EFFECT OF PLYOMETRIC TRAINING AND SAQ TRAINING FOLLOWED BY DETRAINING ON SELECTED BIO-MOTOR ABILITIES OF INTER-COLLEGIATE LEVEL FOOTBALLERS

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ABSTRACT

Thirty male soccer players aged between 18 and 26 years from Nirmala college in Ernakulam District, Kerala were selected. They were randomly divided into three groups of ten each, out of which group I (n = 10) consisted of SAQ (speed, agility, quickness) training, group II (n = 10) consisted Plyometric training and group III (n = 10) consisted control group. The selected bio-motor abilities were speed endurance and strength endurance. The season of training period was divided into three. The first training season was later pre-season, which consisted of four weeks of training with three days (three sessions) of training and before the training session was a rest day. The second training season was the In-season, which consisted of two weeks with two days (two sessions) of training and before the training session was a rest day. The third training season was in the closed-season, which consisted of two weeks. The subjects of SAQ group and Plyometric group were made to undergo de-training. Pre-test was conducted for all the three groups before giving the training and post-test was conducted after 6 weeks of training. The de-training effect was measured after the two weeks of de-training. The statistical technique used was ANCOVA. The results of the study showed that SAQ training improved speed endurance better than Plyometric training whereas Plyometric training improved strength endurance better than SAQ training after 6 weeks of training programme. The results of the 2 weeks de-training programme showed that there was no significant improvement in speed endurance and strength endurance for both SAQ training and Plyometric training among the male inter-collegiate level footballers.

Keywords: Plyometric training, SAQ training and Football.

INTRODUCTION:

A pre-requisite for playing soccer is possession of the skills and fitness to do so. Fitness refers to a range of individual characteristics and in a game like soccer it a composite of many

attributes and competencies. In consequence, fitness for soccer is said to be multivariate and also specific to the sport. It comprises physical, physiological, psychomotor, and psychological factors. Such qualities are needed in contesting and retaining possession of the ball, maintaining a high work-rate for 90 minutes of play, reacting quickly and appropriately as opportunities arise, and regulating mental attributes before and during match-play. (Thomas Reilly, 1996)

Biomotor abilities are the foundations of ability of an individual to perform an exercise – strength, endurance, speed, coordination, flexibility and agility The contribution of the biomotor abilities to the attainment of high performance is determined by two factors; the ratio between them as a reflection of the specifics of the sport and by the level of development of each ability according to its degree of participation in performing the sport/event. (Arpadcsanadi, 1966). Speed endurance training significantly improves your recovery after a bout of repetitive sprints. Your body's ability to remove lactic acid increases which can make such a difference to your game. Thirdly, a soccer speed training program should improve agility, foot speed and reaction time. Exercises to improve agility don't tend to be physically taxing. The emphasis is on short, sharp movements of a high quality. Strength or muscular endurance is the ability of a muscle group to perform repeated, high-intensity movements. Strength endurance is essential for soccer - and like power, perhaps more essential than all-out strength. At some point in your soccer training routine you should focus on developing strength endurance. Agility is the ability to change direction without the loss of speed, strength, balance, or body control. The performances of athletes who compete today have raised the level of agility. The physical conditioning of athletes has led to a number of changes in teaching, coaching, and training. These changes have allowed for a planned and implemented process that leads to improved performance through greater agility, balance and timing. This new emphasis leads to the evolution of faster, stronger and better conditioned athletes and to elite performances by athletes.

METHODOLOGY:

Thirty male soccer players aged between 18 and 26 years from Nirmala college in Ernakulam District, Kerala were selected. They were randomly divided into three groups of ten each, out of

which group I (n = 10) consisted of SAQ (speed, agility, quickness) training, group II (n = 10) consisted Plyometric training and group III (n = 10) consisted control group which was not given any training. The selected bio-motor abilities were speed endurance and strength endurance. Speed endurance was measured by 400m dash and strength endurance was measured by bent knee sit-ups. The season of training period was divided into three. The first training season was later pre-season, which consisted of four weeks of training with three days (three sessions) of training and before the training session was a rest day. The second training season was the In-season, which consisted of two weeks with two days (two sessions) of training and before the training session was a rest day. The third training season was in the closed-season, which consisted of two weeks. The subjects of SAQ group and Plyometric group were made to undergo de-training. Each training session started with light warm-up and ended with cool-down exercises. Each work out session lasted for 60-75 minutes. After the first half of the training five minutes were given as the rest period.

