International Journal of Physical Education and Sports Sciences

Vol. IV, No.I, October-2012, ISSN 2231-3745

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International Journal of Physical Education and Sports Sciences
Vol. IV, Issue I, October-2012, ISSN 2231-3745

Comparative Study of Physical Parameters among Tennis, Badminton and Squash Players at the University Level

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Abstract:- The aim of the study was to compare the physical parameters among tennis, badminton and squash players at the university level. The participants selected for the study were 80 players from badminton (N=30), tennis (N=27) and squash (N=23) aged 20.2 ± 2.1, 20.6 ± 2.2, and 19.9 ± 2.7 years, respectively, from Lakshmibai National University of Physical Education, Gwalior. AAHPER youth fitness test was used to measure physical parameters, which consist of six test batteries i.e. distance runs, pushups, pull-ups, sit-ups, standing broad jump and sit & reach. The mean and standard deviation of AAHPER test batteries among badminton, tennis and squash players were distances runs 3202.00 ± 175.49, 3311.11 ± 136.05, 3271.74 ± 164.25; sit-ups 42.46 ± 4.60, 37.62 ± 3.74, 37.21 ± 3.51; pushups 34.70 ± 4.04, 34.25 ± 4.10, 34.82 ± 3.82; pull ups 7.73 ± 2.82, 7.22 ± 2.30, 7.56 ± 2.17; standing broad jump 241.50 ± 11.68, 235.00 ± 7.22, 231.69 ± 8.28; sit and reach 38.50 ± 5.25, 36.11 ± 4.28, 35.47 ± 3.61, respectively. To compare the physical parameters among three sports one way ANOVA was calculated and found significant at 0.05 level of significance in distance runs, sit-ups, standing broad jump and sit & reach. As the calculated 'F'values, 3.41, 14.68, 7.57 and 3.43 respectively are greater than the tabulated value at 2, 77 df, scheffes post hoc test was conducted to find out the mean difference among the groups. Result indicated that the badminton players have better abdominal strength and explosive strength of lower extremities than tennis and squash players whereas tennis players have better aerobic endurance than badminton players.

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INTRODUCTION

It has been established that no single variable measures physical fitness, which a composite factor is varying with each sport (Dewney and Brodie, 1980). Tennis, badminton and squash are alike games but distinguish with each other in all prospects. Tennis is a physically demanding sport (Chandler, 1995), can last anywhere from 30 minutes to several hours (Roetert and Ellenbecker, 2007), tennis is characterized by high-intensity efforts (i.e., accelerations, decelerations, changeovers, and upper arm involvement) interspersed with periods of variable duration and low-intensity activity, during which active recovery (between points: 20 seconds) and sitting periods (between changeover break in play: 90 and 120 seconds) take place (Fernandez et al., 2009), whereas, Squash is a moderate to high intensity sport which demands specific fitness. Squash at any level places a high demand on the aerobic system for energy delivery during play and recovery. In addition, the sport requires bursts of intense, anaerobic physical activity involving the lactic anaerobic energy system. Players must possess appropriate levels of local muscular endurance, strength, power, flexibility and speed, combined with agility, balance and co-ordination (Locke et al. 1997). At last, Badminton at the elite level requires a combination of the aerobic and anaerobic systems and the involvement of these systems depends on the nature of the rally (short or long) and the duration of the game (short set or long match) (Dewney and Brodie, 1980). In recent years, sports have been developed dramatically in all aspects, especially in physical fitness. Basically, Physical fitness is a set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests (Caspersen et al., 1985). American Association for Health, Physical Education, and Recreation (AAHPER) Youth Fitness Test had been developed the physical fitness test, which stated that the test is a battery of six test items designed to give a measure of physical fitness for both boys and girls (Hunsicker and Reiff, 1976). However, from last few decades, lots of studies have been done on tennis, badminton and squash, (Lees, 2003; Bouché, 2010; Docherty, 1982), but still, remarkable amount of information is required before comprehensive knowledge of any of the racket sports can be claimed. So, plenty more studies are to be done to find out the specific differences and demand of physical fitness among these three sports, that's why, the query have been rise to justify and verify the physical capacities of the

players engaged in these physical demanding racket sports.

