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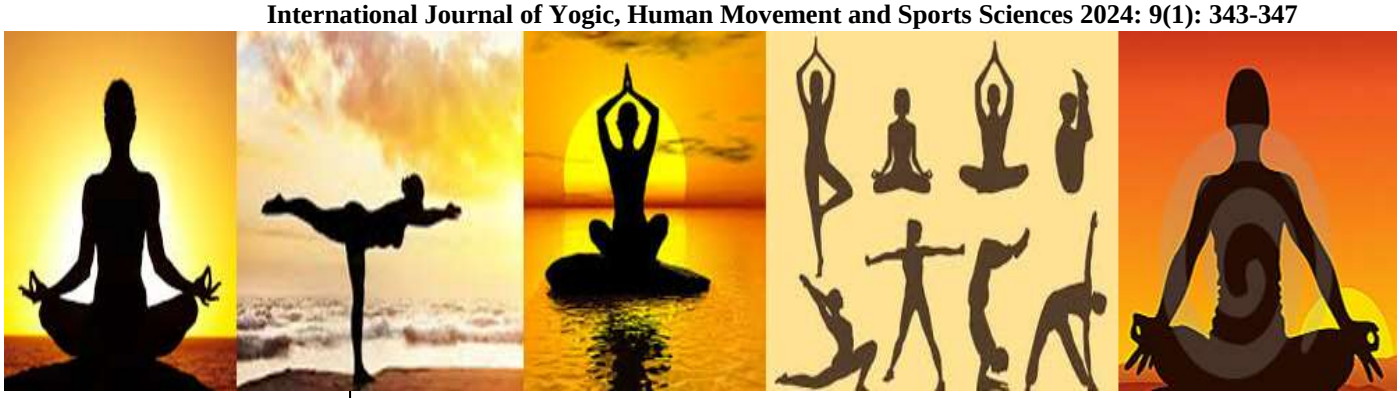

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Impacts of yogic practices with and without aerobics training on bio chemical and physiological variables among male college students

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Abstract
The present investigation was to find out the impacts of yogic practices with and without aerobics training on biochemical and physiological variables among male college students. Sixty individuals from Govt. Engineering College Thrissur, Kerala, aged between 18 to 22 years, were selected for the study. They were divided into three equal groups (n = 20): Group I underwent yogic practices, Group II practiced yogic practices with aerobics, and Group III served as the control group without any specific training. The training regimen lasted three days a week for twelve weeks. The selected bio chemical variables such as low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose and physiological variables such as VO_2 max, systolic blood pressure and diastolic blood pressure were tested before and after the training period.
Analysis of covariance (ANCOVA) was employed to determine any significant differences among the experimental groups and the control group regarding the selected variables. Additionally, the Scheffe's test was utilized as a post-hoc test due to the involvement of three groups in the study. The findings indicated that both yogic practices with and without aerobics training positively influenced the criterion variables of speed, agility, muscular strength & endurance, VO_2 max, systolic blood pressure and diastolic blood pressure among college male students compared to the control group. However, no significant difference was observed between the training groups themselves.

Keywords: Yogic practices, aerobics training, low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose, vo_2 max, systolic blood pressure, diastolic blood pressure and college students

Introduction
In recent years, the pursuit of holistic health and fitness has led individuals to explore various forms of physical activity and exercise regimens beyond conventional methods. Among these practices, both yoga and aerobic training have gained considerable attention for their potential benefits on physiological and biochemical variables. While yoga is renowned for its ancient roots in promoting mental, physical, and spiritual well-being, aerobic training is celebrated for its capacity to enhance cardiovascular endurance and overall fitness levels. In the context of contemporary lifestyles characterized by sedentary habits and increasing stress levels, the integration of these practices holds promise for optimizing health outcomes, particularly among college students who often face academic and personal pressures.
This study aims to investigate the impacts of yogic practices, both with and without aerobic training, on various biochemical and physiological variables among male college students. By examining the effects of these interventions on parameters such as heart rate, blood pressure, lipid profiles, glucose metabolism, and hormonal balance, we seek to elucidate the potential synergistic or additive benefits of combining yoga with aerobic exercise. Understanding how these practices influence key markers of health and fitness can offer valuable insights into developing comprehensive lifestyle interventions for promoting well-being in college-aged populations.
The significance of this research lies in its potential to inform evidence-based strategies for health promotion and disease prevention among young adults. Given the rising prevalence of lifestyle-related diseases and mental health disorders in this demographic, identifying effective

interventions that are accessible, sustainable, and culturally relevant is paramount. Moreover, by delineating the differential effects of yogic practices with and without aerobic training, this study contributes to advancing our understanding of the mechanisms underlying the observed physiological adaptations, thereby facilitating targeted interventions tailored to individual needs and preferences.

