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Role of Watermelon (*Citrullus lanatus*) Juice in Sports Performance: A Critical Review

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Abstract

Background: Athletes and coaches increasingly seek natural, food-based beverages that can support hydration, recovery, and training tolerance alongside conventional sports drinks. Watermelon (*Citrullus lanatus*) is unique among common fruits in being the richest known dietary source of the non-essential amino acid L-citrulline, a metabolic precursor of L-arginine and, in turn, nitric oxide (NO), while also supplying carbohydrate, potassium, vitamin C, provitamin-A carotenoids, and the carotenoid lycopene within a beverage that is roughly 90% water. This review asks whether watermelon-juice-based beverages, through this combination of hydration, electrolyte, carbohydrate, and phytochemical properties, confer measurable functional benefits for exercising and competitive athletes, and to what extent these benefits extend from recovery-related outcomes to direct performance outcomes. **Methods:** A structured, non-exhaustive search of PubMed, ScienceDirect, Scopus, and Google Scholar (2000–2025) was conducted using the terms “watermelon,” “*Citrullus lanatus*,” “L-citrulline,” “nitric oxide,” “lycopene,” and “sports nutrition” and “athletic performance.” Eligible studies reporting nutrient composition, vascular or nitric oxide pathway effects, antioxidant or anti-inflammatory activity, muscle soreness and recovery outcomes, or exercise-performance outcomes following watermelon juice, puree, or extract consumption were synthesized narratively under thematic headings. **Results:** Watermelon juice supplies carbohydrate, potassium, vitamin C, provitamin-A carotenoids, lycopene, and L-citrulline/L-arginine. Human trials in trained cyclists, half-marathon runners, resistance-trained men, and taekwondo athletes indicate benefits for post-exercise muscle soreness perception, heart rate recovery, and plasma markers of muscle damage, together with an increase in circulating L-citrulline and L-arginine. However, these benefits are not universal across non-athletic populations or beverage doses. Evidence for direct ergogenic (performance-enhancing) effects on time-to-exhaustion, $\text{VO}_{2\text{max}}$, and force output is more heterogeneous, with some trials reporting benefit and others reporting no change, likely reflecting inconsistent acute translation of increased L-arginine bioavailability into nitric oxide-mediated vasodilation. **Conclusions:** The evidence positions watermelon-juice-based beverages as a promising, food-first functional drink for athletic recovery, hydration, and cardiovascular support, with a more modest and inconsistent evidence base for direct performance enhancement. Standardised, citrulline-quantified beverage formulations and further trials in competitive athlete populations are recommended before firm ergogenic claims can be made.

Keywords: *watermelon; Citrullus lanatus; L-citrulline; nitric oxide; sports nutrition; functional beverage; athletic recovery*

Introduction

Effective nutrition and hydration plans are key factors influencing athletic performance and recovery. They affect substrate availability, temperature regulation, and the ability to handle training loads (Thomas et al., 2016). Replenishing fluids and electrolytes—especially sodium and potassium lost through sweat during and after exercise is crucial for avoiding performance drops and heat-related injuries (Sawka et al., 2007). In this context, whole-food and juice-based drinks are gaining attention as natural options or additions to traditional carbohydrate-electrolyte sports beverages, offering hydration, carbohydrates, and bioactive phytochemicals not found in typical sports drinks (Bojarczuk & Dzitkowska-Zabielska, 2022; Vitošević et al., 2025).

Watermelon (*Citrullus lanatus*) is a member of the Cucurbitaceae family and, at approximately 90–92% water by weight, is among the most hydrating of common fruits, while still providing carbohydrate, vitamin C, provitamin-A carotenoids, potassium, and magnesium (Shanely et al., 2016). Watermelon flesh is also the richest known dietary source of L-citrulline, a non-essential amino acid that serves as the principal circulating precursor of L-arginine, the substrate for endothelial nitric oxide synthase (eNOS) (dos Santos Baião et al., 2025). Unlike orally ingested L-arginine, which undergoes extensive first-pass hepatic and intestinal metabolism, L-citrulline is absorbed intact in the small intestine and converted to L-arginine primarily in the kidney, giving it comparatively higher systemic bioavailability as an arginine/nitric-oxide precursor (dos Santos Baião et al., 2025). Watermelon additionally contains lycopene, the carotenoid responsible for its characteristic red colour and a potent singlet-oxygen quencher, at concentrations exceeding those of most other fresh fruits and vegetables (Shanely et al., 2016; dos Santos Baião et al., 2025).

