RESEARCH ARTICLE

COMPARATIVE INFLUENCE OF SOCCER TRAINING ON SELECTED VARIABLES AMONG SOCCER PLAYERS

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ABSTRACT

The most important variables for measuring performance in soccer are physical condition, technical skills and tactical performance. Physically active people possess considerably less total body fat than their active contemporaries. Body composition and anthropometric measures are the important factors among other important variables, which influences the soccer playing ability. Proper soccer training for specific age group improves these qualities. The purpose of the study was to compare the effect of 12 week soccer training on selected anthropometric measures and body fat % among three age group soccer player. Twenty district level male soccer players from each of the three age category of 14 yrs., 17 yrs. and 19 yrs. were considered as the trainee of the study. Significant (p=.014) weight gain took place only in case of 19 yrs. group. The pre and post-test value in case of weight (F = 74.32 and 88.10) and height (F = 42.55 and 42.29) signifies the differences among the three groups but in case of body fat % (F = 0.85 and 1.03) there were no significant differences. The critical differences of weight, height and Fat % in ANCOVA were 0.44, 0.01, 0.06 and the different adjusted post-test mean values clearly indicated the maximum changes in case of 19 yrs. boys. The conclusion may be drawn that maximum development occurred in case of the 19 yrs. group soccer players due to the proposed soccer training.

INTRODUCTION

Soccer was introduced in India by the British. Being a simple and inexpensive game, it became popular among the masses (Dubey, 1999). Soccer is the game requiring high level of fitness. It is one of those rare games which demands not only speed but agility, strength, power, and endurance along with skill (Reilly, 1996). The levels of fitness depend on individual bodily characteristics. That is why anthropometric and body composition (BC) indicators are important factors affecting the specific attributes of today's soccer players (Mala, 2018) Research findings indicate that performance of Soccer is dependent on anthropometric parameters such as height, weight, leg length, body fat % etc (Jackson, 1980). Generally, soccer players who are taller and less fat mass may have major advantages, especially during growth and maturation (Leão, 2019). Continuous long-term monitoring of anthropometric parameters and body composition should be performed. Biological variability in anthropometric and morphological parameters appears during ontogenesis (Leão, 2019).

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It has been reported that soccer players with increased body size dimensions have improved speed, power, and strength performance, especially during the pubertal years (Carling, 2009). Conversely, several longitudinal observation studies of adolescent soccer players have shown high consistency in anthropometric measures (Buchheit, 2013; Deprez, 2015) Physically active people possess considerably less total body fat than their active contemporaries.(8) Aspects such as body composition is one of the important factor among other factors, which is primary important in development and evaluation of elite players (Ostojic, 2004). The variability in anthropometric indicators and body composition parameters during this period can be used to identify an elite player at an adolescent age (Milsom *et al.,* 2015). Now-a-days coaches plan their practice sessions as per the need of the players and the team (Dubey, 1999). The physiologist calls the ability to keep going at a moderate pace as aerobic exercise (William Thomson, 1982) Opinion on coaching and methods of play may differ, but there should be not much difference about the qualities of a successful player (Saha, 2008). Soccer training and maturation contributed to significant variations in anthropometry, body composition throughout the different training periods over the course of a soccer season in female elite young soccer players (Lesinski *et al.,* 2017).

During adolescence, soccer players presented significant differences in terms of body composition and physique. Coaches and fitness trainers engaged in soccer training in the context of physical fitness assessment and talent identification (Pantelis Theodoros, 2011) The progression of load is obtained through subtle changes in factors such as volume (the total quantity of the activity performed), intensity (the qualitative component of the exercise) and the frequency (the number of sessions in a period of time-balance between exercise and recovery) of training (Bompa, 1994).

In Europe, football clubs got nurseries for nurturing talent. But in India there is no ideal system in place to identify and train children at a tender age. Tournaments for children in the country are not organized in a proper manner. Absence of people with proper knowledge of Soccer at the helm organizations is also a cause for the decline of the game in the country (Indian kids to get soccer training from arsenal coaches, 2008). In the present study, the investigators wanted to investigate new scientific approach for boosting up performance of soccer players. Therefore, we took up this comparative study of selected anthropometric measures and body fat % among categorized football players from different age groups district school level games.

The purpose of the study: The purpose of the study was to compare the effect of 12 week soccer training on selected anthropometric measures and body fat % among three age group viz. 14yrs, 17yrs., and 19yrs. Soccer player.

