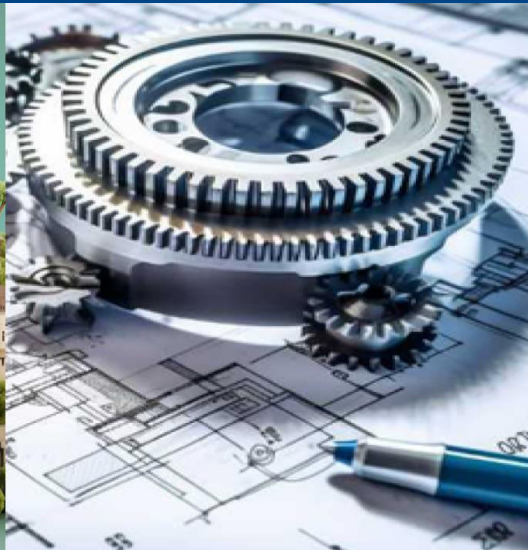
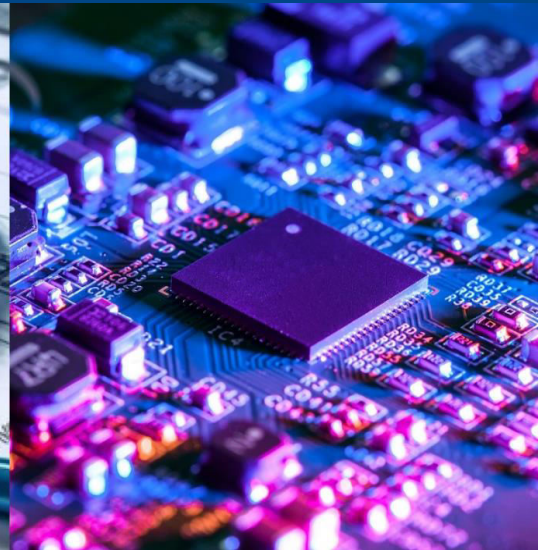
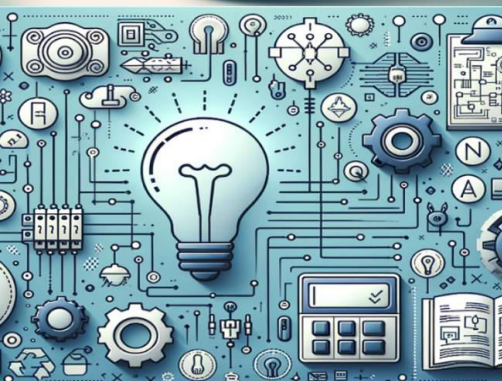




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Effect of Resistance Training on Core Strength of Basketball Players: A Plank Test Analysis

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ABSTRACT: The purpose of this study was to examine changes in plank-test performance following a resistance-training programme among basketball players and to compare post-test scores between an experimental group and a control group. The dataset included 30 players, with 15 participants in each group. Plank-test scores were analyzed using descriptive statistics, paired-samples t-tests for within-group pre-test/post-test comparisons, and a Welch independent-samples t-test for the post-test comparison. The experimental group's mean score increased from 3.02 (SD = 0.66) at pre-test to 4.50 (SD = 1.09) at post-test, and the within-group difference was statistically significant, $t(14) = 9.55$, $p < .001$. The control group's mean increased from 2.34 (SD = 0.67) to 3.24 (SD = 1.12), $t(14) = 3.35$, $p = .005$. The post-test score was higher in the experimental group than in the control group, $t(27.97) = 3.11$, $p = .004$. These findings indicate improved recorded plank-test performance in both groups, with a higher post-test mean in the experimental group.

KEYWORDS: Resistance training, core strength, basketball players, plank test, muscular endurance.

