



# Title: From plate to performance: Unpacking the Effects of Low-Carb Ketogenic Diet on Physical Activity in Athletes

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## Introduction

Ketogenic diet has gained popularity in endurance sports as a potential strategy for enhancing performance. The concept of carbohydrate intake serves as a defining factor between ketogenic and non-ketogenic low-carb regimens. This study aims to investigate the influence of endurance training with a ketogenic diet on promoting adaptive changes in athletes.

## Rationale

Traditionally, athletes have focused on carbohydrate loading to optimize endurance performance. High-carbohydrate diets have been shown to increase muscle and liver glycogen stores, thereby improving overall endurance performance. However, these diets also elevate the rate of carbohydrate utilization during exercise, prompting exploration into alternative dietary approaches.

Overall, the introduction of ketogenic diet in endurance sports presents a shift towards understanding the potential benefits and challenges associated with altering the macronutrient composition of athletes' diets. This study seeks to contribute to the ongoing discourse surrounding the impact of ketogenic diet on endurance athletes' performance outcomes over an extended period.

## Methods

Robust advanced literature searches were conducted across PubMed, Google Scholar, and OVID databases. The PubMed search on "Ketogenic Diet" yielded 5028 results, while the MeSH term search produced 2035 hits after applying exclusion criteria. Google Scholar search with specified keywords returned 248 articles. In OVID, a search for "ketogenic diet" resulted in 5306 hits, with subsequent searches for "endurance" and "athlete" generating 60,079 and 26,071 hits. Applying various filters reduced the results to 95, with 37 relevant titles identified. A Grey Literature search on medrxiv.org yielded 93 initial results, potentially including 1 qualifying study. After removing duplicates, the search titles were independently reviewed, resulting in 183 articles for abstract screening to finalize the selection.

## Conclusion

Limited and heterogeneous evidence hinders definitive conclusions on the efficacy of the Ketogenic diet for performance benefits, particularly in comparison to high-carbohydrate diets. The impact of ketogenic diet consumption on  $VO_2$  max and performance outcomes remains inconclusive, necessitating further randomized trials to elucidate its nuanced effects on endurance performance. Studies suggest that high-fat diets may prove advantageous for aerobic endurance athletes during preparatory seasons with high-volume, low to moderate intensity training. While low carb high fat ketogenic diet can enhance fat metabolism, reduce body mass and fat content, and decrease post-exercise muscle damage, it may impede high-intensity work due to decreased glycogen stores. Gender differences may also influence fat and carbohydrate oxidation at varying exercise intensities, underscoring the need for research on genetic, recovery, sport type, and sex-related factors in shaping the impact of ketogenic diet consumption on performance outcomes.

## Discussion

The investigations on the intersection of endurance athletes and the ketogenic diet present a valuable opportunity to explore how dietary interventions can potentially impact athletic performance. By examining the effects of the ketogenic diet on endurance athletes such as runners, swimmers, and cyclists, researchers can shed light on how different nutritional approaches may influence aspects like energy levels, endurance, speed, power, strength, agility, and recovery. Understanding the relationship between specific dietary components like carbohydrates, proteins, and fats, and their impact on performance metrics, provides valuable insights for athletes, coaches, and nutritionists seeking to optimize training regimens and enhance athletic achievements. The findings from these investigations could potentially inform dietary recommendations tailored to the unique needs of endurance athletes, contributing to the broader conversation on sports nutrition and performance enhancement strategies.