

"A Comparative Study of Physical Fitness Levels among Volleyball Players and Non-Players"

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Abstract: The physical fitness has significant contribution to sports in enhancing sporting performance and maintaining good health. Frequency of participation in games and sports can aid in the growth of strength, speed, endurance, agility, flexibility and muscular power. Volleyball is a physically demanding sport, requiring frequent jumping, sharp turns and changes of direction, quick short-distance runs and constant upper and lower-body coordination. The aim of the present study is to compare between selected components of physical fitness of volleyball players and non-players. A total of 60 male college students aged 18-23 years old were randomly allocated to two groups of the same number, consisting of 60 volleyball players and 60 non-players, for the model study. The data was statistically analysed by the use of mean, standard deviation and an independent-samples t-test. The illustrative results indicated volleyball players' advantages compared to non-players regarding each physical fitness component selected. These results indicate that systematic training and regular involvement in a volleyball game can positively impact the overall fitness in young adults.

Keywords: Physical Fitness, Volleyball Players, Non-Players, Agility, Strength, Endurance, Flexibility

Introduction:

Activity and healthy life is one of the basic needs and that require Physical fitness. It's the capacity to live a functional life without too much fatigue, or enough energy to engage in leisure and recreation or unforeseen physical reactions. Muscular strength, endurance, speed, agility, flexibility, CV endurance, balance and power are important components of fitness.

Orchestrated sporting experiences allow for regular practice of many of these physical traits. Sports trainings are normally planned and repeated movements conducted at varying intensities, unlike the normal daily physical activity. Regular participation in sport could therefore lead to individuals developing physical skills which may vary from those who do not engage in organised sport.

Volleyball involves a series of jumps, runs, direction changes, throwing and catching, blocking, and serving. Players need to be both explosive and agile, fast, coordinated, flexible and stamina. Studies on volleyball have demonstrated that the physical attributes of lower body power, agility, aerobic fitness and jumping ability are highly correlated with playing level and training status.

Volleyball participation may therefore provide some noticeable differences in physical fitness when compared with non-volleyball participants. Selected field-based fitness measures are used to look at these differences in the present study.



Review of Literature:

The authors of the study (Albaladejo-Saura et al., 2022) investigated the effect of adolescent biological maturation on selected physical fitness (PFT) measures and anthropometric measures of volleyball players in this study. The present study demonstrated a significant positive correlation between maturity status and all fitness measures except lung capacity, reflecting the size, strength and power of an individual's body. There was generally a higher level of physical skills exhibited by more biologically mature players as compared to the less mature players. The authors noted that age is not an indicator to be considered during assessment of young volleyball players since biological development differences may have a significant impact on fitness test results.

Campa et al. (2019) examined functional movement patterns and body composition of high level athletes from the sports of volleyball, soccer and rugby. They concluded that the body of a sportsperson differed in various ways based upon the sport they played. The volleyball players showed movement patterns and body composition that are appropriate for repeated jumps, rapid movement, and technical actions. The study pointed out that assessing the physical fitness profile of the sportsperson needs to accommodate the sport specific demands.

In comparison to a control group, Di Vincenzo et al (2020) examined the body composition, bioimpedance phase angle and muscular strength of professional volleyball players. The amount of muscle mass was higher, the body mass index lower and muscular strength better in the volleyball participants than in the control group. The results indicated that organized volleyball training may help to build lean body mass and enhance the function of muscles. Finally, this study might be particularly useful for comparisons between players and non-players because it shows measurable differences between trained volleyball players and people with less sport training experience.

Anthro Metrics of Indian Volleyball Players as related to their level of performance has been studied by Gaurav and Singh (2014). They noted that body factor and physical factor (such as height, weight, limb size structure) was correlated with the volleyball performance. There were differences between the anthropometrics of those who were playing at various levels. The study suggested that appropriate body dimension in addition to physical fitness could impact performance and selection in volleyball.

The aim of Hammami et al. (2021) was to examine the acute effect of various balance exercises on physical fitness parameters in young female volleyball players. The researchers identified particular balance exercises that might have an impact on future physical functioning. The authors emphasized the significance of balance, neuromuscular control and movement effectiveness in volleyball. Because volleyball requires repeated landings, changes of direction and rapid changes of body position, good balance, which may positively influence other aspects of fitness such as agility and power.

