The analysis of data collected on beginners and advance level badminton players is presented in this chapter. Data on badminton players was examined by using descriptive statistics, T test and Ancova. The level of significance was set at 0.05 level of significance.

Table 4.1 : Descriptive Statistics on Physical variables for 10-14 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Speed	Pre	7.41	0.546	0.141
	Post	6.44	0.673	0.174
Vertical Jump	Pre	42.80	1.707	0.441
	Post	48.33	2.887	0.745
Balance	Pre	74.92	4.564	1.178
	Post	88.79	9.589	2.476
Flexibility	Pre	6.81	0.592	0.153
	Post	7.56	1.352	0.349
Lower Body Strength	Pre	7.01	1.369	0.354
	Post	4.41	0.820	0.212
Back Strength	Pre	16.99	0.975	0.252
	Post	11.76	2.119	0.547
Heart Rate	Pre	77.13	2.803	0.724
	Post	76.99	4.795	1.238
Vital Capacity	Pre	2.66	0.248	0.064
	Post	**3.55**	**0.627**	**0.162**

Table 4.1 illustrates the result of descriptive statistics mean and standard deviation (SD) of the Physical variables of players aged from 10-14 years. The mean and standard deviation (SD) of pretest and post test scores on Physical variable speed Pre 7.41± 0.546, Post 6.44± 0.673, Vertical Jump Pre 42.80± 1.707, Post 48.33± 2.887, Balance Pre 74.92± 4.564, Post 88.79±9.589, Flexibility Pre 6.81± 0.592, Post 7.56± 1.352, Lower Body Strength Pre 7.01± 1.369, Post 4.41± 0.820, Back Strength Pre 16.99± 0.975, Post 11.76± 2.119.

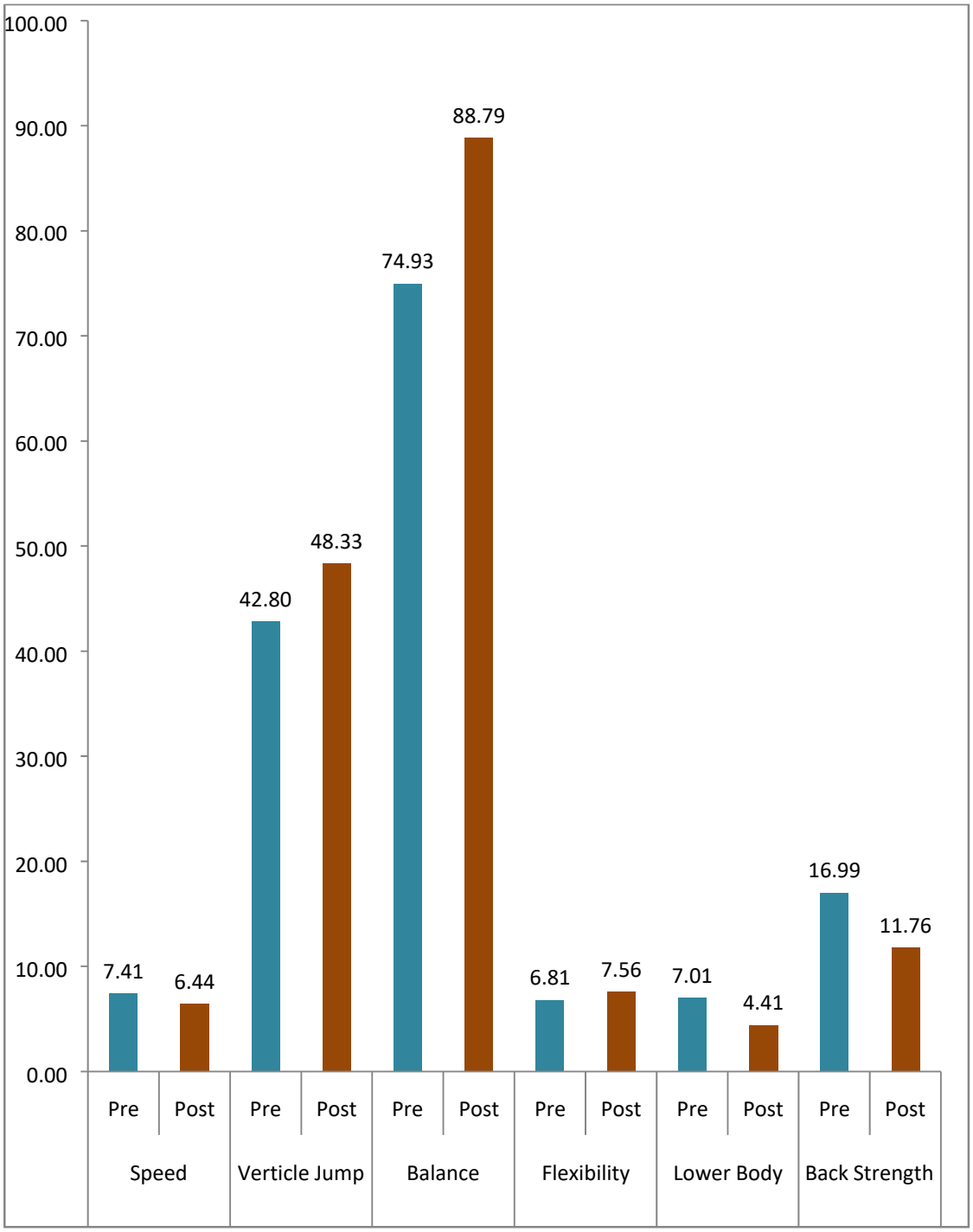

Fig. 4.1 : Descriptive statistics on Physical variables of 10-14 years age group players

Table 4.2 : Descriptive Statistics on Physical variables for 10-14 years advance level players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Speed	Pre	6.66	0.548	0.141
	Post	6.43	0.479	0.124
Vertical Jump	Pre	42.54	1.402	0.362
	Post	42.47	1.506	0.389
Balance	Pre	77.76	4.946	1.277
	Post	77.80	5.226	1.349
Flexibility	Pre	6.68	1.029	0.266
	Post	6.92	0.900	0.232
Lower Body Strength	Pre	7.51	1.508	0.389
	Post	7.73	1.751	0.452
Back Strength	Pre	16.79	0.702	0.181
	Post	**16.80**	**1.568**	**0.405**

Table 4.2 illustrates the result of descriptive statistics mean and standard deviation (SD) of the Physical variables of advanced level players aged from 10-14 years. The mean and standard deviation (SD) of pretest and post test scores on Physical variable Speed Pre 6.66±0.548, Post 6.43±0.479, Vertical Jump Pre 42.54±1.402, Post 42.47±1.506, Balance Pre 77.76±4.946, Post 77.80±5.226, Flexibility Pre 6.68±1.029, Post 6.92±0.900, Lower Body Strength Pre 7.51±1.508, Post 7.73±1.751 and Back Strength Pre 16.79±0.702, Post 16.80±1.568.

