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An assessment of physical fitness profiling of university-ranked badminton players

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Abstract
Objective
1. To assess the physical fitness profiling of All India Inter-University ranked badminton players.
2. To find out the most prominent physical fitness variable suitable for profiling of university-ranked badminton players.
Methods: Physical profiling of All India India-ranked badminton players was done for physical profiling. A total of 19 subjects of the All India Inter-University ranked badminton players (W) team were selected for the study. Physical fitness variables i.e. Cardiovascular Endurance (CV), Explosive Strength (ES), Speed (SP), Coordinative ability (COA), and Flexibility (FIX) was assessed during the All India Inter-University tournament. The subjects comprised teams that qualified for rounds of all Indian Inter University tournaments. The teams were Jain University, Delhi University, SRM University, & Adamas University, representing All Indian ranked female badminton players. To assess and compare the physical fitness variables among All India University-ranked female badminton players, descriptive statistics and one-way ANOVA were used with the SPSS 25.0 version. The level of significance was set at 0.05.
Results: The study found that there will be no difference in physical fitness variables among all Indian-ranked badminton players. It was found that there were insignificant differences in Cardiovascular efficiency (CV) where $p>0.05$ (p=.141, f=2.114), Explosive strength (ES) where $p>0.05$ (p = .053, f = 3.229), Speed (SP) where $p> 0.05$ (p = .718, f = .455), Sideways Agility (SW CO AB) where $p>0.05$ (p = .387, f = 1.082), Four Corner Agility (FR CO AB) where $p>0.05$ (p = .505, f = .815), Flexibility (FIX) $p>0.05$ (p = .068, f = .673). Thereby, it was found that all physical fitness variables were insignificant among all India university-ranked badminton players.
Conclusions: The study indicated that the physical fitness variables' physical profile was found that the mean of Cardiovascular efficiency was 121.84, which as per norms indicates in the excellent category of Harvard Step Test Norms. Further, the mean of Explosive Strength was 30.05, which indicates players are in the excellent category. The mean Speed was 6.67 seconds, which was in the excellent category as per norms. The mean of sideward agility and four-corner agility were 19.78 & 36.45 as respectively. The last Physical Fitness variable was Sit & Reach flexibility in which the mean was 10.95 and was found that female badminton players had excellent flexibility. However, the results of the physical fitness profile of university-ranked badminton players testing seems to be at the same level in regard to the ability relative to university-ranked badminton performance. The results of this study describe the physical fitness profiles of all Indian university-ranked badminton players. They can also help coaches in identifying and choosing new badminton players/athletes.

Keywords: Cardiovascular Endurance (CV), Explosive Strength (ES), Speed (SP), Coordinative ability (COA), Sideways agility (SW CO AB), Four corner agility (FR CO AB) and Flexibility (FIX)

Introduction
Badminton is a racket sport played by two people (for singles) or two pairs (for doubles). Badminton is played with players on one side aiming to hit the shuttlecock over the net in order to fall on the opponent's designated field of play, and must also try to prevent his opponent from doing so to him.
Badminton is a sport branch which can be played easily and savorily by all people of several ages, which does not drive the player to violence, it also can be used for recreation and fitness purposes. Sport is an important activity to get rid of the physical and mental stress of the individuals under the heavy burden of societal life, and to physically harmonize with the life conditions.

The comparison of test scores of any one player with data from a normative base of many players enables strengths and weaknesses to be identified. This plays an important role in designing individual physical conditioning programs according to sport-specific demands, motivating players to train, and leading to the development of the players as well as the sport as a whole.

When the countries and teams have reached an upper level in sports branches, studies are being carried out in the light of programs prepared more scientifically and by more informed people. In most countries, the science people not only try to show sportsmen profiles of their countries through studies but also provide data that may dominate other countries' studies. The performances and physical characteristics of elite sportsmen who perform in different sports branches may vary and anthropometric and basic motoric differences may be distinctive for branches in talent identification. The studies that seek for how the structural features affect the performance in the selected sports branch are limited.

The purpose of this study was to measure and describe the Cardiovascular Endurance (CV), Explosive Strength (ES), Speed (SP), Coordinative ability (COA), and Flexibility (FIX) of all Indian university-ranked female badminton players.

Objective

1. To assess the physical fitness profiling of All India University ranked badminton players.
2. To find out the most prominent physical fitness variable suitable for profiling of university ranked badminton players.

Statement of the problem

This research proposes to determine the "Physical Fitness Profile of All India University Ranked Badminton Players".

