


Research Report

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The Impact of High-Intensity Interval Training (HIIT) on Endurance and Speed in Adolescent Athletes

Abhishek Balo , Tonkey Pegu, Sidhartha Rajbongshi, Pabitra Pran Gogoi, Pranjit Boruah, Arindom Baruah, Mantu Baro, O. Jiten Singh

Centre for Studies in Physical Education and Sports, Dibrugarh University, Dibrugarh, 786004, Assam, India

 Corresponding author: abhishekbalo.ab@gmail.com

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Abstract High-Intensity Interval Training (HIIT) has emerged as a highly efficient conditioning method in athletic performance development. While HIIT has been widely studied in adults, limited research has investigated its effects on adolescent athletes, a population undergoing critical physical and physiological development. The purpose of this study was to examine the impact of an 8-week HIIT program on endurance and speed performance in adolescent athletes. Forty male and female athletes (age 14~17) were randomly assigned to either a HIIT group (n=20) or a control group performing traditional endurance and sprint training (n=20). Endurance was assessed using VO₂ max testing, and speed was evaluated through a 30-meter sprint test. Following the intervention, the HIIT group demonstrated a significant improvement in VO₂ max (10.8% increase, $p<0.01$) and 30-meter sprint times (8% improvement, $p<0.05$), whereas the control group showed only marginal gains (3.1% and 1.2%, respectively). These findings suggest that HIIT provides superior benefits for improving both aerobic capacity and speed compared to traditional training methods in adolescent athletes. The study highlights the potential of HIIT as a time-efficient and effective training strategy for youth sports performance.

Keywords HIIT; Adolescent; Endurance; Speed; Sports training

1 Introduction

In the area of sports science, High-Intensity Interval Training (HIIT) is widely known as a quick and effective way to get in shape. HIIT usually includes short, intense workouts that are done over and over again, with recovery times that can be either passive (rest) or active (low-intensity activity). HIIT is different from traditional endurance training, which is usually done at a moderate level for long periods of time. It causes big changes in the body in shorter amounts of time, which makes it very appealing in both sports and clinical settings (Buchheit and Laursen, 2013).

One of the most important developmental phases for athletes is adolescence. Significant physiological, hormonal, and neuromuscular changes occur in young athletes between the ages of 13 and 18, which affects their potential for performance as well as their response to training. Long-term impacts on sports performance and potential career paths could result from training treatments implemented during this time (Bishop et al., 2011). There is a lack of evidence-based guidelines for adolescent athletes because the majority of HIIT research has been done on adults, despite its significance.

The fundamental elements of athletic performance in a variety of sports disciplines are speed and endurance. The ability of the circulatory and muscular systems to maintain extended exercise is reflected in endurance capacity, which is commonly assessed by maximal oxygen uptake (VO₂ max). It is commonly acknowledged that one of the best indicators of aerobic performance is VO₂ max (Bauer et al., 2022). Enhancing endurance capacity in teenagers not only improves performance but also has long-term health benefits, such as lowering the risk of obesity and cardiovascular disease (Milanović et al., 2015; Deng and Wang, 2024)

On the other hand, in sports like rugby, football, basketball, and track and field, speed is a key component. When playing games that require rapid accelerations, direction changes, or pursuit, even minor gains in sprint