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## **Study of Co-linearity between volleyball player fitness & team game performance in India**

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### **ABSTRACT**

The study revolves around the co-linearity of various fitness parameters with the team game performance of volleyball. It aims to point out the health-related fitness parameters and study the essence of the same, then examine the relation of the health-related and skill-related fitness parameters with the team performance in volleyball and to assess the extent to which team performance is affected by the fitness parameters. For this purpose, a compiled, clean and summarised version of data has been picked up from reports such as the annual report of youth affairs ministry, various sports journals, fitness magazines etc. Among the sports data, that associated with volleyball has been given focus and the information pertaining to the regional and inter-school sports teams are leveraged for the purpose of this study. The study has found that Cardiovascular Endurance and Muscular Endurance have moderate correlation with team performance. Muscular Strength is observed to be strongly correlated with team performance. Flexibility and Body Composition w.r.t height, weight, arm length etc., though perceived to be important in sports, are found to have a weak or nil correlation in the context of our data. Also, Agility of the players are found to be moderately correlated with team performance. The reaction time has moderate correlation with the team performance. However, the correlation is negative in this case. Speed and balance, although demand importance in the ground, are found to be not much influential with respect to the volleyball. They have a very weak or almost nil correlation with the team performance. Higher the Power of the players, better the team outcome has been obtained. From the Multiple Regression Analysis, it is evident that among the skill-related fitness parameters, only the Power factor is found to have a significant influence on the team performance, given the p-value of 0.04, which is less than the level of significance, 0.05. The study brings us to the conclusion that in terms of fitness parameters associated with health, Cardiovascular endurance and muscular strength is found to have a strong linkage with the performance of the students. Keeping this in mind, fitness training and exercises of the students should be better focused to muscular strength build-up with push-ups and cardiac capability enhancement with yoga, respiratory exercises etc. In terms of fitness parameters associated with skill, power, agility and prompt reaction have a greater influence on the students' performance. It suggests that the fitness trainer should give attention to enhance such skills with proper training and care. Health-related fitness is although prerequisite for sustenance and performance, the ultimate focus should be on skill-related fitness to enhance results. In contrary to the traditional view, body composition like height and hand length are not found



to be that much impactful on performance. So, attention should be shifted from body composition to dynamic fitness and skill build-up.

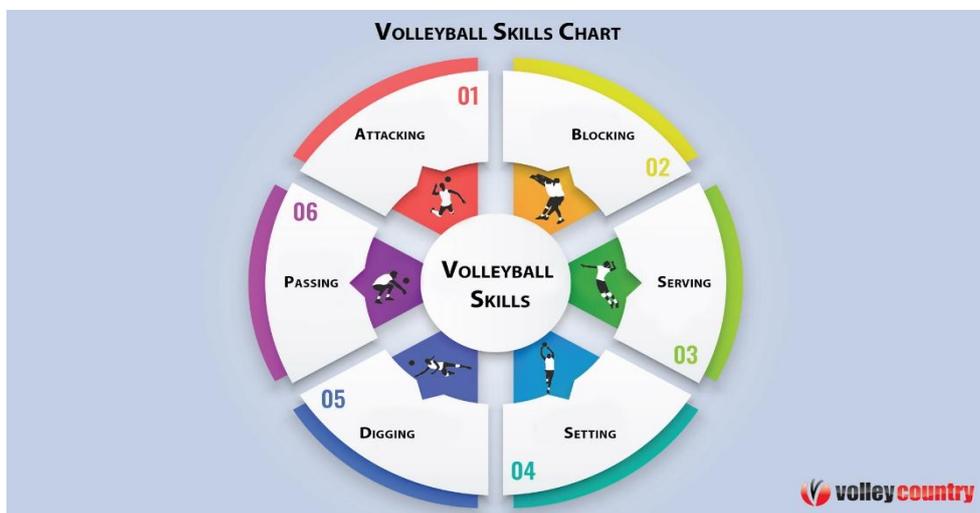
### Keywords:

Volleyball, Team Game, Correlation, Flexibility, Agility, Cardiovascular Endurance, Muscle Power, Sustenance.

## 1. INTRODUCTION

Health and well-being are directly proportional to sports and exercises. Volleyball is a notable outdoor sport which yields health benefits as well as instigate endurance. The health benefits comprise strengthening the muscles, good cardiac and respiratory condition, bone solidification etc. Still, to derive health benefit, a sound and healthy condition is necessary to be able to play. Physical strength, cardiac stability, body composition, and agility are some of the prerequisites for playing volleyball. For a player, physical fitness is of utmost importance to sustain the gruesome exercises and enormous strain on the ground.