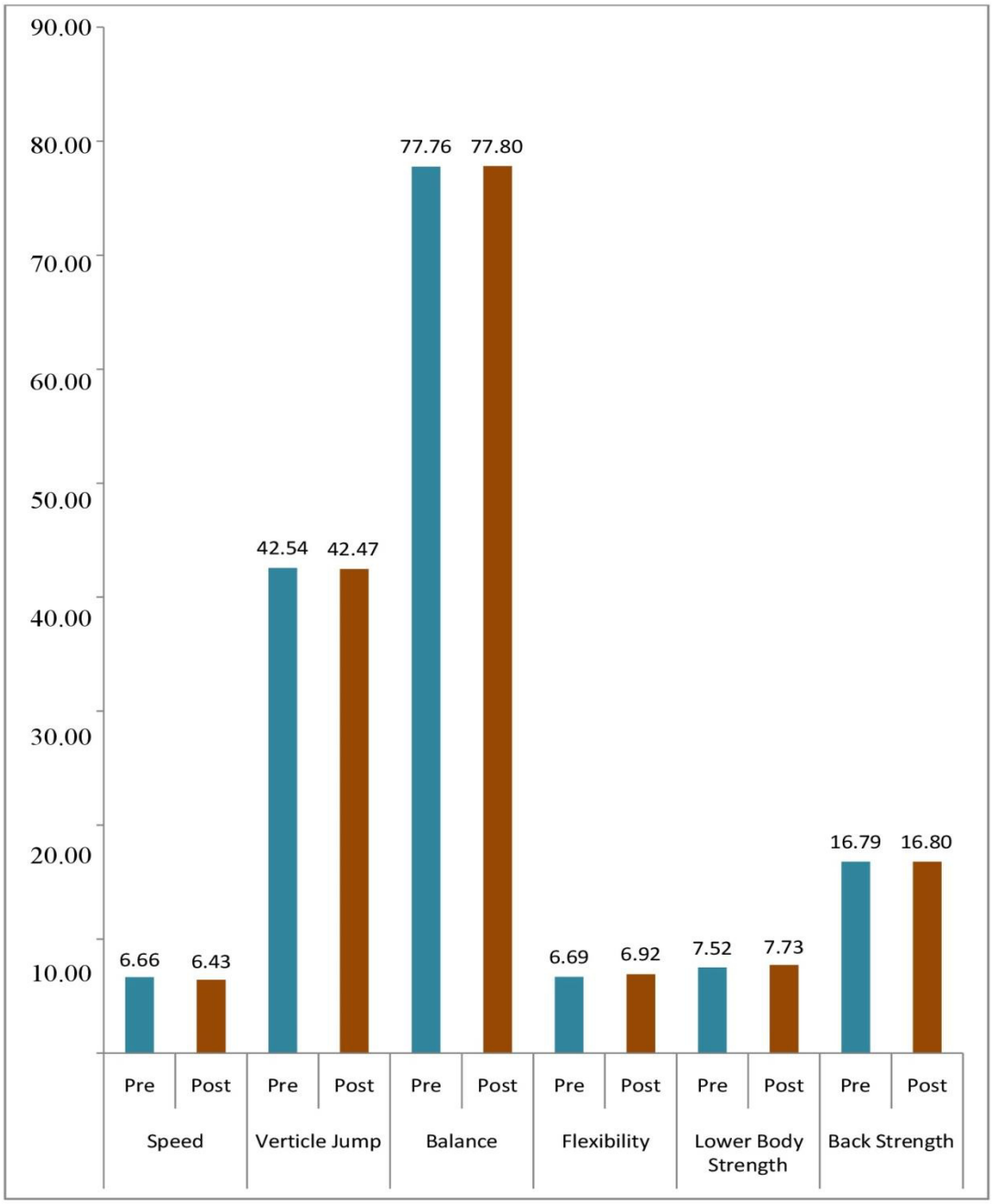

Fig. 4.2 : Descriptive statistics on Physical variables of 10-14 years age group advance level players

Table 4.3 : 'T' test Comparative Statistics on Physical variables of 15-19 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Speed	Pre	7.19	0.702	0.181
	Post	6.08	0.559	0.144
Vertical Jump	Pre	42.79	1.435	0.370
	Post	45.33	1.988	0.513
Balance	Pre	77.19	5.739	1.482
	Post	88.36	8.668	2.238
Flexibility	Pre	6.31	0.915	0.236
	Post	6.87	0.990	0.256
Lower Body Strength	Pre	7.29	1.410	0.364
	Post	10.13	1.407	0.363
Back Strength	Pre	17.351	0.561	0.145
	Post	**19.07**	**1.534**	**0.396**

Table 4.3 illustrates the result of descriptive statistics mean and standard deviation (SD) of the Physical variables of players aged from 15-19 years. The mean and standard deviation (SD) of pretest and post test scores on Physical variable Speed Pre 7.19±0.702, Post 6.08±0.559, Vertical Jump Pre 42.79±1.435, Post 45.33±1.988, Balance Pre 77.19±5.739, Post 88.36±8.668, Flexibility Pre 6.31±0.915, Post 6.87±0.990, Lower Body Strength Pre 7.29±1.410, Post 10.13±1.407 and Back Strength Pre 17.351±0.561, Post 19.07±1.534.

