwide. Various measures have been used for soccer players' physical fitness. Injury risk,⁴ training history and match experience,⁵ psychological,⁶ technical,⁷ motor,⁸ and perceptual-cognitive skills have been investigated. In addition, it has been shown that anthropometric and physiological features, maturity status,⁹ and the effect of the time during the election year in which players are born are predictors of success in young soccer players. A longitudinal approach is required to support talent prediction and growth.¹⁰ Cricket is a field-based popular team game in most countries. It is a most common game, especially in India, which is a bat and ball game played on a field between two teams of 11 players, at the centre of which is a rectangular 22-yard-long pitch. Though cricket is one of the oldest organized sports, there is very little research on the game's physical requirements.¹¹ There are few scientifically sound training programs for cricketers.¹² This was a direct consequence of more scientifically based physical training programs prior to their Cricket World Cup wins in 1991. In addition, the increased demands imposed on many cricketers now provide a further need for them to not only be in peak physical condition for success, but also for injury prevention. International cricketers are now subject to higher demands reflected in more matches of five and one days per season, longer seasons, and more regular touring.¹³ Despite the limited cricket data, over the last few decades, teams that have accepted the belief that sports analysis leads to improved results have excelled.¹⁴ Basketball has gained worldwide prominence.¹⁵ In this sport, players cover between 4500-5000 m during a 40-minute game with a range of multidirectional movements such as running, dribbling, and shuffling at varying speeds, and jumping.¹⁶ Some research explained advantages of using scientific criteria in the process of talent detection and identification reduces time required to reach high performance, eliminates a high volume of work, energy, and talent on the part of the coach, increases competitiveness, increases an athlete's self-confidence, indirectly facilitates applying scientific training.

In cricket, muscle strength and flexibility are known as important factors that determine an athlete's physical condition as it is required for bating, balling, throwing purposes. Handgrip strength is characterized as the strength and force of the muscles they can create with their hands. The forceful flexion of all finger joints, thumbs, wrists with full voluntary force is the result of which the subject is able to exercise under normal bio-kinetic conditions.¹⁷ According to German Sports, the fingers and the thumb act as a flexible pair of pliers. For bating, balling, throwing purposes, also leg and back strength are important for cricket. In football, kicking, tackling, and jumping have been proposed to be relevant to muscle strength. For throwing, handgrip is important and leg and back strength play a role in kicking and retaining balance in sports. During such operations, the power production is related to the strength and flexibility of the muscles involved in movements. In Basketball, the ball can be advanced on the court by bouncing it while walking, running, throwing it to the teammate. Passing movement require good handgrip strength and running movements require good leg and back strength. Flexibility is an important factor for all sports. The success of sport is depending on flexibility. Many authors give the concept of flexibility as a motor ability that, with the aid of a partner or a piece of equipment, provides body motion with an absolute range of movement in a joint or set of joints that are attainable in a momentary effort.

To ensure a better quality of life and optimum success in professional sports, an acceptable degree of versatility is required. In certain sports requirements, flexibility is now recognized as a valuable part of an athlete's physical fitness program for the purpose of injury prevention, improved and successful results, or quicker and safer recovery, regardless of

achieving great flexibility as a fundamental motor ability.¹⁸ Without proper direction, a person begins to take part in a game or event. It is therefore a pure probability that his selection of the sport will be fitting to his innate skill. Therefore, in most situations, the inability to become a champion is unavoidable. There is, therefore, an urgent need to provide advice to those endowed with such acceptable features that form the basis of success in a game or case. This could be one of the most significant variables in most countries that will help to increase the quality of sports. In Japan, however, the method of selection holding physique in view was implemented in more than one thousand schools and administered from kindergartens to universities to some three hundred thousand subjects. Physical fitness is required for the promotion of the national physical training program. A physique is not, however, the exclusive selection factor. The other variables that decide success need due consideration as well. The target should be, "Catch them young." In this way, the choice of talent would help to use the time and resources of coaches and athletes in a more productive way. In particular, the poor performance of Indian athletes and athletes at international competitions was of great concern to coaches, physical educationists, and sports scientists. Efforts have long been made to raise the standards of our sportsmen, but little improvement has been achieved in this respect so far. In contrast to the most frequently played sports in India, i.e. football and cricket, basketball, there is a lack of literature. For cricket, football, and basketball players, the aims of this analysis are to calculate flexibility and muscle power. Strength and flexibility are different in cricket and football, basketball. By comparing each sport, we can determine the market for each sport. To strengthen these parameters, we can plan training programs. As, there is the paucity of literature in India, in comparison to flexibility and strength in these 3 sports. Therefore, I felt the need to do this research.

