

Review Article

A Systematic Review of Kidney Stones in West and North Africa: Comparing the Epidemiological Profile and Therapeutic Strategies in Burkina Faso and Morocco

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Abstract

Purpose: This systematic review aims to compare the epidemiological profile and therapeutic modalities of kidney stones between Morocco (MAR) and Burkina Faso (BF). **Methods:** We conducted a systematic review based on a structured search of literature published between 2004 and 2023 in databases such as PubMed, Scopus, and African Journals Online (AJOL), as well as manual searches of relevant urology journals. The included studies focused on the epidemiology and management of kidney stones in both countries. Data were extracted and synthesized qualitatively. The quality of included studies was assessed using appropriate tools for observational studies. Data collected included prevalence, patient profiles, and the therapeutic techniques used. **Results:** Analysis of hospital prevalence data from included studies showed rates of was 25.36% in Morocco and 12.52% in Burkina Faso. In both countries, the renal location was predominant (>80%), mainly affecting young adults (median age 35–40 years). Male predominance was observed (sex ratio 1.9 in Burkina Faso and 1.27 in Morocco). Calcium oxalate was the main stone component. Morocco favored minimally invasive techniques, especially percutaneous nephrolithotomy and flexible ureteroscopy. In contrast, open surgery was used in over 90% of cases in Burkina Faso. **Conclusion:** Renal lithiasis is increasing similarly in both Morocco and Burkina Faso, in line with the westernization of lifestyles. However, significant disparities persist in access to modern therapeutic modalities. The technological gap in therapeutic management highlights the need to strengthen South-South cooperation to improve access to minimally invasive techniques in West Africa.

Keywords

Kidney Stone, Urolithiasis, Burkina Faso, Morocco, Systematic Review

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1. Introduction

Urolithiasis (from the Greek lithos) is a pathology characterized by the precipitation, aggregation, and growth of crystals within the urinary tract [1, 2].

This condition has been known since ancient times and remains closely linked to human history. It reflects sanitary conditions, dietary habits, and socioeconomic status, and continues to evolve both epidemiologically and etiologically. Since antiquity, it has been indicative of population-level hygiene and nutrition [3]. Today, its evolution is marked by the westernization of lifestyles, particularly in developing countries.

Over the past 25 years, significant changes have occurred in these regions, with renal stones becoming predominant and calcium oxalate the primary component [4]. While global trends are well-documented [2, 5, 6], regional variations across Africa are less explored. Morocco, in North Africa, and Burkina Faso, in West Africa, represent two distinct healthcare systems with different economic realities and access to technology.

The aim of this study is to systematically compare the epidemiological profile and therapeutic approaches to kidney stone management between Burkina Faso and Morocco, two African countries with differing healthcare trajectories but shared challenges to identify disparities and potential avenues for collaborative improvement.

2. Material and Methods

2.1. Study Design and Search Strategy

We conducted a systematic review following best practices for the synthesis of observational studies. A comprehensive search was performed for scientific literature published between January 2004 and December 2023. Electronic databases including PubMed, Scopus, and African Journals Online (AJOL) were searched using a combination of keywords and MeSH terms: ("urolithiasis" OR "kidney stone" OR "nephrolithiasis") AND ("epidemiology" OR "therapy" OR "management") AND ("Burkina Faso" OR "Morocco" OR "Africa, Northern" OR "Africa, Western"). The search was supplemented by a manual review of references from retrieved articles and key regional urology journals.

2.2. Study Selection and Eligibility Criteria

Studies were included if they were: (1) original observational studies (cohort, case-control, cross-sectional) or clinical

series; (2) conducted in human populations within Burkina Faso or Morocco; (3) reported on the epidemiology (prevalence, age, sex, location, composition) and/or therapeutic management of renal lithiasis; (4) published in English or French. Reviews, commentaries, and case reports were excluded.

2.3. Data Extraction and Quality Assessment

Two reviewers independently screened titles, abstracts, and full texts for eligibility. Data were extracted using a standardized form capturing: first author, publication year, study period, study design, sample size, demographic data, stone characteristics, and treatment modalities. Any discrepancies were resolved through consensus. The quality of the included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklists for prevalence studies and case series.

