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Evaluating Speed, Agility, and Endurance in Individual and Team Sports: A Comparative Approach

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Abstract
Physical fitness is a key determinant of athletic performance, with speed, agility, and endurance playing crucial roles across various sports disciplines. This study aimed to compare these three fitness components among individual and team sport athletes to understand how different sporting environments influence physical attributes. The research was conducted on 120 male athletes (60 from individual sports—wrestling, judo, and boxing, and 60 from team sports—hockey, football, and basketball) who had secured podium finishes in inter-collegiate competitions of Haryana universities.
A survey and observation-based approach was used, and physical fitness was assessed using standardized tests: the 50-Yard Dash for speed, the Shuttle Run for agility, and the 600-Yard Run/Walk for endurance. Statistical analyses, including mean, standard deviation, and t-tests, were employed to determine differences between the two groups.
Results revealed that team sport athletes demonstrated significantly superior speed (Mean: 5.800s vs. 6.663s; $p < 0.0001$) and agility (Mean: 8.628s vs. 10.078s; $p < 0.0001$) compared to individual sport athletes. This difference is attributed to the high-intensity, dynamic nature of team sports, which demand frequent directional changes and rapid acceleration. However, no significant difference was observed in endurance (Mean: 96.62s vs. 96.78s; $p = 0.8366$), suggesting that both groups develop similar aerobic capacities due to the endurance requirements inherent in their respective sports.
The findings reject the null hypotheses for speed and agility but accept it for endurance. These insights can help coaches and trainers develop sport-specific training programs to enhance performance based on the unique physical demands of each sport. Future research should explore additional physiological and biomechanical factors to gain a more comprehensive understanding of athletic performance across different sporting disciplines.

Keywords: Physical fitness, speed, agility, endurance, individual sports, team sports, athletic performance

Introduction

Physical fitness plays a crucial role in athletic performance across various sports disciplines. Speed, agility, and endurance are three fundamental components that significantly impact an athlete's ability to compete effectively (Bompa & Haff, 2009). While both individual and team sports require a high level of physical fitness, the specific demands of these sports vary due to differences in gameplay, movement patterns, and strategic requirements (Reilly, Bangsbo, & Franks, 2000). Speed, defined as the ability to move quickly across a distance, is essential in both individual and team sports, but its application differs. For instance, sprinters in track and field rely on maximum velocity over short distances, whereas soccer or hockey players require intermittent bursts of speed throughout a game (Cronin & Hansen, 2005). Similarly, agility, the ability to change direction rapidly while maintaining balance and control, is critical in team sports such as basketball, football, and field hockey, where quick reactions to opponents and dynamic gameplay are necessary (Sheppard & Young, 2006). In contrast, individual sport athletes, such as tennis players, depend on agility in one-on-one competitive settings (Sporis et al., 2010). Endurance, or the ability to sustain physical effort over time, is another key differentiator between individual and team sports. Long-distance runners, cyclists, and swimmers require continuous aerobic capacity to maintain consistent performance, while team sports demand a combination of aerobic and anaerobic endurance due to frequent changes in intensity (Bangsbo, Mohr, & Krustrup, 2006). The physiological and psychological demands of these sports suggest that training programs must be tailored to the specific requirements of each discipline. This study aims to compare speed, agility, and endurance among individual and team sport athletes, providing insights into how different sporting environments influence these physical fitness components. Understanding these differences can help coaches, trainers, and athletes optimize their training methodologies for enhanced performance in their respective sports.

Objectives

The objectives of this research are:
1. To analyze the differences in speed between individual and team sport athletes.
2. To examine the variations in agility between individual and team sport athletes.
3. To assess the differences in endurance between individual and team sport athletes.

Hypothesis

1. There is no significant difference in speed between individual and team sport athletes.
2. There is no significant difference in agility between individual and team sport athletes.
3. There is no significant difference in endurance between individual and team sport athletes.

