

Abstract

Background: Tobacco smoking is a major global health concern, with its effects extending beyond pulmonary damage to include significant musculoskeletal and cardiorespiratory impairments. Among young adults, who are at a critical stage for achieving peak physiological capacity, smoking may reduce skeletal muscle mass and limit oxygen consumption during exercise. This study explores the early physiological changes in young smokers, focusing on oxygen uptake and muscular function before clinical symptoms manifest.

Aim: The objective of this study was to evaluate the physiological responses of young adult smokers by analyzing their VO_2 Max (aerobic capacity), heart rate responses, and skeletal muscle mass to determine the effects of tobacco use on muscle metabolism and oxygen consumption.

Methodology: A total of 60 participants aged 18–25 years who reported regular cigarette use were selected via convenient sampling. After applying inclusion and exclusion criteria, 59 were analyzed. The study employed a correlational research design. Participants underwent standardized treadmill walking tests (horizontal and inclined) to assess VO_2 Max using the Ebbeling formula. Skeletal muscle mass was calculated using the Harris-Benedict anthropometric method. Key parameters measured included Body Mass Index (BMI), Body Surface Area (BSA), Heart Rate (HR), VO_2 Max, and Skeletal Muscle Mass.

Results: Regression analysis revealed a weak but significant correlation between BMI and HR ($R^2 = 0.1114$ to 0.1574), and a weak to moderate inverse correlation between BMI and VO_2 Max ($R^2 = 0.1654$). The strongest positive correlation was observed between BMI and skeletal muscle mass ($R^2 = 0.4228$). BSA showed minimal correlation with HR and VO_2 Max, but had a very strong correlation with skeletal muscle mass ($R^2 = 0.8705$), indicating its reliability as a predictor of structural muscle content.

Conclusion: This study demonstrates that cigarette smoking in young adults is associated with early but measurable reductions in oxygen uptake and muscular function. BMI serves as a moderate predictor of muscle mass and aerobic decline, while BSA is highly predictive of skeletal muscle mass. These findings suggest that even asymptomatic smokers may exhibit physiological impairments, highlighting the importance of early screening and preventive interventions.

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