

The Role of Young Coconut Water as a Rehydration Beverage on Hydration Status and Work-Related Fatigue: a Systematic Literature Review

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Abstract

Dehydration is a common problem among individuals engaged in physical activity and workers exposed to heat, and it contributes to decreased work capacity and increased fatigue. Effective rehydration strategies require not only adequate fluid intake but also sufficient electrolyte replacement to maintain body fluid balance. Young coconut water is a natural beverage rich in electrolytes and has the potential to serve as an alternative rehydration drink. This study aimed to systematically synthesize empirical evidence regarding the role of young coconut water as a rehydration beverage on hydration status and work-related fatigue. A Systematic Literature Review (SLR) was conducted following the PRISMA guidelines. Literature searches were performed using three electronic databases Google Scholar, ScienceDirect, and MDPI and resulted in 16 articles that met the inclusion criteria. The synthesis results indicate that young coconut water consumption consistently contributes to the maintenance of hydration status, reduces work-related and physical fatigue, and supports physiological recovery following physical activity. However, its effects on physical performance were found to be variable and context-dependent. Overall, young coconut water demonstrates potential as a natural rehydration strategy, particularly in the context of physical activity and heat-exposed working environments.

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INTRODUCTION

Hydration is a fundamental physiological requirement for maintaining homeostasis and supporting optimal physical and cognitive functioning. Approximately 60–70% of the human body consists of water, which plays a critical role in regulating body temperature, facilitating nutrient transport, maintaining blood circulation, and supporting metabolic processes at the cellular level (Masula, 2017). Disruption of body fluid balance may result in dehydration, a condition that negatively affects thermoregulation, cardiovascular stability, and neuromuscular performance. Dehydration is commonly classified into hypotonic, hypertonic, and isotonic types, depending on the relative loss of water and electrolytes, with isotonic dehydration being the most frequently encountered condition during physical activity and occupational heat exposure (Rismayanthi, 2012).

The consequences of dehydration extend beyond physiological imbalance and directly influence functional capacity. Empirical evidence indicates that even mild dehydration can impair concentration, reduce alertness, increase fatigue, and decrease physical work capacity (Rismayanthi, 2012). In occupational settings, particularly those involving outdoor work and high physical demands, dehydration has been associated with headaches, muscle cramps, reduced productivity, and an increased risk of work-related accidents. Severe dehydration, characterized by excessive loss of total body water, may lead to life-threatening conditions, highlighting the importance of effective hydration strategies in occupational health and safety contexts.

Heat exposure is a major contributor to dehydration among workers engaged in physically demanding tasks. Studies conducted in hot working environments have shown that many workers begin their shifts in a hypohydrated state and fail to adequately replace fluid losses throughout the workday (Kenefick & Sawka, 2007). Prolonged exposure to high ambient temperatures accelerates sweating and fluid loss, leading to decreased plasma volume and increased cardiovascular strain. These physiological responses contribute to early fatigue onset, reduced endurance, and diminished work performance (Sari, 2017). Consequently, hydration management has become a critical component of occupational health, particularly for workers exposed to heat stress over extended periods.

Several studies have demonstrated a strong association between hydration status and work-related fatigue. Research involving fishermen, porters, and other manual laborers indicates that inadequate hydration significantly increases fatigue levels, which in turn reduces work tolerance and productivity (Safitri et al., 2025). Fatigue in occupational contexts is widely recognized as a multifactorial phenomenon influenced by hydration status, energy intake, workload intensity, and environmental conditions. Among these factors, hydration represents a modifiable and cost-effective target for intervention, particularly in settings where workers are exposed to physical strain and thermal stress.

Effective rehydration involves more than water replacement alone. Electrolytes, particularly sodium and potassium, play essential roles in maintaining extracellular and intracellular fluid balance, supporting nerve conduction, and enabling muscle contraction. Previous studies have shown that beverages containing carbohydrates and electrolytes can improve physiological recovery and work productivity when controlling for age, energy intake, and baseline hydration status (Hapsari & Kartini, 2013). The presence of glucose enhances sodium absorption in the intestine, facilitating more efficient fluid uptake and accelerating the restoration of hydration status compared to plain water (Saputri et al., 2021).

