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IMPACT OF VARIOUS COMBINED TRAINING ON VO_2 MAX AND MAXIMUM VOLUNTARY VENTILATION AMONGBASKETBALL PLAYERS IN UNITED ARAB EMIRATES

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Abstract

This study's main goal was to evaluate how various combination training approaches—such as aerobic and plyometric training, plyometric and speed training, and aerobic and speed training—affect the Vo2 max and maximum voluntary ventilation of female basketball players in the United Arab Emirates. To take part in the study, sixty female basketball players between the ages of 12 and 18 were chosen from among the secondary schools in the United Arab Emirates, namely Gulf Indian School Dubai, Our Own School Dubai, and Cambridge International School Dubai. Group I (n = 20) had plyometric and aerobic training, Group II (n = 20) plyometric and speed training and group III (n = 20) aerobic and speed training. The participants were split into three groups. For twelve weeks, each group received training three days a week. A one mile run test was used to measure Vo2 max and spirometer tool was used assess maximum voluntary ventilation both before and after the training session. The paired "t" test and Analysis of Covariance (ANCOVA) were applied in the statistical analysis, and the Scheffé S test was used as a post-hoc test when the "F"-ratio of the adjusted post-test means was determined to be significant at the 0.05 level of significance. When compared to the control group, the study showed that the three combined training methods improved speed. Particularly, among female basketball players, the plyometric with speed training group showed the greatest improvements in Vo2 max and maximum voluntary ventilation.

Keywords:,*Aerobic with plyometric training, Plyometric with speed training, Aerobic with speed training, Basketball, Vo2 max and maximum voluntary ventilation*

Introduction

Combination training takes a comprehensive and functional approach to training. If an athlete is performing a daily task that involves only one joint or muscle group, such as a leg extension exercise that isolates the quadriceps, this does not represent the integrated function of muscles in real-life movements. Instead, muscles learn to synergize, simulating real-life scenarios in which multiple muscle groups work together seamlessly. Cross-training adds variety to exercise regimens by adding different activities to improve overall fitness and performance in one's primary sport or activity, which is beneficial to people of all ages and fitness levels.This article explores the benefits of cross-training for athletes and provides advice on how to incorporate it into everyday activities for better health.

Running, aerobic dance, jumping rope, cycling, swimming, cross-country skiing, stationary cycling, walking, and other physical activities are all considered aerobic exercises. To be considered aerobic workouts, these exercises must maintain a target heart rate for a minimum of 20 minutes.

Rapid muscular contractions are used in plyometric exercises to produce cycles of muscle lengthening and shortening. Performance is improved by this dynamic process of stretching and contracting muscles, connective tissues, and the neurological system.

In order to increase velocity and agility, speed training emphasises high-speed exercises like jogging. Speed training maximises neuromuscular coordination and energy utilisation by introducing high-intensity intervals.
The capacity to move quickly in a certain direction is known as speed. Step frequency and stride length have an impact on it. Cadence is the number of

steps made in a specific amount of time or distance, and it can be improved with appropriate technique, responsive training methods, and the development of core strength. The distance a runner covers in a single stride is known as their stride length.

Statement of the Problem:

This study aimed to investigate the impact of combined training methods such as aerobic with plyometric training, plyometric with speed training, and aerobic with speed training on Vo2 max and maximum voluntary ventilation among basketball players in the UAE.

Methodology:

To take part in the study, sixty female basketball players between the ages of 12 and 18 were chosen from among the secondary schools in the United Arab Emirates, namely Gulf Indian School Dubai, Our Own School Dubai, and Cambridge International School Dubai.Group I (n = 20) had plyometric and aerobic training, Group II (n = 20) plyometric and speed training and group III (n = 20) aerobic and speed training. The participants were split into three groups. The participants were split into four groups. For twelve weeks, each group received training three days a week. A one mile run test was used to measure Vo2 max and spirometer tool was used assess maximum voluntary ventilation both before and after the training session.

Analysis of VO_2 Max

Table I presents the analysis and submission of the mean values on VO2 Max of the aerobic and speed training group, the control group, and the plyometric and aerobic training group at various test phases.

