Traditional knowledge of medicinal macrofungi commonly used by riverine populations of the Taï, Comoé and Marahoué national parks (Côte d'Ivoire)

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Research

Abstract

Background: Medicinal mushrooms are generally listed without specific therapeutic indications. This study aimed to enhance knowledge and practices regarding the use of medicinal mushrooms in the treatment of various ailments.

Methods: An ethnomedicinal survey was conducted using a questionnaire focusing on local names, parts used, preparation methods, and routes of administration of macrofungi. The knowledge gathered was assessed based on the frequency of recipe citations and the relative level of exploitation of ethnopharmacological species.

Results: This study reveals that women are the main holders of ethnopharmacological knowledge. The work focused on twelve species grouped by the informants into seven ethno-species. Species belonging to the genera Auricularia and lycoperdon were each considered a single ethno-species. The naming of ethnospecies is based on the shape of the sporophore, the color and the sociolinguistic affiliation of the users. These ethno-species are used in the treatment or relief of 28 conditions for which the ethno-medicinal recipes have been inventoried. The majority of conditions listed are treated using whole sporophores. The treatment of twelve conditions involves the combination of various inputs. The most common preparation method involves grinding the sporophores into powder. The method of administration of the recipes depends on the location of the condition. The analysis shows variability in the use of preparations and unequal exploitation of ethnospecies.

Conclusions: This study highlights the wealth of ethnopharmacological knowledge about macrofungi. However, the gradual erosion of this knowledge among young people underscores the need to document and promote it.

Keywords: Traditional knowledge, Medicinal macrofungi, Local communities, National parks, Côte d'Ivoire.

Background

In many rural areas of the world, primary healthcare still relies on the use of forest resources, both timber and non-timber. Akpi *et al*. (2019) revealed that these resources have been used in traditional medicine for millennia, often without requiring industrial processing. Among these, macrofungi hold an important place due to their long-recognized therapeutic potential (Deslandes & Pic, 2001). However, some fungi have been rejected by local populations because of the proven toxicity of certain species, which can cause serious poisoning. Despite this mistrust, traditional medicine still uses certain species. However, the medicinal indications attributed to the use of these species are largely based on empirical experience and influenced by cultural beliefs (Francia *et al*. 2007).

The diversity of medicinal macrofungi varies according to region (Soro *et al*. 2019). Many species have been used in traditional medicine to treat various ailments over the centuries (Francia *et al*. 2007). Research has shown that mushrooms contain bioactive compounds with anticancer, neuroregenerative, cardioprotective, antimicrobial, anti-inflammatory, and antioxidant properties (Patel *et al.* 2012. Beyond pharmacological applications, some species are increasingly used in cosmetics and functional foods (Plourde 2016). In recent decades, medicinal mushrooms have gained popularity and are now found in foods, supplements, and beverages such as tea and coffee. In Côte d'Ivoire, Soro *et al*. (2019) identified sixteen medicinal species, but their potential remains insufficient for efficient use. This study aims to contribute to a better use of medicinal mushrooms in the treatment of various ailments. Specifically, it involved (i) identifying the holders of ethno-medical knowledge and the vernacular names attributed to each of the medicinal species, (ii) identifying the techniques and routes of administration.

Materials and Methods

Study area

The study was conducted in nine villages in Côte d'Ivoire (Fig1). These villages are permanent sites for collecting mycological data, selected following an ethnomycological survey during the work of Soro *et a*l. (2019). The villages are distributed across three phytogeographical zones (forest zone, forest-savanna transition zone, and savanna zone) as shown in Fig 1.

