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A comparative study of flexibility and fat percentage components of Chaudhary Charan Singh University's volleyball and basketball players

Dr. Sushil Kumar and Dr. Hoshiyar Singh

Abstract

The objective of the present study was to compare the selected flexibility and fat percentage variables of the male Volleyball and Basketball Players of Western Uttar Pradesh. 26 male Volleyball and Basketball Players who had represented Chaudhary Charan Singh University in the inter- university Championships were taken as subjects. To accomplish the objectives of the study six flexibility components namely shoulder flexibility, elbow flexibility, wrist flexibility, trunk flexibility, knee flexibility, ankle flexibility and fat percentage component were measured using steel stick, measuring tape, goniometer and portable sits and reach bench and Slaughter et al.'s (1988) population specific body fat percentage mathematical equation. It was hypothesised that there would be a significant difference in the flexibility and fat percentage components of university Volleyball and Basketball players. The collected data was analysed applying 's' test and the level of significance was set at 0.05 level of confidence. The results showed that the university team Volleyball and Basketball players had significant difference on the wrist flexibility characteristic only whereas both the groups were found to be having nearly identical shoulder, elbow, hip, knee and ankle flexibility features. Moreover, significant difference was found between the two groups on the fat percentage component. Hence, the directional hypothesis was partially rejected and partially accepted.

Keywords: Flexibility, fat percentage, university team, volleyball and basketball

Introduction

Volleyball

Volleyball is a team sport in which two teams of six players are separated by a net. Each team tries to score points by grounding a ball on the other team's court under organized rules. It has been a part of the official program of the Summer Olympic Games since Tokyo 1964. Beach volleyball was introduced to the programme at the Atlanta 1996. The adapted version of volleyball at the Summer Paralympic Games is sitting volleyball.

The complete set of rules is extensive, but play essentially proceeds as follows: a player on one of the teams begins a 'rally' by serving the ball (tossing or releasing it and then hitting it with a hand or arm), from behind the back boundary line of the court, over the net, and into the receiving team's court. The receiving team must not let the ball be grounded within their court. The team may touch the ball up to three times to return the ball to the other side of the court, but individual players may not touch the ball twice consecutively. Typically, the first two touches are used to set up for an attack. An attack is an attempt to direct the ball back over the net in such a way that the team receiving the ball is unable to pass the ball and continue the rally, thus, losing the point. The team that wins the rally is awarded a point and serves the ball to start the next rally. A few of the most common faults include:

- causing the ball to touch the ground or floor outside the opponents' court or without first passing over the net;
- catching and throwing the ball;
- double hit: two consecutive contacts with the ball made by the same player;
- four consecutive contacts with the ball made by the same team;
- net foul: touching the net during play;
- foot fault: the foot crosses over the boundary line when serving or under the net when a front row player is trying to keep the ball in play.

The ball is usually played with the hands or arms, but players can legally strike or push (short contact) the ball with any part of the body.

A number of consistent techniques have evolved in volleyball, including spiking and blocking (because these plays are made above the top of the net, the vertical jump is an athletic skill emphasized in the sport) as well as passing, setting, and specialized player positions and offensive and defensive structures [4]

Basketball

Basketball is a team sport in which two teams, most commonly of five players each, opposing one another on a rectangular court, compete with the primary objective of shooting a basketball (approximately 9.4 inches (24 cm) in diameter) through the defender's hoop (a basket 18 inches (46 cm) in diameter mounted 10 feet (3.048 m) high to a backboard at each end of the court, while preventing the opposing team from shooting through their own hoop. A field goal is worth two points, unless made from behind the three-point line, when it is worth three. After a foul, timed play stops and the player fouled or designated to shoot a technical foul is given one, two or three one-point free throws. The team with the most points at the end of the game wins, but if regulation play expires with the score tied, an additional period of play (overtime) is mandated.

Players advance the ball by bouncing it while walking or running (dribbling) or by passing it to a teammate, both of which require considerable skill. On offense, players may use a variety of shots – the layup, the jump shot, or a dunk; on defense, they may steal the ball from a dribbler, intercept passes, or block shots; either offense or defense may collect a rebound, that is, a missed shot that bounces from rim or backboard. It is a violation to lift or drag one's pivot foot without dribbling the ball, to carry it, or to hold the ball with both hands then resume dribbling.

