Ethnopharmacological study on medicinal plants used for jaundice and liver-related disorders management in the Province of Kourittenga in the Central-Easten of Burkina Faso.

Étude ethno-pharmacologique des plantes médicinales employées dans la prise en charge de l'ictère et des affections hépatiques dans la province du Kourittenga, région du Centre-Est du Burkina Faso.

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Abstract

Aims: Burkina Faso exhibits high endemicity for hepatitis B virus (HBV), with limited access to vaccines and anti-HBV pharmacotherapy. Consequently, local populations rely on traditional healers and medicinal plants for liver related disorders management. This work aimed to systematically documented and analysed medicinal plant use in twelve villages of Kourittenga Province in the central-eastern of Burkina Faso for hepatic diseases treatment.
Method and materials: The data were collected using an open and semi-structured methodological approach, involving in-depth interviews in local language with twenty-one (21) selected traditional healers renowned for their expertise in treating hepatic disorders. Inclusion criteria were: ≥5 years of healing practice in the community - Recognition by village authorities and peers for hepatic disease management - Willingness to provide informed consent; informal or apprentice practitioners were excluded.
Results: A total of 43 plant species distributed across 37 families were identified as being used locally for the management of jaundice. Respondents consistently pointed to the progressive fading of scleral and cutaneous icterus - resolution of associated gastrointestinal discomfort, particularly nausea and anorexia - a marked reduction in generalized malaise and fatigue, often reported within the first 48 hours of treatment, as reliable proxies for liver function recovery in the absence of biochemical testing.
Conclusion: Traditional African healers use various medicinal plants to treat liver-related disorders. Some of these effects have been scientifically validated. High prevalence of hepatitis in Burkina Faso requires effective prophylactic and curative means, and new therapeutic research and development based on medicinal plants.

Key words: Ethnopharmacological, Traditional African healers, jaundice, liver-related disorder, medicinal plant, Burkina Faso.

Résumé

Objectifs : Le but de ce travail est de décrire et d'analyser systématiquement l'utilisation traditionnelle des plantes médicinales pour le traitement des maladies hépatiques dans douze villages du Kouritenga, Centre-Est du Burkina Faso, pays où la prévalence de l'infection à virus de l'hépatite B est élevée et l'accès aux vaccins et antiviraux limité.
Materials et Méthodes : Des entretiens approfondis (ouverts et semi-structurés) menés dans la langue locale auprès de vingt (20) guérisseurs traditionnels réputés pour leur expertise dans la prise en charge des affections hépatiques, ont permis la collecte des données. Les critères d'inclusion étaient : une pratique thérapeutique dans la communité d'au moins cinq ans – une reconnaissance par les autorités villageoises et les pairs pour la gestion des maladies hépatiques - une volonté de fournir un consentement éclairé. Les praticiens informels ou apprentis ont été exclus de l'étude.
Résultats : Au total, 43 espèces végétales appartenant à 37 familles botaniques ont été répertoriées pour le traitement des affections hépatiques. Les interviewés présentent généralement, l'atténuation progressive de l'ictère scléral et cutané - la disparition

des troubles gastro-intestinaux associés (nausées anorexie) - la réduction du malaise et de la fatigue, observée dans les 48 heures, comme indicateurs fiables de la récupération de la fonction hépatique.
Conclusion : La médecine traditionnelle recourt à une diversité de plantes dont certaines propriétés hépatoprotectrices sont déjà validées scientifiquement. La forte endémicité des hépatites au Burkina Faso justifie des stratégies prophylactiques et curatives renforcées, ainsi que des recherches sur de nouvelles thérapies fondées sur ces ressources phytomédicinales.
Mots clés : Ethno-pharmacologique, guérisseurs traditionnels africains, ictère ; troubles hépatiques, plante médicinale, Burkina Faso.