A central distinction motivates this review: watermelon-derived compounds may support athletic performance through at least two partly separable routes — a haemodynamic/vascular route, in which increased L-arginine bioavailability enhances nitric-oxide-mediated vasodilation and thereby oxygen and substrate delivery to working muscle, and a recovery-support route, in which antioxidant and anti-inflammatory phytochemicals (lycopene, vitamin C, polyphenols), together with electrolyte and fluid provision, reduce oxidative stress, muscle damage markers, and perceived soreness after exercise, without necessarily altering performance during the exercise bout itself. Existing reviews of L-citrulline and watermelon have generally addressed one of these routes in isolation, most often the vascular/blood-pressure literature in clinical and older-adult populations (Figuerola et al., 2017) or the muscle-soreness literature in athletes (Vitošević et al., 2025); this review integrates both strands specifically for an exercising-athlete population and asks how consistently each route is supported by the available evidence.

Accordingly, the present review addresses three objectives. First, to consolidate the documented nutritional and phytochemical composition of watermelon juice relevant to athletes, including its

carbohydrate, electrolyte, vitamin, and L-citrulline/lycopene content (dos Santos Baião et al., 2025). Second, to evaluate the vascular (nitric-oxide-mediated) mechanisms by which watermelon-derived L-citrulline may act, and the consistency with which these mechanisms translate into measurable exercise-performance outcomes (Bailey et al., 2015; Figueroa et al., 2017; Gonzalez & Trexler, 2020). Third, to synthesize the clinical trial evidence in athletic and exercising populations on recovery-related outcomes — muscle soreness, heart-rate recovery, blood markers of muscle damage, and antioxidant status — in order to assess watermelon juice's potential as a functional recovery and hydration beverage (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017; Blohm et al., 2020; Norouzzadeh et al., 2025).

Materials and Methods

Search Strategy

This paper adopts a critical narrative review design suited to appraising, rather than only summarizing, evidence spanning food-composition science, vascular physiology, and applied sports nutrition for a single beverage source. Rather than treating each study as an independent line of support for a functional-food claim, studies were weighed against one another by design quality (crossover versus parallel, blinding, sample size), population (trained athlete versus non-athlete or clinical), and dose form (whole juice/puree versus isolated or enriched citrulline), so that convergent and conflicting findings could be explicitly reconciled rather than merely listed. A structured, non-exhaustive literature search was conducted across PubMed, ScienceDirect, and Google Scholar for peer-reviewed articles published between 2000 and 2025. Search terms combined the identifiers “watermelon” OR “*Citrullus lanatus*” with the descriptors “L-citrulline,” “nitric oxide,” “L-arginine,” “lycopene,” “antioxidant,” and “blood pressure,” and separately with the sports-science terms “athletic performance,” “exercise,” “muscle soreness,” “recovery,” and “hydration.”

Eligibility Criteria and Data Synthesis

Studies were included if they reported primary data or systematic/narrative review findings on the nutrient or phytochemical composition of watermelon fruit, juice, puree, or extract, or on the physiological demands of exercise relevant to nutrition and hydration (oxidative stress, inflammation, vascular function, fluid-electrolyte balance). Non-peer-reviewed sources and articles without a traceable digital object identifier (DOI) or PubMed identifier were excluded to preserve citation verifiability. Extracted data were synthesized narratively under thematic headings rather than pooled quantitatively, consistent with the heterogeneity of study designs (in vitro, animal, non-athlete human, and athlete human) retrieved. For each theme, evidence was additionally classified by population studied (athletic versus non-athletic or clinical), by outcome domain (vascular/biochemical marker, recovery/soreness, or direct performance), and by a basic quality lens (sample size, crossover versus single-arm design, and whether citrulline dose reflected a typically consumed juice serving or an artificially enriched/isolated dose), in order to

make explicit not only where athlete-specific performance evidence is available, but how much weight that evidence can reasonably bear.

Ethics Statement

This review synthesizes previously published, publicly available secondary literature and did not involve new data collection from human or animal participants; ethical approval and informed consent were therefore not applicable.

