International Journal of Computational Research and Development (IJCRD)
Impact Factor: 5.015, ISSN (Online): 2456 - 3137
(www.dvpublication.com) Volume 2, Issue 2, 2017

EFFECTS OF YOGIC TRAINING AEROBIC TRAINING AND DETRAINING ON FLEXIBILITY OF COLLEGE MALE STUDENTS

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Cite This Article: Dr. D. Sakthignanavel, "Effects of Yogic Training Aerobic Training and Detraining on Flexibility of College Male Students", International Journal of Computational Research and Development, Volume 2, Issue 2, Page Number 213-219, 2017.

Abstract:

The purpose of the study is to find out the effects of yogic training, aerobic training and detraining on flexibility of college male students. For this study 45 (forty five) healthy untrained subjects were selected on random basis. The students were selected from Dr. R. K. Shanmugam College of Arts & Science, Indili, Kallakurichi T.K Villupuram (Dt) in Tamil Nadu, India. The subject's age were ranged between 18 to 21 years. The selected subjects were divided into three groups, each group consist of fifteen (15) subjects. Group I underwent yogic training, group II underwent aerobic training and group III acted as a control group. The selected Asanas and Pranayama were given to yogic training group. The selected aerobic dance steps assigned for aerobic training group. The duration of the training period was stipulated to 12 weeks for 5 days per week (45 minutes). Control group was kept under control without any training. The flexibility was measured by using sit and reach box test. Prior to and after the end of practice period all the subjects were tested on flexibility. The results of pre, mid, post, first, second, and third cessation test were compared statistically analyzed by using two-way factorial analysis of variance with last factor repeated measures. The 'F' ratio value was statistically analyzed and tested for significant difference at 0.05 level of confidence.

Key Words: Asanas, Pranayama, Aerobic Dance, Sit and Reach Box Test & Cessation Period

Introduction:

The best way to keep physical activity and exercises a permanent part of one's life is to make it fun and enjoyable. If people are given different options of what they can do and have easy access to those options, they are more likely to participate in physical activity and exercises. This allows people to have a positive attitude towards physical fitness. It's also helpful if people are knowledgeable about the rewards of physical activity and exercises. The challenge facing the fitness professional is how to best manipulate, progressively overload and inter mix intensity, duration and frequency with a variety of modes of activity to help the clients reach their goals. Fortunately a number of different training programs are available to the fitness professional including yogic training and aerobic training. Detraining refers to the cessation of regular physical training, the effect of stop training are quite minor compared with those from immobilization. In general, the greater the gains during training, the greater the decrease during detraining simply because, the well trained person has more to lose than the untrained person. Detraining causes muscle atrophy, which is accompanied by loss in muscular endurance. However muscles require only minimal stimulation to retain these qualities during periods of reduced activity. (Tran. et. al, 2001).

Flexibility:

Flexibility is defined as the ability to move muscles and joints through their full range of motion. Most people will, at one time or another, suffer back problems. Approximately 80% of these low back problems are due to weak and or tense muscles. Many daily activities place a great deal of strain on these muscles. Physical inactivity can also contribute to the risk factors that promote back problems. This means that these problems can be deducted or limited through improved physical fitness. Physical inactivity contributes to a loss of flexibility for the lower back and the hips flexors, sitting for long periods time promotes a sedentary existence which will result in a loss of flexibility. Individuals with a sedentary life style who perform occasional physical labor are at high risk for developing back problems. Physicians prescribe specific trunk and thigh flexibility exercises, stretching for their patients with lower back problems, supporting the value of stretching exercises to prevent low back problems.

Methodology:

The purpose of the study is to find out the effects of yogic training aerobic training and detraining on flexibility of college male students. Forty five healthy, untrained students were selected from Dr. R. K. Shanmugam College of Arts & Science, Indili, Kallakurichi T. K, Villupuram Dt, Tamil Nadu. The subject's age ranged from 18 to 21 years. The selected subjects were divided into three groups with fifteen subjects in each group selected randomly, with two experimental groups and one control group. Experimental Group I underwent the yogic training in selected asanas and pranayama. Experimental Group II underwent the selected aerobic dance with music's programme. The training periods of experimental groups were twelve weeks, five days per week with duration of 45 minutes. Control group did not undergo any training programme rather than their routine work. The flexibility was measured by using Sit and reach box tests.(Barry& Nelson,1979). The

data were collected on flexibility for all the three groups before the experimental period (pre test), after six weeks of training (mid test) and after twelve weeks of the training period (post test) respectively. After training period data collection the detraining period data were collected on flexibility once in ten days for three times. During this period the subjects were not allowed to participate in any training programme.