Delimitations

- The study is also delimited to female badminton players of the age group 18-25 years of university-level participation.
- The study will also be delimited to the following performance levels: Position holders of All India Inter-university level players.

Limitations

- The performance effect of the subjects due to their difference in physical characteristics.
- The environmental conditions also can affect the study.

Significance of the study

The study was some light on the different physical fitness tests of all Indian university-level badminton players. The results further help coaches, physical directors, and teaching faculty assess the player's ability to participate in different activities**.**

Hypothesis

After going through the literature review, it was hypothesized that "there will be a significant difference in the physical fitness among All India University ranked female badminton players.

Methodology

Selection of subjects: The data pertaining to the present study were collected at the All-India Badminton championship which was held at LPU Jalandhar Panjab in January. (2023), in which the teams of four zones participated like the north zone, south zone, east zone and west zone. Those teams who qualified for the semifinal match selected the subjects. A total of 19 female badminton players subject age group of 18 to 25 years, were semifinal players selected from different universities in India. All the subjects, after having been informed about the objective and protocol of the study, gave their consent and volunteered to participate in this study. The physical fitness Test was used to collect the data from these subjects.

Selection of variables

- Cardiovascular Endurance (CV)
- Explosive Strength (ES)
- Speed (SP)
- Coordinative Ability (COA)
- Flexibility (FIX)

Criterion measures: The components of physical fitness that were selected for the present study and were measured by the below flow chart

Table 1: various physical fitness components, their corresponding tests, and the units of measurement used for each test

Physical fitness components	Test	Measuring units
Cardiovascular Endurance (CV),	Harvard step test	Minutes
Explosive Strength (ES)	Vertical Jump	Meters
Speed (SP)	50 yard dash	Seconds
Coordinative Ability (COA)	Sideway & Four Corner Shuttle Run	Seconds
Flexibility (FIX)	Sit And Rich Test	Centimeters

Statistical analysis

To assess and compare the physical fitness variables among All India University-ranked female badminton players, descriptive statistics and one-way ANOVA were used with the SPSS 25.0 version. The level of significance was set at 0.05.

Results and findings of the study

Table 3 shows that the mean of HST of All India University-ranked female badminton players is 121.8432 respectively. Whereas the standard deviation of the HST of All India University-ranked female badminton players are 17.89 respectively. The results reveal that there is a statistically insignificant difference in Cardiovascular Endurance (CV) among the four group players (p>.141, F=2.114).

Table - 4 shows that the mean of Explosive strength of All India University-ranked female badminton players is 30.05 respectively. Whereas the standard deviation of the Explosive strength of All India University ranked female badminton players are 12.72 respectively. The results reveal that there is a statistically in significant difference in explosive strength among the four group players (p>.053, F=3.22).

Table 2: Details of the descriptive statistics of selected variables for all India University-ranked female badminton players

Name of the variable	Name of the groups	N	Mean	SD	Std. Error
Harvard step test	Jain UNI	5	116.50	11.88	5.31
	Delhi UNI	4	118.95	17.77	8.88
	Ramaya UNI	5	137.45	24.64	11.02
	Adamas UNI	5	113.88	5.19	2.32
	Total	19	121.84	17.89	4.10
Explosive strength	Jain UNI	5	32.20	12.59	5.63
	Delhi UNI	4	26.25	2.75	1.37
	Ramaya UNI	5	20.20	14.39	6.43
	Adamas UNI	5	40.80	8.43	3.77
	Total	19	30.05	12.72	2.91
Speed	Jain UNI	5	6.77	.332	.148
	Delhi UNI	4	6.52	.403	.201
	Ramaya UNI	5	6.63	.417	.186
	Adamas UNI	5	6.72	.214	.095
	Total	19	6.67	.331	.076
Sideways Agility	Jain UNI	5	21.23	5.18	2.31
	Delhi UNI	4	20.91	5.11	2.55
	Ramaya UNI	5	20.25	3.92	1.75
	Adamas UNI	5	16.98	1.65	.739
	Total	19	19.78	4.18	.959
Four corner agility	Jain UNI	5	36.51	5.79	2.59
	Delhi UNI	4	37.96	6.91	3.45
	Ramaya UNI	5	38.22	5.04	2.25
	Adamas UNI	5	33.41	3.76	1.68
	Total	19	36.45	5.31	1.21
Flexibility	Jain UNI	5	27.69	9.53	4.26
	Delhi UNI	4	29.74	.570	.285
	Ramaya UNI	5	29.64	2.25	1.00
	Adamas UNI	5	24.91	6.38	2.85
	Total	19	27.90	5.87	1.34

*Significant at 0.05 level, Degree of freedom= 15

Table 3: Anova summary

	Sources of variance	Sum of square	Df	Mean squares	F	Sig.
Harvard step test	Between Groups	1711.926	3	570.642	2.11	.141
	Within Groups	4049.959	15	269.997		
	Total	5761.886	18			

Table 4: presents the analysis of variance (ANOVA) for explosive strength, showing the sources of variance, sum of squares, degrees of freedom (Df), mean squares, F-value, and significance (Sig.)