MATERIALS AND METHODS

The participants selected for the study were 80 players from badminton (N=30), tennis (N=27) and squash (N=23) aged 20.2 ± 2.1, 20.6 ± 2.2, and 19.9 ± 2.7 years, respectively, from Lakshmibai National University of Physical Education, Gwalior, volunteered to participate in the study.

The subjects were studying in bachelor and master degree of physical education and practicing in their respective games for 2 hours during match practice time. The subjects were informed about the purpose of the study as well as informed that the data will be kept confidential and will not be used for any other purpose. For the purpose of the collection of the data, AAHPER, youth fitness test was used (Hunsicker and Reiff, 1976). AAHPER youth fitness test consist of six test batteries i.e. distance runs, pushups, pull ups, sit ups, standing broad jump and sit and reach. The sit-ups (abdominal strength) and pushups (shoulder strength) were measured by number of repetitions performed in one minute.

The pull ups (shoulder strength) were measured by no. of repetitions performed in single possible maximal efforts, sit and reach test measures trunk flexibility in inches using sit and reach box, standing broad jump measures explosive strength of the lower extremities and measured by the distance jumped in centimeters. At last distance runs measures aerobic endurance of the players and measured by the distance covered in 12 minutes in yards.

The data were analyzed and compared with the help of statistical procedure in which Descriptive Statistics - Mean and Standard Deviation and Comparative Statistics one way analysis of variance (ANOVA) were used at 0.05 level of significance. To find out the significant differences among the groups post hoc Scheffe test was employed.

RESULTS

The data collected were analyzed statistically with the software package SPSS 18 and the outcome generated has been given bellow.

Table 1:

Mean and Standard deviation of AAPHER components among Badminton, Tennis and Squash Players

Variables		N	Mean	S.D	Minimum	Maximum
Distance Runs	Badminton	30	3202.00	175.49	2950	3550
	Tennis	27	3311.11	136.05	3040	3520
	Squash	23	3271.74	164.25	2980	3500
Sit-Ups	Badminton	30	42.46	4.60	35	54
	Tennis	27	37.62	3.74	31	48
	Squash	23	37.21	3.51	32	47
Pushups	Badminton	30	34.70	4.04	26	41
	Tennis	27	34.25	4.10	27	42
	Squash	23	34.82	3.82	26	41
Pull-Ups	Badminton	30	7.73	2.82	3	14
	Tennis	27	7.22	2.30	3	12
	Squash	23	7.56	2.17	4	12
Standing Broad Jump	Badminton	30	241.50	11.68	220	265
	Tennis	27	235.00	7.22	220	250
	Squash	23	231.69	8.28	220	250
Sit and Reach	Badminton	30	38.50	5.25	27	48
	Tennis	27	36.11	4.28	27	45
	Squash	23	35.47	3.61	30	45

The analysis presented in table-1 pertaining to descriptive statistics of distance runs, sit-ups, pushups, pull-ups, standing broad jump and sit and reach documented the mean and standard deviation recorded for the groups namely (badminton, tennis and squash). The findings advocated that the mean of badminton players were higher than the tennis and squash players in sit-ups, pull-ups, sit and reach and standing broad jump, whereas in distance runs, tennis players and in pushups, squash players were higher than the other two groups.

