Effect of Core Specific Fitness Training Program on Muscular Endurance and Flexibility of School Going Children

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Abstract – The present study has been undertaken by the researcher to know the effect of core specific fitness training program on muscular endurance and flexibility of school going children. To get the answers to the questions, the researcher has planned a very scientific core specific fitness training program for the implementation. The researcher has selected a total of 40 participants whose age ranged between 15 to 18 years. The participants were divided on control and experimental group having 20 members each. All the participants were school going children and regularly participated in physical activity classes. The training of the participants was conducted for 12 weeks for 4 days a week. For the data analysis ANCOVA was used after applying all the required assumption statistics on the data collected. The data was collected pre and post the treatment given. The experimental group has received the planned training program whereas the control group did not get any training program. The results of the study have shown the positive and significant impact of core specific training program on the muscular endurance and flexibility on the school going children.

Keywords: Training, Core, Muscular Endurance, Flexibility, School Children

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INTRODUCTION

The aim of sports training is to enhance the working capacity of athletes, the effectiveness of skill, and psychological makeup to improve the performance in the competitions. The training leads to the adaptions in relation to the load. The effective training programs are designed considering the energy systems required, the fuel to utilize by each of the variable. The nature of training used significantly affects the specific mechanisms in the body. The core strength training programs have been in trend now-a-days due to their direct relation to the performance of athletes. The training of core muscles is done in various ways and the researchers are extensively searching for the effects of the core training methodologies in adult population. But there is a lack of proper research in the area of children. The core muscles are now very much emphasized n various sports and games. Core training involves both the isometric and isotonic exercises. The core training involves the muscles of abdomen and back. To develop the core muscles in overall manner, so that the all components may be integrated, the training program must involve endurance, strength and flexibility training of core muscles. The core training in the school going children may prevent the occurrence of injuries while participating in sports activities in later stages.

Strength training results in the development of enhanced motor unit recruitment (Haff G, G., A. Whitley, and J. A. Potteiger, 2001), motor unit synchronization (Stone M.H. , M. E. Stone, and W A sands, 2007.), muscle hypertrophy etc. (Pollock M. L. , J E , MM Bamman, 1993.) . The major muscles involved in the core are pelvic floor muscles, transverse abdominals, multifolds, internal and external oblique, rectus abdominus and erector spinae. Development of strong core may result in enhancement of flexibility in the mid area of the body whether static of dynamic. The increase in flexibility may lead to the development of the overall performance as the range of motion will consequently enhance the production of force. The core muscles assist in the countering the rotatory forces and the also helps in the maintenance of good posture.

In the present study the researcher has made efforts to develop and training program having a balanced nature involving the muscular endurance, strength and flexibility of core muscles in school going children.

METHODOLOGY

For the purpose of study a total of 40 participants were selected whose age ranged between 15 to 18 years. The participants were divided on control and

experimental group having 20 members each. All the participants were school going children and regularly participated in physical activity classes. The training of the participants was conducted for 12 weeks for 4 days a week. The training program involved warm up, mountain climbing In prone line position, crunches, planks, 4 sprints for 200 meters with a recovery of 2 minutes in-between the repetitions. The training program was carried out for 40 minutes. The researcher along with assistants had demonstrated the exercises to the participants. After the participants learned the exercises properly, pre data was taken. The participants had volunteered in the study and medical fitness was obtained. Parent consent was also obtained.

Pretest posttest experimental design was used for the study and data on the selected variables was collected before and after the training program. The experimental group was given core specific exercises in addition of the regular physical activity in school curriculum, while the control group only participated in regular physical activity of the school.

The dependent variables selected for the study were muscular endurance and flexibility. The criterion variables for the tests were:

1. Muscular endurance: Measured by Plank test and the score have been recorded in seconds.

2. Flexibility: Measured by the Sit and Reach Test and the score has been recorded in cm.

STATISTICAL TECHNIQUE:

The data was collected before and after the training program. The data was analyzed with the help of SPSS 20. Descriptive statistics i.e. mean and standard deviation was used to describe the nature of data. The significance of difference in the pre and posttest mean values was tested using dependent t test. The posttest mean values of control and experimental groups were compared by using independent t test. To test the significance, if difference of mean values of control and experimental groups after eliminating the effect of covariates, ANCOVA was used. The level of significance was set at 0.05.

RESULTS:

To get the results of the study all the assumptions of ANCOVA has been employed and after that ANCOVA has been employed. The tables and the results of this section are presented in the below tables.

