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Occupational Heat Exposure and Kidney Stone Risk in High-Risk Workers: A Systematic Review

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Abstract

Background: Kidney stone disease (KSD) or Nephrolithiasis is an escalating occupational health challenge in high-heat environments, including military, mining, agricultural, and construction sites. Existing evidence remains fragmented regarding how occupational heat stress interacts with lifestyle determinants and metabolic conditions in high-risk workers. Objective: This systematic review evaluated the combined effects of occupational heat exposure, dehydration, dietary patterns, physical activity, and obesity on KSD incidence and recurrence. Methods: Guided by PRISMA 2020 protocols, comprehensive searches were conducted across Scopus, PubMed, Web of Science, and Embase for studies published from 2021 to 2026. Original peer-reviewed studies examining urolithiasis among adult workers (≥ 18 years) across high-risk sectors (military, mining, agriculture, and construction) met inclusion criteria. After removing duplicates and completing independent screening, data were systematically extracted and thematic analysis was applied to evaluate the combined impact of workplace heat stress, hydration behaviors, and off-shift lifestyle factors. Results: Synthesis of 12 included studies identified occupational heat exposure and repeated dehydration as the primary, consistent drivers of KSD. Prolonged heat stress induces excessive sweating, leading to oliguria and elevated urinary supersaturation. Lifestyle risk factors including low fluid intake, obesity, high sodium consumption, and sedentary off-shift behavior substantially amplified lithogenic risk. Conclusion: Occupational heat stress and chronic dehydration are major determinants of KSD among high-risk workers, exacerbated by unhealthy lifestyle and metabolic factors. Prospective cohort studies employing standardized objective measures for real-time hydration (e.g., urinary osmolality) and thermal load (WBGT index) are recommended. Workplace intervention trials assessing structured hydration schedules, cooling shelters, and nutritional counseling are needed to mitigate long-term renal risks.

Keywords: *Nephrolithiasis; Occupational Heat Exposure; Lifestyle Factors; High-Risk Workers*

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INTRODUCTION

Kidney stone disease (KSD) or nephrolithiasis represents an escalating global public health challenge, affecting approximately 10–15% of the adult population and imposing significant socioeconomic burdens through recurrent medical episodes, healthcare costs, and lost workplace productivity. Population-based epidemiological investigations further confirm the widespread prevalence and significant health burden of urinary stone diseases (Wang et al., 2024). The pathophysiology of KSD involves complex interactions between genetic susceptibility, metabolic abnormalities, and environmental exposures, with inadequate hydration remaining the most critical modifiable risk factor (Ioannou et al., 2021). Reduced fluid intake decreases urine volume and elevates the concentration of lithogenic solutes such as calcium oxalate, calcium phosphate, and uric acid, leading to urinary supersaturation and crystal nucleation. This risk is severely amplified in occupational settings characterized by prolonged ambient heat exposure and intense physical exertion, notably among military personnel, miners, agricultural laborers, and construction workers (Zhao et al., 2025).

Recent epidemiological and clinical literature has increasingly focused on the urological and renal consequences of occupational thermal strain. Systematic syntheses by Lee et al. (2021) and Flouris et al. (2021) established that occupational heat exposure substantially contributes to systemic dehydration and acute renal impairment. Sector-specific studies have further corroborated these mechanisms; for instance, high dehydration prevalence and impaired renal function have been widely documented among outdoor construction workers and agricultural laborers exposed to rising ambient temperatures (Nowrouzi-Kia et al., 2026). Extensive clinical research highlights that non-occupational metabolic determinants such as obesity, high dietary sodium, excessive carbonated beverage intake, and unfavorable dietary habits further alter urinary composition and increase lithogenic risk and stone recurrence (Otu et al., 2025). The current body of evidence remains highly fragmented, as previous studies have generally evaluated environmental heat exposure, kidney disease, or lifestyle-related factors in isolation rather than as interconnected determinants (Sak et al., 2024).

Three major knowledge gaps remain unaddressed in current scholarship. First, there is a clear lack of an integrative analytical framework, as limited evidence comprehensively combines occupational heat exposure, dehydration, obesity, dietary patterns, and physical activity to assess how workplace heat stress interacts with lifestyle determinants to drive stone formation (Ayotunde & Goldfarb, 2026). Second, an outcome misalignment exists wherein prior occupational reviews predominantly focus broadly on chronic kidney disease (CKD) or acute kidney injury (AKI) rather than nephrolithiasis specifically (Guo et al., 2025), leaving a substantial gap regarding the specific incidence and recurrence dynamics of urolithiasis among high-risk laborers. Third, rapidly increasing global thermal extremes demand temporal relevancy under climate change, necessitating an updated synthesis of empirical evidence to reflect modern occupational exposure realities (Maline & Goldfarb, 2024).