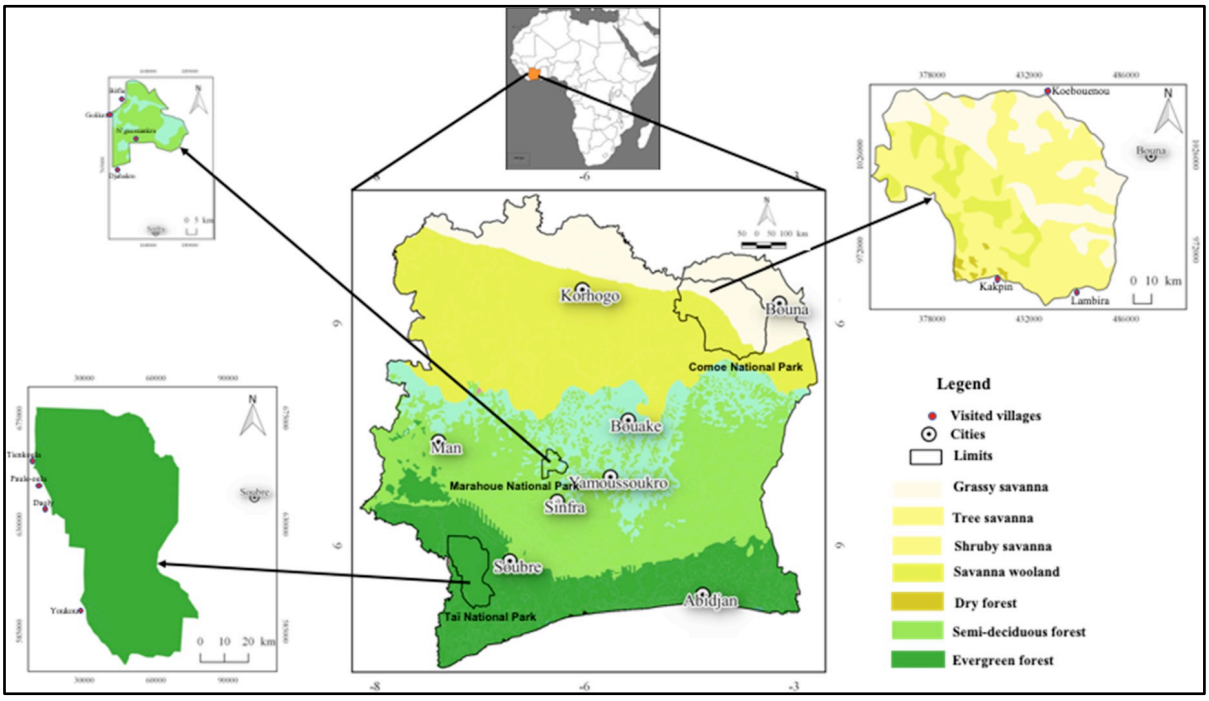


Figure 1. Location of villages visited (source, Soro *et al.* 2019)

Ethnic distribution of collection areas

The areas visited are populated by indigenous, allogeneic and allochthonous sociolinguistic groups (Table 1).

Table 1. Sociolinguistic groups of the different collection areas

Study areas	Villages visited	Indigenous and Local Sociolinguistic Groups	Allochthonous sociolinguistic groups
Forest area	Paule-oula, Daobly, Tienkoula	Oubi, guéré, Baoulé, senoufo, kroumen	Mossi
Forest-Savannah transition area	Djahakro, Bêfla, Golikro	Gouro, Baoulé, Whan	Mossi
Savannah area	Kapkin, Lambira, Kouebouenou	Lobi, Malinké, Koulango	Peulh

Selection of respondents

The ethnomycological survey was conducted among users of macrofungi in traditional medicine. Respondents were interviewed based on their ability to identify at least one species from images of medicinal species identified in the work of Soro *et al*. (2019).

Data Collection

Individual interviews were conducted using a semi-structured questionnaire combined with a photo album developed during the work of Soro *et al*. (2019). The survey focused primarily on local names, the parts of the fruiting bodies used, preparation methods, and routes of administration of the drugs. This information was collected through a questionnaire administered to the respondents. They were asked to identify the fungal species in images (Fig 2) and in the fruiting zone. The sociocultural characteristics (ethnicity, age, and sex) of the respondents were also recorded. Taxonomic identifications were made based on macroscopic and microscopic observations of the collected specimens, which were assigned collection numbers. These identifications were corroborated by consulting mycological herbaria, field guides for identifying fungi, and specialized reference works, as mentioned in the work of Soro *et al*. (2019).