TABLE 1

TESTS OF NORMALITY

	Shapiro-Wilk		
	Statistic	**Df**	**Sig.**
E_Pre_Plank	.945	20	.303
E_Post_Plank	.925	20	.126
E_Pre_SAR	.915	20	.080
E_Post_SAR	.923	20	.112
C_Pre_Plank	.959	20	.524
C_Post_Plank	.957	20	.487
C_Pre_SAR	.960	20	.543
C_Post_SAR	.938	20	.221
*. This is a lower bound of the true significance.			
a. Lilliefors Significance Correction			
Where E=Experiment, SAR=Sit and Reach Test			

Table 1 shows the tests of normality which is considered to be an important part in statistics. For checking the normality of the data Shapiro-Wilk test has been employed and its statistic values for all the data sets has come insignificant. The insignificance of the Shapiro-Wilk Statistic confirms that all the data sets were normally distributed.

In addition to the tests of normality, it is very important to know whether outliers in the data set are present or not. To check the same, researcher has employed BOX-M Plots and the same are presented below in Figure 1 to 8.
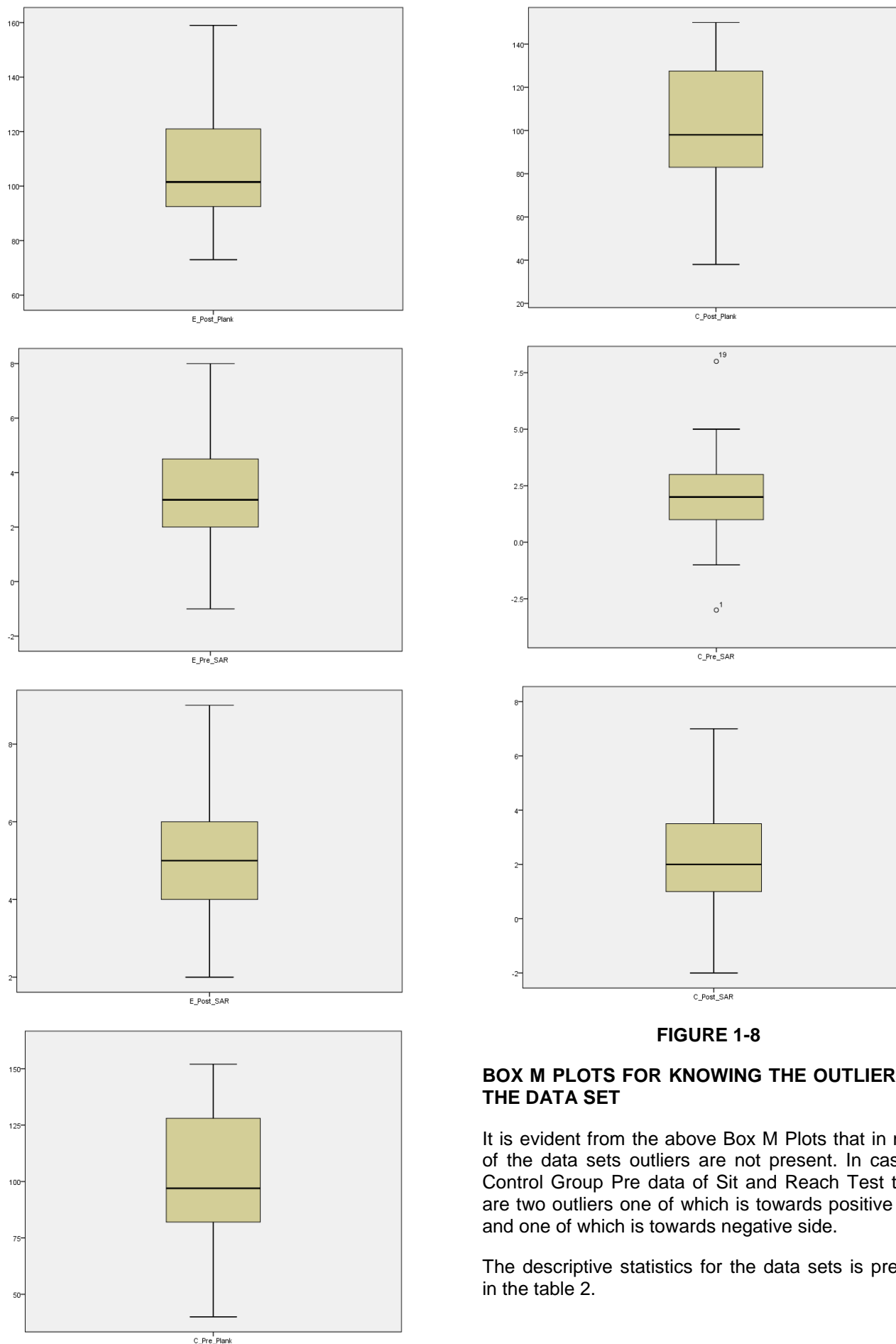
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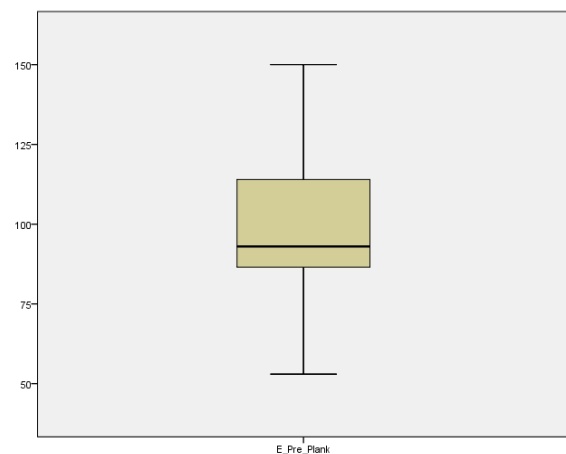
FIGURE 1-8