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Delimitations of the Study

The scope of this study is defined by the following delimitations:

1. The study focuses on the physical fitness components of speed, agility, and endurance.
2. The study is limited to 100 athletes (50 individual sport athletes and 50 team sport athletes) from Haryana universities, namely KUK, MDU Rohtak, and CDLU Sirsa.
3. Participants will be within the age range of 17-27 years, as per AIU regulations.
4. The study includes athletes from selected individual sports (wrestling, judo, and boxing) and team sports (hockey, football, and basketball).
5. Only athletes who have secured 1st, 2nd, or 3rd positions in inter-college competitions of Haryana state universities will be considered.

Design of the study:

The present study employed survey and observation methods to evaluate speed, agility, and endurance among athletes participating in individual and team sports. The survey method facilitated the collection of self-reported data, while the observation method enabled direct assessment of the athletes' physical performance. This comparative approach ensured a comprehensive analysis of the key physiological attributes across different sporting disciplines.

Sample

The study utilized purposive sampling to select 120 male athletes (20 each from wrestling, judo, boxing, hockey, football, and basketball) based on their active participation and podium finishes (1st, 2nd, or 3rd place) in intercollegiate competitions**.** This approach ensured a representative sample of high-performing athletes. Participants, aged 17 to 27 years**.**

TOOL USED:

For data collection, the study utilized the following assessment tools:

- **50-Yard Dash** – Measured speed and acceleration.
- **Shuttle Run** – Evaluated agility and speed.
- **600-Yard Run/Walk** – Assessed cardiovascular endurance.

Statistical Technique Used:

The study employed the following statistical techniques:

- **Mean** – Represents the central tendency of the data set.
- **Standard Deviation (SD)** – Indicates the dispersion of data points from the mean.
- **t-Statistic (t)** – Assesses the significance of differences between two sample means.

Results and Discussion:

Table No. 1 Comparison of the 50 Yard Dash to measure Speed of Individual and Team game

Parameter	**Individual Sports**	**Team Sports**
Mean	6.663	5.800
Standard Deviation (SD)	0.284	0.231
Standard Error of the Mean (SEM)	0.037	0.030
Sample Size (N)	60	60
t-Statistic (t)	18.8836	
Degrees of Freedom (df)	59	
Standard Error of Difference (SED)	0.046	
Mean Difference (Individual - Team)	0.863	
95% Confidence Interval	0.772 to 0.955	
P-Value (Two-Tailed)	< 0.0001 (Extremely statistically significant)	
Critical t-Value (Two-Tailed, 95% CI)	1.987	

Table No.1 presents the comparison of speed between individual and team sport athletes using the 50 yards dash test. The results of the 50-Yard Dash Test indicate a statistically significant difference in speed between individual and team sport athletes. The mean speed for individual sport athletes was 6.663 seconds, whereas team sport athletes had a faster mean time of 5.800 seconds. The t-statistic value of 18.8836 and a p-value of < 0.0001 confirm that this difference is extremely statistically significant. The 95% confidence interval (0.772 to 0.955) further supports this conclusion, indicating that the observed difference is unlikely due to random chance.

The null hypothesis, which states that there is no significant difference in speed between individual and team sport athletes, is rejected based on the statistical evidence. The findings suggest that team sport athletes demonstrate superior speed

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compared to individual sport athletes, likely due to the nature of their sports, which require rapid acceleration, frequent directional changes, and continuous movement in dynamic game situations.

Fig No.1 Comparison of the 50 Yard Dash to measure Speed of Individual and team game players