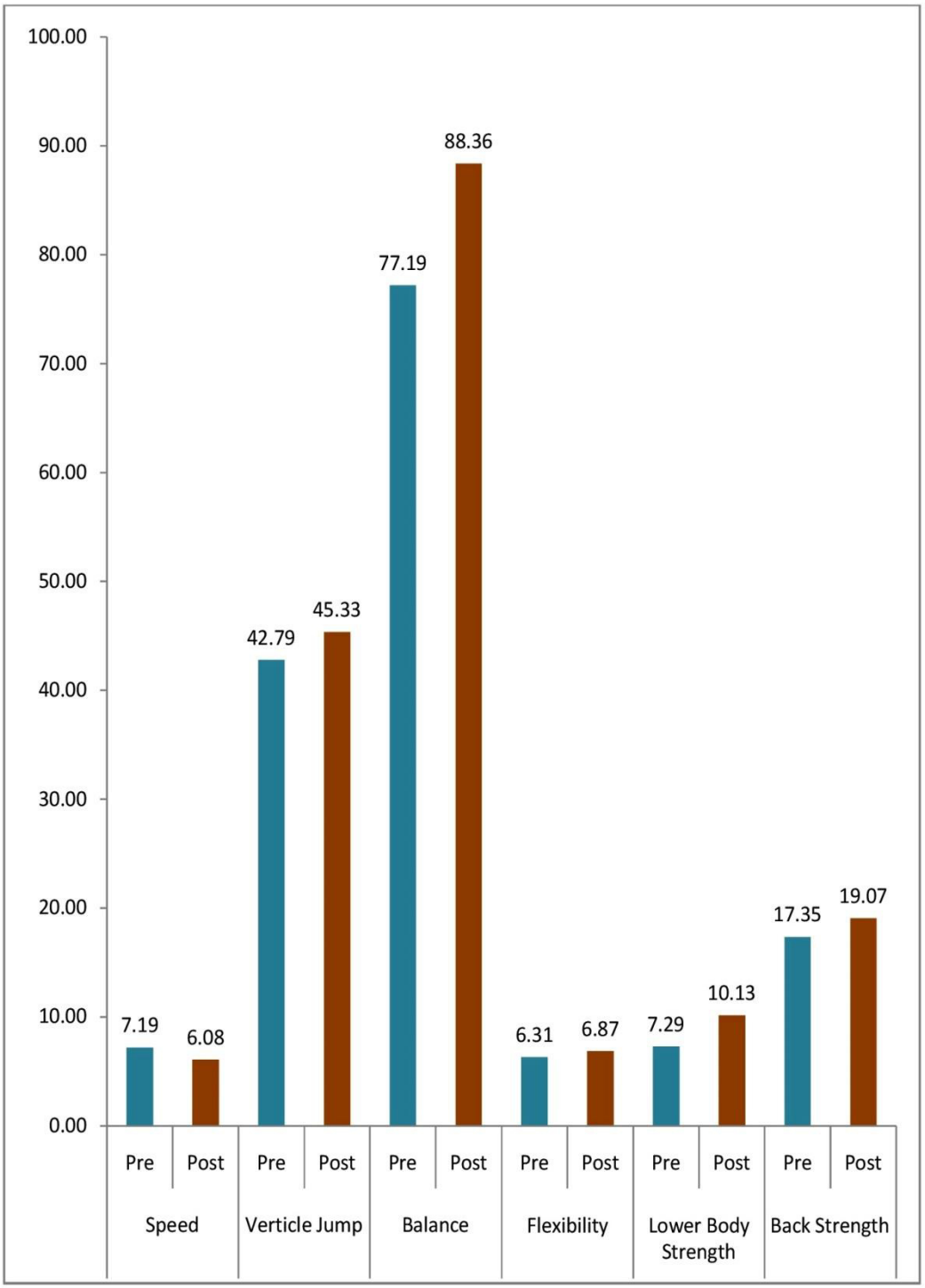

Figure 4.3 : Descriptive statistics on Physical variables of 15-19 years age group players

Table 4.4 : Descriptive Statistics on Physical variables of 15-19 years age group advance level players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Speed	Pre	5.83	0.601	0.155
	Post	6.85	0.760	0.196
Vertical Jump	Pre	42.76	1.512	0.390
	Post	41.87	1.642	0.424
Balance	Pre	75.80	5.177	1.337
	Post	75.67	4.499	1.162
Flexibility	Pre	6.20	0.952	0.246
	Post	6.47	1.060	0.274
Lower Body Strength	Pre	7.06	1.608	0.415
	Post	7.20	1.265	0.327
Back Strength	Pre	16.74	0.895	0.231
	Post	**16.93**	**1.163**	**0.300**

Data presented in Table 4.4 shows the result of descriptive statistics mean and standard deviation (SD) of the Physical variables of advance level players aged from 15-19 years. The mean and standard deviation (SD) of pretest and post test scores on Physical variable Speed Pre 7.19±0.702, Post 6.08±0.559, Vertical Jump Pre 42.79±1.435, Post 45.33±1.988, Balance Pre 77.19±5.739, Post 88.36±8.668, Flexibility Pre 6.31±0.915, Post 6.87±0.990, Lower Body Strength Pre 7.29±1.410, Post 10.13±1.407 and Back Strength Pre 17.351±0.561, Post 19.07±1.534.

