

## Physical Variables and Badminton Performance: A Relationship Study

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### Abstract

An individual rally is a series of demanding movements performed using a movement pattern which is unique. Study focused on finding out the relationship of physical variables (strength of Arm and Leg, flexibility and agility) with the performance of badminton players. Twenty badminton players were randomly selected from Tripura who represented the state in the national tournament. To measure the selected physical variables i.e., arm strength, leg strength, flexibility, agility, the following tests were employed: for arm strength - the Rogers formula was employed in which height was measured in inches, weight in kilograms, push-ups and pull-ups in numbers, leg strength in kilograms, flexibility test for spine, shoulder and wrist and shuttle run for agility. The badminton player's performance was evaluated by a panel of experts. Zero order correlation was used to measure the relationship between selected physical variables and badminton performance and level of significance was set at 0.05. The result reveals that all the physical variables were found significant except spine flexibility. The skills in badminton are highly technical and mainly concerned with relative strength, strength endurance, quickness in combination of flexibility is highly associated with badminton performance.

**KEYWORD:** Strength, quickness, flexibility, badminton

### INTRODUCTION

Physical activities and sports are an integral part of society and culture. It has been a part of life for all people from the primitive period to present. The influence of international sports has made physical activity a part of life in all cultures and nations. Physical activity is the process by which the individual is shaped to fit into the society and which maintains and advances the social order. It is a systematic process designed to make a man more rational, mature and knowledgeable as well as the modification of behavior of an individual for his own personal happiness, better adjustment and better citizen.

In response to the demand of the society, a long standing profession has focused on human physical activity. It has scientifically and philosophically collected information about people in motion and has made a descriptive analysis of benefits of regular exercise, commonly known as physical fitness. It has had the basics of physical education for thousands of years. Even in primitive times it was recognized that physical exercise was capable of increasing the physical fitness of an individual. Modern physical education is not just exercise, serving as a balance to sedentary living, not merely physical training, but a qualitative program based on knowledge of physiological and psychological effects of exercise at various age levels. It concerns itself with factors of aging, fatigue, nutrition, rest, sleep as these relate to one's health.

In today's techno-scientific age the world has completely changed in all aspects due to discovery and research. Thus, the field of fitness also changed with the help of

scientific training and coaching. The athletes are being trained on scientific guidelines with highly sophisticated means, for better achievement in their concerned sports enabling the coaches to get optimum performance with minimum expenditure of energy and time. They are being exposed to exercise training for the benefit of achieving higher standards.

Mind without muscles cannot make the human body functional and nor can the muscles strength make a top performance. So strength is an important component, which affects the performance in any activity and modern system of training. It is created by a contraction of the muscle fibers. The contraction results due to the proteins present in the muscle, mainly atomism. Strength can be developed through systematic training. It is the most dependent component of fitness in which good performance is based (Yuri V. Verkhoshansky, 2006). The development of specific strength for each specific sport can be achieved through specific training methods. Training never stops and it is exhausting and continues throughout the year with varying intensity, duration and resistance to suit one's sport (Nicolas Appiotitis, 1979).

Besides strength, quickness combined with agility and flexibility are the prerequisite components of specific fitness which is required in every sport. Flexibility is an important component of physical fitness, which helps in synchronizing the various movements. Moreover, flexibility is an essential part of life even for a common man who can avert a possible injury resulting from a fall while performing daily chores. It concerns the degree of movements and it limits the degree of movement depending on the flexibility and extensibility of the muscles and the ligaments surrounding the particular joint. The Significance of flexibility in sports as well as in daily life is inevitable. It is the fundamental for qualitatively and quantitatively well executed movements. Learning of motor skills and rate of their acquisition depends upon the optimum amount of flexibility in the concerned joint area. For a strong, quick, easy and expressive movement an athlete is supposed to have command over the score of this flexibility. It is well known that individuals have different degrees of flexibility. Differences also exist in different areas of the body, within the individuals for example, flexibility of the Hamstrings or flexibility of lower back. Difference among the individuals is also affected by the use of a particular area of the body. It has been a common belief that a high degree of flexibility is necessary for success in all athletic endeavours (Richard Godfrey and Gregory Whyte, 2006).