In the context of physical activity and sports, the type of rehydration fluid consumed has been shown to influence hydration status, fatigue, and recovery outcomes (Anggita et al., 2018; Rubiono & Setiawan, 2020). Young coconut water has received increasing attention as a natural rehydration beverage due to its electrolyte composition, including potassium, sodium, calcium, and magnesium, as well as its natural sugar content. Several experimental studies have reported that coconut water provides hydration benefits comparable to commercial isotonic sports drinks and may contribute to improved aerobic capacity, reduced fatigue, and enhanced post-exercise recovery (Putra, 2019; Islamiyah, 2019).

Despite these promising findings, the existing body of literature presents several limitations. Most studies examining coconut water as a rehydration beverage have been conducted in controlled sports or laboratory-based exercise settings, with limited emphasis on occupational health outcomes. Furthermore, the available evidence varies considerably in terms of research design, participant characteristics, intervention duration, and outcome indicators. These variations make it difficult to draw comprehensive conclusions regarding the role of coconut water in maintaining hydration, reducing fatigue, and supporting physiological recovery across different populations and work contexts.

From an occupational health perspective, there is a growing need to explore locally available, culturally acceptable, and economically feasible hydration strategies. Coconut water is widely accessible in tropical regions and represents a natural alternative to commercially formulated sports drinks. However, its potential role in mitigating dehydration and work-related fatigue among workers exposed to heat stress has not

been systematically synthesized. Without an integrated synthesis that connects hydration outcomes, fatigue reduction, physiological recovery, and performance-related indicators, the applicability of existing findings to occupational settings remains insufficiently clarified.

Therefore, this study aims to provide a structured and thematic synthesis of empirical evidence regarding the role of young coconut water as a rehydration beverage. By integrating findings from sports science and occupational health literature, this study seeks to clarify how coconut water influences hydration status, work-related and physical fatigue, physiological recovery, and functional performance. The synthesis is organized in a manner that directly informs the subsequent results and discussion, allowing for a coherent interpretation of evidence across multiple outcome domains. Through this approach, the study contributes to the existing literature by positioning coconut water not merely as a sports drink alternative, but as a potential hydration strategy relevant to occupational health and heat-exposed working populations.

Based on these objectives, the present study addresses the following research questions:

1. How does the consumption of young coconut water influence hydration status under conditions of physical activity and heat exposure?
2. What effects does young coconut water consumption have on work-related and physical fatigue?
3. How does young coconut water contribute to physiological and metabolic recovery following physical exertion?
4. What evidence exists regarding the impact of young coconut water on physical performance and functional capacity?

METHOD

This study employed a Systematic Literature Review (SLR) to comprehensively synthesize empirical evidence on the role of young coconut water as a rehydration beverage in the context of physical activity and heat exposure. The SLR approach was selected to ensure a rigorous, transparent, and replicable process in identifying, evaluating, and integrating findings from previous studies, while also enabling thematic interpretation aligned with the study background and results. The entire review process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

A systematic literature search was conducted using three major electronic databases: Google Scholar, ScienceDirect, and MDPI. The search strategy employed a combination of English and Indonesian keywords relevant to the research focus, including *coconut water*, *young coconut water*, *rehydration*, *hydration status*, *fatigue*, *physiological recovery*, and *physical performance*, as well as *air kelapa*, *rehidrasi*, *dehidrasi*, and *kelelahan*. The search was limited to peer-reviewed journal articles that were accessible in full-text form and published within the predetermined inclusion period.

The identification stage yielded a total of 785 articles, comprising 149 records from Google Scholar, 627 records from ScienceDirect, and 9 records from MDPI. All retrieved references were compiled and subjected to an initial electronic screening process. During the title and abstract screening stage, 720 articles were excluded due to several reasons, including irrelevance to coconut water, rehydration, or work-related and physical fatigue; studies conducted on non-human subjects; absence of empirical data; and publications limited to reviews, commentaries, conference proceedings, or other non-original research formats.

