

Ethno-Medicinal Potential of Mushrooms among the Igala People of Kogi State

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Abstract

This study aims to explore the different types of mushrooms and examines their ethno-medicinal potential among the Igala people in Kogi State with a focus on their medicinal properties and effectiveness. The traditional use of mushrooms in area of food and medicine has been passed down from generation to generation, with the Igala people recognizing the medicinal properties of different species of mushrooms. A mixed-method research design, incorporating in-depth interviews, focus group discussion and literature review was adopted to gather data from a sample size of four hundred and fifty (450) randomly selected individuals. The methodology involved semi structured interviews, focus group discussion to explore the types of mushrooms used, their applications and associated beliefs. Thematic analysis was used to analyze the qualitative data, while descriptive statistics were used to analyze the quantitative data. The findings highlight the diverse application of mushrooms in Igala traditional medicine, emphasizing their role in promoting health and well-being, it revealed that several mushroom species are used for treating various ailments including common colds, wounds, stomach ailments, diabetes and hypertension. The study concludes that the Igala people holds a significant ethno-medicinal knowledge about mushrooms. This study provides valuable insights into the potential of mushrooms and promotes the preservation of indigenous knowledge among the Igala people; it also calls for further research on their potential for modern medicine shedding light on the importance of these fungi in traditional medicine and their potential for modern medical applications.

Keywords: Ethnomedicine, Mushrooms, Sustainable Development, Igala People.

Introduction

Mushrooms are the fleshy, spore – bearing fruiting bodies of fungi, some of which are edible while others are poisonous, they are among the most diverse organisms on Earth, playing a vital role in terrestrial ecosystems (Chang & Miles, 2004) especially for use as food and medicine. Despite their historical use in traditional medicine by indigenous communities worldwide, the full medicinal potential of mushrooms remains underexplored. Numerous mushroom species, particularly in Nigeria, are yet to be fully understood regarding their health benefits, largely due to limited information about their medicinal properties. Existing research primarily focuses on the nutritional composition of wild mushrooms (Ola & Oboh, 2001; Akpaja *et al.*, 2003; Adejumo *et al.*, 2015; Asemota *et al.*, 2015).

Nigeria's unique climatic conditions are conducive to the growth of various mushroom species. Many of these mushrooms are gradually gaining recognition for their nutritional, medicinal, and economic importance (Ola & Oboh, 2001; Akpaja *et al.*, 2003; Ayodele *et al.*, 2009; Okhuoya *et al.*, 2010; Oyetayo, 2011). Notable species with bioactive compounds in Nigeria include *Absorporus*, *Agaricus*, *Amanita*, *Chanterelles*, *Flammulina*, *Ganoderma*, *Lentinus*, *Pleurotus*, *Psathyrella*, *Russula*, *Termitomyces*, *Trametes*, *Trichaptum*, and *Volvariella* (Joshua & Agina, 2002; Ayodele *et al.*, 2009; Asemota *et al.*, 2015; Adebisi & Yakubu, 2016). Although traditional healers value these mushrooms, the active compounds responsible for their therapeutic effects are often unknown (Ayodele *et al.*, 2011; Adejumo *et al.*, 2015).

Studies have shown a growing interest in mushrooms for their therapeutic properties in treating diseases (Joshua & Agina, 2002; Boa, 2004; Chang & Miles, 2004; Idu *et al.*, 2007; Mohamed *et al.*, 2007; Silva *et al.*, 2010; Oyetayo, 2011; Ranghoo-Sanmukhiya *et al.*, 2014; Adejumo *et al.*, 2015; Asemota *et al.*, 2015; Zhang *et al.*, 2016; Slusarczyk *et al.*, 2021). However, challenges such as seasonal availability, deforestation and loss of ecosystem, lack of awareness, difficulty distinguishing edible from toxic species, social stigmas or change in lifestyle, and limited information on antioxidant properties hinder optimal use.

The Igala people of Kogi State, Nigeria, recognize various wild mushrooms called "Oru" and have rich ethno-medicinal knowledge with a long tradition of using them for economic sustenance, food and medicine. These mushrooms hold cultural significance, with names reflecting features like growth habits, shape, habitat, texture, and taste. But this knowledge is threatened by factors like deforestation and changing lifestyles, this necessitates the documentation and preservation. The research is aimed at documenting ethno-medicinal uses of mushroom among the Igala people, highlighting the problem of knowledge loss and significance of preserving this traditional knowledge for sustainable health care and economic benefits.