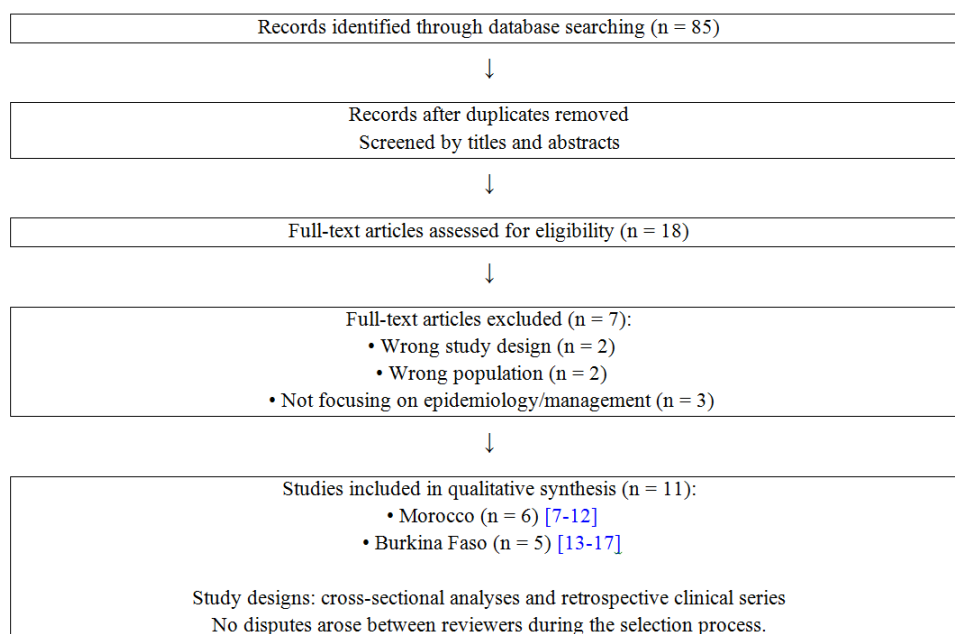
2.4. Data Synthesis

Due to the anticipated heterogeneity in study designs, populations, and outcome reporting, a meta-analysis was not feasible. Therefore, a narrative synthesis was performed. Data were summarized descriptively and presented in tables to compare the epidemiological and therapeutic profiles between the two countries.

3. Results

3.1. Study Selection and Characteristics

The initial database search yielded 85 records. After removing duplicates and screening titles and abstracts, 18 full-text articles were assessed for eligibility. Finally, 11 studies met the inclusion criteria and were included in the qualitative synthesis (6 from Morocco [7-12] and 5 from Burkina Faso [13-17]). The included studies comprised cross-sectional analyses and retrospective clinical series. A flow diagram of the study selection process according to PRISMA guidelines is presented in Figure 1. The main reasons for exclusion at the full-text stage were wrong study design (e.g., case reports, n=2), wrong population (e.g., studies on children only, n=2), and articles not focusing on epidemiology or management (n=3). No disputes arose between reviewers during the selection process.

**Figure 1.** Flow Diagram.

3.2. Epidemiological Profile

Hospital prevalence of urolithiasis was estimated at 25.36% in Morocco [7] and 12.52% in Burkina Faso [13]. Renal localization was predominant in both countries, accounting for 82.60% of cases in Morocco [8] and 81.66% in Burkina Faso [14]. The median age was 35 years in Burkina Faso [5] and

approximately 40 years in Morocco [6]. Regarding sex distribution, the male-to-female ratio was 1.9 in Burkina Faso [15] and 1.27 in Morocco [9]. Urban patients were the majority, representing 74.8% in Burkina Faso [13] and 70.9% in Morocco [8]. Analysis of stone composition revealed a predominance of calcium oxalate in 64.9% of cases in Burkina Faso [16] and 61% in Morocco [9]. The epidemiological profile of kidney stones in the two countries is given in Table 1.

Table 1. Epidemiological profile of renal stones in both countries.

EPIDEMIOLOGICAL DATA	MOROCCO	BURKINA FASO
Hospital prevalence	25,36%	12,50%
Renal location of stones	82,64%	81,66%
Mean age (in years)	40	35
Sex ratio	1,27	1,90
Urban area	70,90%	74,80%
Composition of stones (Calcium oxalate)	61,00%	64,90%

3.3. Therapeutic Modalities

In Morocco, minimally invasive techniques are predominantly used to treat kidney stones. Percutaneous nephrolithotomy (PCNL) was performed in 49.48% of cases, followed by flexible ureteroscopy (URS) in 38.78%, extracorporeal shock wave lithotripsy (ESWL) in 5.7%, and open

surgery in 2.13% of cases [7]. Laparoscopic surgery is also performed, accounting for 9.74% of procedures in Marrakech [11] and up to 48.50% in Rabat [12].

