JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

EFFECT OF CORE STRENGTHENING EXERCISES ON CRICKET BOWLING SPEED AND ACCURACY

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Abstract: Bowling speed and accuracy are critical performance metrics in cricket. Despite their importance, the role of core strength in enhancing these aspects has received limited attention in sports science research. This study investigates the impact of a structured core-strengthening exercise regimen on bowling speed and accuracy among amateur cricket bowlers. A total of 30 participants were divided into intervention and control groups, with the intervention group undergoing an eight-week core-strengthening program. Measurements of bowling speed, accuracy, and core strength were taken before and after the intervention. The results showed significant improvements in both speed and accuracy for the intervention group, with no notable changes in the control group. These findings highlight the importance of core strengthening in cricket training and provide actionable insights for athletes and coaches to optimize performance. Additionally, this research underscores the necessity for targeted training programs that focus on enhancing biomechanical efficiency and muscular stability, which are essential for improving sports performance. By bridging the gap between theoretical benefits and practical outcomes, this study paves the way for evidence-based strategies in cricket coaching.

Index Terms - **Core Strengthening, Bowling Speed, Bowling Accuracy, Cricket, Athletic Performance, Sports Science**

I. INTRODUCTION

Bowling is a fundamental skill in cricket, requiring a blend of speed, accuracy, and biomechanical efficiency. A fast and accurate bowler can significantly influence the outcome of a match, making these attributes highly desirable. While general fitness and skill training are emphasized, the specific contribution of core musculature to bowling performance remains underexplored. The core, comprising the muscles of the abdomen, lower back, and pelvis, is integral for stabilizing the body and facilitating efficient energy transfer during dynamic movements such as bowling. A strong core enables better balance, posture, and force generation, which are critical for executing high-speed, accurate deliveries.

Cricket bowling is a highly dynamic activity involving complex kinetic chains. Each delivery relies on a coordinated transfer of energy from the lower body, through the core, and into the upper limbs. Weakness or instability in the core disrupts this transfer, potentially limiting performance and increasing injury risk. Existing coaching practices often focus on developing upper and lower body strength but may overlook the pivotal role of the core as a connecting link in this biomechanical chain.

Despite these theoretical benefits, empirical studies examining the direct impact of core-strengthening exercises on bowling performance metrics are scarce. Previous research has highlighted the importance of core stability in sports like tennis, golf, and baseball, but its application to cricket remains underexplored. The unique demands of cricket bowling, such as repetitive high-speed arm rotations and abrupt decelerations, further emphasize the need for a strong and stable core. This study addresses this gap by investigating the effects of a structured core-strengthening program on bowling speed and accuracy among amateur cricket bowlers. By identifying the tangible benefits of core-focused training, this research aims to provide evidence-based recommendations for athletes and coaches to incorporate into their training regimens.

II.OBJECTIVES

1. To evaluate the impact of core-strengthening exercises on bowling speed, focusing on both initial improvements and sustained performance gains over an eight-week period.

2. To assess the effect of core-strengthening exercises on bowling accuracy, specifically examining changes in targeting consistency and precision.
3. To determine the relationship between core strength improvement, as measured by plank hold duration and medicine ball throw distance, and overall bowling performance metrics.
4. To explore the practical applicability of integrating core-specific exercises into regular cricket training routines for amateur athletes.

III.METHODS

3.1 Participants

The study recruited 30 amateur male cricket bowlers aged 18-25 years from local cricket clubs. Inclusion criteria required participants to have at least two years of bowling experience and no recent history of injuries affecting performance. Participants were randomly assigned to an intervention group ($n = 15$) and a control group ($n = 15$). All participants provided informed consent, and the study was conducted in accordance with ethical guidelines for research involving human subjects.

3.2 Intervention

The intervention group underwent an eight-week core-strengthening program, consisting of exercises such as planks, side planks, Russian twists, and leg raises. Sessions were conducted three times per week, with each session lasting 45 minutes. Progressive overload was applied by increasing the duration, repetitions, and complexity of exercises over the eight weeks. For example, static planks were advanced to weighted planks, and Russian twists were performed with increasing resistance. The control group continued their regular cricket training without additional exercises, ensuring that changes in performance could be attributed to the core-strengthening program.