Nutritional and phytochemical composition of watermelon juice

Watermelon flesh is approximately 90–92% water, positioning its juice as a naturally hydrating beverage base, while still supplying roughly 6% sugar by weight with a fructose-to-glucose ratio near 1:0.55, together with dietary vitamin C, provitamin-A carotenoids, and B-group vitamins including vitamin B6 (dos Santos Baião et al., 2025). Potassium is the predominant mineral, with one cup of watermelon juice providing roughly 269 mg (about 10% of daily value), supporting its traditional use as a natural electrolyte-replacement drink after exercise, alongside smaller contributions of magnesium (Sawka et al., 2007; dos Santos Baião et al., 2025).

Watermelon is the richest known dietary source of the non-essential amino acid L-citrulline, with the highest concentrations found in the white rind surrounding the flesh, and also contains its metabolic product L-arginine (dos Santos Baião et al., 2025). A standardized 500 mL serving of natural watermelon juice has been reported to provide approximately 1.17 g of L-citrulline, with enriched formulations tested in trials reaching 3–5 g per serving (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017). Watermelon also contains substantial lycopene — the carotenoid pigment responsible for its red colour and one of the most efficient dietary singlet-oxygen quenchers known — at concentrations exceeding those of most other fresh produce, alongside beta-carotene and smaller amounts of polyphenolic compounds (Volino-Souza et al., 2016; dos Santos Baião et al., 2025). Collectively, this composition combines fluid, carbohydrate, potassium, and a distinctive antioxidant/nitric-oxide-precursor profile within a single, palatable, whole-food beverage, aligning it with several of the physiological demands athletes face during and after training.

The L-citrulline -L-arginine – nitric oxide pathway

L-citrulline's relevance to exercise physiology rests principally on its role as a highly bioavailable precursor of L-arginine, the sole substrate for nitric oxide synthase (dos Santos Baião et al., 2025). Following ingestion, L-citrulline is absorbed in the small intestine and largely bypasses hepatic first-pass metabolism, which substantially degrades orally ingested L-arginine; it is subsequently converted to L-arginine mainly in the kidney, raising circulating L-arginine and, downstream, nitric-oxide-mediated vasodilation more effectively, gram-for-gram, than direct arginine supplementation (dos Santos Baião et al., 2025). This vascular pathway underlies watermelon's documented blood-pressure-lowering effects: a systematic review and meta-analysis of randomized controlled trials reported that L-citrulline supplementation and

watermelon intake significantly reduced systolic and diastolic blood pressure in middle-aged and older adults, with larger reductions when L-citrulline was combined with L-arginine (cited via Figueroa et al., 2017 and related meta-analytic literature). For athletes, reduced resting and post-exercise blood pressure and improved vascular tone are relevant to cardiovascular strain during repeated training sessions and to recovery between bouts.

Translation of this vascular mechanism into acute exercise performance is, however, inconsistent, and several controlled trials directly testing watermelon juice or extract in exercising humans report null findings. A randomised, double-blind, within-participants study comparing a single pre-exercise dose of L-citrulline, watermelon juice, or placebo in 22 participants found no significant differences between conditions in repetition volume over five sets, time-to-exhaustion, VO_2max , anaerobic threshold, or flow-mediated vasodilation (Cutrufello et al., 2015). Similarly, 16 days of watermelon juice concentrate supplementation (~ 3.4 g L-citrulline/day) raised plasma L-citrulline, L-arginine, and nitrite confirming improved nitric oxide pathway bioavailability but did not improve time-to-exhaustion during severe-intensity cycling, and unexpectedly increase rather than lowered resting systolic blood pressure in this trial, an atypical finding the author attribute to the high sugar content of the concentrate (Bailey et al., 2016). In resistance-trained men, seven days of watermelon juice concentrate (2.2 g L-citrulline/day) did not enhance isometric mid-thigh-pull force, bench-press velocity or power, muscle oxygenation, or brachial-artery vessel diameter relative to placebo (Gonzalez et al., 2022). A focused review of L-citrulline and watermelon supplementation concluded that while acute L-citrulline ingestion reliably raises plasma L-arginine, the subsequent improvement in nitric oxide production and flow-mediated dilation is variable, which likely explains why acute L-citrulline or watermelon intake does not consistently improve exercise tolerance, even though chronic supplementation more reliably improves resting vascular function and blood pressure in clinical populations (Figueroa et al., 2017). Where performance benefits have been shown, as with seven days of higher-dose synthetic L-citrulline before high-intensity cycling (Bailey et al., 2015) or in meta-analysed strength/power trials (Trexler et al., 2019), the interventions often used isolated, higher-dose L-citrulline rather than whole watermelon juice at typically consumed volumes, so the extent to which these findings generalize to a practical juice-based beverage is not fully established. A broader narrative review of the human citrulline-supplementation literature similarly concluded that performance benefits are inconsistent across studies and depend heavily on dose, timing, exercise mode, and training status (Gonzalez & Trexler, 2020).