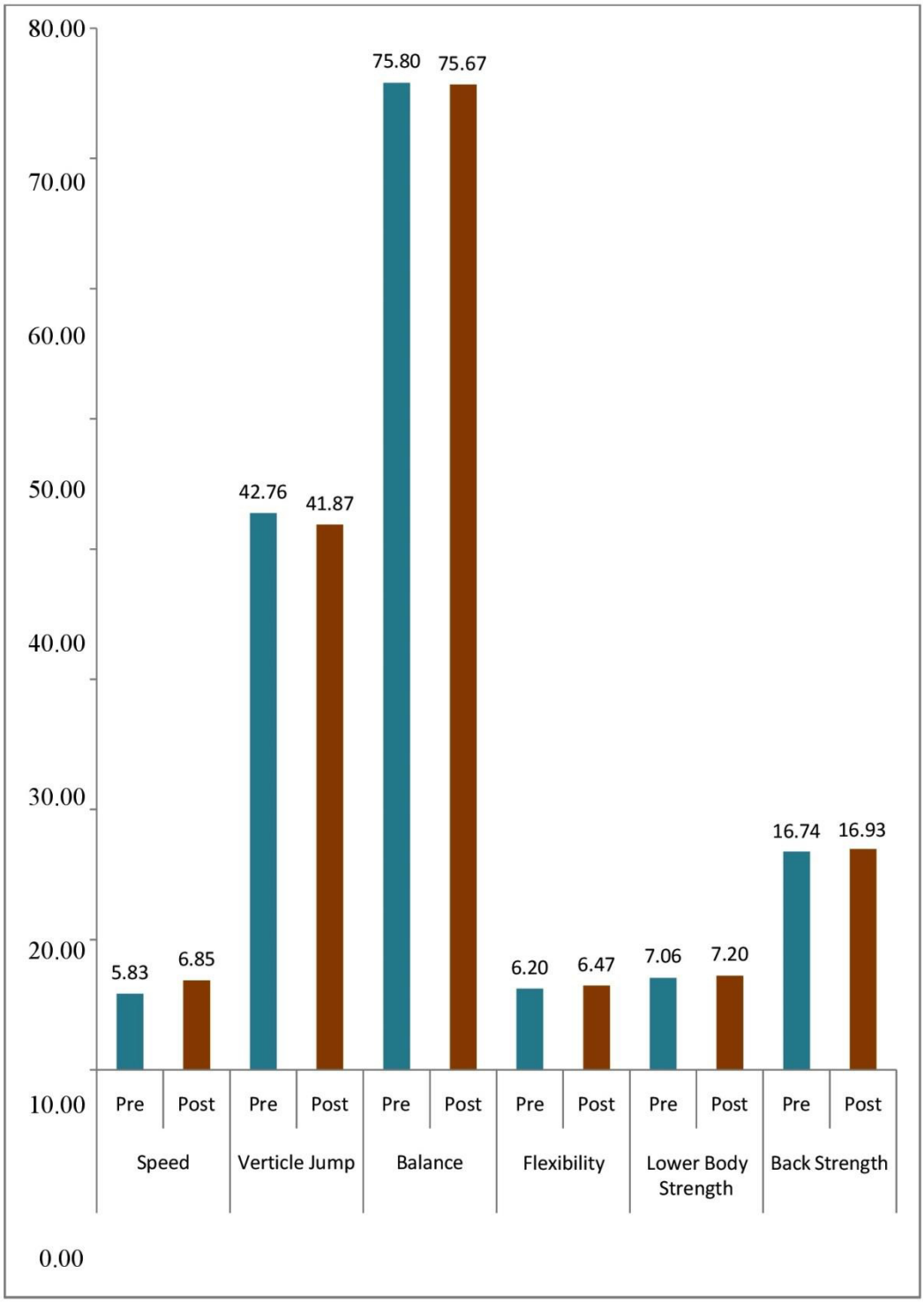

Fig. 4.4 : Descriptive statistics on Physical variables of 15-19 years age group advance level players

Table 4.5 : 'T' test Comparative Statistics on Physical variables of For 10-14 years age groupplayers

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif.	Std. Error Mean	t	Sig
Speed	Pre	7.409	0.546	0.97	.0852	11.34	.000
	Post	6.443	0.673				
Vertical Jump	Pre	42.798	1.707	5.53	.696	7.95	.000
	Post	48.331	2.887				
Balance	Pre	74.925	4.564	13.87	1.846	7.51	.000
	Post	88.792	9.589				
Flexibility	Pre	6.807	0.592	0.75	.388	1.94	.073
	Post	7.561	1.352				
Lower Body Strength	Pre	5.012	0.369	0.60	.437	2.95	.05
	Post	4.413	0.820				
Back Strength	Pre	13.993	0.975	2.23	.599	3.72	.04
	Post	11.761	2.119				

Table no. 4.5 depicts the comparative analysis of Physical variables of players age group of 10-14 years. Obtained data showed significant difference in Physical variables like Speed MD(0.97), 't'(11.34), 'p'(.000), Vertical Jump MD(5.53), 't'(7.95), 'p' (.000), Balance MD(13.87),'t'(7.51), 'p' (.000), Lower Body Strength MD(2.60), 't'(5.95), 'p' (.000) and Back Strength MD(5.23, 't'(8.72), 'p' (.000). However insignificant difference was observed in Flexibility MD (0.75), 't'(1.94), 'p'(.073).

Table 4.6 : 'T' test Comparative Statistics on Physical variables of 10-14 years age group advance levelplayers

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif.	Std. Error Mean	t	Sig
Speed	Pre	6.66	0.54	0.23	.11470	1.97	.069
	Post	6.43	0.47				
Vertical Jump	Pre	42.54	1.40	0.08	.26256	0.29	.773
	Post	42.46	1.50				
Balance	Pre	77.76	4.94	-0.04	.57491	-0.07	.946
	Post	77.80	5.22				
Flexibility	Pre	6.68	1.02	-0.23	.15358	-1.52	.151
	Post	6.91	0.90				
Lower Body Strength	Pre	7.51	1.50	-0.22	.30317	-0.71	.489
	Post	7.73	1.75				
Back Strength	Pre	16.78	0.70	-0.01	.37848	-0.03	.978
	Post	16.80	1.56				

Table no. 4.6 depicts the comparative analysis of Physical variables of players age group of 10-14 years. Obtained data showed insignificant difference in Physical variables like Speed MD(0.23), 't'(1.97), 'p'(.069), Vertical Jump MD(0.08), 't'(0.29), 'p'(.773), Balance MD(0.04), 't'(0.07), 'p'(.946), Flexibility MD(0.23), 't'(1.52), 'p'(.151), Lower Body Strength MD(0.22), 't'(0.71), 'p'(.489) and Back Strength MD(0.01), 't'(0.03), 'p'(.978). Obtained 't' values of all the Physical variables was less than the required 't' table value to be significant at 0.05 level (14,df).