	Sources of variance	Sum of square	Df	Mean squares	F	Sig.
Explosive strength	Between groups	1143.797	3	381.266	3.22	.053
	Within groups	1771.150	15	118.077		
	Total	2914.947	18			

Table 5: presents the analysis of variance (ANOVA) for speed, showing the sources of variance, sum of squares, degrees of freedom (df), mean squares, F-value, and significance (Sig.)

	Sources of variance	Sum of square	df	Mean squares	F	Sig.
Speed	Between groups	.165	3	.055	.455	.718
	Within groups	1.813	15	.121		
	Total	1.978	18			

Table - 5 shows that the mean of Speed of All India University-ranked female badminton players is 6.67 respectively. Whereas the standard deviation of the speed of All India University ranked female badminton players are .331 respectively. The results reveal that there is a statistically in significant difference in speed among the four group players (p>.718, F=.455).

Table 6: presents the analysis of variance (ANOVA) for sideways agility, showing the sources of variance, sum of squares, degrees of freedom (df), mean squares, F-value, and significance (Sig.)

	Sources of variance	Sum of square	df	Mean squares	F	Sig.
Sideways agility	Between groups	55.999	3	18.66	1.08	.387
	Within groups	258.774	15	17.25		
	Total	314.773	18			

Table - 6 shows that the mean of Sideways agility of All India University-ranked female badminton players is 19.7895 respectively. Whereas the standard deviation of the speed of All India University ranked female badminton players are 4.18 respectively. The results reveal that there is a statistically in significant difference in Sideways agility among the four group players (p>.387, F=1.08).

Table 7: The table presents the analysis of variance (ANOVA) for four corner agility, showing the sources of variance, sum of squares, degrees of freedom (df), mean squares, F-value, and significance (Sig.)

	Sources of Variance	Sum of square	df	Mean squares	F	Sig.
Four corner agility	Between Groups	71.124	3	23.708	.815	.505
	Within Groups	436.460	15	29.097		
	Total	507.584	18			

Table - 7 shows that the mean four corner agility of All India University-ranked female badminton players is 36.45 respectively. Whereas the standard deviation of the speed of All India University ranked female badminton players are 5.31 respectively. The results reveal that there is a statistically insignificant difference in four corner agility among the four group players (p>.505, F=.815).

Table 8: presents the analysis of variance (ANOVA) for flexibility, showing the sources of variance, sum of squares, degrees of freedom (df), mean squares, F-value, and significance (Sig.)

	Sources of variance	Sum of square	df	Mean squares	F	Sig.
Flexibility	Between groups	73.713	3	24.571	.673	.582
	Within groups	547.618	15	36.508		
	Total	621.330	18			

Table - 8 shows that the mean of Flexibility of All India University-ranked female badminton players is 27.90 respectively. Whereas the standard deviation of the speed of All India University ranked female badminton players are 5.87 respectively. The results reveal that there is a statistically significant difference in Flexibility among the four group players (p>.582, F=.673).

Discussion

The researcher dissected the gathered information according to the reason for the study. It was no different p value 0.05. The purple reason of the same level of performance and the same level of competition among of four teams. There may be problem reasons of a similar level of training received due to which there may not be a signification difference in physical fitness of badminton players. They're all subjects for study and play only game badminton and comparison is done among all badminton players because of which there are less chances of difference among the teams.

Conclusions

The researcher dissected the gathered information according to the reason for the study. The factual examination of physical fitness variables uncovered the boundaries, for example, cardiovascular endurance, strength, speed, agility and flexibility there were critical distinctions among all Indian university-ranked badminton players of semifinal players selected from different universities in India and there were no noteworthy contrasts in the segment of among all Indian university ranked badminton players.

However, the results of the physical fitness profile of university-ranked badminton players testing seems to be at the same level in regard to the ability relative to university-ranked badminton performance. The results of this study describe the physical fitness profiles of all Indian university-ranked badminton players. They can also help coaches in identifying and choosing new badminton players/athletes.

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