Effects of Varied Combinations of Aerobic Training followed by Strength Training on Speed, Flexibility, Aerobic Capacity and Dribbling Performance of Male Basketball Players

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ABSTRACT- To study the effects of varied combinations of aerobic training followed by strength training on speed, flexibility, aerobic capacity and dribbling performance of male basketball players eighty male basketball players (18 -25 yrs) were selected from various colleges. The subjects were divided as the Experimental group:-1 (n=20, ASAD group) performed the aerobic and strength program on alternate days, Experimental group:-2 (n=20; ASSD group) performed the aerobic and strength training program on the same day, Experimental group:-3 (n=20, ASSTS group) performed the aerobic and strength training program on the same day, Experimental group:-3 (n=20, ASSTS group) performed the aerobic and strength training program at the same training session and the fourth group (n=20; CONTROL group) underwent skill practice alone. Pre-test values of speed, flexibility, aerobic capacity and dribbling were 8.725 ± 0.34 , 26.35 ± 1.2 , 40.7315 ± 1.7 , 22.878 ± 1.1 for ASAD, 8.7685 ± 0.35 , 26.6 ± 1.1 , 40.8445 ± 1.5 , 22.839 ± 1.2 for ASSD $8.8935\pm.37$, 26.8 ± 0.83 , 40.687 ± 1.3 , 22.8370 ± 0.3 for ASSTS and $8.8935\pm.46$, 26.8 ± 1.96 , 40.687 ± 1.73 , 22.8575 ± 0.82 for CONTROL group respectively; After 12 week of training programme the physical variables and skill performance variables were significantly improved at (P<=0.05 level) the post test values were $7.8065\pm.23$, $28.55\pm.68$, 43.745 ± 1.5 , 20.8175 ± 0.96 for ASAD, 7.9015 ± 0.43 , $28.25\pm.71$, 42.8375 ± 1.3 , 20.8670 ± 0.85 for ASSD, 8.393 ± 0 . 6, 28.2 ± 0.95 , 42.077 ± 0.7 , 20.9015 ± 0.7 for ASSTS and 8.911 ± 0.33 , 26.95 ± 1.73 , 40.766 ± 1.41 , 21.847 ± 0.87 for CONTROL group respectively. The study shows that aerobic training followed by strength training yields a positive influence on speed, flexibility, aerobic capacity and dribbling performance of male basketball players.

Keywords: Basketball, Flexibility, Aerobic Capacity, Dribbling and ANOCOVA.

INTRODUCTION

Basketball is one of today's fastest team sports and is epitomized by grandiose manoeures such as slam dunk and blocked shot. These show cases of athletic ability clearly demonstrate the nature of the sports in that speed. Strength and power are all major determinants of successful basketball performances (Nick stone., 2007). Basketball has gained worldwide popularity and fascinated players and spectators with its dynamic characteristics as a team sport (Hoffman & Maresh, 2000). In this sport, players cover about 4500–5000 m during a 40-min game with a variety of multidirectional movements such as running, dribbling, and shuffling at variable velocities (Crisafulli et al., 2002). In order to execute running, dribbling and shuffling like movements during performance, both aerobic and anaerobic metabolic systems appear to be involved throughout a game (Ciuti et al., 1996).Therefore the objectives of this study was to examine the effects of varied combinations of concurrent aerobic and strength training programme on selected skill performance and fitness related parameters of male basket ball players.

METHODS

Subjects

Randomly Eighty male basketball players from various colleges representing inter collegiate level tournaments were selected as subjects for this study.

Protocol

Four groups participated in various training programmes. The Experimental group:-1 (n=20, ASAD group) performed the aerobic and strength program on alternate days, Experimental group:-2 (n=20; ASSD group) performed the aerobic and strength training program on the same day, Experimental group:-3 (n=20, ASSTS group) performed a aerobic and strength training program at the same training session and the fourth group (n=20; CONTROL group) underwent skill practice alone.

