COMPARATIVE EFFECTS OF TRADITIONAL C1RCUTT TRAINING AND PLYOMETRIC CIRCUIT TRAINING ON THE SELECTED PHYSICAL FITNESS VARIABLES OF SCHOOL CHILDRENS

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ABSTRACT

The purpose of the study was find out the effects of traditional circuit training and plyometric circuit training on selected physical fitness variables (speed, flexibility, muscular strength and muscular endurance) of the male school children's. For the present study, sixty school students studying from Senior Secondary Model School Punjabi University Patiala were selected randomly as subjects. Their age ranged from 13 to 17. Twenty subjects were distributed into three equally groups. Control group (N=20), Group – I traditional circuit training (N=20),, group–II plyometrie circuit training (N=20),. The experimental groups with varied load and velocity (intensity) underwent their respective training programme for three days in a week for eight weeks. Analysis of co-variance (ANCOVA) and scheffe's post hoc tests were used to examine the significance between the variables for testing groups. The analysis was carried out using SPSS version in 21.0 and statistical significance was set to a priority at p □ 0.05.all physical fitness variables signifince improvement of traditional circuit training, plyometric circuit training and control group. The speed and flexibility no significant proved of between experimental groups and to be improved muscular strength and muscular endurance.

***Key words**: Speed, Flexibility, Muscular Strength and Muscular Endurance.*

INTRODUCTION:

There are many different training methods that help to improve the physical fitness of athletes or students. Circuit training to improve the general fitness of students. There is a strong relationship between health and physical fitness. Research shows that there is a relationship between physical fitness, changes in fitness and the mortality in healthy middle-aged men in which the increase in physical fitness may lower the risk of death and decrease the mortality of people **(Erikssen et al, 1998). deVries and oush (1994)** state that the optimal level of physical fitness is conducive to the lifelong health. The improvement of physical fitness in sport participation helps to minimize the risk factors of health and leads to good health.

Physical fitness is very important to sport participation. Not only can it help to develop the skill of different physical activities physiologically but also psychologically. As physical fitness involves the performance of different body parts such as heart, lungs or muscles, it affects what we can do with our minds and so it influences to some degree qualities like mental alertness

and emotional stability **(Harris, 1996**). There are many physiological benefits of physical training on health. **vini and Smimova (1995)** suggest that physical training can improve the central nervous system and the endocrine systems, increase energy potential, increase metabolic and functional economy, improve oxidation process, improve the capacity of oxygen transport system, increase functional stability.

The Traditional Circuit Training exercises of include push-up, sit-up, bench lifting, squat thrusts, stepping and dumbbell raising. These exercises are performed with or without apparatus. Circuit training aims at the development of the basic components of physical fitness including muscular **(Morgan & Adamson, 1961**). The plyometric training has been suggested to improve the muscular power of athletes **(Moran & McGlynn, i 997).** Originally, plyometric training is used to improve the explosive power of athletes **(Blattner & Noble, 1979; Brown et al, 1986; Clutch et al, 1983).** The traditional circuits training as the plyometric exercises are specific for explosive power development **(Bobbert et al, 1987**). As circuit training may include a. number of different training exercises, some elementary plyometrie exercises may be implemented in the stations of circuit training in this study to create a new plyometric circuit.

HYPOTHESES

The improvement of speed, flexibility, muscular strength and muscular endurance of the male students after the traditional circuit training is superior to that after the plyometric circuit training and control group.

Objectives of the Study

To find out the effects of traditional circuit training and plyometric circuit training on selected physical fitness variables (speed, flexibility, muscular strength and muscular endurance) of the male school children's.

METHODOLOGY

Selection of Subjects

For the present study, sixty school students studying from Senior Secondary Model School Punjabi University Patiala, were selected randomly as subjects. Their age ranged from 13 to 17. Twenty subjects were distributed into three equally groups. control group (N=20), Group –

I traditional circuit training (N=20),, group– II plyometrie circuit training (N=20),. The experimental groups with varied load and velocity (intensity) underwent their respective training programme for three days in a week for eight weeks.

