

EFFECT OF COMPLEX TRAINING WITH GAME SPECIFIC TRAINING ON PHYSICAL AND PHYSIOLOGICAL VARIABLES AMONG HIGH SCHOOL LEVEL KHO KHO PLAYERS

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Abstract

The purpose of the study was to find out the effect of complex training with game specific training on physical and physiological variables among high school level kho kho players. To achieve this purpose, sixty school boys kho kho players were selected as subjects, their aged between 15 to 17 years, they are studying in the around Kanchipuram district schools, Tamil Nadu. The selected subjects were divided into four equal groups of fifteen subjects each, namely resistance training group, plyometric training group, complex training group and control group. The training periods of 8 weeks for all groups. The selected fitness variables were tested by using speed, agility, lower extremity and upper extremity physiological variables VO_2 MAX respectively. ANCOVA was used to find out the significant difference if any between the groups. The results of the study showed that there was a significant difference on strength endurance and agility between complex training group and control group. This was achieved by the application of the “t” ratio, which tested for significance. This study may be conducted various age group and sex also. A deep study may be conducted various games and sports.

Key words: Complex training, physical fitness, strength endurance, agility.

INTRODUCTION

Kho Kho one of the most popular traditional sports in India. Kho kho is a modified form of 'Run Chase', which in its simplest form involves chasing and touching a person. Kho-Kho in ancient times, was played on 'raths' or chariots, and was known as RATHERA, it is simple, inexpensive and enjoyable. It does, however, demand physical fitness, strength, speed and stamina, and a certain amount of agility. Dodging, feinting and bursts of controlled speed make this game quite thrilling. To catch by pursuit - to chase, rather than just run - is the capstone of Kho-Kho. The game develops qualities such as obedience, discipline, sportsmanship, and loyalty between team members. They are the chasers. The opposing team sends a player in the court as a dodger. A chaser may only run in one direction and cannot cut across the central line. If a chaser needs to catch a dodger who is on the other side of the line, he/she needs to pass the chasing job to another team-mate. This is done by touching the back of a sitter facing the other way and shouting 'Kho'. The main aim of the chasing team is to tag all dodgers of the opposing team in the shortest time possible. Play is an enjoyable experience deriving from behavior which is self-initiated in accordance with personal goals or expressive impulses; it tolerates all ranges of movement abilities; its rules are spontaneous; it has a temporal sequence but no predetermined ending; it results into Sports are as old as human society and it has achieved a universal following in the modern terms.

COMPLEX TRAINING

Complex training, also known as contrast training or post-activation potentiating training, involves the integration of strength training and plyometrics in a training system designed to improve explosive power (BRANDON R. 1999).

Strength training and plyometric training are both effective measures for increasing athletic performance independent of each other, but a true program designed for power-based athletes needs to incorporate both disciplines. A study done in 2000 in the NSCA's Journal of Strength and Conditioning Research measured three different training protocols strength training, plyometric training, and a combination of both. The group that used combined methods was the only group that showed significant increases in both strength and power **Fatouros, I. (2000)**.

RESISTANCE TRAINING

Resistance training is a form of exercise that improves muscular strength and endurance. During a resistance training workout, you move your limbs against resistance provided by your body weight, gravity, bands, weighted bars or dumbbells. Some exercise machines can also be used for resistance training.

PLYOMETRIC TRAINING

This grabbed the attention of an American track and field coach named Fred Wilt, who decided to investigate how the Soviets were training. After observing their methods, Wilt returned to the US, and in 1975 he coined the term ‘plyometric’ and immediately began implementing the training method with his athletes. Since then, sports teams across the U.S. and the world have incorporated plyometric into their training regimens to help their athletes become faster and more explosive.

SELECTION OF SUBJECTS

To achieve the purpose of the study sixty high school level kho kho players were randomly selected as the subjects for this study from the age group 15 – 17 years in Kanchipuram district. The participants were randomly assigned to experimental group I (Resistance Training along with game specific training), experimental group II (Plyometric Training along with game specific training) experimental group III (Complex Training along with game specific training), and control group. Each group consisted of 15 subjects.