Testing

The test items selected were highly standardized, appropriate and ideal for the selected variables. Speed, flexibility and aerobic capacity were tested with 50 mtr dash, Sit and Reach test and Queens college three minute step tests respectively. Dribbling was measured with dribble test (KNOX basket ball test), testing occurred before and after the 12 weeks of training regimen.

Training programme

TABLE – 1: Training Programme for ASAD (1,3, 5,7, 9 and 11th week's schedule, Strength training 3 sets of 10 - 12 reps with 60 % -75 % 1RM.

Mon	Tue	Wed	Thu	Fri	Sat
Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min
Jogging : 30 min. 75% - 85%MHR Warm-down	 Bench press, Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension 	Jogging : 30-45 min. 75% - 85%MHR Warm-down	 Bench press, Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension Log curl 	Jogging : 30-45 min. 75% - 85% MHR Warm-down	 Bench press, Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension Log curl
10min	 Calf raise with barbell 	10min	 Calf raise with barbel 	10min	• Calf raise with barbel

TABLE – 2 : Training programme for ASAD (2, 4, 6, 8, 10 and 12th week's schedule, Strength training 3 sets of 10 – 12 reps with 60 % – 75 %1RM)

Mon	Tue	Wed	Thu	Fri	Sat
Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min
Jogging : 30 min. 75% - 85%MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm 	Jogging : 30 min. 75% - 85%MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm row 	Jogging : 30 min. 75% - 85% MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm
Warm-down 10min	row • Biceps dumbell curl • Lying Triceps extension • Lunges • Squats • Calf raise with dumbells	Warm-down 10min	 Biceps dumbell curl Lying Triceps extension Lunges Squats Calf raise with dumbells 	Warm-down 10min	row •Biceps dumbell curl •Lying Triceps extension •Lunges •Squats •Calf raise with dumbells

TABLE – 3 Training Programme for ASSD (1,3, 5,7, 9 and 11th week's schedule, Strength training 3 sets of 10 – 12 reps with 60 % – 75 %1RM.

Mon /	Mon /	Wed /	Wed /	Fri/	Fri/ Evening
Morning	Evening	Morning	Evening	Morning	
Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min
Jogging : 30 min. 75% - 85%MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl 	Jogging : 30-45 min. 75% - 85%MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl 	Jogging : 30-45 min. 75% - 85% MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl
Warm-down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel 	Warm-down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel 	Warm- down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel

TABLE – 4: Training programme for ASSD (2, 4, 6, 8, 10 and 12^{th} week's schedule, Strength training 3 sets of 10 - 12 reps with 60 % - 75 % 1RM)

Mon /	Mon /	Wed /	Wed /	Fri/	Fri/
Morning	Evening	Morning	Evening	Morning	Evening

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Warm-up	Warm-up	Warm-up	Warm-up	Warm-up	Warm-up
10min	10min	10min	10min	10min	10min
Jogging :	•Bench flyes	Jogging :	 Bench flyes 	Jogging :	•Bench flyes
30 min.	•Dumbells Lateral raise	30 min.	•Dumbells Lateral raise	30 min.	•Dumbells Lateral raise
75% -	•Dumbell one arm row	75% -	•Dumbell one arm row	75% -	•Dumbell one arm row
85%MHR	•Biceps dumbell curl	85%MHR	•Biceps dumbell curl	85%MHR	•Biceps dumbell curl
	•Lying Triceps extension		 Lying Triceps 		•Lying Triceps extension
Warm-	•Lunges		extension		•Lunges
down	• Squats	Warm-down	•Lunges	Warm-down	•Squats
10min	•Calf raise with dumbells	10min	•Squats	10min	•Calf raise with
1011111			 Calf raise with 		dumbells
			dumbells		

TABLE -5: Training programme for ASSTS (1, 3, 5, 7, 9 and 11th week's schedule, Strength training 3 sets of 10 – 12 reps with 60% - 75 % 1RM and 10 minutes gap before Strength works)