Through rigorous scientific inquiry and systematic analysis, we aim to contribute to the growing body of literature on complementary and alternative approaches to health and fitness. By elucidating the nuanced effects of yoga and aerobic training on biochemical and physiological variables, we hope to empower college students with knowledge and tools to proactively manage their health and well-being. Ultimately, our findings may have implications for optimizing educational and public health initiatives aimed at fostering healthier lifestyles and enhancing overall quality of life among young adults.

Methods

This research investigates the impacts of yogic practices with and without aerobics training on biochemical and physiological variables among male college students. Sixty individuals from Govt. Engineering College Thrissur, Kerala, aged between 18 to 22 years. Sixty subjects were randomly allocated into three groups, each comprising twenty participants. Group I (n = 20) engaged in yogic practices, Group II (n = 20) practiced yogic practices with aerobics training, and Group III (n = 20) served as the control group.

The training regimen spanned twelve weeks, with sessions conducted three days per week during morning hours (6.30 am to 8 am). The selected bio chemical variables such as low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose was assessed using cobas integra blood analyzer and physiological variables such as VO_2 max was assessed using the queens college step test, systolic blood pressure and diastolic blood pressure was measured using spigmomanometer. Prior to commencing the experiment, all subjects in the yogic practices with and without aerobics training and control groups underwent a pre-test one day before training initiation. Data on selected physical fitness and physiological variables were collected during this pre-test.

Following the twelve-week training period, a post-test was conducted one day after training completion to assess any changes in the criterion variables. Analysis of covariance (ANCOVA) was utilized to determine significant differences among the experimental and control groups for each criterion variable, with a confidence level of 0.05 considered appropriate. Given the involvement of three groups, the Scheffe's test was employed as a post-hoc test.

Results

Table 1: Analysis of Covariance on Selected Bio Chemical Variables of Yogic Practices and Yogic Practices with aerobics training and Control Groups

Variables Name	Test	Yoga Practice Group	Yoga Practice with Aerobic Training Group	Control Group	'F' Ratio
Low Density Lipoprotein (LDL)	Pre-test Mean ± S.D	99.12±15.82	99.81±19.07	94.62±24.24	0.39
	Post-test Mean ± S.D	93.71±14.96	89.18±16.21	95.74±22.81	45.48*
	Adj. Post-test Mean	93.24	88	99.27	57.95*
High Density Lipoprotein (HDL)	Pre-test Mean ± S.D	40.86±4.19	39.82±6.80	41.97±8.61	0.33
	Post-test Mean ± S.D	44.18±3.39	44.83±5.76	41.92±6.03	16.52*
	Adj. Post-test Mean	44.14	45.52	41.08	23.05*
Fasting Blood Glucose	Pre-test Mean ± S.D	83.40±5.29	82.75±6.48	82.55±16.65	0.06
	Post-test Mean ± S.D.	80.45±4.29	75.15±2.35	84.20±12.22	8.23*
	Adj. Post-test Mean	80.06	75.13	84.29	23.84*

*Significant at 0.05 level of confidence. (The table value required for significance at 0.05 level of confidence with df 2 and 57, 2 and 56 were 3.15 respectively).

Table 1 displays the results indicating that the pre-test mean 'F' ratio for low density lipoprotein (LDL) in the yogic practices, yogic practices with aerobics training and control groups was 0.39, which was found to be insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental groups and the control group was 45.48 and 57.95, respectively, showing significance at the 0.05 level of confidence.

Similarly for high density lipoprotein (HDL), the pre-test mean 'F' ratio for the yogic practices, yogic practices with aerobics training and control groups was 0.33, which was insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental groups and the control group was 16.52 and 23.05, respectively, showing significance at the 0.05 level of confidence.

