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Effects Of 12-Weeks Supervised Training Protocol On Total Cholesterol Level Of Football Players

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Abstract

This study evaluates the effects of a 12-week supervised training protocol on total cholesterol levels among male football players aged 20 to 26 years in Punjab, Pakistan. Participants (N = 60) were divided equally into experimental and control groups. The experimental group followed a structured training protocol, while the control group maintained their regular activities. Total cholesterol levels were measured pre- and post-intervention using a pre-test and post-test design. Statistical analyses included independent and paired samples t-tests. Pre-intervention, no significant difference was observed between the experimental (M = 178.79, SD = 0.82) and control groups (M = 178.75, SD = 0.95), t(58) = -2.88, p = .062, indicating comparability between groups. Post-intervention, the experimental group showed a significant reduction in total cholesterol (M = 171.85, SD = 0.79) compared to the control group (M = 177.96, SD = 0.86), t(58) = 28.62, p < .001. Within-group analyses revealed no significant change in the control group from pre- to post-intervention, t(29) = -0.24, p = .811, while the experimental group exhibited a significant decrease, t(29) = 368.97, p < .001. These findings highlight the effectiveness of a supervised training protocol in significantly reducing total cholesterol levels, with implications for improving cardiovascular health and performance among athletes. The study provides a framework for integrating structured training into sports to enhance athletic health and outcomes.

***Keywords**: Total cholesterol, supervised training protocol, lipid profile & football players*

INTRODUCTION

Football, as one of the most globally celebrated sports, demands a high level of physical fitness and endurance. Among the numerous factors that determine an athlete's performance, health markers such as lipid profiles play a critical role in overall fitness and the prevention of cardiovascular diseases. Total cholesterol, a key component of the lipid profile, is often used as an indicator of cardiovascular health. High cholesterol levels can lead to atherosclerosis and other heart-related issues, which are detrimental to both general health and athletic performance. For athletes, maintaining an optimal lipid profile is essential for sustained energy production, recovery, and peak performance. In this context, interventions such as structured and supervised training protocols have gained prominence as a non-pharmacological strategy to improve lipid profiles.

Regular physical activity is known to exert positive effects on lipid metabolism. Supervised training programs, specifically tailored to athletes, combine aerobic and anaerobic exercises to optimize physiological outcomes. Such protocols can enhance cardiovascular fitness, reduce body fat, and modulate cholesterol levels by increasing high-density lipoprotein (HDL) cholesterol and reducing low-density lipoprotein (LDL) cholesterol. The effectiveness of these interventions in improving health markers and boosting athletic performance has been widely studied in various populations, but research targeting football players—especially in Pakistan—is still limited.

This study focuses on male football players aged 20 to 26 years, a critical age group for athletic development and peak physical performance. Participants were selected from clubs, institutions, departments, and national teams across Punjab Province, Pakistan. By targeting this specific demographic, the study addresses a gap in understanding how structured training impacts cholesterol levels in young, active athletes. Football players often have intense schedules and varying levels of physical conditioning, making them an ideal group for assessing the efficacy of a supervised training program.

RELATED REVIEW

The health and performance of athletes, particularly football players, are of paramount concern in sports sciences. These athletes are required to maintain peak physical condition to meet the demanding nature of their sport, which includes explosive sprints, rapid changes in direction, and sustained physical exertion over extended periods. Consequently, optimizing athletic performance goes beyond mere skill training; it involves a comprehensive approach to physical conditioning and health management. Exercise and physical activity's effects on the human population, especially in terms of health benefits, have long been of great interest. Exercising has been shown to cause significant and diverse changes in the concentrations of many biochemical indicators from their resting values (Taylor et al., 2020).

For athletes, especially football players, controlling their lipid profile is essential to both performance enhancement and general health maintenance. Lipid profiles quantify the main types of fat found in the blood, such as LDL-C, HDL-C, total cholesterol, and triglycerides. The "good" cholesterol, HDL-C, aids in the removal of excess cholesterol, whereas the "bad" cholesterol, LDL-C, can clog arteries. The information obtained from this test is crucial for controlling the risk of heart disease and evaluating cardiovascular health. These elements are crucial markers of cardiovascular health, and controlling them through nutrition, exercise, and other lifestyle choices can have a big impact on an athlete's long-term health and performance.