The five players on each side fall into five playing positions. The tallest player is usually the center, the second-tallest and strongest is the power forward, a slightly shorter but more agile player is the small forward, and the shortest players or the best ball handlers are the shooting guard and the point guard, who implements the coach's game plan by managing the execution of offensive and defensive plays (player positioning). Informally, players may play three-on-three, two-on-two, and one-on-one.

Invented in 1891 by Canadian-American gym teacher James Naismith in Springfield, Massachusetts, United States, basketball has evolved to become one of the world's most popular and widely viewed sports. The National Basketball Association (NBA) is the most significant professional basketball league in the world in terms of popularity, salaries, talent, and level of competition. Outside North America, the top clubs from national leagues qualify to continental championships such as the Euro League and the Basketball Champions League Americas. The FIBA Basketball World Cup and Men's Olympic Basketball Tournament are the major international events of the sport and attract top national teams from around the world. Each continent hosts regional competitions for national teams, like Euro Basket and FIBA Ameri Cup.

The FIBA Women's Basketball World Cup and Women's Olympic Basketball Tournament feature top national teams from continental championships. The main North American league is the WNBA (NCAA Women's Division I Basketball Championship is also popular), whereas the strongest

European clubs participate in the Euro League Women.

Fitness had always been a concern of man from pre-historic times. Harry et al. (1965) [3] concluded that "People were not agreed as to what constitute physical fitness though it is important to everyone". The expression "Physically fit" is very much common (vague). Percival and Taylor (1982)

[5] Concluded that every individual has different level of fitness. Which may change from time to time, it may also change from place to place and sometimes it may changes with work or situation also. Physical fitness is defined as the ability to carry out daily tasks with vigour and alertness, without undue fatigue, and with ample energy to enjoy leisure pursuits and to meet unforeseen emergencies. Physical fitness can best be understood in terms of their components, each of which have a distinctive feature and contribute an essential element to the individual. The most important measurable components of physical fitness are muscular strength, cardiovascular endurance, speed, flexibility and agility. Sports play an important role in the development of physical, mental and emotional health. Strength is the ability of a muscle to generate force against resistance.

Different sports place different degrees of demands on the athlete's physiological set-up and it has been scientifically proved that different sports or different events in same sports require the demand of different bodily characteristics. Flexibility is needed to perform everyday activities with relative ease. Flexibility tends to deteriorate with age often due to a sedentary life style. Without adequate flexibility, daily activities may become more difficult to perform over time, we create body movements and postural habits that lead to reduce mobility of joints and compromised body position. Improved flexibility may enhance the performance in aerobic training and muscular conditioning as well as in sports. There is scientific evidence that the incidence of injury decreased when people include flexibility training in their routines due to enhanced ability to move.

Anthropometry provides scientific method and observation to help in finding out talent in sports. In same games, where players have to play at different positions, there too it has been found that the requirement of anthropometric characteristics is different. Role of anthropometry at the time of identification, selection and development of talent, can never be overlooked and that is why it is felt that this sports science plays marvellous role in enhancing the sports performance. Fat in the body is categorized as either "Essential" or "Storage". Essential fat which is necessary for normal physiologic functioning, in men about 3% of body fat is considered essential and in women, essential fat is higher about 12%. The storage fat is the primary energy reserve of the body and protects internal organs from injury. The range of total body fat (essential fat plus storage fat) associated with optimum health is 8% to 24% in male and 21% 35% in females (Gallagher et al. 2000) [10], although professional and elite athletes have body fats much lower than those of average person. Considering, all above factors researcher undertook the above titled study to unearth the relevant facts w.r.t. Volleyball and Basketball players of Western Uttar Pradesh.