Selection of Variables

Independent variable: Traditional circuit training And Plyometric circuit training and control group

Dependent variables: Physical fitness components (Speed, Flexibility, Muscular Strength and Muscular Endurance)

Physical Fitness Components

Criterion variables	Instruments
Speed	50m Dash
Flexibility	sit-and-reach test
Muscular Strength	Pushups test
Muscular Endurance	sit-up test

Training Programme

Twenty subjects participated in the traditional circuit training which included a series of traditional exercises. The selected traditional exercises in this study were shuttle run, squat thrust, and bench press, bent-knee sit-up, alternating dumbbell press, back hyperextension, weight lifting, dipping, bench stepping and squat. There were about nine to twelve different traditional exercises in each circuit of training. The number of repetitions in each exercise was gradually increased from eight to twelve. The training intensity was required to be about 65% of the maximum capacity as indicated by the heart rate. the plyometric circuit training which consisted of a series of plyometric exercises. The plyometric exercises selected in this study included squat jump, barrier jump, lateral barrier jump, front tuek jump with knees up, incline push-up depth jump, jump from bench, plyometric sit-up, incline chest pass with medicine ball and alternate leg bound. There were also about nine to twelve different plyometric exercises in each circuit. The subjects were required to complete three circuits in each training session and

there were three sessions per week. The workload, intensity, duration and frequency were similar to that of the traditional circuit training for eight weeks.

Statistical Analysis

Analysis of co-variance (ANCOVA) and scheffe's post hoc tests were used to examine the significance between the variables for testing groups. The analysis was carried out using SPSS version in 21.0 and statistical significance was set to a priority at p □ 0.05.

RESULTS

TABLE –I

Analysis of Covariance on Criterion Variables of Experimental Groups (ANCOVA)

Criterion variables	Adjusted post test means			Source of variance	Sum of squares	df	Mean squares	F value
	Plyometic circuit training group	Traditional circuit training group	Control group					
Speed	7.007	6.900	7.393	B	1.521	2	0.761	**5.530***
				W	7.701	56	0.136	
Flexibility	18.663	20.700	15.187	B	310.773	2	155.386	**16.869***
				W	515.839	56	9.211	
Muscular Strength	21.884	18.481	14.486	B	548.159	2	274.079	**205.309***
				W	74.758	56	1.335	
Muscular Endurance	30.416	28.709	26.326	B	164.590	2	82.295	**45.003***
				W	102.404	56	1.829	

*Significant at 0.05 level of confidence.

(The table value required for significance at 0.05 levels with df 2 and 56 is 3.16).

The table –I The significant difference Where shown Between Plyometric circuit training, Traditional circuit training and control group the obtained F- ratio of speed, flexibility, muscular strength and muscular endurance for adjusted post test means were 5.530*****, 16.869*****, 205.309***** and 45.003***** respectively which are more than the table value of 3.16 for df 2 and 56 required for significant at .05 level of confidence. So the results indicate that there was a significant improvement between pre and post test means of experimental groups. There was no change found on control group. This study indicates that Plyometric circuit training, Traditional circuit training for school children's would support for the development of the physical fitness variables.

Table –II

Scheffe's Paired Mean Difference of Experimental and Control Groups

Criterion variables	**Plyometic circuit training group**	**Traditional circuit training Group**	**Control group**	**Paired Mean Differences**	**C.I**
Speed	7.007	6.900	-	0.10	**0.29**
	7.007	-	7.393	0.38*	
	-	6.900	7.393	0.39*	
Flexibility	18.663	20.700		1.52	**2.38**
	18.663		15.187	3.47*	
		20.700	15.187	5.51*	
Muscular Strength	21.884	18.481	-	3.40*	**0.91**
	21.884	-	14.486	7.39*	
	-	18.481	14.486	3.99*	
Muscular Endurance	30.416	28.709		1.70*	**1.05**
	30.416		26.326	4.09*	
		28.709	26.326	2.38*	