Material and Methods

Study design: Cross-sectional.

Study Setting: Department of Physiology, GMC Solapur, Maharashtra, India

Ethical Approval: Institution Ethical Committee, Dr. VM GMC, Solapur, Maharashtra

Sample Size: 90 Players. Group I 30cricket, Group II 30 football, Group III 30 basketball players

Statistical analysis: unpaired t-test, Microsoft Excel, SPSS version 19

Inclusion criteria:

- Normal 30 cricket, 30 football, 30 basketball players playing cricket from last 3 years still playing at the university level, state-level or national-level.
- Age group between 15- 25 years.
- Practicing in daily football practice for 2-3 hours for 6 days a week.
- Subjects with the written consent.

Exclusion criteria:

- Subjects suffering from disease or injury or any treatment and surgery.
- Ambidextrous subject using both hands with equal ease.

Methodology:

Handgrip strength:

The handgrip dynamometry used in the study was of the Digital Hand Grip (Figures 1, 2) Researchers have proved its validity and reliability proved.¹⁹ A standard testing position was used, as accepted by the American Hand Therapist Society (ASHT). We demonstrated methodology to all subjects.²⁰

Figure 1:



Handgrip strength²⁰

HG Dynamometer

Upright posture, arm at side, squeeze

Leg strength²¹

BLC Dynamometer

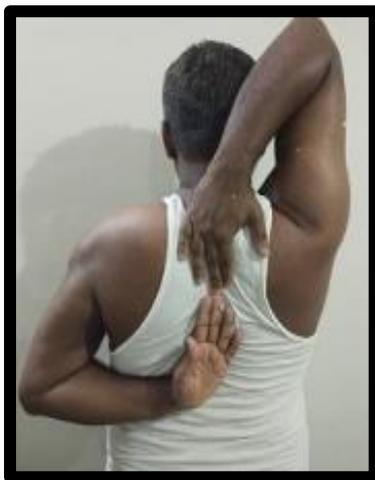
Trunk erect, knees flexed, bar across thighs, extend legs

Back strength.²¹

BLC Dynamometer

Erect posture, knees extended, bar should lift Upward.

Figure 2:



Shoulder flexibility²²

Measuring tape

One hand behind head, & back over shoulder, reach to touch middle finger of both hands.



Back flexibility

Sit & reach test²³

Measuring tape

Knee extended, Slowly reach forward with both hands & hold it for 2 sec



Ankle flexibility²³

Measuring tape

Feet together, arm outstretched, chest against wall, move both feet away from wall

Back-leg-chest strength.²¹

A calibrated BLC dynamometer tests the strength of the isometric muscle, recorded in kilograms of force (kg) and pounds (lb). A steel spring compresses and a pointer shifts when an external force is applied to a handle which is connected to an elastic chain. In ten pound intervals, the dial ranges from 0 to 2500 pounds. By asking the subject to stand on the base

of the BLC dynamometer with extended knees, we modified the length of the chain to the height of the participants. Then the handle was located at the height of the knee joint's intra-articular space. Participants then had to balance on the foundation, with slightly flexed knees and hips while maintaining an acceptable lordotic curve on the lower back. By supplying continuous isometric contractions of the extensors of the knees, hips, and lower back while holding the handle, subjects were asked to lift in a vertical direction. Participants were asked to progressively raise the pull in a safe way and achieve the maximum force in three seconds while sustaining the pull for a further two seconds. Three trials were conducted after a demonstration and a familiarization trial, with rest intervals of 30 seconds between trials. For further study, the full intensity was used for the three experiments.