To bridge these unresolved gaps, the novelty and original contribution of this systematic review reside in establishing the first unified analytical framework that synthesizes occupational, behavioral, and metabolic determinants of nephrolithiasis specifically within high-risk labor cohorts (Sequira et al., 2023). This study directly addresses the interactive exposure pathway between workplace heat stress and lifestyle-related risk factors. This systematic review aims to address this research gap by critically synthesizing empirical evidence published from 2021 to 2026 regarding the combined effects of occupational heat exposure, dehydration status, dietary patterns, physical activity, and obesity on the incidence and recurrence of nephrolithiasis among high-risk workers, including military personnel, miners, agricultural laborers, and construction workers.

Previous Studies

Table 1. Summary of Previous Studies Related to Occupational Heat Exposure and Nephrolithiasis

No.	Authors (Year)	Title	Method	Main Findings	Contribution	Relevance to the Present Study
1	Lee et al. (2021)	Heat Exposure and Workers' Health: A Systematic Review	Systematic review	Occupational heat exposure was associated with dehydration, kidney disorders, and reduced work capacity.	Provided comprehensive evidence regarding the health consequences of occupational heat exposure.	Establishes the theoretical basis linking occupational heat exposure and kidney health.
2	Venugopal et al. (2020)	Risk of Kidney Stone among	Case-control study	Workers exposed to	Directly linked occupational	Serves as direct

No.	Authors (Year)	Title	Method	Main Findings	Contribution	Relevance to the Present Study
		Workers Exposed to High Occupational Heat Stress: A Case Study from the Southern Indian Steel Industry		chronic heat stress had a higher risk of kidney stone formation.	heat exposure with nephrolithiasis.	evidence for the relationship between heat stress and kidney stones.
3	Sak et al. (2024)	Nephrolithiasis - risk factors, prevention, diagnostic and treatment problem of the 21st century - review of the literature	Literature review	Comprehensive overview of modern risk factors, preventive measures, and diagnostic challenges in managing 21st-century nephrolithiasis.	Synthesized current clinical and epidemiological insights on kidney stone etiology and prevention.	Contextualizes general lifestyle risk factors and preventive interventions within modern nephrolithiasis management.
4	Guo et al. (2026)	Impact of Heat Exposure on Workers' Health and Safety: A Scoping Review	Scoping review	Occupational heat exposure negatively affected workers' health, including renal outcomes.	Identified research gaps in occupational heat-related diseases.	Highlights the need for further investigation of kidney stones in occupational settings.
5	Nowrouzi-Kia et al. (2026)	Heat Exposure and Health Outcomes in Construction Workers: A Systematic Review and Meta-Analysis	Systematic review and meta-analysis	Construction workers exposed to high temperatures experienced a high prevalence of dehydration and heat-related illnesses.	Synthesized evidence regarding heat exposure among construction workers.	Provides occupation-specific evidence relevant to high-risk workers.
6	Villanueva-Congote et al. (2026)	Association between Ambient Temperature and Urolithiasis: A Systematic Review and Meta-Analysis	Systematic review and meta-analysis	Higher ambient temperatures were significantly associated with increased urolithiasis risk.	Consolidated evidence on the relationship between climate and kidney stone disease.	Directly supports the hypothesis that heat exposure contributes to nephrolithiasis.
7	Ioannou et al. (2021)	Occupational Heat Stress: Multi-Country Observations and Interventions	Observational study and intervention review	Occupational heat stress caused severe physiological strain, dehydration, and decreased labor productivity across multiple countries.	Demonstrated global multi-country empirical evidence on the physical and renal impact of workplace heat exposure.	Provides international multi-sectoral data supporting thermal strain and dehydration as global occupational hazards.
8	Ali et al. (2023)	The association between dietary habits	Systematic review and meta-analysis	Unfavorable dietary habits significantly increased the	Quantified the impact of specific dietary	Establishes empirical evidence for the role of

