



Effect of 12 weeks combined training on performance of basketball players

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Abstract

The purpose of this study is to find out the effect of twelve weeks Combined Training on Performance of Basketball Players. To achieve the purpose, 80 Male basketball players are selected randomly and the age group of subject ranged from 18-23 years. The subjects were divided into two equal four groups of 20 each. The study was conducted on four groups of players. Group -I (n=20) called Resistance training group, Group -II (n=20) called plyometric training group, Group III (n=20) as combined training group and Group IV and Group IV (n=20) act as control group who have not taken part in any special training apart from regular basketball practice. After assigning the subjects into various groups the pre-test was conducted on the selected variables of Speed, agility, flexibility, explosive power, passing ability, dribbling ability, shooting ability. After completion of the pre-test, the subjects were trained with their respective training program. The training period was scheduled for Twelve weeks. Experimental Group-I (RTG) underwent a Resistance training programme, Group-II (PTG) underwent a Plyometric training program, Group-III underwent a Combined training program and control group-IV (CG) did not practice any specific training. After 12 weeks of the training period post test was conducted on the dependent variables of Speed, agility, flexibility, explosive power, passing ability, dribbling ability, shooting ability for the four groups. The analysis of covariance (T-TEST) and Anova was used to find out the significant differences if any, between the experimental groups and control group on selected criterion variable. In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there was a significant difference among the experimental and control group on shooting performance.

Results: The Resistance training group, Plyometric training group, and combined training group significantly improved in (P<0.05) the selected variables of speed, agility, explosive power, passing ability, dribbling ability and shooting ability better than the Control groups.

Keywords: speed, agility, explosive power, flexibility, passing ability, shooting ability, dribbling ability and basketball

1. Introduction

Basketball is one of the today's fastest team sports and is epitomized by grandiose Maneuvers such as the slam-dunk and blocked shot. In this game everyone should mastery over fundamental skills like Dribbling, passing, shooting, rebounding, defense etc. Resistance training programme can improve measures of strength and power in adult. In children and adolescents, it is well-established that training-induced gains in strength and power are indeed possible following participation in a resistance training programme. Resistance training during a training cycle should be structured to allow maximal efficacy and physical improvement. Since young Basketball player are often encouraged to perform static stretching prior to resistance exercise. Resistance training has been used extensively to increase fitness and sport performance. It has been demonstrated to augment maximum strength, power and jumping ability. It is well known that a variety of resistance training programs can stimulate and increase in one repetition maximum strength. It is important to ascertain efficacious method for enhancing fitness performance in children and adolescents.

2. Review of related literature

Review of Literature has been completed there are 64 reviews related to the study.

3. Methodology

The purpose of the study was to find out the effect of Resistance training on Performance among DonBasco College Basketball players. To achieve the purpose of the study, 80 male basketball players were selected as subjects who were from the various departments in Donbasco institution, Chitradurga, Karnataka. The selected students in the age of 18-23 years were chosen as sample for the study. The selected participants were divided into four groups. Group-I underwent Resistance training and Group-II underwent Plyometric training group, Group-III underwent Combined training group Group-IV act as control group. The experimental groups underwent twelveweeks of training in their particular workout. For this study dependent variable is Speed, agility, flexibility, explosive power, passing ability, dribbling ability, shooting ability. The data were collected at prior and immediately after the training period. The data was analysis by using

standardized ‘t’ test and ANOVA. And the level of significance set as 0.05.

4. Experimental Design

In this study 80 Male basketball players were randomly divided into four equal groups namely, experimental group -I called Resistance training group (n=20, RTG), experimental group-II called Plyometric training group (n=20, PTG), group-III called combined training group (n=20, CTG) and group IV act as control group (n=20, CG) who have not taken part in any special training apart from the regular basketball practice. Each group consists of 20 subjects. The selected subjects were initially tested on the selected variables of agility, explosive power and passing ability. After the completion of the initial test, the subjects belonging to experimental Group-I were treated with their respective training programme for Twelve weeks. Experimental Group-I (RTG) underwent a Resistance training programme, Group-II (PTG) underwent a Plyometric training program, Group-III underwent a Combined training program and control group-IV (CG) did not practice any specific training. After Twelve weeks of the training period post test was conducted on the dependent variables of Speed, agility, flexibility, explosive power, passing ability, dribbling ability, shooting ability for all the Two groups.