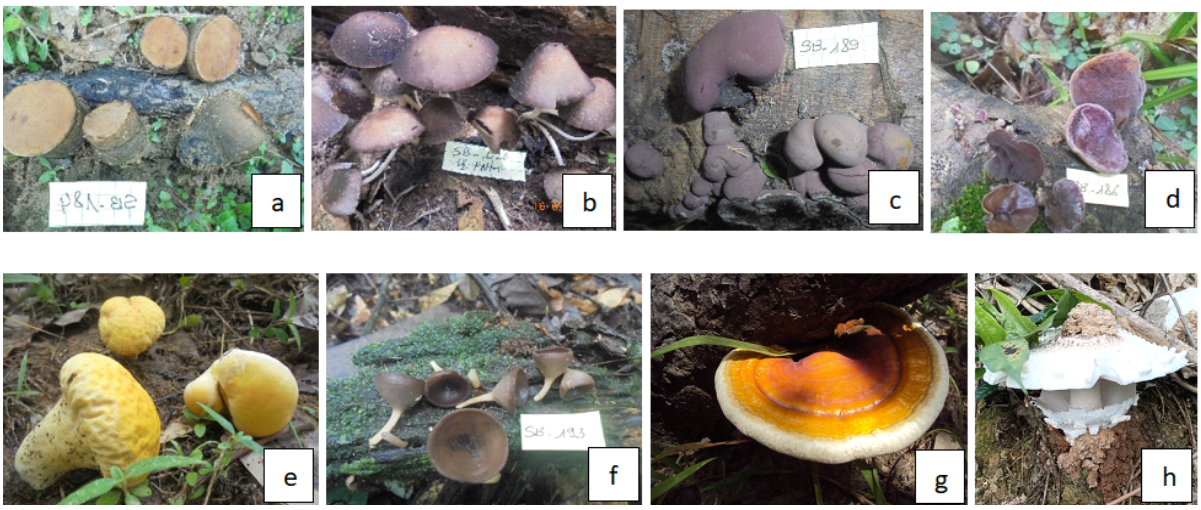


Figure 2. Some photos from the photo album : a : *Bulgaria* sp (SB-184), b : *Psathyrella tuberculata* (SB-026), c : *Daldinia eschscholtzii* (SB-189), d : *Auricularia* sp (SB-186), e : *Lycoperdon* sp (SB-188), f : *Cookeina* sp (SB-193), g : *Ganoderma lucidum* (SB-002) ; h : Termitomyces schimperi (CK-01)

Note : SB and CK are the initials of the collectors followed by the numbers corresponding to the collection numbers

Data Processing

An Excel spreadsheet was used to record the collected data. Local knowledge and know-how were assessed through the calculation and interpretation of the Citation Frequency of recipes and the Relative Exploitation Level (REL).

Citation Frequency (CF) is the number of participants who described the use of each recipe for ethnomedicinal purposes. Schrauf & Sanchez (2008) consider citation frequency to be a good indicator for assessing the credibility of the information received.

Relative Exploitation Level (REL) was obtained by calculating the ratio between the number (n) of conditions treated by a species and the total number (N) of conditions treated by all species (N'guessan *et al*. 2015). The REL values obtained allowed

us to characterize the level of exploitation of the different species. These species were classified according to the following categories :

- Species very well exploited if REL is between 75 and 100% ;
- Well exploited species if REL is between 50 and 75% ;
- Moderately exploited species if RELis between 25 and 50% ;
- Underexploited species if REL is between 1 and 25% ;
- Unexploited species if NER = 0.

Results and Discussion

Socio-demographic characteristics of respondents

A total of 82 respondents, including 32 men and 50 women, were identified as holders of ethno-medicinal knowledge and skills. The numerical superiority of women shows that they are more concerned and preoccupied with family health and well-being (Yorou *et al.* 2011, Guissou *et al*., 2014), which translates into significant involvement in traditional healthcare practices. They play a leading role in the preservation of ethno-medicinal knowledge and are generally responsible for preparing medicinal recipes. All of the women surveyed (100%) perform household activities. As for men, most of them are farmers (Table 2). In the forest area and the forest-savannah transition area, most of the respondents with ethno-mycological knowledge are in the 46-60 age group. In fact, in the forest-savannah transition area and the forest area, ethno-medicinal knowledge and skills are passed on to the adult generation, unlike in the savannah area, where the majority of those with ethno-medicinal knowledge are over 60 years old (Table 2). The fact that this age group in the savannah area possesses ethno-medicinal knowledge can be explained by the lack of interest shown by young people, young adults, and adults. In this area, ethno-medicinal knowledge and skills could disappear or become tainted in the coming decades.