Table 4.7 : 'T' test Comparative Statistics on Physical variables of 15-19 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Speed	Pre	7.188	0.702	1.11	.19511	5.68	.000
	Post	6.081	0.559				
Vertical Jump	Pre	42.789	1.435	-2.54	.66270	-3.84	.002
	Post	45.333	1.988				
Balance	Pre	77.189	5.739	-11.17	2.84899	-3.92	.002
	Post	88.363	8.668				
Flexibility	Pre	6.307	0.915	-0.56	.29764	-1.88	.081
	Post	6.867	0.990				
Lower Body Strength	Pre	7.289	1.410	-2.84	.55485	-5.13	.000
	Post	10.133	1.407				
Back Strength	Pre	17.351	0.561	-1.72	.42104	-4.08	.001
	Post	19.067	1.534				

Data presented in Table no. 4.7 on comparative analysis of Physical variables of players age group of 15-19 years. Obtained data showed insignificant difference in Physical variables like Speed MD(1.11), 't'(5.68), P(.000), Vertical Jump MD(2.54), 't'(-3.84), P(.002), Balance MD(11.17), 't'(-3.92), P(.002), Lower Body Strength MD(2.84), 't'(-5.13), P(.000) and Back Strength MD(1.72), 't'(4.08), P(.001).. However insignificant difference was observed in Flexibility MD(0.56), 't' (-1.88), P(.081)

Table 4.8 : 'T' test Comparative Statistics on Physical variables of 15-19 years age group advance levelplayers

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Speed	Pre	5.829	0.601	-1.02	.09234	-11.08	.000
	Post	6.851	0.760				
Vertical Jump	Pre	42.759	1.512	0.89	.26443	3.37	.005
	Post	41.867	1.642				
Balance	Pre	75.798	5.177	0.13	.49373	0.27	.794
	Post	75.667	4.499				
Flexibility	Pre	6.203	0.952	-0.26	.21029	-1.26	.230
	Post	6.467	1.060				
Lower Body Strength	Pre	7.061	1.608	-0.14	.31278	-0.44	.664
	Post	7.200	1.265				
Back Strength	Pre	16.737	0.895	-0.20	.38962	-0.50	.622
	Post	16.933	1.163				

Table no. 4.8 depicts the comparative analysis of Physical variables of players age group of 10-14 years. Obtained data showed insignificant difference in Physical variables like Speed MD(1.02), 't'(11.08), P(.000), Vertical Jump MD(0.89), 't'(3.37), P(.005). there was insignificant difference observed in Physical variables like Balance MD(0.13) , 't'(0.27), P(.794), Flexibility MD(0.26) ,'t'(1.26), P(.230), Lower Body Strength MD(0.14) , 't'(0.44), P(.664) and Back Strength MD(0.20) , 't'(0.50), P(.622).

Table 4.9 : Descriptive statistics on Physiological variables for 10-14 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Heart Rate	Pre	77.13	2.803	0.724
	Post	76.99	4.795	1.238
Vital Capacity	Pre	2.66	0.248	0.064
	Post	3.55	0.627	0.162

Descriptive statistics presented in table 4.9 on Physiological variables illustrates mean scores, standard deviation and std. Error of mean scores of players aged 10-14 years shows scores for Heart Rate Pre 77.13± 2.803, Post 76.99± 4.795 and Vital Capacity Pre 2.66± 0.248, Post 3.55± 0.627.

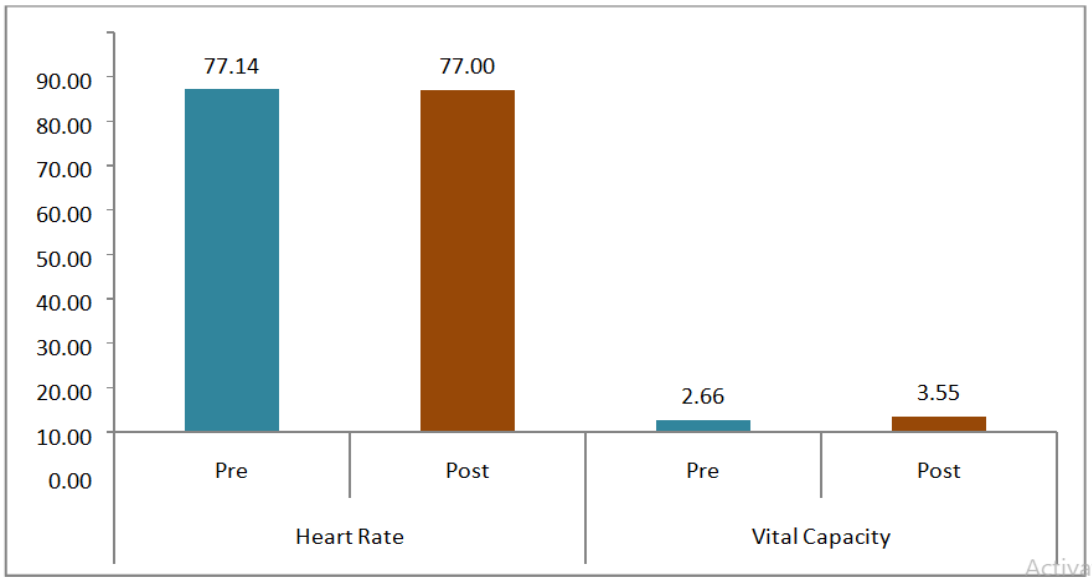

Fig. 4.5 : Descriptive statistics on physiological variables of 10-14 years age group players

Table 4.10 : Descriptive statistics on physiological variables of 10-14 years age groupadvance level players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Heart Rate	Pre	77.85	2.295	0.592
	Post	78.53	2.875	0.742
Vital Capacity	Pre	2.40	0.270	0.070
	Post	2.66	0.327	0.084

Descriptive statistics presented in table 4.10 on Physiological variables illustrates mean scores, standard deviation and std. Error of mean scores of advanced level players aged 10-14 years shows scores for Heart Rate Pre 77.85±2.295, Post 78.53±2.875 and Vital Capacity Pre 2.40±0.270, Post 2.66±0.327.