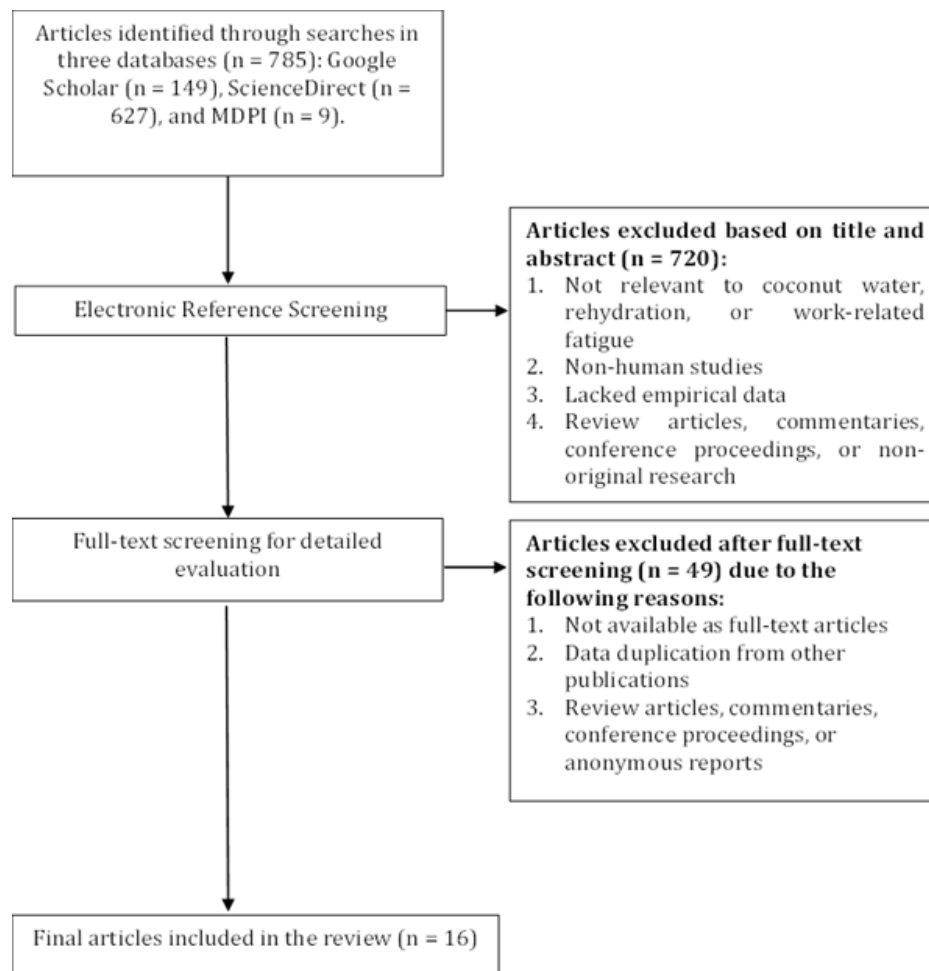


Figure 1. Flow Diagram of the Article Selection Process

The remaining articles were then assessed through full-text screening to determine eligibility based on predefined inclusion and exclusion criteria. At this stage, 49 articles were excluded following comprehensive evaluation. The main reasons for exclusion included the unavailability of full-text articles, duplication of data reported in other publications, and studies presented solely as reviews, commentaries, proceedings, or anonymous reports. After completing the screening and eligibility assessment process, 16 articles met all inclusion criteria and were selected for inclusion in the qualitative synthesis.

The entire study selection process, including identification, screening, eligibility assessment, and final inclusion, is visually summarized in the PRISMA flow diagram, which is presented as Figure 1 at the beginning of the Results section. The placement of this figure is intended to provide readers with a clear and transparent overview of the literature selection pathway prior to the presentation of synthesized findings.

Following study selection, data extraction was conducted using a structured extraction framework. Extracted information included author(s) and year of publication, study title, participant characteristics, research design, and key outcomes related to hydration status, fatigue, physiological recovery, and physical performance. The extracted data were first organized into a general synthesis table to provide an overarching summary of the characteristics and principal findings of the included studies.

Subsequently, a qualitative thematic synthesis was performed to integrate the findings across studies. Based on conceptual similarity and outcome focus, the evidence was grouped into four main thematic domains: hydration status and fluid balance, work-related and physical fatigue, physiological and metabolic recovery, and physical

performance and functional capacity. These thematic groupings formed the basis for the development of grouped synthesis tables, which are presented prior to the Discussion section to ensure logical continuity between results presentation and interpretative analysis.