In order to test the effect of training, the collected data from all the three groups before, during and after experimentation on flexibility was statistically analyzed by using two-way (3x3) factorial analysis of variance with last factor repeated measures.

The data collected from the three groups at post experimentation and detraining (three cessation) on flexibility was statistically analyzed by using two way (3x4) factorial ANOVA with last factor repeated measures.

Whenever, two-way factorial ANOVA with last factor repeated the obtained 'F' ratio interaction values are found to be significant, the simple effect test is used. When the obtained 'F' ratio value in the simple effect is found significant, the Scheffe's test is applied as post hoc test to determine which of the paired mean had significant differences. In all the cases the level of confidence is fixed at 0.05 to test the significance.

Table 1: The Mean and Standard Deviation Values on Flexibility of Pretest, Mid Test, Post Test, First Cessation, Second Cessation And Third Cessation Period Scores of Yogic, Aerobic and Control Groups

Groups		Pre Test	Mid Test	Post Test	First Cessation	Second Cessation	Third Cessation
Yogic Group	Mean	32.13	37.20	40.40	37.60	35.40	32.80
	S.D	2.031	2.042	2.063	1.993	1.920	2.178
Aerobic Group	Mean	32.07	34.73	37.07	35.87	34.80	33.07
	S.D	6.006	5.970	5.612	5.579	5.570	5.338
Control Group	Mean	31.80	31.73	31.60	31.53	31.47	31.20
	S.D	7.073	6.475	6.379	6.413	6.357	6.178

The table 1 showed that the pre test mean values on flexibility for yogic, aerobic and control group are 32.13, 32.07 and 31.80 respectively. The mid tests means values on flexibility for yogic, aerobic and control group are 37.20, 34.73 and 31.73 respectively. The post test mean values on flexibility for yogic, aerobic and control group are 40.40, 37.07 and 31.60 respectively. The first cessation mean values on flexibility for yogic, aerobic and control group are 37.60, 35.87 and 31.53 respectively. The second cessation mean values on flexibility for yogic, aerobic and control group are 35.40, 34.80 and 31.47 respectively. The third cessation mean values on flexibility for yogic, aerobic and control group are 32.80, 33.07 and 31.20 respectively.

The data on flexibility during training period have been analyzed by two-way factorial ANOVA (3x3) with repeated measures on last factor and the results are presented in table 2

Table 3: Two Way Analysis of Variance with Last Factor Repeated Measures on Flexibility of Control and Experimental Groups at Three Different Testing Periods

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" Ratio
Rows (Groups)	539.748	2	269.874	3.287*
Error	3448.800	42	82.114	
Columns (Testing Periods)	431.126	2	215.563	631.650
Interaction (Groups X Testing Periods)	278.207	4	69.552	203.803*
Error	28.667	84	0.341	

* Significant at 0.05 level

Table values required for significance at 0.05 level with df 2, 42; 2, 84 and 4, 84 are 3.222, 3.106 and 2.482 respectively.

From the table.3 it is clear that the obtained 'F' ratio for groups is 3.287, which is greater than the table value of 3.222 with df 2 and 42 required for significance at 0.05 level of confidence. The result of the study indicates that, significant differences exist among the experimental and control groups irrespective of different stages of testing on flexibility.

The obtained 'F' ratio for different stages of testing period is 631.650, which is greater than the table value of 3.106 with df 2 and 84 required for significance at 0.05 level of confidence. The result of the study indicates that flexibility differs significantly among different stages of testing irrespective of groups.

The obtained 'F' ratio value of interaction (groups x testing periods) is 203.803, which is greater than the table value of 2.482 with df 4 and 84 required for significance at 0.05 level of confidence. The result of the study shows that significant difference exists among groups at each test and also significant difference between tests for each group on flexibility.