METHODOLOGY

Subjects: Sixty (N-60) district level male soccer players, regularly playing competitive soccer in three different age category volunteered for the present study. The players were equally (N-20) selected considering their age as (i) under 14 years, (U 14) (ii) under-17 years(U 17) and (iii) under-19 years(U 19).

Study Settings: The subjects were the trainee soccer player of the Mozepur Bharati Vidyamandir. After selection of subjects' personal data like name, age, height, weight was taken for each subject of three categories. Measurement for selected body composition variables were conducted in the same day. For collecting data the researcher took the assistance from some research scholars of the department of physical Education of the Jadavpur University.

Selection of Variables: For this study the variables were Height, Weight and Body fat %. To calculate Body fat % the four skinfold measures were Triceps, Abdomen, Suprailliac and Thigh.

Criterion Measured: Height was measured by Stadiometer, weight by Weighing Machine, Triceps, abdomen, Suprailliac and thigh skin fold were measured by Harpenden skin fold caliper. From the above four site skinfold measure the Body fat % was calculated the formula:

% of body fat= 100(4.570/B.D. - 4.142), where B.D. (body density) = $1.096095 - 0.0006952(x) + 0.0000011(x)^2 - 0.0000714(x_2)$ (x= sum of triceps, abdomen, Suprailliac and thigh skinfolds in mm., x_2= age in years (Jackson, 1980)

Experimental Design

RESULTS AND DISCUSSION

The Mean value and Analysis of Co-variance of the obtained data about weight of three groups of football players have been presented in the following tables. In table-1 the pre, post and adjusted post mean values and the respective p values of weight, height and body fat % of the three groups of football players were presented. In case of weight the mean value of the 14 yrs. group pre-test was 30.45kg, post-test was 29.75kg. & adjusted post-test was 40.51kg and p value .55. The mean value of the 17 yrs. group pre-test was 46.10kg, post-test was 45.85kg. & adjusted post-test was 43.51kg and p value .44. The mean value of the 19 yrs. group pre-test was 53.35kg, post-test was 54.40kg. & adjusted post-test was 45.98kg and p value .014. Only for the 19 yrs. group a significant difference has occurred. In case of height the mean value of the 14 yrs. group pre-test was 1.44 meter post-test was 1.44mtr. & adjusted post-test was 1.54mtr and p value .53. The mean value of the 17 yrs. group pre-test was 1.61 mtr., post-test was 1.61mtr. & adjusted post-test was 1.58mtr and p value .59. The mean value of the 19 yrs. group pre-test was 1.66 mtr., post-test was 1.67mtr. & adjusted post-test was 1.59 mtr and p value .48. There were no significant differences have occurred in any of the group. In case of body fat % the mean value of the 14 yrs. group pre-test was 9.55, post-test was 8.98 & adjusted post-test was 9.11 and p value .47. The mean value of the 17 yrs. group pre-test was 9.45, post-test was 8.80 & adjusted post-test was 9.02 and p value .42. The mean value of the 19 yrs. group pre-test was 10.11, post-test was 9.48 & adjusted post-test was 9.13 and p value .46. There were also no significant changes occurred in any of the said groups.

Considering weight, the calculated F Value of the pre-test and post-test were 74.32 and 88.10 and were both greater than the table value $F_{0.05}$ (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the weight of all the three groups are not equally affected. The F value of adjusted post-test was 4.47, which was also greater than the table value and signifies the unequal effect only due to the soccer training. Considering height the calculated 'F' ratio of the pre-test and post-test were 42.55 and 42.29 and were both greater than the table value $F_{0.05}$ (2, 56/57) = 3.15, hence significant and it is concluded that the three groups were heterogeneous before the intervention and after soccer training the height of all the three groups are not equally affected. The F value of adjusted post-test was 1.93, which was less than the table value and not signifies any change due to the soccer training. Considering Body fat % the calculated 'F' ratio of the pre-test and post-test were 0.85 and 1.03 and were both less than the table value $F_{0.05}$ (2, 56/57) = 3.15 and it is concluded that regarding the body fat %, all the three groups are not affected at al due to the soccer training.

