

ASSESSMENT OF CARDIOVASCULAR ENDURANCE AMONG
TAEKWONDO ATHLETES IN PUNE CITY: A CROSS SECTIONAL STUDY.

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ABSTRACT This study evaluates cardiovascular endurance among Taekwondo athletes in Pune City by measuring maximum oxygen uptake (VO₂max) using the 12-minute Cooper Run Test. Participants included athletes from three competitive levels: amateur, sub-elite, and elite. Results indicate significant differences in cardiovascular endurance, with elite athletes demonstrating superior VO₂max and distance covered compared to sub-elite and amateur athletes. These findings underline the importance of aerobic fitness in Taekwondo performance and suggest implications for tailored training programs aimed at enhancing endurance.

KEYWORDS : Taekwondo, Cardiovascular Endurance, VO₂max, 12-minute Cooper Run Test, Athletic

INTRODUCTION

Taekwondo, a traditional Korean martial art, integrates dynamic kicking and punching techniques requiring both explosive strength and sustained endurance. With its inclusion in the Olympic Games, Taekwondo has gained international prominence, highlighting the need for effective conditioning and training strategies. Cardiovascular endurance is pivotal for Taekwondo athletes, impacting their ability to sustain high-intensity efforts and recover between bouts.

Cardiovascular fitness, often measured by VO₂max, reflects an athlete's aerobic capacity and overall endurance. Enhanced VO₂max allows athletes to maintain performance levels throughout competitions and improve recovery times. This study aims to quantify and compare the cardiovascular endurance of Taekwondo athletes at different competitive levels in Pune City to provide insights into training effectiveness and performance optimization.

Need of Study

Despite the growing interest in Taekwondo, specific research on cardiovascular endurance in this sport remains limited. Understanding the cardiovascular profiles of athletes across different competitive levels can provide valuable insights into training efficacy and performance optimization. This study seeks to fill this gap by assessing the VO₂max levels of Taekwondo athletes from amateur to elite levels, helping coaches and trainers develop targeted training programs to enhance endurance and overall performance.

Aim

To assess and compare the cardiovascular endurance of Taekwondo athletes in Pune City across different competitive levels.

Objectives

- To assess cardiovascular endurance among amateur Taekwondo athletes using the 12-minute Cooper Run Test.
- To assess cardiovascular endurance among sub-elite Taekwondo athletes using the 12-minute Cooper Run Test.
- To assess cardiovascular endurance among elite Taekwondo athletes using the 12-minute Cooper Run Test.
- To analyze and compare the differences in cardiovascular endurance among athletes of varying competitive levels.

Review of Literature

1. Bridge et al. (2014): Investigated the impact of aerobic fitness on Taekwondo performance, revealing that higher VO₂max levels enhance endurance and recovery capabilities in athletes. This study underscores the significance of aerobic conditioning for sustained high-intensity performance in Taekwondo.

2. Marković et al. (2005): Found that elite Taekwondo athletes possess advanced aerobic and anaerobic fitness, emphasizing the need for a balanced training approach to achieve peak performance.

3. Tritama et al. (2014): Reported on the suboptimal aerobic endurance of Taekwondo athletes in Central Sulawesi, suggesting that improved aerobic conditioning is necessary for enhanced performance.

4. GAO et al. (1998): Established a link between VO₂max, lean body mass, and athletic performance, highlighting the importance of aerobic fitness for high-level competition.

5. Campos et al. (2012): Focused on the energy demands of Taekwondo and the role of aerobic metabolism, demonstrating that enhanced aerobic capacity supports high-intensity efforts and recovery.

6. Doolittle & Bigbee (1968): Validated the 12-minute Cooper Run Test as a reliable measure of VO₂max, which remains widely used in athletic assessments.

7. Chen et al. (2016): Examined the relationship between muscle fatigue and aerobic conditioning in Taekwondo, emphasizing the need for adequate aerobic fitness to combat fatigue.

8. Tomlin & Wenger (2001): Demonstrated that improved aerobic fitness enhances recovery from high-intensity intermittent exercises, relevant for Taekwondo training regimens.