Functional benefits relevant to athlete recovery and performance

Muscle soreness and post-exercise recovery

The most direct athlete-population evidence for watermelon juice comes from a maximal-effort cycloergometer test in which athletes consumed 500 mL of natural watermelon juice (1.17 g L-citrulline), an enriched juice (4.83 g L-citrulline), or a placebo; both watermelon juices reduced

recovery heart rate and muscle soreness at 24 hours relative to placebo (Tarazona-Díaz et al., 2013). In trained runners completing a half-marathon, a single 500 mL dose of watermelon juice enriched to 3.45 g L-citrulline, consumed two hours before the race, diminished muscle-soreness perception from 24 to 72 hours post-race, increased plasma L-arginine, and maintained lower plasma lactate and higher lactate dehydrogenase relative to placebo, alongside better-maintained countermovement-jump height after the race (Martínez-Sánchez, Ramos-Campo, et al., 2017). In resistance-trained men performing an intense half-squat protocol, watermelon juice enriched with both L-citrulline and pomegranate ellagitannins maintained basal levels of the muscle-damage markers lactate dehydrogenase and myoglobin, sustained force output during the protocol, and reduced both perceived exertion and post-exercise muscle soreness compared with placebo (Martínez-Sánchez, Alacid, et al., 2017).

In non-athletic adults, a single pre exercise dose of watermelon juice raised post exercise heart rate and blood lactate similarly to sugar water Gatorade, and produced no significant differences from these comparators in heart rate recovery, blood lactate, or post exercise muscle soreness the one selective benefit observe was that watermelon juice prevented the post exercise rise in systolic and diastolic blood pressure seen with other beverages in female, but not male, participants (Blohm et al., 2020), a further illustration of inconsistent and sex dependent translation of watermelon juice's biochemical effects into measurable physiological outcomes. By contrast, a randomized controlled trial in non-athlete men undergoing endurance training found that watermelon juice supplementation benefited muscle hypertrophy, exercise performance, and muscle soreness outcomes over the training period (Norouzzadeh et al., 2025). In trained cyclists, two weeks of daily watermelon puree ingestion (980 mL/day) raised plasma L-citrulline, L-arginine, and post-exercise antioxidant capacity relative to a carbohydrate-beverage comparator during 75 km time-trial cycling, although this trial found no difference in time-trial performance or systemic inflammatory markers between conditions, illustrating the gap between biochemical or antioxidant benefit and measurable performance change (Shanely et al., 2016).

Antioxidant status and oxidative stress mitigation

Strenuous exercise increases mitochondrial and phagocytic generation of reactive oxygen species, which, once exceeding endogenous antioxidant buffering capacity, contributes to lipid peroxidation and delayed-onset muscle soreness (Bojarczuk & Dzitkowska-Zabielska, 2022). Watermelon's lycopene, vitamin C, and beta-carotene content provide a plausible antioxidant basis for mitigating this response, and a systematic review of juice-based sports-nutrition interventions concluded that watermelon juice, primarily through its L-citrulline content, offered antioxidant and recovery support to exercising individuals, although performance outcomes varied across the included trials (Vitošević et al., 2025). In elite female taekwondo athletes, six weeks of watermelon juice supplementation improved total antioxidant capacity alongside changes in aerobic capacity (VO_2max), suggesting that sustained intake in a competitive athlete

population may support both oxidative-stress management and aerobic fitness markers (AghabeigiAmin et al., 2025).

Combined use with structured training and physical fitness outcomes

Beyond isolated supplementation trials, watermelon juice has also been tested as an adjunct to structured training programmes. In a controlled trial combining watermelon juice intake with an aquatic-exercise programme in 36 university-aged men and women, the combination was reported to produced synergistic improvements in physical-fitness and physiological variables relative to a reference group, illustrate that watermelon juice's functional benefits may be most apparent when paired with, rather than substituted for, a structured training stimulus (Omar et al., 2019).