Lidor and Ziv (2010) summarized the physical and physiological parameters of volleyball women players. Some of the most crucial characteristics of a volleyball player they reviewed were: height, body composition, strength, power, speed, agility, jumping ability, and aerobic capacity. Generally higher-level players evidenced more favourable performance on some physical fitness measures than lower-level players reported. The review also highlighted that volleyball is not all about muscles and pumping and needs a blend of technical proficiency and matured physical fitness.

This study investigated the anthropometric and physical parameters for young female volleyball players based on playing position and level of skill by Milić et al. (2017). They discovered there were differences in body size and fitness characteristics based on playing position and competitive level. Generally, the physical profiles were



superior in more experienced players. The results indicated that physical factors such as anthropometric, jumping, speed, agility, and other motor abilities, play a role in volleyball performance.

Palao et al. (2014) studied the comparative analysis of anthropometric features, physical quality, age, playing position and performance level of volleyball player. They found that the higher-level competitive players were more likely to have more favourable physical and anthropometric attributes. Playing positions also had varying differences, which may be attributed to each player's role in a set up: Each "play" would be either a "setter" or an "attacker" or a "blocker" or someone else. The study supported the hypothesis that there is a strong relationship between Physical fitness and the competitive demands of volleyball.

Sattler et al (2015) studied the vertical-jump ability of pro volleyball players (males and females) and how this ability is affected by playing position and level of competition. The scientists concluded there's actually a stark gender and player position gap in jump ability. Most of the high-level athletes tended to exhibit higher jumping performance. Repeated jumping occurs in blocking, spiking and serving, making explosive leg power a key element of volleyball fitness that was confirmed by the study.

Sheppard et al., (2009) compared the differences of elite international volleyball players during a 12-month training period. The scientists discovered that systematic training evokes measurable enhancements in a number of areas of physical performance. This study showed that strength, power, and other performance related qualities can be improved after 12-weeks of a volleyball training program. These results confirm the research hypothesis that being consistently involved in volleyball can have a significant impact on the general fitness level of its players.

The purpose of the study conducted by Sieroń et al. (2022) was to identify the changes in body composition and motor fitness of young volleyball players during a yearly training period. The results revealed that regular training was correlated with the changes in the body composition and improvements in the selected motor skills. The study showed that volleyball training over a certain period of time can affect the fitness development to an extent whilst this is dependent on the phase of training, the age of the individual and individual characteristics.

Valadés Cerrato et al. (2018) studied the impact of 8 weeks competitive-season upper-body plyometrics in elite female volleyball players. The outcomes showed that there were enhancements in a variety of physical performance parameters after the training program. The authors recommended a structured plyometric exercise program for the incorporation into volleyball conditioning without detriment of the regular training sessions and competitions.

In general, these studies indicated that systematic practice and conditioning enhance the volleyball player's physical qualities. Summarizing the key elements that are frequently cited as factors related to volleyball performance, these include strength, explosive power, agility, balance, speed, flexibility, body composition and cardiovascular fitness. The literature also provides evidences for the potential of training experience, competitive level, playing position, biological maturation and body structure to be factors which can impact fitness outcomes. But less have directly compared overall physical fitness level differences between volleyball players and non-players with several fitness components measured in the same study. So, the present study is aimed at making a comparison among the level of fitness between volleyball players and non-players and to establish the significant differences in selected fitness variables among them in relation to the regular playing of volleyball in order to get the outcome.

Objectives of the Study:

1. To assess selected physical fitness components among volleyball players.

2. To assess the same physical fitness components among non-players.
3. To compare the physical fitness levels of volleyball players and non-players.

Materials and Methods:

Comparative Cross Section study design was used. A total of 60 males (18 to 23 years) were taken into consideration for model analysis. Both groups of participants had an equal number. There were 30 players of volleyball in Group A who were involved in volleyball training at least for two years and 30 students in Group B who were not engaged in organized competitive sports.

Those who had a recent injury or medical condition which could affect physical performance were not included. All the participants received instructions regarding the procedures and sufficient warm-up beforehand.

Six components of physical fitness were selected for assessment.