For fasting blood glucose, the pre-test mean 'F' ratio for the yogic practices, yogic practices with aerobics training and control groups was 0.06, which was insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental groups and the control group was 8.23 and 23.84, respectively, showing significance at the 0.05 level of confidence. To determine which paired means exhibited significant differences among the groups, the Scheffe's test was employed.

Table 2: Scheffe's Post Hoc Test for the Difference Between the Adjusted Post-Test Mean of Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL) and Fasting Blood Glucose

Adjusted Post-test Mean Difference on Low Density Lipoprotein (LDL)				
Yoga Practice Group	**Yoga Practice with Aerobic Training Group**	**Control Group**	**Mean Difference**	**CI**
93.24		99.27	6.03*	
93.24	88		5.24*	0.34
	88	99.27	11.27*	
Adjusted Post-test Mean Difference on High Density Lipoprotein (HDL)				
44.14		41.08	3.06*	
44.14	45.52		1.38*	0.21
	45.52	41.08	4.44*	
Adjusted Post-test Mean Difference on Fasting Blood Glucose				
80.06		84.29	4.23*	
80.06	75.13		4.93*	0.48
	75.13	84.29	9.16*	

*Significant at 0.05 level of confidence

Table 2 indicates the results of the Scheffe's Test for the difference between adjusted post-test mean values on low density lipoprotein (LDL). The comparison between the yoga practice group and the control group yielded a difference of (6.03), yoga practice group and yoga practice with aerobic training group (5.24) and while the yoga practice with aerobic training group versus the control group exhibited a difference of (11.27). These differences were found to be significant at the 0.05 level of confidence.

Moreover, significant differences were observed in high density lipoprotein (HDL) between the yoga practice group and the control group (3.06), the yoga practice group and yoga practice with aerobic training group (1.38), and the yoga practice with aerobic training group and the control group (4.44). Additionally, significant differences were found in fasting blood glucose between the yoga practice group and control group (4.23), the yoga practice group and yoga practice with aerobic training group (4.93), and the yoga practice with aerobic training group and the control group (9.16), all significant at the 0.05 level of confidence following the respective training programs.

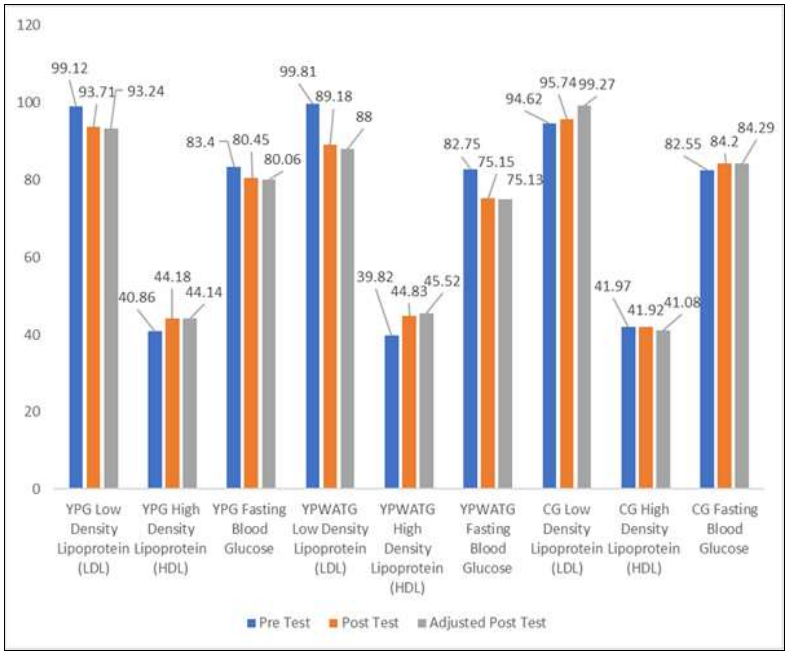

Fig 1: Furthermore, the study's results indicated no significant difference between the training groups on the selected criterion variables

Table 3: Analysis of Covariance on Selected Physiological Variables of Yogic Practices and Yogic Practices with aerobics training and Control Groups