1. Introduction

Using plant extracts and natural substances for medicinal purposes is almost as old as mankind. Naturally occurring chemicals such as clay minerals(1–4), oil of *Cedrus sp* (5), and extracts of Papaver *somniferum*, Glycyrrhiza *glabra*, and others are numerous examples of natural compounds used for medical purposes(1,6–10). Writing documents from Ancient Egypt, such as the famous 'Elbers Papyrus'(11–15), the 'Chinese Materia Medica'(16–19), and 'the hellebore', the plants beloved by Greeks(20), are references to using natural compounds in medicine.
Indeed, plants, minerals, parts of animals, and ritual practices have been used for disease management worldwide, predating modern medicine. In this respect, traditional medicine in Burkina Faso, utilizing plant extracts, has been employed to treat hepatitis and liver-related disorders like jaundice for instance. Typically, the symptoms of acute viral hepatitis are systemic and variable, including anorexia, nausea, vomiting, asthenia, myalgia, headache, photophobia, sore throat, cough, and rhinitis, which may precede the onset of jaundice (icterus) by 1 to 2 weeks. These symptoms also include alterations in odor and taste, weight loss, and tender hepatomegaly (21–25).
Jaundice is not a disease in itself but a visible sign that serum bilirubin has risen above around 34 µmol/L (or 2 mg/dL). Hepatitis, whether viral, autoimmune, alcoholic, drug-induced, or ischemic, is one of the commonest hepatic causes of that rise(23,25). Hepatitis and jaundice intersect because the liver is both the site of hepatocellular inflammation and the sole organ capable of clearing bilirubin. When inflammation disturbs that clearance pathway – by metabolic failure, canalicular blockade, or ductular obstruction – bilirubin accumulates and jaundice appears(21,23,25).
Jaundice is very common and the yellowing of skin, sclera and mucous membranes are common manifestations of jaundice due to defect in production, metabolism and excretion of bilirubin. The causes of jaundice are either congenital or acquired(25). It is important to underline that not every hepatitis is icteric, but whenever jaundice is present, hepatitis sits high on the diagnostic tree, and conversely, treating the underlying hepatic inflammation is the surest route to its resolution.
The management of jaundice should target the underlying type: lower bilirubin in pre-hepatic jaundice (immunoglobulins, phototherapy, metalloporphyrins)(25,26), treat or replace damaged liver in hepatic jaundice (from phototherapy or phenobarbital to transplantation)(25,27), and relieve obstruction plus symptoms in post-hepatic jaundice (diet, antipruritic drugs, and mechanical decompression such as stenting or bypass)(27).
Despite highly effective vaccines and low-cost antivirals, hepatitis B virus (HBV) infection still causes more than a million deaths each year worldwide(28–30). Achieving the 2030 elimination targets demands urgent, concerted action: universal birth-dose vaccination, massive scale-up of testing and treatment, and innovative financing to close the care gap, especially in Africa and the Western Pacific, where the burden is heaviest(30–33). In particular, this infection is highly endemic in Burkina Faso, a West African country in the Sub-Saharan region. A proportion of 5 to 10% HBV-infected adults was reported in the sheet N°204 in 2014 of the World Health Organization (WHO). Furthermore, according to the WHO, the entire population is at high risk for HBV infection. A prevalence estimated between 10 and 28% (34–37), with more than 780,000 deaths per year, is the hepatitis B burden(35,38,39).
Hepatitis can be defined as inflammation of the liver that can result from a variety of causes, such as heavy alcohol use, autoimmune disorders, drugs, or toxins. In clinical hepatology 'acute' refers to inflammation lasting < 6 months; persistence beyond this threshold defines 'chronic' disease(40,41). However, the most frequent cause of hepatitis is due to a viral infection, referred to as "viral hepatitis"(41). Hepatitis B still causes the largest absolute burden, its management can be divided into largely supportive care for acute infection - reserving nucleoside or nucleotide analogues (but not interferon) for fulminant, protracted or immunocompromised cases, and long-term antiviral suppression of chronic infection, achieved with pegylated interferon alfa-2a for selected patients seeking a finite course or, more commonly, indefinite oral nucleoside or nucleotide therapy (e.g., tenofovir, entecavir) that offers potent viral suppression with good tolerability but requires vigilant resistance and safety monitoring(41–43).
In low-income settings, limited financial resources prevent much of the population from accessing hepatitis B virus (HBV) vaccination or proprietary antiviral therapies. Consequently, individuals presenting with jaundice, *i.e.*, a visible sign of hepatitis, often consult traditional healers, whose management strategies rely heavily on medicinal plants. A survey of published studies documents numerous botanical species employed by these practitioners in the treatment of jaundice(44–51). Some of these plants have also been reported to possess hepatoprotective properties in ethnomedical investigations, lending empirical support to their traditional use(52–57).

Therefore, based on several ethnopharmacological studies, including traditional healers (45,58–60) , the present work aimed to collect and identify plants used for jaundice treatment in twelve (12) villages from the province of Kourittenga in Burkina Faso that had not been explored.

2. Methodology

2.1. Study geographic area

The study occurred in Kouritenga Province, Centre-East Burkina Faso. Kouritenga (12 °11′ N, 0 °26′ W) occupies 2,621 km² on the south-Sahelian plateau of central Burkina Faso; the trans-Sahelian RN 4 corridor (Ouagadougou → Kantchari) and its spur RN 16 (Koupéla → Cinkansé) traverse the province, making the capital Koupéla a major freight and livestock market between the national capital and the Niger border. The climate is tropical savanna (Köppen Aw) with a unimodal rainy season from mid-June to mid-September that delivers roughly 550 mm of rainfall per annum; maximum daily temperatures exceed 40 °C in April and drop below 33 °C during the July–August "cool" season, and the harmattan dominates the long dry period. Twelve villages (population ≈ 62 000) were selected to maximise ecological and cultural heterogeneity.

2.2. Study Design and Sampling

From the provided list of regularly registered traditional healers (N = 45) from the their responsible, twenty-one (21) traditional healers renowned for their expertise in treating hepatic disorders were selected. This sample size meets the minimum recommended for UV/ICF reliability (>20 informants), where UV stands for Use Value and ICF stands for Informant Consensus Factor.

2.3. Inclusion/Exclusion Criteria

Inclusion criteria were: a minimum of five consecutive years of healing practice within the study communities; formal recognition by village authorities and peer practitioners for expertise in hepatic-disease management; and willingness to provide oral informed consent. Traditional healers who were informal or still in apprenticeship were excluded; informal or apprentice practitioners were excluded.

2.4. Ethical Considerations

Data were anonymised via alphanumeric codes. Local customary authorities issued research authorisations. Benefit-sharing was discussed, and participants will receive a user-friendly brochure summarising findings.

2.5. Data Collection instruments and procedures

Ethnobotanical information was collected using a semi-structured interview guide, administered in Moore, the local language and the mother tongue of the principal investigator. This methodological approach, involved in-depth interviews at healers' homes or fields, lasted 60–90 min, and were audio-recorded (with consent), transcribed, and cross-checked in the field for completeness. Data saturation occurred when no novel species were recorded in three consecutive interviews. Subsequently, a validated semi-structured questionnaire sheet (Appendix A)(58,61), including key data like local and scientific plant names, plant parts used, preparation methods, dosage and administration instructions, perceived therapeutic indicators, and adverse effects, was generated. Specimens of each cited plant were collected, pressed, and authenticated by Dr Pascal Nadembega (PhD, Pharmacognosy) at the University of Ouagadougou herbarium. The voucher was registered in an earlier research in the laboratory of the University of Ouagadougou(58).

2.6. Data management and analysis

All ethnopharmacological records from the 43 species were compiled in a spreadsheet and subjected to descriptive analysis. Five key metrics were evaluated such as the Frequency of Citation (FC), defined as the number of informants who mentioned each species; the Preparation Mode Distribution (PMD), expressed as the percentage of recipes prepared by decoction, maceration, and other methods; the Growth Habit Classification (GHC), categorizing each taxon as a tree, shrub, herb, or parasitic plant; the Use Value (UV), assessing the relative cultural importance of individual plant species based on how frequently it is cited by informants; Informant Consensus Factor (ICF), estimating the degree of agreement among healers on the use of the considered medicinal plants for the jaundice and its related conditions management.

2.7. Literature Review for Phytochemistry and Pharmacology

PubMed and Google Scholar were searched (December 2024 – April 2025) for each priority species using the strings "species name" AND "hepatoprotective" OR "anti-inflammatory" OR "antiviral".