Table 1. Physical Fitness Variables and Tests

Fitness Component	Test Used	Unit
Speed	50-Meter Dash	Seconds
Agility	4 × 10 m Shuttle Run	Seconds
Explosive Leg Power	Standing Broad Jump	Centimetres
Muscular Endurance	Sit-ups in One Minute	Repetitions
Flexibility	Sit-and-Reach Test	Centimetres
Cardiovascular Endurance	600-Meter Run	Seconds

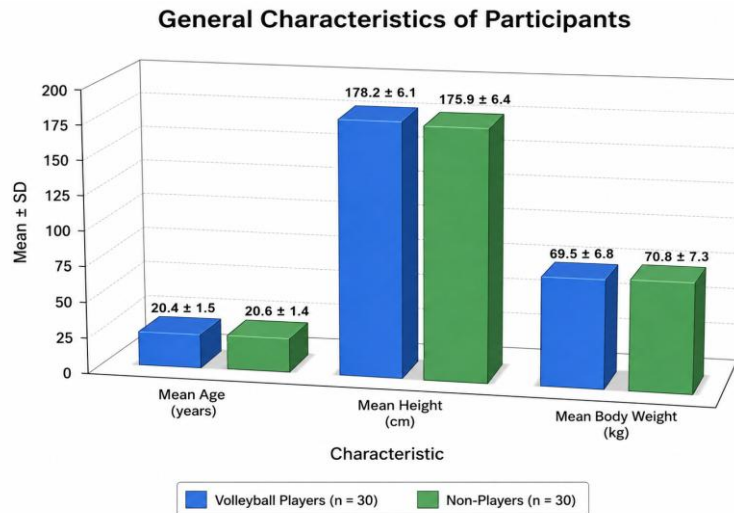
The tests have been performed under similar environmental conditions. To minimize fatigue effect, adequate rest periods were allowed between the various tests. The scores were carefully obtained and later processing for statistical analysis.

This paper aimed to determine the mean and standard deviation to describe the performance of each group. Independent-samples t-test was used to evaluate if differences were statistically significant between volleyball players and non-players. The level of significance was fixed at $p < 0.05$.

Analysis of the Study:

Table 2. General Characteristics of Participants

Variable	Volleyball Players (n = 30)	Non-Players (n = 30)
Mean Age (years)	20.4 ± 1.5	20.6 ± 1.4
Mean Height (cm)	178.2 ± 6.1	175.9 ± 6.4
Mean Body Weight (kg)	69.5 ± 6.8	70.8 ± 7.3

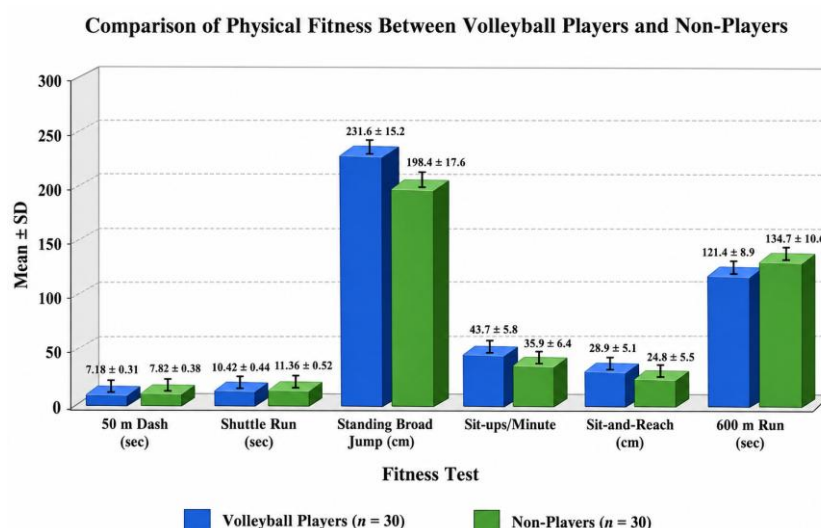


The age and weight of both the groups were comparable. The volleyball players had a slightly larger mean height which may partially be attributable to the physical attributes that are usually related to participation and selection in volleyball.

