

## 12-Weeks Term of Complex and Contrast Training on Physical and Biochemical Criterion among Sportsmen

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### Abstract

*The aims of this experimental analysis were to examine the effects of two different strength and power training. (Complex: CMX and Contrast: CNT training) lower body strength is assigned with repetition maximum (1RM). CMX is one of the most advanced forms of sports training; It has intense strength exercise followed by a plyometric exercise. CNT is the back to back combination training it includes resistance and plyometric exercises. To achieve these study 45 men physical education students were selected as subjects. This consists of three equal groups (N=15). Group 1 treated as CMX, Group 2 treated as CNT and Group 3 treated as CG. The subjects were tested on selected criterion variables viz speed and total cholesterol. The duration of training was 12 weeks and the level of significance 0.05 was fixed. The Calculated data of before-test and after- test were tool by using analysis of covariance. The results shows that the complex training showed better improvement on speed and contrast training showed better improvement on total cholesterol. It is concluded that complex training and contrast training is advantageous training for physical education students and sportsmen.*

**Key words:** Complex Training (CMX), Contrast Training (CNT), Control group (CG), Speed, Total Cholesterol and Sportsmen.

### Introduction

Complex training is comprises of two major training includes set of resistance exercises followed by matched plyometric exercises. Complex training is used to develop muscular strength, muscular endurance, speed and explosive power. This training activates fast twitch muscle fibers and also improving strength protocols. It has been focused on sprinters, jumpers and throwers.

#### Resistance exercises

- Squat
- Barbells incline bench press

#### Plyometric exercises

- Vertical jump (jumps in place)
- Medicine ball chest pass

### Contrast training

Contrast training refers to a form of resistance training that alternates the utilization of great and lightweight load exercises so on enhance muscular power. This training accomplishes every by requiring to perform two exercises consecutive. The first exercise could also be an ancient strength exercise, and so the second exercise is in explosive exercise that challenges an identical muscles and movement pattern. As a result of the resistance inside the initial exercise is develop, this could turn out further activation of the muscles

involved inside the movement. Then, by following the first exercise with a further explosive, lighter load exercise that works identical muscles, may not entirely teach our body the simplest way to activate further muscle, but the simplest way to activate that muscle or groups of muscles further quickly resulting in improved power.

Resistance exercises and matched plyometric exercises

- Squat
- Vertical jump (jumps in place)
  
- Barbells incline bench press
- Medicine ball chest pass

**Methodology**

The aims of this experimental analysis were to examine the effects of two different strength and power training. (Complex: CMX and Contrast: CNT training) upper and lower body strength is assigned with repetition maximum (1RM). CMX is one of the most advanced forms of sports training; it combines with resistance training and plyometric training. It has intense strength exercise followed by a plyometric exercise (ex: Squat followed by vertical jump). CNT is the back to back combination training it includes resistance and plyometric exercises. To achieve these study 45 men physical education students were selected as subjects. This consists of three equal groups (N=15). Group 1 treated as CMX, Group 2 treated as CNT and Group 3 treated as CG. The subjects were tested on selected criterion variables viz, speed and total cholesterol. The duration of training was 12 weeks and the level of significance 0.05 was fixed. The Calculated data of before-test and after- test were mathematical tool by using Analysis of Covariance (ANCOVA).

**Table-I**  
**Results of experimental groups, control group on**  
**Speed and total cholesterol by ANCOVA**

Physical & Biochemical Protocols	Test	CG	CMX	CNT	SOV	SOS	DF	Squares of mean	'F' ratio
Speed	Pre test	10.5073	10.3773	10.3773	<b>B</b>	1.719	2	0.859	2.427
		0.68638	0.58616	0.49770	W	14.874	42	0.354	
	Post test	10.1647	10.4607	9.8833	<b>B</b>	2.500	2	1.250	3.480*
		0.49915	0.75926	0.50213	W	15.089	42	0.359	
	Adjusted Post test	9.977	10.135	10.396	<b>B</b>	1.341	2	0.671	15.478*
					W	1.776	41	0.043	
Total Cholesterol	Pre test	137.13	131.93	133.73	<b>B</b>	209.200	2	104.600	0.909
		13.293	6.147	11.436	W	4833.600	42	115.086	
	Post test	134.73	122.13	129.53	<b>B</b>	1202.800	2	601.400	5.907*
		9.632	6.906	12.844	W	4276.400	42	101.819	
	Adjusted Post test	138.00	122.13	129.53	<b>B</b>	826.218	2	413.109	41.086*
					W	412.245	41	10.055	

\*Significant at 0.05 level.

*Required table value at 0.05 level of significance for 2 & 42 degrees of freedom = 3.23 respectively.*

Speed indicates from ANCOVA shown on the table the pre-test mean on 2.427 do not reveal significant difference among the three groups, since the calculated f value is less than the required table value 3.23. The post test mean on speed 3.480 reveals difference among the three groups, since the calculated value 3.480 is greater than the required value 3.23. The adjusted post test mean 41.086 is found to higher table value 3.23 therefore there exist significant among the three groups.