The tropical climate condition of Indian subcontinent features hot and humid weather. Due to this factor, players often suffer from dehydration and physical breakdown caused by workouts and sports-related strain. Therefore, fitness is crucial to endure such drawbacks to reap the maximum benefit of playing Sports while maintaining a sustainable health setup.



Source: Internet

Apart from physical fitness, personality and mental fitness are also key determinants of a successful Volleyball player. For the Holistic development of a player, the right combination of attitude, motivation, and physical fitness is predominantly required. Also, the psychosocial



aspects need to be taken care of in terms of team building and cooperative mindset among players. The moral and ethical aspects of a player contribute to good sportsmanship and a balanced team game in the result.

## 2. REVIEW OF LITERATURE

**Corbin CB, Pangrazi RP, Franks DB** Propounded that a player should always be active. the performance of a player is dependent on his speed agility and reaction time. Proper care should be given to the health of a volleyball player to manifest his strength and power to be able to take on the challenges of the game.

**Wormhoudt R, Savelsbergh GJP, Teunissen JW, Davids Kin** their study supported the view that the player should be optimized with proper training and exercise on a regular basis. There should be a physical health profile with a preset checklist that needs to be reviewed with each player periodically. Also, the effort should be put in place to keep the players high in spirit and infuse consistent motivation in them in an ongoing basis.

**Webb P, Pearson P, Forrest G.** that the teachers in primary and secondary schools should be empowered to guide and supervise the students in the context of their health and fitness. This should have an awareness of different kinds of sports and related fitness standards. Also, the nutrition standards should be taken care of among the students as a complementary measure to realise the sports Endeavour.

**Lorenz and colleagues** highlighted that Sports live volleyball or rugby are more inclined towards individual performances rather than a proper team game. An elite player who is properly trained excels over others in the field. Such a performance is attributed to the agility and speed of the player. Such a disparity can impede team spirit and Jeopardise the outcome to a very extent.

**Caspersen CJ, Powell KE, and Christenson GM** viewed that the anthropological characteristics like height, body weight, and shoulder size may not be that much related to the performance of a volleyball player. It is the skill and training of a player that determines the outcome. Physic may be helpful in this regard but is neither necessary nor sufficient for the outcome of a volleyball player.

## 3. RESEARCH GAP

As far the studies referred has covered, the importance of fitness in the field of sports including volleyball has been highlighted. However, there is a need of bringing up a proper lineage between the different fitness parameters and the sports performances. It is also needed to distinguish the health-related fitness criteria and the skill-related fitness criteria and their relative importance on the outcome of a Volleyball player. The quantifiable impact of fitness on the outcome of sports that is crucial for understanding the true essence of health benefits is lacking so far.



#### **4. RELEVANCE OF THE STUDY**

To enhance the performance of a team as a whole, fitness and health factors must be given due importance. Proper channelization of the player's energy towards sports needs serious attention. A curative lookout towards the linkage of health and fitness with the team performance is a relevant aspect to be take care of. With the recent push towards sports by governments in regional and national level, it has become imperative to put focus on sports.

#### **5. OBJECTIVES OF THE STUDY**

1. To point out the health-related fitness parameters and study the essence of the same.
2. To examine the relation of the health-related and skill-related fitness parameters with the team performance in volleyball.
3. To assess the extent to which team performance is affected by the fitness parameters.

#### **6. RESEARCH METHODOLOGY**

##### **6.1 Source of Data**

The data for the purpose of research is sourced from several secondary sources. A compiled, clean and summarised version of data has been picked up from reports such as the annual report of youth affairs ministry, various sports journals, fitness magazines etc.

Among the sports data, that associated with volleyball has been given focus and the information pertaining to the regional and inter-school sports teams are leveraged for the purpose of this study.

##### **6.2 Research Framework**

The research uses statistical techniques such as Correlation analysis and Multiple Linear Regression analysis to analyse and interpret the data regarding following two fitness parameters.