Cardiovascular and vascular support

Beyond acute exercise contexts, watermelon extract and juice consumption have been shown in multiple trials to reduce resting systolic and diastolic blood pressure and improve markers of arterial stiffness in adults with elevated blood pressure, effects attributed to increased L-arginine bioavailability and nitric oxide-mediated vasodilation (Figueroa et al., 2017). For athletes, whose cardiovascular system is repeatedly stressed by training load, a beverage that supports vascular tone and blood-pressure regulation between sessions may plausibly contribute to overall cardiovascular readiness, even though, as noted above, this vascular benefit does not translate uniformly into acute within-session performance gains.

Hydration and electrolyte balance

Fluid and electrolyte replacement, particularly of potassium and sodium lost in sweat, is central to sustaining performance and preventing thermal injury during prolonged or intense exercise (Sawka et al., 2007). Watermelon juice's high water content (approximately 90–92%) combined with a meaningful potassium contribution positions it as a naturally hydrating, electrolyte-contributing beverage (Shanely et al., 2016; dos Santos Baião et al., 2025). This hydration and electrolyte profile complements, rather than replaces, standard carbohydrate-electrolyte fluid replacement protocols used in hot weather exercise (Sawka et al., 2007).

Discussion

The reviewed evidence indicates that watermelon-juice-based beverages are a multifunctional, food-based intervention with relevance to athletic recovery, spanning hydration and electrolyte provision (Sawka et al., 2007), muscle-soreness and muscle-damage-marker mitigation (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017; Martínez-Sánchez, Alacid, et al., 2017), antioxidant status support (Vitošević et al., 2025), and vascular/blood-pressure regulation (Figueroa et al., 2017). Unlike many underexplored functional foods, several of these findings derive directly from trials conducted in competitive or trained athletes cyclists, half-marathon runners, resistance-trained men, and taekwondo athletes rather than exclusively

from non-athlete or in vitro models, strengthening the applied relevance of the evidence base relative to reviews of less-studied functional foods.

Nonetheless, the review's central question of whether these benefits extend consistently from recovery-related outcomes to direct performance enhancement must be answered with caution. Recovery-oriented outcomes (soreness perception, heart-rate recovery, muscle-damage biomarkers, jump-height maintenance) are supported with reasonable consistency in trials conducted specifically in trained athletes (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017; Martínez-Sánchez, Alacid, et al., 2017; Blohm et al., 2020; Norouzzadeh et al., 2025). and in a non athlete endurance training trials (Norouzzadeh et al., 2025) although this consistency is not universal a crossover trial in non athletic adults found no significant benefit of a single watermelon juice dose for heart rate recovery, blood lactate, or muscle soreness relative to sugar water or a sports drink, with only a sex specific effect on post exercise blood pressure (Blohm et al., 2020)

Direct performance metrics time-to-exhaustion, submaximal or maximal aerobic capacity, and acute force or power output are supported considerably less consistently: multiple controlled trials specifically testing watermelon juice or concentrate found no significant improvement in repetition volume, time-to-exhaustion, VO_2max , anaerobic threshold, or flow-mediated dilation (Cutrufello et al., 2015), no improvement in endurance time-to-exhaustion and an unexpected increase in resting blood pressure despite confirmed gains in nitric-oxide-pathway biomarkers (Bailey et al., 2016), and no enhancement of isometric force, bench-press power, muscle oxygenation, or vessel diameter in resistance-trained men (Gonzalez et al., 2022). The mechanistic literature explains why: acute L-citrulline ingestion reliably raises plasma L-arginine, but the downstream increase in nitric-oxide-mediated vasodilation is variable between individuals and studies, limiting acute ergogenic translation even where recovery benefits are observed (Figuerola et al., 2017; Gonzalez & Trexler, 2020). Where performance benefits have been shown, as with seven days of higher-dose synthetic L-citrulline before high-intensity cycling (Bailey et al., 2015) or in meta-analysed strength or power trials (Trexler et al., 2019), the interventions often used isolated, higher-dose L-citrulline rather than whole watermelon juice at typically consumed volumes, so the extent to which these findings generalize to a practical juice-based beverage is not fully established. Combined-modality evidence, such as watermelon juice paired with an aquatic-exercise programme, suggests that some fitness benefits may depend on concurrent structured training rather than the beverage in isolation (Omar et al., 2019).

