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The Impact of Yoga and Pranayama on Health-Related Physical Fitness

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***Abstract:** 90 (Ninety) college male students were taken as subjects for the study. The experimental treatments were given to two groups (yoga and pranayama) and one group served as the control. The analysis of data revealed that the two experimental groups administered with yogic asanas and pranayama showed significant gains in performance of many health related fitness components after administration of pranayamas and asanas for duration of 6 weeks.*
***Keywords:** Yogic Asanas, Pranayama and Health related Physical Fitness*

I. INTRODUCTION

Yoga was selected as the focus of this research based on the claims that have been made regarding yoga's benefits for college students and its unique coupling of pranayama and physical activity. In addition to the apparent positive influence that yoga has on physical health and many recent studies have investigated its influence on cognitive function. The current study is aimed to examine the immediate effects of short-term instructional yoga and pranayama practices on selective health related fitness college students. The purpose of this study was to know the effect of regular participation in yoga and pranayama programme on health related physical fitness. Health related physical fitness is the minimum level of fitness that is required for everyone to perform daily tasks efficiently and effectively and to resist disease. Health-related components of physical fitness include body-composition, cardiovascular fitness, flexibility, muscular endurance, and strength.

II. METHODOLOGY

Total of 90 (Ninety) college male students were taken as subjects for the study. Their age ranged from 20 to 25 years. The average age of the subjects was 22.3 year. Random group design was adopted for the study and equal numbers of subjects were assigned at random to three groups of thirty subjects each. The experimental treatments were given to two groups and one group served as the control. All the groups underwent the pre-test on all the health related physical fitness components. Then yoga group and pranayama group underwent the scheduled yoga and pranayama programmes, respectively for a period of 6 weeks. The group C served as control and was not allowed to undergo the yoga and pranayama programme at all. After the end of six weeks of yoga and pranayama programmes of concerned groups, the three groups including control group underwent post-test on all the variables on which pre-test was made. Yoga group was administered with the scheduled selected yogic asanas while Pranayama group was administered with the scheduled pranayamas for duration of 6 weeks and five days in a week in the morning from 6 am to 7 am.

III. FINDINGS

For each of the chosen variables, the results pertaining to significant difference, if any, between the pre-test and post-test means for the three groups after six weeks of yoga and pranayama programmes, were submitted to analysis of variance and covariance and are stated below.

Table – 1: Significance of Difference between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Bent Knee Curl Up

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' ratio
Yoga.	17.367	22.867	5.500	0.406	13.542*
Pranayama	17.533	22.767	5.233	0.266	19.705*
Control	17.567	17.867	0.300	0.215	1.394

* Significant at 0.05 level of confidence,'t' $_{0.05}$ (29) = 2.045

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Table 1 clearly revealed that the yoga and pranayama groups improved significantly yielding 't' value of 13.542 and 19.705, respectively, where as the control group did not show any significant improvement in bent knee curl up performance of subjects indicating 't' values of 1.394.

Table – 2: Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in Bent Knee Curl Up.

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	17.367	17.533	17.567	B 0.689 W 1229.800	2 87	0.344 14.136	0.240
Post-test means	22.867	22.767	17.867	B 490.200 W 970.300	2 87	245.100 11.153	21.976*
Adjusted post-test means	22.964	22.731	17.805	B 509.269 W 193.392	2 86	254.634 2.249	113.234*

* Significant at 0.05 level of confidence, N = 90, B = Between group variance,

W = Within group variance

The analysis of covariance for bent knee curl up showed that the resultant 'F' ratio of 0.240 was not significant in case of pre-test means. The post test means yielded 'F' ratio of 21.976, which was found to be significant. The adjusted final means yielded the 'F' ratio of 113.234 and was found significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 3: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Bent Knee Curl Up

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
22.964	22.731		0.233	0.274
22.964		17.805	5.159*	0.274
	22.731	17.805	4.926*	0.274

* Significance at 0.05 level

It was clear from the Table 3 that the mean differences with respect to performance in bent knee curl up of both the yoga group and pranayama group were found to be significantly greater than that of control group. No significant difference between yoga and pranayama groups was found with respect to bent knee curl up performance.

Table – 4: Significance of Difference between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Sit Up

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	24.633	28.067	3.433	0.317	10.834*
Pranayama	24.767	28.567	3.800	0.416	9.127*
Control	24.633	24.367	0.266	0.258	1.034

* Significant at 0.05 level of confidence, 't' $_{0.05}$ (29) = 2.045

Table 4 revealed that both the experimental groups improved significantly yielding 't' value 10.834 and 9.127, where as control group did not show any significant improvement in sit up performance of subjects indicating 't' values of 1.034.