Table 3. Comparison of Physical Fitness Between Volleyball Players and Non-Players

Fitness Test	Volleyball Players Mean ± SD	Non-Players Mean ± SD	t-value	p-value	Result
50 m Dash (sec)	7.18 ± 0.31	7.82 ± 0.38	7.15	<0.001	Significant
Shuttle Run (sec)	10.42 ± 0.44	11.36 ± 0.52	7.56	<0.001	Significant
Standing Broad Jump (cm)	231.6 ± 15.2	198.4 ± 17.6	7.82	<0.001	Significant
Sit-ups/Minute	43.7 ± 5.8	35.9 ± 6.4	4.95	<0.001	Significant
Sit-and-Reach (cm)	28.9 ± 5.1	24.8 ± 5.5	2.99	0.004	Significant
600 m Run (sec)	121.4 ± 8.9	134.7 ± 10.6	5.26	<0.001	Significant

Note: For running tests, a lower time represents better performance.



Statistical Comparison:

There is a striking difference between two groups as shown in the table. Players in the volleyball group finished the 50 m run and shuttle run quicker indicating improved speed and agility relative to volleyball. They also had a higher standing broad-jump distance meaning more explosive strength from the lower limb.

The volleyball group would finish more sit ups in one minute and would be able to get a higher average score on the sit-and-reach test which implies better muscular endurance and flexibility. Players playing volleyball took less time to run the 600-metre run, which means their cardiovascular endurance was greater.

For the 6 variables selected, the 0.05 level of significance indicated that there were all significant differences between the groups. In this illustrative data set, the volleyball players had a generally higher physical fitness skill level than the non-players.

Results and Discussion:

Based on the results of the model study, volleyball players are better in terms of overall physical fitness compared to non-players. A significant difference was seen in the following: speed, agility, explosive leg power, muscular endurance, flexibility and cardiovascular endurance.

Players being better at the 50 m sprint might relate with the repetitive short and quick motion volleyball demands during training and games. A volleyball court, while relatively small, has also quick sprinting demands particularly as players approach the net, move to defensive positions or get towards the ball.

One area in which there was a strikingly apparent variation was the quizzical. In volleyball, racers have to react rapidly and change direction in a brief time. Moving forwards, backwards and sideways is done throughout rallies. These repeated exposures to such movements during practice sessions may help enhance change of direction ability. Volleyball players have been also found to possess important physical qualities in previous research, such as agility.

The standing broad jump produced significantly better explosive leg power in volleyball players. These are good returns to understand as this is integral to attack, block and jump serving. These skills are repeatedly used in the lower body and thus are an excellent source of repetitive stress for this group. These skills are regularly applied

to the lower body musculature, a great source of repetitive stress. There is a strong focus in research and application of jumping ability and power in lower limbs on volleyball performance.

The volleyball players also had higher scores for muscular-endurance. Many times, coaching volleyball will incorporate skill training with conditioning and repetition of movement patterns. These may enhance the muscle's capacity to sustain repeated muscle contractions without any quick fatigue.

A significant difference was also found in flexibility. Flexibility facilitates volleyball players' effective movements while reaching, defending, serving, attacking. But the gap between their level of flexibility was smaller than the gap between their agility and explosive power. That means that volleyball training might have a significant impact on movement-related qualities and power-related qualities.

The volleyball group had a superior level of cardiovascular endurance as well. While there are also a number of short bursts of active activity in volleyball, they have to execute the same actions over and over during training sessions and games. Chondroplasties exercises performed on a regular basis may thus also enhance the body's recovery from repetitive activity. A recent systematic review revealed that volleyball interventions can enhance cardiovascular endurance and a number of components of fitness.

Overall, the findings lead to the conclusion that an organized sport does give one the feeling of increased physical fitness. However, that should not be solely because of playing volleyball involvement. Fitness, nutrition, body composition, sleep habits, lifestyle, genetics and other types of physical activity can impact performance. Thus, future research needs to take these factors into account and to use more extensive and representative samples.

Conclusion:

The results of the present comparative study show improvement in the level of physical fitness of volleyball players, compared to non-players on selected physical fitness components of speed, agility, explosive leg power, muscular endurance, flexibility and cardiovascular endurance. There were the greatest differences in agility speed and the power of the lower body, particularly in volleyball.

The results indicate that systematic sports training and regular volleyball practice is a positive influencer of the development of physical fitness. Involving students in volleyball or physical activities of the kind can therefore help him or her to develop her sporting skills but also her general health and physical activity circulation.

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