Methodology

- Study Design:** Cross-Sectional Study
- Sample Size:** 50 Taekwondo athletes
- Sampling Method:** Convenient Sampling
- Study Population:** Taekwondo athletes practicing in Pune City
- Study Setting:** Taekwondo academies and training centers in Pune
- Study Duration:** 6 Months

Criteria

- Inclusion Criteria:**
 - Age between 12 to 18 years
 - Active participation in Taekwondo (amateur, sub-elite, or elite level)
- Exclusion Criteria:**
 - Athletes with neurological, metabolic, or cardiovascular diseases
 - Recent history of knee joint surgery

Materials

- Marker cones for distance marking
- Stopwatch for timekeeping
- Recording sheets for data collection
- Pen for recording data
- Assent forms and informed consent forms

Outcome Measures

Cardiovascular endurance was assessed using the Cooper 12-minute Run Test, which estimates VO₂max based on the distance covered. The formula used was: $VO_{2max} = \{22.351 \times kms\} - 11.288$.

Procedure

- Ethical Clearance:** Obtained from the Institutional Review Board.
- Participant Selection:** Based on inclusion and exclusion criteria.
- Informed Consent/Assent:** Collected from participants and

guardians.

4. Test Administration: Conducted the 12-minute Cooper Run Test under standardized conditions.

5. Data Collection: Recorded distances covered and calculated VO₂max.

6. Data Analysis: Analyzed and compared results using statistical tools.

Data Analysis

- **Total Participants:** 50
- **Gender Distribution:** 40 males (80%), 10 females (20%)

Experience Levels:

- **Elite Athletes:** 9
- **Sub-Elite Athletes:** 13
- **Amateur Athletes:** 28

Cardiovascular Endurance Results:

Amateur Athletes:

- Average Distance Covered: 1748 meters
- Average VO₂ Max: 28.26 mL/kg/min

Sub-Elite Athletes:

- Average Distance Covered: 2080.5 meters
- Average VO₂ Max: 34.69 mL/kg/min

Elite Athletes:

- **Average Distance Covered:** 2777 meters
- **Average VO₂ Max:** 50.66 mL/kg/min

RESULTS

The study revealed significant differences in cardiovascular endurance among Taekwondo athletes based on competitive levels. Elite athletes exhibited superior VO₂max and distance covered compared to sub-elite and amateur athletes. Specifically:

- Elite athletes covered 56% more distance than amateur athletes and 33.4% more than sub-elite athletes.
- The VO₂max values were 79.6% higher in elite athletes compared to amateurs and 46.2% higher compared to sub-elites.

These results emphasize the critical role of cardiovascular endurance in achieving high performance in Taekwondo.

DISCUSSION

The observed differences in cardiovascular endurance align with prior research indicating the importance of aerobic fitness in combat sports. Elite Taekwondo athletes, with their higher VO₂max and greater endurance, can sustain high-intensity performance and recover more effectively between bouts. This supports the findings of Bridge et al. (2014) and Marković et al. (2005), who highlighted the role of aerobic conditioning in improving performance and endurance.

The results suggest that enhancing aerobic capacity through targeted training can benefit amateur and sub-elite athletes by improving their performance and endurance. Incorporating aerobic training into regular practice is crucial for maintaining high-intensity efforts and optimizing recovery, as highlighted by Tomlin & Wenger (2001).

CONCLUSION

The study concludes that cardiovascular endurance varies significantly among Taekwondo athletes at different competitive levels, with elite athletes demonstrating superior aerobic capacity. These findings underscore the importance of cardiovascular fitness in enhancing Taekwondo performance and support the development of targeted training programs to improve endurance.

Future Scope

Future research should focus on longitudinal studies to track changes in cardiovascular endurance over time and evaluate the impact of specific training interventions. Additionally, exploring the relationship between aerobic fitness and other performance metrics, such as technique efficiency and injury prevention, could provide further insights into optimizing Taekwondo training.

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