I. INTRODUCTION

Basketball is a physically demanding team sport that requires players to perform repeated accelerations, decelerations, jumps, landings, rapid changes of direction, and physical contact throughout a match. These movements require coordinated action of the upper and lower limbs, supported by adequate trunk stability and muscular control. The core musculature, which includes the abdominal muscles, back muscles, and other muscles surrounding the trunk and pelvis, plays an important role in maintaining body alignment, controlling posture, and transferring forces between the upper and lower extremities. Adequate core strength and endurance may therefore contribute to movement efficiency, balance, and postural control during basketball-specific activities. However, the contribution of core fitness to overall sporting performance depends on several physical, technical, and tactical factors. Resistance training is widely used in sports conditioning to improve muscular strength, endurance, and functional capacity. When appropriately designed and progressively implemented, resistance-training programmes can target specific muscle groups and support the physical demands of a particular sport. Core-focused resistance exercises may help improve the ability to stabilise the trunk during dynamic movements and maintain body control under physical stress. The effectiveness of such training depends on factors such as exercise selection, training intensity, frequency, duration, volume, individual fitness levels, and recovery. Therefore, evaluating changes in core-related performance following a resistance-training programme can provide useful information for coaches and physical education professionals involved in basketball conditioning.

The plank test is a practical field-based assessment commonly used to evaluate static trunk endurance. It requires participants to maintain a prescribed body position while resisting the effects of gravity and sustaining appropriate muscular contraction. The test primarily assesses the ability of the core musculature to maintain a stable position over time and provides an accessible method for monitoring changes in core-related muscular endurance. Although plank-test performance is relevant to core conditioning, it should not be considered a comprehensive measure of all



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dimensions of core strength, stability, or athletic performance. Standardised testing procedures and consistent recording of performance duration are essential for obtaining meaningful and comparable results.

In this context, the present study, titled “Effect of Resistance Training on Core Strength of Basketball Players,” examines plank-test performance among basketball players in an experimental group and a control group. The analysis focuses on pre-test and post-test scores to examine changes within each group and differences between the groups following the study period. By concentrating exclusively on the plank test, the study aims to assess changes in static trunk endurance associated with the resistance-training programme. The findings may provide preliminary insights into the potential value of resistance training for improving core-related fitness among basketball players, while recognising that the interpretation of results depends on the accuracy of the recorded data, the characteristics of the training programme, and the suitability of the research design.

II. OBJECTIVES

The main objectives of the present study were to examine pre-test and post-test changes in plank-test performance among basketball players in the experimental group, to assess pre-test and post-test changes in the control group and to compare the post-test plank-test scores of the experimental and control groups to evaluate the effect of resistance training on core-strength of basketball players.

III. METHODOLOGY

3.1 Research design and participants

Participants:

The study included 30 **male** basketball players aged 14–19 years. The participants were divided into two groups: an experimental group ($n = 15$) and a control group ($n = 15$). Plank performance was assessed using pre-test and post-test measurements to examine changes following the intervention. The study employed a pre-test–post-test control group design. Information regarding sex distribution, competitive level, participant recruitment, group-allocation procedures.

IV. STATISTICAL ANALYSIS

Means and standard deviations were calculated for pre-test and post-test scores. Paired-samples t-tests examined pre-test/post-test changes within each group. A two-tailed Welch independent-samples t-test compared the groups’ post-test scores without assuming equal variances. Statistical significance was evaluated at $\alpha = .05$.

V. RESULTS

Table 1 presents descriptive statistics and paired-samples t-test results for the experimental and control groups.

Group	N	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Change	t(df)	p-value
Experimental	15	3.02 $\pm$ 0.66	4.50 $\pm$ 1.09	1.48	9.55 (14)	< .001
Control	15	2.34 $\pm$ 0.67	3.24 $\pm$ 1.12	0.90	3.35 (14)	.005