Variable Name	Test	Yoga Practice Group	Yoga Practice with Aerobic Training Group	Control Group	'F' Ratio
VO_2 max	Pre-test Mean ± S.D	53.10±3.52	54.02±2.41	53.90±3.39	0.39
	Post-test Mean ± S.D	55.86±2.98	58.78±1.76	53.82±3.41	17.91*
	Adj. Post-test Mean	56.35	58.56	53.69	90.26*
Systolic Blood Pressure	Pre-test Mean ± S.D	129.90±10.17	128.95±6.50	129.70±5.44	0.18
	Post-test Mean ± S.D	123.70±5.05	115.28±14.71	130.20±4.63	34.01*
	Adj. Post-test Mean	123.57	118.51	130.11	36.28*
Diastolic Blood Pressure	Pre-test Mean ± S.D	86.20±5.87	87±4.92	82.9±7.35	1.83
	Post-test Mean ± S.D.	81.60±4.67	79.80±2.89	85.10±6.58	6.10*
	Adj. Post-test Mean	81.27	79.20	85.91	9.61*

*Significant at 0.05 level of confidence. (The table value required for significance at 0.05 level of confidence with df 2 and 57, 2 and 56 were 3.15 respectively)

Table 3 displays the results indicating that the pre-test mean 'F' ratio for VO_2 max in the yogic practices, yogic practices with aerobics training and control groups was 0.39, which was found to be insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental groups and the control group was 17.91 and 90.26, respectively, showing significance at the 0.05 level of confidence.

Similarly for systolic blood pressure, the pre-test mean 'F' ratio for the yogic practices, yogic practices with aerobics training and control groups was 0.18, which was insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental group and the control group was 34.01 and 36.28, respectively, showing significance at the 0.05 level of confidence.

For diastolic blood pressure, the pre-test mean 'F' ratio for the yogic practices, yogic practices with aerobics training and control groups was 1.83, which was insignificant at the 0.05 level of confidence. However, the post-test and adjusted post-test mean 'F' ratio value for the experimental groups and the control group was 6.10 and 9.61, respectively, showing significance at the 0.05 level of confidence. To determine which paired means exhibited significant differences among the groups, the Scheffe's test was employed.

Table 4: Scheffe's Post Hoc Test for the Difference between the Adjusted Post-Test Mean of VO_2 max, Systolic Blood Pressure and Diastolic Blood Pressure

Adjusted Post-test Mean Difference on VO_2 max				
Yoga Practice Group	**Yoga Practice with Aerobic Training Group**	**Control Group**	**Mean Difference**	**CI**
56.35		53.69	2.66*	0.32
56.35	58.56		2.21*	
	58.56	53.69	4.87*	
Adjusted Post-test Mean Difference on Systolic Blood Pressure				
123.57		130.11	6.54*	0.54
123.57	118.51		5.06*	
	118.51	130.11	11.60*	
Adjusted Post-test Mean Difference on Diastolic Blood Pressure				
81.27		85.91	4.64*	0.61
81.27	79.20		2.07*	
	79.20	85.91	6.71*	

*Significant at 0.05 level of confidence

Table 4 indicates the results of the Scheffe's Test for the difference between adjusted post-test mean values on VO2 max. The comparison between the yoga practice group and the control group yielded a difference of (2.66), yoga practice group and yoga practice with aerobic training group (2.21) and while the yoga practice with aerobic training group versus the control group exhibited a difference of (4.87). These differences were found to be significant at the 0.05 level of confidence.

Moreover, significant differences were observed in systolic blood pressure between the yoga practice group and the control group (6.54), the yoga practice group and yoga practice with aerobic training group (5.06), and the yoga practice with aerobic training group and the control group (11.60). Additionally, significant differences were found in diastolic blood pressure between the yoga practice group and the control group (4.64), the yoga practice group and yoga practice with aerobic training group (2.07), and the yoga practice with aerobic training group and the control group (6.71), all significant at the 0.05 level of confidence following the respective training programs.