Table 2. Socio-demographic information of respondents

Features		**Collection areas**			
		Forest Zone (ZF)	**Forest-savannah Transition Zone (ZT)**	**Savannah Zone (ZS)**	**Total frequency**
		frequency			
Genders	Men	09	15	08	32
	women	13	21	16	50
Activities	Farmers	09	15	06	30
	Cutlery sets	13	21	16	50
	Others	00	00	02	02
Ethnics	Oubi	04	00	00	04
	Guéré	15	00	00	15
	Baoulé	03	21	00	24
	Gouro	00	15	00	15
	Malinké	00	00	04	04
	Koulango	00	00	18	18
	Lobi	00	00	02	02
Ages	18 – 30 years	00	04	01	05
	31 – 45 years	07	11	02	20
	46 – 60 years	09	12	07	28
	More than 60 years	06	09	14	29

Medicinal Species and Associated Local Names

The ethnomedicinal research focused on twelve species, the knowledge and know-how of which were shared by the respondents. Among these, the work of Yian *et al*. 2020, conducted in the forest zone, focused on four ethnospecies (*Auricularia cornea, Psathyrella tuberculata, Termitomyces schimperi, Volvariella volvaceae).* In Burkina Faso, the work of Guisssou *et al*. 2014, revealed the use of Daldinia eschscholzii, Ganoderma lucidum, and *Lycoperdon* sp. Local names are assigned to each of the species used by the holders of knowledge and know-how (Table 3). These local names have no connection to the ailments treated. They are assigned in the local language of the sociolinguistic group using them. The

twelve species included in the study are grouped into seven ethnospecies by the various respondents. Each ethnospecies has a specific name that considers its shape, the sociolinguistic group using it, and its color (Guisssou *et al*. 2014). The meaning of the local name assigned depends on the sociolinguistic group using it, with the exception of Psathyrella tuberculata, whose meaning alludes to the black color of the mushroom when dry. Species belonging to the genera Auricularia and Lycoperdon each represent an ethnospecies.

Table 3. Local names assigned by informants

Scientific names	Ethno-species (local names)		
	Forest Zone (ZF°)	**Forest-savannah Transition Zone (ZT))**	**Savannah Zone (ZS)**
Auricularia polytricha ((Mont.) Sacc., *Auricularia cornea* Ehrenb., *Auricularia sp Auricularia sp*	**Urodohou**[1,2] (monkey ear)	**Gouro n'dré**[3] (mushrooms used by gouro) **Liblateinin**[4] (old woman's ear)	**Kotingo**[6]
*Psathyrella tuberculata (*Pat.) A.H.Sm	**Ndré-blé**[3] (black mushroom) **Woico**[1] (black mushroom) Gbaho	**Troutinin**[4] (black mushroom) **Ndré-blé**[3] (black mushroom)	**Fienanfi**[5] (black mushroom) **Poubidigo**[6] (black mushroom) **Commine-bissi**[7] (black mushroom)
Ganoderma lucidum (Curtis) P. Karst	**Wagahou-dré**[3] (wood mushroom)	**Wagahou-dré**[3] (wood mushroom)	**Soulawagané**[6,5] (monkey stool) **Gbalgbôkougo**[6] (monkey stool)
Lycoperdon sp1, 2	**Seyawoi**[2] (Mushroom of madness) Pohopoho[3]		
Termitomyces schimperi (Pat.) R. Heim			**Isêpouho**[6] (long-stemmed mushroom)
Daldinia eschscholtzii (Ehrenb.) Rehm	**Zué**[2] **Wagahou-dré**[3] (wood mushroom) Nanwibê[2] (Firewood pepper)	**Wagahou-dré**[3] (wood mushroom) **Yirimanpolou**[3] (wood swellings)	**Trontrongo**[6] **Tel-commine**[7]
Volvariella volvacea (Bull.) Singer, Lilloa	**Bôhéfê**[3] (sweet mushroom)		
Bulgaria sp	**Nanacloa n'zué**[3] (water from the king's goblet)		

NB : (…) = meaning of local names, [1,2] = Oubi, Guéré, [3] = Baoulé, [4] = Gouro, [5] = Malinké, [6] = Koulango, [7] = lobi

