

## EFFECT OF VARIATED CIRCUIT TRAINING ON SPEED AND AGILITY OF THE SCHOOL CHILDREN

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### Abstract

Fitness and training for conditioning has been an important aspect of all the training programs during, before and after the competitions. Consistency of athletics performance can be ensured through systematic and scientific fitness program planning. It ensures that the athlete achieves his/her peak zone at the right time through accurate and important to consistent fitness development methods and strategies. The present study was conducted on 56 male school level athletes in the age group of 14 to 16 years who had participated at the minimum zonal level. The athletes were divided into four equal groups. Each group was subjected to 10 weeks of specifically designed circuit training. (Group-A) 5 days a week circuit training, (Group-B) 4 days a week circuit training, (Group-C) alternate day's circuit training program was implemented to the 3 experimental groups and no any such training was imparted to the fourth that is the control group (Group-D). The 55 athletes were tested upon the two motor fitness components namely speed and agility before the intervention and later at the regular intervals of 2 weeks of the circuit training (total 6 times testing) and later all the four groups were further tested again at the 2 weeks of regular intervals without any training being implemented to them to know about the circuit training effects on their speed and agility variables. Group-A showed significant improvement in their speed component after 8 weeks of circuit training and the same group had shown significant improvement in the agility variable after 4 weeks of circuit training. In the next phase of testing without any training being imparted, group -A had shown improved performance on speed and agility component consistently over the ensuing no-training phase of 10 weeks.

**Key Words:** Circuit training; Speed; Agility

### Introduction:

Mankind has consistently strived to run faster, jump higher, throw farther and exhibit greater strength, endurance, and skill. Humans are naturally highly competitive and ambitious for excellence in athlete performance. As a result of practical experience, observation and much scientific experimentation, old method of conditioning, though fascinating and rich in tradition, have been discarded and replaced by new methods based on insight and understanding. For centuries this evolution towards better methods of conditioning was very slow, but in recent years of dramatic changes which have taken place brought about some outstanding results in performance. These recent changes in conditioning methods are based on, and have been motivated by, an abundance of scientific research. The research has produced valid and precise information about the relative effectiveness of different training methods.

Various latest techniques and tactics based on scientific principles are introduced for finer coaching of various sports and games. Many diverse conditions can be improved by the judicious control of all exercise and activity program. The perfect knowledge of physiological aspects of exercise is essential to prescribe the individualized type of exercise program to meet the particular need of each person. Literature indicates that the circuit training based on the endurance method generates the physiological benefits namely increased cardiovascular functioning, increased capillarization, increased oxygen intake capacity, increased muscular endurance, and a greater resistance to fatigue. The positive physical fitness effects are related to the development of speed, endurance, strength and greater energy potential. The high resistance levels training and the complexity of application make circuit training based on the repetition method suitable for sports training. The main objective of the present study was to find out the effect of ten weeks circuit training on speed and agility motor fitness variables. To achieve the objectives of the study, subjects were organized in following groups.

Group A: The group was given circuit training five days a week continuously and two days' rest.  
 Group B: The group was given circuit training four days a week continuously and three days' rest.  
 Group C: The group was given circuit training alternative days regularly during treatment period.  
 Group D: The group was not given any experimental training and acted as a control group.

The secondary objective of the study was to find out the effect of training for ten weeks after the training was discontinued. In every case the test of criterion were conducted after every two weeks. The analysis of covariance was applied to find out the significance difference between the final adjusted means of control and experimental groups.

### **Procedure:**

Fifty six (56) male students studying in South Delhi School, New Delhi were selected as subjects for this experiment. These subjects were selected randomly. The age of these subjects ranged from 14 to 16 years.

**Experimental Design:** Random control group design was adopted for the present experimental study. Fifty six subjects were divided at random into four equal groups of fourteen subjects each i.e. total four groups were formed which were named as Group A, Group B, Group C and Group D in which Group A, B, and C, were experimental groups and group D was control group. The following experimental treatments were assigned to these four groups at random. However these groups were not equated:

1. Circuit training five days a week was assigned to Group A.
2. Circuit training four days a week was assigned to Group B.
3. Circuit training alternate days was assigned to Group C.
4. Group D served as control group and was not subjected to any experimental treatment.

Group A, B, and C participated in the planned training program for a period of 10 weeks but all the four groups were tested every alternate week for 20 weeks. However, they kept

participating in the required physical education classes of the school curriculum. The criterion measure used for the two motor fitness variables was as below:

1. SPEED: The speed of the subjects was measured through applying 50 meters dash test
2. AGILITY: The agility of the subjects was measured through 10 mts x 4 times shuttle run test

### Results and discussion:

The summary results of motor fitness on speed variable calculated on the data obtained after every two weeks have been presented in table 1. The results shown in Table 1 indicated that there has been no significant difference among groups on speed variable for the initial eight weeks of circuit training. As the obtained 'F' values for the speed timing were less than the table value of 2.79 required to be significant at five percent level of confidence.