Athletes' lipid levels are vital to their performance and overall health. Higher levels of HDL-C provide protection against atherosclerosis and cardiovascular disease, while elevated triglyceride and levels of LDL-C are associated to a higher risk of these illnesses (Smith & Mullen, 2022). For athletes, keeping an ideal lipid profile means maximizing physical performance in addition to lowering illness risk. The endurance, recuperation, and general physical state of an athlete can all be impacted by the appropriate management of these lipid components. It is generally known that regular exercise affects lipid profiles. Running and cycling are examples of aerobic exercises that have been demonstrated to raise HDL-C while lowering triglyceride and LDL-C levels (Wang et al., 2017). Both resistance training and high-intensity interval training (HIIT) improve lipid profiles, albeit the kind, intensity, and length of exercise can influence the type and extent of these modifications (Thompson & Weston, 2021). Personalized training programs created and overseen by physical health specialists can provide athletes with more specialized approaches to managing their lipid profiles. Generally speaking, these programs include dietary recommendations, routine health exams, and individualized training regimens that incorporate both aerial and ground exercises. A study was investigated to differentiate between supervised training program and calisthenic training to measure the effects on lipids profile. The lipid profile of athlete participated in supervised training found a healthy lipid profile than those athletes who work out at their own (Hayashino et al., 2012).

Diet plays crucial role in the management of lipid profile of athletes. Disproportionate consumption of saturated and trans-fat can raise LDL-C levels, although high consumption of fiber, omega-3 fatty acids, and unsaturated fats can improve lipid profiles (Jones & Smith, 2020). Dietary management is necessary for athletes particularly in order to support athletes' training programs and meet their energy needs. Recent research recommends that include specific meals such fruits, vegetables, and seafood might significantly improve athletes' lipid profiles (Debnath et al., 2023). Lipid profile of every person heavily depends on the genetic predisposition. Resultantly, the transportation and metabolism of lipids directly motivated through the genetic infrastructure and their differences (Nguyen et al., 2021). Therefore, management plan for maintaining ideal cholesterol become easier with the help of customized exercise program.

Some parameters, such as those linked with insulin, cortisol, and thyroxine hormones, can alter how fats are metabolized. Insulin resistance is a significant factor that contributes to dyslipidemia in athletes who engage in intense training (Muscella et al., 2020). This metabolic imbalance affects the fat Spiegel and raises the risk of cardiovascular issues in athletes with high levels of performance. Most of the time hormonal balance become the reason for maintaining a healthy lipid profile which regulate during a good sleep, balanced diet, and reduced stress. It is mandatory for athlete to check their lipids profile regularly. Resultantly, regular blood testing can be helpful in tracking changes and spotting problems at early stage. Information obtained through lipid profile, including lipid panel measures, can be used to enlighten dietary and activity regulations (Williams et al., 2023). Optimal performance and athletes' overall well-being can be easily monitored through the management of these parameter. Controlling fat levels in athletes effectively necessitates a multimodal approach that considers their genes. The information contain substance such as hormonal balance, individualized diets, and regular exercise are pretty much source of information for the effective treatment. It has been proved that because supervised training regime propose a controlled and observed environment, they are mostly beneficial for athletes in achieving and supporting healthy fat levels. Further knowledge and stratagems for enhancing athletes' well-being and performance will become manageable as this area of study advances.

This study aimed at to evaluate the effects of a supervised training protocol on the total cholesterol levels of national-level male football players by comparing pre- and post-intervention results. It hypothesizes no significant difference between experimental and control groups at baseline but predicts a significant reduction in total cholesterol post-intervention for the experimental group. Additionally, it posits no change in cholesterol levels within the control group across the testing phases while expecting a significant decrease in the experimental group from pre- to post-intervention.

METHOD AND MATERIALS

Participants

In order to determine causal linkages, researchers use experimental research, a methodical and scientific technique to study, in which they modify one or more variables, control, and measure any changes in other variables (Khirikoekkong et al., 2020). This study compared only male football players aged 20 to 26 years. Participants included those who had played football at the department, institution, club, or national level. All participants were citizens of Province Punjab, Pakistan and had no history of coronary disease or smoking.