Monday		Wednesday		Friday	
Aerobic	Strength	Aerobic	Strength	Aerobic	Strength
Warm-up 10min	Strength related Warm-up 10min	Warm-up 10min	Strength related Warm-up 10min	Warm-up 10min	Strength related Warm-up 10min
Jogging : 30 min. 75% - 85% MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl 	Jogging : 30 min. 75% - 85% MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl 	Jogging : 30 min. 75% - 85%MHR	 Bench press, Shoulder press Lat pull down Biceps barbell curl
Warm- down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel 	Warm- down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel 	Warm- down 10min	 Triceps dip Leg extension Leg curl Calf raise with barbel

TABLE -6: Training programme for ASSTS (2, 4, 6, 8, 10 and 12th week's schedule, Strength training 3 sets of 10 – 12 reps with 60 % – 75 % 1RM and 10 minutes gap before Strength works)

Monday		Wednesday		Friday	
Aerobic	Strength	Aerobic	Strength	Aerobic	Strength
Warm-up 10min	Strength related Warm-up 10min	Warm-up 10min	Strength related Warm-up 10min	Warm-up 10min	Strength related Warm-up 10min
Jogging : 30 min. 75% - 85%MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm row Biceps dumbell curl Lying Trigons extension 	Jogging : 30 min. 75% - 85%MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm row Biceps dumbell curl Luing Tricons extension 	Jogging : 30 min. 75% - 85% MHR	 Bench flyes Dumbells Lateral raise Dumbell one arm row Biceps dumbell curl Luing Tricops optension
Warm-down 10min	 Lyng Theeps extension Lunges Squats Calf raise with dumbbells 	Warm-down 10min	•Lyng Theeps extension •Lunges •Squats •Calf raise with dumbells	Warm-down 10min	•Lyng Theeps extension •Lunges •Squats •Calf raise with dumbells

Statistical Analysis

A paired sample of student's t-test was used to determine the significance of the mean differences between the pretest to posttest values of a variable in the same group. Analysis of covariance (ANOCOVA) was used with the pretest values as the covariate for each

group to adjust the posttest values to determine the significance of mean difference among the groups. Statistical significance was accepted as $p \le 0.05$ level of confidence.

Results and Discussion

The results of the study showed significant differences in dribbling (Table-7)

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TABLE – 7:- T- Test					
Variable	ASAD	ASSD	ASSTS	CONTROL	
Speed	9.587*	6.64*	2.738*	1.371	
Flexibility	6.242*	5.180*	4.381*	0.238	
Aerobic					
Capacity	21.208*	24.508*	4.465*	.325	
Dribbling	9.060*	8.541*	10.312*	3.826*	
*Table value = 2.093					

The scheduling of aerobic and strength training performed on alternate days, on the same day and during the same session produced greater development on dribbling performance and fitness variables of speed, flexibility and aerobic capacity significantly (Table -8).

$\mathbf{I}\mathbf{A}\mathbf{D}\mathbf{L}\mathbf{E} = 0;$	Analysis of	variance and	Covariance	

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Variable	ANOVA Pre	ANOVA Post	ANACOVA Adj.Post test			
Speed	0.993	8.223*	27.092*			
Flexibility	0.489	28.512*	9.935*			
Aerobic	0.000	<i>(57</i> 0*	40.221*			
Capacity	0.008	0.3/8*	49.321*			
Dribbling	0.043	18.595*	7.225*			