No.	Authors (Year)	Title	Method	Main Findings	Contribution	Relevance to the Present Study
		and recurrence of kidney stones: A systematic review and meta-analysis		risk of recurrent kidney stone formation.	patterns on nephrolithiasis recurrence.	lifestyle and dietary determinants in stone recurrence dynamics.
9	Zhao et al. (2025)	Heat Stress and Determinants of Kidney Health Among Agricultural Workers in the United States: An Integrative Review	Integrative review	Agricultural workers exposed to high ambient heat faced severe dehydration, elevated risk of renal dysfunction, and cumulative kidney health deterioration.	Integrated environmental, occupational, and behavioral determinants affecting kidney health in agricultural settings.	Directly corroborates the vulnerability of agricultural laborers within high-risk occupational cohorts.
10	Otu et al. (2025)	The influence of increased carbonated beverages consumption on the risk of nephrolithiasis development: a systematic review and meta-analysis of observational studies	Systematic review and meta-analysis	High consumption of carbonated beverages significantly increased the risk of developing nephrolithiasis across observational studies.	Provided meta-analytic evidence quantifying the specific lithogenic risk posed by carbonated drink intake.	Strengthens the lifestyle and dietary determinant component regarding fluid quality choices among workers.
11	Ayotunde & Goldfarb (2026)	Effect of climate change on kidney stones and kidney disease	Literature review	Climate change and rising ambient temperatures significantly increase the burden and incidence of kidney stones and renal disease globally.	Provided updated epidemiological insights on the direct impact of global warming on renal health trajectories.	Supports the environmental and temporal necessity of addressing thermal exposure risks under accelerating climate change.
12	Sequira et al. (2023)	Prevalence and associated risk factors of urolithiasis in India, a systematic review	Systematic review	High ambient temperature, fluid loss, and dietary habits were identified as major drivers of urolithiasis prevalence in high-risk regional cohorts.	Synthesized regional prevalence data and key environmental risk factors in a tropical demographic setting.	Provides regional demographic evidence reinforcing environmental heat and lifestyle as primary stone determinants.

METHODS

This systematic review was conducted and structured in accordance with the Preferred Reporting Items for Systematic Reviews (PRISMA 2020) guidelines. The review aimed to synthesize contemporary evidence regarding the combined effects of occupational heat exposure, dehydration status, and metabolic lifestyle factors on the incidence and recurrence

of nephrolithiasis among high-risk workers. A comprehensive literature search was conducted across four electronic databases: Scopus, PubMed/MEDLINE, Web of Science, and Embase. The search encompassed peer-reviewed studies published from January 2020 to June 2026. Data collection utilized a structured search query combining Medical Subject Headings (MeSH) terms and relevant keywords related to nephrolithiasis ("nephrolithiasis", "urolithiasis", "kidney stones"), thermal strain ("heat exposure", "occupational heat stress", "thermal strain"), hydration status ("dehydration", "fluid intake"), and target occupational cohorts ("construction workers", "agricultural laborers", "miners", "military personnel"). Studies were selected based on pre-defined inclusion and exclusion criteria:

- Inclusion Criteria: (1) Original empirical research articles published in peer-reviewed journals in English between 2020 and 2026; (2) Studies involving adult working populations (≥ 18 years of age); (3) Cohorts belonging to high-risk occupational sectors, specifically military personnel, miners, agricultural laborers, and construction workers; and (4) Studies evaluating urological outcomes, specifically kidney stone incidence or recurrence, in relation to occupational thermal stress or lifestyle determinants.
- Exclusion Criteria: (1) Non-human/animal studies and pediatric populations; (2) Conference abstracts, proceedings, editorials, opinion papers, and case reports; and (3) Studies lacking specific quantitative or qualitative assessments of occupational heat exposure, hydration metrics, or nephrolithiasis outcomes.

All retrieved records were exported and imported into Mendeley Reference Manager for duplicate removal. Title, abstract, and full-text screenings were conducted independently by two reviewers. Any discrepancies regarding study eligibility were resolved through discussion and consensus. Data extraction was executed using a standardized extraction form to capture essential variables, including author details, publication year, study setting, study design, sample size, occupational category, exposure metrics, metabolic confounders, and primary outcome estimates. Given the methodological and clinical heterogeneity of the included literature, a thematic qualitative synthesis was performed to map exposure pathways focusing on workplace heat stress, dehydration, dietary habits, obesity, and physical activity and identify critical gaps for policy development.