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Table – 5: Analysis of Variance and Covariance of the Means of two Experimental Groups and the Control Group in Sit Up

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	24.633	24.767	24.633	B 0.356 W 1753.3	2 87	0.178 20.153	0.009
Post-test means	28.067	28.567	24.367	B 315.800 W 996.200	2 87	157.900 11.451	13.790*
Adjusted post-test means	28.098	28.504	24.398	B 307.184 W 137.890	2 86	153.592 1.603	95.793*

* Significant at 0.05 level of confidence , N = 90, B = Between group variance,

W = Within group variance

The analysis of covariance for sit up showed that the resultant 'F' ratio of 0.009 was not significant in case of pre-test means. The post test and adjusted final means yielded the 'F' ratio of 13.790 and 95.793, respectively, which were found to be significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 6: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Sit Up

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
28.098	28.504		0.406	0.431
28.098		24.398	3.700*	0.431
	28.504	24.398	4.142*	0.431

* Significant at 0.05 level

It was very much clear from the Table 6 that the mean differences with respect to performance in sit up of both yoga and pranayama groups were found to be significantly greater than that of control group. No significant difference between yoga and pranayama groups was observed in respect of sit up performance.

Table – 7: Significance of Difference Between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Harvard Step Test

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	75.000	73.133	1.867	0.371	5.037*
Pranayama	75.133	73.000	2.133	0.351	6.070*
Control	75.133	75.167	0.033	0.148	0.226

* Significant at 0.05 level of confidence, 't' $_{0.05}$ (19) = 2.045

Table 7 clearly showed that both yoga and pranayama groups improved significantly yielding 't' value of 5.037 and 6.070, respectively, where as control group did not show any significant improvement in Harvard step test performance of subjects indicating 't' values of 0.226. In Harvard step test, it was noted that the differences between the means existed and the experimental groups improved, where as no significant change was observed in the control group.

Table – 8: Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in Harvard Step Test

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	75.000	75.133	75.133	B 0. 356 W 158.933	2 87	0.178 1.827	0.097
Post-test means	73.133	73.000	75.167	B 88.467 W 143.633	2 87	44.233 1.651	26.793*
Adjusted post-test means	73.149	72.992	75.159	B 87.536 W 138.582	2 86	43.768 1.611	27.161*

* Significant at 0.05 level of confidence, N = 90, B = Between group variance,

W = Within group variance

The analysis of covariance for Harvard step test showed the resultant 'F' ratio of 0.097, which was not significant in case of pre test means. The post test means and adjusted final means yielded the 'F' ratio of 26.793 and 27.161 and were found significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 9: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Harvard Step Test

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
73.149	72.992		0.157	0.232
73.149		75.159	2.010*	0.232
	72.992	75.159	2.167*	0.232

* Significant at 0.05 level of confidence

It was clear from the Table 9 that the mean differences with respect to performance in Harvard step test of yoga and pranayama groups were found to be significantly greater than that of control group. No significant difference between yoga and pranayama groups was found in respect of Harvard step test performance.

Table – 10: Significance of Difference between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in One Mile Run/Walk

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	12.855	10.170	2.685	0.102	26.451*
Pranayama	12.877	9.891	2.985	0.056	53.738*
Control	12.980	12.896	0.084	0.109	0.773

* Significant at 0.05 level of confidence, 't' $_{0.05}$ (29) = 2.045

Table 10 clearly revealed that yoga and pranayama groups improved significantly yielding 't' value of 26.451 and 53.738, respectively. Further, control group did not show any significant improvement in one mile run/walk performance of subjects indicating't' values of 0.773. The needed 't' value for significance at 0.05 level of confidence with 29 degrees of freedom was 2.045.

Table – 11**:** Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in One Mile Run/Walk

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	12.855	12.877	12.980	B 0.268 W 128.409	2 87	0.134 1.476	0.091
Post-test means	10.170	9.891	12.896	B 165.368 W 83.990	2 87	82.684 0.965	85.647*
Adjusted post-test means	10.206	9.912	12.839	B 155.628 W 13.423	2 86	77.814 0.156	498.557*

* Significant at 0.05 level of confidence, N = 90, B = Between group variance,

W = Within group variance

The analysis of covariance for one mile run/walk showed that the resultant 'F' ratio of 0.091 was not significant in case of pre-test means. The post-test and adjusted final means yielded the 'F' ratio of 85.647 and 498.557, respectively and were found to be significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 12: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in One Mile Run/Walk

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
10.206	9.912		0.294	0.372
10.206		12.839	2.633*	0.372
	9.912	12.839	2.927*	0.372

* Significant at 0.05 level of confidence

It was very much clear from the Table 12 that the mean differences with respect to performance in one mile run/walk of both the experimental groups were found to be significantly lesser than that of control group. No significant difference between yoga and pranayama groups was found with respect to one mile run/walk performance.