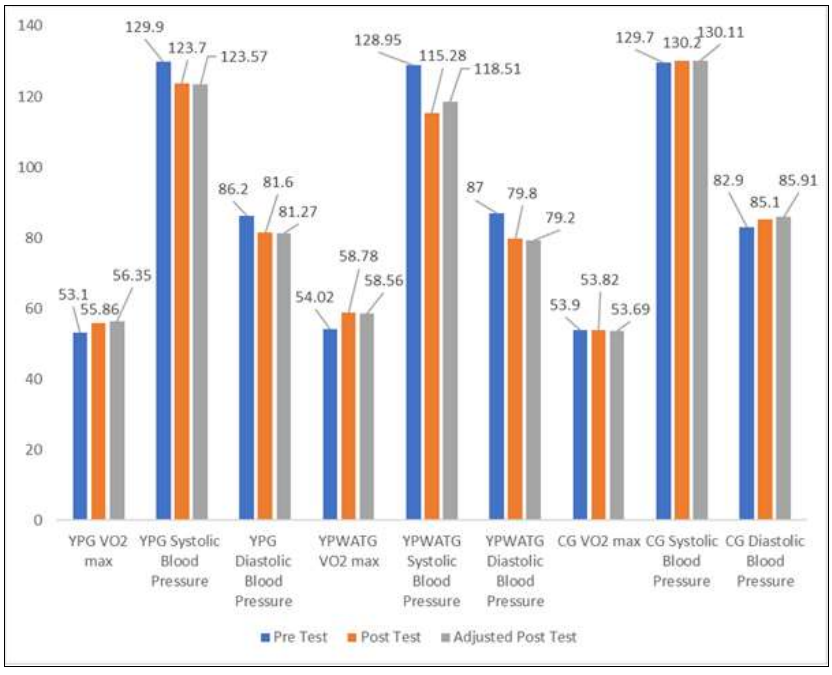

Fig 2: Furthermore, the study's results indicated no significant difference between the training groups on the selected criterion variables

Discussion on Findings

In this study, the Analysis of Covariance (ANCOVA) of bio chemical and physiological variables was carried in two different experimental groups with the inclusion of yogic practices and yogic practices with aerobics training programme. The same analysis was carried out in control group without inclusion of training programme. From these analyses, it was found that the results obtained from experimental groups had significant improvement on the bio chemical and physiological variables when compared with control group. This was due to influence of yogic practices and yogic practices with aerobics training programme with in the analysis of experimental groups. It was interesting to note that the result of bio chemical and physiological variables such as low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose, VO_2 max, systolic blood pressure and diastolic blood pressure concluded that the yogic practices with aerobics training group was better than yogic practices group and control group. This in turns helps to develop to the male college students. The findings of the study had close relationship with the results of the previous study conducted by (Yokesh and Chandrasekaran., 2011) [1], (Singh., 2019) [2], (Doijad *et al.*, 2013) [3] and (Arasi and Maniazhagu., 2014) [5].

Conclusion

Illustration upon the study's findings and considering its essential limitations, it becomes evident that the integration of yogic practices and yogic practices with aerobics training has a noticeable positive influence on improving bio chemical and physiological variables among male college students. Furthermore, significant progress was observed within the selected variables of the yogic practices and yogic practices with aerobics training group, evident after a twelve-week period of specialized training. This solidifies the notion that this training regimen is effective in enhancing both low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose, VO_2 max, systolic blood pressure and diastolic blood pressure.

1. It can be inferred that the personalized implementation of yogic practices demonstrated statistically significant and positive effects throughout the intervention period, contributing to the improvement of bio chemical and physiological variables among male college students.
2. It can be conditional that the improved application of yogic practices with aerobics training demonstrated statistically significant and positive effects throughout the intervention period, contributing to the improvement of bio chemical and physiological variables among male college students.
3. It is apparent that the individualized interventions applied by the control group, while showing a positive trend, did not yield statistically significant results within the given timeframe. This applies to bio chemical and physiological variables among male college students.
4. Upon comparison, the comparative outcomes lead to the conclusion that the yogic practices with aerobics training group exhibited significantly more pronounced advancements in bio chemical and physiological variables when contrasted with the performance of the yogic practices and control groups. This discrepancy underscores the superior impact of specialized training on low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood glucose, vo_2 max, systolic blood pressure and diastolic blood pressure in male college students.

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