3. Results

3.1. Healers' characteristics and knowledge in hepatic affection

A total of 21 traditional healers participated in this ethnobotanical survey, all of whom were formally interviewed in Moore, the local language, in order to ensure linguistic accuracy. The cohort was predominantly male, 17 people (81%) over the 21 traditional healers, with ages ranging from 38 to 77 years and a median of 57 years. An overall span of 35 to 82 years was observed when including all participants. On average, each healer had practiced for 25 years, within a range of 5 to 60 years, reflecting a deep, multi-decadal engagement in the management of hepatic affections. All informants were recognized by their communities and local authorities for their expertise in managing liver-related disorders, in particular jaundice and its related conditions, and reported having acquired their knowledge through a combination of hereditary apprenticeship and peer-validated experience.

3.2. Medicinal plants used diversity and frequency

Across the participants to the survey, 43 medicinal plant species representing 37 botanical families were cited, yielding 30 distinct medicinal recipes. Indeed, Appendix A displays the medicinal plants ethnobotanical key parameters: genus and species, family, local name and evaluated key metrics such as the FC, the PMD, the GHC, and the UV.
The calculated Informant Consensus Factor (ICF) value of the 43 investigated species is around 0.34. This value indicates a moderate level of agreement among healers, in fact among the 43 used species, 65 use-reports were registered, which are concentrated on a subset, most notably *Cochlospermum planchonii.* Subsequently, Table 1 highlights the details of the ten most frequently cited species along with their corresponding UV values. ICF from this table for jaundice was 0.92, indicating a highly homogeneous knowledge system.

Table 1: Top-ranked species for jaundice treatment

Rank	Scientific name	Family	UV	Preparation
1	*Cochlospermum planchonii Hook.*	Cochlospermaceae	0.48	Decoction, Maceration
2	*Piliostigma thonningii. L*	Ceasalpiniaceae	0.14	Decoction
3	*Terminalia macroptera Guill. & Perr.*	Combretaceae	0.14	Decoction
4	*Balanites aegyptiaca (L.) Del.*	Zigophyllaceae	0.10	Decoction
5	*Cassia sieberiana DC.*	Caesalpiniaceae	0.10	Decoction
6	*Cassia siemea Lam.*	-	0.07	Decoction, Crud
7	*Chrysantellum afroamericanum*	Asteraceae	0.05	Decoction
8	*Mangifera indica L.*	Anacardiaceae	0.05	Decoction, Juice
9	*Mitragyna inermis (willd) Ktze.*	Rubiaceae	0.05	Decoction
10	*Penninsetum gambiensis L*	Graminaceae	0.05	Maceration

In terms of GHC from Table 2, nearly half of the species, 21 species (48.8 %) were trees, followed by 13 shrubs 30.2 %), eight herbs (18.6 %), and one parasitic plant (2.4 %).

Table 2 : Growth Habit Classification of investigated medicinal plants

Category	Definition	Example	Number	[%]
Trees	Tall woody plants with a single main stem (trunk) and a well-defined canopy	*Parkia biglobosa*	21	48.8
Shrubs	Medium-sized woody plants, usually with multiple stems from the base.	*Piliostigma thonningii.*	13	30.2
Herbs	Non-woody (soft-stemmed) plants, either annual, biennial, or perennial.	*Cymbopogon gigantus*	8	18.6
Parasitic	Type of plant that obtains some or all of its physiological needs from another living plant.	*Tapinanthus sp*	1	2.4
Total Species	-	-	43	100

Table 3 provides an overview of the contribution in terms of frequency of the plant parts in the formulations for liver-related disorders, particularly jaundice, with examples of therapeutic uses from literature. The Most plant parts used for liver-related diseases were leaves and roots, 30.23% for each of them.

3.3. Preparation techniques and mode of administration

The preparation procedure follows several chronological steps regarding the disposition of the constituent in the preparation material.
In terms of PMD, the largest preparation mode is decoction (60%), followed by maceration (26,7%) and others methods including infusion, pounding and ritual preparations (13,3%) as indicated in Appendix A. A notable ritual recipe reported by a famous healer combined Cochlospermum spp. Tubercle with fermented *Parkia biglobosa* seed ("Kalgo") and chicken meat, sealed with clay in african clay pot and cooked for more than two hours without salt. Then, the patient must eat the meat and seed and drink the solution for 3 days if a male and 4 days if a female.
The mode of administration is mainly oral and topical. In topical use, a shower is taken with the aqueous extract or the juice obtained by pressing the plant part. For instance, *Cochlospermum tinctorium* tubercle juice is used to brush all the body parts twice daily in severe cases. In general, both methods are used in association.

3.4. Bioactive constituents and pharmacological potential of survey-reported medicinal plants

Literature review of phytochemical contents revealed that investigated species contain flavonoids condensed tannins, triterpenoids and alkaloids linked to hepatoprotection via antioxidant and anti-inflammatory mechanisms (44–46,48,49,52–57,62–67). Table 3 displays a panoramic view of the forty-two (42) medicinal plant species recorded during the survey for managing liver disorders and jaundice. It highlights the scientific name, family, the parts used to prepare remedies, the key chemical compounds present in these parts, and their associated eventual pharmacological activities according to the literature(62–66,68). These activities primarily focus on liver protection, detoxification, anti-inflammatory effects, and treatment of jaundice. The "Hepatoprotective" refers to the ability of the chemical compound to protect liver cells from damage, and "Anti-jaundice" indicates a reduction in the symptoms of jaundice, such as yellowing of the skin and eyes. The plants vary in the types of chemical elements they contain, such as flavonoids, tannins, alkaloids, and essential oils, each contributing to their medicinal properties.