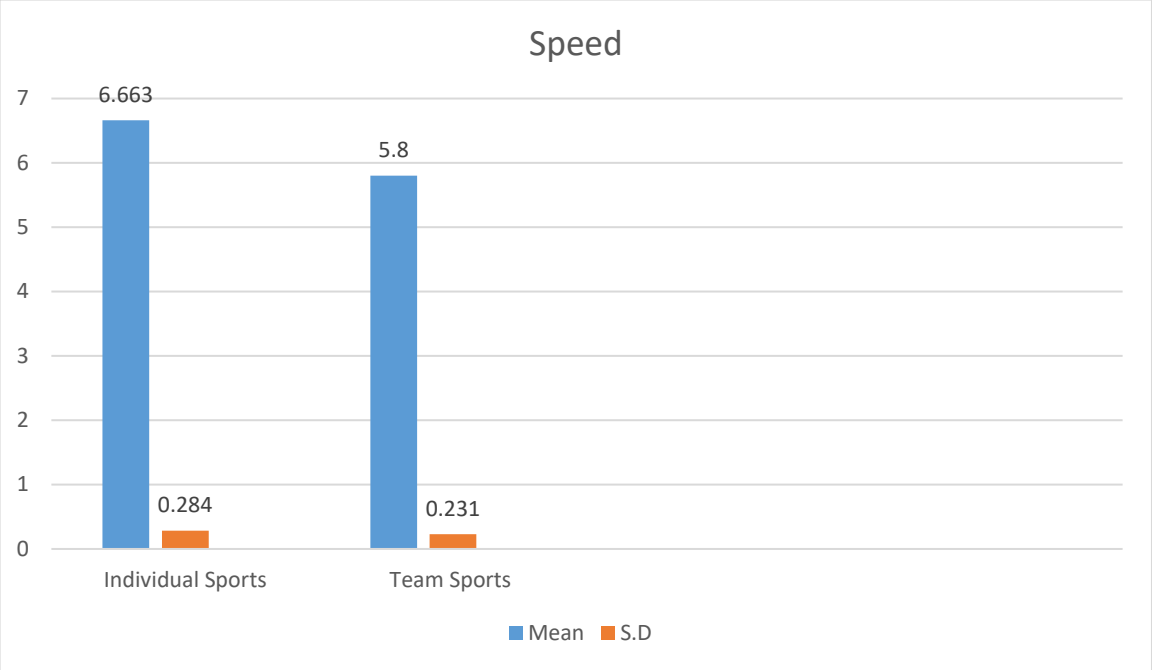

Table No.2 Comparison of the Shuttle Run test to measure agility of Individual and team game players

Parameter	Individual Sports	Team Sports
Mean	10.078	8.628
Standard Deviation (SD)	0.404	0.362
Standard Error of the Mean (SEM)	0.052	0.047
Sample Size (N)	60	60
t-Statistic (t)	21.2580	
Degrees of Freedom (df)	59	
Standard Error of Difference (SED)	0.068	
Mean Difference (Individual - Team)	1.450	
95% Confidence Interval	1.314 to 1.586	
P-Value (Two-Tailed)	< 0.0001 (Extremely statistically significant)	
Critical t-Value (Two-Tailed, 95% CI)	1.987	

Table No.2 presents the comparison of agility between individual and team sport athletes using the Shuttle Run test. The results indicate a mean agility score of 10.078 seconds for individual sport athletes and 8.628 seconds for team sport athletes, with standard deviations of 0.404 and 0.362, respectively.
The t-statistic value ($t = 21.2580$, $df = 59$) is extremely high, and the P-value (< 0.0001) is well below the conventional significance threshold (0.05). This suggests that the difference in agility between the two groups is statistically significant. The mean difference of 1.450 seconds, with a 95% confidence interval ranging from 1.314 to 1.586, further supports this finding, indicating that individual sport athletes perform significantly slower in the agility test compared to team sport athletes. The null hypothesis (H_0) stated that there is no significant difference in agility between individual and team sport athletes. However, the results demonstrate a statistically significant difference in agility performance between the two groups. The observed data suggest that team sport athletes exhibit superior agility compared to individual sport athletes, possibly due to the dynamic nature of team sports, which require rapid directional changes, quick reflexes, and coordination.
Since the difference is statistically significant, the null hypothesis is rejected, and it can be concluded that team sport athletes have significantly better agility compared to individual sport athletes.

