

EFFECTS OF VARIED COMBINATIONS OF CONCURRENT AEROBIC AND STRENGTH TRAINING PROGRAMME ON SELECTED SKILL PERFORMANCE AND FITNESS RELATED PARAMETERS OF MALE BASKETBALL PLAYERS

Dr. P. KUMARAVELU

Associate Professor, Dept of Physical Education, Tamilnadu Physical Education and Sports University, Chennai, Tamilnadu, India.

Abstract

To study the effects of varied combinations of concurrent aerobic and strength training programme on the selected skill performance and fitness related parameters of male basketball players, eighty male basketball players age ranged from 18-25 yrs were selected from various colleges. The subjects were divided as the Experimental group:-1 (n=20, CASAD group) performed the combined aerobic and strength program on alternate days, Experimental group-2 (n=20; CASSD group) performed the combined aerobic and strength training programs on the same day, Experimental group:-3 (n=20, CASSTS group) performed a combined 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 dribbling, speed, flexibility and aerobic capacity were 22.878 ± 1.18 , 7.251 ± 34 , 26.35 ± 1.2 , 40.73152 ± 17 for CASAD, 22.839 ± 12 , 8.7685 ± 35 , 26.6 ± 1.1 , 40.8445 ± 1.5 for CASSD, 22.8370 ± 3 , 8.89352 ± 37 , 26.883 , 40.687 ± 1.3 for CASSTS and 22.8575 ± 82 , 8.89352 ± 46 , 26.8 ± 1.96 , 40.687 ± 1.73 for CONTROL group respectively. After 12 week of training programme the skill performance and physical variables significantly improved at ($P < 0.05$ level) and the post test values were 20.8175 ± 96 , 7.8065 ± 23 , 28.551 ± 68 , 43.745 ± 1.5 for CASAD, 20.8670 ± 185 , 7.9015 ± 1.43 , 28.25 ± 71 , 42.8375 ± 1.3 for CASSD, 20.9015 ± 7 , 8.393 ± 6 , 28.2195 , 42.077 ± 7 for CASSTS and 21.847 ± 87 , 8.911 ± 33 , 26.95 ± 1.73 , 40.7662 ± 1.41 for CONTROL group respectively. The study shows that concurrent aerobic and strength training yielded a positive influence on the basketball skill performance and the selected fitness variables namely dribbling, speed, flexibility, and aerobic capacity.

Keywords: Aerobic, Strength, Basketball.

Introduction

Basketball is one of today's fastest team sports and is epitomized by grandiose manoeuvres 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 performance (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 the 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 lev tournaments were selected as subjects for this study.

Protocol

Four groups participated in various training programmes. The Experimental group:-1 (n=22 CASAD group) performed the combined aerobic and strength program on alternate days, Experiments group:-2 (n=20:CASSD group) performed the combined aerobic and strength training program on the same day. Experimental group-3 (n=20, CASSTS group) performed a combined aerobic and strengts 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 standardized, appropriate and ideal to evaluate the selected variables. Dribbling was measured using dribble test (KNOX basket ball test), Speed, flexibility and aerobic capacity were tested using 50 mtr dash, Sit and Reach test and Queens college three minute step tests respectively. Testing occurred before and after the 12 weeks training regimen.

Training programme: The training programmes are give in tables from I-VI

Table-1
Training Programme for CASAD (1,3,5,7,9 and 11 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	Warm-up 10min
Jogging 30 min. 75%- 85%MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curt • Triceps dip • Leg extension • Leg curl 	Jogging 30-45 min. 75% -85 %MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curt • Triceps dip • Leg extension • Leg curl 	Jogging 30-45 min. 75% -85 %MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curt • Triceps dip • Leg extension • Leg curl
Warm-down 10min		Warm-down 10min		Warm-down 10min	

	<ul style="list-style-type: none"> • Calf raise with barbel 		<ul style="list-style-type: none"> • Calf raise with barbel 		<ul style="list-style-type: none"> • Calf raise with barbel
--	--	--	--	--	--