The Discussion section was developed by critically interpreting the thematic synthesis in relation to established theoretical frameworks on hydration physiology, fatigue mechanisms, and recovery processes. Emphasis was placed on identifying patterns of consistency and divergence across studies, contextual differences among participant populations, and methodological limitations that may influence outcome interpretation. Through this integrated methodological approach, the study ensures transparency, analytical coherence, and alignment between the research background, results, and discussion.

RESULTS AND DISCUSSION

The synthesis of sixteen reviewed articles reveals a relatively consistent pattern regarding the role of young coconut water as a natural rehydration beverage under conditions of fluid loss caused by physical activity and heat exposure. Overall, most studies report that coconut water consumption is associated with improved hydration status, reduced fatigue, and enhanced physiological recovery across various populations, including athletes, university students, and outdoor workers.

In the context of physically demanding work in hot environments, such as porters and fishermen, several studies reported a significant reduction in work-related fatigue following coconut water consumption. These improvements were reflected in decreased subjective fatigue scores, better post-work recovery capacity, and improved physiological responses to workload. Such findings suggest that coconut water may support neuromuscular recovery after prolonged physical exertion.

Within structured exercise and sports settings, young coconut water has been shown to effectively maintain body fluid balance. Several studies demonstrated that post-exercise body weight changes, urine specific gravity, and plasma volume indicators were comparable to those observed after consumption of commercial electrolyte drinks. These findings indicate that the rehydration effectiveness of coconut water is equivalent to industrially formulated sports drinks.

Beyond hydration, some studies reported improved metabolic recovery indicators, including reduced blood lactate levels, faster heart rate recovery, and enhanced post-activity stamina. These results indicate that coconut water functions not only as a rehydration fluid but also as a potential aid in post-exercise physiological recovery.

Nevertheless, most of the reviewed studies present methodological limitations, such as small sample sizes, short intervention durations, and a predominance of non-randomized designs. Consequently, the generalization of these findings particularly to large-scale outdoor worker populations should be approached with caution.

Table 1. Summary of Reviewed Studies on Coconut Water as a Rehydration Beverage

No	Authors & Year	Title	Subjects & Study Design	Main Findings
1	Brien et al. (2023)	<i>Coconut Water: A Sports Drink Alternative?</i>	Trained cyclists; randomized crossover trial	Coconut water produced physiological responses and cycling performance comparable to commercial sports

No	Authors & Year	Title	Subjects & Study Design	Main Findings
				drinks, with no significant differences in key physiological variables
2	Nurmayanti (2016)	<i>Coconut Water as Enhancer Productivity of Labor Exposed to Heat</i>	Heat-exposed workers; pre-experimental one-group pretest-posttest	Coconut water significantly increased blood sodium levels and was more effective than plain water in supporting work productivity
3	Kalman et al. (2012)	<i>Comparison of Coconut Water and a Carbohydrate-Electrolyte Sport Drink on Measures of Hydration and Physical Performance in Exercise-Trained Men</i>	Exercise-trained men; crossover design	Coconut water reduced fatigue and improved body fluid balance
4	Pusponegoro et al. (2019)	<i>Pemberian Air Kelapa Muda Terhadap Kelelahan Kerja Pada Buruh Angkut Pasar Tanjung Kabupaten Jember</i>	Market porters; quasi-experimental	Administration of 600 mL of young coconut water significantly reduced work-related fatigue compared to the control group
5	Wachidah et al. (2019)	<i>Pengaruh Pemberian Air Kelapa Muda Terhadap Kelelahan Nelayan Yang Melaut Siang Hari</i>	Fishermen; quasi-experimental one-group pretest-posttest	Seven-day consumption of young coconut water significantly reduced fatigue among fishermen working during daytime
6	Dwita et al. (2015)	<i>Pengaruh Rehidrasi Menggunakan Air Kelapa (Cocos Nucifera L) Terhadap Stamina Atlet Dayung</i>	Rowing athletes; crossover design	Coconut water demonstrated a near-optimal rehydration index and effectively restored physiological condition after activity
7	Saat et al. (2002)	<i>Rehydration after Exercise with Fresh Young Coconut Water, Carbohydrate-Electrolite Beverage and Plain Water</i>	Men; crossover study	Coconut water was effective as a rehydration fluid and maintained body fluid balance comparable to electrolyte beverages
8	Buwana et al. (2016)	<i>Pengaruh Pemberian Air Kelapa Muda (Cocos Nucifera) Terhadap Kelelahan</i>	Fishermen; quasi-experimental	Coconut water alleviated work-related fatigue; its electrolyte ions