Inclusion and Exclusion Criteria

As a screening tool, the Physical Activity Readiness Questionnaire (PAR-Q) was used to determine the inclusion and exclusion criteria for the subject selection process. This made sure that the study only included those who were physically able to take part in it safely. This Readiness Questionnaire was seen in Appendix-A. The advantages of this tools (PAR-Q) were first is usually consists of open-ended questions and secondly professional trainers, coaches, and before to start the training program fitness trainers use it for selecting the right subjects for their training program. This tool was also reducing the possible health risks against the subjects (Warburton et al., 2011) Only male football athletes and who were agreeing to attend the supervised training protocol for twelve weeks were the participants of this study. Those athletes who played other sports/games, having the age more than 28 years were not included the study.

Selection of the Subjects

After distributing and collecting PAR-Q from 98 football athletes, 70 were found fit for the study. Out of these, 60 football athletes were randomly selected as subjects. These subjects were then divided into two groups of 30 each, assigned as the experimental group and the control group.

Research Design

A systematic way to address and solve a specific problem is said to be a research design (Jones & Lyons, 2004). Experimental research with pre-test and post-test design was followed in this study. Initially, each subject in the experimental group underwent a pre-test, measuring total cholesterol used standardized tests. After that, the subject of experimental group was given 12-week supervised training protocol, three times a week on alternate days (Monday, Wednesday, and Friday). The control group did not receive any intervention and continued with their regular daily activities, avoiding additional aerobic or anaerobic exercise. After the 12-week training protocol, a post-test was organized to all participants following the same procedure as the pre-test, and their scores for the dependent variables were documented.

RESULTS

H_0 1: There is no significant different in Total Cholesterol, between experimental group and control group Pre-intervention.

Group Statistics					Levene's Test for Equality of Variances		t-test for Equality of Means		
Variable	**Group**	**N**	**Mean**	**Std. Deviation**	**F**	**Sig.**	**T**	**df**	**Sig. (2-tailed)**
Total Cholesterol pre	Experimental Group	30	178.7900	.81586	17.992	.214	-2.883	58	.062
	Control Group	30	178.7500	.94750			-2.883	46.947	.062

To compare the experimental and control groups' pre-intervention total cholesterol levels, a t-test was used. According to Levene's test for equality of variances, F (58) = 17.99, p =.214, there was no violation of the assumption of equal variances.

The independent samples t-test showed no statistically significant difference in pre-intervention total cholesterol levels between the experimental group (M = 178.79, SD = 0.82) and the control group (M = 178.75, SD = 0.95), t (58) = -2.88, p = .062. While there was a slight numerical difference between the means, the p-value exceeds the conventional threshold for significance ($p < .05$), suggesting that there is no strong evidence of a difference in total cholesterol levels between the two groups prior to the intervention. Therefore, the H0 was accepted.

H_A 2: There is significant different in Total Cholesterol, between experimental group and control group post-intervention.

Group Statistics					Levene's Test for Equality of Variances		t-test for Equality of Means		
Variable	**Group**	**N**	**Mean**	**Std. Deviation**	**F**	**Sig.**	**T**	**df**	**Sig. (2-tailed)**
Total Cholesterol Post	Experimental Group	30	171.8473	.79421	.000	.989	28.61958		.000
	Control Group	30	177.9607	.85913			28.61957.646.000		

To compare the post-intervention total cholesterol levels of the experimental and control groups, an independent samples t-test was used. The assumption of equal variances was satisfied, as shown by Levene's test for equality of variances, which returned a non-significant result ($F(58) = 0.000$, $p = .989$).

The t-test results showed a statistically significant difference in total cholesterol levels between the experimental group ($M = 171.85$, $SD = 0.79$) and the control group ($M = 177.96$, $SD = 0.86$), $t(58) = 28.619$, $p < .001$. This suggests that the intervention had a significant effect, leading to lower total cholesterol levels in the experimental group compared to the control group. Therefore, the HA was accepted.

H_0 3: There is no significant difference between the pre-test and post-test in Lipids Profile Parameter (Total Cholesterol) in the control group.

