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A COMPARATIVE STUDY OF MUSCULAR STRENGTH, MUSCULAR ENDURANCE, AND FLEXIBILITY BETWEEN BADMINTON AND TABLE TENNIS PLAYERS OF MANIPUR

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Abstract: Physical fitness is a multifaceted concept encompassing various health and performance attributes. The study aimed to compare the physical fitness components like muscular strength, muscular endurance, and Flexibility of badminton and Table Tennis players from Manipur. For this study fifty (n=50) players aged from 18 to 25 years were selected, 25 female players each from the game of badminton and Table Tennis. An Independent 't' test statistical technique was employed to find the significant difference among Badminton and Table Tennis players. For muscular strength, the Hand Grip test was used and the Mean (M) and Standard Deviation of the Hand Grip test were 26.64±1.51 and 23.31±1.57. The p-value of Hand Grip is 0.001, at a 0.05 level of significance. For muscular endurance of the abdomen, the Knee Bent Sit-Up test was used and the Mean (M) and Standard Deviation of the Knee Bent Sit-Up test were 21.36±2.13 and 17.96±3.13. The p-value of Knee Bent Sit-Up is 0.001, at a 0.05 level of significance. For flexibility, the Shoulder and wrist elevation test was used and the Mean (M) and Standard Deviation of the Shoulder and wrist elevation test were 14.24±1.09 and 13.44±1.47. The p-value of the shoulder and wrist elevation test is 0.34, at a 0.05 level of significance. It can be revealed that these two sports can be pronounced as significantly different in terms of Muscular Strength, and Muscular Endurance, and no significant difference was found in Flexibility.

Keywords: *Badminton, Flexibility, Muscular Endurance, Muscular Strength, Table Tennis.*

Introduction:

Athletes in all sports must acquire and maintain physical fitness, and each sport has its characteristics, such as strength, endurance, and flexibility. Fast-paced, precision-based sports like badminton and table tennis require great coordination, agility, and quick thinking. Nonetheless, the physical demands of various sports vary greatly. Gaining insight into how particular physical fitness characteristics, including muscular strength, endurance, and flexibility, differ across players participating in these activities can help determine the best training plans for each discipline and provide recommendations for improving performance.

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Muscular strength is the highest power that a muscle or set of muscles can generate, whereas muscular endurance is the ability to work continuously without tiring. Flexibility is the range of motion available at a joint, which improves overall movement efficiency and lowers the chance of injury. All three components are necessary for badminton and table tennis players, however, the emphasis on each differs according to the sport's requirements. Muscular strength, endurance, and flexibility have been identified as separate degrees of competence in a wide range of occupations.

It has been viewed as an integrated composite of various attributes like strength, endurance, power, speed, agility, balance, response time, and coordination traits that are required for success in a range of motor systems. In successful motor performance, these qualities combine in an ineffective sequence to provide an exact and efficient movement, whether it's a single effort like a golf drive or a series of intricate and constantly changing actions like basketball (Clark 1976). Singh et al. (2017) researched to compare specified motor fitness component levels among Uttarakhand state-level racquet sport participants.

This study aims to compare and contrast the physical strength, endurance, and flexibility of badminton and table tennis players. By analyzing these physical traits, we hope to gain a better knowledge of how each activity fosters the development of certain fitness features, as well as identify the key components that contribute to peak performance.

Methods:

Population and Sample

Twenty-five (n=25) badminton players, fifty (n=50) players, and twenty-five (n=25) table tennis players were selected for the study from the Manipur Table Tennis Association and the Manipur Badminton Association. The age range of the subjects is 18 to 25 years old. The sample was chosen at random. To gauge physical strength, the Hand Grip Test was employed. The Knee Bent Sit-Up test was used to measure the endurance of the abdominal muscles, and the results were recorded in seconds. The findings of the Shoulder and Wrist Elevation Test, which measures flexibility, were expressed in cm.