Table – 13: Significance of Difference between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Triceps Skin Fold Measurement

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	14.600	14.367	0.233	0.522	0.447
Pranayama	14.600	14.667	0.667	0.191	0.348
Control	14.633	14.400	0.233	0.561	0.416

't' $_{0.05}$ (29) = 2.045

Table 13 clearly revealed that yoga and pranayama and control groups showed no significant change with respect to tricep skin fold measurement yielding 't' value of 0.447, 0.348 and 0.416, respectively.

Table – 14: Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in Triceps Skin Fold Measurement

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	14.600	14.600	14.633	B 0.022 W 409.367	2 87	0.011 4.705	0.002
Post-test means	14.367	14.667	14.400	B 1.622 W 644.833	2 87	0.811 7.412	0.896
Adjusted post-test means	14.374	14.674	14.386	B 1.728 W 484.992	2 86	0.864 5.639	0.153

N = 90, B = Between group variance, W = Within group variance,

The analysis of covariance for tricep skin fold measurement showed that the resultant 'F' ratio of 0.002, 0.896 and 0.153, respectively for pre-test means, post test means and adjusted final means were not significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 15: Paired Adjusted Final Means and Differences between Means for the two Experimental Groups and the Control Group in Triceps' Skin Fold Measurement

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
14.374	14.674		0.300	0.434
14.374		14.386	0.012	0.434
	14.674	14.386	0.288	0.434

It was evident from the Table 15 that the mean differences with respect to triceps' skin fold measurement of subjects in two experimental and control group were not significant in any case.

Table – 16: Significance of Difference between Pre-Test and Post-Test Means of the two Experimental Groups and the Control Group in Sub-Scapular Skin Fold Measurement

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	14.667	14.000	0.667	0.191	0.348
Pranayama	14.600	14.633	0.033	0.195	0.171
Control	14.400	14.367	0.033	0.169	0.197

't' $_{0.05}$ (29) = 2.045

Table 16 clearly revealed that yoga and pranayama and control groups showed no significant change with respect to sub-scapular skin fold measurement yielding 't' value of 0.348, 0.171 and 0.197, respectively.

Table – 17: Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in Sub-Scapular Skin Fold Measurement

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	14.667	14.000	14.400	B 1.156 W 651.067	2 87	0.578 7.484	0.077
Post-test means	14.600	14.633	14.367	B 1.267 W 403.133	2 87	0.633 4.634	0.137
Adjusted post-test means	14.518	14.600	14.482	B 0.222 W 46.001	2 86	0.111 0.535	0.207

N = 90, B = between group variance, W = within group variance

The analysis of covariance for triceps' skin fold measurement showed that the resultant 'F' ratio of 0.077, 0.137 and 0.207, respectively for pre-test means, post test means and adjusted final means were not significant.

Table – 18: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Sub-Scapular Skin Fold Measurement

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
14.518	14.600		0.082	0.134
14.518		14.482	0.036	0.134
	14.600	14.482	0.118	0.134

It was evident from the Table 18 that the mean differences with respect to in sub-scapular skin fold measurement of subjects in two experimental and control group were not significant in any case.

Table – 19: Significance of Difference between Pre-Test and Post-Test Means of the Two Experimental Groups and the Control Group in Sit And Reach

Groups	Pre-test mean	Post-test mean	Difference between mean	SE	't' Ratio
Yoga.	25.800	29.633	3.833	0.250	15.363*
Pranayama	25.800	29.833	4.033	0.294	13.740*
Control	25.867	25.833	0.033	0.206	0.162

* Significant at 0.05 level of confidence, $t'_{0.05}(29) = 2.045$

Table 19 clearly revealed that yoga and pranayama groups improved significantly yielding 't' value of 15.363 and 13.740, respectively, whereas, control group did not show any significant improvement in sit and reach performance of subjects indicating 't' values of 0.162.

Table – 20: Analysis of Variance and Covariance of the Means of Two Experimental Groups and the Control Group in Sit and Reach

	Yoga group	Pranayama group	Control group	Sum of squares	df	Mean square	F ratio
Pre-test means	25.800	25.800	25.867	B 0.089 W 729.067	2 87	0.044 8.380	0.005
Post-test means	29.633	29.833	25.833	B 304.800 W 469.300	2 87	152.400 5.394	28.252*
Adjusted post-test means	29.649	29.849	25.802	B 312.169 W 103.910	2 86	156.085 1.208	129.182*

* Significant at 0.05 level of confidence, N = 90, B = Between group variance,

W = Within group variance

The analysis of covariance for sit and reach showed that the resultant 'F' ratio of 0.005, which was not significant in case of pre test means. The post test and adjusted final means yielded the 'F' ratio of 28.252 and 129.182, respectively and differences among means were found to be significant. The 'F' ratio, needed for significance at 0.05 level of confidence (df 2, 87) was 3.07.