Bioactive Compounds and their Therapeutic Effects

Mushrooms have been used in traditional medicine for centuries, particularly in East Asia, for their immune-boosting, anti-cancer, and anti-inflammatory properties. Alkaloids, flavonoids, tannins, saponins, anthraquinones, phenols, glycosides, terpenes, and sterols are bioactive compounds studied for their therapeutic effects (Oyetayo, 2011; Armando *et al.*, 2019; Zeb & Lee, 2021; Venturella *et al.*, 2021; Lysakowska *et al.*, 2023; Muhammed *et al.*, 2023).

- **Alkaloids** are nitrogenous compounds with pharmacological effects.
- **Flavonoids** are antioxidants that reduce oxidative stress.
- **Tannins** possess antimicrobial and antiviral properties and can inhibit tumor growth.
- **Saponins** offer immune-modulating effects and may reduce cholesterol.
- **Anthraquinones** exhibit laxative and anticancer effects.

- **Phenolic compounds** have strong antioxidant activity, helping combat oxidative stress.
- **Glycosides** aid in immune function and exhibit anti-inflammatory properties.
- **Terpenes** have anti-inflammatory and anticancer activities.
- **Sterols**, like ergosterol, act as vitamin D₂ precursors and may lower cholesterol.
- **Coumarins** have anticoagulant properties and prevent thrombosis.

Mushrooms such as *Agaricus bisporus* and *Psilocybe* species contain psilocybin, known for its potential in treating depression and anxiety (Venturella *et al.*, 2021). *Lentinula edodes* has flavonoids like quercetin and kaempferol, which help reduce inflammation and oxidative stress (Venturella *et al.*, 2021). *Ganoderma lucidum* contains tannins with antimicrobial and antiviral effects, while saponins in *Pleurotus ostreatus* can lower cholesterol (Venturella *et al.*, 2021).

Problem Statement

Despite the importance of this rich ethnomedicinal traditional knowledge of the Igala people on the usage of mushrooms in traditional medicine, it faces several threats including loss of habitats, deforestation, erosion of traditional knowledge, lack of comprehensive documentation scientific validation on the medicinal uses of mushrooms. Many people remain unaware of the therapeutic compounds responsible for their benefits. This study seeks to explore and document the ethno-medicinal potential of mushrooms among the Igala, focusing on species identification, traditional uses, phytochemical properties, and cultural significance which promotes sustainability and conservation. It highlights the underutilization of mushrooms in Nigeria and the need for optimal and sustainable exploitation.

Objectives of the Study

This study aims to investigate the ethnomedicinal uses of mushrooms by the Igala people, with specific goals to:

- i. Document indigenous knowledge and medicinal uses of mushrooms in Kogi State.
- ii. Identify the phytochemical constituents of different mushroom species.
- iii. Emphasize the importance of mushrooms in traditional medicine for human health.

Methodology

Mushrooms were collected from the wild during its season and shown to the locals for the purpose of proper identification. Ethno-medicinal data were collected through mixed-method research design employing both qualitative and quantitative approach, incorporating in-depth interviews and focus group discussion to gather data from randomly selected sample size of four hundred and fifty (450) individuals which include traditional healers, educated elites and community members to explore the types of mushrooms used, their applications and associated beliefs. The data for the phytochemical analysis were purely from reviewed literature. Thematic analysis was used to analyze the qualitative data as it offers insight to the underlying meanings, experiences and

behaviours, while descriptive statistics were used to analyze the quantitative data as it aids in describing and summarizing data point.

Study Area

The research was conducted in Igala land, Kogi State, Nigeria—an area with forest and savanna vegetation favorable for mushrooms. The region experiences a mean annual rainfall of 1,260 mm, with the rainy season from April to October and a dry season from November to March. Harmattan sets in during the dry season, and the average annual temperature is 27°C. The Igala people are primarily farmers.

Sampling Procedure

The data for the phytochemical analysis were purely from literatures of various authors that have worked on various aspects of mushrooms no laboratory analysis was conducted. A structured questionnaire was used to gather information from randomly selected respondents. Interviews and focus group discussion were conducted with non-literate respondents. A total sample size of 450 respondents was used to gather the data. The questionnaire focused on:

1. Mushroom species found in the wild and around homes.
2. Traditional uses of identified mushrooms.
3. Awareness of mushrooms' medicinal potential.
4. Phyto-chemical constituents of different mushrooms.
5. Importance of mushrooms in traditional medicine.

Result

The indigenous knowledge and uses of various mushrooms for medicinal purposes by Igala people of Kogi State.