This distinction has practical implications: watermelon juice is best conceptualized, on current evidence, primarily as a recovery- and hydration-supporting functional beverage rather than as a guaranteed acute ergogenic aid. The lycopene and antioxidant content, together with the potassium and fluid provision, offer a food-based route to muscle-soreness mitigation and hydration support that complements, rather than replaces, established carbohydrate-electrolyte sports drinks and standard hydration protocols (Sawka et al., 2007). At the same time, the consistency of blood-pressure and vascular benefits across both athletic and clinical populations

suggests that regular watermelon juice intake may offer cardiovascular benefits relevant to sustained training load, independent of any acute performance effect (Figueroa et al., 2017).

Several limitations of the evidence base warrant caution. Many trials used enriched or standardized juices with citrulline content(3-5g/ serving) above what is typically obtained from a commercially available serving of watermelon juice(~1.17g/500mL), meaning dose-matched, real-world formulations require further testing(Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017). Sample sizes in the athlete-population trials are generally small, and study designs vary in exercise mode (cycling, running, resistance exercise), duration of supplementation (acute versus chronic), and athlete calibre, limiting direct comparison(Bailey et al., 2016; Gonzalez et al., 2022; Norouzzadeh et al., 2025). Finally, most vascular and blood-pressure evidence derives from non-athlete, middle-aged, or clinical populations(Figueroa et al., 2017), so its extrapolation to young, trained athletes with typically lower resting blood pressure remains partly inferential.

Conclusion

This review establishes watermelon (*Citrullus lanatus*) juice as a functional, food-based beverage relevant to sports nutrition, built on three converging evidence strands. Compositionally, its high water content, carbohydrate, potassium, vitamin C, and lycopene profile justify its role as a natural hydration- and electrolyte-supportive whole-food beverage (dos Santos Baião et al., 2025; Sawka et al., 2007). Mechanistically, its status as the richest dietary source of L-citrulline provides a well-characterized, if variably expressed, route to increased L-arginine bioavailability and nitric-oxide-mediated vascular benefit (dos Santos Baião et al., 2025; Figueroa et al., 2017). Clinically and in applied athlete trials, watermelon juice consumption has repeatedly reduced post-exercise muscle soreness, supported heart-rate recovery, and maintained lower muscle-damage-marker and lactate concentrations across cycling, running, and resistance-exercise contexts, while direct performance-enhancement evidence remains more heterogeneous (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017; Martínez-Sánchez, Alacid, et al., 2017).

Because the strongest and most consistent evidence concerns recovery, hydration, and vascular support rather than acute performance enhancement, watermelon juice's relevance to athletes rests principally on this recovery-and-cardiovascular-support rationale, reinforced by its low cost, palatability, and long-standing dietary use. Standardized, citrulline-quantified beverage formulations, dose-response trials in competitive athlete populations, and head-to-head comparisons against conventional sports drinks are recommended as priority next steps before watermelon juice can be formally incorporated into evidence-based athlete dietary guidance.

Practical applications

For sports nutritionists, coaches, and athletes, the reviewed evidence suggests several tentative, food-first applications of watermelon juice pending further confirmatory trials in competitive

populations. Watermelon juice may be used as a natural, palatable pre-exercise hydration and carbohydrate source, consumed roughly one to two hours before training or competition, consistent with the timing used in half-marathon and cycloergometer trials (Tarazona-Díaz et al., 2013; Martínez-Sánchez, Ramos-Campo, et al., 2017). As a post-exercise recovery beverage, its combination of potassium, fluid, and antioxidant phytochemicals offers a whole-food alternative or complement to isolated electrolyte or polyphenol supplements, with the strongest evidence for reduced muscle soreness and faster heart-rate recovery (Blohm et al., 2020; Norouzzadeh et al., 2025). In hot-weather training and competition, watermelon juice's high water and potassium content may serve as a culturally familiar, food-based adjunct to standard fluid-replacement protocols rather than a substitute for them (Sawka et al., 2007). These applications position watermelon juice as a recovery- and hydration-supporting addition to an athlete's diet, best combined with, rather than substituted for, individualized carbohydrate-electrolyte strategies and periodized training nutrition.

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