Table – 21: Paired Adjusted Final Means and Differences between Means for the Two Experimental Groups and the Control Group in Sit and Reach

Yoga group	Pranayama group	Control group	Difference between means	Critical differences for adjusted mean
29.649	29.849		0.200	0.201
29.649		25.802	3.847*	0.201
	29.849	25.802	4.047*	0.201

* Significant at 0.05 level of confidence

It was clear from the Table 21 that the mean differences with respect to performance in sit and reach of both yoga and pranayama groups were found to be significantly better than that of control group. No significant difference between yoga and pranayama groups was found with respect to sit and reach performance.

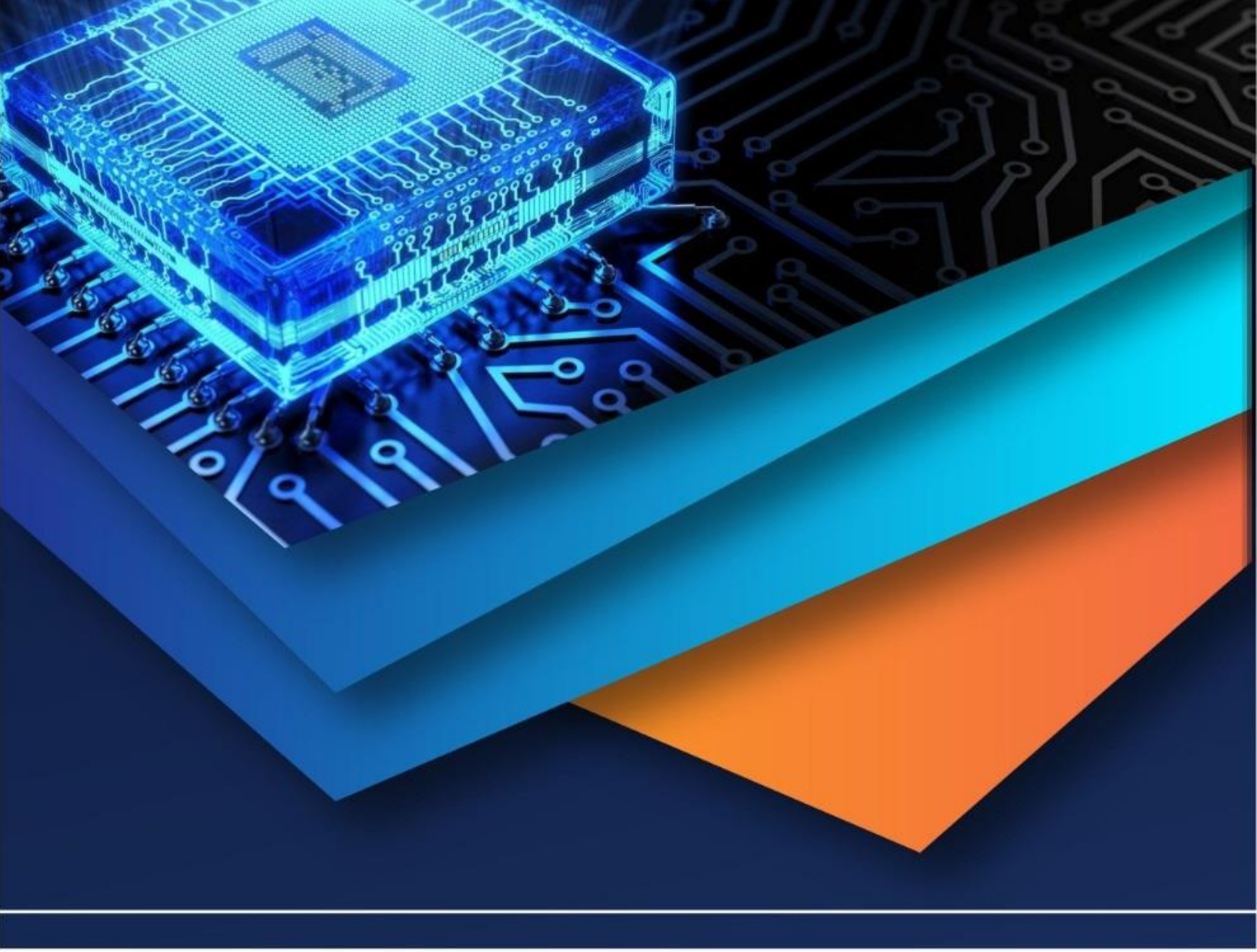
IV. CONCLUSION

The analysis of data revealed that the two experimental groups administered with yogic asanas and pranayama showed significant gains in performance of many health related fitness components after administration of pranayamas and asanas for duration of six weeks. The control group did not show any significant improvement in the performance of any variable under study.

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