Fig. 2 Comparison of the Shuttle Run test to measure agility of Individual and team game players

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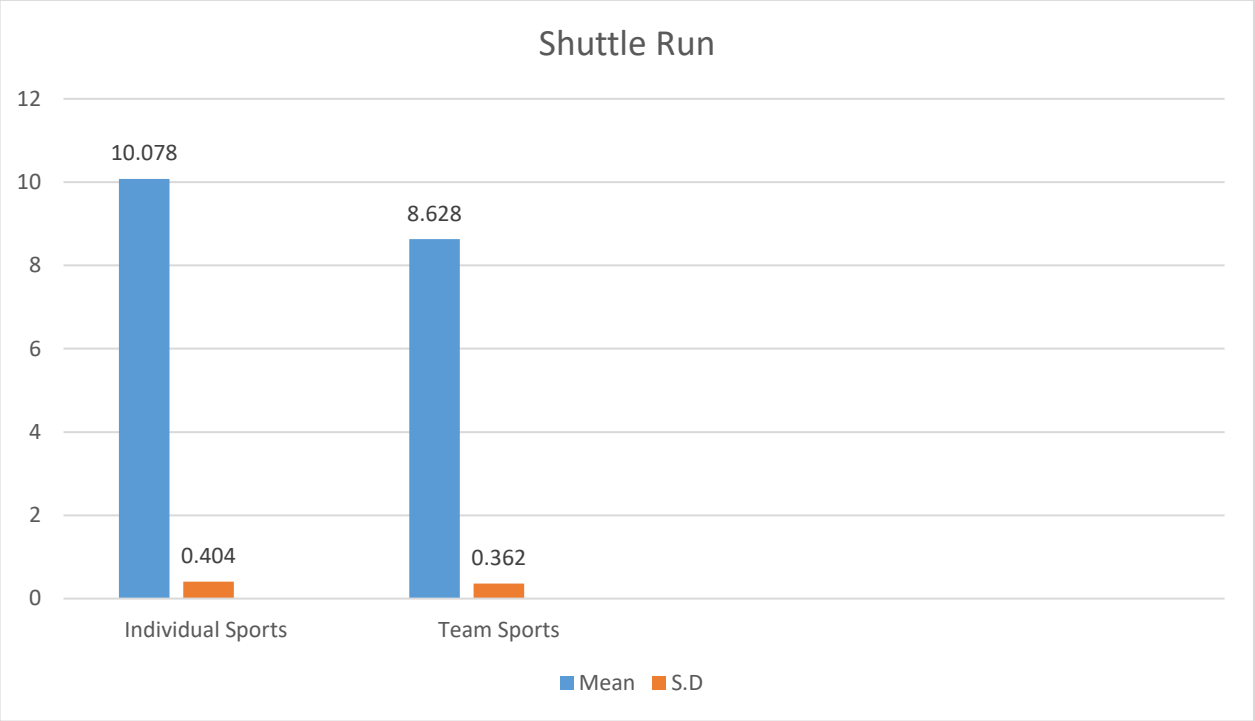

Table No. 3 Comparison of the 600-Yard Run/Walk to Measure Endurance in Individual and Team Sport Athletes

Parameter	Individual Sports	Team Sports
Mean	96.78	96.62
Standard Deviation (SD)	8.21	8.03
Standard Error of the Mean (SEM)	1.06	1.04
Sample Size (N)	60	60
t-Statistic (t)	0.2071	
Degrees of Freedom (df)	59	
Standard Error of Difference (SED)	0.805	
Mean Difference (Individual - Team)	0.17	
95% Confidence Interval	-1.44 to 1.78	
P-Value (Two-Tailed)	0.8366 (Not statistically significant)	
Critical t-Value (Two-Tailed, 95% CI)	1.987	

The results of the 600-Yard Run/Walk Test indicate no statistically significant difference in endurance levels between individual and team sport athletes. The mean endurance time for individual sport athletes (96.78 seconds) was only slightly higher than that of team sport athletes (96.62 seconds). However, the p-value of 0.8366 suggests that this difference is not statistically significant. The t-statistic (0.2071) is well below the critical t-value (1.987), and the 95% confidence interval (-1.44 to 1.78) includes zero, further confirming that the difference is likely due to random variation rather than a real effect.

Based on these findings, the null hypothesis—which states that there is no significant difference in endurance between individual and team sport athletes—cannot be rejected. This suggests that both groups exhibit similar endurance capacities, which may be influenced by the nature of their training and sport-specific demands.