The results of the study indicate that significant differences exist in the interaction effect (between groups and tests) on flexibility. Since the interaction effect is significant, the simple effect test has been applied as follow up test and it is presented in table .4

Table 4: The Simple Effect Scores of Groups (Rows) at Three Different Stages of Testing (Columns) on Flexibility

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Groups and Pre test	0.467	2	0.234	0.685
Groups and Mid test	112.422	2	56.211	164.842*
Groups and Post test	296.089	2	148.045	434.148*
Tests and Control Group	0.016	2	0.008	0.023
Tests and Yogic Group	260.622	2	130.311	382.143*
Tests and Aerobic Group	93.889	2	46.945	137.667*
Error	28.667	84	0.341	

* Significant at 0.05 level of confidence

Table values required for significance at 0.05 level with df 2 and 84, is 3.106.

Table 4 shows that the obtained 'F' ratio values for groups at mid and post test are 164.842 and 434.148 respectively, which are higher than the table value of 3.106 with df 2 and 84 required for significance at 0.05 level of confidence. The result of the study indicates that significant difference on flexibility exists between groups at mid and post test.

Further, it denotes that the obtained 'F' ratio values for tests of yogic and aerobic group are 382.143 and 137.667 respectively, which are higher than the table value of 3.106 with df 2 and 84 required for significance at 0.05 level of confidence. The result of the study indicates that there is significant increase on flexibility among the tests of yogic and aerobic group.

Whenever, the obtained 'F' ratio value is found to be significant, the Scheffe's post hoc test is applied to find out the paired mean differences, and it is presented in tables 5 and 6.

Table 5: Scheffe's Test for the Differences between the Paired Means of Different Groups at Each Testing Periods during Training on Flexibility

Testing Periods	Yogic Group	Aerobic Group	Control Group	Mean Difference
Pre Test	32.13	-	31.80	0.33
	-	32.07	31.80	0.27
	32.13	32.07	-	0.06
Mid Test	37.20	-	31.73	5.47*
	-	34.73	31.73	3.00*
	37.20	34.73	-	2.47*
Post Test	40.40	-	31.60	8.80*
	-	37.06	31.60	5.46*
	40.40	37.06	-	3.34*

* Significant at 0.05 level.

The confidence interval required for significance at 0.05 level is 0.539.

From the above table it has been observed that the mean difference values on flexibility during the mid test between the yogic and control group are 5.47, aerobic and control group are 3.00 and yogic and aerobic group are 2.47. The post test between the yogic and control group are 8.80, aerobic and control group are 5.46 and yogic and aerobic group are 3.34. Since the calculated value for both the experimental groups is higher than the required value 0.539 at 0.05 level of confidence interval. Therefore there is significant difference among the three groups which denotes that both the experimental groups are significantly better on flexibility than the control group. Finally the result reveals that the yogic group is superior to aerobic group and the aerobic group is better than the control group. Hence the hypothesis has been rejected.

Table 6: Scheffe's Test for the Differences between the Paired Means of Each Group at Different Testing Periods during Training on Flexibility

	Pre test	Mid test	Post test	Mean Difference
Yogic Group	32.13	37.20	-	5.07*
	32.13	-	40.40	8.27*
	-	37.20	40.40	3.20*
Aerobic Group	32.07	34.73	-	2.66*
	32.07	-	37.06	4.99*
	-	34.73	37.06	2.33*
Control Group	31.80	31.73	-	0.07
	31.80	-	31.60	0.20
	-	31.73	31.60	0.13

* Significant at 0.05 level.

The confidence interval required for significance at 0.05 level is 0.539.

Table 6 reveals that the mean difference values on flexibility of the yogic group during the pre test to mid test are 5.07, pre test to post test are 8.27 and mid test to post test are 3.20. The mean difference of aerobic group pre test to mid test is 2.66, pre test to post test are 4.99 and mid test to post test are 2.33. Since the calculated value is higher than the required value 0.539 at 0.05 level of confidence interval. Therefore there is significant difference during the pre test to mid test, pre test to post test and mid test to post test period. The result reveals that the flexibility is found to be more effective during the pre test to mid test when compared to the mid to post test period. Hence the hypothesis has been accepted.