Skill-related component of physical fitness that is related to the ability to rapidly change the position of the entire body in space with speed and accuracy (Retrieved on 02.06.2022). It is the ability to move and change the direction and position of the body quickly and effectively while under control (Robert A. Donatelli, Kenji Carp, 2007). It is one of the key components of fitness and is valuable in many sports and physical activities. Badminton-like games which are ranked highest for agility require changes of direction in response to a stimulus (Erika Zemkova and Dusan Hamar (2014).

Unit of body movement performed is required in badminton play. All units are action focused i.e. they focus on what the body can do and other qualitative and spatial aspects are used as a means of developing the action focus. Badminton is an extremely demanding sport. At an elite level, players are often required to perform at

their limits of speed, agility, flexibility, endurance and strength. On top of all of this, players must maintain a high state of concentration in order to meet the tactical / mental demands of dealing with their opponents. The varied potential stresses of competitive play are considerable. It is therefore essential that everyone involved with the modern game ought to be familiar with the fitness (physiological) requirements of the game and how 'Badminton fitness' can be enhanced (Badminton Association of England, 2002).

### Objective

To take out the relationship between physical variables (selected) and the performance of badminton players.

### Methodology

#### Selection of subjects

To fulfill the objective, twenty (20) badminton players were randomly selected from Tripura and their age range between 18-24 years (senior level players).

#### Selection of variables

Keeping the desirous of the sports, the following physical variables were selected and treated as independent variables:

1. Arm strength
2. Leg strength
3. Flexibility
4. Agility

Further, to find out the relationship of these selected variables with the performance of badminton players are considered as dependent variables.

**Table-1: Criterion measures**

Sl.No	Variables	Criterion measures
1	Arm strength	The Rogers formula was employed in which height was measured in inches, weight in kilograms, push-ups and pull-ups in numbers and the formula was: $(\text{Pull ups} + \text{Push-up}) \left( \frac{W}{10} + H - 60 \right)$
2	Leg strength	Leg dynamometer to the nearest kilogram.
3	Flexibility	Spine and shoulder-wrist flexibility was taken by flexomeasure with yardstick to the nearest inches.
4	Agility	4x10 yards shuttle run and recorded the nearest 1/10 <sup>th</sup> of a second.

### Players performance in Badminton

The performance of the players are evaluated by three qualified experts and were given points out of 20 to each player according to their skills, techniques, acquisition and perfection throughout the game.

### Statistic

For determining the significant relationships of arm strength, leg strength, flexibility and agility with the performance, the Pearson's product moment correlation method was used with level of significance was set at 0.05.

### Analysis of data and results

The test-retest method was employed to determine reliability of performance of the subjects. The performance of the subjects in arm strength, leg strength, flexibility, and agility were recorded on two days with a gap of one day in between. Pearson's 'r' method was used to find out the coefficient of correlation, and data are presented in table 1.

**Table- 2**  
**Coefficient of reliability of test retests scores**

Test Items	'r'
Arm strength	0.941*
Leg strength	0.923*
Spine flexibility	0.827*
Shoulder -wrist flexibility	0.876*
Agility	0.948*

\*Significant at 0.05 level of significance

The reliability of the test retest scores of arm strength, leg strength, spine flexibility, shoulder-wrist agility, flexibility are obtained respectively 0.941\*, 0.923\*, 0.827\*, 0.876\*, 0.948\*, which was significant at 0.05 level of significance with (2, 18) degree of freedom is 0.444.

To find out the relationship between independent variables i.e. arm strength, leg strength, agility and flexibility with the dependent variable of players performance was obtained by "zero-order correlation".

**Table-3: Coefficient of correlation**

Independent Variables	'r'
Arm strength	0.534*
Leg strength	0.562*
Spine flexibility	-0.114
Shoulder-wrist flexibility	0.545*
Agility	0.493*

\*Significant,  $r_{.05}(2, 18) = 0.444$

The table-3 reveals that arm strength, leg strength, shoulder-wrist flexibility and agility were found significant with the badminton performance. The significant

coefficient of correlation values are 0.534\*, 0.562\*, 0.545\* and 0.493\* respectively. On the other hand spine flexibility was not found significant at 0.05 level of significance with (2, 18) degree of freedom.

### Conclusion

Based on the results, it was concluded that arm strength, leg strength, shoulder-wrist flexibility, and agility significantly influenced the performance of badminton players. Infact, the skills in badminton are highly technical and mainly concerned with relative strength, strength endurance, quickness in combination of flexibility is highly associated with badminton performance.

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