Methodology

For the present study, investigator adopted selective sampling procedure. A sample of 26 males comprising of 12 Volleyball and 14 Basketball players who represented Chaudhary Charan Singh University in the inter-university Volleyball and Basketball championships during the academic session 2019-20 selected for the study. Prior to the collection of data, the

researcher assembled all the subjects in the hassle free place within the premises of the institution where the Volleyball and Basketball Championships were held. The investigators then, explained them about the various flexibility and skinfold measurements to be recorded from them and their purpose. Importantly, after proper explanation, researcher also gave the practical demonstration of various measurements before the subjects. Questions on the parts of the subject were allowed and their doubts and apprehensions were cleared. Among the selected six flexibility components four components namely; elbow flexibility, wrist flexibility, knee flexibility and ankle flexibility were measured using goniometer while shoulder flexibility was measured using steel stick and measuring tape whereas trunk flexibility was measured by administering portable sits and reach test. Moreover, body fat percentage

was calculated using Slaughter et al.'s (1988) ^[11] population specific body fat percentage formula $\{\% \text{ Body fat} = 0.783 (\text{TS} + \text{SS}) + 1.7\}$ applying measured skinfold values. Where, TS = Triceps skinfold in mm and SS = Subscapular skinfold in mm. Statistical tools mean, standard deviation and t-test were used to analyse the data statistically. The level of significance was set at 0.05 level of confidence.

Results and discussion

Table 1 and 2 present the obtained mean values, standard deviations, mean difference, degrees of freedom, t-value and its level of significance w.r.t. selected flexibility and fat percentage components of Chaudhary Charan Singh University's Volleyball and Basketball team players.

Table 1: Comparison of Flexibility Components of Chaudhary Charan Singh University's Volleyball and Basketball Team Players

Sr. No.	Variables	Groups	N	Mean	SD	MD	df	't' Value
1.	Shoulder flexibility	V.B. U.T.	12	8.133	.9287	.017	24	.045
		B.B. U.T.	14	8.150	.9701			
2.	Elbow flexibility	V.B. U.T.	12	118.67	23.922	.88	24	.117
		B.B. U.T.	14	117.79	11.281			
3.	Wrist flexibility	V.B. U.T.	12	62.42	10.808	16.99	24	3.543*
		B.B. U.T.	14	45.43	13.625			
4.	Hip flexibility	V.B. U.T.	12	7.01	1.009	.26	24	.526
		B.B. U.T.	14	7.27	1.520			
5.	Knee flexibility	V.B. U.T.	12	110.25	18.091	10.61	24	1.253
		B.B. U.T.	14	99.64	24.933			
6.	Ankle flexibility	V.B. U.T.	12	46.08	7.154	2.21	24	.828
		B.B. U.T.	14	48.29	6.281			

*Significant at 0.01 level of confidence

As per Table 1 the mean values of shoulder flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players are 8.133 and 8.150 and mean difference is .017. The standard deviation for the Volleyball and Basketball players came out to be .9287 and .9701. The obtained "t" value at 24 df is .045 which is lesser than the "t" table value at 0.05 level of significance. Hence, it is interpreted that the two groups have no significant difference. Table 1 shows the mean values of elbow flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players to be 118.67 and 117.79 and mean difference as .88. The standard deviation for the Volleyball and Basketball players came out to be 23.922 and 11.281. The obtained "t" value at 24 df is .117 which is lesser than the "t" table value at 0.05 level of significance. Hence, it is interpreted that the two groups have no significant difference. Table 1 reveals that the mean values of wrist flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players are 62.42 and 45.43 and mean difference is 16.99. The standard deviation for the Volleyball and Basketball players came out to be 10.808 and 13.625. The obtained "t" value at 24 df is 3.543 Which is higher than the "t" table value at 0.01 level of significance. Hence, it is interpreted that the two groups have significant difference. Table 1 exhibits that the values of hip flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players are 7.01 and 7.27 and mean difference is .26. The

standard deviation for the Volleyball and Basketball players came out to be 1.009 and 1.520. The obtained "t" value at 24 df is .526 which is lesser than the "t" table value at 0.05 level of significance. Hence, it is interpreted that the two groups have no significant difference.