The data on flexibility during detraining(cessation) period have been analyzed by two-way factorial ANOVA (3 x 4) with repeated measures on last factor and the results are presented in table 7

Table 7: Two Way Analysis of Variance with Last Factor Repeated Measures on Flexibility of Control and Experimental Groups at Four Different Testing Periods

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Rows (Groups)	837.900	2	418.950	4.230*
Error	4159.800	42	99.043	
Columns (Testing Periods)	388.133	3	129.378	564.721*
Interaction (Groups X Testing Periods)	212.500	6	35.417	154.590*
Error	28.867	126	0.229	

* Significant at 0.05 level

Table values required for significance at 0.05 level with df 2, 42; 3, 126 and 6, 126 are 3.22, 2.68 and 2.17 respectively

From the table 7 the obtained 'F' ratio for groups is 4.230, which is greater than the table value of 3.222 with df 2 and 42 required for significance at 0.05 level of confidence. The result of the study indicates that, significant differences exist among the experimental and control groups irrespective of different stages of testing on flexibility.

The obtained 'F' ratio for different stages of testing period is 564.721, which is greater than the table value of 2.68 with df 3 and 126 required for significance at 0.05 level of confidence. The result of the study indicates that flexibility differs significantly among different stages of testing irrespective of groups.

The obtained 'F' ratio value of interaction (groups x testing periods) is 154.590, which is greater than the table value of 2.17 with df 6 and 126 required for significance at 0.05 level of confidence. The result of the study shows that significant difference exists among groups at each test and also significant difference between tests for each group on flexibility.

The results of the study indicate that significant differences exist in the interaction effect (between groups and tests) on flexibility. Since the interaction effect is significant, the simple effect test has been applied as follow up test and it is presented in table 8.

Table 9: The Simple Effect Scores of Groups (Rows) at Four Different stages of Testing (Columns) on Flexibility

Source of Variance	Sum of Squares	DF	Mean Squares	Obtained "F" ratio
Groups and Post test	296.09	2	148.05	646.485*
Groups and First Cessation	146.47	2	73.24	319.804*
Groups and Second Cessation	67.36	2	33.68	147.074*
Groups and Third Cessation	15.29	2	7.645	33.384*
Tests and Control Group	0.461	3	0.154	0.671
Tests and Yoga Group	156.550	3	52.183	227.875*
Tests and Aerobic Group	43.200	3	14.400	62.882*
Error	28.867	126	0.229	

* Significant at .05 level of confidence

Table values required for significance at 0.05 level with df 2 and 126, & 3 and 126 are 3.069 and 2.679 respectively.

Table 9 shows that the obtained 'F' ratio values for groups at post test, first, second and third cessation are 646.485, 319.804, 147.074 and 33.384 respectively, which are higher than the table value of 3.069 with df 2 and 126 required for significance at 0.05 level of confidence. The result of the study indicates that significant difference on flexibility exists between groups at post test, first, second and third cessation.

Further, it denotes that the obtained 'F' ratio values for tests of yogic and aerobic group are 227.875 and 62.882 respectively, which are higher than the table value of 2.679 with df 3 and 126 required for significance at 0.05 level of confidence. The result of the study indicates that there is significant decrease on flexibility among the tests of yogic and aerobic group.

Whenever, the obtained 'F' ratio value is found to be significant, the Scheffe's post hoc test is applied to find out the paired mean differences, and it is presented in tables 10 and 11

Table 10: Scheffe's Test for the Differences between the Paired Means of Different Groups at Each Testing Periods during Training Cessation on Flexibility

Testing Periods	Yogic Group	Aerobic Group	Control Group	Mean Difference
Post Test	40.40	-	31.60	8.80*
	-	37.06	31.60	5.46*
	40.40	37.06	-	3.34*
First Cessation	37.60	-	31.53	6.07*
	-	35.87	31.53	4.34*
	37.60	35.87	-	1.73*
Second Cessation	35.40	-	31.47	3.93*
	-	34.80	31.47	3.33*
	35.40	34.80	-	0.60*
Third Cessation	32.80	-	31.20	1.60*
	-	33.07	31.20	1.87*
	32.80	33.07	-	0.27

* Significant at 0.05 level.