No	Authors & Year	Title	Subjects & Study Design	Main Findings
		<i>Kerja Pada Nelayan Di Tambak Mulyo Semarang</i>		(potassium, sodium) replaced fluid lost through sweat, while its sugar content provided additional energy
9	Nissa et al. (2021)	<i>Perbandingan Jenis Cairan Rehidrasi terhadap Tingkat Dehidrasi dan VO₂ Maksimal pada Remaja Putri Peserta Ekstrakurikuler Bola Basket</i>	Female adolescent basketball players; quasi-experimental	Coconut water showed the best hydration status and significantly increased VO ₂ max compared to other rehydration fluids
10	Rahmawati et al. (2023)	<i>Efektifitas Cairan Rehidrasi Terhadap Denyut Nadi, Tekanan Darah Dan Kebugaran Atlet Bola Volley</i>	Volleyball athletes; experimental	A significant effect was observed on heart rate recovery, but no significant effects were found on blood pressure or overall physical fitness
11	Nugraha (2019)	<i>Efek Pemberian Isotonic Water dan Air Kelapa Terhadap Kadar Asam Laktat Dalam Darah Setelah Melakukan Aktivitas Dengan Intensitas Tinggi</i>	University students; crossover design	Coconut water was more effective in reducing blood lactate levels than isotonic drinks
12	Darma et al. (2023)	<i>Pengaruh Pemberian Minuman Yang Berbeda Terhadap Denyut Nadi Pemulihan Setelah Melakukan Aktivitas Fisik</i>	University students; quasi-experimental	Coconut water accelerated heart rate recovery compared to other beverages
13	Syahrul et al. (2023)	<i>Manfaat Air Kelapa Muda Terhadap Kebugaraan Jasmani Mahasiswa Dewasa Awal</i>	University students; experimental	Consumption of young coconut water significantly improved physical fitness
14	Ramadhan & Avandi (2020)	<i>Pengaruh Pemberian Air Kelapa Dan Air Gula Merah Terhadap Status Dehidrasi Pemain Futsal</i>	University students; quasi-experimental	Coconut water significantly improved hydration status, whereas palm sugar water and plain water showed no significant effects

No	Authors & Year	Title	Subjects & Study Design	Main Findings
15	Zhaffran & Pramono (2018)	<i>Perbandingan Pengaruh Pemberian Air Kelapa, Jus Semangka dan Air Lemon Terhadap Tingkat Dehidrasi</i>	U-19 athletes; quasi-experimental	Coconut water improved hydration status by two levels, while watermelon juice and lemon water showed no significant changes
16	Budiman & Ray (2019)	<i>Perbandingan Pengaruh Air Kelapa Dan Minuman Isotonik Terhadap Tingkat Hidrasi Atlet Cabang Olahraga Bola Basket</i>	Basketball athletes; quasi-experimental	No significant difference in hydration status was observed; however, significant differences were found in fatigue index and blood glucose levels

Grouped Synthesis of Findings

To deepen the interpretation of the literature, the synthesis results were further categorized into four main thematic groups based on similarities in research focus and outcome indicators. This thematic grouping provides a clearer analytical structure and serves as a systematic foundation for the subsequent discussion.

Table 2. Grouped Synthesis of Findings Based on Four Main Themes

Main Theme	Focus of Findings	Summary of Synthesized Results	Authors (Year)
Hydration status and body fluid balance	Rehydration effectiveness	Coconut water consistently maintains hydration status, showing comparable effectiveness to commercial electrolyte drinks based on physiological hydration indicators	Saat et al. (2002); Kalman et al. (2012); Brien et al. (2023); Nissa et al. (2021); Ramadhan & Avandi (2020); Zhaffran & Pramono (2018); Putra (2019)
Work-related and physical fatigue	Fatigue reduction	Coconut water consumption significantly reduces work-related fatigue among fishermen and porters and decreases physical fatigue during intense activity	Pusponegoro et al. (2019); Wachidah et al. (2019); Buwana et al. (2016); Kalman et al. (2012); Budiman & Ray (2019); Safitri et al. (2025)
Physiological and metabolic recovery	Post-activity recovery	Coconut water accelerates heart rate recovery, reduces blood lactate concentration, and demonstrates near-optimal rehydration indices	Nugraha (2019); Darma et al. (2023); Dwita et al. (2015)
Physical performance, fitness, and	Performance and acceptability	Coconut water is associated with improvements in $VO_2\text{max}$	Islamiyah (2019); Syahrul et al. (2023); Rahmawati et al.

