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# An Analysis of Physical Fitness During Pre-Competitive Phase Among Young Athletes

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**Abstract** | The pre-competitive phase represents a crucial period in an athlete's training cycle, during which the emphasis transitions from building foundational fitness to refining specific skills and optimizing overall physical performance. Young athletes require customized training strategies to enhance their physical fitness, preparing them for the rigours of competition and enabling them to excel in their respective sports. This study aims to evaluate the physical fitness levels of young athletes during the pre-competitive phase, offering insights into the efficacy of current training practices and pinpointing areas for potential improvement. A total of 209 SUKMA athletes participated in this study, undergoing five fitness tests designed to measure various aspects of their physical fitness: body mass index (BMI), sit-and-reach test, Yo-Yo endurance test (YYET), countermovement jump test (CMJ), and one-minute push-up test. These assessments were conducted before and after the athletes' preparatory phase to evaluate changes in BMI, flexibility, cardiovascular endurance, muscular power, and muscular endurance. The results revealed significant differences in muscular power, flexibility, muscular endurance, and cardiovascular endurance ($p < 0.001$) between the pre-and post-testing phases. However, BMI did not show any significant changes. These findings highlight the effectiveness of the pre-competitive training phase in enhancing key physical fitness components, although BMI remained unaffected. Future research should focus on further elucidating strategies to optimize young athletes' physical health and performance during this pivotal pre-competitive period, ensuring they are adequately prepared for competition demands.

***Keywords:*** *Physical fitness, pre-competitive phase, young athletes, fitness assessment.*

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# I. Introduction

Physical fitness plays a crucial role in the development and performance of young athletes across various sports disciplines. Studies have shown that traditional sports interventions can significantly enhance physical fitness levels among young athletes, leading to improvements in components such as multi-stage endurance, shuttle run, and flexibility [1]. Additionally, assessments conducted on young alpine ski racers have highlighted the importance of evaluating physical fitness attributes like jump height, maximal heart rate, and cycling workload during the pre-competitive phase to tailor training programs effectively [2]. Furthermore, research on freestyle wrestlers emphasizes the need for continuous monitoring and analysis of general physical fitness indicators to optimize training methods and enhance overall athletic preparedness, especially during the initial stages of training [3]. Young athletes require customized training strategies to enhance their physical fitness, preparing them for the rigors of competition and enabling them to excel in their respective sports [4]. This study aims to evaluate the physical fitness levels of young athletes during the pre-competitive phase, offering insights into the efficacy of current training practices and pinpointing areas for potential improvement.

# II. Methods

A total of 209 SUKMA athletes ($N = 209$) participated in this study, undergoing five fitness tests designed to measure various aspects of their physical fitness: body mass index (BMI), sit-and-reach test, Yoyo endurance test (YYET), countermovement jumps test (CMJ), and one-minute push-up test. These assessments were conducted both before and after the athletes' preparatory phase to evaluate changes in BMI, flexibility, cardiovascular endurance, muscular power, and muscular endurance.

# III. Results and Discussion

Results in Table 1 revealed significant differences in muscular power, flexibility, muscular endurance, and cardiovascular endurance ($p < 0.001$) between the pre- and post-testing phases. However, BMI did not show any significant changes. These findings highlight the effectiveness of the pre-competitive training phase in enhancing key physical fitness components, although BMI remained unaffected.

TABLE 1
CHANGES IN PHYSICAL FITNESS COMPONENTS PRE- AND POST-TESTING PHASE AMONG YOUNG ATHLETES

| **Variables** | **Pre-Mean (*SD*)** | **Post Mean (*SD*)** | ***p*-value** |
|---|---|---|---|
| CMJ | 39.81 (10.75) | 42.10 (11.15) | < 0.001 |
| Sit-and-Reach | 38.19 (6.66) | 39.37 (6.49) | < 0.001 |
| 1 min. Push-up | 21.56 (12.36) | 23.86 (12.62) | < 0.001 |
| YYET | 39.49 (7.57) | 40.91 (7.77) | < 0.001 |
| BMI | 21.66 (4.07) | 21.83 (4.08) | 0.06 |

The results from the physical fitness tests conducted during the pre-competitive phase among young athletes reveal several key insights into their physical conditioning. Significant improvements were observed in all measured fitness components except for Body Mass Index (BMI), which showed no significant change.

The significant increase in muscular power, as evidenced by the Countermovement Jump (CMJ), aligns with previous research emphasizing the effectiveness of targeted strength and conditioning programs during pre-competitive phases [5]. Studies have shown that structured training regimens, such as dynamic conditioning contractions, can lead to notable enhancements in power output, jump height, and overall neuromuscular performance [6]. Additionally, monitoring tools like CMJ have been instrumental in assessing lower body fatigue and readiness in athletes across various sports, indicating the importance of tracking these parameters throughout a competitive season to optimize performance [7]. The findings collectively highlight the value of tailored strength and conditioning interventions in enhancing muscular power and performance, underscoring the benefits of targeted training programs in improving athletic outcomes during pre-competitive phases.

The enhancement in flexibility is consistent with studies showing that flexibility training, when integrated into regular conditioning routines, leads to improved range of motion and reduced injury risk [8]. Flexibility is especially important in sports that demand a wide range of motion, and these results suggest that the pre-competitive phase effectively addresses this need. The effectiveness of endurance training strategies during the pre-competitive phase can be reflected in the increase in muscular endurance, as demonstrated by the push-up test results [9]. Endurance training plays a crucial role in enhancing physical performance and preparing athletes for competition [2]. The significant improvement in cardiovascular endurance, indicated by the Yoyo Endurance Test (YYET) results corresponds with existing evidence that training during the pre-competitive phase can significantly boost cardiovascular fitness [10]. Enhanced cardiovascular endurance is vital for athletes to maintain high-intensity efforts throughout competition.

The lack of significant change in BMI suggests that the training phase, while effective in improving fitness components, did not significantly alter body composition. This outcome is consistent with a study on Greek naval cadets showing that a weight training program significantly improved physical fitness components like push-ups, sit-ups, and strength, despite no significant BMI changes [11]. The stable BMI could also reflect the athletes' maintenance of a balanced diet tailored to support performance without substantial changes in weight.

## IV. CONCLUSIONS

The study's findings reinforce the value of the pre-competitive phase in improving key physical fitness components, including muscular power, flexibility, muscular endurance, and cardiovascular endurance, among young athletes. These enhancements are crucial for preparing athletes to meet the demands of competition. However, the unchanged BMI suggests that while the training effectively enhanced specific fitness components, it did not significantly influence body composition. This highlights the need for a more integrated approach that could address both performance-related fitness and body composition, ensuring holistic physical development. Future research should continue to explore strategies for optimizing both fitness and health outcomes during critical training phases.

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