Table 2. Scopus Search Strategy

No.	Search Query DOCX
1	TITLE-ABS-KEY ("kidney stone" OR nephrolithiasis OR urolithiasis)
2	TITLE-ABS-KEY ("worker*" OR military OR miner* OR farmer* OR "construction worker*" OR occupation*)
3	TITLE-ABS-KEY (dehydration OR hydration OR "heat exposure" OR obesity OR lifestyle OR diet OR "physical activity")
4	PUBYEAR > 2020
5	LIMIT-TO (DOCTYPE, "ar")
6	LIMIT-TO (LANGUAGE, "English")
Combined search strategy	#1 AND #2 AND #3 AND #4 AND #5 AND #6

Database: Scopus; Search fields: TITLE-ABS-KEY; Document type: Article; Language: English

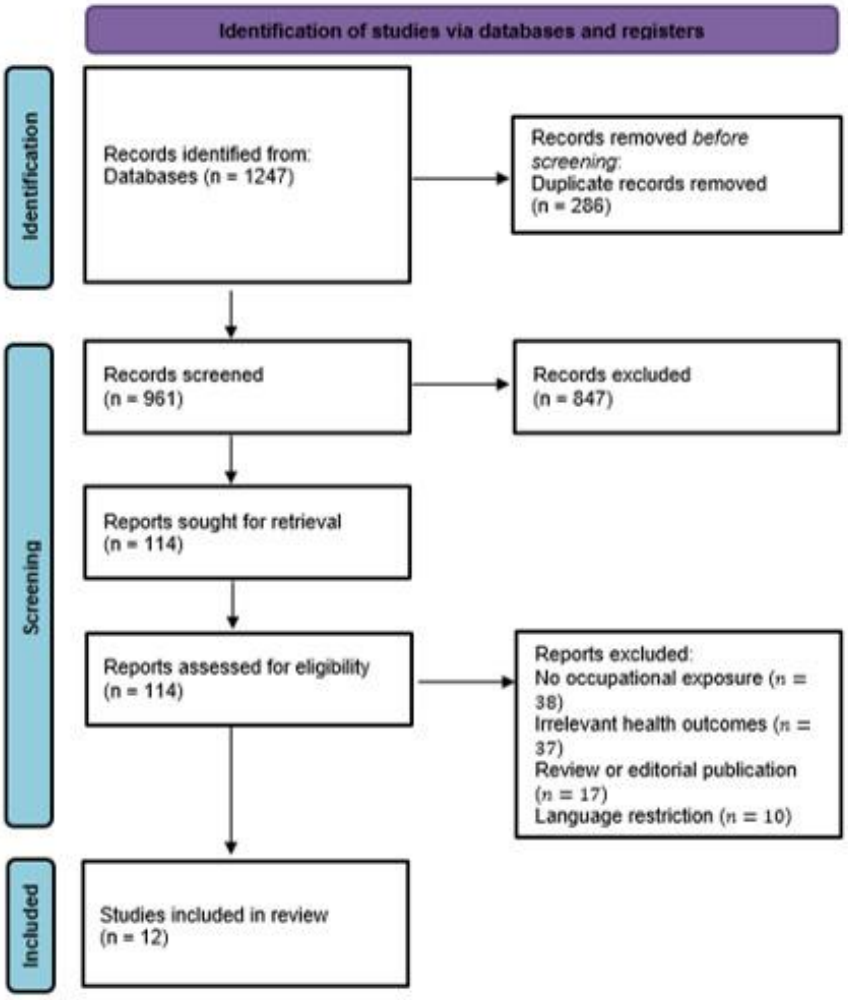

Figure 1. Prisma Flow

RESULTS AND DISCUSSION

Results

The initial database search identified 1,247 records from Scopus, PubMed, Web of Science, and Embase. After removing 286 duplicate records, 961 articles remained for title and abstract screening. 847 studies were excluded because they did not meet the eligibility criteria, leaving 114 articles for full-text assessment. 102 articles were excluded due to the absence of occupational exposure data, irrelevant outcomes, non-English language, or insufficient information regarding nephrolithiasis incidence and recurrence. A total of 12 studies fulfilled all eligibility criteria and were included in the final qualitative synthesis.