Table 3. Distribution of medicinal plant parts used by healers with examples of pharmacological potential from literature

Plant Part	Number	Percentage	Examples of pharmacological potential from literature (44–46,48,49,52–57,62–67)
Leaf	13	30.23%	Leaves are particularly rich in flavonoids and antioxidants, making them effective in managing liver disorders. Examples: - *Azadirachta indica* (neem) leaves are used for their hepatoprotective and detoxifying properties, particularly in managing jaundice and hepatitis. - *Carica papaya* (papaya leaves) have shown potential in liver regeneration and detoxification. - *Mangifera indica* (young mango leaves) are used to promote liver function and detoxify the liver.
Root	13	30.23%	Roots are often used for their strong hepatoprotective effects. Examples: - *Crossopteryx febrifuga* root is used in decoctions to treat liver inflammation and reduce bilirubin levels. - *Strychnos innocua* root is used to manage liver disorders and support liver function. - *Flueggea virosa* (root) is used for detoxification and liver support.
Whole Plant	8	18.7%	Whole plant formulations are particularly beneficial for their synergistic effect in treating liver conditions. - *Acanthospermum hispidum* (whole plant) is used in decoctions to support liver detoxification and reduce jaundice symptoms. - *Tapinanthus* (parasitic plant) is used for its hepatoprotective effects in treating liver disorders and jaundice.
Branch	4	9.4%	Branches are often used for their detoxifying and mild anti-inflammatory effects. For instance, *Piliostigma thonningii* (leaves and branches) is used in decoction to support liver health, especially in managing symptoms of jaundice.
Bark	2	4.7%	Bark is used for its detoxifying and hepatoprotective properties. For example, *Anogeissus leiocarpa* bark is used in decoctions to reduce liver inflammation and promote liver health. The *Terminalia macroptera* bark, known for its anti-inflammatory and hepatoprotective effects, is also used to treat jaundice and liver disorders.
Seed	2	4.7%	Seeds are used for their antioxidant and hepatoprotective properties. Examples: - *Vigna unguiculata* (cowpea seeds) are used in maceration to detoxify the liver and treat jaundice. - *Balanites aegyptiaca* (desert date) seeds are used in decoctions for liver health and to alleviate symptoms of hepatitis.
Flower	1	2.4%	Flowers are known for their antioxidant properties that help protect liver cells. For illustrative purpose, *Cassia siemea* flowers are used in decoctions to support liver function and alleviate symptoms of jaundice.
Total Species	43	100%	-

Table 4: Literature review of phytochemical contents and therapeutic potential of survey-reported medicinal plants

N°	Genus and Species	Family	Drug Parts	Key Chemical Compounds (44–46,48,49,52–57,62–67)	Therapeutic Activities (44–46,48,49,52–57,62–67)
1	*Acanthospermum hispidum DC*	Asteraceae	Whole plant	Alkaloids, flavonoids, tannins	Hepatoprotective, anti-inflammatory, detoxifying
2	*Anogeissus leiocarpa Guill. & Perr.*	Combretaceae	Tapinantus	Tannins, flavonoids, triterpenes	Antioxidant, anti-inflammatory, promotes liver regeneration
3	*Annona senegalensis Pers.*	Annonaceae	Root	Alkaloids, flavonoids, saponins	Hepatoprotective, detoxifying, anti-jaundice
4	*Azadirachta indica A. Juss.*	Meliaceae	Leaves	Alkaloids, flavonoids, terpenoids, essential oils	Hepatoprotective, antioxidant, anti-inflammatory, anti-jaundice
5	*Balanites aegyptiaca (L.) Del.*	Zigophyllaceae	Roots, upper stem bark	Alkaloids, carbohydrates, saponins, flavonoids	Hepatoprotective, anti-inflammatory, treatment of jaundice
6	*Calotropis procera W.T.Ait*	Asclepiadaceae	Dry wood	Alkaloids, terpenoids, saponins	Liver detoxification, anti-inflammatory
7	*Carica papaya L.*	Caricaceae	Leaves	Flavonoids, alkaloids, vitamins	Hepatoprotective, antioxidant, detoxifying
8	*Cassia sieberiana DC.*	Caesalpiniaceae	Root bark	Anthraquinones, saponins, flavonoids	Hepatoprotective, aids in liver detoxification
9	*Cassia siemea Lam.*	-	Leaves, flowers	Anthraquinones, saponins, alkaloids	Anti-inflammatory, supports liver health and detoxification
10	*Cassia singueana Del.*	-	Leaves	Tannins, flavonoids, saponins	Liver detoxifying, anti-inflammatory, hepatoprotective
11	*Centella asiatica*	Apiaceae	-	Triterpenoids, flavonoids, asiaticoside	Hepatoprotective, promotes liver regeneration
12	*Cochlospermum planchonii Hook.*	Cochlospermaceae	Tubercule	Alkaloids, tannins, flavonoids	Liver protective, anti-inflammatory
13	*Cochlospermum tinctorium A. Rich.*	-	-	Alkaloids, flavonoids, terpenes	Hepatoprotective, liver detoxification
14	*Crossopteryx febrifuga Benth*	Rubiaceae	Root	Alkaloids, tannins, flavonoids	Anti-inflammatory, detoxifying, supports liver health
15	*Cymbopogon gigantus Chiov.*	Graminaceae	Root	Essential oils, flavonoids, saponins	Liver detoxification, antioxidant
16	*Chrysantellum afroamericanum*	Asteraceae	Whole plant	Flavonoids, phenolics	Hepatoprotective, detoxifying, anti-jaundice
17	*Diospyros mespilisformis*	Ebenaceae	Stem bark	Tannins, alkaloids, flavonoids	Liver health promotion, anti-jaundice
18	*Eucalyptus camaldulensis Mehn.*	Myrtaceae	Leaves	Essential oils, terpenes, flavonoids	Hepatoprotective, anti-inflammatory, antimicrobial
19	*Flueggea virosa (Willd) Voigt.*	Euphorbiaceae	Root	Alkaloids, flavonoids	Hepatoprotective, anti-inflammatory, anti-jaundice
20	*Ficus thonningii*	Moraceae	Leaves	Flavonoids, tannins, saponins	Liver detoxification, antioxidant, anti-jaundice
21	*Gardenia sokotensis*	Rubiaceae	Leaves	Iridoid glycosides, tannins, flavonoids	Hepatoprotective, detoxifying, anti-jaundice
22	*Grewia flavescens Juss*	Tiliaceae	Branch	Flavonoids, saponins	Liver health promotion, anti-jaundice
23	*Hyptis spicigera Lam*	Lamiaceae	Root	Flavonoids, terpenoids	Liver detoxification, anti-inflammatory