BOX M PLOTS FOR KNOWING THE OUTLIERS IN THE DATA SET

It is evident from the above Box M Plots that in most of the data sets outliers are not present. In case of Control Group Pre data of Sit and Reach Test there are two outliers one of which is towards positive side and one of which is towards negative side.

The descriptive statistics for the data sets is present in the table 2.

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TABLE 2

DESCRIPTIVE STATISTICS FOR THE DATA ON MUSCULAR ENDURANCE AND FLEXIBILITY OF EXPERIMENTAL AND CONTROL GROUP CHILDREN

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E_Pre_Plank	100.3000	20	24.66854	5.51605
	E_Post_Plank	108.5000	20	22.94043	5.12964
Pair 2	E_Pre_SAR	3.4500	20	2.01246	.45000
	E_Post_SAR	5.3500	20	1.81442	.40572
Pair 3	C_Pre_Plank	98.8500	20	33.26809	7.43897
	C_Post_Plank	99.1000	20	32.83275	7.34163
Pair 4	C_Pre_SAR	2.1000	20	2.48998	.55678
	C_Post_SAR	2.0500	20	2.16370	.48382
Where E=Experiment, SAR=Sit and Reach Test					

Table 2 shows the descriptive statistics of the data sets collected from the experimental and control groups on selected variables. The mean and SD of the E_Pre_Plank, E_Post_Plank, E_Pre_SAR, E_Post_SAR, C_Pre_Plank, C_Post_Plank, C_Pre_SAR and C_Post_SAR were found to be 100 (24), 108 (22), 3.45 (2.01), 5.35 (1.81), 98 (33), 99 (32), 2.1 (2.48) and 2.05 (2.16) respectively.

TABLE 3

PAIRED SAMPLES CORRELATIONS

		N	Correlation	Sig.
Pair 1	E_Pre_Plank & E_Post_Plank	20	.980	.000
Pair 2	E_Pre_SAR & E_Post_SAR	20	.863	.000
Pair 3	C_Pre_Plank & C_Post_Plank	20	.990	.000
Pair 4	C_Pre_SAR & C_Post_SAR	20	.947	.000

The correlation coefficients between the pre and post data on all the selected variables with their significance value is presented in table 3. It is clearly evident from the table that all the correlation coefficients are significant at 0.05 level of significance.

The researcher has employed dependent t-test to test whether improvement in the dependent variable has happened or not. The tests for the same has been presented below.

TABLE 4

PAIRED SAMPLES TEST

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	E_Pre_Plank - E_Post_Plank	-8.20000	5.09489	1.13925	-10.584	-5.81552	-7.198	19	.000
Pair 2	E_Pre_SAR - E_Post_SAR	-1.90000	1.02084	.22827	-2.377	-1.42223	-8.324	19	.000
Pair 3	C_Pre_Plank - C_Post_Plank	-.25000	4.79995	1.07330	-2.496	1.99644	-.233	19	.818
Pair 4	C_Pre_SAR - C_Post_SAR	.05000	.82558	.18460	-.3363	.43638	.271	19	.789

The dependent t-test has been employed to know the improvement status in all the variables after the training and it is evident from the table that the improvement has happened only in case of experimental group (pair 1 and pair 3). It indicates that the training was effective and it has significantly contributed in the development of all the selected variables.