RESULTS

**TABLE 1
ANALYSIS OF COVARIANCE AMONG RESISTANCE TRAINING AND GAME SPECIFIC TRAINING GROUP I, PLYOMETRIC TRAINING AND GAME SPECIFIC TRAINING GROUP II ,COMPLEX TRAINING AND GAME SPECIFIC TRAINING GROUP III AND CONTROL GROUP ON 50 MTS DASH**

	Resistance Training Group	Plyometric Training Group	Complex Training Group	Control Group	Source of Variance	Sum of square	Df	Mean square	F-value
Pre test mean	7.18	7.38	7.48	7.21	Between	0.898	3	0.299	1.159
					Within	14.454	56	0.258	
Post test mean	7.03	7.22	7.23	7.20	Between	0.38	3	0.128	0.564
					Within	12.69	56	0.226	
Adjusted post mean	7.15	7.16	7.08	7.29	Between	0.355	3	0.118	7.68*
					Within	0.846	55	0.015	

*Significant at 0.05 level of confidence

Required table value at 0.05 level of significant with df3 and 56 is 2.77 and df 3 and 55 is 2.77.

The pre test means on 50 mts dash were 7.18, 7.38, 7.48 and 7.21 respectively. The ‘F’ value observed for the pre – test on 50mts dash was 1.159. It fails to reach the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 50mts dash before the start of the respective treatments were found to be insignificant.

The post test means on 50mts dash of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 7.03,7.22,7.23 and 7.20 respectively. The ‘F’ value observed for the post test on 50mts dash was 0.564. It was lesser than the table value of 2.77 for degree of freedom 3,56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 50mts dash was not significant as the value was lesser than required table value of 2.77. Thus the results obtained proved that the training on 50mts dash produced no significant improvements among the experimental groups.

The adjusted post test means on 50mts dash of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 7.15,7.16,7.08 and 7.29 respectively. The ‘F’ value observed for the post test on 50mts dash was 7.68. It was greater than the table value of 2.77 for degree of freedom 3, 55 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 50mts dash was highly significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on explosive power produced significant improvements among the experimental groups.

FIGURE - 1

ADJUSTED MEAN VALUES OF SPEED OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II, EXPERIMENTAL GROUP III AND CONTROL GROUP

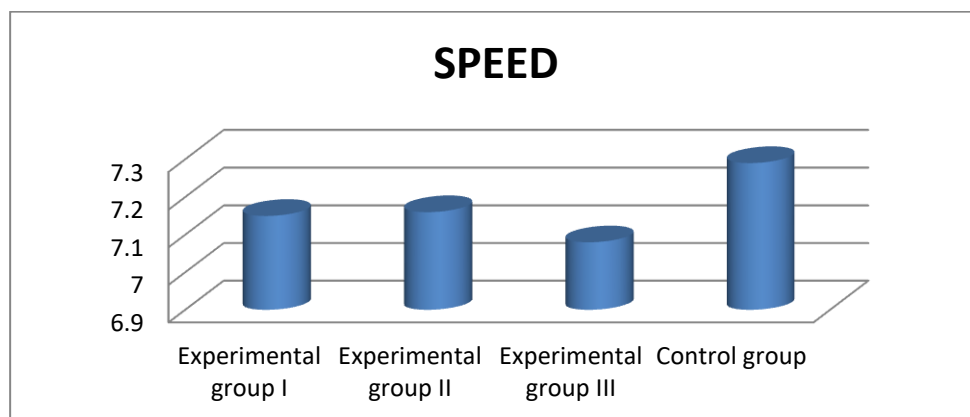


TABLE -2

ANALYSIS OF COVARIANCE AMONG RESISTANCE TRAINING AND GAME SPECIFIC TRAINING GROUP I, PLYOMETRIC TRAINING AND GAME SPECIFIC TRAINING GROUP II, COMPLEX TRAINING AND GAME SPECIFIC TRAINING GROUP III AND CONTROL GROUP ON AGILITY SHUTTLE RUN