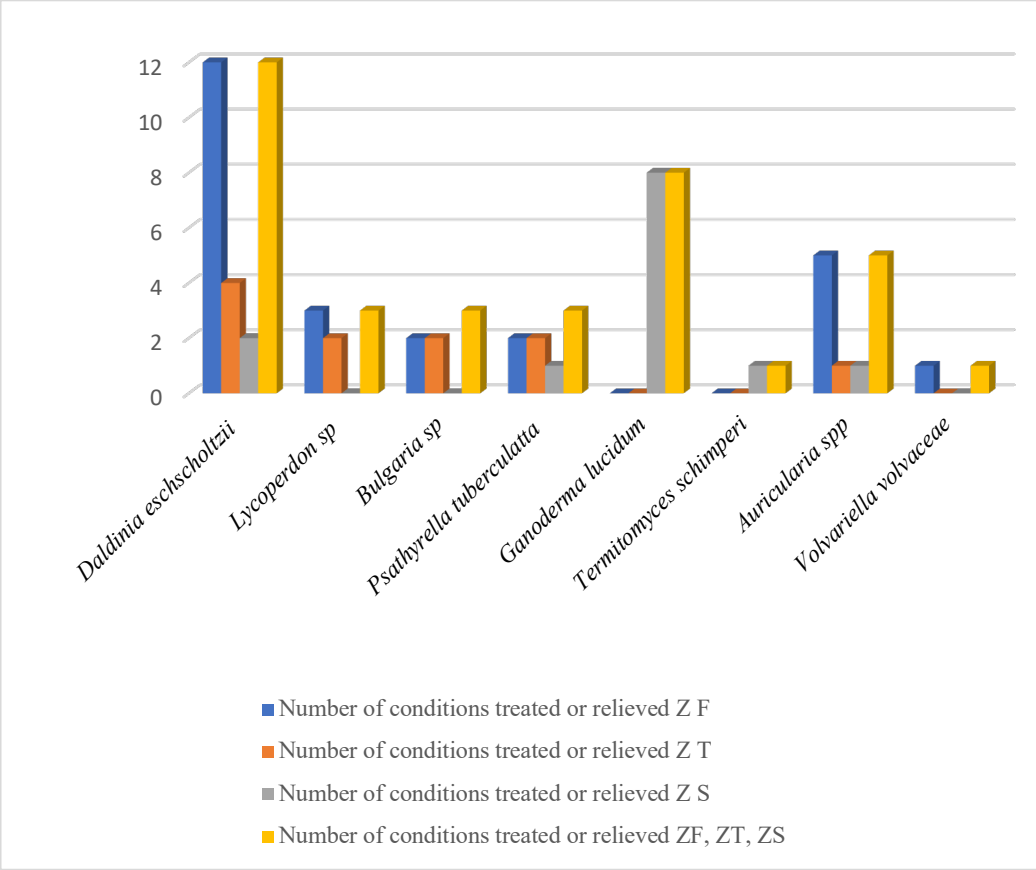
Conditions Treated or Relieved

A total of 28 conditions, for which the use of each recipe for ethnomedicinal purposes was listed, were identified. The number of conditions treated or relieved per ethnospecies ranged from 1 to 12 per ethnospecies and per sampling area (Fig 3). The majority of these conditions were documented in the work of Soro *et al*. 2019, without any specific details regarding their therapeutic characteristics.

Therapeutic Indicators of Medicinal Macrofungi

The therapeutic indicators for this study focused on the ailments treated by the macrofungal ethnospecies, the parts used (stem, cap, spores, container, whole sporophore), the inputs, and the methods of preparation and administration (Table 4). Several studies on the use of medicinal fungi exist in the literature. However, the medicinal species associated with the ailments are most often cited without any further details on therapeutic uses or methods of administration (Kouagou *et al*. 2016 ; Njouonkou *et al*. 2016 ; Soro *et al*. 2019 ; Mikobi *et al*. 2023). The work of Ngom *et al*., 2022, conducted in central

Uganda, mentioned eight species identified as medicinal. However, the knowledge and know-how relating to the types of diseases they treat, and their application only concern a limited number of these species.