1. Health-related Fitness Parameters

- ✓ Cardiovascular Endurance
- ✓ Muscular Endurance
- ✓ Muscular Strength
- ✓ Flexibility
- ✓ Body Composition

2. Skill-related Fitness Parameters

- ✓ Agility
- ✓ Balance
- ✓ Speed
- ✓ Power
- ✓ Reaction Time

In the context of assessing the impact of above two groups of fitness parameters, following linear equations have been envisaged.

$$\text{Team Performance} = a + b_1 \cdot \text{Cardiovascular Endurance} + b_2 \cdot \text{Muscular Endurance} + b_3 \cdot \text{Muscular Strength} + b_4 \cdot \text{Flexibility} + b_5 \cdot \text{Body Composition} + e_1$$

$$\text{Team Performance} = c + d_1 \cdot \text{Agility} + d_2 \cdot \text{Balance} + d_3 \cdot \text{Speed} + d_4 \cdot \text{Power} + d_5 \cdot \text{Reaction Time} + e_2$$

## 7. DATA ANALYSIS

### 7.1 Health-related Fitness Analysis

Correlation Table		
	Team Performance	Degree of Correlation
Cardiovascular Endurance	$r = 0.46$	Moderate
Muscular Endurance	$r = 0.34$	Moderate
Muscular Strength	$r = 0.67$	Strong
Flexibility	$r = 0.09$	Nil
Body Composition	$r = 0.19$	Weak



From the correlation table, we can render that Cardiovascular Endurance and Muscular Endurance have moderate correlation with team performance. That implies teams with players having good cardiac and respiratory stamina as well as muscular durability tend to sustain more and deliver somewhat good performance collectively.

Muscular Strength is observed to be strongly correlated with team performance. This implies that higher the muscular strength, more impact the servicing and pressure have on the opponent.

Flexibility and Body Composition w.r.t height, weight, arm length etc., though perceived to be important in sports, are found to have a weak or nil correlation in the context of our data.

Coefficient Table of Multiple Linear Regression		
	t-value	p-value (Significance)
(Constant)	1.24	0.34
Cardiovascular Endurance	2.48	0.09
Muscular Endurance	1.83	0.14
Muscular Strength	2.93	0.07
Flexibility	0.98	0.31
Body Composition	1.12	0.26

The Multiple Linear Regression analysis brings out that none of the fitness parameters have any significant impact on the dependent variable, team performance. All the coefficients of the regression equation correspond to the p-value higher than 0.05, that is outside the critical region. So, we render their non-significance in the context of the database.

## 7.2 Skill-related Fitness Analysis

Correlation Table		
	Team Performance	Degree of Correlation
Agility	$r = 0.38$	Moderate
Balance	$r = 0.04$	Nil
Speed	$r = 0.19$	Weak
Power	$r = 0.69$	Strong
Reaction Time	$r = -0.48$	Moderate



Agility of the players are found to be moderately correlated with team performance. Higher the agility of players, greater the team outcome tends to be. Also, the reaction time has moderate correlation with the team performance. However, the correlation is negative in this case. That renders that less reaction time of players collectively produces higher team outcome.

Speed and balance, although demand importance in the ground, are found to be not much influential with respect to the volleyball. They have a very weak or almost nil correlation with the team performance.

Higher the Power of the players, better the team outcome has been obtained. The statistical analysis substantiates the linkage with a higher value of correlation coefficient.

Coefficient Table of Multiple Linear Regression		
	t-value	p-value (Significance)
(Constant)	2.2	0.21
Agility	2.62	0.08
Balance	0.72	0.37
Speed	1.12	0.29
Power	3.64	0.04
Reaction Time	-1.9	0.11

From the Multiple Regression Analysis, it is evident that among the skill-related fitness parameters, only the Power factor is found to have a significant influence on the team performance, given the p-value of 0.04, which is less than the level of significance, 0.05.

## 8. CONCLUSION & SUGGESTIONS

The study makes us conclude some of the important findings and their interpretation and further paves way towards some relevant suggestions.

- In terms of fitness parameters associated with health, Cardiovascular endurance and muscular strength is found to have a strong linkage with the performance of the students. Keeping this in mind, fitness training and exercises of the students should be better focused to muscular strength build-up with push-ups and cardiac capability enhancement with yoga, respiratory exercises etc.



- In terms of fitness parameters associated with skill, power, agility and prompt reaction have a greater influence on the students' performance. So, the fitness trainer should give attention to enhance such skills with proper training and care.
- Health-related fitness is although prerequisite for sustenance and performance, the ultimate focus should be on skill-related fitness to enhance results.
- In contrary to the traditional view, body composition like height and hand length are not found to be that much impactful on performance. So, attention should be shifted from body composition to dynamic fitness and skill build-up.

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