	Resistance Training Group	Plyometric Training Group	Complex Training Group	Control Group	Source of Variance	Sum of square	Df	Mean square	F-value
Pre test mean	18.2	18.32	18.17	18.25	Between	0.191	3	0.064	0.435
					Within	8.17	56	0.146	
Post test mean	17.88	18.08	18.00	18.23	Between	0.935	3	0.312	1.687
					Within	10.34	56	0.185	
Adjusted post mean	17.92	18.00	18.06	18.21	Between	0.709	3	0.236	3.61*
					Within	3.59	55	0.065	

*Significant at 0.05 level of confidence

Required table value at 0.05 level of significant with df3 and 56 is 2.77 and df3 and 55 is 2.77.

The pre test means on Agility (Shuttle run) were 18.20, 18.32, 18.17 and 18.25 respectively. The ‘F’ value observed for the pre – test on Agility (Shuttle run) was 0.435. It fails to reach the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Agility (Shuttle run) before the start of the respective treatments were found to be insignificant.

The post test means on Agility (Shuttle run) of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 17.88, 18.08, 18.00 and 18.23 respectively. The ‘F’ value observed for the post test on Agility (Shuttle run) was 1.687. It was lesser than the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Agility (Shuttle run) was no significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on Agility produced no significant improvements among the experimental groups.

The adjusted post test means on Agility (Shuttle run) of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 17.92, 18.00, 18.06 and 18.21 respectively. The ‘F’ value observed for the post test on Agility (Shuttle run) was 3.61. It was greater than the table value of 2.77 for degree of freedom 3, 55 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Agility (Shuttle run) was significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on Agility produced significant improvements among the experimental groups.

FIGURE - 2

ADJUSTED MEAN VALUES OF AGILITY OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II, EXPERIMENTAL GROUP III AND CONTROL GROUP

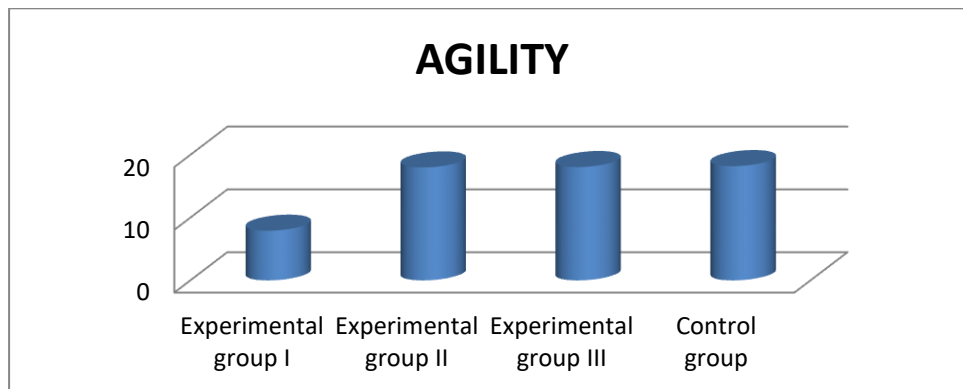


TABLE - 3

ANALYSIS OF COVARIANCE AMONG RESISTANCE TRAINING AND GAME SPECIFIC TRAINING GROUP I, PLYOMETRIC TRAINING AND GAME SPECIFIC TRAINING GROUP II, COMPLEX TRAINING AND GAME SPECIFIC TRAINING GROUP III AND CONTROL GROUP ON LOWER EXTREMITY STRENGTH

	Resistance Training Group	Plyometric Training Group	Complex Training Group	Control Group	Source of Variance	Sum of square	df	Mean square	F-value
Pre test mean	53.93	51.60	55.60	53.06	Between	125.783	3	41.92	0.737
					Within	3185.06	56	56.87	
Post test mean	59	54.33	57.46	53.26	Between	320.98	3	106.99	2
					Within	2984	56	53.28	
Adjusted post mean	58.65	56.10	55.6	53.70	Between	186.79	3	62.26	9.89
					Within	346.22	55	6.26	

*Significant at 0.05 level of confidence

Required table value at 0.05 level of significant with df3 and 56 is 2.77 and df3 and 55 is 2.77.