Table 1: Mushrooms found in the wild and their traditionally known importance

S/No	Botanical names	Common names	Family	Igala names	Traditionally known Importance
1.	<i>Agaricus arvensis</i> Schaeff.	Horse mushroom	Agaricaceae	Oru-Anyia	Food, Fever, Cancer, Diabetes, Heart disease
2.	<i>Agaricus bisporus</i> (J.E. Lange) Imbach	Table or button mushroom	Agaricaceae	Oru-Akwu, Oru-Okwu	Food, Fever, Cancer, Diabetes, Heart disease Digestive problems, Skin diseases, Arthritis
3.	<i>Agaricus silvaticus</i> Schaeff.	Scaly wood mushroom	Agaricaceae	Oru-Agba	Food, High fever
4.	<i>Aleuria aurantia</i> (Pers) Fuckel	Orange peel	Pyronemataceae		Cancer, Syphilis
5.	<i>Amanita muscaria</i> (L) Lam	Fly Agaric	Amanitaceae	Oru-Agbadogo-kpikpa	Madness, Spirituals rituals
6.	<i>Amanita phalloides</i> (Vaill ex Fr.) Link	Death angel, Death cap	Amanitaceae	Oru-Agbadogo	Tumor, To commit suicide
7.	<i>Amanita caesarea</i> (scop.) Pers.	Caesar's Mushroom	Amanitaceae	Oru-Agbadogo	Tumor, To commit suicide
8.	<i>Auricularia auricular-Judae</i> (Bull.) J. Schrot.	Wood ear, Jew's ear, jelly ear	Auriculariaceae	Oru Etioli	Food, Sore eyes, Sore throats, Ear puss. Colds, Hypertension, Bleeding a Jaundice
9.	<i>Auricularia polytrica</i> Ehrenb.	Cloud ear	Auriculariaceae	Oru Etioli	Tumor, Heart disease
10.	<i>Calvatia cyathiformis</i> (Bosc.) Morgan	Puffballs	Agaricaceae	Iro-obututu, Iro-Agbailo	Food, Wound, Sexual dysfunction, Hiccups, Barrenness
11.	<i>Calvatia fragilis</i> (Quei.) Morgan	Small puffballs	Agaricaceae	Iro-obututu, Iro-Agbailo	Food, Wounds, Sexual dysfunction, Hiccups, Barrenness, Menstrual pain
12.	<i>Cantharellus cibarius</i> Fr.	<i>Girolle</i>	Cantharellaceae	Oru Apo	Food, Diabetes, Bone ailments, Wounds, Respiratory diseases, and General weakness,
13.	<i>Chlorophyllum molybdites</i> (G.Mey.)Massee	<i>False parasol, green gill</i>	Agaricaceae		Skin diseases, Cancer
14.	<i>Coprinopsis africana</i> (Pegler) Redhead. Vilgalys & Moncalvo	Ink cap	Agaricaceae		Diabetes
15.	<i>Cortinarius orellanus</i> Fries	Fools webcap	Cortinariaceae		To commit suicide
16.	<i>Daldinia concentrica</i> (Bolton) Cesati & deNotaris	<i>King Alfred's cake, cramp balls, coal fungus</i>	Hypoxylaceae		Stomach upset, Wounds, Ulcer, Cancer, Skin disease, Whooping cough, Difficult labour.
17.	<i>Flammulina Velutipes</i> (Curtis) Singer	Velvet shank	Physalacriaceae		Cancer, Gonorrhoea, Inflammation
18.	<i>Ganoderma applanatum</i> (Pers) Pat.	Artist's bracket, bear bread	Ganodermataceae	Apayi	Rheumatism, Cancer, Tuberculosis, Diabetes Indigestion, Pain, Hypertension
19.	<i>Ganoderma lucidum</i> Karst	Reishi	Ganodermataceae	Apayi –Aja	Bronchitis, Asthma, Diabetes, Liver disease, Hypertension, Arthritis, Migraine, Insomnia, Cancer, Asthma, Dizziness, Difficult Labour