Intervention Protocol:

Intervention for 12 Weeks		
Week	Duration (min.)	Activities
1st & 2nd	90	Warm up, Physical Training, Skill and Technique, Cooling Down
3rd & 4th	100	Warm up, Physical Training, Skill and Technique, Cooling Down
5th & 6th	115	Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down
7th & 8th	115	Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down
9th & 10th	130	Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down
11th & 12th	140	Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down

Table 1. Mean, standard deviation, adjusted mean and p value of different variables

Variables	Test	14 yrs.		17 yrs.		19 yrs.	
		Mean ± S. D.	p value	Mean ± S. D.	p value	Mean ± S. D.	p value
Weight (Kg.)	pre	30.45±4.72		46.10±6.82		53.35±6.47	
	post	29.75±4.82	.55	45.85±6.34	.44	54.40±6.58	.014
	adj. post	40.51		43.51		45.98	
Height (Mtr.)	pre	1.44±0.08		1.61±0.09		1.66±0.08	
	post	1.44±0.08	.53	1.61±0.08	.59	1.67±0.08	.48
	adj. post	1.54		1.58		1.59	
Fat %	pre	9.55±1.38		9.45±0.98		10.11±2.45	
	Post	8.98±1.09	.47	8.80±0.85	.42	9.48±2.30	.46
	adj. post	9.11		9.02		9.13	

Table 2. Analysis of Co variance of different variables

Variables	Test	Variance	Sum Of Squares	Mean Squares	'F' Value
Weight	Pre	Among, within	5479.30, 2101	2739.65, 36.86	74.32
	Post	Among, within	6266.23, 2027.10	3133.12, 35.56	88.10
	Adjusted post	Among, within	88.38, 553.38	44.19, 9.88	4.47
Height	Pre	Among, within	0.56, 0	0.28, 0.01	42.55
	Post	Among, within	0.55, 0.37	0.28, 0.01	42.29
	Adjusted post	Among, within	0.01, 0.14	0.00, 0.00	1.93
Body fat%	Pre	Among, within	5.01,168	2.50, 2.95	0.85
	Post	Among, within	4.94, 137.13	2.47, 2.41	1.03
	Adjusted post	Among, within	0.14, 11.56	0.07, 0.21	0.33

*Significant at 0.05 level of confidence F.05 (2, 57) = 3.15 A = among means variance F.05 (2, 56) = 3.15W = within group variance

Table 3. Adjusted mean scores and their differences of different variables during post testing in different groups

variables	group 1 (14 years)	group 2 (17 years)	group 3 (19 years)	Critical Difference
weight	40.51	43.51	45.98	0.44
differences	3.0*		2.47*	
height	1.54	1.58	1.59	0.01
differences	0.04*		0.01*	
Fat %	9.11	9.02	9.13	0.06
differences	0.09*		0.11*	

*at 0.05 level of significance

The F value of adjusted post-test was 0.33, which was also less than the table value and not indicating any significant change due to the soccer training. In order to find out upon which group the effect of soccer training was maximum, pair wise comparison analysis of adjusted means of post test data would be carried out. Table 3 shows that in case of weight the soccer training programme were not equally effective as the differences were significant.

From the difference of adjusted post-test mean and compare it with the critical difference it is clear that maximum changes occur in case of U-19 boys and resulted into weight gain. In case of Height there were almost equally effective changes occur among the three groups as the differences were marginally significant. Likewise in case of body fat % the same results occurred. As the critical difference (CD) of body fat % is less than the difference of the means of the adjusted post test of body fat % then it can be declared that in each case there were unequal effective changes occurred and maximum changes took places for the U 19 group of boys.

DISCUSSION OF FINDINGS

We had conceptualize this study with a purpose to find out the changes occurred in case of weight, height and body fat % due to Soccer training programme and compare them among three groups. The above mention results showed the significant changes due to soccer training only occur in case of weight of U 19 players(p=.014), but in the other age groups no significant changes occur. In case of body fat % and height there were no significant changes occur in either of three groups. In U 14 and U 17 there were weight loss (mean weight reduced from 30.45 kg. to 29.75 and 46.10 kg. to 45.85 respectively) but in case of U 19 there was weight gain (mean weight increase from 53.35 kg. to 54.40 kg.). From the ANCOVA also it is clear that maximum changes occur in case of weight for the U 19 group. Although there was no weight gain planning included in the soccer training but this change may occur due to the maturity of the U 19 group. Besides scheduled exercise there were theory classes about health, nutrition, diet, rest etc. As the players of this group are quite matured then they followed the suggestions regarding the