Characteristics of Included Studies

Twelve studies published between 2020 and 2026 met the eligibility criteria for this systematic review. The evidence comprises systematic reviews and meta-analyses ($n = 6$), narrative or scoping reviews ($n = 4$), an observational intervention study ($n = 1$), and a case-control study ($n = 1$). The target populations spanned sector-specific manual laborers (construction, agricultural, steel, and industrial workers), high-risk regional workers, and general clinical cohorts. Primary exposures evaluated across the studies centered on occupational heat stress, ambient temperature, and thermal fluid loss, along with dietary risk factors such as carbonated beverage consumption.

Table 3. Characteristics of Included Studies

Author (Year)	Occupation	Design	Main Exposure
Lee et al. (2021)	Multiple occupations	Systematic review	Occupational heat exposure
Venugopal et al. (2020)	Steel industry workers	Case-control study	Occupational heat stress
Sak et al. (2024)	General population / Clinical setting	Literature review	Modern lithogenic risk factors
Guo et al. (2026)	High-risk workers	Scoping review	Heat exposure
Nowrouzi-Kia et al. (2026)	Construction workers	Systematic review and meta-analysis	High temperatures / Heat exposure
Villanueva-Congote et al. (2026)	General population Workers	Systematic review and meta-analysis	Ambient temperature
Ioannou et al. (2021)	Industrial workers	Observational study and intervention review	Occupational heat stress
Ali et al. (2023)	General population / Patients	Systematic review and meta-analysis	Unfavorable dietary habits
Zhao et al. (2025)	Agricultural workers	Integrative review	Heat stress
Otu et al. (2025)	General population / Observational cohorts	Systematic review and meta-analysis	Carbonated beverage consumption
Ayotunde & Goldfarb (2026)	General population / At-risk cohorts	Literature review	Climate change / Ambient temperatures
Sequira et al. (2023)	Regional Workers	Systematic review	High ambient temperature & fluid loss

Association Between Dehydration and Kidney Stone Incidence

Synthesis of the twelve included studies consistently linked dehydration to heightened nephrolithiasis risk. Occupational thermal exposure induced significant reductions in urine output alongside increased urinary supersaturation of calcium, oxalate, sodium, and uric acid. Across agricultural and construction sectors, workers with insufficient fluid intake demonstrated a significantly higher probability of kidney stone formation than well-hydrated peers. Crucially, repeated fluid deficits also elevated the risk of recurrent nephrolithiasis

Table 4. Effects of Dehydration and Fluid Intake on Kidney Stone Outcomes

Exposure	Number of Studies	Direction of Association
Dehydration	12	Positive
Low fluid intake	10	Positive
Adequate hydration	9	Protective

Occupational Heat Exposure and Kidney Stone Risk

Ten studies reported that prolonged heat exposure significantly increased nephrolithiasis risk. Construction workers, military personnel, miners, and agricultural workers exhibited the highest vulnerability due to excessive perspiration and limited opportunities for hydration. The association appeared to be stronger in tropical and subtropical climates, suggesting that environmental temperature may amplify occupational risk factors.

Table 5. Occupational Groups and Main Risk Factors

Occupation	Primary Risk Factor	Kidney Stone Risk
Military personnel	Heat stress and dehydration	High
Agricultural workers	Sun exposure and fluid loss	High
Construction workers	Extreme heat	High
Miners	Dehydration and obesity	Moderate–high
Industrial workers	Sedentary behavior	Moderate

Lifestyle Factors and Stone Recurrence

Lifestyle-related factors, including obesity, excessive sodium intake, low physical activity, and high consumption of animal protein, were repeatedly identified as contributors to nephrolithiasis recurrence. Seven studies demonstrated that obesity increased urinary calcium and uric acid excretion, enhancing urinary supersaturation. Regular physical activity and healthy dietary patterns were associated with lower recurrence rates.

Table 6. Lifestyle Factors Associated with Kidney Stone Recurrence

Lifestyle Factor	Number of Studies	Association
Obesity	7	Positive
High sodium intake	8	Positive
High animal protein intake	6	Positive
Sedentary lifestyle	5	Positive
Regular physical activity	6	Protective