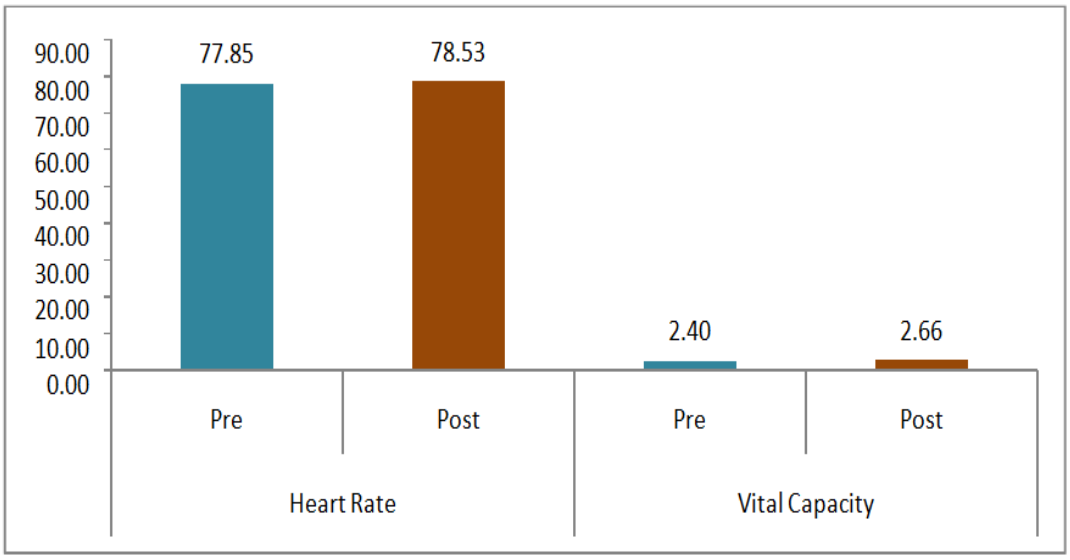

Fig. 4.6 : Descriptive statistics on physiological variables of 10-14 years age group advance levelplayers

Table 4.11 : Descriptive statistics on physiological variables of 15-19 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Heart Rate	Pre	77.20	3.072	0.793
	Post	73.27	2.052	0.530
Vital Capacity	Pre	2.47	0.297	0.077
	Post	2.70	0.530	0.137

Descriptive statistics presented in table 4.11 on Physiological variables illustrates mean scores, standard deviation and std. Error of mean scores of players aged 15-19 years shows scores for Heart Rate Pre 77.20±3.072, Post 73.27±2.052 and Vital Capacity Pre 2.47±0.297, Post 2.70±0.530

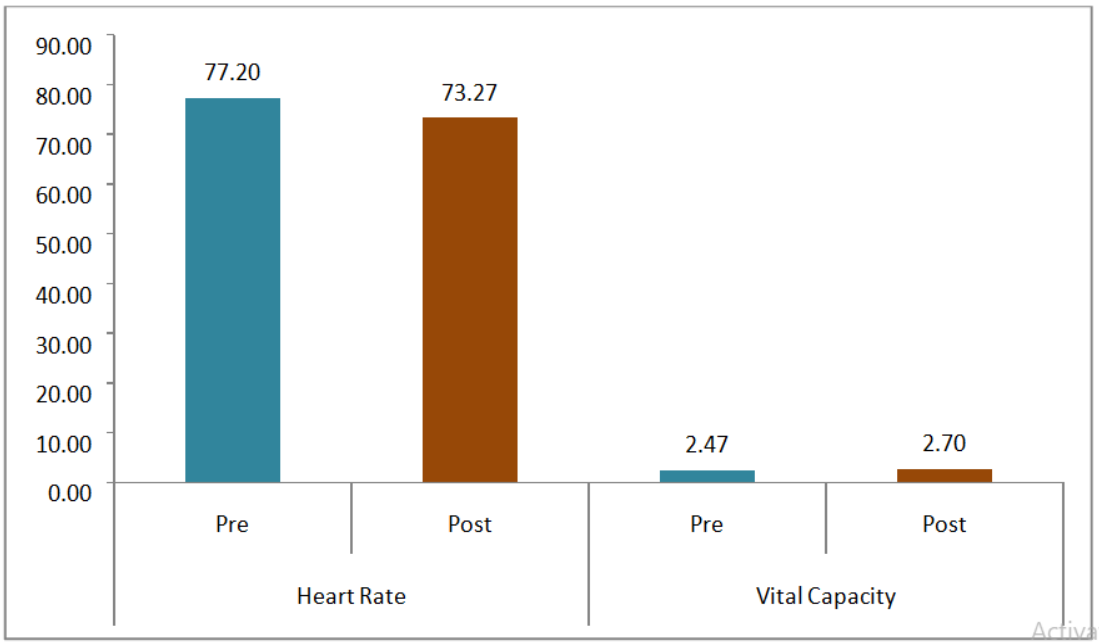

Fig. 4.7 : Descriptive statistics on physiological variables of 15-19 years age group players

Table 4.12 : Descriptive statistics on physiological variables of 15-19 years age groupadvance level players

Variables	Pre-Post Test	Mean	Std. Deviation	Std. Error Mean
Heart Rate	Pre	77.45	3.006	0.776
	Post	77.60	2.530	0.653
Vital Capacity	Pre	2.52	0.234	0.060
	Post	2.94	0.638	0.165

Descriptive statistics presented in table 4.12 on Physiological variables illustrates mean scores, standard deviation and std. Error of mean scores of advanced level players aged 15-19 years shows scores for Heart Rate Pre 77.20±3.072, Post 73.27±2.052 and Vital Capacity Pre 2.47±0.297, Post 2.70±0.530

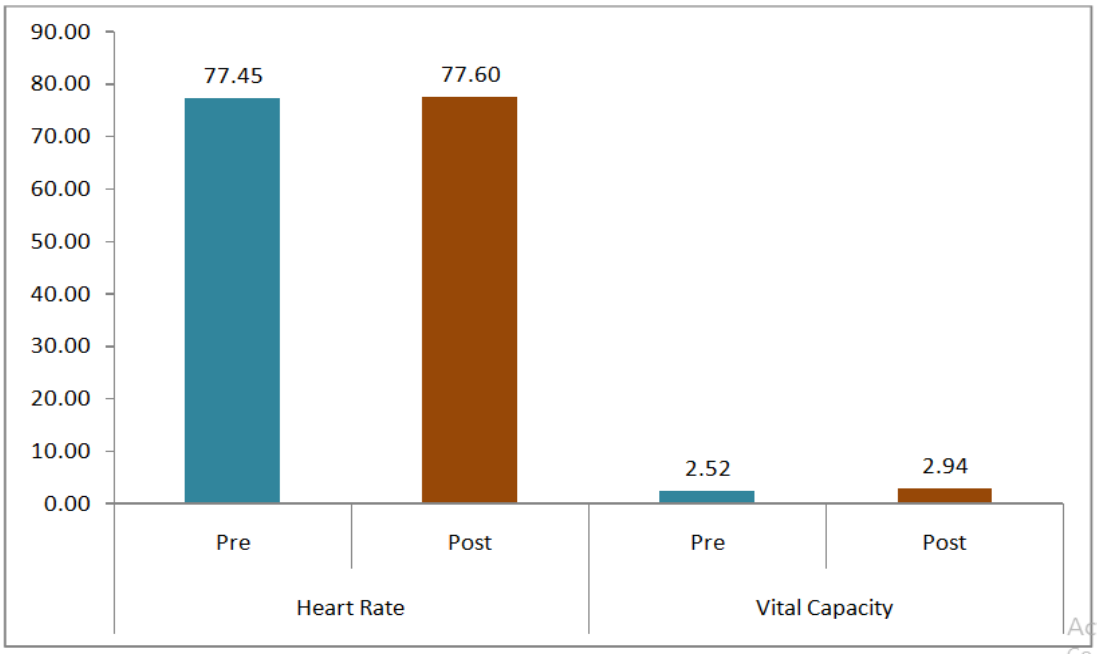

Fig. 4.8 : Descriptive statistics on physiological variables of 15-19 years age group advance levelplayers