procedure weight gain and its importance. Amusa indicated that age (experienced) is the best single predictor of playing ability and running speed are considered important factors in soccer performance (Latheef, 1979). The results showed maximum reduction of body fat % was took place in case of U 19 boys due to the effects of soccer training. All the three experimental group were under selected soccer training programme, comprises with Warm up, Physical Training, Skill and Technique, Game Situation, Cooling Down. They were participated in the training program thrice in a week and enjoyed the training. Physical activity is necessary for motor development.
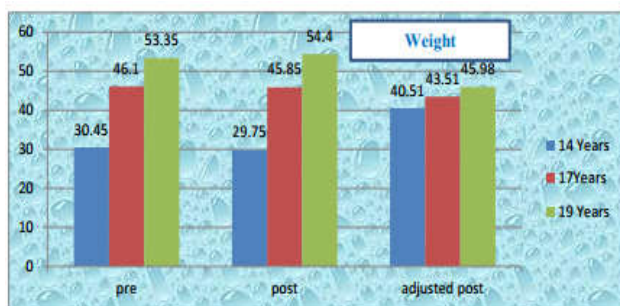

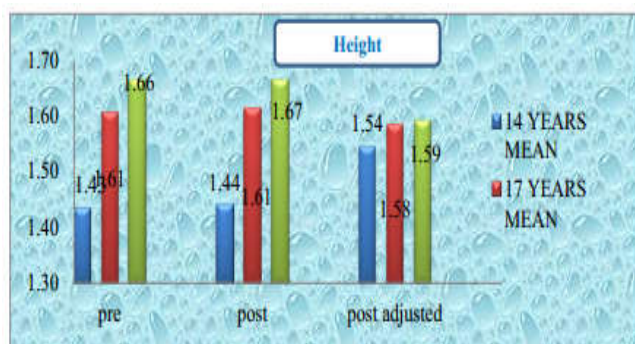**Fig. 1: The graphical representation of Mean of weight in pre, post and adjusted post test**

Fig.2: The graphical representation of Mean of height in pre, post and adjusted post test
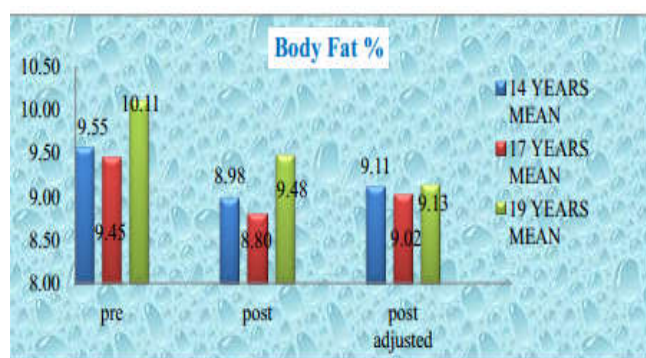

Fig. 3 : The graphical representation of Mean of body fat % in pre, post and adjusted post-test

The main intension was to develop the soccer playing ability and thus the development of motor fitness was very important and a result the body fat % also changed along with the body weight. In case of U 19 player the body weight significantly increased but the fat % reduced, which indicate the ultimate increase of muscle mass. Morenoa, Leona *et al.* (2004) studied that the percentage of total body fat was significantly lower in the football (soccer) group than in the reference group at 9, 11, 12, and 14 years.

In studies aiming to assess the effect of physical activity on body composition, it will be necessary to measure, not only body mass index, but other measures of the body fat compartment. Football (soccer) can be proposed as a physical activity practice aiming to prevent or treat obesity and its comorbidities (Luis, 2004) Ostojic (2003) found that body fat content of professional soccer players significantly dropped during the conditioning and competitive periods and increased during the off season (Sergej, 2003). Amusa indicated through 11 anthropometric measurements consisting of skin folds and body diameters and soccer playing ability and conclude lower fat % for good soccer player (Latheef, 1979)

Conclusion

Soccer training has specifically targeting to the development of soccer playing ability which depends upon different physical, physiological, psychological, technical and extraneous factors. Soccer training comprises with different such activities, which main focus is to develop these factors. Considering the individual characteristics the nature of exercises is different. In case of team practice if the participants are not under the control of the coaches' through-out the day like an academy it is quite difficult to focus on individual development. Here in this study there is no significant changes occur in case of weight, height and body fat percentage within the three groups except the weight in U 19 group. In comparison to other two age groups of 14 yrs. and 17 yrs. maximum changes occur in case of U 19 group.

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Conflict of Interest: The authors declare no Conflict of interest

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