Shoulder Rotation Test/ Flexibility.²²

We have done this test in a standing position. We instructed the athlete to put one hand over the shoulder behind the head and back, and stretch as far down the center of his back as possible, his palm touching his body and his fingers pointing downward. We instructed him to put the other arm behind his back, the palm facing outward and the fingers facing upward, and to try to cross or overlap the middle fingers on both hands as much as possible. We have directed athlete so that fingers are aligned, and to measure the distance between tips of middle fingers. If you hit your fingers, the score is zero. We have measured the distance between the fingertips (a negative score) if they do not touch, if they overlap, by calculating how much (a positive score). He trained twice and then checked twice. We have stopped the test if the pain is encountered by the subject. We have recorded the best score to the nearest centimeter or 1/2 inch.

Back flexibility.²³

Sit and Reach Test to obtain the lower back and hamstring endurance of the athlete. We used measurement tape. Sitting on the floor with legs spread straight ahead, the test was carried out. Shoes were removed. Yardstick was placed on the floor and tape was placed across it at a right angle to the 15 in the mark. The athlete was instructed to sit with the yardstick between the legs. Athlete instructed to slowly reach forward with both hands as far as possible, holding the same position approximately 2s. We kept an eye on keeping the participant's hands parallel and not leading with one hand. The best was recorded in two trials. We also made sure that the athletes' knees remain extended.

Ankle Static Flexibility Test.²⁴

We have instructed athletes to removes their shoes &warms up for 10 minutes. The athlete stands to face the wall, feet together close to the base of the wall, arms outstretched above the head on the wall and chest against the wall. We then advised him to step both feet away from the wall as slowly as possible. We checked to ensure that the feet of the athlete are together, heels on the ground, chest against the wall, and arms spread out over the head on the wall, so that these requirements are met, the athlete must change their position. We have measured and recorded the distance along the ground from the wall to the big toes. The test was performed three times and the longest distance was used to determine the success of the competitor.

Results

It was found that statistically there was a high significant difference in handgrip strength & shoulder, back flexibility of cricketers than basketball players than football players.

And in football players, there was a very substantial difference in leg & back strength, ankle flexibility, then in cricket players, then in basketball players.

In comparison, I have found the following conclusions.

- 1) Hand grip strength– **cricket**>basketball>football.
- 2) Leg strength– **football** >cricket>basketball
- 3) Back strength– **football**>cricket>basketball
- 4) Shoulder flexibility– **cricket**>basketball>football
- 5) Back flexibility– **cricket**>basketball>football
- 6) Ankle flexion– **football** > cricket>basketball

Table 1: comparison of strengths and flexibilities in cricket, basketball & football players

Sport	Cricket n=30 Mean (S.D.)	Basket Ball n=30 Mean (S.D.)	Foot Ball n=30 Mean (S.D.)	p- value	Result
Strength (K.G.)					
Hand Grip Strength	46.600(5.82)	41.867 (6.06)	37.100 (4.37)	≤0.001	HS
Leg strength	31.947 (3.73)	22.627 (2.50)	33.560 (2.50)	≤0.001	HS
Back strength	31.617 (2.46)	28.790 (3.84)	32.807 (2.72)	≤0.001	HS
Flexibility (Inch)					
Shoulder flexibility	39.773 (5.51)	39.240 (5.35)	32.810 (3.13)	≤0.001	HS
Back flexibility	1.833 (1.01)	1.0083 (0.572)	0.91667 (0.6333)	≤0.001	HS
Ankle flexibility	10.703 (1.84)	8.533 (1.08)	10.783 (2.01)	≤0.001	HS

p ≤ 0.001, Highly Significant

Discussion

	Hand grip strength	Leg strength	Back strength	Shoulder flexibility	Back flexibility	Ankle flexibility
My study finding	More in cricketer	More in footballer	More in footballer	More in cricketer.	More in cricketer.	More in footballer
Analysis	Pitcher, hitter have to grip , swing the bat, hit and throw Consistent these movements	Exercise, vigorous training and use of legs for different movements	Exercise, vigorous training and use of legs for different movements like	Much use of upper part of body. Consistent these movements & practice of upper part of	May be because of excessive use of hamstring muscles in batting,	Much use of lower part of body. Consistent these movements & practice of upper part of