The researcher has selected analysis of covariance to test the effectiveness of training program on the selected variables. One of the very important assumptions for applying ANCOVA is equality of error variances and for the same Leven's Test has been applied in the study. The table for Levene's Test is presented below.

TABLE 5

Levene's Test of Equality of Error Variances[a]			
Dependent Variable: Post_Plank			
F	df1	df2	Sig.
.028	1	38	.868
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + Pre_Plank + Treatment			

Table 5 shows the value of Levene's test of Equality of Error Variances for the data of muscular endurance (measured through Plank). The F-Value for the same has come insignificant as the Sig. Value is more than 0.05. The insignificance of the F-Value shows that the error variances of data were equal.

TABLE 6

TESTS OF BETWEEN-SUBJECTS EFFECTS					
Dependent Variable: Post_Plank					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Pre_Plank	29620.783	1	29620.783	1274.358	.000
Treatment	642.412	1	642.412	27.638	.000
Error	860.017	37	23.244		
Total	462342.000	40			
Corrected Total	31364.400	39			
a. R Squared = .973 (Adjusted R Squared = .971)					

Table 6 shows the analysis of covariance for the data on Muscular Endurance (Measured through Plank) of children. The pre data on Muscular Endurance (Measured through Plank) of children was found to be significantly different for both the groups which

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clearly shows that the decision of applying ANCOVA was correct. The F-Value for the treatment was also found to be significant which shows that the improvement in Muscular Endurance (Measured through Plank) of the children after the selected training was significant.

TABLE 7

Levene's Test of Equality of Error Variances[a]			
Dependent Variable: Post Sit & Reach			
F	df1	df2	Sig.
.429	1	38	.517
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + Pre_SAR + Treatment			

Table 7 shows the value of Levene's test of Equality of Error Variances for the flexibility (sit and reach) data. The F-Value for the same has come insignificant as the Sig. Value is more than 0.05. The insignificance of the F-Value shows that the error variances of data were equal.

TABLE 8

TESTS OF BETWEEN-SUBJECTS EFFECTS					
Dependent Variable: Post Sit & Reach					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Pre_SAR	126.165	1	126.165	184.252	.000
Treatment	44.800	1	44.800	65.426	.000
Error	25.335	37	.685		
Total	808.000	40			
Corrected Total	260.400	39			
a. R Squared = .903 (Adjusted R Squared = .897)					

Table 8 shows the analysis of covariance for the data on Flexibility (Measured through Sit & Reach Test) of children. The pre data on Flexibility (Measured through Sit & Reach Test) of children was found to be significantly different for both the groups which clearly show that the decision of applying ANCOVA was correct. The F-Value for the treatment was also found to be significant which shows that the improvement in Flexibility (Measured through Sit & Reach Test) of the children after the selected training was significant.

DISCUSSION OF THE FINDINGS:

The purpose of the study was to determine the effect of specific core strength training programme on the muscular flexibility and core strength of school going children. The results of the study revealed that there is significant effect of specific core strength training programme on the muscular endurance and flexibility of the participants. In this study, it has been noted that muscular endurance training also leads to the enhancement of flexibility as in the training program,

the component of flexibility training was comparatively less. The muscular endurance training exercises basically have resulted in the development of strength endurance of the poor muscles. While flexibility is a component which may require strength in muscles and endurance also in order to sustain the pressure while the joints are stretched beyond the range of motion. The muscular endurance training effect has resulted in development of flexibility due to its qualities of development of strength endurance in muscles.

The criterion variable for measuring the changes in muscular endurance was plank hold. The participants improved significantly in the test after training as the core muscles became efficient enough to hold the weight of the body against the gravity while the body is suspended between toes and arms. The exercises considered in the training program were largely designed for the development of core muscles and it has been found that the core muscles strength may help athletes widely in attaining other physical fitness goals. Strong core muscle not only helps in attaining fitness but also it prevents a lot of injuries while tackling the external forces.

CONCLUSION

Based on the results of the study it may be concluded that core specific training program have an positive impact on the muscular endurance and flexibility of school going children.

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