Table –I
ANACOVA ON VO_2 MAX OF COMBINED EXERCISE GROUPS

	PATG	**PSTG**	**ASTG**	**SOV**	**SS**	**df**	**MS**	**'F'**
Pre-test mean	11.608	11.591	11.575	**B**	.008	2	.004	0.081
SD	.265	.146	.247	**W**	2.142	57	.051	
Post-test mean	11.061	11.310	11.373	**B**	.814	2	.407	7.410*
SD	.244	.276	.168	**W**	2.308	57	.055	
Adjusted post-test mean	11.056	11.311	11.378	**B**	.860	2	.430	8.363*
				W	2.108	56	.051	

(The table values of 3.159 and 3.162, respectively, were needed for significance at the 0.05 level of significance with df 2 and 57 and 2 and 56.
PATG: The group for plyometric and aerobic training
PSTG: The group for plyometric and speed training
ASTG: The group for speed and aerobic training

Pre-test mean VO2 Max scores are 11.575, 11.591, and 11.608 for the plyometric with aerobic training, plyometric with speed training, and aerobic with speed training groups, respectively, presented in Table-I. A "F" value of 0.081 was obtained from the pre-test data, which is less than the 3.159 "F" value required to be significant at the 0.05 level. This indicates that the patients' random assignment into three groups was successful and that there are no discernible initial differences between the groups. The post-test results analysis indicates that the groups differed significantly; the obtained "F" value of 7.410 is greater than the required "F" value of 3.159. This indicates that there was a substantial difference in the participants' post-test means. The pre- and post-test findings for each group are taken into consideration when computing and statistically processing the adjusted

mean scores. The obtained "F" value of 8.363 is greater than the required table "F" value of 3.162. This indicates that there was a substantial variation in the adjusted averages during the twelve weeks of varied combination training on VO2 Max.

Scheffe's confidence interval test can be applied to post hoc data analysis since the results indicate a significant improvement in the data. The results are displayed in Table II.

Table-II- POST HOCTESTSCORESON VO_2 MAX

APTG	PSTG	ASTG	M.D	C.I
11.056	11.311		0.255*	0.028
11.056		11.378	0.322*	
	11.311	11.378	0.067*	

**Significant at 0.05 level.*

The obtained values are indicated to be greater than the required value of the confidence interval, which is 0.028 to be significant at 0.05 levels, indicating the discovery of a significant difference. To aid visualise the study's findings, Figure-I offers a bar diagram that shows the ordered adjusted means onVO2Max.