Analysis for variance (ANOVA) for the means of badminton, tennis and squash players in physical variables has been shown in Table 2

Table – 2

Comparisons among the three groups regard to physical variables of AAPHER test

Variables		Sum of Squares	df	Mean Square	F	Sig.
Distance runs	Between Groups	174521.64	2	87260.82	3.41	.038
	Within Groups	1967877.10	77	25556.84		
Sit-ups	Between Groups	475.87	2	237.93	14.68	.000
	Within Groups	1247.67	77	16.20		
Pushups	Between Groups	4.59	2	2.29	0.14	.866
	Within Groups	1232.79	77	16.01		
Pull-ups	Between Groups	3.80	2	1.90	0.31	.735
	Within Groups	474.18	77	6.15		
Standing Broad Jump	Between Groups	1341.61	2	670.80	7.57	.001
	Within Groups	6824.37	77	88.62		
Sit and Reach	Between Groups	139.64	2	69.82	3.43	.037
	Within Groups	1565.90	77	20.33		

In the table 2 analysis of variance (ANOVA) for the means of badminton, tennis and squash players in distance runs, sit-ups, standing broad jump and sit & reach were calculated and found significant that Tab F.05 (2,77) = 3.11 is less than the Cal values of F = 3.41, 14.68, 7.57 and 3.43 respectively. It is conclude that the evidence is sufficient to indicate a difference in distance runs, sit-ups, standing broad jump and sit & reach among badminton, tennis and squash players.

To further analyze as which group is higher in physical variable, Pairwise mean comparison analysis was done by using Scheffe test in the table 3.

Table-3

Post-Hoc Comparisons among Badminton, Tennis and Squash Players in Regard to Physical Variable

Variable	(I) Sport	(J) Sport	Mean Difference (I-J)	Sig.
Distance Runs	Tennis	Badminton	109.11*	.042
Sit-Ups	Badminton	Tennis	4.83*	.000
		Squash	5.24*	.000
Standing Broad Jump	Badminton	Tennis	6.50*	.039
		Squash	9.80*	.002

*Significant at 0.05 level of significance

In the table 3, it is evident that there is a significant difference between badminton and tennis players in distance runs, sit-ups and standing broad jump, as well as between squash and badminton players in standing broad jump and sit-ups whereas there is no significant difference between tennis and squash players in any of the physical variables.

DISCUSSION

The purpose of the study was to compare the physical parameters among badminton, tennis and squash players. The study reveals that badminton players have better abdominal strength and explosive strength of lower extremities than tennis and squash players whereas tennis players have better aerobic endurance than badminton players.

The results might be attributed due to nature of the sport. The duration and environment of all three sports were different. Tennis is an event which is mostly played outside in high temperature for long duration; a tennis match often lasts longer than an hour and in some cases more than five hours. During a match there is a combination of periods of maximal or near maximal work and longer periods of moderate and low intensity activity (Fernandez.et al. 2006); whereas badminton is a game which is played in a hall as well last hardly for one hour. (Manrique & González-Badillo, 2003), studied Analysis of the characteristics of competitive badminton results that badminton is characterized by repetitive efforts of alactic nature and great intensity which are continuously performed throughout the match. Therefore, this might be the reason which is attributes better endurance of tennis players.

The other results might owe due to the intensity, efforts and demand of the game. Badminton is a game which is very intensive in nature, requires jumps and vigorous movement on the court. In tennis, the ball may bounce once before the player hits it; in badminton, the rally ends once the shuttlecock touches the floor. The fastest recorded tennis stroke is Samuel Groth 163.4 mph (263 km/h) serve; the fastest recorded badminton stroke is Fu Haifeng's 206 mph (331 km/h) smash. This shows that badminton is intensive game requires lot of abdominal strength to move around the court and explosive strength to take initial start and jump continuously and vigorously, Whereas tennis and squash are very less intensive game and gets lot of time to recover between points and sets. The analysis of time spent in actual play during the 30 min game period revealed that squash and badminton players rallied for 15 and 10 min respectively. Tennis players rallied for five min or 20% of the playing time which is in agreement with the findings of Misner et al (1980). Comparative results among three sports were also seen in the study of Docherty, 1982. Hence, nature, duration and intensity of all the three sports vary with each other. It is recommended that effect of various surfaces and temperature on these three sports can also be studied to further fill up the gap of the knowledge.

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