

The Impact of Nasal Strips on Aerobic Respiration in Athletes: A Comprehensive Systematic Review

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Abstract

Nasal dilator strips have emerged as a popular intervention among athletes seeking to enhance respiratory function and exercise performance. These adhesive devices, designed to mechanically expand the nasal valve area, theoretically reduce nasal airway resistance and improve pulmonary ventilation during physical exertion. This systematic review critically examines five pivotal studies investigating the physiological and performance effects of both external (e.g., Breathe Right) and internal (e.g., Nas-air) nasal dilators during aerobic exercise. While certain investigations report subjective improvements in breathing comfort and reduced perceived exertion (1), the majority of objective physiological measures - including maximal oxygen uptake ($\text{VO}_{2\text{max}}$), minute ventilation (VE), and heart rate (HR) responses - demonstrate no statistically significant enhancements (2,3,4). Notably, the most consistent findings suggest these devices may offer specific advantages in particular environmental conditions (e.g., heat stress) or for athletes with pre-existing nasal obstructions (5). The review highlights critical methodological variations across studies and identifies key gaps in the current literature that warrant attention in future research endeavors to better elucidate the potential role of nasal dilators in sports performance optimization.

Keywords: nasal dilator strips, aerobic capacity, respiratory physiology, exercise performance, nasal resistance, $\text{VO}_{2\text{max}}$, thermoregulation

Introduction

The human respiratory system represents a critical determinant of athletic performance, with the nasal airway serving as the primary conduit for pulmonary ventilation during rest and low-to-moderate intensity exercise. The nasal valve region, constituting the narrowest segment of the upper respiratory tract, creates substantial airflow resistance that may potentially limit respiratory efficiency during physical exertion (1). Nasal dilator devices, first introduced in the early 1990s, were originally developed as therapeutic interventions for sleep-disordered breathing but rapidly gained popularity among competitive athletes seeking ergogenic advantages (3). These devices function through mechanical dilation of the nasal vestibule, employing either external adhesive strips with embedded plastic springs or internal silicone-based dilators. The proposed mechanisms of action include reduction of nasal airway resistance, delay in the transition to oronasal breathing patterns during vigorous exercise, and potential improvements in respiratory muscle efficiency (1,5). Despite widespread anecdotal adoption among elite athletes across various sports disciplines, the scientific literature presents conflicting evidence regarding their physiological and performance efficacy. This systematic review synthesizes current evidence from five methodologically diverse studies to provide a comprehensive, evidence-based evaluation of nasal strips' effects on multiple aspects of aerobic exercise performance. The analysis encompasses both objective

physiological parameters (VO₂max, ventilation, cardiovascular responses) and subjective measures (perceived exertion, breathing comfort), while considering potential moderating factors such as environmental conditions and individual anatomical variations. By critically examining these collective findings, this review aims to clarify the current state of knowledge, identify consistent patterns across studies, and highlight areas requiring further investigation to establish evidence-based recommendations for athletes and sports medicine practitioners. The clinical and practical significance of this review extends beyond mere performance enhancement considerations. A thorough understanding of nasal dilators' effects has important implications for respiratory physiology research, athletic training methodologies, and the development of future respiratory assist devices. Furthermore, by identifying key gaps and inconsistencies in the existing literature, this analysis helps direct future research efforts toward resolving current controversies in this field of sports science.

Research Methodology

This study was conducted as a systematic review. To gather relevant data, a comprehensive search was performed across reputable databases, including PubMed, Scopus, and Google Scholar, using a combination of keywords such as "nasal strips," "athletic performance," "aerobic respiration," and "athletes." Following an initial screening and application of selection criteria, five high-quality studies with the strongest levels of scientific evidence were identified and analyzed. For each study, key details were extracted, including research characteristics, methodology, study population, measured variables, and primary findings. The methodological quality of the studies was assessed using standardized checklists. The findings were qualitatively analyzed and synthesized. During this process, consistencies and discrepancies among the different results were examined, and a comprehensive summary of the existing evidence was developed, taking into account the strengths and limitations of each study. Finally, based on a systematic analysis of the findings, general conclusions were drawn regarding the impact of nasal strips on athletes' respiratory performance and their practical applications in sports settings.

Discussion and Conclusion

Current research presents a complex but revealing picture of nasal strips' effects on athletic performance. While the physiological data shows limited measurable impact on fundamental performance metrics like VO₂max, ventilation, and heart rate responses during exercise, the psychological and situational benefits suggest these devices may have meaningful applications in specific athletic contexts. The most consistent finding across studies is the lack of significant improvement in core physiological parameters. Multiple well-controlled investigations demonstrate that neither external nor internal nasal dilators meaningfully enhance oxygen uptake or cardiovascular function during exercise. This holds true across various exercise modalities and intensities, from submaximal endurance efforts to maximal interval training. The explanation appears straightforward - during vigorous exercise, ventilation demands naturally exceed what nasal breathing alone can provide, leading athletes to shift to oronasal breathing patterns regardless of nasal dilation. However, the research reveals several important exceptions and nuances that merit consideration. First, subjective measures consistently show benefits, with athletes reporting reduced perceived exertion and improved breathing comfort when using nasal strips. This psychological effect, while not reflected in physiological measurements, could translate to meaningful performance advantages in competitive settings where mental factors play a crucial role. Second, certain athletic populations and environmental conditions appear particularly suited to benefit from nasal strips. Athletes who must wear mouth guards (like football players) often rely more heavily on nasal breathing and may experience greater benefits. Similarly, exercise in hot environments may be improved through the enhanced nasal airflow and

potential cooling effects. Athletes with mild nasal obstructions or anatomical variations represent another subgroup that might benefit disproportionately. The practical implications suggest nasal strips should not be viewed as universal performance enhancers, but rather as situational tools that may offer advantages in specific circumstances. For most athletes under normal training conditions, they provide little measurable benefit. However, in targeted applications - particularly when psychological factors, environmental conditions, or individual anatomy create favorable conditions for their use - they may offer meaningful competitive edges. Future research should focus on better understanding these specific applications through larger, more targeted studies. Standardized protocols, improved placebo controls, and investigations in special populations would all contribute to a clearer picture of when and for whom nasal strips might be most beneficial. Until then, athletes and coaches should approach these devices as potential tools for specific situations rather than universal performance enhancers.

References

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