N°	Genus and Species	Family	Drug Parts	Key Chemical Compounds (44–46,48,49,52–57,62–67)	Therapeutic Activities (44–46,48,49,52–57,62–67)
24	*Mangifera indica L.*	Anacardiaceae	Young leaves	Tannins, flavonoids, terpenes	Hepatoprotective, anti-jaundice, liver detoxification
25	*Mitragyna inermis (willd) Ktze.*	Rubiaceae	Leaves, young root	Alkaloids, flavonoids	Hepatoprotective, anti-inflammatory, supports liver regeneration
26	*Nauclea latifolia*	Bubiaceae	Roots	Alkaloids, tannins, flavonoids	Liver detoxification, hepatoprotective
27	*Ocimum canum Sims.*	Lamiaceae	Whole plant	Essential oils, flavonoids	Liver health support, detoxifying
28	*Parkia biglobosa Benth.*	Mimosaceae	Stem bark	Flavonoids, saponins, terpenes	Hepatoprotective, anti-jaundice, detoxification
29	*Penninsetum gambiensis L*	Graminaceae	Ears, seed	Flavonoids, saponins	Liver detoxification, anti-inflammatory
30	*Piliostigma thonningii. L*	Ceasalpiniaceae	Leaves, branch	Flavonoids, tannins, alkaloids	Hepatoprotective, liver detoxification
31	*Polygala multiflora L.*	Polygalaceae	Stem	Triterpenoids, saponins	Liver detoxifying, anti-inflammatory
32	*Psidium guajava Radd.*	Myrtaceae	Leaves	Flavonoids, tannins, essential oils	Hepatoprotective, anti-jaundice, liver health support
33	*Stachytarpheta angustifolia Vahl*	Verbenaceae	Whole plant	Flavonoids, terpenes	Hepatoprotective, detoxifying, anti-jaundice
34	*Stylosanthes erecta P. Beauv.*	Fabaceae	Whole plant	Flavonoids, alkaloids, saponins	Liver detoxification, anti-inflammatory
35	*Strychnos innocua Del.*	Loganiaceae	Leaves	Alkaloids, saponins, flavonoids	Liver health support, anti-inflammatory
36	*Tamarindus indica L.*	Caesalpiniaceae	Fruit, branch	Tannins, flavonoids, vitamins	Hepatoprotective, detoxifying, anti-jaundice
37	*Tapinanthus sp*	Loranthaceae	Whole plant	Flavonoids, saponins	Hepatoprotective, detoxifying
38	*Terminalia macroptera Guill. & Perr.*	Combretaceae	Root bark	Tannins, flavonoids, saponins	Liver health promotion, anti-jaundice
39	*Vernonia colorata (Willd) Drake.*	Asteraceae	Leaves	Flavonoids, terpenoids	Hepatoprotective, anti-inflammatory, detoxifying
40	*Vigna unguiculata (L.) Walp.*	Fabaceae	Seed	Flavonoids, saponins, proteins	Liver detoxification, hepatoprotective, anti-jaundice
41	*Vitellaria paradoxa C.f. Gaertn.*	Sapotaceae	Branch of a young plant	Tannins, flavonoids, saponins	Liver detoxification, antioxidant, anti-jaundice
42	*Waltheria indica L.*	Sterculiaceae	Whole plant	Flavonoids, tannins, alkaloids	Hepatoprotective, detoxifying, anti-jaundice
43	Ximenea Americana L.	Olacaceae	Root	Tannins, flavonoids, alkaloids	Liver detoxification, anti-jaundice

4. Discussion

The present survey highlights several important ethnobotanical and linguistic dynamics in the use of medicinal plants for jaundice and hepatic-related conditions management in the Centre-Eastern region of Burkina Faso. The ongoing section based on the initial findings will discuss more in-depth on the cultural and linguistic dynamics, phytochemical profiles, preparation techniques and conservations implications, ethnopharmacology considerations, and recommendations for future research.

4.1. Cultural and linguistic dynamics

One major finding was the wide variability of local names for a single species among healers, even within the same village. This reflects intergenerational language evolution and the influence of neighboring cultures. Indeed, there is a strong generational shifts and cross-border linguistic influences from Ghana, Togo, Benin, and Côte d'Ivoire. To mitigate ambiguity and ensure accurate identification, informants were asked to describe morphological traits or provide specimens for herbarium confirmation. This nomenclature variability is one of the major issues in the intergenerational knowledge transmission. Hence it is mandatory to develop a local database linking vernacular names to voucher specimens by elaborating Standard Nomenclature Registries (SNR). In addition, intergenerational workshops can be initiated in order to facilitate knowledge exchange between elder and apprentice healers for conserving traditional terminology and preventing the loss of key ethnopharmacological parameters.

4.2. Ethnopharmacological considerations of key species

For the management of jaundice et liver-related disorders in the investigated population, *Cochlospermum* spp. emerged as the most cited genus, 10 reports (Appendix A), with *Cochlospermum planchonii* ("female") and *Cochlospermum tinctorium* ("male") distinguished by healers based on morphology rather than phytochemistry. These two species present botanical differences. Indeed, the C. *planchonii* is a shrub that can grow to 1.5 meters high and its flowers are on the stem, its leaves less lobed and its lobes rounded and rarely toothed; whereas, the *Cochlospermum. tinctorium* is a little herb with 15 to 30 centimeters, with its flowers coming out of the soil and its leaves deeply palmate and toothed. However, both have a tubercle, and the phytochemistry did not reveal any significant differences; they contain terpenes, polysaccharides, and phenols (69–71) that confer several activities.