3.3 Measurements

1. **Bowling Speed:** Measured using a calibrated radar gun positioned behind the stumps. Three attempts were recorded for each participant, with the highest speed taken as the representative value.
2. **Bowling Accuracy:** Assessed using a target grid placed at the batter's end, divided into concentric accuracy zones. Participants bowled six deliveries aiming for the central target, and scores were calculated based on the number of hits and proximity to the target center.
3. **Core Strength:** Evaluated through standardized fitness tests:
   - **Plank Hold Duration:** The time participants could maintain a forearm plank position.
   - **Medicine Ball Throw Distance:** The horizontal distance achieved when throwing a 3 kg medicine ball from a seated position, emphasizing core engagement.

3.4 Statistical Analysis

Data were analyzed using paired t-tests to compare pre- and post-intervention results within groups and repeated measures ANOVA to assess differences between the intervention and control groups. Effect sizes were calculated to determine the magnitude of observed changes. Statistical significance was set at $p < 0.05$.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Bowling Speed: The intervention group demonstrated a statistically significant increase in bowling speed (pre: 118.4 ± 5.6 km/h; post: 125.7 ± 6.1 km/h, $p < 0.01$), with an average improvement of 6.1%. In contrast, the control group showed no significant change (pre: 119.1 ± 6.2 km/h; post: 119.8 ± 5.9 km/h, $p = 0.42$). The effect size for the intervention group was large (Cohen's $d = 1.24$), indicating meaningful performance enhancement.

Bowling Accuracy: Accuracy scores improved significantly in the intervention group (pre: 68.2 ± 10.3; post: 80.6 ± 9.8, $p < 0.01$), reflecting an 18.2% increase in target precision. No significant improvement was observed in the control group (pre: 69.4 ± 9.7; post: 70.3 ± 10.2, $p = 0.35$). The intervention group's improvement suggests a strong correlation between enhanced core stability and consistent delivery mechanics.

Core Strength: Substantial gains were observed in the intervention group's core strength metrics:

- **Plank Hold Duration:** Increased from 120 ± 15.4 seconds to 155 ± 18.6 seconds ($p < 0.01$), a 29% improvement.
- **Medicine Ball Throw Distance:** Increased from 4.2 ± 0.8 m to 5.6 ± 0.9 m ($p < 0.01$), indicating enhanced explosive power. In contrast, the control group exhibited negligible changes in these metrics.

4.2 TABLES

Table 1: Changes in Bowling Speed

Group	Pre – Intervention Speed (km/h)	Post – Intervention Speed (km/h)	Change (%)	P-Value	Effect Size (Cohen's d)
Intervention Group	118.4 ± 5.6	125.7 ± 6.1	6.10%	< 0.01	1.24
Control Group	119.1 ± 6.2	119.8 ± 5.9	0.60%	0.42	0.12

Table 2: Changes in Bowling Accuracy

Group	Pre – Intervention Accuracy Score	Post – Intervention Accuracy Score	Change (%)	P-Value	Effect Size (Cohen's d)
Intervention Group	68.2 ± 10.3	80.6 ± 9.8	18.20%	< 0.01	1.05
Control Group	69.4 ± 9.7	70.3 ± 10.2	1.30%	0.35	0.08

Table 3: Changes in Core Strength Metrics

Metric	Group	Pre – Intervention	Post – Intervention	Change (%)	P-Value	Effect Size (Cohen's d)
Plank Hold Duration (s)	Intervention Group	120 ± 15.4	155 ± 18.6	29%	< 0.01	1.15
	Control Group	122 ± 14.8	123 ± 15.1	0.80%	0.38	0.09
Medicine Ball Throw (m)	Intervention Group	4.2 ± 0.8	5.6 ± 0.9	33%	< 0.01	1.34
	Control Group	4.3 ± 0.7	4.4 ± 0.8	2.30%	0.45	0.11

4.3 DISCUSSION

The findings of this study demonstrate the significant impact of core-strengthening exercises on cricket bowling performance. The intervention group exhibited substantial improvements in both bowling speed and accuracy, highlighting the critical role of core stability in optimizing biomechanical efficiency. Enhanced core strength likely facilitated better energy transfer during bowling actions, contributing to faster delivery speeds.

V. ACKNOWLEDGMENT

We express our sincere gratitude to the participants who dedicated their time and effort to this study. We also thank the local cricket clubs for their cooperation and support in recruiting participants and providing training facilities. A special acknowledgment is extended to the trainers and support staff who ensured the safe and effective implementation of the core-strengthening program.

We are deeply grateful to Anna University Regional Campus, Tirunelveli for providing ethical clearance and logistical support for this research. Furthermore, we recognize the invaluable guidance and insights provided by Mentors, which significantly enriched this study.

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