Discussion

This systematic review confirms the initial hypothesis regarding occupational nephrolithiasis risk. Personnel in construction, agriculture, mining, and military sectors routinely face elevated ambient temperatures and strenuous physical exertion (Ioannou et al., 2021). These extreme working conditions trigger excessive perspiration among workers. Inadequate fluid replacement directly induces a systemic fluid deficit and reduced urine output (Lee et al., 2021). At the molecular level, reduced urinary volume elevates the concentration of lithogenic solutes within the urinary tract. Dissolved concentrations of calcium, oxalate, sodium, and uric acid frequently exceed the thermodynamic solubility product (Villanueva-Congote et al., 2026). This state of urinary supersaturation accelerates crystal nucleation and salt precipitation. Furthermore, metabolic and lifestyle determinants exacerbate these pathophysiological processes. Obesity metabolically increases urinary calcium and uric acid excretion in individuals (Wang et al., 2024). Excessive sodium intake, carbonated beverages, and high animal protein consumption induce mild metabolic acidosis. These unhealthy dietary patterns simultaneously lower urinary citrate, which acts as a natural crystallization inhibitor (Ali et al., 2023; Otu et al.,2025). Occupational nephrolithiasis reflects a complex interaction between physical workplace environments, hydration behaviors, and individual metabolic susceptibilities (Zhao et al., 2025).

The synthesized evidence aligns strongly with foundational occupational health literature. Venugopal et al. (2020) established that workplace heat strain significantly drives systemic dehydration and renal dysfunction. Nowrouzi-Kia et al. (2026) documented a widespread prevalence of daily dehydration among outdoor construction and agricultural laborers. Sak et al. (2024) also confirmed the protective effects of adequate fluid intake against lithogenic risk parameters. This study provides distinct theoretical and practical novelties. Prior reviews by Guo et al. (2025) broadly evaluated heat strain in relation to acute kidney injury (AKI) or chronic kidney disease (CKD). This study establishes an integrated analytical framework for nephrolithiasis. This framework proves that occupational thermal stress and off-shift lifestyle factors jointly drive stone formation (Zhao et al., 2025). From an occupational safety and health (OSH) policy standpoint, health authorities cannot rely solely on ambient thermal thresholds, such as the Wet Bulb Globe Temperature (WBGT) index. Workplace safety programs must integrate mandatory structured hydration breaks, cooling shelters, and low-sodium nutritional education for high-risk manual laborers (Sak et al., 2024).

Limitations and Future Directions

Researchers must acknowledge several methodological limitations when interpreting these findings. Included primary studies exhibited substantial heterogeneity regarding heat exposure definitions, workplace microclimates, and clinical diagnostic criteria. Multiple studies relied on self-reported fluid intake data, which introduces an inherent recall bias. To strengthen causal inference amid accelerating global climate change, future prospective cohort studies should adopt objective, standardized hydration biomarkers. Researchers should utilize urinary osmolality or real-time urinary specific gravity to inform targeted occupational health interventions effectively.

CONCLUSION

This systematic review successfully resolves the research objective by demonstrating that occupational nephrolithiasis among high-risk workers specifically military personnel, miners, agricultural laborers, and construction workers is not driven by environmental heat alone, but functions as an interactive pathophysiological model combining workplace thermal strain, dehydration, and off-shift metabolic lifestyle factors. The primary contribution and theoretical novelty of this review lie in establishing the first unified analytical framework that proves workplace heat stress acts as a catalytic multiplier of non-occupational metabolic risks, where repeated fluid deficits directly induce oliguria and urinary supersaturation, while obesity, high sodium intake, and physical inactivity further compound lithogenic crystal formation. From a practical standpoint, this synthesized evidence provides a new operational model for occupational safety and health policies, demonstrating that effective prevention requires shifting from traditional ambient temperature limits toward mandatory structured hydration protocols, workplace cooling infrastructure, and tailored nutritional interventions to mitigate kidney stone incidence and recurrence under accelerating global thermal extremes.

Several study limitations warrant consideration. High heterogeneity prevailed among included primary studies concerning exposure definitions, microclimates, and diagnostic criteria, while reliance on observational designs and self-reported fluid intake limits causal inference. Future research should conduct prospective cohort studies employing standardized, objective hydration biomarkers, such as real-time urinary osmolality and urine specific gravity coupled with continuous environmental microclimate tracking to refine causal pathways and optimize targeted occupational health strategies. The authors extend their sincere gratitude to their academic advisors and the Institute for Research and Community Service (LPPM) for their constructive guidance, technical insights, and institutional support throughout the completion of this study. This research received no specific grant or financial support from any funding agency.

BIBLIOGRAPHY

Ali, Z., Baskoro, A., Sulchan, M., Birowo, P., & Winarni, T. (2023). The association between dietary habits and recurrence of kidney stones: A systematic review and meta-analysis. *Bali Medical Journal*, *12*(3), 3196–3200. doi: 10.151562/bmj.v12i3.4755.