Table-11

Training programme for CASAD (2, 4, 6, 8, 10 and 12 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	Warm-up 10min
Jogging 30 min. 75%-85%MH R	<ul style="list-style-type: none"> • Bench flies Dumbbells • Lateral raise 	Jogging 30min. 75% - 85 %MHR	<ul style="list-style-type: none"> • Bench flies Dumbbells • Lateral raise 	Jogging 30min. 75% - 85 %MHR	<ul style="list-style-type: none"> • Bench flies Dumbbells • Lateral raise
Warm-down 10min	<ul style="list-style-type: none"> • Dumbbell one arm row • Biceps dumbbell curl • dumbbell curl • Lying Triceps . • Extension • Lunges • Squats • Calf raise with dumbbells 	Warm-down 10min	<ul style="list-style-type: none"> • Dumbbell one arm row • Biceps dumbbell curl • dumbbell curl • Lying Triceps . • Extension • Lunges • Squats • Calf raise with dumbbells 	Warm-down 10min	<ul style="list-style-type: none"> • Dumbbell one arm row • Biceps dumbbell curl • dumbbell curl • Lying Triceps . • Extension • Lunges • Squats • Calf raise with dumbbells

Table-III

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

Mon/Morning	Mon/Evening	Wed/Morning	Wed/Evening	Fri/Morning	Fri/Evening
Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min Warm-up 10min	Warm-up 10min

Jogging 30 min. 75%-85%MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curl • Triceps dip • Leg extension • Leg curl • Calf raise with barbell 	Jogging 30-45 min. 75%-85 %MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curl • Triceps dip • Leg extension • Leg curl • Calf raise with barbell 	Jogging 30-45 min. 75% -85 %MHR	<ul style="list-style-type: none"> • Bench press • Shoulder press • Lat pull down • Biceps barbell curl • Triceps dip • Leg extension • Leg curl • Calf raise with barbell
Warm-down 10min		Warm-down 10min		Warm-down 10min	

Table-IV

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

Mon/Morning	Mon/Evening	Wed/Morning	Wed/Evening	Fri/Morning	Fri/Evening
Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min Warm-up 10min	Warm-up 10min
Jogging 30 min. 75%-85%MHR	<ul style="list-style-type: none"> • Bench flies • Dumbbells 	Jogging 30min. 75%-85 %MHR	<ul style="list-style-type: none"> • Bench flies • Dumbbells 	Jogging 30min. 75% -85 %MHR	<ul style="list-style-type: none"> • Bench flies • Dumbbells
Warm-down 10min	<ul style="list-style-type: none"> • Lateral raise • Dumbbell one arm row • Biceps dumbbell • curl 	Warm-down 10min	<ul style="list-style-type: none"> • Lateral raise • Dumbbell one arm row • Biceps dumbbell • curl 	Warm-down 10min	<ul style="list-style-type: none"> • Lateral raise • Dumbbell one arm row • Biceps dumbbell • curl

	<ul style="list-style-type: none"> dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells 		<ul style="list-style-type: none"> dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells 		<ul style="list-style-type: none"> dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells
--	--	--	--	--	--

Table-V

Training programme for CASSTS (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	Warm-up 10min	Warm-up 10min	Warm-up 10min	Warm-up 10min Warm-up 10min	Warm-up 10min
Jogging 30 min. 75%-85%MHR	<ul style="list-style-type: none"> Bench press Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension Leg curl Calf raise with barbell 	Jogging 30-45 min. 75% -85 %MHR	<ul style="list-style-type: none"> Bench press Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension Leg curl Calf raise with barbell 	Jogging 30-45 min. 75% -85 %MHR	<ul style="list-style-type: none"> Bench press Shoulder press Lat pull down Biceps barbell curl Triceps dip Leg extension Leg curl Calf raise with barbell
Warm-down 10min		Warm-down 10min		Warm-down 10min	