5. Selection of Subjects

The primary purpose of the present study was to know how far the basketball Resistance training, Plyometric training, Combined training would help the development of selected variables (agility, explosive power and passing ability, playing ability) compared with the experimental and control group of players, with some intervening training methods. To achieve this purpose 80 male volunteered basketball players from Chitradurga district Don Bosco School participate in this study as their age ranged from 18-23 years.

6. Selection of Variables and Tests

The following test were chosen for testing variables. Speed was measured by using 50-yard dash, agility was measured by using illinois Agility test. Flexibility was measure by suing sit and reach test, Explosive power was measured by using medicine ball throw test and passing ability was measured by using Leilich push-pass test. Explosive jump was measured by using sargent vertical jump test, Skill performance was measured by using Johnson’s dribbling test, AAPHERD Basketball Different shooting test, AAHPERD Basketball Passing ability test The chosen tests were highly standardized,

appropriate and ideal to assess the selected variables.

7. Training Programme

The specially designed Resistance training group programme was given to the experimental Group-I (RTG). This training comprised of Push ups, Squat, abdominal crunches, Back extension, Lunges, Plank, modified Pull ups, Leg trust, militarily press Dead lift. These trainings were executed in the morning sessions only. In the evening sessions, basketball skills, drills practice training and game practice were adapted Plyometric training group programme was given to the experimental Group-II (PTG). This training comprised of strength Upper body and lower body plyometric training programme. Medicine ball throw, Ankle hops, Vertical jumps, Vertical jumps and rotations, Front obstacle jumps, Lateral obstacle jumps, Leg lunging, Single leg hops, Power skipping, repeated tuck jump, Alternate leg bounding and squat jump, jump training. These trainings were executed in the morning sessions only. In the evening sessions, basketball skills, drills practice training and game practice were adapted Experimental group-III underwent Resistance training and the plyometric training programme alternate days. These trainings were executed in the morning sessions only. In the evening sessions, basketball skills drills practice training and game practice were adapted. The subjects in the Control group (CG) practiced their normal basketball game and their own conditioning and training programme without any interventions of any training programme.

8. Statistical Analyses

To analyse the comparative treatment effects of training ‘t’ ratio and ‘f’ ratio was used. To test the significance of the derived results, the alpha level was set at 0.05 level of confidence.

9. Results of the Study

Analysis of covariance was applied to determine whether the training programmes produced significantly different improvements in agility, Speed, strength and passing ability among the Resistance training group, and control group. The analysis is presented in the following tables.

10. Analysis of the Results

The data collected before and after the training period on agility of Resistance training group, and control group was analyzed statistically and presented in table-1.

Table 1: Significance of mean gains / losses between pre and post-test of resistance training group on selected performance variables and skill performance of don bosco institution chitradurga, male basketball players.

Variables	Pre Test MEAN± SD	Post Test Mean± SD	M.D	Std. Error Mean	‘t’-Value	df	sig
Performance Variables							
Speed in seconds	8.19±0.60	6.42±0.45	1.76	0.1088	16.23	19	.000
Agility (in seconds)	18.28±1.05	16.38±1.23	1.89	0.20155	9.40	19	.000
Flexibility (in centimetres)	29.34±3.50	32.81±2.70	3.47	0.58542	5.93	19	.000
Upper body strength (in kilograms)	3.85±0.59	4.87±0.66	1.02	0.08007	12.84	19	.000
Leg Explosive power (in Centimetres)	36.90±0.94	39.60±0.92	2.69	0.14930	18.07	19	.000