*Critical value = 2.73

The Speed, flexibility, aerobic capacity and dribbling performance had improved significantly after 12 weeks of training. The improvements in speed were as follows: Group ASAD = 10.5%; group ASSD = 9.88%; group ASSTS = 5.62%; and group CONTROL = 0.19%. The improvements in flexibility were as follows: Group ASAD = 8.34%; group ASSD = 6.2%; group ASSTS = 5.2%; and group CONTROL = 0.55%. The improvements in aerobic capacity were as follows: Group ASAD = 7.4%; group ASSD = 4.9%; group ASSTS = 3.4%; and group CONTROL = 0.194%. The improvements in dribbling were as follows: Group ASAD = 9%; group ASSD = 8.63%; group ASSTS = 8.47%; and group CONTROL = 4.4%. The study is in line with previous studies of Davis.W Jackson. (2008) who reported a significant increase in lower body flexibility by 8.4%. Further the present study are in line with previous studies [J.McCarthy (1993), Christos Balabins (2003) and Collins (1993)] who reported a significant increase in aerobic endurance training during the same session, 12.9% due to combined aerobic endurance training during the same session, 12.9% due to combined aerobic endurance training during the same session, 12.9% due to combined aerobic endurance fraining during the same session, 12.9% due to combined aerobic endurance and strength training for male basket ball players and 6.2% (endurance /strength) concurrent training performed in males and females performed during the same session respectively.

CONCLUSION

The coaches and physical education personnel should plan the training schedule for basketball players in such a way that at least 24 hours of rest is given between the strength training and aerobic endurance training programme so that the basketball players can improve their performance at the highest level or at least 8 hours of rest is given between the strength training and aerobic endurance training programme so that the basketball players can improve their performance but not as like 24 hours of rest between strength and aerobic trainings.

REFERENCES

- [1] Christos Balabinis , Charalampos H. Psarakis, Markos Moukas, Miltos P. Vassiliou, and Panagiotis K. Behrakis (2003) "Early Phase Changes by Concurrent Endurance and Strength Training", The Journal of Strength and Conditioning Research ;Volume 17, Issue 2 (may 2003) Article :pp.393-401.
- [2] Ciuti C, Marcello C, Macis A, (1996), Improved aerobic power by detraining in basketball players mainly trained for strength. Sports Med Training Rehab.1996: 6: 325–335.

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Journal of Xi'an Shiyou University, Natural Science Edition

- [3] Collins MA & Snow TK (1993) "Are adaptations to combined endurance and strength training affected by the sequence of training?" Journal of Sports Science.1993.Dec; 11(6):485-91.Dept of health and physical education, Kennesaw state college, Marietta, Georgia .30061. PMID: 8114172
- [4] Collins MA, Snow TK (1993), "Are adaptations to combined endurance and strength training affected by sequence of training?" J Sports Sci. 1993 Dec; 11 (6) :485 – 91. PMID:8114171.
- [5] Crisafulli A, Melis F, Tocco F, Laconi P, Lai C, Concu A. External mechanical work versus oxidative energy consumption ratio during a basketball field test. J Sports Med Phys Fitness 2002: 42: 409–417.
- [6] Davis,W Jackson (WJ) (2008) has conducted a study to determine "Concurrent training enhances athletes' strength, muscle endurance, and other measures", division of physical and biological sciences and strength and conditioning coach .Athletic department, University of California at santa Cruz, USA .jackson (-atsign-)Miracle.com. journal of strength conditioning and research .Ref:2008-sep:vol22 (issue5);pp1487 – 502.
- [7] Hofman JR, Maresh CM. Physiology of basketball. In: Garrett WE Jr, Kirkendall DT, eds. Exercise and sport science. Philadelphia, PA: Lippincott Williams & Wilkins, 2000: P.No.733–744.
- [8] J.Mc Carthy, P.Griffith, W.K.Prusaczyk, H.W.Goforth and A.Vailas (1993) "combined strength and endurance training functional and morphological adaptations to ten weeks of training", Appr. by public release distribution unlimited. Naval health research center, San Diego, California 92186 – 5122. Naval medical research and development command, Bethesda, Maryland .Rep. no: 92-26.
- [9] Nick stone, june 2007. Physiological response to sport specific aerobic interval training in high school male basket ball players, School of sport and recreation, BSR (AUT University).