Table-VI

Training programme for CASSTS (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 Warm-up 10min	Strength related Warm-up 10min
Jogging 30 min. 75%-85% MHR	<ul style="list-style-type: none"> Bench flies Dumbbells Lateral raise Dumbbell one arm row Biceps dumbbell curl dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells 	Jogging 30min. 75% - 85 %MHR	<ul style="list-style-type: none"> Bench flies Dumbbells Lateral raise Dumbbell one arm row Biceps dumbbell curl dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells 	Jogging 30min. 75% - 85 %MHR	<ul style="list-style-type: none"> Bench flies Dumbbells Lateral raise Dumbbell one arm row Biceps dumbbell curl dumbbell curl Lying Triceps . Extension Lunges Squats Calf raise with dumbbells
Warm-down 10min		Warm-down 10min		Warm-down 10min	

Statistical Analysis

A paired sample of student's t-test was used to determine the significance of the mean differences between the pretest posttest values of a variable in the same group as shown in table VII. 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 as shown in table VII. Statistical significance was accepted as $p \leq 0.05$ level of confidence.

Results of the Study

Table-VII:-t-Test

Variable	Casad	Cassd	Cassts	Control
Dribbling	9.060*	8.541*	10.312*	3.826*
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
------------------	---------	---------	--------	------

*Table Value = 2.093

Table-VIII
Analysis of Variance and Covariance

Variable	ANOVA Pre	ANOVA Post	ANACOVA Adj.Post test
Dribbling	0.043*	18.595*	7.225*
Speed	0.993*	8.223*	27.092*
Flexibility	0.489*	28.512*	9.935*
Aerobic Capacity	0.008*	6.578*	49.321*

*Critical Value = 2.73

The scheduling of aerobic and strength training performed on alternate days, on the same and during the same session produced greater development on dribbling performance and variables of speed, flexibility and aerobic capacity significantly.

Discussion on findings

The dribbling performance, Speed, flexibility and aerobic capacity improved significantly after weeks of training. The improvements in dribbling are as follows: Group CASAD= 9%; group CASSD 8.63% group CASSTS-8.47%, and group CONTROL=44%. The improvements in speed are as follows: Group CASAD= 10.5%; group CASSD= 9.88%, group CASSTS= 5.62%; and group CONTROL -0.19%. The improvements in flexibility are as follows: Group CASAD= 8.34%; group CASSD = 6.2% group CASSTS-5.2%; and group CONTROL= 0.55%. The improvements in aerobic capacity are as follows: Group CASAD=7.4%, group CASSD=4.9%; group CASSTS = 3.4%; and group CONTROL=0.194%. The present study is inline with the previous studies of Davis.W Jackson. (2008) who reported a significant increase in lower body flexibility by 8.4% Further the present study is in line with the previous studies of [LMcCarthy (1993), Christos Balabins (2003) and Collins (1993)) who reported a significant increase in aerobic capacity by 16% due to the combined strength and aerobic endurance training during the same session, 12.9% due to combined aerobic endurance and strength training for the male basketball players and 6.2% (endurance /strength) concurrent training performed in males and females performed during the same session respectively.

Recommendations

The coaches and physical education personnel may plan the training schedule for basketball players in such a way that at least 24 hours of rest be 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. Calins 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. [PubMed-indexed for Collins MA, Snow TK (1993), "Are adaptations to combined endurance and strength training affected by MEDLINE sequence of training?" J Sports Sci. 1993 Dec; 11 (6):485-91. PMID:8114171 (PubMed-indexed
2. 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 Strength and Conditioning Research Volume 17, Issue 2 (may 2003) Article :pp.393-401.
 3. 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.
 4. Disill 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.
 5. Holman 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.
 6. Kickstone, June 2007. Physiological response to sport-specific aerobic interval training in high school male basketball players, School of sport and recreation, BSR (AUT University).
 7. 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.