Figures 3. Number of conditions treated or relieved by ethnospecies and by zone. ZF : Forest zone ; ZT : Forest-savannah transition zone ; ZS : Savannah zone

Preparation and use of medicinal Macrofungi

Parts and ingredients used in recipes

The infections reported by respondents (87%) are largely treated using whole fruiting bodies. Indeed, the difference between the stipe and the cap of a mushroom lies in their function and position within the fungal structure. Using different parts could be complementary. However, 12.5% of infections are treated using specific parts, notably the pseudorhiza, spores, and contents (liquid). These different parts are not combined with each other or with other substances. This is because these fruiting bodies have unique morphological characteristics. Species of the genus Bulgaria are filled with a clear liquid, those of Lycoperdon contain a cluster of spores, and finally, species of the genus *Termitomyces* are characterized by a pseudorhiza. *Lycoperdon* clusters used without additives in the forest zone are combined with shea butter or cow cream for the treatment of minor wounds in Burkina Faso (Guissou *et al.* 2014). The treatment of 12 ailments using medicinal macrofungi involves a combination of different additives. In West Bengal, the work of Dutta *et al*. (2014) also mentioned the use of various additives in the formulation of medicinal recipes for certain fungi. For the same ethnospecies, the additives cited vary from one ailment treated to another (Table 4). No explanation for the use of these additives was provided.

Methods of preparation and administration of recipes

The methods of preparation and administration of recipes are listed in Table 4. The most commonly used method of preparation is to reduce the sporophores to powder. Regardless of the condition being treated, powder reduction mainly involved *Daldinia eschscholtzii* and *Ganoderma lucidum*. These two species are lignicolous and reducing them to powder facilitates their use. The same preparation method was adopted in Burkina Faso (Guissou *et al*. 2014). The administration of recipes considers the location of the condition to be treated or relieved. The methods of administration vary from one condition to another for the same species (Table 4).

Table 4. Therapeutic characteristics of medicinal macrofungi

Ethno-species	Ailments	Parts used	Additive	Preparation methods	Method of administration	Sociocultural groups
Daldinia eschscholtzii (Ehrenb.) Rehm	Hemorrhoidal crisis	Whole sporophore	dried chili peppers	Powder obtained after calcination	Enema	Guéré
	hernia	Whole sporophore	Pepper	Powder obtained after calcination	Enema	Oubi, Guéré, Baoulé,
	Keloid	Whole sporophore	Artisanal palm seed oil	Powder obtained after calcination	Poultice	Gueré
	Wounds, burns, and body rashes	Whole sporophore	Shea butter	Powder obtained after calcination	Poultice	Guéré
	Children's navel dilation	Whole sporophore	Nothing	Infusion	Enema	Mossi
				Powder obtained after calcination	Enema	Oubi, guéré, Baoulé, gouro, koulango
	Cheek swelling	Whole sporophore	Nothing	Powder obtained after calcination	Poultice	Oubi
	Hip pain, STD (gonorrhea), hernia	Whole sporophore	Pepper	Powder obtained after calcination	Enema	Oubi, gueré, gouro,
	Chute rapide du cordon ombilical	Whole sporophore	Ash	Powder obtained after calcination	Apply to the navel and umbilical cord	Guéré,
Lycoperdon sp	Swelling of the lower limbs	Whole sporophore	Wasps' earth construction	Beverage	Poultice	Oubi
	Frail children	Whole sporophore	Nothing	Beverage	Make a body mask	Guéré
	External wound and burn	Spores	Nothing	Cluster of spores	Poultice	Guéré, Baoulé
Bulgaria sp	Heart palpitations	Liquid contained in the sporophore	Nothing	Beverage	Beverage	Baoulé, Gouro
	Epilepsy					
	Ulcer					
Psathyrella tuberculatta (Pat.) A.H.Sm	Internal wound in nursing mothers	Whole sporophore	Auricularia sp., peppers, chilies, pistachio; baobab seed powder, meat	Sauce	Alicament	Koulango, Baoulé
	Rapid fall of the umbilical cord	Whole sporophore	Nothing	Pasta after cooking	Apply to the navel and umbilical cord area.	Gouro
	Eye pain Blurred vision	Whole sporophore	Nothing	Infusion	Place one or two drops in the affected eyes.	Baoulé, Gouro
	Stomach ache	Whole sporophore	Nothing	Infusion	Beverage	Koulango, gouro,

