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## Impact of structured netball-specific drills on upper limb muscle strength and endurance in school-level players

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### Abstract

This study aimed to investigate the effects of structured netball-specific drills on upper limb muscle strength and endurance in school-level players. The research focused on students from grades 9 to 12, with a total of 60 participants selected through random sampling. The subjects were allocated into two groups: Experimental Group (Group A): 30 participants underwent a structured netball drill training program. Control Group (Group B): 30 participants received no specialized training. Muscle strength and endurance of the upper limbs were assessed using the lift test. A one-way analysis of variance (ANOVA) was employed to analyze the data, and the Least Significant Difference (LSD) test was applied at a significance level of  $p < 0.05$  to determine statistically meaningful differences between groups. Findings revealed that the 12-week netball drill training intervention resulted in significant improvements in upper limb muscle strength and endurance among the experimental group compared to the control group ( $p < 0.05$ ). These results suggest that structured netball-specific conditioning drills can effectively enhance muscular performance in young athletes.

**Keywords:** Netball, muscle strength, endurance, training, conditioning

### 1. Introduction

Netball originated in England in the late 19<sup>th</sup> century, initially emerging as a variant of basketball known as "women's basketball." Over time, it evolved into a distinct sport with unique rules and structural modifications. Unlike basketball, netball prohibits dribbling, bouncing, and running while in possession of the ball. Additionally, the game imposes positional restrictions, limiting players' movement to specific areas of the court. These regulations emphasize precise passing, spatial awareness, and tactical positioning while minimizing direct physical contact.

Physical fitness and structured training are fundamental to athletic performance and overall well-being, particularly in school-aged children. Regular physical activity plays a pivotal role in musculoskeletal development, reducing the risk of osteoporosis, childhood obesity, and cardiovascular diseases. Beyond physiological benefits, participation in sports enhances psychological and emotional well-being, promoting self-esteem, stress reduction, and long-term adherence to active lifestyles.

The purpose of this study is to examine the impact of netball-specific conditioning drills on upper limb strength and endurance in school-level players.

### 2. Materials and Methods

#### 2.1 Selection of participants

This study was conducted on school-level netball players, focusing on students from grades 9 to 12. A total of 60 participants were selected using a random sampling method and were assigned to one of two groups:

- **Group A (Experimental group):** 30 students underwent a structured netball drill training program.
- **Group B (Control group):** 30 students did not receive any specialized training.

This experimental design facilitated a comparative analysis to evaluate the effectiveness of netball-specific drills in enhancing upper limb muscle strength and endurance.

## 2.2 Measurement criteria

**Table 1:** Measurement criteria

| Sl. No. | Variables   | Test     | Measurement |
|---------|---|----------|-------------|
| 1       | Muscle strength and endurance of the arm and shoulder muscles | Pull-ups | Number      |

## 2.3 Study plan

A randomized controlled trial design was employed to assess the impact of netball-specific drills on upper limb muscle strength and endurance. Participants in the experimental group engaged in practical training sessions focused on netball-specific drills designed to enhance muscular strength and endurance. The control group did not participate in any structured training interventions, serving as a baseline for comparison.

**Table 2:** Analysis of variance (ANOVA) of pre-test, post-test, and adjusted post-test (Revised means) scores between group A and group B

| Test            | Group          | Sum of Squares (SS) | Independent doses (df) | Mean Squares (MSS) | F-value |
|-----------------|----------------|---------------------|------------------------|--------------------|---------|
| Pre-test means  | Group A: 6.933 | 1.350               | 1                      | 1.350              | 0.608   |
|                 | Group B: 6.633 | 128.833             | 58                     | 2.221              |         |
| Post-test means | Group A: 9.367 | 101.400             | 1                      | 101.400            | 36.681* |
|                 | Group B: 6.767 | 160.333             | 58                     | 2.764              |         |
| Revised means   | Group A: 9.274 | 86.623              | 1                      | 86.623             | 44.209* |
|                 | Group B: 6.859 | 111.686             | 57                     | 1.959              |         |

The critical value of 'F' at the 0.05 significance level is:  $F(1,58) = 4.006$ , &  $F(1,57) = 4.009$

The results indicate that the experimental group (Group A) showed significant improvements in muscle strength and endurance compared to the control group (Group B). The effectiveness of the netball drill training program was observed, demonstrating its positive influence on physical fitness and performance in school-level players.

## 4. Conclusion

The findings of this study indicate that a 12-week netball drill training program led to significant improvements in the muscle strength and endurance of the hands and shoulders in the selected participants. The structured training effectively enhanced physical performance, demonstrating the positive impact of netball drills on upper body strength and endurance. These results highlight the importance of sport-specific training in improving physical fitness and can be beneficial for athletes, coaches, and sports scientists aiming to optimize performance through targeted conditioning programs.

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## 2.4 Data analysis process

A one-way analysis of variance (ANOVA) was conducted to compare differences between the experimental and control groups. Additionally, the Least Significant Difference (LSD) test was applied at a 0.05 significance level to identify statistically meaningful differences in the impact of netball drills on muscle strength, endurance, and overall physical fitness.

## 3. Results and Discussion

### 3.1 Muscle strength and endurance test for arm and shoulder muscles

This section presents the comparative analysis of muscle strength and endurance between the experimental group (Group A) and the control group (Group B) using distraction analysis.

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