Variables	Pre Test MEAN± SD	Post Test Mean± SD	M.D	Std. Error Mean	't'-Value	df	sig
Skill performance Variables							
Passing ability (in points)	37.95±4.85	45±4.99	7.9	0.71414	11.06	19	.000
Dribbling ability (in seconds)	36.2±2.19	45.2±2.37	9.0	0.49204	18.29	19	.000
AAHPERD BASKETBALL SHOOTING ABILITY TEST							
Front Shot Test 15	18.5±1.79	25.75±1.55	7.25	0.44054	16.45	19	.000
Side Shot Test, 10+10=20×2=40, One side=10, Another side=10	24.6±3.15	33.55±3.74	8.95	0.76597	11.68	19	.000
Foul Shot Test 20 shots 1 point given for each basket made	10.5±1.100	17.7±2.05	7.2	0.44485	16.18	19	.000
Under Basket Shot Test 30 second no of under board shots done	10.45±2.30	17.75±2.53	7.3	0.55772	13.08	19	.000
Overall playing ability(in scores)	5.84±0.83	8.66±0.61	2.81	0.15582	18.09	19	.000

* Significant at 0.05 level, Table value-2.09

Table-1 shows the changes made from pre to post-test in the performance and skill performance variables were: 1.76 sec(speed), 1.89Secs (agility), 3.47cms (flexibility), 1.02kgs (upper body strength), 2.69cms (leg explosive power), 7.9 points (passing ability), 7.0 (dribbling ability), 7.25 points (Front Shot Test) 8.95points (Side Shot Test) 7.2 points (Foul Shot) 7.3 points (Under Basket Shot Test) 2.81 Overall playing ability test.

Table also shows the obtained 't' values of pre to post-test mean differences on performance and skill performance variables were: 16.23(speed), 9.40(agility), 5.93 (flexibility), 12.8(upper body strength), 18.07 (Leg Explosive), 11.06 (Passing ability), 18.29(Dribbling ability), 16.45 (Front Shot Test), 11.68(Side Shot Test), 16.18(Foul Shot Test), 13.08

(Under Basket Shot Test), and 18.09 Overall playing ability test.

The obtained 't' values were tested at 0.05 level of significance. Since the calculated 't' values were greater than the table 't' value at 0.05 level for degrees of freedom 19. (null hypothesis) was rejected at 0.05 levels of significance and formulated research hypothesis was accepted. Thus it was concluded that twelve weeks of resistance training program showed significant improvement in speed, agility, flexibility, upper body strength, Leg Explosive power, passing ability, dribbling ability, shooting ability and overall playing ability, as the study the above remark can be given at 95% confidence.

Table 2: Significance of Mean Gains / Losses Between Pre And Post-Test Of Plometric Training Group On Selected Performance Variables And Skill Performance Of Don Bosco Institution Chitradurga, Male Basketball Players.

Variables	Pre Test MEAN±SD	Post Test MEAN±SD	M.D	Std. Error Mean	't'-Value	df	sig
Performance Variables							
Speed in seconds	8.22±0.56	6.68±0.45	1.54	0.11058	13.94	19	.000
Agility (in seconds)	17.75±0.89	16.31±0.55	1.44	0.12408	11.63	19	.000
Flexibility (in centimetres)	28.44±3.00	31.71±2.88	3.27	0.30667	10.66	19	.000
Upper body strength (in kilograms)	3.33±0.41	4.96±0.75	1.62	0.168162	9.68	19	.000
Leg Explosive power (in Centimetres)	35.00±0.85	40.07±1.34	5.07	0.23273	21.78	19	.000
Skill performance Variables							
Passing ability (in points)	38.75±2.63	44.50±2.56	5.75	0.34698	16.57	19	.000
Dribbling ability (in seconds)	35.50±1.96	44.70±2.22	9.2	0.75254	12.22	19	.000
Aahperd Basketball Shooting Ability Test							
Front Shot Test 15	19.50±0.88	27.85±1.59	8.35	0.40572	20.58	19	.000
Side Shot Test, 10+10=20×2=40, One side=10 Another side=10	24.4±2.45	35.6±2.54	11.20	0.69434	16.13	19	.000
Foul Shot Test 20 shots 1 point given for each basket made	10.45±0.75	17.9±1.25	7.45	0.35891	20.75	19	.000
Under Basket Shot Test 30 second no of under board shots done	11.05±2.08	19.15±1.53	8.10	0.34717	23.33	19	.000
Overall playing ability(in scores)	5.89±0.70	8.77±0.68	2.88	0.10911	26.41	19	.000

* Significant at 0.05 level, Table value-2.09

Table-2 shows the changes made from pre to post-test in the performance and skill performance variables were: 1.54 sec(speed), 1.44Secs (agility), 3.27cms (flexibility), 1.62kgs (upper body strength), 5.07cms (leg explosive power), 5.75 points (passing ability), 9.2 (dribbling ability), 8.35 points (Front Shot Test) 11.20points (Side Shot Test) 7.45 points (Foul Shot) 8.10 points (Under Basket Shot Test) 2.88 Overall playing ability test.