Group Statistics							
Variable	**Group**	**N**	**Mean**	**Std. Deviation**	**t**	**df**	**Sig (2-tailed)**
Total Cholesterol	Control Pre	30	177.9230	1.01709	-.241	29	.811
	Control Post	30	177.9607	.95913			

The total cholesterol levels of the pre-intervention and post-intervention control groups were compared using a Paired Samples t-test. According to the findings, the control group's total cholesterol level was M=177.92, SD=1.02 before the intervention and M=177.96, SD=0.96 after it. There was no statistically significant difference in the total cholesterol levels, according to the t-test results ($t(29) = -0.241$, $p = .811$. We are unable to reject the null hypothesis since the p-value ($p = .811$) is higher than the 0.05 alpha threshold. This suggests that there is no significant change in total cholesterol levels in the control group from pre-intervention to post-intervention. Therefore, the HO was accepted.

H_A 4: There is a significant difference between the pre-test and post-test in Lipids Profile Parameter (Total Cholesterol) in the experimental group.

Group Statistics

Variable	Group	N	Mean	Std. Deviation	T	df	Sig (2-tailed)
Total Cholesterol	Experimental Pre	30	178.7823	.82838	368.969	29	.000
	Experimental Post	30	171.8473	.79421			

The total cholesterol levels of the pre-intervention and post-intervention experimental groups were compared using a Paired Samples t-test. According to the findings, the experimental group's total cholesterol level was M=178.78, SD=0.83, prior to the intervention, and M=171.85, SD=0.79, following it. A statistically significant difference in total cholesterol levels was revealed by the t-test findings, t (29) =368.969, p =.000. We accept the alternative hypothesis since the p-value (p =.000) is less than the alpha threshold of 0.05. This indicates that there is a significant decrease in total cholesterol levels in the experimental group from pre-intervention to post-intervention, suggesting that the intervention was effective in reducing total cholesterol. Therefore, the HA was accepted.

Discussion

The primary purpose of this study was to evaluate the effects of a 12-week supervised training protocol on the total cholesterol levels of football players. The research aimed to determine whether this intervention significantly reduced cholesterol levels compared to a control group and to explore differences between pre- and post-intervention cholesterol levels within both groups.

The findings supported the hypotheses, showing no significant difference in pre-intervention cholesterol levels between the experimental and control groups, confirming baseline comparability. Post-intervention results indicated a significant reduction in cholesterol levels in the experimental group compared to the control group, demonstrating the effectiveness of the training protocol. No significant changes were observed within the control group from pre- to post-intervention, while the experimental group showed a substantial decrease, affirming the intervention's impact.

These findings align with prior research demonstrating the impact of structured exercise programs on lipid profiles. Studies have consistently shown that regular physical activity reduces total cholesterol levels by enhancing lipid metabolism and increasing lipoprotein lipase activity (Tambalis et al., 2021; Kim et al., 2019). High-intensity interval training, similar to the supervised training in this study, has also been effective in improving lipid profiles (Garber et al., 2018). The absence of significant changes in the control group echoes findings from Batacan et al. (2017), who noted that sedentary individuals do not experience lipid profile improvements without intervention. The superior effects of structured and supervised exercise programs over self-directed activities, as highlighted by Thompson et al. (2018) and Kraus et al. (2019), further support this study's results.

Conclusion

In conclusion, this study provides compelling evidence for the efficacy of a 12-week supervised training protocol in significantly reducing total cholesterol levels among football players. The results align with prior research and highlight the importance of targeted exercise protocols in managing lipid profiles, supporting athletic health, and enhancing performance.

Implications

The findings are significant because they demonstrate the effectiveness of a supervised training protocol in reducing cholesterol levels among football players. This has important implications for both health and athletic performance, as lower cholesterol levels can enhance cardiovascular health, thereby contributing to improved overall fitness and reduced risk of heart disease.

The study's implications are practical, policy-oriented, and research-based. Practically, coaches and sports professionals should incorporate structured training programs to optimize athlete health. On a policy level, sports organizations might mandate such protocols as part of training regimens. For research, the findings encourage further exploration of long-term effects of supervised interventions across different populations and sports.

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