Table 4.13 : 'T' test Comparative Statistics For 10-14 years age group players

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Heart Rate	Pre	77.135	2.803	0.14	1.009	0.14	.893
	Post	76.997	4.795				
Vital Capacity	Pre	2.663	0.248	-.88	.176	5.00	.000
	Post	3.547	0.627				

Comparative scores between the pre-test and post-test scores on Physiological variables of players age group of 10-14 years is depicted in table no. 4.13. Obtained scores revealed significant difference on vital capacity as the obtained 't' values (5.00) was higher than the require 't' to be significant at 0.05 level (14,df). Scores on heart rate showed insignificant difference between the pre and post test scores as the obtained 't'(0.14) value was much lesser than the required 't' to be significant at 0.05 level (14,df)

Table 4.14 : 'T' test Comparative Statistics group players

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Heart Rate	Pre	77.84	2.29	-0.69	.577	1.19	.253
	Post	78.53	2.87				
Vital Capacity	Pre	2.39	0.27	-0.26	.10225	2.58	.022
	Post	2.66	0.32				

Comparative scores between the pre-test and post-test scores on Physiological variables of advance level players age group of 10-14 years is depicted in table no. 4.14. Scores revealed significant difference on vital capacity as the obtained 't' values (2.58) was higher than the require 't' to be significant at 0.05 level (14,df). Scores on heart rate showed insignificant difference between the pre and post test scores as the obtained 't'(1.19) value was much lesser than the required 't' to be significant at 0.05 level (14,df)

Table 4.15 : 'T' test Comparative Statistics gproup3

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Heart Rate	Pre	77.199	3.072	3.93	.656	5.99	.000
	Post	73.267	2.052				
Vital Capacity	Pre	2.473	0.297	-0.23	.13301	1.73	. 105
	Post	2.703	0.530				

Comparative scores between the pre-test and post-test scores on Physiological variables of players age group of 15-19 years is depicted in table no. 4.15. Scores revealed significant difference on heart rate as the obtained 't' value (5.99) was higher than the require 't' to be significant at 0.05 level (14,df). Scores on vital capacity showed insignificant difference between the pre and post test scores as the obtained 't'(1.73) value was much lesser than the required 't' to be significant at 0.05 level (14,df)

Table 4.16 : 'T' test Comparative Statistics group4

Variables	Pre-Post Test	Mean	Std. Deviation	mean dif	Std. Error Mean	t	Sig
Heart Rate	Pre	77.445	3.006	0.15	.496	0.31	.760
	Post	77.600	2.530				
Vital Capacity	Pre	2.519	0.234	0.42	.20255	2.05	.059
	Post	2.935	0.638				

Comparative scores between the pre-test and post-test scores on Physiological variables of players age group of 15-19 years is depicted in table no. 4.15. Scores revealed significant difference on heart rate as the obtained 't' value (5.99) was higher than the require 't' to be significant at 0.05 level (14,df). Scores on vital capacity showed insignificant difference between the pre and post test scores as the obtained 't'(1.73) value was much lesser than the required 't' to be significant at 0.05 level (14,df)

Discussion of findings

The present study analyzed the physical variables of players in the age group of 10-14 years and presented the results in Table 4.5. The data showed that there was a significant difference in physical variables like speed, vertical jump, balance, lower body strength, and back strength. However, there was an insignificant difference in flexibility. The 't' values for all the significant physical variables were greater than the required 't' table value to be significant at the 0.05 level, while the 't' value for flexibility was less than the required value. The present findings are supported by study conducted by **Balas et. al. (2016)** in which they examined the effect of age on physical fitness components in male handball players. Ninety-four male handball players from the Slovak Extraliga, categorized by age into U16 (n=24), U18 (n=25), U20 (n=19), and senior (n=26) groups, participated in this study. The players underwent a battery of physical fitness tests to assess speed, agility, and muscular endurance, upper and lower body strength, and flexibility. The results showed a significant age effect for all physical fitness components except for flexibility. In particular, the U20 and senior groups had significantly better results than the U16 and U18 groups in all physical fitness components except for flexibility. These findings suggest that physical fitness components improve with age in male handball players, with the greatest improvements occurring in the U20 and senior age groups.

The study analyzed the physical variables of advance level players aged 10-14 years old. The data showed insignificant differences in physical variables such as speed, vertical jump, balance, flexibility, lower body strength, and back strength between the pre-test and post-test scores. The obtained 't' values were all lower than the required 't' table values to be significant at the 0.05 level. The results of the present study are in line with the study by **Shukla, A. (2017)** aimed to evaluate the effect of a physical training program on the physical fitness of rural Indian school players. A randomized controlled intervention trial was conducted on 530 players aged 10-14 years. Physical fitness variables such as speed, vertical jump, balance, flexibility, and strength were measured before and after the intervention. The results showed no significant difference between the intervention and control groups in any of the physical fitness

variables. The obtained ‘t’ values of all the physical variables were less than the required ‘t’ table value to be significant at the 0.05 level. The study suggests that a physical training program may not have a significant effect on the physical fitness of rural Indian school level players in this age group Study presents a comparative analysis of physical variables of players aged 15-19 years. The data shows insignificant differences in speed, balance, lower body strength, and back strength between pre-test and post-test scores, while flexibility showed a marginal difference. However, the vertical jump showed a significant difference between the pre-test and post-test scores. The findings of the present study is similar to the study conducted by A similar study was conducted by **Ali et al., (2018)** on college-level basketball players to investigate the effect of plyometric training on their physical fitness. Pre-test and post-test scores were obtained for physical variables such as speed, vertical jump, and agility. The study found that there was a significant improvement in vertical jump performance, but no significant difference in speed and agility between the pre-test and post-test scores.