Total cholesterol indicates from ANCOVA shown on the table the pre-test mean on 0.909 do not reveal significant among the three groups, since the calculated f value is less than the required table value 3.23. The post test mean on total cholesterol 5.907 reveals difference among the three groups, since the calculated value 5.907 is greater than the required value 3.23. The adjusted post test mean 41.086 is found to higher table value 3.23 therefore there exist significant among the three groups.

**Table-II**  
**Training schedule**  
**(Complex training schedule)**

S.no	Resistance exercises	Resistance 1 rm			Repetitions	Sets	Rest in between exercise	Rest in between sets
		1 <sup>st</sup> to 4 <sup>th</sup> week	5 <sup>th</sup> to 8 <sup>th</sup> week	9 <sup>th</sup> to 12 <sup>th</sup> week				
1.	Squat	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
2.	Barbells incline bench press	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
3.	Calf press on the leg press	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
4.	Lateral pull down	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
5.	Roman bench sit-ups	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
6.	Single leg extension	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
7.	Barbell step-ups	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
8.	Chin-ups	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
9.	Barbell walking lunge	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
10.	Incline pushups	70%	75%	80%	4-6	3	60 SEC	3-4 MIN

**(3MINUTES REST)**

S.no	Plyometric exercises	No.of foot contacts in the period MIN			Repetitions	Sets	Rest in between exercise	Rest in between sets
		1 <sup>st</sup> to 4 <sup>th</sup> week	5 <sup>th</sup> to 8 <sup>th</sup> week	9 <sup>th</sup> to 12 <sup>th</sup> week				
1.	Vertical jump (jumps in place)	100	150	200	10-15-20	3	60 SEC	3-4 MIN
2.	Medicine ball chest pass	100	150	200	10-15-20	3	60 SEC	3-4 MIN
3.	Leg forward raise (raise in place)	100	150	200	10-15-20	3	60 SEC	3-4 MIN
4.	Medicine ball overhead pass	100	150	200	10-15-20	3	60 SEC	3-4 MIN
5.	Reverse crunch cycle	100	150	200	10-15-20	3	60 SEC	3-4 MIN
6.	Rocket jump	100	150	200	10-15-20	3	60 SEC	3-4 MIN
7.	Zigzag hops (multiple hops and jumps)	100	150	200	10-15-20	3	60 SEC	3-4 MIN
8.	Medicine ball standing sidewall throws	100	150	200	10-15-20	3	60 SEC	3-4 MIN
9.	Back kick (multiple hops and jumps),	100	150	200	10-15-20	3	60 SEC	3-4 MIN
10.	Contrast with medicine ball slams	100	150	200	10-15-20	3	60 SEC	3-4 MIN

**Table-III**  
**(Contrast Training Schedule)**

S.no	Contrast training	Resistance 1 rm			Repetitions	Sets	Rest in between exercise	Rest in between sets
		1 <sup>st</sup> to 4 <sup>th</sup> week	5 <sup>th</sup> to 8 <sup>th</sup> week	9 <sup>th</sup> to 12 <sup>th</sup> week				
1.	<b>R</b> Squat	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b> Vertical jump,	-	-	-	8-10	3	60 SEC	3-4 MIN
2.	<b>R</b> Barbells incline bench press,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b> Medicine ball chest pass,	-	-	-	8-10	3	60 SEC	3-4 MIN
3.	<b>R</b> Calf press on	70%	75%	80%	4-6	3	60 SEC	3-4 MIN

		the leg press,							
	<b>P</b>	Leg forward raise,	-	-	-	8-10	3	60 SEC	3-4 MIN
4.	<b>R</b>	Lateral pull down,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Medicine ball overhead pass,	-	-	-	8-10	3	60 SEC	3-4 MIN
5.	<b>R</b>	Roman bench sit-ups,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Reverse crunch cycles,	-	-	-	8-10	3	60 SEC	3-4 MIN
6.	<b>R</b>	Single leg extension,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Rocket jump,	-	-	-	8-10	3	60 SEC	3-4 MIN
7.	<b>R</b>	Barbell step-up,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Zigzag hops,	-	-	-	8-10	3	60 SEC	3-4 MIN
8.	<b>R</b>	Chin ups,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Medicine ball standing sidewall throws,	-	-	-	8-10	3	60 SEC	3-4 MIN
9.	<b>R</b>	Barbell walking lunge,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Back kick,	-	-	-	8-10	3	60 SEC	3-4 MIN
10	<b>R</b>	Incline push up,	70%	75%	80%	4-6	3	60 SEC	3-4 MIN
	<b>P</b>	Contrast with medicine ball slams.	-	-	-	8-10	3	60 SEC	3-4 MIN

