Beetroot Juice Fails to Boost Sports Performance in Latest Study

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Athletes and fitness enthusiasts frequently seek an edge, often turning to dietary supplements promising enhanced performance. Beetroot juice, rich in nitrates, has gained considerable attention as a natural ergogenic aid, with many believing it can improve endurance and power output.

But the evidence supporting these claims, particularly in well-trained individuals, has been inconsistent, leading to continued debate among sports scientists and clinicians.

KEY TAKEAWAYS

- The Pivot: Despite widespread anecdotal use, beetroot juice did not enhance performance in trained athletes.
- The Data: No statistically significant improvement in time to exhaustion or power output was observed.
- The Action: Clinicians should advise patients that current evidence does not support beetroot juice for performance enhancement.

The idea that dietary nitrates, found abundantly in beetroot, can improve athletic performance stems from their conversion to nitric oxide (NO) in the body. Nitric oxide plays a crucial role in vasodilation, increasing blood flow to muscles, and potentially improving oxygen delivery and nutrient exchange during exercise. This physiological mechanism has fueled the widespread belief that consuming beetroot juice before or during physical activity could translate into tangible performance benefits, particularly for endurance sports.1

Many athletes, from amateur runners to professional cyclists, incorporate beetroot juice into their training regimens, often citing personal experiences of reduced fatigue or improved times. This anecdotal evidence, however, frequently lacks the rigor of controlled clinical investigation. Previous smaller studies have yielded mixed results, with some showing modest improvements in untrained or moderately trained individuals, while others found no effect in elite athletes. This variability underscores the need for larger, well-designed trials to definitively assess its efficacy across different populations and exercise modalities.1

What the trial actually measured

A recent investigation aimed to clarify the effects of beetroot juice supplementation on exercise performance in a cohort of trained athletes. The study enrolled 60 healthy, recreationally active adults, all of whom engaged in at least three structured exercise sessions per week. Participants were randomised 1:1 to receive either 70 mL of concentrated beetroot juice (containing approximately 400 mg of nitrate) or a nitrate-depleted placebo juice daily for seven days. The trial employed a double-blind, placebo-controlled crossover design, meaning each participant received both the active

intervention and the placebo at different times, separated by a washout period, to minimise inter-individual variability.1
Investigators measured several key performance parameters, including time to exhaustion during a high-intensity cycling test, peak power output, and oxygen consumption (VO2 max). Blood samples were collected at baseline and after each intervention period to assess plasma nitrate and nitrite levels, confirming compliance and the physiological impact of the supplementation. Participants maintained their usual dietary and exercise habits throughout the study, with specific instructions to avoid other high-nitrate foods during the intervention phases.1
The primary endpoint, time to exhaustion during the cycling test, showed no statistically significant difference between the beetroot juice group and the placebo group. Participants receiving beetroot juice cycled for a median of 10.2 minutes, compared to 10.0 minutes for those on placebo (P=.32). This marginal difference falls well within the range of normal day-to-day physiological variation and does not support a performance-enhancing effect. Peak power output also remained unchanged, with no discernible improvement in the beetroot juice arm (P=.41).1
Oxygen consumption, a critical measure of aerobic capacity, similarly showed no significant alteration. VO2 max values were comparable between both groups, indicating that beetroot juice did not enhance the body's ability to utilise oxygen during maximal exercise. These findings challenge the prevailing notion that increased nitric oxide availability from beetroot juice directly translates into improved aerobic performance in trained individuals. The lack of effect on these objective measures suggests that any perceived benefits might be subjective or limited to specific populations not represented in this study.1
Secondary endpoints, including perceived exertion and recovery rates, also yielded no significant differences. Participants reported similar levels of fatigue and recovery regardless of whether they consumed beetroot juice or placebo. This suggests that even if there were subtle physiological changes, they were not sufficient to alter the subjective experience of exercise. The study did confirm a significant increase in plasma nitrate and nitrite levels in the beetroot juice group (P<.001), indicating that the active compound was absorbed and metabolised as expected. This confirms that the lack of performance effect was not due to insufficient nitrate delivery.1
The open-label design of many previous studies is an obvious caveat when interpreting their positive results, as participant expectation can heavily influence perceived performance. This trial’s double-blind, placebo-controlled methodology strengthens its conclusions by removing such bias. The study was powered to detect a 5% improvement in time to exhaustion, a clinically meaningful threshold for athletes. The fact that no such improvement was observed, even with adequate statistical power, reinforces the null finding.1
Still, the trial was conducted in recreationally active individuals, not elite athletes. Whether beetroot juice might offer a marginal benefit to highly trained professionals, where even a 1% improvement can be decisive, remains an open question. The specific dosage and duration of supplementation also warrant consideration; while 400 mg of nitrate is a commonly studied dose, individual responses can vary, and different protocols might yield different outcomes. The study also did not explore potential benefits in specific anaerobic activities or recovery from intense exercise, focusing primarily on aerobic endurance.1

CLINICAL IMPLICATIONS

Clinicians should advise patients that the current evidence does not support the use of beetroot juice as an ergogenic aid for improving sports performance in trained individuals. The data from this well-designed,

placebo-controlled trial are clear: no significant benefit was observed for key performance metrics like time to exhaustion or peak power output.

The widespread belief in beetroot juice's efficacy appears to be more rooted in anecdotal experience and marketing than in rigorous scientific validation. While the physiological mechanism of nitrate conversion to nitric oxide is sound, its translation into measurable performance gains in already fit individuals is not. This distinction is critical for managing patient expectations.

Patients, particularly those seeking an edge in competitive sports, often invest in supplements based on limited or biased evidence. GPs and specialists have a responsibility to provide evidence-based guidance, steering patients away from ineffective interventions that offer little more than a placebo effect. Money spent on beetroot juice could be better allocated to proven strategies like optimised nutrition, proper training, and adequate recovery.

The industry promoting these supplements often capitalises on the desire for quick fixes. This study serves as a reminder that physiological benefits do not always translate into performance benefits, especially when dealing with individuals already operating at a high level of fitness. The next trial needs to focus on specific, high-performance cohorts or explore different exercise modalities to find any niche where beetroot juice might genuinely offer an advantage.