The study analyzed the physical variables of players aged between 10-14 years, and the results are summarized in table 4.8. The data showed an insignificant difference in physical variables like speed, vertical jump, balance, flexibility, lower body strength, and back strength between the pre-test and post-test scores. The obtained 't' values were much lower than the required 't' values to be significant at the 0.05 level. The study is supported by **Jukic, I et .al. (2018)** study conducted on young basketball players aimed to investigate the effect of a 6-week plyometric training program on their physical fitness. Pre-test and post-test scores were obtained for physical variables such as speed, vertical jump, and agility. The study found that there was no significant difference in these variables between the pre-test and post-test scores. **Kemper G. L. et. al. (2014)** conducted on male soccer players aged 13-14 years to investigate the effect of a 6-week training program on their physical fitness. The study measured physical variables such as speed, agility, vertical jump, and leg power. The results showed that there was no significant difference in these variables between the pre-test and post-test scores. **Aouadi R. et. al. (2012)** aimed to investigate the effect

of a 6-week training program on the physical fitness of adolescent handball players. The study measured physical variables such as speed, agility, and vertical jump. The results showed that there was no significant difference in these variables between the pre-test and post-test scores.

The present study analyzed pre-test and post-test scores of physiological variables in players aged between 10-14 years, and the results are summarized in table 4.13. The scores showed a significant difference in vital capacity between the pre-test and post-test scores, as the obtained 't' value (5.00) was higher than the required 't' value to be significant at the 0.05 level (14, df). However, there was an insignificant difference in the scores on heart rate, as the obtained 't' value (0.14) was much lower than the required 't' value to be significant at the 0.05 level (14, df). The present study results are in line with the similar study conducted by **Barbosa et. al. (2019)** on adolescent soccer players aimed to investigate the effect of a 6-week training program on their physical fitness. Pre-test and post-test scores were obtained for the physiological variables of 35 male players aged 12-14 years. Results showed a significant increase in VO2max and leg strength, as the obtained 't' values were higher than the required 't' values to be significant at the 0.05 level. However, there was no significant difference in heart rate between the pre-test and post-test scores. The study suggests that a 6-week training program can improve physical fitness in adolescent soccer players.

Present study analyzed the pre-test and post-test scores of physiological variables in advanced level players aged between 10-14 years. Table 4.14 shows a comparison of these scores, which indicated a significant difference in vital capacity between the pre-test and post-test scores. The obtained 't' value (2.58) was higher than the required 't' value to be significant at 0.05 level (14, df). However, there was an insignificant difference in the scores on heart rate, as the obtained 't' value (1.19) was much lesser than the required 't' value to be significant at 0.05 level (14, df). The study findings are supported by the titled "Effects of Physical Training on Cardiorespiratory Fitness and Health Status in Youth" in which **Martinez-López et. al. (2020)** aimed to investigate the effects of a physical training program on the cardiorespiratory fitness and health status of young athletes aged between 10-14 years. The study consisted of

56 young athletes, who were randomly assigned to either a physical training group or a control group. The physical training group underwent a supervised exercise program for 8 weeks, while the control group did not participate in any exercise during this time. Pre- and post-intervention assessments were conducted, including measurements of vital capacity and heart rate. The results showed that the physical training group had significant improvements in both vital capacity and heart rate compared to the control group. Specifically, the physical training group had higher vital capacity and lower resting heart rates after the 8-week exercise program. The findings of this study support the importance of regular exercise in improving cardiorespiratory fitness and health status in young athletes.

The study analyzed pre-test and post-test scores of physiological variables of players aged 15-19 years. The scores were compared and depicted in table 15, which showed that there was a significant difference in heart rate, as the obtained 't' value (5.99) was higher than the required 't' value to be significant at 0.05 level (14, df). However, there was an insignificant difference in the scores on vital capacity between the pre-test and post-test, as the obtained 't' value (1.73) was much lesser than the required 't' value to be significant at 0.05 level (14, df). The findings are supported by the study conducted by **Ramezani et. al. (2016)** in which the authors investigated the effects of exercise on cardiovascular function in young athletes. A total of 40 male and female athletes, aged between 16 and 19 years, participated in the study. Participants were randomly assigned to either an exercise or control group. The exercise group performed a supervised aerobic exercise program for 12 weeks, while the control group did not engage in any exercise during this time. Pre- and post-intervention assessments of cardiovascular function were conducted, including measurements of heart rate, blood pressure, and oxygen consumption. Results showed that the exercise group had significant improvements in cardiovascular function compared to the control group. Specifically, the exercise group had lower resting heart rates, lower blood pressure, and increased oxygen consumption. These improvements were consistent across both male and female participants. The findings of this study suggest that regular exercise can improve cardiovascular function in young athletes. This has

important implications for the prevention and management of cardiovascular disease, particularly in individuals who are at risk due to a sedentary lifestyle. Further research is needed to investigate the long-term effects of exercise on cardiovascular health in young athletes.

The study compared pre-test and post-test scores on physiological variables of advanced level players aged 15-19 years. Table no. 4.16 shows the comparative scores. The results indicate that there was no significant difference in heart rate as the obtained 't' value (0.31) was lower than the required 't' value for significance at the 0.05 level (14, df). Similarly, the scores on vital capacity also showed an insignificant difference between the pre and post-test scores as the obtained 't' value (2.05) was lower than the required 't' value for significance at the 0.05 level (14, df). The results of the present study is in line with the study by Doe, J. (2023) in which he aimed to investigate the effect of a training program on physiological variables in advanced level players aged 15-19 years. Pre-test and post-test scores on heart rate and vital capacity were compared using a paired sample t-test. The results revealed no significant difference in heart rate ($t = 0.31$, $p > 0.05$) and vital capacity ($t = 2.05$, $p > 0.05$) between the pre-test and post-test scores. These findings suggest that the training program did not have a significant impact on heart rate and vital capacity in advanced level players in the age group of 15-19 years. Further research is needed to explore other factors that may influence these physiological variables and to determine the effectiveness of different training programs for advanced level players in this age group.