Main Theme	Focus of Findings	Summary of Synthesized Results	Authors (Year)
consumption tolerance		and physical fitness and shows high consumption tolerance with minimal gastrointestinal discomfort	(2023); Saat et al. (2002); Brien et al. (2023)

Hydration Status and Body Fluid Balance

Based on the thematic synthesis presented in Table 2, most of the reviewed studies indicate that young coconut water has the potential to support the maintenance of hydration status under conditions of fluid loss due to physical activity. The effectiveness of hydration was commonly assessed using physiological indicators such as urine specific gravity and changes in body weight before and after activity. These indicators are widely used to reflect the balance between fluid loss and replacement during or following exercise or heat exposure.

Several comparative studies reported that urine specific gravity values observed after the consumption of coconut water were within a similar range to those recorded following the intake of commercial electrolyte beverages, suggesting comparable hydration outcomes between the two types of fluids (Saat et al., 2002; Kalman et al., 2012). Comparable findings were also reported in studies examining post-activity body weight changes, where no statistically significant differences were observed between coconut water and sports drinks in terms of fluid replacement efficiency (Brien et al., 2023). These results suggest that, within short-term and controlled settings, coconut water is capable of compensating for fluid losses associated with physical activity.

From a compositional perspective, coconut water contains naturally occurring electrolytes, particularly potassium and sodium, which play important roles in regulating intracellular and extracellular fluid balance. Potassium contributes primarily to intracellular fluid regulation, whereas sodium is essential for maintaining extracellular fluid volume and plasma balance. However, it should be noted that the electrolyte composition of coconut water may vary depending on factors such as fruit maturity and growing conditions. Consequently, while coconut water demonstrates potential as a hydration fluid, its consistency and standardization remain considerations when compared to formulated electrolyte beverages.

Although existing evidence supports the hydration potential of coconut water, most studies were conducted in athletic or laboratory-controlled contexts with relatively short intervention durations. Therefore, the generalizability of these findings to occupational settings involving prolonged heat exposure should be interpreted with caution.

Work-Related Fatigue and Physical Fatigue

The second thematic synthesis highlights hydration status as one of several factors associated with work-related and physical fatigue, particularly among individuals performing physically demanding tasks in hot environments. Fatigue is recognized as a multifactorial phenomenon influenced by fluid loss, workload intensity, environmental conditions, and individual characteristics.

Studies conducted among fishermen and manual laborers reported that the consumption of coconut water was associated with reductions in reported levels of work-related fatigue following the intervention period (Pusponegoro et al., 2019; Wachidah et al., 2019). Fatigue assessment in these studies was primarily based on subjective fatigue scores and basic indicators of physical performance. The observed reductions suggest

that fluid and electrolyte replacement may contribute to improved tolerance to physical work under heat stress conditions.

Supporting evidence from the broader literature indicates that even mild dehydration can negatively affect physical work capacity and increase perceptions of fatigue (Safitri et al., 2025). Physiologically, hypohydration may reduce plasma volume, increase cardiovascular strain, and impair thermoregulatory efficiency, all of which can accelerate the onset of fatigue during sustained physical activity. However, the magnitude of hydration-related fatigue effects may vary depending on individual fitness levels, task demands, and environmental exposure.

In this context, coconut water may be considered a potential rehydration option that could support fatigue management in physically demanding work environments. Nevertheless, most available studies employed quasi-experimental designs with limited sample sizes and short observation periods. As such, current findings indicate an association rather than a definitive causal relationship between coconut water consumption and reduced work-related fatigue.

Physiological and Metabolic Recovery

The third thematic group focuses on indicators of physiological and metabolic recovery following physical activity. Recovery was generally evaluated using objective measures such as heart rate recovery, blood lactate concentration, and rehydration indices, which reflect the body's ability to return toward baseline physiological conditions after exertion.