	& practice of upper part of body		kicking, jumping	body	bowling.	body
Reference	Correlates with study of Shyamal koley. ²⁵	Correlates with study of Berg K, Richard W. Latin. ²⁶	Correlates with study of Berg K, Richard W. Latin. ²⁷	MilivoJdopsa - footballers possess low shoulder flexibility. ²⁷	Santosh Kumar study- flexibility was more in football. ²⁸	Milivo Jdopsa. ²⁷ F. Alburquerque, F. Sanchez - footballers possess more ankle flexibility. ²⁹

As per my study, handgrip strength is more in cricketer than basketball players than in football players. It may be because, pitcher and heater have to grip and swing the bat, hit and throw so consistent these movements & practice of the upper part of the body lead to increased handgrip strength. As per the thesis of Barut C, Demirel P, Kiran S, handgrip strength was more in basketball than in holly ball and handball players.³⁰ As per the thesis of shyamalkoley, handgrip strength is more in cricketer than in the control group ($t = 6.098$, $p \leq 0.001$).²⁵

For Leg and Back strength, my studies show there is a significant difference between these 3 sports. Compared to basketball players, football players and cricketers have more leg and back strength. Exercise and rigorous training in sports and the use of legs for various activities such as kicking, jumping, tackling contribute to improved strength. Our study coincides with the study Berg K, Richard W. Latin, who states that leg and back strength is more in football players ($p \leq 0.005$).²⁶

For Shoulder flexibility, the shoulder rotation test, showed, the flexibility of the cricketer is more than basketball than football. As per the thesis of milivojdopsa football players possess the least flexibility.²⁷ In-sufficient exercise within the training phase is the primary explanation for poor flexibility. Cricketers have more as they use the upper part of the body a lot.

For back flexibility, my study showed, the flexibility of a cricketer is more than basketball than football. As per flexibility is more in football players than cricketers which are contradictory to my results. In my results, more flexibility in cricketers may be because of excessive use of hamstring muscles in batting, bowling. Our study coincides with the study of Santosh Kumar, who states that back flexibility is more in footballplayers²⁸. For reliability of the sit and reach test is done by Goran Sporis.³¹

For Ankle flexibility, my study ankle flexibility is more in football players than basketball than cricketer. As per the thesis of F. Alburquerque, F. Sanchez footballer have good ankle flexibility because of different movements & practice cause use of lower extremities.²⁹

There is a lack of literature comparing these three sports, although there is no evidence of such studies in our field.

Conclusion

This data can be used as a measure of the player's playing status, players' physical fitness. Evaluating athletes can help a coach assess a player's ability to play in a certain position. To improve the efficiency of the players, this knowledge can be used. Sports authorities can use the data to design sport-specific training program. The data might be useful in the future

investigations on player's selection and talent identification in the game. So that 'Right sports for the right player' will take place. It will be helpful for Sport prescription purposes.

Suggestions for further studies-

1. To check and compare the findings with the younger population, studies should be carried out on various age groups, sports person populations.
2. Number of sample sizes should be increased and comparing of results should be done.
3. For reference to the player's physique, more anthropometric tests should be conducted.
4. Study in the future can be done on an equal number of Rt and Lt hand DM subjects and find the difference in bilateral handgrip strength.
5. At different levels and conditions, dynamometers can be used to find out any improvement in handgrip power. One can find out which dynamometer settings are comfortable and generate more handgrip strength by using different settings.
6. The study should consider different aspects of the sport prescription method.

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