The pre test means on Lower Extremity Strength were 53.93,51.60,55.60 and 53.06 respectively. The ‘F’ value observed for the pre – test on Lower Extremity Strength was 0.737. It fails to reach the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Lower Extremity Strength before the start of the respective treatments were found to be insignificant.

The post test means on Lower Extremity Strength of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 59.00,54.33,57.46 and 53.26 respectively. The ‘F’ value observed for the post test on Lower Extremity Strength was 2.00. It was lesser than the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Lower Extremity Strength was no significant as the value was lower than required table value of 2.77. Thus the results obtained proved that the training on Lower Extremity Strength produced no significant improvements among the experimental groups.

The adjusted post test means on Lower Extremity Strength of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 58.65,56.10, 55.60 and 53.70 respectively. The ‘F’ value observed for the post test on Lower Extremity Strength was 9.89. It was greater than the table value of 2.77 for degree of freedom 3, 55 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Lower Extremity Strength was highly significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on Lower Extremity Strength produced significant improvements among the experimental groups.

FIGURE - 3

ADJUSTED MEAN VALUES OF LOWER EXTREMITY STRENGTH OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II, EXPERIMENTAL GROUP III AND CONTROL GROUP

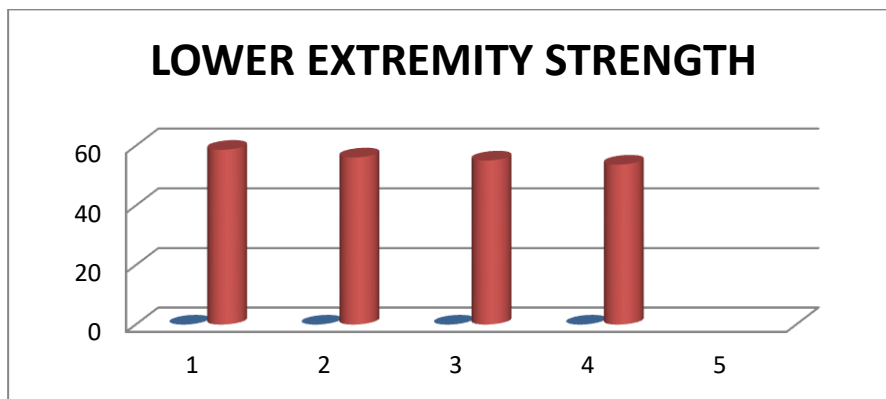


TABLE - 4

ANALYSIS OF COVARIANCE AMONG RESISTANCE TRAINING AND GAME SPECIFIC TRAINING GROUP I, PLYOMETRIC TRAINING AND GAME SPECIFIC TRAINING GROUP II ,COMPLEX TRAINING AND GAME SPECIFIC TRAINING GROUP III AND CONTROL GROUP ON UPPER EXTREMITY STRENGTH

	Resistance Training Group	Plyometric Training Group	Complex Training Group	Control Group	Source of Variance	Sum of square	Df	Mean square	F-value
Pretest mean	39.73	36	42.93	42.66	Between	470.133	3	156.711	4.650
					Within	1887.200	56	33.700	
Post test mean	44.2	39.6	51.8	44.93	Between	1139.6	3	379.867	12.105
					Within	1757.33	56	31.831	
Adjusted post mean	44.535	42.021	50.34	43.63	Between	537.917	3	179.305	8.441
					Within	1168.377	55	21.243	

*Significant at 0.05 level of confidence

Required table value at 0.05 level of significant with df3 and 56 is 2.77 and df3 and 55 is 2.77.