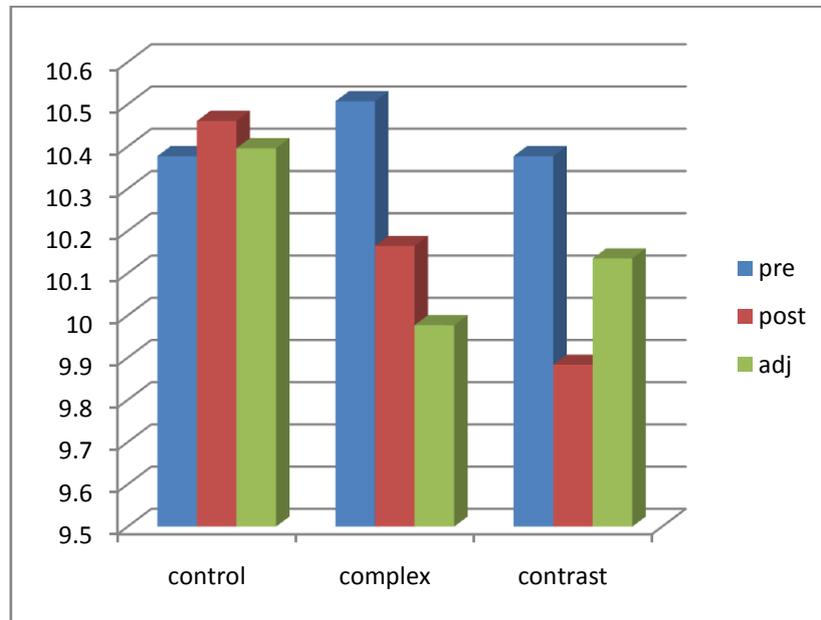
**R- Resistance Exercise, P-Plyometric Exercise**

**Table-IV**  
**Scheffe's post hoc test on Muscular endurance and breath holding time**

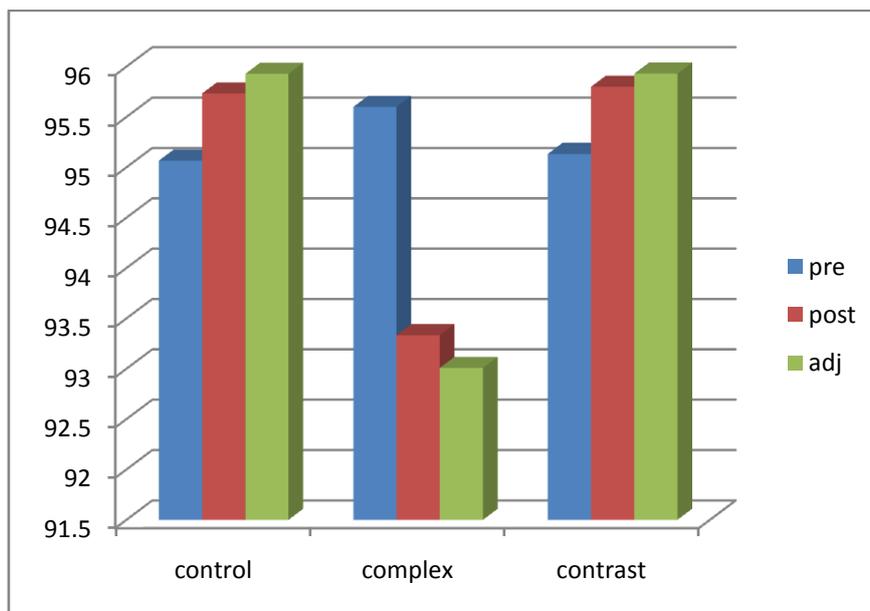
Physical & Biochemical Protocols	Adjusted mean			Difference of mean	CI
	CG	CMX	CNT		
Speed	37.234	42.264	-	3.33*	0.96 (0.05)
	37.234	-	40.568	5.03*	
	-	42.264	40.568	1.69*	
Total Cholesterol	138.00	122.13	-	15.87*	2.94 (0.05)
	138.00	-	129.53	8.47*	
	-	122.13	129.53	7.40*	

The Scheffe's post-hoc test table shows for the significant differences between the paired means among control group (CG), complex training (CMX) & contrast training (CNT) groups. Since the mean difference between the paired means of the three groups is higher than the class interval (CI) value, therefore there is significant among the three groups.

**Figure-1**  
**Results of complex training, contrast training and control group on speed**



**Figure-2**  
**Results of complex training, contrast training and control group on total cholesterol**



## Results

The results shows that the complex training group showed better improvement on speed and contrast training group showed better improvement on total cholesterol. It is

concluded that complex training and contrast training is advantageous training for physical education students and sportsmen.

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