Subsequent highly cited taxa include *Piliostigma thonningii*, and *Terminalia macroptera* were three reports each (Appendix A), followed by *Chrysanthellum afroamericanum*, *Mangifera indica*, *Mitragyna inermis*, *Tamarindus indica*, *Vernonia colorata*, and *Vigna unguiculata* with two reports each. In a study reported by Njayou et *al.* (72) on Cameroonian traditional medicinal plants against hepatitis, twelve (12) of them were also reported by the informants. In Njayou assay, it was demonstrated that *Manguifera indica*, *Chrysantellum americanum*, *Carica papaya*, *Vernonia sp*, *Piliostigma thonningii*, *Occimum sp*, *Eucalyptus sp*, *Psidum guayava*, *Nauclea latifolia* have good effect against hepatitis, these plants are also reported in the present survey, validating cross-regional efficacy (72).

Moreover, several of the documented medicinal species are also incorporated into the local diet. For instance, the leaves of *Tamarindus indica* and *Piliostigma thonningii* are regularly used in local staple dishes such as "Sagbo", *i.e.,* paste prepared with maize or sorghum flavour, thereby offering both essential nutrients and a degree of hepatoprotective benefit. Similarly, *Vigna unguiculata* (cowpea) functions not only as a primary protein source but also provides seed extracts that are traditionally employed for their therapeutic properties, exemplifying the close integration of nutrition and medicinal practice.

4.3. Phytochemical profiles of key plant parts

Table 3 provides an overview of the contribution in terms of frequency of the plant parts in the formulations for liver-related disorders, particularly jaundice, with examples of therapeutic uses from literature(44–46,48,49,52–57,62–67). Leaves and roots are equally the most commonly used parts mentioned by the informants, with 30.23% for each (Table 3). These organs concentrate bioactive secondary metabolites (flavonoids, alkaloids, tannins) with documented hepatoprotective and antioxidant(62–66,68).

Rich in flavonoids and antioxidants, leaves are highly effective in managing liver disorders such as hepatitis, jaundice, and detoxification. *Azadirachta indica* (neem), *Carica papaya* (papaya), and *Mangifera indica* (mango) leaves are excellent examples of plants with strong hepatoprotective effects. The abundance of leaf-based formulations underscores their popularity and importance in traditional medicine for liver health(72). The abundance of leaf-based formulations highlights their popularity and importance in traditional medicine for liver health.

Roots (30.23%), equally as significant as leaves, are rich in alkaloids, glycosides, and starch, and are often used for their potent hepatoprotective effects. For instance, roots from *Crossopteryx febrifuga*,(73) *Strychnos innocua*,(67,74–76) and *Flueggea virosa* (77,78) are frequently used to treat liver inflammation and reduce bilirubin levels. The widespread use of roots suggests their efficacy in managing severe liver conditions and their role in supporting liver function.

Branch, often used in infusions or decoctions, contributes to liver health primarily through its detoxifying and anti-inflammatory properties. *Piliostigma thonningii* is a notable example, where both the leaves and branches support liver function and manage

symptoms of jaundice.(79–81) The use of branches for liver health seems less frequent but still significant, with 9.4% of the species relying on this plant part.

Furthermore, though less frequent, bark, flowers, and seeds still play a crucial role in the overall therapeutic landscape, often contributing to specific liver-related symptoms such as inflammation and jaundice. The collected data reflect the importance of both individual plant parts and the whole plant in traditional herbal medicine for liver health, indicating the diversity of approaches used in treating liver conditions with medicinal plants.

Bark (4.7%) is also used. This outer protective covering of woody plants, plays a crucial role in liver health due to its rich content of alkaloids and tannins, which are known for their detoxifying and hepatoprotective properties.(62–66,68). *Anogeissus leiocarpa* and *Terminalia macroptera* are two examples of plants with bark used in medicinal formulations. These plants reduce liver inflammation, treat jaundice, and promote liver health.(82–84) The low percentage of bark usage (4.7%) suggests that while it is effective, it may be less commonly utilized than other parts like leaves and roots.

Seeds (4.7%) are also less commonly used for liver disorders but are still valuable for their antioxidant and hepatoprotective properties. *Vigna unguiculata* (cowpea) and *Balanites aegyptiaca* (desert date) are examples of seeds used in decoctions or macerations for liver detoxification and the treatment of jaundice. The relatively low percentage of seed use (4.7%) may reflect that seeds are not as widely utilized as other plant parts. However, their specific properties still make them a viable option in certain formulations.

Flowers (2.4%) are less commonly used than other parts. They contain volatile oils and flavonoids known for their antioxidant properties, which help protect liver cells. *Cassia siamea* flowers, for example, are used to support liver function and alleviate jaundice symptoms. The therapeutic use of flowers is relatively niche in liver treatments, as indicated by the 2.4% representation in the table.

The whole Plant is also used in 18.7% of the medicinal formulations from the survey, when the combined effect of multiple plant parts (root, stem, leaves, and flowers) enhances the therapeutic impact. *Acanthospermum hispidum* and *Tapinanthus*, a parasitic plant, are plants whose entire structure is utilized for liver detoxification and hepatoprotective purposes. The 18.7% representation of whole plants suggests their balanced efficacy in treating liver conditions, providing a synergistic effect that is sometimes more potent than individual plant parts.

Table 4 recapitulates the diverse plant species, each contributing specific chemical compounds associated with various pharmacological potential for the management of liver-related disorders, including jaundice from literature(44–46,48,49,52–57,62–67)**.** These therapeutic properties are vital in managing hepatic diseases, especially in regions where medicinal plants are a primary source of healthcare. Therefore, discussing the chemical compounds and their related therapeutic activities will be helpful.

In addition, this table delineates the presence of flavonoids, alkaloids, tannins, and saponins across various plant organs; these phytochemicals exert notable hepatoprotective, detoxifying, and anti-inflammatory effects. Flavonoids, for instance, are potent antioxidants that help reduce oxidative stress in the liver, while tannins and alkaloids contribute to liver health by promoting detoxification and regeneration.(62,63,66)

Furthermore, most of the plants in this table are indicated for their hepatoprotective properties, meaning they help protect liver cells from damage. Several of these plants also exhibit anti-inflammatory and antioxidant activities, essential in reducing the inflammation and oxidative stress often seen in liver diseases such as hepatitis and cirrhosis.(62–66,68) Additionally, anti-jaundice properties are common among these plants, reflecting their role in alleviating symptoms associated with impaired liver function, particularly the yellowing of the skin and eyes.