Table 1 presents that the mean values of knee flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players are 110.25 and 99.64 and mean difference is 10.61. The standard deviation for the Volleyball and Basketball players came out to be 18.091 and 24.933. The obtained "t" value at 24 df is 1.253 which is lesser than the "t" table value at 0.05 level of significance. Hence, it is interpreted that the two groups have no significant difference. As per Table 1 the mean values of ankle flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players are 46.08 and 48.29 and mean difference is 2.21. The standard deviation for the Volleyball and Basketball players came out to be 7.154 and 6.281. The obtained "t" value at 24 df is .828 which is lesser than the "t" table value at 0.05 level of significance. Hence, it is interpreted that the two groups have no significant difference. These facts are further shown in the Figure 1 where the comparison of mean values of six flexibility variables namely: shoulder flexibility, elbow flexibility, wrist flexibility, hip flexibility, knee flexibility and ankle flexibility of Chaudhary Charan Singh University's Volleyball and Basketball team players have been depicted graphically.

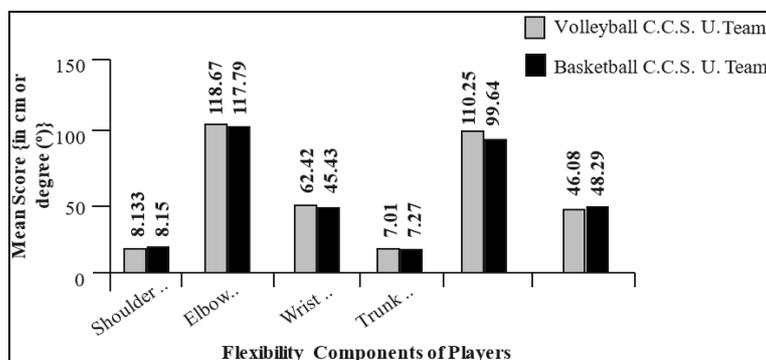


Fig 1: Comparison of Mean Scores of Flexibility Components of Chaudhary Charan Singh University's Volleyball and Basketball Team Players

Table 2: Comparison of Fat Percentage Component of Chaudhary Charan Singh University's Volleyball and Basketball Team Players

Sr. No.	Variables	Groups	N	Mean	SD	MD	df	't' Value
1.	Body Fat	V.B. U.T.	12	15.04150	6.253611	.57793	24	.276
	Percentage	B.B.U.T.	14	14.46357	3.953530			

Not significant at 0.05 level of confidence

Table 2 presents the mean values of fat percentage of Chaudhary Charan Singh University's Volleyball and Basketball team players to be 15.04150 and 14.46357 and mean difference as .57793. The standard deviation for the Volleyball and Basketball players came out to be 6.253611 and 3.953530. The obtained "t" value at 24 df is .276 which is lesser than the "t" table value at 0.05 level of significance.

Hence, it is interpreted that the two groups have no significant difference.

These facts are further shown in the Figure 2 where the comparison of mean values of fat percentage component of Chaudhary Charan Singh University's Volleyball and Basketball team players have been depicted graphically.

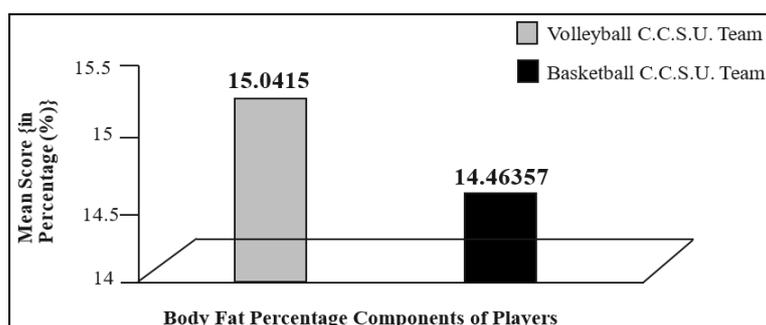


Fig 2: Comparison of Mean Scores of Fat Percentage Component of Chaudhary Charan Singh University's Volleyball and Basketball Team Players

Conclusion

There is a significant difference between the university team Volleyball and Basketball players on the basis of wrist flexibility characteristic only whereas both the groups are found to be having nearly identical shoulder, elbow, hip, knee and ankle flexibility features.

University team Volleyball and Basketball players differ significantly w.r.t fat percentage component.

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