The confidence interval required for significance at 0.05 level is 0.442.

Table 10 reveals that the mean difference on flexibility is found to be significant for the three groups during the post test, first, second and third cessation. In order to find out which of the following groups has decreased significantly on flexibility, the Scheffe's test for the difference between the paired means has been calculated and given in the below table 11.

Table 11: Scheffe's Test for the Differences between the Paired Means of Each Group at Different Testing Periods during Training Cessation on Flexibility

	Post Test	First Cessation	Second Cessation	Third Cessation	Mean Difference
Yogic Group	40.40	37.60	-	-	2.80*
	40.40	-	35.40	-	5.00*
	40.40	-	-	32.80	7.60*
	-	37.60	35.40	-	2.20*
	-	37.60	-	32.80	4.80*
	-	-	35.40	32.80	2.60*
Aerobic Group	37.06	35.87	-	-	1.19*
	37.06	-	34.80	-	2.26*
	37.06	-	-	33.07	3.99*
	-	35.87	34.80	-	1.07*
	-	35.87	-	33.07	2.80*
	-	-	34.80	33.07	1.73*
Control Group	31.60	31.53	-	-	0.07
	31.60	-	31.47	-	0.13
	31.60	-	-	31.20	0.40
	-	31.53	31.47	-	0.06
	-	31.53	-	31.20	0.30
	-	-	31.47	31.20	0.27

* Significant at 0.05 level.

The confidence interval required for significance at 0.05 level is 0.442.

It is observed from the table 11 that the mean difference of the yogic group during the post test to first, second and third cessation are 2.80, 5.00 and 7.60 respectively. The mean differences between first to second, third cessation and second to third cessation are 2.20, 4.80 and 2.60 respectively for the yogic group. The aerobic group during the post test to first, second and third cessation are 1.19, 2.26 and 3.99 respectively. The mean differences between first to second, third cessation and second to third cessation are 1.07, 2.80 and 1.73 respectively for the aerobic group. Since the above mentioned mean difference value of the yogic and aerobic group are higher than the confidence interval value 0.442 at 0.05 level of significance, it is inferred that there is gradual decrease of flexibility among the cessation period of both the experimental groups.

Finally the result reveals that the mean differences of yogic group is higher than the aerobic group so it is concluded that the yogic group has gradually decreased on flexibility than the aerobic group during the different cessation. This decrease on flexibility is graphically represented in figure 1 and 2

Figure 1: The Pretest Mid Test and Post Test Mean Values of Yogic Aerobic and Control Groups on Flexibility