The pre test means on Upper Extremity Strength were 39.73, 36.00, 42.93 and 42.66 respectively. The ‘F’ value observed for the pre – test on Upper Extremity Strength was 4.650. It highly reach the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence.

Based on the results it was confirmed that the mean differences among the groups of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Upper Extremity Strength before the start of the respective treatments were found to be significant.

The post test means on Upper Extremity Strength of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 44.20, 39.60, 51.80 and 44.93 respectively. The ‘F’ value observed for the post test on Upper Extremity Strength was 12.105. It was greater than the table value of 2.77 for degree of freedom 3, 56at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Upper Extremity Strength was highly significant as the value was higher than required table value of 3.21. Thus the results obtained proved that the training on Upper Extremity Strength produced significant improvements among the experimental groups.

The adjusted post test means on Upper Extremity Strength of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 44.535, 42.021, 53.34 and 43.63 respectively. The ‘F’ value observed for the post test on Upper Extremity Strength was 8.441. It was greater than the table value of 2.77 for degree of freedom 3, 55at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on Upper Extremity Strength was highly significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on Upper Extremity Strength produced significant improvements among the experimental groups.

FIGURE - 4

ADJUSTED MEAN VALUES OF UPPER EXTREMITY STRENGTH OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II, EXPERIMENTAL GROUP III AND CONTROL GROUP

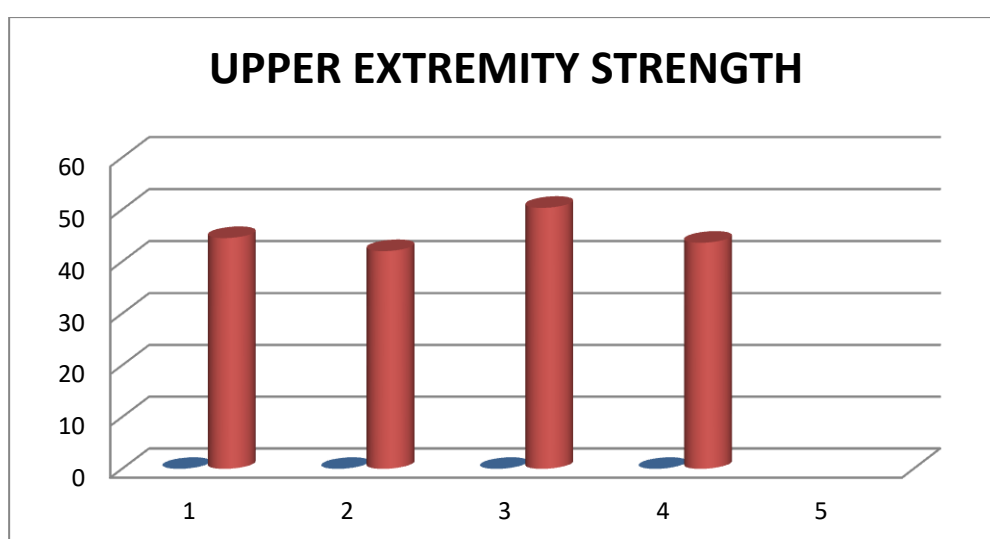


TABLE - 5
ANALYSIS OF COVARIANCE AMONG
RESISTANCE TRAINING AND GAME SPECIFIC TRAINING GROUP I, PLYOMETRIC
TRAINING AND GAME SPECIFIC TRAINING GROUP II ,COMPLEX TRAINING AND
GAME SPECIFIC TRAINING GROUP III AND CONTROL GROUP ON VO₂ MAX (3 MIN
QUEEN TEST)

	Resistance Training Group	Plyometric Training Group	Complex Training Group	Control Group	Source of Variance	Sum of square	Df	Mean square	F-value
Pretest mean	1.33	1.34	1.29	1.32	Between	216.733	3	72.244	1.016
					Within	3980.267	56	71.07	
Posttest mean	1.26	1.30	1.25	1.32	Between	444.8	3	148.267	2.102
					Within	3950.933	56	70.552	
Adjusted post mean	1.259	1.289	1.284	1.325	Between	327.227	3	109.076	7.57
					Within	792.532	55	14.41	