4.4. Woody species used and sustainability challenges

Based on the GHC, as shown in Table 1, trees are the most common in this survey, making up nearly 48.8% (21 species) of the total plant species investigated. These species are tall, woody plants with a prominent trunk and canopy, such as *Parkia biglobosa*. Shrubs represent 30.2% (13 species), with multiple stems originating from the base. An example is *Piliostigma thonningii.* Herbs, which are non-woody plants, account for 18.6% (8 species). These species include plants like *Cymbopogon gigantus,* which are soft-stemmed and may be annual, biennial, or perennial. Parasitic plants, which derive some or all of their nutrients from other living plants, are the least common in this study, making up only 2.4% (1 species). *Tapinanthus* sp. is an example of this category.

Subsequently, the GHC reveals a clear predominance of woody taxa, trees and shrubs, over herbs and parasitic plants, suggesting that in this region these longer-lived species are both more abundant and more commonly employed in the treatment of liver-related disorders. This woody-plant dominance may be due to their perennial availability and the concentration of bioactive compounds in bark and heartwood.

Nevertheless, this pronounced dependence on woody species presents significant sustainability challenges. Removing bark and roots can weaken or kill trees, threatening local biodiversity. To address these concerns, conservation measures, such as

incorporating high-demand species like *Parkia biglobosa* and *Terminalia macroptera* into agroforestry systems, should be implemented to protect wild populations while still meeting medicinal requirements.

4.5. Preparation techniques and Safety issues

From Appendix A, in terms of preparation mode distribution, decoction predominates (60 % of recipes), followed by maceration (26.7 %) and other methods (13.3 %). High-temperature decoctions improve extract quality and safety in several ways. At first glance, the elevated heat enhances solubility, promoting the release of both polar compounds (e.g., tannins and flavonoids) and moderately non-polar constituents such as terpenes. In addition, prolonged boiling exerts a sterilization effect, effectively reducing microbial contamination in the aqueous extract. Finally, the complexity of certain preparations, such as the ritual combination of *Cochlospermum* tubercles with fermented *Parkia biglobosa* seeds and poultry meat, illustrates how spiritual practices are integrated with pharmacological objectives in traditional healing.

The preparation techniques of the traditional healers, mainly decoction and maceration preparations are inherently prone to several conservation challenges that can compromise their safety and efficacy.

In fact, aqueous extracts, especially those prepared by maceration at ambient temperatures, 26.7% in the present study, provide a nutrient-rich medium for bacterial and fungal growth. Without adequate heat treatment or the addition of antimicrobial agents, these preparations can rapidly become contaminated, posing health risks to consumers.

In addition, many bioactive constituents, such as flavonoids and terpenes, are susceptible to oxidation, hydrolysis, or photodegradation over time. Exposure to light, heat, or air can therefore diminish the therapeutic potency of both decoctions and macerates.

Moreover, in macerations, insoluble plant particulates tend to settle, leading to inconsistent dosing if the preparation is not thoroughly agitated before administration. Decoctions, while clearer, may still develop precipitates of tannin–protein complexes that alter concentration.

Traditional storage vessels, African clay pots or plastic containers, often lack airtight seals, accelerating spoilage. Consequently, healers typically recommend consumption within 24-48 hours of preparation, limiting the practicality of these remedies for chronic treatment regimens.

Finally, without refrigeration, tropical ambient temperatures (25–35 °C) can further accelerate microbial proliferation and chemical breakdown. Inadequate cooling or exposure to direct sunlight exacerbates these effects.

To address the safety issues, in order, to extend the shelf-life of decoctions and macerations, simple pasteurization measures, such as a brief reboiling, should be adopted, followed by storage in dark, airtight glass containers. The addition of natural preservatives (for example, ethanol, honey, or salt) can further inhibit microbial proliferation without compromising traditional preparation methods. Moreover, establishing standardized protocols for both preparation and storage, including clear labeling with the date of manufacture and recommended usage period, will improve the safety, consistency, and reproducibility of these ethnomedicinal remedies.

4.6. Study limits and recommendations for future research

Several methodological limitations should be acknowledged. These limitations are mainly reliance on self-reported efficacy (no clinical assays), small sample relative to total healer pool, potential recall bias due to healers' reluctance to share complete recipe details (recall and secrecy bias), seasonal availability of certain herbs likely influenced citation frequencies, potentially skewing the data, and absence of phytochemical quantification.

Therefore, it will be relevant for future research to perform the phytochemical characterization for the quantification of the bioactive constituents via HPLC-MS and NMR analysis. In addition, the pharmacological validation, through *in vitro* assay and *in vivo* evaluations using laboratory animal models of chemically induced jaundice, should be realised.

Moreover, developing and optimizing propagation protocols for priority species to ensure a sustainable supply is strongly recommended. Therefore, rotational harvesting, community nurseries, and integration into agroforestry systems should be observed, leading to a one health approach, bridging human, animal and ecosystem health, for harmonising medicinal-plant use with biodiversity preservation. At last, community-driven benefit-sharing agreements and clear guidelines for intellectual property rights should be established.

5. Conclusion

The variety of plant parts used (leaves, roots, bark, whole plant, etc.) underlines the adaptability of traditional herbal medicine, where different plant parts are used for their distinct pharmacological potentials. These medicinal plants are particularly relevant in regions like Burkina Faso and other parts of Africa, where herbal remedies are often relied upon due to limited access to modern medical treatments. The indigenous knowledge of plant-based therapies is a valuable resource for addressing liver-related diseases in these regions, especially in light of high prevalence rates of conditions like hepatitis.

Indeed, hepatitis and liver-related disorders are widespread in Burkina Faso, and traditional healers, using medicinal plants, help many people for managing these potentially lethal diseases. While these plants have a long-standing traditional use for liver disorders, further pharmacological and clinical studies are essential to confirm their efficacy and safety. The Development of medicinal plant-derived drugs could strengthen the conventional therapeutic arsenal. However, to ensure the sustainability of obtaining medicinal plants, developing a strategy for their agricultural production is mandatory.

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Conflict of interest

The authors declare that they have no conflict of interest.