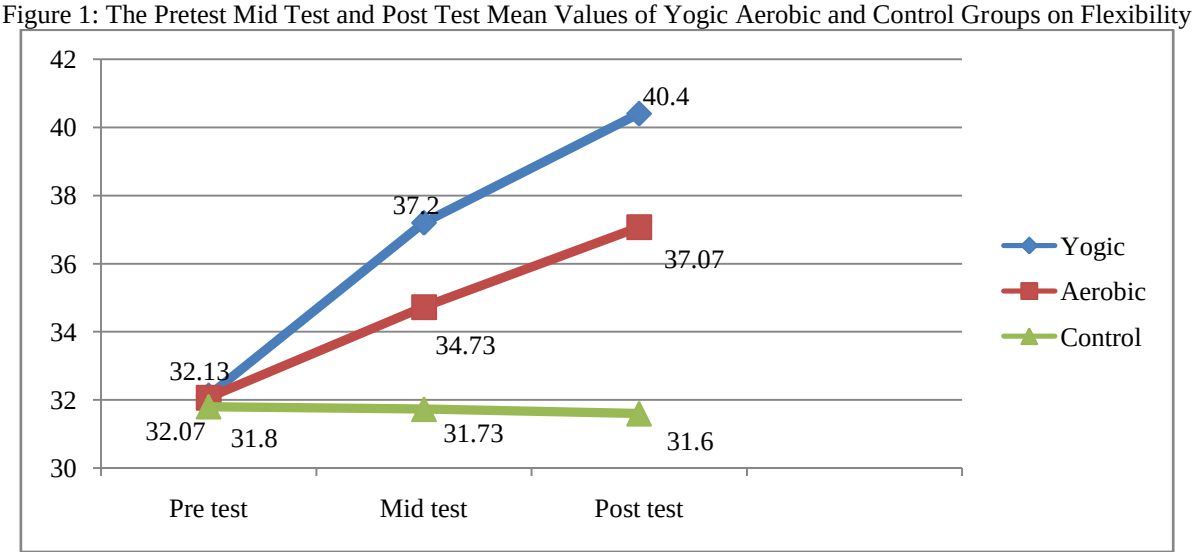
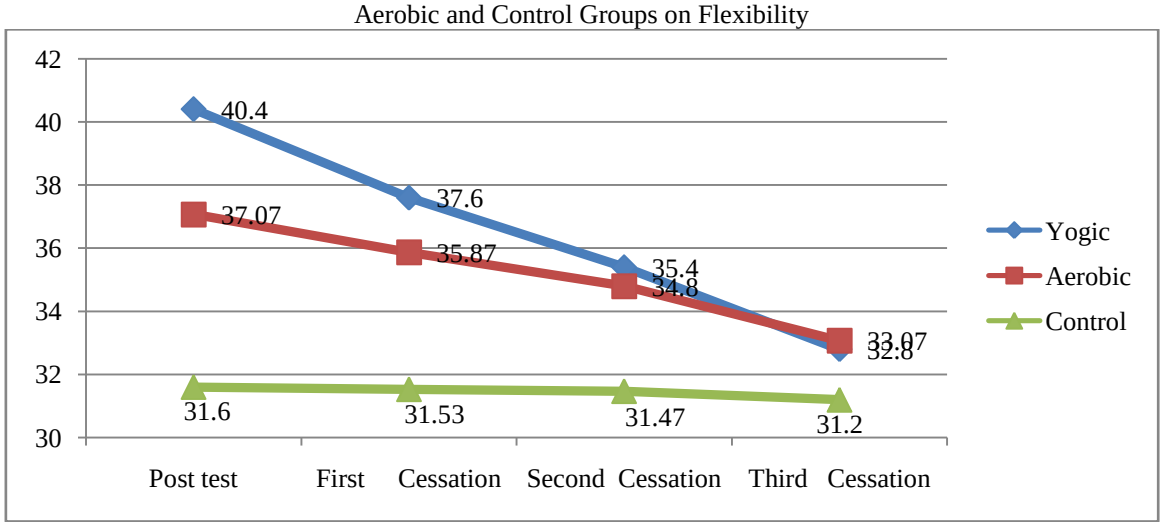


Figure 2: The Post Test, First Cessation, Second Cessation and Third Cessation Period Mean Values of Yogic Aerobic and Control Groups on Flexibility



Discussion on Findings:

The results of the present study indicates that both the experimental groups have significantly increased in the flexibility when compared to the control group during training period. The result of the study is in consonance with Madanmohan et.al, (2008), Chen et.al, (2009) Tran et.al, (2001) and Agro (1988).

Further, the improvement of flexibility is significantly higher the yogic group when compared to the aerobic group during training periods. The result of the study is in consonance with Ravikumar (2010) and Punithavathi (2010). But during the training cessation periods flexibility is both the experimental groups have significantly reduced in a gradual manner for first, second and third cessation period. Finally yogic group is seen that the flexibility has significantly reduced when compared to the aerobic group during training cessation periods.

Since the investigators have not come across similar studies on yogic training and aerobic training followed by detraining period above the variables, it was unable for him to mention relevant studies. But some scholars have conducted studies on circuit training followed by detraining, plyometric training followed by detraining and weight training followed by detraining on some physical and physiological variables.

Conclusions:

It was concluded from the result of the study that flexibility can be improved significantly due to twelve of yogic training and aerobic training during mid and post test period. The yogic training group is better improved compare than the aerobic training group, during the testing periods namely pre to mid and mid to post test. The pre to mid test results reveal to be better than mid to post test period. The effect on flexibility for both the training groups has gradually decreased up to third cessation period during the detraining period, the effect of flexibility of yogic training group has decreased faster when compare to the aerobic training group.

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