Table also shows the obtained 't' values of pre to post-test mean differences on performance and skill performance variables were: 13.94(speed), 11.63(agility), 10.66 (flexibility), 9.68 (upper body strength), 21.78 (Leg Explosive), 16.57 (Passing ability), 12.22 (Dribbling ability), 20.58 (Front Shot Test), 16.13 (Side Shot Test), 20.75 (Foul Shot Test), 23.33 (Under Basket Shot Test), and 26.41 (Overall playing ability test).

The obtained 't' values were tested at 0.05 level of significance. Since the calculated 't' values were greater than the table 't' value at 0.05 level for degrees of freedom 19. (null hypothesis) was rejected at 0.05 levels of significance and formulated research hypothesis was accepted. Thus it was concluded that twelve weeks of plyometric training program

showed significant improvement in speed, agility, flexibility, upper body strength, Leg Explosive power, passing ability, dribbling ability, shooting ability and overall playing ability, as the study the above remark can be given at 95% confidence.

Table 3: Significance of mean gains/losses between pre and post-test of combined training group on selected performance variables and skill performance of don bosco institution chitradurga male basketball players.

Variables	Pre Test MEAN± SD	Post Test MEAN± SD	M.D	Std. Error Mean	't'- Value	df	sig
Performance Variables							
Speed in seconds	8.06±0.83	6.46±0.63	1.59	0.17200	9.27	19	.000
Agility (in seconds)	18.70±1.24	16.43±0.46	2.27	0.32361	7.028	19	.000
Flexibility (in centimetres)	29.61±3.73	31.81±3.94	2.19	0.19941	11.02	19	.000
Upper body strength (in kilograms)	3.75±0.47	4.87±0.44	1.11	0.10189	10.978	19	.000
Leg Explosive power (in Centimetres)	38.3±0.75	41.44±0.92	3.14	0.13168	23.88	19	.000
Skill performance Variables							
Passing ability (in points)	40.2±3.96	50.30±3.86	10.1	0.94563	10.68	19	.000
Dribbling ability (in seconds)	36.75±1.71	45±2.84	8.25	0.57066	14.45	19	.000
Aahperd Basketball Shooting Ability Test							
Front Shot Test 15	20.45±2.92	27.95±1.70	7.50	0.59161	12.67	19	.000
Side Shot Test 10+10=20×2=40, One side=10 Another side=10	29.7±2.17	38.40±1.46	8.70	0.53361	16.30	19	.000
Foul Shot Test 20 shots 1 point given for each basket made	11.1±1.29	18.25±1.33	7.15	0.29267	24.43	19	.000
Under Basket Shot Test 30 second no of under board shots done	11.35±2.62	19.8±1.54	8.45	0.55949	15.10	19	.000
Overall playing ability(in scores)	5.74±0.94	8.88±0.77	3.13	0.11712	26.75	19	.000

*Significant at 0.05 level, Table value-2.09

Table-3 shows the changes made from pre to post-test in the performance and skill performance variables were: 1.59 sec(speed),2.27 Secs (agility), 2.19 cms (flexibility), 1.11 kgs (upper body strength), 3.14 cms (leg explosive power),10.01 points (passing ability),8.25 (dribbling ability), 7.50 points (Front Shot Test) 8.70points (Side Shot Test) 7.15 points (Foul Shot) 8.45 points (Under Basket Shot Test) 3.13 Overall playing ability test.

Table also shows the obtained 't' values of pre to post-test mean differences on performance and skill performance variables were: 9.27 (speed), 7.02(agility), 11.02 (flexibility), 10.97(upper body strength),23.88 (Leg Explosive), 10.68 (Passing ability), 14.45(Dribbling ability),12.67 (Front Shot Test),16.30(Side Shot Test), 24.43 (Foul Shot Test), 15.10

(Under Basket Shot Test), and 26.75(Overall playing ability test).