*** Significant at .05 level**

The table -II shows the paired mean differences on speed of Plyometric circuit training and control group, Traditional circuit training and control group are 0.38 and 0.39.the flexibility of 3.47 and 5.51 respectively. These values are greater than the confidence interval values of for speed 0.29, and flexibility 2.38.which are no paired mean differences between speed and flexibility of Plyometric circuit training and Traditional circuit training 0.10 and 1.52.there is less than confidence interval values. The mean differences of muscular strength 3.40, 7.39 and 3.99 muscular endurance are 1.70, 4.09 and 2.38 respectively. These values are greater than the confidence interval values of 0.91 and 1.05.The result of the study shows that there were significant differences between of Plyometric circuit training and Traditional circuit training the mean differences were greater than the confidence interval values of muscular strength and muscular endurance. The speed, flexibility, muscular strength and muscular endurance are better than control groups.

Discussion and Finding

The results of this study suggest that eight weeks of Plyometric circuit training and Traditional circuit training have a beneficial effect on speed, flexibility, muscular strength and muscular endurance on school children's. There was a control group that received no training apart from the physical fitness tests. There were significant differences found in the physical fitness test results of the traditional circuit training group and Plyometric circuit training as compared with the control group. According to the results of the Table 2 there were significant improvements of the Speed, Flexibility, Muscular Strength and Muscular Endurance where traditional circuit training group and control groups. **Atul Meethal And A.M.Najeeb(2013), Sivakumar. M et al (2014).** Muscular Strength and Muscular Endurance where significant improvements of The plyometric circuit training and control groups. It showed that different components of physical fitness were not equally affected by the traditional circuit training, the improvement in flexibility helps to decrease the chance of hamstring injuries **(Hartig & Henderson, 1999).** But there is no significance of speed and flexibility for between experimental groups.

CONCLUSION:

Eight weeks of training of both the plyometric circuit training group ,traditional circuit training group and control group showed significant increase in speed, flexibility, Muscular Strength and Muscular Endurance. Between the experimental groups plyometric circuit training group and traditional circuit training group showed significant improvement of Muscular Strength and Muscular Endurance. There is no significance of speed and flexibility for between experimental groups.

REFERENCES

- Adams, K.; O' Shea, J.P., O' Shea, K.L. and Climstein, M. (1992) The Effect of Six Weeks of Squat, Polymeric and Squat-Plyometric Training on Power Production. ***Journal of Applied Sports Science Research***, 6 :(1)36-41.
- Adams, T.M. (1984) ***An Investigation of Selected Plyometric Training Exercises on Muscular Leg Strength and Power***. Track and Field Quarterly Review, 84(4)36-40.
- Atul meethal and A.M.najeeb (2013) effects of circuit training on different surfaces on selected physical and physiological variables of school boys. ***International Journal of Physical Education, Fitness and Sports,*** Vol.2. No.4. ISSN 2277-5447.
- Blattner, S. E. & Noble, L. (1979). R&ative effects of isokinetic and plyometiic training on vertical jumping performance. Research Quarterly, 50. 583-88.
- Bobbert, M.F., Huijing, P.A. Sc Van Ingeri Schenau, G.J. (1987). Drop jumping. I. The influenc of jumping technique on the bio mechanices of jampping. ***Medcne and Science in Sports and Exercise.*** 19 (4), 332-338.
- Brown, M. E., Mayhew, J. L. Sc Boleach, L. W. (1986). Effect ofplyometric training on vertical jump performance in high school basketball players. ***The Journal of Sports Medicine and Physical Fitness,*** 26, 1-4.
- Clutch, D., Wilton, M., MeGown, C. & Bryce. G. R. (1983). The effects of depth jumps and weight training on leg strength and vertical jump. Research Quarterly of Exercise and Sport.54, 5-10.