In Burkina Faso, open surgery remains the main method for stone removal, used in over 90% of cases [14, 17]. Therapeutic modalities for kidney stones in both countries are given in Table 2.

Table 2. Therapeutic modalities for kidney stones in both countries.

THERAPEUTIC MODALITIES	MOROCCO	BURKINA FASO
Percutaneous Nephrolithotomy (PCNL)	49,48%	00
Flexible Ureteroscopy (URS/S)	38,78%	00
Extracorporeal Lithotripsy (ESL)	05,70%	00
Laparoscopic Surgery	09,74%	00
Conventional Surgery	02,13%	> 90%

4. Discussion

4.1. Epidemiological Analysis

This study reveals several similarities between Morocco and Burkina Faso regarding renal lithiasis. High hospital prevalence in both countries reflects the growing burden of this condition, despite variation in reported rates. This variability may stem from differences in study methodology and the availability of hospital data, as well as potential regional variations within each country. The predominance of renal stones (>80%) is consistent with global trends, where nephrolithiasis constitutes the majority of urinary stones [3, 4]. The median age of 35–40 years confirms that urolithiasis primarily affects young adults in their reproductive and working years [3], posing a significant socioeconomic burden. Male predominance, with a sex ratio above 1, aligns with global literature [3], suggesting hormonal, anatomical, and behavioral factors in stone formation among men. The large proportion of urban patients may be attributed to environmental factors (sedentary lifestyle, westernized diet), but also to better access to healthcare services, resulting in more frequent diagnosis and treatment compared to rural areas where cases often go undiagnosed [3, 18]. The increasing urbanization of West and North Africa may thus explain the growing prevalence of urolithiasis. The dominance of calcium oxalate stones reflects the epidemiological transition in developing countries due to dietary changes and gradual industrialization [4].

4.2. Therapeutic Analysis

Comparison of therapeutic strategies reveals a marked disparity between the two countries, which is the most significant finding of this review. In Morocco, kidney stone management aligns with international standards, with widespread use of minimally invasive techniques such as PCNL and URS [19–21]. The adoption of laparoscopic surgery in some Moroccan centers demonstrates high technical expertise and good access to modern equipment. In contrast, open

surgery remains the main approach in Burkina Faso, used in more than 90% of renal lithiasis procedures [14, 17]. This highlights the limited access to minimally invasive technologies, likely due to financial, logistical, and training constraints. According to current recommendations [19–22], open surgery should be reserved for complex cases or failures of minimally invasive techniques. The almost exclusive reliance on open surgery in Burkina Faso underscores the need to strengthen local capacity in endourological techniques.

5. Study Limitations

This study has certain limitations, primarily due to the retrospective nature of the data and methodological heterogeneity among the series compared, which precluded a quantitative meta-analysis. Moreover, the absence of systematic national registries for urolithiasis limits the generalizability of the findings to the entire population. Finally, disparities in hospital infrastructure among the centers studied may introduce interpretation bias. The quality assessment of included studies revealed variations in methodological rigor, which should be considered when interpreting the results.

6. Perspectives

Promoting South-South medical cooperation is essential to improving urolithiasis management in Africa. Morocco, with its advanced technical infrastructure, could serve as a key partner in training Burkinabè urologists in minimally invasive techniques. Moreover, initiatives to develop interventional urology tailored to local resources should be encouraged in Burkina Faso. Future research should include prospective, multi-center studies in both countries to generate higher-quality, more comparable data.

7. Conclusion

This comparative systematic review highlights some epidemiological similarities between Morocco and Burkina Faso, with a rising trend in renal lithiasis in both countries, driven by factors such as healthcare conditions, dietary habits, and

living standards increasingly resembling those of industrialized countries. However, there is a major disparity in therapeutic means, with Morocco offering a more advanced technical platform that aligns with international guidelines. This disparity opens avenues for knowledge sharing and collaboration between the two countries in a spirit of solidarity, which is crucial for bridging the technological gap and improving urologic care across the region.

Abbreviations

MAR	Morocco
BF	Burkina Faso
AJOL	African Journals Online
PCNL	Percutaneous Nephrolithotomy
URS/S	Flexible Ureteroscopy
ESL	Extracorporeal Lithotripsy

Author Contributions

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Salif Ouédraogo: Methodology, Resources, Writing – review & editing

Adama Ouattara: Supervision, Writing – original draft, Writing – review & editing

Fasnéwindé Aristide Kabore: Supervision, Writing – original draft, Writing – review & editing

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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