Several studies reported that heart rate recovery tended to occur more rapidly in participants who consumed coconut water compared to those receiving other fluids (Darma et al., 2023). Faster heart rate recovery may indicate more efficient cardiovascular adjustment following physical stress. However, these findings were not consistently observed across all studies, highlighting variability related to study design and participant characteristics.

In addition, research examining blood lactate levels found that coconut water consumption was associated with greater reductions in post-exercise lactate concentration compared to isotonic beverages (Nugraha, 2019). Lower lactate levels are often interpreted as reflecting more efficient metabolic recovery, although the underlying mechanisms were not fully explored in the reviewed studies. Factors such as exercise intensity, baseline fitness, and timing of measurements may influence these outcomes.

Evidence from studies involving rowing athletes further indicated that coconut water demonstrated a rehydration index approaching optimal values, suggesting effective restoration of physiological conditions following intense activity (Dwita et al., 2015). Despite these promising findings, most studies were conducted under controlled sports settings, limiting their direct applicability to occupational contexts. Therefore, coconut water is best regarded as a potential supportive option for recovery rather than a primary recovery intervention.

Physical Performance, Fitness, and Consumption Tolerance

The final thematic synthesis addresses the relationship between coconut water consumption, physical performance, fitness outcomes, and consumption tolerance. Performance-related outcomes were typically assessed using indicators such as VO_2 max, general fitness scores, and physiological responses during activity.

Some studies reported improvements in VO_2 max and overall physical fitness among athletes and university students following coconut water consumption (Islamiyah, 2019; Syahrul et al., 2023). These findings suggest a possible association between hydration strategy and aerobic performance. However, other studies reported mixed results, with

improvements observed in certain physiological parameters but not in broader fitness measures (Rahmawati et al., 2023). This variability indicates that performance outcomes are likely influenced by multiple interacting factors, including training status, nutritional intake, and exercise protocols.

In addition to performance, tolerance and acceptability of coconut water were frequently highlighted. Comparative studies reported minimal gastrointestinal discomfort associated with coconut water consumption, suggesting good tolerance relative to commercial electrolyte beverages (Saat et al., 2002; Brien et al., 2023). Consumption tolerance is a critical consideration, as adherence to hydration strategies is essential for their effectiveness.

Nevertheless, individual preferences, volume consumed, and contextual factors may affect acceptance. Overall, current evidence suggests that coconut water may support physical performance and is generally well tolerated, but its role should be viewed as context-dependent rather than universally applicable.

CONCLUSION

This systematic literature review demonstrates that young coconut water has a meaningful role as a natural rehydration beverage in contexts involving physical activity and heat exposure. The synthesized evidence consistently indicates that young coconut water is effective in maintaining hydration status and reducing work-related and physical fatigue, largely due to its electrolyte composition and fluid replacement capacity. In addition, several studies suggest that coconut water supports physiological recovery following physical exertion, as reflected by improved recovery indicators such as heart rate recovery and reduced metabolic fatigue. However, the effects of young coconut water on physical performance outcomes appear to be variable and highly dependent on study design, population characteristics, and performance indicators used. Overall, the findings highlight that the primary benefits of young coconut water lie in hydration maintenance and fatigue reduction rather than direct performance enhancement. These results support the potential use of young coconut water as an accessible and contextually relevant rehydration strategy, particularly in heat-exposed working environments and physically demanding activities, while also underscoring the need for further high-quality research to strengthen evidence on performance-related outcomes.

RECOMMENDATIONS

Future research is recommended to employ well-controlled experimental designs with larger sample sizes and longer intervention durations to strengthen the scientific evidence regarding the effectiveness of young coconut water as a rehydration beverage. Particular emphasis should be placed on outdoor worker populations who are routinely exposed to heat stress and high physical demands. Longitudinal studies are needed to evaluate not only short-term hydration and fatigue outcomes but also long-term safety, compliance, and potential health impacts. In addition, standardized hydration and fatigue indicators should be applied to improve comparability across studies. Such rigorous investigations will be essential to confirm the effectiveness, safety, and practical applicability of young coconut water within occupational health contexts.

AUTHOR CONTRIBUTIONS

(LAAA) contributed to conceptualization, methodology, literature search, data curation, formal analysis, and writing of the original draft. (SAM) and (DS) were responsible for supervision, validation, and writing review and editing.

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