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Short-Term Performance Outcomes of Mediterranean, Ketogenic, Plant-Based, and Intermittent Fasting Diets

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ABSTRACT

Recent nutrition research has established that diet plays a central role in factors ranging from endurance and recovery to body composition among athletes (Thomas et al., 2016). The physical effects of popular dietary approaches—such as the Mediterranean, ketogenic, plant-based, and intermittent fasting diets—have all been investigated. The Mediterranean diet has been found to improve endurance and reduce inflammation (Aune et al., 2017), while ketogenic and intermittent fasting diets show mixed results depending on the type of activity (Burke et al., 2017; Tinsley & La Bounty, 2015). This study explored how these four diets might influence athletic performance when followed by recreational athletes. Each participant was assigned one diet and tested for changes in endurance, sprint speed, and recovery after two weeks. The purpose was not to determine which diet is superior but to assess whether short-term dietary variation could create measurable changes in physical performance.

Introduction

Traditionally, physical performance has been evaluated through training, recovery, and biomechanical efficiency. However, in recent years, nutrition has emerged as a crucial determinant of athletic performance across endurance and high-intensity sports (Thomas et al., 2016).

The Mediterranean diet—rich in fruits, vegetables, whole grains, olive oil, and lean proteins—has consistently been linked with improved cardiovascular function and reduced inflammation (Aune et al., 2017). These properties make it particularly suitable for endurance athletes seeking sustained energy and quicker recovery.

The Ketogenic diet, in contrast, relies on high fat and minimal carbohydrates, shifting energy metabolism toward fat oxidation (Burke et al., 2017). While this can promote fat loss and

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metabolic efficiency, it may also decrease muscle glycogen and increase oxygen cost, impairing performance in high-intensity activities (Leckey et al., 2017).

Plant-based diets have gained popularity for their cardiovascular and sustainability benefits. When balanced with adequate protein, iron, and omega-3 sources, they support comparable performance levels to omnivorous diets (Wilson & Madrigal, 2016). However, insufficient nutrient intake can result in fatigue or slower recovery (Cermak et al., 2012).

Finally, Intermittent fasting—commonly following a 16:8 eating pattern—may improve metabolic regulation and fat loss but can lower energy availability during prolonged or intense exercise (Tinsley & La Bounty, 2015).

Therefore, this research aimed to compare how these four dietary approaches influence short-term endurance, sprint speed, and recovery among recreational athletes.

Methods

Participants

Eight healthy sportive volunteers, aged between 16 and 23 years, participated in the present study. They were further divided into four males and four females. All subjects were selected who had no history of any medical disorder that might influence the exercise performance, consistently exercising at least three days a week, and on a free diet before the commencement of the experiment. Since participation was completely on a volunteer basis and no remuneration was paid, eliminative measures against financial motivations were ensured.

The participants were divided into four groups at random, with one male and one female per group. Each group followed one of four diets: Mediterranean, ketogenic, plant-based, or intermittent fasting according to the 16:8 protocol. These diets were chosen due to their popularity and widely discussed preferences in sport nutrition research.

Examples and Technology Used

Changes in fitness were measured with three performance tests. The first test was an endurance test consisting of a treadmill run at 70% of the participant's estimated VO_2 max; the second test was a speed test, a 40-meter sprint, while the third test was for recovery, the time it took for heart rate to return to baseline after the treadmill exercise.

Sample meal plans were provided, along with virtual consultations with a nutrition advisor, to ensure the accurate following of each diet. Supplements and ergogenic aids were not used. Daily food logs were kept and virtual check-ins weekly monitored adherence.

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Procedure

These three base-line performance tests were given at the beginning of the experiment under similar environmental conditions and at the same time of day to all participants. The results served as the baseline for further comparison.

Each participant then followed their assigned diet for two weeks without changes in normal exercise or sleep routines. They kept a log of daily meals and reported if they noticed energy or mood changing.

At the end of the two weeks, participants repeated these performance tests. This post-diet testing was compared to their baseline data to see if the diet resulted in measurable changes in endurance, sprint time, or recovery.