Ganoderma lucidum (Curtis) P. Karst	Intestinal worms	Whole sporophore	Nothing	Powder obtained after calcination	Enema	Koulango
	Body pimples	Whole sporophore	Nothing	Powder	Se poudrer	Malinké.
	Hemorrhoidal crisis	Whole sporophore	Nothing	Powder obtained after calcination	beverage	Lobi
	Eye pain (swollen eye)	Whole sporophore	Nothing	Place on burning embers	Fumigation	Koulango
			Rust	Powder	Apply to eyes at bedtime	Koulango
	Rectal prolapse	Whole sporophore	Shea butter	Powder obtained after calcination	Apply to the rectum	Lobi
	Facilitates childbirth	Whole sporophore	Nothing	Powder obtained after calcination	Enema	Koulango
	Navel dilation	Whole sporophore	Nothing	Powder obtained after calcination	Beverage	Lobi
Termitomyces schimperi (Pat.) R. Heim	Breast cancer	pseudorhiza	Nothing	Trituration	Poultice	Koulango
Auricularia sp	Ulcer, hypertension	Whole sporophore	Nothing	fresh sporophores	Chew and swallow	Oubi, gouro, Gueré
	Menopause symptom	Whole sporophore	Sauce ingredients	Sauce	Alicament	Gueré, oubi
	AIDS					Guéré
Volvariella volvacea	Hypertension	Whole sporophore	Sauce ingredients	Sauce	Alicament	Baoulé

Frequency of Citation of Drug Recipes

Different drug recipes were cited for each of the conditions. However, *Daldinia eschscholtzii* is indicated for the treatment or relief of 12 conditions for which drug recipes were recorded in the forest zone, compared to 4 conditions and 2 conditions respectively in the forest-savanna transition zone and the savannah zone. The most frequently cited drug recipes in the forest, transition, and savanna zones were for the treatment of hernias (FC= 45.45%), umbilical dilation in children (FC=25%), and abdominal pain (FC=8.33%). The species *Ganoderma lucidum* was specifically cited for the treatment or relief of eight (8) conditions. It is used only in the savanna zone, and the drug recipe for facilitating childbirth was the most frequently cited (FC=16.66%). Three (3) ailments are treated or alleviated using the ethno-species *Lycoperdon* sp. and *Bulgaria* sp., but only in the forest and savanna zones. In the forest zone, the frequency of citations for the different medicinal recipes is equal (FC = 9.09%). In the transition zone, the most frequently cited medicinal recipes for treating frail children and heart palpitations, using Lycoperdon sp. (FC = 11.11%) and Bulgaria sp. (13.88%), respectively, are the ones most often mentioned. Medicinal recipes formulated from *Psathyrella tuberculata*, used for eye problems in the forest (FC = 9.09%) and transition (FC = 44.44%) zones, are the most frequently mentioned. In the savanna zone, the medicinal recipe used for treating abdominal wounds (lesions) is the only one mentioned. Of the five ailments treated or relieved by the ethnospecies Auricularia spp. in the forest zone, the remedy for ulcer treatment is cited in the forest-savanna and savanna transition zones. In the forest zone, the remedy for treating menopausal symptoms is the most frequently cited (CR = 54.54%). All Citation Frequency values are listed in Table 5. Differences in the frequency of citation of medicinal recipes between areas reflect a spatial variability in the ethnomedicinal knowledge and know-how of macrofungi. This variability could be linked to ecological diversity and also to the cultural transmission of knowledge and know-how.

Table 5 . Frequency of mention of conditions coupled with the knowledge and skills of the informants.

Ethno-species	**Affections**	**C F drug recipes**			
		Z F	Z T	Z S	ZF, ZT, ZS
Daldinia eschscholtzii	Hemorrhoidal crisis	18,18	0	0	4,87
	Hernia	45,45	11,11	0	18,29
	Keloid	9,09	0	0	2,43
	External wound	9,09	0	0	2,43
	Body pimple rash	9,09	0	0	2,43
	Children's umbilical dilation	22,72	25	4,62	29,26
	Cheek swelling	4,54	0	0	1,21
	Hip pain	18,18	0	0	4,87
	Running urine	9,09	0	0	2,43
	Rapid umbilical cord falloff	9,09	8,33	0	6,09
	Abdominal pain	18,18	2,77	8,33	8,53
	Body pimple	9,09	0	0	2,43
Lycoperdon sp	Lower limb swelling	9,09	0	0	2,43
	Frail children	9,09	11,11	0	7,31
	External wound	9,09	2,77	0	3,65
Bulgaria sp	Heart palpitations	9,09	13,88	0	8,53
	Ulcer	9,09	0	0	2,43
	Epilepsy	0	5,55	0	2,43
Psathyrella tuberculata	Internal wound in infants	4,54	0	70,83	21,95