The obtained 't' values were tested at 0.05 level of significance. Since the calculated 't' values were greater than the table 't' value at 0.05 level for degrees of freedom 19. (null hypothesis) was rejected at 0.05 levels of significance and formulated research hypothesis was accepted. Thus it was concluded that twelve weeks of combined training program showed significant improvement in speed, agility, flexibility, upper body strength, Leg Explosive power, passing ability, dribbling ability, shooting ability and overall playing ability, as the study the above remark can be given at 95% confidence.

Table 4: Significance of mean gains / losses between pre and post-test of controal training group on selected performance variables and skill performance of don bosco institution chitradurga, male basketball players.

Variables	Pre Test MEAN± SD	Post Test MEAN± SD	M.D	Std. Error Mean	't'- Value	df	sig
Performance Variables							
Speed (in seconds)	8.15±0.55	8.05±0.50	0.10	0.0565	1.77	19	.092
Agility (in seconds)	18.45±0.76	18.41±0.77	0.04	0.02853	1.35	19	.193
Flexibility (in centimetres)	25.25±2.49	25.74±2.52	0.49	0.26232	1.87	19	.076
Upper body strength (in kilograms)	3.75±0.48	3.75±0.49	0.00	0.00595	0.25	19	.804
Leg Explosive power (in Centimetres)	36.85±0.95	36.91±0.95	0.06	0.3078	2.015	19	.058
Skill performance Variables							
Passing ability (in points)	37.20±4.33	37.15±3.34	0.05	0.24575	0.203	19	.841
Dribbling ability (in seconds)	35.30±3.18	35.60±3.29	- .30	0.25236	-1.189	19	.249

Variables	Pre Test MEAN± SD	Post Test MEAN± SD	M.D	Std. Error Mean	't'- Value	df	sig
Aahperd Basketball Shooting Ability Test							
Front Shot Test 15	18.30±1.52	18.50±1.98	- .20	0.35982	-0.556	19	.585
Side Shot Test 10+10=20×2=40 One side=10 Another side=10	23.85±2.49	24.10±2.29	- .25	0.37609	-0.665	19	.514
Foul Shot Test 20 shots 1 point given for each basket made	8.25±2.04	8.55±1.63	0.30	0.32525	-0.922	19	.368
Under Basket Shot Test 30 second no of under board shots done	9.25±1.77	9.50±1.84	- .25	0.22798	-1.097	19	.287
Overall playing ability (in scores)	4.59±0.54	4.76±0.63	- .17	0.08871	-1.877	19	.076

*Significant at 0.05 level, and the Table value-2.09

Table-4 shows the changes made from pre to post-test in the performance and skill performance variables were: 0.10 sec(speed),0.04 Secs (agility), 0.49 cms (flexibility), 0.00kgs (upper body strength), 0.06 cms (leg explosive power), 0.05 points (passing ability), 0.30(dribbling ability), 0.20 points (Front Shot Test) 0.25 points (Side Shot Test) 0.30 points (Foul Shot) 0.25points (Under Basket Shot Test) 0.17 Overall playing ability test.

Table also shows the obtained 't' values of pre to post-test mean differences on performance and skill performance variables were: 1.77 (speed), 1.35(agility), 1.87 (flexibility), 0.25 (upper body strength), 2.015(Leg Explosive), 0.20(Passing ability), 1.18(Dribbling ability),0.55 (Front Shot Test), 0.66(Side Shot Test), 0.92 (Foul Shot Test), 1.09 (Under Basket Shot Test), and 1.87(Overall playing ability test).

The obtained 't' values were tested at 0.05 level of significance. Since the calculated 't' values of performance variables were lesser than the table 't' value at 0.05 level for degrees of freedom 19. (null hypothesis) was accepted at 0.05 levels of significance and formulated research hypothesis was rejected. Thus it was concluded that control group showed significantly not improvement in passing ability, dribbling ability, shooting ability and overall playing ability.