Results

After two weeks, performance outcomes varied moderately but distinctly among the four diet groups.

Participants following the Mediterranean diet demonstrated the greatest overall improvement. Average endurance time increased by 7.6–8% ($t = 11$, $df = 1$, $p = .0577$), showing a positive trend despite the small sample size. Heart rate recovery improved by 9 bpm, and sprint times decreased slightly (0.03–0.04 s). The Mediterranean group's endurance gains were significantly higher than those of the ketogenic group ($t = 14.70$, $df = 2$, $p < .005$) and greater than those of the intermittent fasting group ($t = 4.56$, $df = 2$, $p < .05$), aligning with findings that Mediterranean-style eating enhances aerobic performance and cardiovascular efficiency (Aune et al., 2017; Thomas et al., 2016).

The Ketogenic diet group showed a 4.8% decline in endurance ($t = 10$, $df = 1$, $p = .0635$) and slower post-exercise recovery—about 5 bpm higher one minute after exertion. Sprint performance improved marginally (0.05 s), likely due to minor weight reduction (~1.2 kg). These findings mirror prior studies reporting reduced exercise economy and endurance under carbohydrate-restricted conditions (Burke et al., 2017; Leckey et al., 2017).

Participants on the Plant-Based diet displayed consistent improvements. Endurance increased by 5.9% ($t = 25$, $df = 1$, $p = .0255$), sprint times dropped 0.02 s, and recovery improved 7 bpm. These results align with prior evidence linking plant-based eating to better aerobic efficiency and inflammation control (Wilson & Madrigal, 2016; Aune et al., 2017).

The Intermittent Fasting group presented mixed results: one participant's endurance decreased by 3.3%, and the other's remained stable ($t < 1$, ns). Recovery declined 1.5 bpm, and sprint speed

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was unchanged. These variations reflect previously observed short-term performance fluctuations during fasting regimens (Tinsley & La Bounty, 2015).

Overall, both the Mediterranean and plant-based diets showed measurable gains in endurance and recovery, while ketogenic and intermittent fasting patterns produced inconsistent outcomes.

Discussion

This study supports prior research suggesting that diet composition can significantly affect athletic performance within a short time frame (Thomas et al., 2016; Kerksick et al., 2018). The Mediterranean and Plant-Based diets improved endurance and recovery, consistent with prior findings that diets rich in complex carbohydrates, antioxidants, and unsaturated fats enhance cardiovascular and muscular efficiency (Aune et al., 2017; Wilson & Madrigal, 2016).

The Mediterranean diet's high intake of complex carbohydrates and anti-inflammatory foods may optimize glycogen replenishment and reduce oxidative stress, leading to sustained energy and faster recovery (Burke et al., 2011). Similarly, plant-based diets supply carbohydrates and micronutrients that improve endurance capacity and reduce perceived fatigue (Cermak et al., 2012; Wilson & Madrigal, 2016).

The Ketogenic group's reduced endurance aligns with prior studies showing that low-carbohydrate, high-fat regimens impair high-intensity performance by limiting glycogen availability (Burke et al., 2017; Leckey et al., 2017). The minor sprint improvement might reflect short-term weight reduction rather than true performance enhancement.

Meanwhile, the Intermittent Fasting group's inconsistent outcomes highlight the effect of energy timing on exercise capacity—especially under fasted training conditions where glycogen stores may be insufficient (Tinsley & La Bounty, 2015).

Limitations of this study include its small sample size, short duration, and reliance on self-reported adherence. Future studies should use larger cohorts and biochemical measures (e.g., glucose or lactate testing) for greater accuracy (Kerksick et al., 2018).

Despite limitations, these findings reinforce the role of nutrition in shaping athletic performance. Diets emphasizing whole foods, complex carbohydrates, and healthy fats—such as the Mediterranean and plant-based diets—appear to provide short-term benefits for endurance and recovery over carbohydrate-restrictive or time-restricted dietary approaches (Aune et al., 2017; Wilson & Madrigal, 2016; Burke et al., 2017).

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