TRAINING SCHEDULE

Table 1

SAQ TRAINING EXERCISES

EXERCISES	LOW INTENSITY	MEDIUM INTENSITY	HIGH INTENSITY
1	butt-kicks	high knee forward	ladder speed run
2	high knee forward	high knee side ward	run over micro hurdle
3	high knee side ward	ladder speed run	----------
4	ing starts	run over micro hurdle	partner resisted run
5	zag run forward	zigzag run forward	adder zigzag cross over
6	zigzag run side ward	zigzag run side ward	figure eight
7	zigzag run back ward	ladder zigzag cross over	z- pattern run
8	s- drill	s- drill	----------

9	rope skipping	single leg rope skipping	----------
10	in place angle jump	cross lateral skaters	cross lateral skaters
11	scissors jump	scissors jump	----------
12	lateral skaters	lateral skaters	single leg hop

Table 1 a

LOW INTENSITY SAQ TRAINING PROGRAM FOR SOCCER PLAYERS (FIRST TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	rest	SAQ training program	active rest	SAQ training program	active rest	SAQ training program	active rest
REP/ SETS	-----	12 x 3	miner game	12 x 3	miner game	12 x 3	miner game

Table 1 b

MEDIUM INTENSITY SAQ TRAINING PROGRAM FOR SOCCER PLAYERS (SECOND TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	rest	SAQ training	active rest	SAQ training	active rest	SAQ training	active rest
REP/ SETS	------	12 x 4	miner game	12 x 4	miner game	12 x 4	miner game

Table 1 c

HIGH INTENSITY SAQ TRAINING PROGRAM FOR SOCCER PLAYERS (THIRD TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	Rest	SAQ	active	active	SAQ	active	active

		training	rest	rest	training	rest	rest
REP/ SETS	------	8 x 4	miner game	miner game	8 x 4	miner game	miner game

Table 2

PLYOMETRIC TRAINING EXERCISES

EXERCIE	LOW INTENSITY	MEDIUM INTENSITY	HIGH INTENSITY
1	butt-kicks	double leg hop	single leg hop
2	double leg hop	double leg jump side ward	Medicine ball throw in single hand
3	double leg jump side ward	Medicine ball throw sitting	single leg hop side ward
4	Medicine ball throw sitting	Medicine ball scoop toes	z- pattern cuts
5	Galloping	single leg rope skipping	single leg stride jump
6	in place angle jump	cross lateral skaters	cross lateral skaters
7	scissors jump	scissors jump	tuck jump
8	lateral skaters	lateral skaters	star jump

Table 2 a

LOW INTENSITY PLYOMETRIC TRAINING PROGRAM

FOR SOCCER PLAYERS (FIRST TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	rest	plyometric training	active rest	plyometric training	active rest	plyometric training	rest
REP/	-------	8 x 4	miner	8 x 4	miner	8 x 4	------

SETS			game		game		

Table 2 b

MEDIUM INTENSITY PLYOMETRIC TRAINING PROGRAM

FOR SOCCER PLAYERS (SECOND TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	rest	plyometric training	active rest	plyometric training	active rest	plyometric training	active rest
REP/ SETS	-----	8 x 3	miner game	8 x 3	miner game	8 x 3	miner game

Table 2 c

HIGH INTENSITY PLYOMETRIC TRAINING PROGRAM

FOR SOCCER PLAYERS (THIRD TWO WEEKS OF TRAINING)

DAYS	SUN	MON	TUE	WEN	THE	FRI	SAT
MORN	rest	plyometric training	active rest	active rest	plyometrics training	active rest	active rest
REP/ SETS	------	8 x 3	miner game	miner game	8 x 3	miner game	miner game

Pre-test was conducted for all the three groups before giving the training and post-test was conducted after 6 weeks of training. The de-training effect was measured after the two weeks of de-training. The statistical technique used was ANCOVA.

ANALYSIS OF DATA AND RESULTS OF THE STUDY:

In all conditions the significant level was fixed at 0.05, which was considered to be appropriate since the nature of this study did not demand more stringent level of significance.

Speed endurance

The data collected from pre test, post test and after the detraining test on SAQ training group, Plyometrics training group and the control group have been statistically analyzed and presented in Table 3

Table 3

Analysis of covariance of control group, SAQ training group and the plyometrics training group on 400 meters

Source of variation	d f	SSx	SSy	SSxy	SSyx	MSSyx	F
Between	2	13.76774	7.465727	9.82504	0.365956	0.182978	
Within	26	-12.7664	-6.46488	-8.824	-0.36581	-0.01407	*13.0053
Total	28						

*Significant at .05 level of confidence

F' value required at 0.05 level=3.37

The adjusted post test mean of control group is 20.223307, SAQ group is 20.33885 and the plyometrics group is 20.52451 , resulting in an 'F' ratio of -13.0053 which indicates a statistical significant difference at .05 level of confidence. The above statistical analysis indicates that there was significant variation among the three groups after the training period further, to determine which of the paired means has a significant difference; LSD test was applied. The result of the LSD test is presented in Table 3 a.