Table-1 Analysis of Covariance of the effect of Circuit Training on Speed variable of 4 groups

Training Duration	Source of Variation	df	SSX	SSY	SXY	SSYX	MSYX	F
2 Weeks	Within Group	51	212.22	211.86	121.33	151.87	2.98	0.72
	Among Group	3	10.68	19.44	6.63	15.33	5.11	
4 Weeks	Within Group	51	212.22	221.99	122.54	151.23	2.97	1.72
	Among Group	3	10.68	14.93	5.12	12.48	4.16	
6 Weeks	Within Group	51	212.22	186.75	103.4	136.37	2.67	1.56
	Among Group	3	10.68	24.71	7.99	19.09	6.36	
8 Weeks	Within Group	51	212.22	208.09	118.61	141.8	2.78	2.28
	Among Group	3	10.68	27.41	1.73	27.65	9.22	
10 Weeks	Within Group	51	212.22	166.01	82.5	133.94	2.63	3.51
	Among Group	3	10.68	13.79	9.39	6.48	2.16	

\*Significant at 0.05 percent level of confidence ( $F > 2.79$ )

However, a significant difference among groups was observed in the speed variable after tenth week of training as the obtained 'F' value (3.51) was higher than the table value required to be significant at five percent level of confidence. To determine the significant improvement in the speed variable after tenth week by a particular group, a significant difference among adjusted means was calculated and given in Table 2. Table 2, indicates that group A which was given circuit training five days a week showed significant improvement over other three groups i.e. B, C and D. As the difference of adjusted means of groups B, C and D was higher than Group A in relation to critical ratio (38) given in table-2.

Table 2: Significance of difference among adjusted means of speed variable after 10th week of training.

Groups	N	MX	MY	MY.X	SED	CR (Adjusted)
A	14	8.56	7.62	7.50		
B	14	8.31	7.58	7.62	.136	0.38
C	14	8.56	8.09	8.03		
D	14	8.27	7.99	8.04		

Significant at 05 percent level of confidence. ( $F > 2.79$ ) The results shown in Table 3 indicated that there has been no significant difference among four groups in the agility variable after two weeks of circuit training. As the calculated F values were less than the table value of (2.79) required to be significant at five percent level of confidence. However, a significant difference among groups was observed when tested after fourth, sixth, eighth and tenth weeks of training. As the 'F' values (5.39, 4.18, 3.81 and 4.53) respectively were found higher than the table value of 2.79 required to be significant at five percent level of confidence.

Table 3: Analysis of Covariance of the effect of circuit training every two weeks on Agility Variable of 4 groups.

Training Duration	Source of Variation	df	SSX	SSY	SXY	SSYX	MSYX	F
2 Weeks	Among Group	3	11.69	11.69	1.76	1.57	5.22	2.52
	Within Group	51	200.79	200.79	140.97	105.45	2.07	
4 Weeks	Among Group	3	28.48	28.48	1.58	27.49	9.16	*5.39
	Within	51	175.54	175.54	136.19	86.57	1.7	

	Group							
6 Weeks	Among Group	3	32.53	32.53	-0.80	34.16	11.39	*4.18
	Within Group	51	202.18	202.18	115.1	138.62	2.27	
8 Weeks	Among Group	3	20.53	20.53	3.28	24.03	8.01	*3.81
	Within Group	51	152.05	152.05	96.75	107.14	2.10	
10 Weeks	Among Group	3	31.98	31.98	0.44	33.18	11.06	*4.53
	Within Group	51	185.61	185.61	112.95	124.41	2.44	

To determine superiority of a particular group in the agility variable over other groups, in the cases where significant differences were observed Post hoc tests of adjusted means were calculated and given in Table 4.

Table 4: Significance of difference among adjusted mean of Agility variable after 4th, 6th, 8th and 10<sup>th</sup> week of training.

Gp.	N	MX	MY	MY.X	SED	CR
A	14	11.17	10.36	10.33		
B	14	11.11	10.57	10.59		
C	14	12.24	10.96	10.84	0.11	0.31
D	14	11.06	10.79	10.89		
A	14	11.17	10.19	10.17		
B	14	11.11	10.44	10.46		
C	14	12.24	10.76	10.71	0.14	0.39
D	14	11.06	10.76	10.81		
A	14	11.17	10.15	10.13		
B	14	11.11	10.69	10.7		
C	14	12.24	10.69	10.63	0.122	0.34
D	14	11.06	10.76	10.81		
A	14	11.17	10.07	10.05		
B	14	11.11	10.44	10.35		
C	14	12.24	10.69	10.63	0.132	0.37
D	14	11.06	10.62	10.76		

The results shown in Table 4 indicated that only group A recorded significant improvement over group C and D after fourth, sixth, eighth and tenth weeks of training. However other groups did not establish any significant differences among one another when the effect of circuit training on agility variable was tested after fourth, sixth, eighth and tenth weeks of experiment.

**Speed:** In speed variable group A which improved its motor fitness component in the last phase of circuit training could retain its conditions up to sixth week after the training was stopped, as it maintained its significant difference in the speed variable over other groups. Richardson (1968) also found that five days per week practice schedule was most effective for the improvement of speed performance of the subjects.

**Agility:** In the case of Agility motor fitness component, group A showed its improvement over other groups in the early phase of training i.e. after fourth week and maintained its lead over other three groups. Similarly after stop in training it maintained significant difference over other groups throughout testing period weeks.

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