Graphical representation of pre-test and post-test means of Resistance training group (RTG) Plyometric training group (PTG), Combined training group (CTG, Control group (CG) on Speed, agility, flexibility, upper body strength, leg explosive power, passing ability, dribbling ability, shooting ability and overall playing ability are presented in the following Figure 01 to 12 respectively.

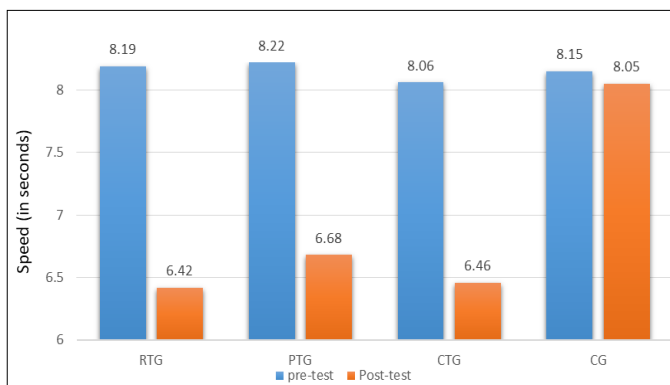


Fig 1: Bar diagram showing the mean values of Pre-test and Post test of RTG,PTG,CTG and CG on speed

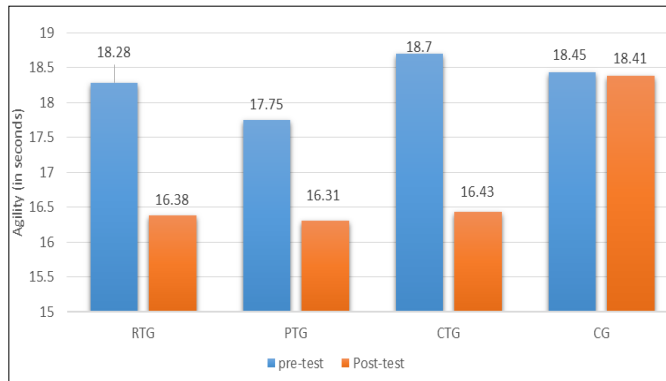


Fig 2: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Agility

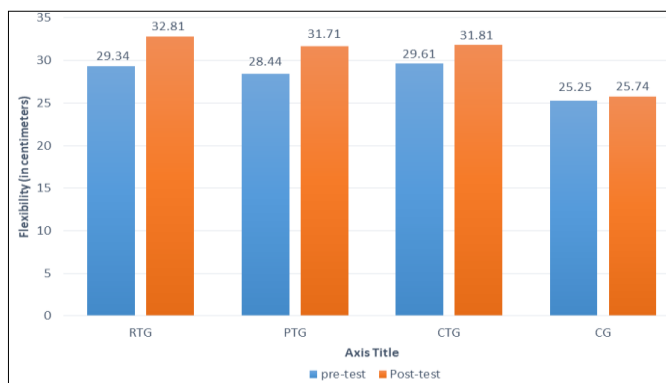


Fig 3: Bar diagram showing the mean values of pre-test and post test of RTG, PTG, CTG and CG on flexibility

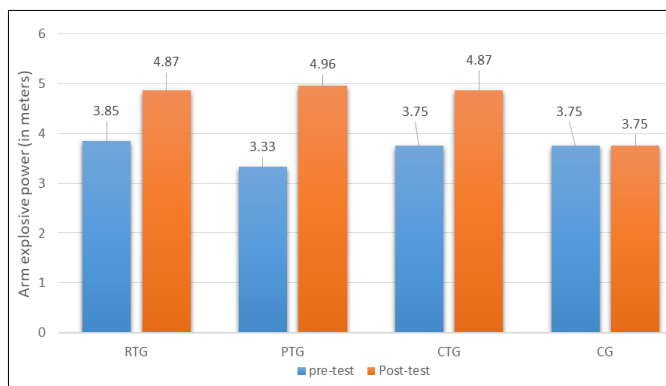


Fig 4: Bar diagram showing the mean values of Pre-test and psot-test of RTG, PTG, CTG and CG on Arm explosive power