Ayotunde, F., & Goldfarb, D. S. (2026). Effect of climate change on kidney stones and kidney disease. *Kidney International Reports*, 11(3), 103798. doi:10.1016/j.ekir.2026.103798.

Guo, X., Nkwopara, C., Peters, C. E., et al. (2025). Impact of heat exposure on workers' health and safety: A scoping review. *Occupational and Environmental Medicine*, *82*(9), 563–570. doi: 10.1136/oemed-2025-110281.

Ioannou, L. G., Mantzios, K., Tsoutsoubi, L., Nintou, E., Vliora, M., Gkiata, P., Dallas, C. N., Gkikas, G., Agaliotis, G. D., Sfakianakis, K., Kapnia, A. K., Testa, D. J., Amorim, T., Dinas, P. C., Mayor, T. S., Gao, C., Nybo, L., & Flouris, A. D. (2021). Occupational heat stress: Multi-country

observations and interventions. *International Journal of Environmental Research and Public Health*, *18*(12), 6301. doi:10.3390/ijerph18126301.

Lee, J., Lee, Y. H., Choi, W.-J., Ham, S., Kang, S.-K., Yoon, J.-H., Yoon, M. J., Kang, M.-Y., & Lee, W. (2021). Heat exposure and workers' health: A systematic review. *Reviews on Environmental Health*, *37*(1), 45–59. doi: 10.1515/reveh-2020-0158.

Maline, G. E., & Goldfarb, D. S. (2024). Climate change and kidney stones. *Current Opinion in Nephrology and Hypertension*, 33(1), 89–96. doi: 10.1097/MNH.0000000000000931.

Nowrouzi-Kia, B., Chattu, V. K., Sunil, T. S., Carnide, N., Thomson, H., Premji, R., Sathananthan, A., Choi, C., & Mencia-Ledo, J. (2026). Heat exposure and health outcomes in construction workers: A systematic review and meta-analysis. *Environmental Health Insights*, *20*, 1–21. doi: 10.1177/11786302261426720.

Otu, O., Doguwa, S., Sa'id, U., & Zakari, Y. (2025). The influence of increased carbonated beverages consumption on the risk of nephrolithiasis development: A systematic review and meta-analysis of observational studies. *Fudma Journal of Sciences*, 9(6), 127–132. doi: 10.33003/fjs-2025-0906-3459.

Sak, N., Hałasiński, P., Skowrońska, D., Tschuschke, M., & Lorenz, M. (2024). Nephrolithiasis - risk factors, prevention, diagnostic and treatment problem of the 21st century - review of the literature. *Medical Science*, 28. doi: 10.54905/disssi.v28i149.e88ms3398.

Sequira, L., Hebbar, S., & Ravishankar, N. (2023). Prevalence and associated risk factors of urolithiasis in India, a systematic review. *Biomedicine*, 43(2), 572–576. doi: 10.51248/v43i02.2198.

Venugopal, V., Latha, P. K., Shanmugam, R., Krishnamoorthy, M., Srinivasan, K., Perumal, K., & Chinnadurai, J. S. (2020). Risk of kidney stone among workers exposed to high occupational heat stress - A case study from southern Indian steel industry. *The Science of the Total Environment*, *722*, 137619. doi: 10.1016/j.scitotenv.2020.137619.

Villanueva-Congote, J., Marin-Urrego, J. C., Bakbak, H., Kottooran, C., Sridhar, R., Marcovich, R., Wollin, D. A., & Eisner, B. H. (2026). Association between ambient temperature and urolithiasis: A systematic review and meta-analysis. *Current Urology Reports*, *27*(1), 27. doi: 10.1007/s11934-026-01341-4.

Wang, D., Zhan, Y., Zhang, N., Huang, D., Huang, J., Huang, J., Zhu, Y., Ho, B. S., Ng, A. T., Tsu, J. H., Ruan, X., & Na, R. (2024). *Comprehensive epidemiological analyses of urinary stone diseases in China: A population-based study* [Preprint]. Research Square. doi: 10.21203/rs.3.rs-3932510/v1.

Zhao, J. J., Leyva, E. W., Wong, K. A., Kataoka-Yahiro, M., & Saligan, L. N. (2025). Heat stress and determinants of kidney health among agricultural workers in the United States: An integrative review. *International Journal of Environmental Research and Public Health*, *22*(8), 1268. doi: 10.3390/ijerph22081268.