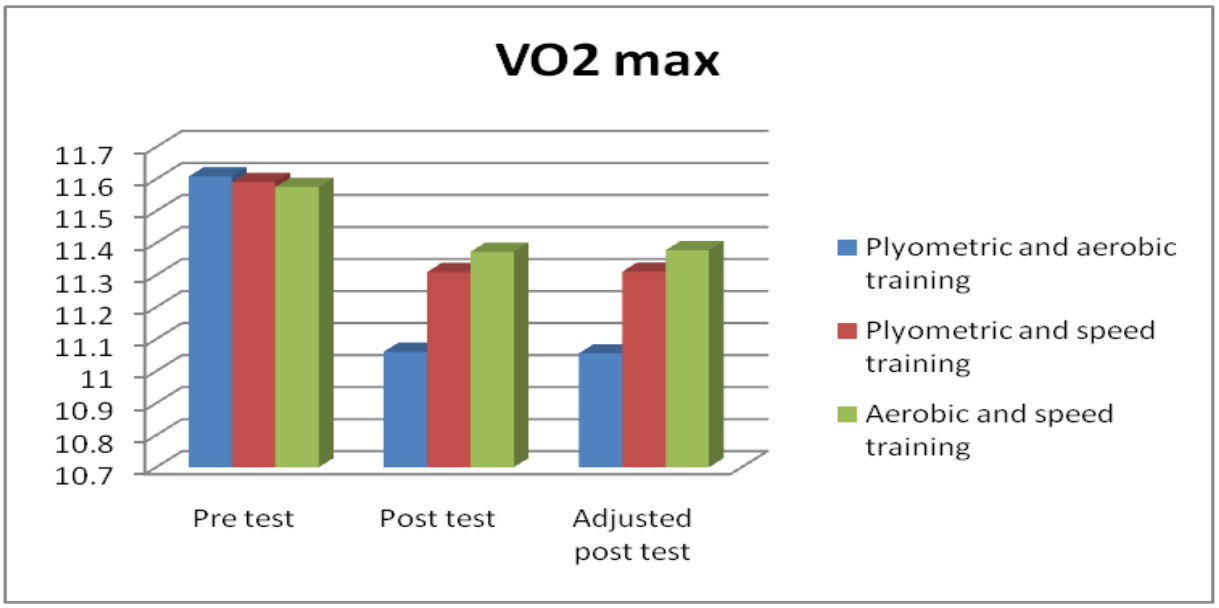

Figure - I –Bar graph displaying the average VO2 Max values for the experimental and control groups

Analysis of maximum voluntary ventilation

Table III presents an analysis of the maximal voluntary ventilation values for the aerobic and speed training group, plyometric and aerobic training, control group, and aerobic and speed training group at various test phases.

Table –III

ANACOVA ON MAXIMUM VOLUNTARY VENTILATION OF COMBINED EXERCISE GROUPS

	PATG	**PSTG**	**ASTG**	**SOV**	**SS**	**df**	**MS**	**'F'**
Pre-test mean	5.628	5.526	5.548	**B**	.086	2	.043	1.181
SD	.143	.145	.120	**W**	.789	57	.019	
Post-test mean	6.760	6.684	6.924	**B**	.451	2	.226	8.587*
SD	.188	.105	.179	**W**	1.103	57	.026	
Adjusted post-test mean	6.781	6.670	6.918	**B**	.460	2	.230	9.317*
				W	1.012	56	.025	

(The table values of 3.159 and 3.162, respectively, were needed for significance at the 0.05 level of significance with df 2 and 57 and 2 and 56.
PATG: The group for plyometric and aerobic training
PSTG: The group for plyometric and speed training
ASTG: The group for speed and aerobic training

Table-III shows that the mean scores for the maximal voluntary ventilation pre-test are 5.628, 5.526, and 5.548 for the plyometric with aerobic training, plyometric with speed training, and aerobic with speed training groups, respectively. A "F" value of 1.181 was obtained from the pre-test findings, which is less than the 3.159 "F" value required to be significant at the 0.05 level. This indicates that the patients' random assignment into three groups was successful and that there are no discernible initial differences between the groups. There were significant differences between the groups, as seen by the post-test score analysis; the resulting 'F' value of 8.587 is larger than the required 'F' value of 3.159.

This indicates that there was a substantial difference in the participants' post-test means.The pre- and post-test findings for each group are taken into consideration when computing and statistically processing the adjusted mean scores. The obtained "F" value of 9.317 is greater than the required table "F" value of 3.162. This demonstrates that there was a substantial difference in the adjusted means following twelve weeks of varied combination training on maximum voluntary breathing.

Scheffe's confidence interval test can be applied to post hoc data analysis since the results indicate a significant improvement in the data. The results are displayed in Table IV.

Table-IV

POST HOCTESTSCORESON MAXIMUM VOLUNTARY VENTILATION

PATG	PSTG	ASTG	M.D	C.I
6.781	6.670		0.111*	0.019
6.781		6.918	0.137*	
	6.670	6.918	0.248*	

**Significant at 0.05 level.*

It is noted that a significant difference is found to exist because the collected values exceed the needed value of 0.019, which is the confidence interval required to be significant at 0.05 levels. Figure X provides a bar graphic that illustrates the ordered adjusted means on maximum voluntary ventilation to help visualise the study's findings.