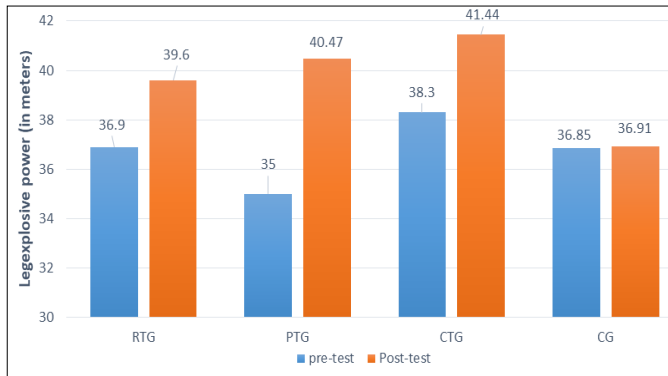


Fig 5: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Leg explosive power

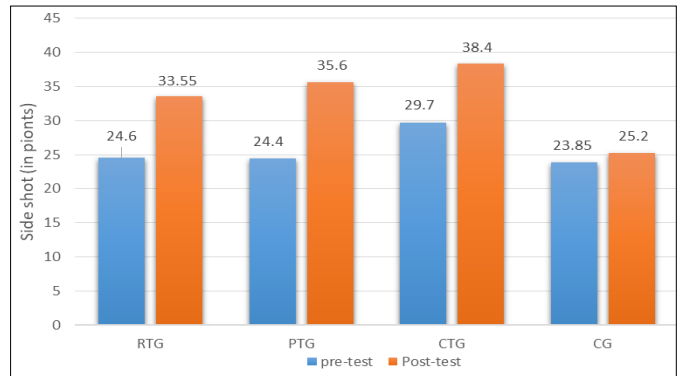


Fig 9: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Side shot

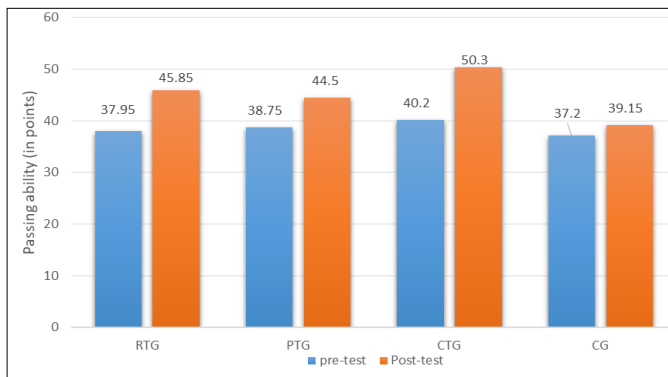


Fig 6: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on passing ability

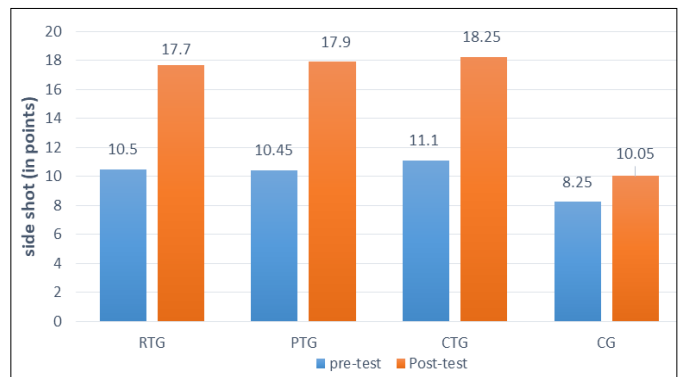


Fig 10: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on foul shot

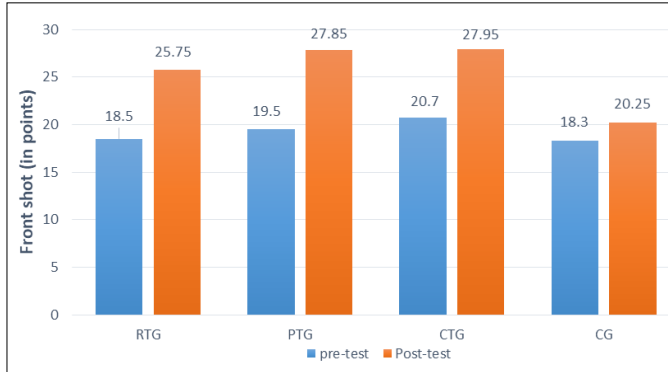


Fig 7: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Front shot

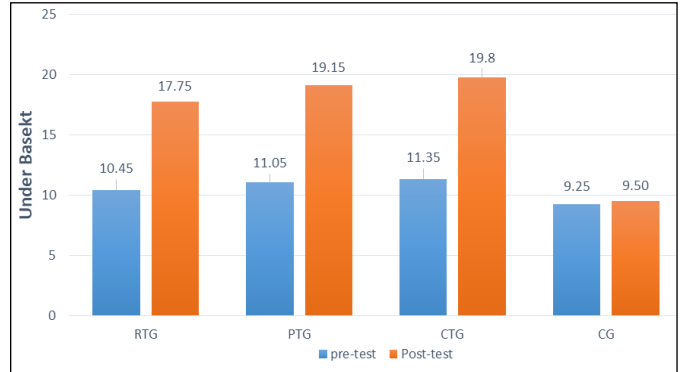


Fig 11: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Under basket test

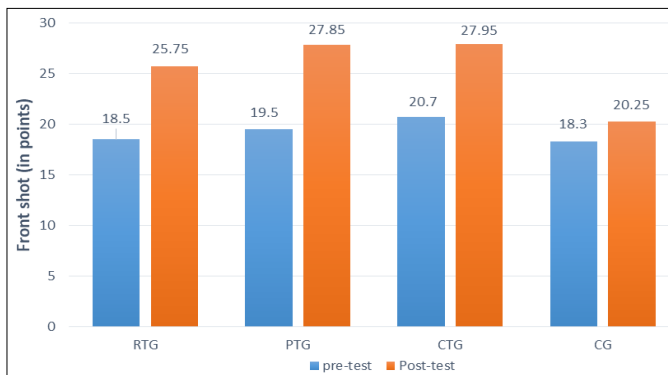


Fig 8: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on Front shot

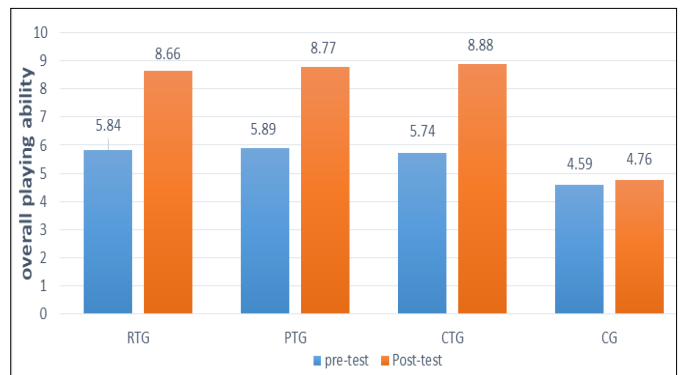


Fig 12: Bar diagram showing the mean values of Pre-test and Post-test of RTG,PTG,CTG and CG on overall playing ability

11. Discussion/conclusions

The results of the study proved that there were significant differences between Resistance training, plyometric training, combined training group and control group. The twelve weeks of experimental treatment significantly influence on shooting performance in college students.

Based on the results it was concluded that the implication of combined training programme specific to the basketball game might have been the source of its dominance on the improvement of speed, agility, explosive power and passing, dribbling and shooting ability of the basketball players.

12. References

1. Fleck & Kraemer. Designing resistance training programs. Champaign, IL: Human Kinetics, 1997.
2. Stone Nick. Physiology response to sports specific aerobic interval training in high school male basketball players, School of Sports and recreation AUT University, 2007.
3. Monsef Cherif, MD, Mohamed. The Effect of a Combined High-Intensity Plyometric and Speed Training Program on the Running and Jumping Ability of Male Handball Players, 2012.
4. Marc Schiltz, MD, Cédric Lehance. Explosive Strength Imbalances in Professional Basketball Players, 2009.
5. Matavulj D, kukolj Ugarkovic J, Tihanyi J, Jaric S. Effect of plyometric training on jumping performance in junior basketball players. Journal of Sports Medicine and Physical Fitness, 2001.