Table 3 a

Mean Difference among control group, SAQ training group and the plyometrics training group on 400 meters

CONTROL	SAQ	PLYOMTRC	MD	CD(5% LEVEL)
20.22307		20.52413	-0.30106*	
20.22307	20.33885		-0.11577*	0.110654
	20.33885	20.52413	-0.18529*	

Table 3 a shows the adjusted post test mean difference between SAQ group and control group as 0.1157 which was statistically significant at .05 level of confidence. The adjusted post test mean difference in Plyometrics group and control group as 0.30106 which was also statistically

significant at .05 level of confidence. Since the adjusted post test mean of SAQ and Plyometrics group is 0.18529, which was also statistically significant at .05 level of confidence.

Strength endurance

The data collected from pre test, post test and after the detraining test on SAQ training group, Plyometrics training group and the control group have been statistically analyzed and presented in Table 4.

Table 4

Analysis of covariance of control group, SAQ training group and the plyometrics training group on sit ups

Source of variation	d f	SSx	SSy	SSxy	SSyx	MSSyx	F
Between	2	56.6	14.86667	25.7	2.894089	1.447044	*13.0044
Within	26	-55.5943	-13.8636	-24.6961	-2.89311	-0.11127	
Total	28						

*Significant at .05 level of confidence

'F' value required at 0.05 level=3.37

The adjusted post test mean of control group is 0.78905, SAQ group is 0.51055 and the plyometrics group is 0.2411 , resulting in an 'F' ratio of -12.9726, which indicates a statistical significant difference at .05 level of confidence. The above statistical analysis indicates that there was significant variation among the three groups after the training period further, to determine which of the paired means has a significant difference; LSD test was applied. The result of the LSD test is presented in Table 4 a.

Table 4 a: Mean Difference among control group, SAQ training group and the plyometrics training group on sit ups

CONTROL	SAQ	PLYOMTRC	MD	CD(5% LEVEL)
34.64455		35.1551	-0.51055*	0.31119
34.64455	35.4336		-0.78905*	
	2.26	2.22	.04	

Table 4 a shows the adjusted post test mean difference between SAQ group and control group as 0.78905 which was statistically significant at .05 level of confidence. The adjusted post test mean difference in Plyometrics group and control group as 0.51055 which was also statistically significant at .05 level of confidence. Since the adjusted post test mean of SAQ and Plyometrics group is 0.04, which are not statistically significant at .05 level of confidence.

Table 4 b

DESCRIPTIVE STATISTICS OF SIT UPS

Groups		pre test	post test	De training	No
CONTROL	Mean	55.6	56.9	57.2	10
	SD	5.04	4.38	3.12	
SAQ	Mean	56.3	58.00	57.1	10
	SD	3.23	2.16	2.18	
PLMTS	Mean	53.1	56.3	55.6	10
	SD	3.90	2.71	1.95	

Table -4 b indicates that the pre-test, post test, detraining mean and standard deviation value of sit ups. The pre-test mean and standard derivation values of sit ups test in control group was 55.6 ± 5.04, The post-test mean and standard derivation values of the sit ups test in control group was 56.9 ± 4.38, and the detraining test mean and standard derivation values of the sit ups test in control group was 57.2 ± 3.12. The pre-test mean and standard derivation values of sit ups test in SAQ group was 56.3 ± 3.23, The post-test mean and standard derivation values of the sit ups test in SAQ group was 58 ± 2.16, and the detraining test mean and standard derivation values of the sit ups test in SAQ group was 57.1 ± 2.18. The pre-test mean and standard derivation values of sit ups test in plyometrics group was 53.1 ± 3.90, The post-test mean and standard derivation values of the sit ups test in plyometrics group was 56.3 ± 2.71, and the detraining test mean and standard derivation values of the sit ups test in plyometrics group was 55.6 ± 1.95.