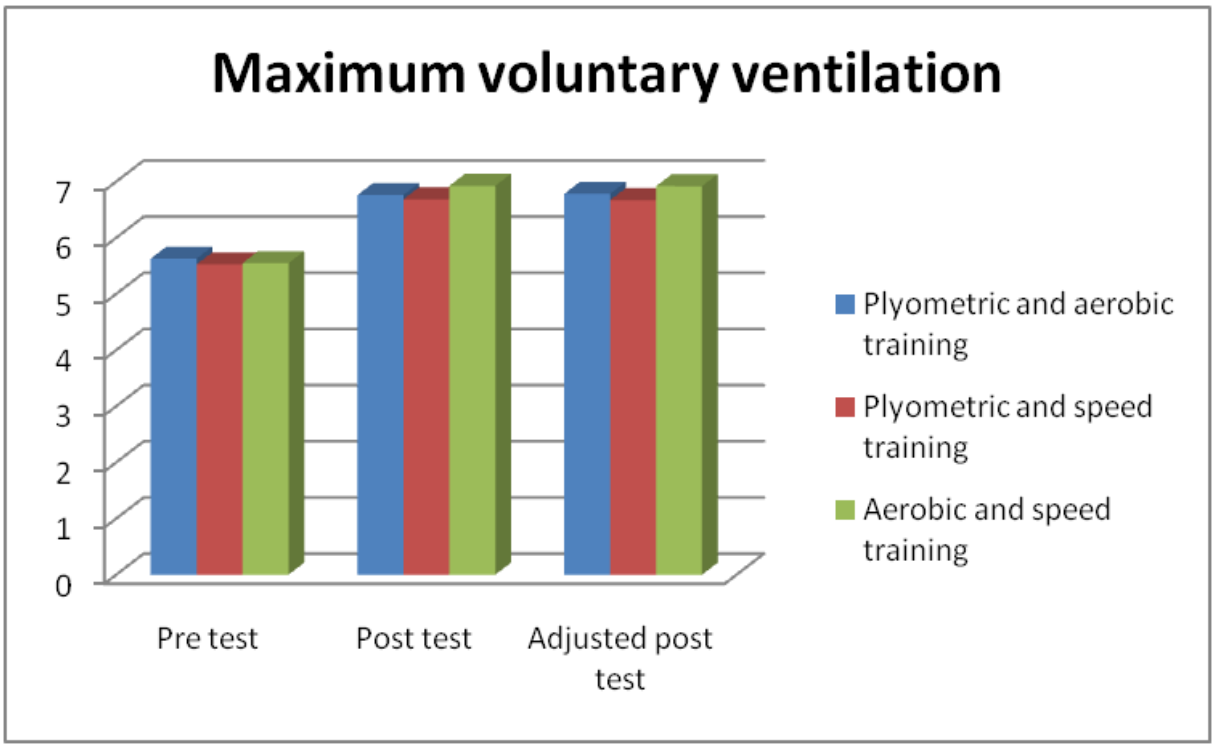

Figure - X –Bar graph displaying the average values for the experimental and control groups' maximal voluntary ventilation

Results

1. It was concluded that due to the effect of aerobic with plyometric training, plyometric with speed training and aerobic with speed training the Vo_2 max and maximum voluntary ventilation was significantly improved among female basketball players.

2. It was also concluded that plyometric withaerobic training group was better than other training groups in decreasing Vo_2 max among female basketball players.

3. It was also concluded that aerobic withspeed training group was better than other training groups in increasing maximum voluntary ventilation among female basketball players.

Conclusion

When compared to the pre-test values, the plyometric and aerobic, plyometric and speed, and aerobic and speed training groups all showed improvements in their VO2 max, and maximum voluntary breathing. Furthermore, the test results indicate a significant difference in VO2 max, maximum voluntary breathing across the experimental groups.

Recommendations

The following recommendations were drawn, from the results of the present study:

1. Combined training may be introduced in schools and colleges curriculum so that all the basketball players could be benefited.
2. It is recommended to the fitness trainers, coaches and physical educators to include combined training for making positive changes on game related fitness variables among basketball players.

3. The government and the educational authorities may come forward to include basketball game along with physical exercises in schools and colleges for the benefit of players.

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