*Significant at 0.05 level of confidence

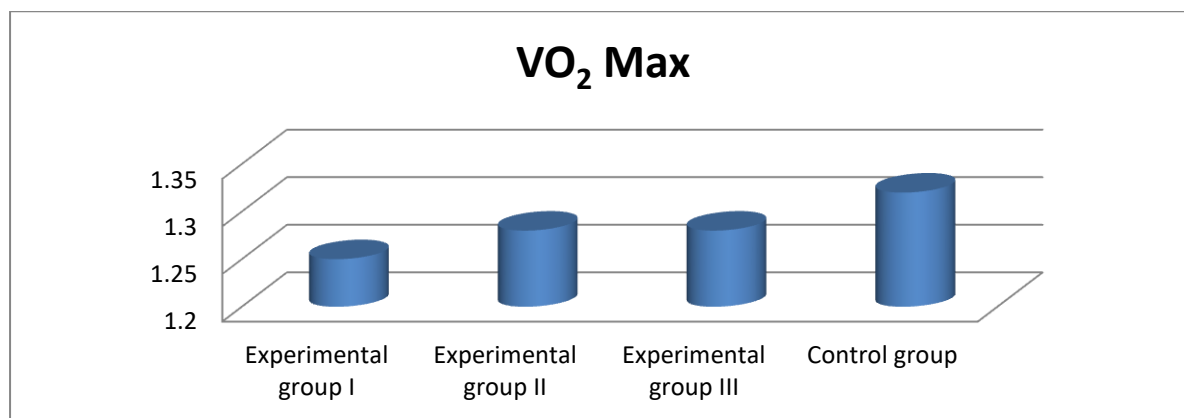
Required table value at 0.05 level of significant with df3 and 56 is 2.77 and df3 and 55 is 2.77.

The pre test means on 3 Min Queen Test were 1.33,1.34,1.29 and 1.32 respectively. The ‘F’ value observed for the pre – test on 3 Min Queen Test was 1.016. It fails to reach the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Based on the results it was confirmed that the mean differences among the groups of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 3 Min Queen Test before the start of the respective treatments were found to be insignificant.

The post test means on 3 Min Queen Test of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 1.26, 1.30, 1.25 and 1.32 respectively. The ‘F’ value observed for the post test on 3 Min Queen Test was 2.102. It was lower than the table value of 2.77 for degree of freedom 3, 56 at 0.05 level of confidence. Since the observed F- value on post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 3 Min Queen Test was no significant as the value was lower than required table value of 2.77. Thus the results obtained proved that the training on 3 Min Queen Test produced no significant improvements among the experimental groups.

The adjusted post test means on 3 Min Queen Test of resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group were 1.259,1.289,1.284 and 1.325 respectively. The ‘F’ value observed for the post test on 3 Min Queen Test was 7.570. It was greater than the table value of 2.77 for degree of freedom 3, 55 at 0.05 level of confidence. Since the observed F- value on adjusted post test means among the groups namely resistance training and game specific training group I, plyometric training and game specific training group II, complex training and game specific training group III and control group on 3 Min Queen Test was highly significant as the value was higher than required table value of 2.77. Thus the results obtained proved that the training on 3 Min Queen Test produced significant improvements among the experimental groups.

FIGURE - 18
ADJUSTED MEAN VALUES OF VO₂ Max OF EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II, EXPERIMENTAL GROUP III AND CONTROL GROUP



Conclusion

It was concluded that complex training with game specific training programme are statistically significantly improved the selected fitness variables: speed, agility, lower extremity and upper extremity physiological variables VO₂ MAX as compared to control group

Based on the results of the study, it was concluded that the complex training program has resulted in significant increase in selected physical fitness variables and physiological variables such as speed, agility, lower extremity and upper extremity physiological variables VO₂ MAX

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