- Chu, D. (1989). ***Plyomeric Exercises with the Medicine Ball***. California: Bittersweet Publishing Company.
- Chu, D. A. (1992). ***Jumping into Plyometrics***. Champaign, Illinois: Leisure Press.
- deVries, H. & Housh, T. J. (1994). ***Phystology ofExercise: Forphysical education and athletics.*** Dubuque: Wm C. Brown Publishers.
- Erikssen, G.. Liestol, K., Bjoniholt, J., Thaulow, E., Saudvik, L. c Erikssen, J. (1998). ***Changes in physical fitness and changes in mortality***. Lancet, 352, 759-762.
- Harris, D. R. (1996). ***Fitness and Exercise Source book*** U.S.A.: Omnigraphics, Inc.
- Hartig, D.E. & Henderson, J.M. (1999). Increasing hamstring flexibility decreases lower extremity overuse injuries in military basic trainees. ***The American Journal of Sports Medicine,*** 27 (2), 173-176.
- Hazeldine, R. (1 995***). Fitness for Sport***. Great Britain, Wiltshire: The Crowood Press.
- Hinson, C. (1995). ***Fitnessfor Children***. Champaign, Illinois: Human Kinetics.
- Ikai, M. (1984) Training of Muscular Strength and Power in Athletes. ***British Journal of Sports Medicine,*** 7:1-2, 43-47.
- Kraerner, W. J. & Fleck, S. J. (1993). ***Strength Training for Young Athletes***. Champaign, Illinois: Human Kinetics Publishers.
- Kumar, Raj and Kumar, Harish. Effect of six-weeks of plyometric circuit training on the jumping performance of female college players [online]. ***Journal of Exercise Science and Physiotherapy***, Vol. 1, 2005: 46-59.
- Miller, B.P. (1981) ***Depth Jumping: A Training Aid for Sports***. Sports Coach, 5(2):22-24.
- Miller, B.P. (1982) The Effects of Plyometric Training on the Vertical Jump Performance of Adult Female Subjects. ***British Journal of Sports Medicine***, 16(2):113.
- Miller, B.P. and Power, L.D. (1981) ***Developing Power in Athletics through Process of Depth Jumping.*** Track and Field Quarterly Review, 81(4):52.
- Moran, G. T. & MeGlynn, G. (1997). ***Dynamics of Strength Training and .Conditioning.*** Dubuque: Brown & Benchmark Publishers.

- Morgan, R. E. & Adamson, G. T. (1961). ***Circuit Training. London***: G. sell and Sons. Ltd.
- Mullan, N. (1997). ***Health-related Fitness***. Oxford: Reed Educational and Professional Publishing Ltd.
- Muthiah, C.M. (1980) ***Training Aspects in Jump***. Athletic Asia, 10(1):13-17.
- Pauletto, B. (1991). ***Strength Training for Coaches. Champaign***, Illinois: Leisure Press
- Raj Kumar & Harish Kumar (2005) Effect of Six-Weeks of Plyometric Circuit Training on the Jumping Performance of Female College Players. ***Journal of Exercise Science and Physiotherapy***, Vol. 1, No.1 & 2: 46-59.
- Rushall, B.S. & Pyke, F.S. (1990). ***Training for Sports and Fitness***. Melbourne: The MacMillan Company of Australia Pty. Ltd.
- Scheu, J. & Leelarthaepin, B. (1994). ***Physical Fitness Assessment in Exercise and Sport Science***. Australia: Leelar Biomediscience Services.
- Scholich, M. (1992). ***Circuit Training for All Sports.*** Canada, Toronto: Sport Books Publisher.
- Sivakumar. M., S. Johnson & K.Rajendran (2014) the influence of plyometric training; circuit training and weight training on muscular endurance, flexibility and jumping ability among inter collegiate volleyball players. ***Star Phy. Edn***.Vol.2 Issue 9(3).
- Thomas, J. R. & Nelson. J. K. (1990). ***Research Methods in Physical Activity***. Champaign Illinois: Human Kinetics Books.
- Verhoshansky, Y. (1 967). ***Depth jumping in the Training of Jumpers***. U.S.S.R. : Legkaya Atletika.
- Vini, A. & Smirnova, T. (1995). Health Promotion and Exercise Training. ***Sports Medicine,*** 19 (2), 123-136.
- Walker, J and Kenneson, J. (1986) ***Track and Field Plyometrics***. Track and Field Quarterly Review, 86(4):42.
- Watson, A.W.S. (1995). ***Physical Fitness dc Athletic Performance***. New York: Longman Publishing.