Data Analysis

The collected data was kept in the Statistical Package for Social Sciences (SPSS) 27.0 application. The statistical approach known as the independent 't' test was used to determine the significant difference between badminton and table tennis players. In every case, a 0.05 level of significance was used.

Result and Findings

Table 1: Comparison of Scores on Muscular Strength (Hand Grip) Between Badminton Players and Table Tennis Players

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Variables	Groups	N	Mean	Standard Deviation	df	p-value
Muscular Strength	Badminton	25	26.64	1.51	58	0.001**
	Table Tennis	25	23.32	1.57		

***Significant at p<0.005**

According to Table 1, the mean and standard deviation scores of muscular strengths for badminton players are 26.64±1.51, whereas for table tennis players they are 23.31±1.57. The sig (p-value) value for muscular strength is 0.001, with df 48 at the 0.05 threshold of significance, indicating a significant difference in muscular strength.

The graphical representation of the mean comparison of Muscular strength between Badminton and Table Tennis players is depicted in Fig. 1.

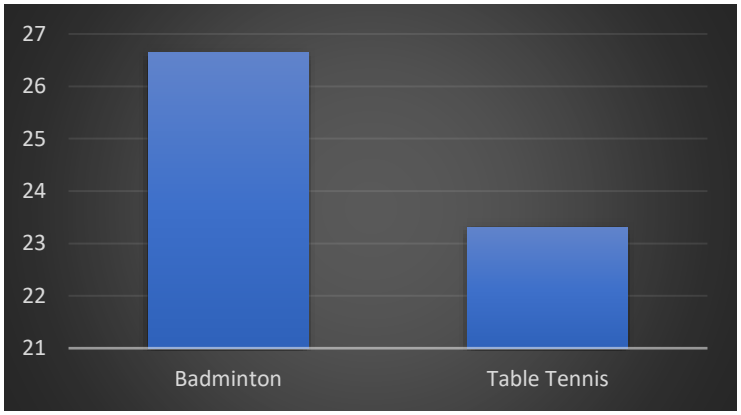

Fig 1: Mean Scores of Badminton Players and Table Tennis Players on Muscular Strength

Table 2: Comparison of scores on muscular endurance (Knee-bent sit-ups) between badminton players and table tennis players

Variables	Groups	N	Mean	Standard Deviation	df	p-value
Muscular endurance	Badminton	25	21.36	2.13	58	0.001**
	Table Tennis	25	17.96	3.13		

***Significant at p<0.005**

Table 2 shows that the mean and standard deviation scores of muscular endurance for badminton players are 21.36±2.13, whereas those for table tennis players are 17.96±3.13. The sig (p-value) value for muscular endurance is 0.001, with df 48 at the 0.05 threshold of significance, indicating a significant difference in muscular endurance.

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The graphical representation of the mean comparison of Muscular strength between Badminton and Table Tennis players is depicted in Fig. 2.

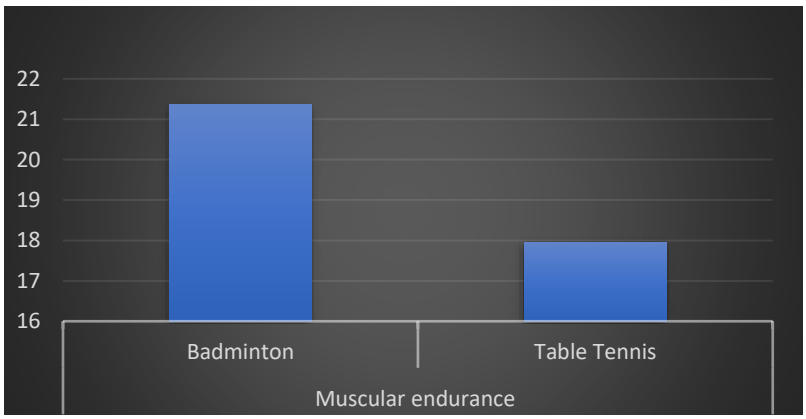

Fig 2: Mean Scores of Badminton Players and Table Tennis Players on Muscular Endurance