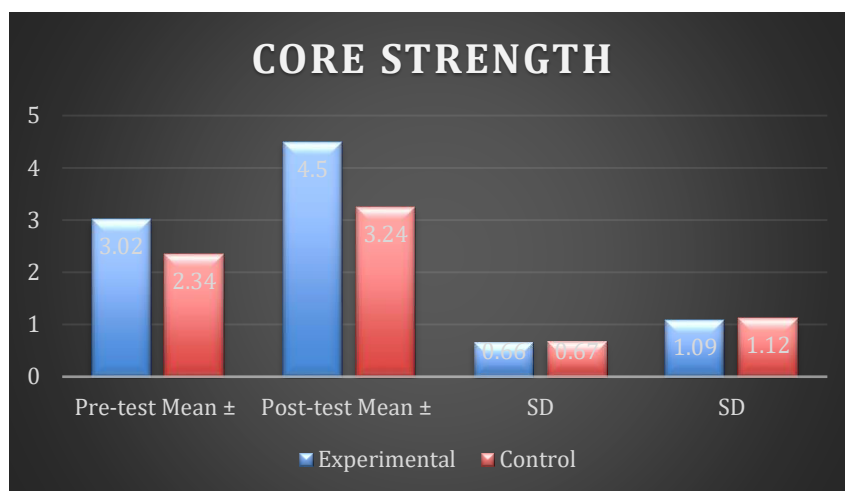
Table no. 1: The results presented in the table indicate changes in plank-test performance among basketball players in both the experimental and control groups. The experimental group, consisting of 15 players, recorded an increase in the mean plank score from 3.02 $\pm$ 0.66 at pre-test to 4.50 $\pm$ 1.09 at post-test, with a mean improvement of 1.48. The paired-samples t-test revealed a statistically significant difference between pre-test and post-test scores, $\backslash(t(14) = 9.55, p < .001\backslash)$. Similarly, the control group showed an increase in the mean plank score from 2.34 $\pm$ 0.67 to 3.24 $\pm$ 1.12, with a mean improvement of 0.90. This difference was also statistically significant, $\backslash(t(14) = 3.35, p = .005\backslash)$. These findings indicate that plank performance improved significantly in both groups over the study period. However, the experimental group demonstrated a greater mean improvement (1.48) than the control group (0.90). Although this pattern favours the experimental group, a direct between-group comparison of changes, such as an independent-samples t-test on change scores or a group-by-time interaction analysis, is required to determine whether the improvement was statistically greater in the experimental group.



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Graph No.1

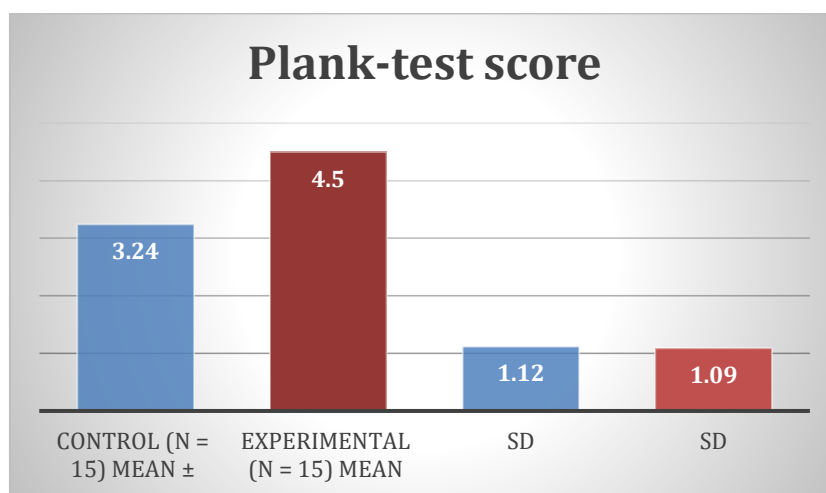


Graph no. 1: Graphical representation of mean and SD of experimental group and control group

Table 2 Compares Post-Test Scores Between Groups.

Outcome	Control (n = 15) Mean ± SD	Experimental (n = 15) Mean ± SD	Mean Difference (Exp. - Control)	t(df)	p-value	Decision
Plank-test score	3.24 ± 1.12	4.50 ± 1.09	1.25		0.0043	Significant

The experimental group had a higher post-test mean than the control group. The between-group difference was statistically significant, Welch's $t(27.97) = 3.11$, $p = .004$. Within-group analyses also showed statistically significant increases in both the experimental group, $t(14) = 9.55$, $p < .001$, and the control group, $t(14) = 3.35$, $p = .005$. The descriptive mean increase was larger in the experimental group; however, a direct group-by-time interaction or comparison of change scores would be a more appropriate formal test of whether the change differed between groups.