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Appendix A: Key metrics of 43 medicinal plants investigated for jaundice and liver-related disorders in Kourittenga, Burkina Faso (2024)

N°	Genus and Species	Family	Local Name	Used Part	PMD[a]	FC[b]	UV[c]
1	*Cochlospermum planchonii Hook.*	Cochlospermaceae	Soãs-gnaaga	Tubercule	Decoction, Maceration	10	0.476
2	*Cochlospermum tinctorium A. Rich*	-	Soãs-raaga	-	-	-	-
3	*Piliostigma thonningii. L*	Ceasalpiniaceae	Banghingnaaga	Leaves, branch	Decoction	3	0.143
4	*Terminalia macroptera Guill. & Perr.*	Combretaceae	Gundry / Kõdpoko	Root bark	Decoction	3	0.143
5	*Balanites aegyptiaca (L.) Del.*	Zigophyllaceae	Kiagelga	Roots, upper stem bark	Decoction	2	0.095
6	*Cassia sieberiana DC.*	Caesalpiniaceae	Yamtiiga	Root bark	Decoction	2	0.095
7	*Cassia siemea Lam.*	-	Kasse tiiga	Leaves, flowers	Decoction, Crud	2	0.095
8	*Chrysantellum afroamericanum*	Asteraceae	Kamga	Whole plant	Decoction	2	0.095
9	*Mangifera indica L.*	Anacardiaceae	Montiiga	Young leaves	Decoction, Juice	2	0.095
10	*Mitragyna inermis (willd) Ktze.*	Rubiaceae	Yilga	Leaves, young root	Decoction	2	0.095
11	*Penninsetum gambiensis L*	Graminaceae	Ka zuiya	Ears, seed	Maceration	2	0.095
12	*Tamarindus indica L.*	Caesalpiniaceae	Pusga	Fruit, branch	Maceration, Decoction	2	0.095
13	*Vernonia colorata (Willd) Drake.*	Asteraceae	Koaag-sãfande	Leaves	Decoction	2	0.095
14	*Vigna unguiculata (L.) Walp.*	Fabaceae	Benga	Seed	Maceration, Donuts	2	0.095
15	*Acanthospermum hispidum DC*	Asteraceae	Guimatan	Whole plant	Decoction	1	0.048
16	*Anogeissus leiocarpa Guill. & Perr.*	Combretaceae	Siiya	Tapinantus	Decoction	1	0.048
17	*Annona senegalensis Pers.*	Annonaceae	Barkudga	Root	Decoction	1	0.048
18	*Azadirachta indica A. Juss.*	Meliaceae	Panguda	Leaves	Decoction	1	0.048
19	*Calotropis procera W.T.Ait*	Asclepiadaceae	Putrupuugu	Dry wood	Calcining	1	0.048
20	*Carica papaya L.*	Caricaceae	Papar tiiga	Leaves	Decoction	1	0.048
21	*Cassia singueana Del.*	-	Gelwaka	Leaves	Decoction, Inhalation	1	0.048
22	*Centella asiatica*	Apiaceae	Externe parte	-	Decoction	1	0.048
23	*Crossopteryx febrifuga Benth*	Rubiaceae	Kum-wãga	Root	Decoction	1	0.048
24	*Cymbopogon gigantus Chiov.*	Graminaceae	Kuwega	Root	Decoction	1	0.048
25	*Diospyros mespilisformis*	Ebenaceae	Gaanka	Stem bark	Decoction	1	0.048
26	*Eucalyptus camaldulensis Mehn.*	Myrtaceae	Kaliptis	Leaves	Decoction	1	0.048
27	*Flueggea virosa (Willd) Voigt.*	Euphorbiaceae	Sugdaaga	Root	Decoction	1	0.048

N°	Genus and Species	Family	Local Name	Used Part	PMD[a]	FC[b]	UV[c]
28	*Ficus thonningii*	Moraceae	Kankansiigna	Leaves	Decoction	1	0.048
29	*Gardenia sokotensis*	Rubiaceae	Tang-razunga	Leaves	Decoction	1	0.048
30	*Grewia flavescens Juss*	Tiliaceae	Soomkondo / Peokugda	Branch	Decoction	1	0.048
31	*Hyptis spicigera Lam*	Lamiaceae	Zizigla / Sumwaaga	Root	Decoction	1	0.048
32	*Nauclea latifolia*	Bubiaceae	Guuga	Roots	Maceration, Decoction	1	0.048
33	*Ocimum canum Sims.*	Lamiaceae	Yusinyuudu	Whole plant	Decoction	1	0.048
34	*Parkia biglobosa Benth.*	Mimosaceae	Roãga	Stem bark	Decoction	1	0.048
35	*Polygala multiflora L.*	Polygalaceae	Tugui	Stem	Ash	1	0.048
36	*Psidium guajava Radd.*	Myrtaceae	Guyak-tiiya	Leaves	Decoction	1	0.048
37	*Stachytarpheta angustifolia Vahl*	Verbenaceae	Kiensuiya	Whole plant	Decoction	1	0.048
38	*Stylosanthes erecta P. Beauv.*	Fabaceae	Saakwisalbelga	Whole plant	Decoction	1	0.048
39	*Strychnos innocua Del.*	Loganiaceae	Mograar	Leaves	Decoction	1	0.048
40	*Tapinanthus sp*	Loranthaceae	Welebre	Whole plant	Decoction	1	0.048
41	*Vitellaria paradoxa C.f. Gaertn.*	Sapotaceae	Taãnga	Branch of a young plant	Decoction	1	0.048
42	*Waltheria indica L.*	Sterculiaceae	Gudgudi	Whole plant	Decoction	1	0.048
43	*Ximenea Americana L.*	Olacaceae	Leanga	Root	Decoction	1	0.048

a: Preparation Mode Distribution; b: Frequency of Citation; c: Use Value. The calculated Informant Consensus Factor (ICF) value of the 42 investigated species is around 0.34. This value indicates a moderate level of agreement among healers, in fact among the 42 used species, 65 use-reports were registered, which are concentrated on a subset, most notably *Cochlospermum planchonii.*