Table 3: Comparison of scores on flexibility (Shoulder and wrist elevation test) between badminton players and table tennis players

Variables	Groups	N	Mean	Standard Deviation	df	p-value
Flexibility	**Badminton**	**25**	**14.24 ±1.09**	**1.09**	**58**	**0.34**
	Table Tennis	**25**	**13.44 ±1.47**	**1.47**		

***Significant at p<0.005**

Table 3 shows that Badminton players' flexibility scores are 14.24±1.09, whereas Table Tennis players' scores are 13.44±1.47. The sig (p-value) for flexibility is 0.34 with df 48 at the 0.05 level of significance, indicating that there was no significant difference in flexibility.

The graphical representation of the mean comparison of flexibility between Badminton and Table Tennis players is depicted in Fig. 3.

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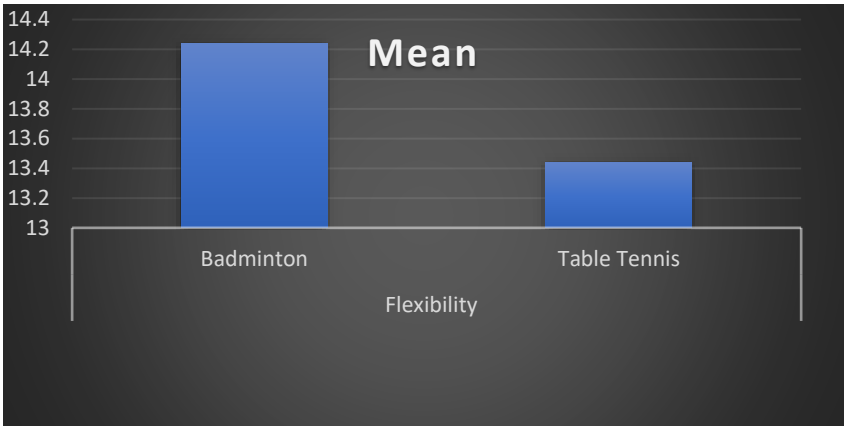

Fig 3: Mean Scores of Badminton Players and Table Tennis Players on flexibility

Discussion:

The present study assessed the strength, endurance, and flexibility of badminton and table tennis players in Manipur and revealed important differences in their physical fitness profiles. A significant difference was observed in muscle strength and endurance, with badminton players outperforming table tennis players, while no significant variation was found in flexibility. These differences are likely due to the varying practice modes, training demands, and fitness levels of the two sports, whereas the similarities in flexibility may be explained by the comparable playing styles and motor fitness requirements. Such findings provide useful insights for athletes and coaches in developing sport-specific training programs and monitoring fitness profiles.

The outcomes of this study align with recent research demonstrating that structured training interventions substantially improve physical fitness and performance across sporting disciplines. For example, Fenta and Mola (2023) found that an eight-week calisthenics program enhanced fitness quality and skill performance in handball players, while Mola et al. (2025) reported notable gains in long jumpers' performance following a 12-week training program. Singh et al. (2024) similarly showed that neuromuscular training improved speed and explosive power in football players, and Tyagi et al. (2025) highlighted position-specific physical attribute distinctions among male Kho-Kho athletes. Together, these studies reinforce the current findings by emphasizing the importance of sport-specific conditioning and well-designed training interventions to maximize athletic performance across different sporting contexts.

Conclusion:

The results show a significant difference in physical strength and endurance among badminton and table tennis players. There is no noticeable difference in flexibility between the players of the two games. This study is important for the two games' competitors since it contributes to the studies on muscle strength, endurance, and flexibility. It is notable in terms of citing earlier research in the field of sports sciences.

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