	Eye pain, blurred vision	9,09	44,44	0	21,95
	Abdominal pain	0	5,55	0	2,43
Ganoderma lucidum	Intestinal worms	0	0	8,33	2,43
	Body rash	0	0	8,33	2,43
	Rectal prolapse	0	0	8,33	2,43
	Facilitates childbirth	0	0	16,66	4,87
	Internal wound	0	0	12,5	3,65
	Hemorrhoidal crisis	0	0	8,33	2,43
	Navel dilation in children	0	0	8,33	2,43
	Swollen eye	0	0	8,33	2,43
Termitomyces schimperi	Breast cancer	0	0	8,33	2,43
Auricularia spp	Ulcer	18,18	11,11	8,33	12,19
	Hypertension	9,09	0	0	2,43
	Menopausal symptoms	54,54	0	0	14,63
	AIDS (Acquired ImmunoDeficiency Syndrome)	9,09	0	0	2,43
	Abdominal pain	4,54	0	0	1,21
Volvariella volvacea	Hypertension	9,09	0	0	2,43

NB citation frequencies (CF) consider the listed conditions associated with their therapeutic characteristics.

Relative Exploitation Level (REL)

In forest and transition zones, *Daldinia eschscholtzii* is moderately exploited and minimally exploited (15.38%) in savannah zone. In contrast, Ganoderma lucidum is well exploited (61.54%) in savannah zone and unexploited in forest and transition zones. *Lycoperdon* sp. and *Bulgaria* sp. are minimally exploited in forest and transition zones and unexploited in savannah zone. Conversely, *Termitomyces schimperi* is unexploited in forest and transition zones and minimally exploited in the savanna zone. *Volvariella volvaceae* is minimally exploited (2.78%) in forest zone and unexploited in transition and savannah zones. Indeed, this species is generally known as an edible mushroom with high culinary value rather than medicinal value, which could explain its limited ethnopharmacological importance (De Roman & Boa 2006).

Across all study areas, *Daldinia eschscholtzii* is the only moderately exploited species (33.33%), while the others are under-exploited with a REL < 25% (Table 6). The observed differences in the level of exploitation of medicinal macrofungi could result from a combination of ecological and cultural factors, including species availability according to their distribution range, empirical knowledge of their medicinal properties, and the symbolic or sociocultural value attributed to them within communities (De Kesel *et al*. 2002; Van Andel, 2012).

Table 6: Relative Exploitation Level (REL)

Ethno-species	**REL (ZF)**	**REL (ZT)**	**REL (ZS)**	**REL (ZF, ZT, ZS)**
Daldinia eschscholtzii	48	36,37	15,38	33,33
Lycoperdon sp	12	18,19	0	8,33
Bulgaria sp	8	18,19	0	8,33
Psathyrella tuberculatta	8	18,19	7,7	8,33
Ganoderma lucidum	0	0	61,54	22,22
Termitomyces schimperi	0	0	7,7	2,78
Auricularia sp	20	10	7,7	13,89

Volvariella volvaceae	4	0	0	2,78

Conclusion

The ethnomedicinal study revealed knowledge and know-how regarding macrofungi used in traditional medicine. In the forest zone and the forest-savannah transition zone, the holders of ethnomycological knowledge are predominantly between 46 and 60 years old, unlike in the forest zone where the majority are over 60. The various holders and practitioners of this knowledge associate medicinal fungi with the ailments treated, the parts of the fruiting bodies used, the inputs, the methods of preparation, and the administration of medicinal recipes. The 12 species of macrofungi, divided into seven ethnospecies, are specialized in the treatment of 28 ailments. The ethnospecies *Daldinia eschscholtzii* is used in the treatment or relief of 12 ailments involving six inputs. Analysis of citation frequencies reveals a rich but unevenly distributed traditional knowledge, both in terms of species used and ailments treated. Calculation of the Exploitation Level shows that medicinal mushrooms are not exploited at the same level from one area to another.

Declarations

Ethics approval and consent to participate : Before beginning the ethnomycology study, we obtained verbal consent from all participants

Consent for publication: Not applicable

Availability of data and Materials : The data featured in this manuscript can be obtained from the corresponding author.

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