Speed endurance

The data collected from pre test, post test and after the detraining test on SAQ training group, Plyometrics training group and the control group have been statistically analyzed and presented in Table 5

Table 5

Analysis of covariance of control group, SAQ training group and the plyometrics training group on post test and detraining test of 400 meters

Source of variation	d f	SSx	SSy	SSxy	SSyx	MSSyx	F
Between	2	7.465727	13.50613	9.708343	0.777145	0.388573	*13.0025
Within	26	-6.46488	-12.5054	-8.70761	-0.777	-0.02988	
Total							

*Significant at .05 level of confidence

F' value required at 0.05 level=3.37

The adjusted post test mean of control group is 11.21847, SAQ group is 10.88715and the plyometrics group 10.82407, resulting in an 'F' ratio of 13.0025 which indicates a statistical significant difference at .05 level of confidence. The above statistical analysis indicates that there was significant variation among the three groups after the training period further, to determine which of the paired means has a significant difference; LSD test was applied. The result of the LSD test is presented in Table 5 a.

Table 5 a

Mean Difference among control group, SAQ training group and the plyometrics training group on post test and detraining test of 400 meters

CONTROL	SAQ	PLYOMTRC	MD	CD(5% LEVEL)
11.21847		10.82407	0.394396*	
11.21847	10.88715		0.331321*	
	10.88715	10.82407	0.063076	0.161269

Table 5 a shows the adjusted post test mean difference between SAQ group and control group as 0.331321which was statistically significant at .05 level of confidence. The adjusted post test mean difference in Plyometrics group and control group 0.394396 which was also statistically significant at .05 level of confidence. Since the adjusted post test mean of SAQ and Plyometrics group 0.063076, which was not statistically significant at .05 level of confidence.

Strength endurance

The data collected from pre test, post test and after the detraining test on SAQ training group, Plyometrics training group and the control group have been statistically analyzed and presented in Table 6

Table 6

Analysis of covariance of control group, SAQ training group and the plyometrics training group on post test and detraining test of Sit ups

Source of variation	df	SSx	SSy	SSxy	SSyx	MSSyx	F
Between	2	14.86667	16.06667	11.33333	7.366694	3.683347	*13.0018
Within	26	-13.8636	-15.0648	-10.3314	-7.3657	-0.2833	
Total							

*Significant at .05 level of confidence

F' value required at 0.05 level=3.37

The adjusted post test mean of control group is 19.05001, SAQ group is 18.13028 and the plyometrics group17.89714, resulting in an 'F' ratio of 0.496535 which indicates a statistical significant difference at .05 level of confidence. The above statistical analysis indicates that there was significant variation among the three groups after the training period further, to determine which of the paired means has a significant difference; LSD test was applied. The result of the LSD test is presented in Table 6 a.

Table 6 a

Mean Difference among control group, SAQ training group and the plyometrics training group on post test and detraining test of Sit ups

CONTROL	SAQ	PLYOMETRIC	MD	CD(5% LEVEL)
19.05001		17.89714	1.152872	
19.05001	18.13028		0.919735*	
	18.13028	17.89714	0.233136	0.496535

Table 6 a shows the adjusted post test mean difference between SAQ group and control group as 0.919735 which was statistically significant at .05 level of confidence. The adjusted post test mean difference in Plyometrics group and control group 1.152872 which was also statistically significant at 0.05 level of confidence. Since the adjusted post test mean of SAQ and Plyometrics group 0.233136, which was not statistically significant at .05 level of confidence.

DISCUSSION:

The result of the study shows that in the case of SAQ training the speed endurance has developed better than the plyometrics training due to six weeks of training. The results are in line with that of study earlier conducted by Polman et al, (2004) reveals that twelve weeks training of three conditioning programme improves flexibility, VO_2 max, sprint, agility, power and reduce fatigue.

The result of the study shows that in the case of plyometrics training the strength endurance has developed better than the SAQ training group. High-level soccer requires a great amount of endurance, speed, agility, and power. Research has identified the intermittent high-intensity exercise as predominant and fitness improvements to this activity pattern have been defined as power endurance (Siegler et al., 2003). However, no studies were conducted to assess the effect of strength endurance training on players' physical fitness along the season.

CONCLUSIONS:

From the analysis of the data the following conclusions were drawn

1. The comparison of pre and post test score of the SAQ group and plyometrics group in the speed endurance test indicated that there is a significant improvement in the SAQ group than the plyometrics group.
2. The comparison of pre and post test score of the SAQ group and plyometrics group in the strength endurance test indicated that there is a significant improvement in the plyometrics group than the SAQ group.
3. The comparison of post and detraining test score of the SAQ group and plyometrics group indicated that there was no significant improvement in speed endurance and strength endurance for both SAQ training and Plyometric training.

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