Graph no. 2: Graphical representation of post test comparison between experimental and control group.



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VI. DISCUSSION

The present study, entitled “Effect of Resistance Training on Core Strength of Basketball Players: A Plank Test Analysis,” examined changes in plank-test performance following resistance training. Core strength and endurance are important components of basketball fitness because players repeatedly perform jumping, landing, rapid changes of direction, defensive movements, and shooting under varying physical demands. The plank test provides a practical field-based measure of the ability to maintain trunk stability and sustain an isometric position. Therefore, changes in plank-test performance may indicate improvements in core muscular endurance, provided that the test protocol and scoring procedures remain consistent.

The findings of the present study can be discussed in relation to previous research on core training and basketball performance. Luo et al. (2023), in their systematic review of core training among basketball players, reported that core training was associated with improvements in several physical and sport-specific outcomes, including strength, jumping, balance, agility, and shooting performance. The authors also highlighted the potential value of combining static and dynamic core exercises within basketball training programmes. These findings provide a relevant theoretical basis for examining whether resistance training can improve plank-test performance among basketball players.

Similarly, Liu (2022) investigated the importance of core strength and coordination balance in basketball using a biomechanical perspective. The study reported that basketball players who performed additional core-strength training demonstrated improvements in muscle strength, coordination, balance, and shooting performance. These findings suggest that core-focused exercises may complement conventional strength training by supporting trunk control and movement efficiency. In the context of the present study, improvements in plank-test performance, if demonstrated by the statistical results, would be consistent with the broader evidence supporting the role of core training in basketball conditioning.

Further support is provided by Reed et al. (2012), who reviewed the effects of isolated and integrated core-stability training on athletic performance. Their review indicated that core training could benefit selected performance outcomes, although the findings were not consistent across all studies. The authors also emphasized that core training was frequently combined with other exercise programmes, making it difficult to isolate its independent effects. This observation is relevant to the present investigation because any improvement in plank-test scores should be interpreted in relation to the training programme, participant characteristics, and other physical activities undertaken during the intervention.

More recent evidence was reported by researchers examining different forms of core-stability training in adolescent female basketball players. Their 2025 study found significant improvements in plank-test performance following eight weeks of Swiss-ball or TRX-based core training, although improvements in the other athletic-performance measures were not consistently different between groups. These findings suggest that improvements in core endurance do not necessarily translate into equivalent improvements across all aspects of athletic performance. Consequently, the plank test should be interpreted as a specific measure of core endurance rather than as a comprehensive indicator of basketball performance.

Overall, previous research supports the inclusion of core-focused exercises in basketball conditioning programmes while also indicating that training effects depend on the intervention and the outcome being measured. The present study contributes to this area by examining plank-test performance following resistance training. However, the extent to which resistance training improved core endurance must be established from the actual pre-test and post-test results, including the mean difference, standard deviation, statistical significance, and effect size where appropriate. If the study included only one group assessed before and after training, the findings should be interpreted cautiously because changes cannot be attributed exclusively to resistance training without accounting for other possible influences.

VII. LIMITATIONS

The study had certain limitations that should be acknowledged. Details regarding participant characteristics, recruitment procedures, group allocation, and ethical approval were not available for verification. Furthermore, the unit of measurement and recording convention for the plank-test scores required confirmation to ensure accurate



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interpretation of the results. The analysis was based on the supplied numerical scores, and potential data-entry errors could not be ruled out. In addition, the analysis did not include a formal group-by-time interaction or an adjusted baseline comparison, which limited the ability to determine the specific effect of resistance training and establish differences between groups over time.

VIII. CONCLUSION

Among the 30 basketball players, plank-test scores improved significantly from pre-test to post-test in both the experimental and control groups. The experimental group demonstrated a greater mean improvement and a higher post-test mean than the control group. These findings suggest that participation in the experimental programme was associated with better post-test plank performance. However, a direct statistical comparison of changes between the two groups is required to establish whether the improvement was significantly greater in the experimental group. Furthermore, incomplete documentation of the intervention protocol and measurement procedures limits the extent to which the observed improvements can be attributed specifically to resistance training.

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