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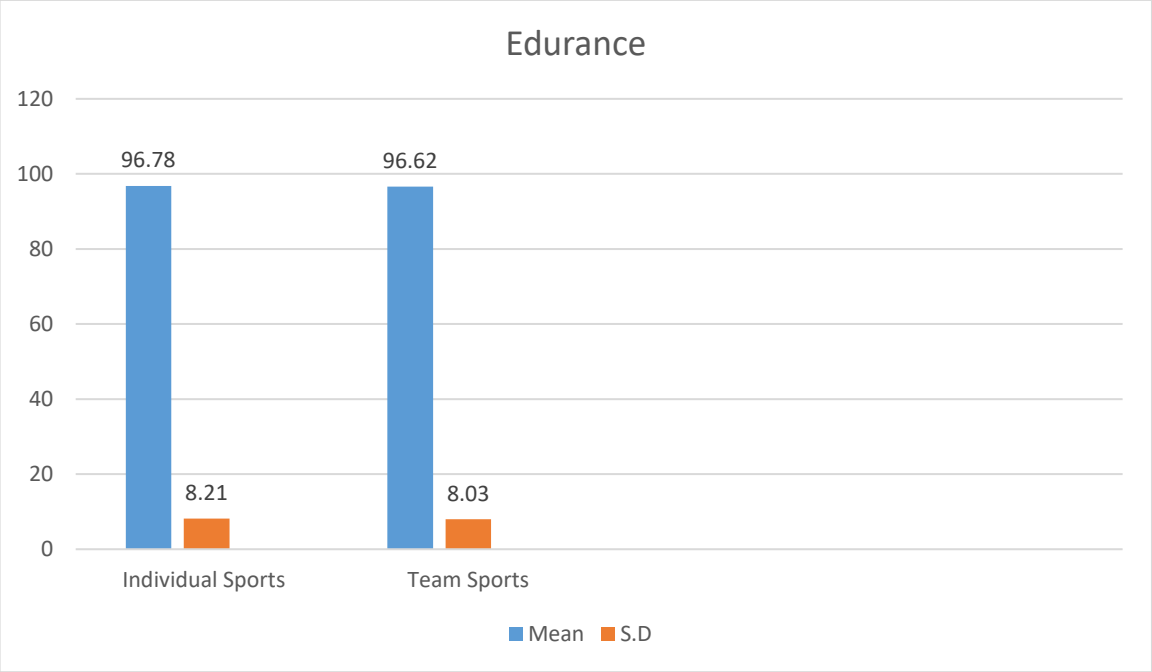

CONCLUSION

The study highlights that team sport athletes have significantly better speed and agility compared to individual sport athletes, likely due to the rapid acceleration, quick reflexes, and frequent directional changes required in team-based sports. However**,** no significant difference was observed in endurance levels between the two groups, suggesting that both individual and team sport athletes develop similar endurance capacities through their training and competition demands. These findings provide valuable insights into sport-specific physical demands and could help in training program development, talent identification, and athlete performance enhancement strategies based on the nature of their sport.

References

1. Bangsbo, J., Mohr, M., & Krustrup, P. (2006). Physical and metabolic demands of training and match-play in the elite football player. *Journal of Sports Sciences, 24*(7), 665-674. https://doi.org/10.1080/02640410500482529
2. Bompa, T. O., & Haff, G. G. (2009). *Periodization: Theory and methodology of training* (5th ed.). Human Kinetics.
3. Cronin, J. B., & Hansen, K. T. (2005). Strength and power predictors of sports speed. *Journal of Strength and Conditioning Research, 19*(2), 349-357. https://doi.org/10.1519/1533-4287(2005)19<349:SAPPOS>2.0.CO;2
4. Reilly, T., Bangsbo, J., & Franks, A. (2000). Anthropometric and physiological predispositions for elite soccer. *Journal of Sports Sciences, 18*(9), 669-683. https://doi.org/10.1080/02640410050120050
5. Sheppard, J. M., & Young, W. B. (2006). Agility literature review: Classifications, training, and testing. *Journal of Sports Sciences, 24*(9), 919-932. https://doi.org/10.1080/02640410500457109
6. Sporis, G., Milanović, Z., Trajković, N., & Joksimović, A. (2010). Correlation between speed, agility and quickness (SAQ) in elite young soccer players. *Acta Kinesiologica, 4*(2), 36-41.