20.	<i>Ganoderma zonatum</i> Murrill	Artist's bracket	Ganodermataceae	Apayi	Asthma, Dizziness, Cough, Insomnia
21.	<i>Helvella crispa</i> (Scop.) Fr.	White elfin saddle	Helvellaceae		Asthma, Cough, Mouth ulceration,
22.	<i>Ischnoderma resinosum</i> (Schrad) P.Karst.	Resinous polypore	Formitopsidaceae	Apayi	Cancer, Yellow fever
23.	<i>Lactarius trivialis</i> (Fr.) Fr.	Slimy lead	Russulaceae		Cancer, Hepatitis, Wound, Anaemia, Diabetes
24.	<i>Lactifluus volemus</i> (Fr.) Kuntze. Syn. <i>Lactarius volemus</i> (Fr.) Fr.	Weeping milk cap Bradley	Russulaceae		Cancer, Hypoglycemia
25.	<i>Laetiporus sulphureus</i> (Bull.;Fr.) Murr	Chicken of the woods	Fomitopsidaceae	Oru Ogbegbe	Cough, Ulcer, Cancer, Rheumatism
26.	<i>Lentinus tigrinus</i> (Bull.) Fr.	Shiitake Mushroom	Marasmiaceae/Omphalotaceae	Oru Ogbogbo	Food, Cancer, Bronchial diseases, Hypertension, Cold, Fever, Diabetes, Heart problems,
27.	<i>Lentinus subnudus</i> Berk	Sawgill fungus	Polyporaceae	Oru Okpoli, Oru Arikparikpa	Food, Anaemia, Cough, Fever, Infertility, Heart disease, Ulcer, Cancer, Mild liver problem, Obesity, Diabetes
28.	<i>Lepiota helveola</i> Bres.	Deadly Parasol mushroom	Agaricaceae	Oru Ugba	Cancer, Depression
29.	<i>Macrolepiota procera</i> (Scop.) Singer	Parasol mushroom	Agaricaceae	Oru - Ugba	Inflammation, Cancer, Depression
30.	<i>Microporellus dealbatus</i> (Berk & M. A. Curtis) Murrill	White polypore	Polyporaceae	Apayi	Inflammation
31.	<i>Microporellus obovatus</i> (Jungh.) Ryvarden	Obovate polypore	Polyporaceae	Apayi	Inflammation
32.	<i>Morchella esculenta</i> Fr.	Yellow Morel	Morchellaceae		Wounds, Stomach problems, Weakness
33.	<i>Pleurotus ostreatus</i> (Jacq. ex Fr.)P.Kumm	Pearl oyster	Pleurotaceae	Oru Ukpoka, Oru Ogbagba	Food, Asthma, Wounds, Hypertension
34.	<i>Pleurotus pulmonarius</i> (Fr.) Quei.	Lung oyster	Pleurotaceae	Oru Abacha	Food, Analgesic, Tumor, Cancer, Inflammation, Sinusitis, Fever, Diabetes
35.	<i>Pleurotus tuber-regium</i> (Rumph.ex Fr.)Singer. Syn. <i>Lentinus tuber-regium</i> (Fr.) Fr.	King tuber oyster	Pleurotaceae	Oru Owo, Oru Akpanya	Food, Fever, Cold, Hypertension, Headache, Stomach ache, Diabetes, Dysentery, Constipation
36.	<i>Polyporus officinalis</i> (Vill.) Fr. Syn. <i>Fomitopsis officinalis</i> (Vill.) Bondatsev & Singer	Agarikon, Eburiko, Quinine conk	Polyporaceae	Oru Apayi	Cough and Catarrh, Hernia
37.	<i>Polyporus squamosus</i> (Huds.) Fr.	Dryad's saddle	Polyporaceae	Oru-Apayi	Skin infections, Inflammation

38.	<i>Psathyrella atroumbonata</i> Pegler.	Crumble cap	Psathyrellaceae	Oru Oli	Food, Cancer, Inflammation
39.	<i>Psathyrella delineate</i> (Peck) A. H. Sm.	Corrugated cap	Psathyrellaceae	Oru Oli	Cancer, Inflammation
40.	<i>Psilocybe cubensis</i> (Earle) Singer	Magic mushroom	Hymenogastraceae		Mental illness, Spiritual rituals
41.	<i>Russula delica</i> Fr.	Milk white brittle gill	Russulaceae		Tumour, Inflammation, Indigestion, Weakness, Pains, Malnutrition
42.	<i>Russula vesca</i> Fr.	Bare-toothed, Flirt	Russulaceae		Diabetes
43.	<i>Schizophyllum commune</i> Fr.	Split-gill	Schizophyllaceae	Ere-Ajuwe	Tumor, Inflammation, Diabetes
44.	<i>Termitomyces clypeatus</i> R. Heim	Black mouse deer	Lyophyllaceae	Oru Obe	Food, Worms, Chicken pox
45.	<i>Termitomyces globulus</i> R. Heim & Goos. Font.	Grilled mushroom	Lyophyllaceae	Oru Okpoko	Food, Cancer, Wounds
46.	<i>Termitomyces letestui</i> (Pat.) R. Heim	Termite mushroom	Lyophyllaceae	Oru Okiti	Food, Malaria fever, Abdominal discomfort, Whooping cough
47.	<i>Termitomyces microcarpus</i> (Berk. & Broome) R. Heim	Termite mushroom	Lyophyllaceae	Oru Ogbagbajele	Food, Gonorrhoea, Partial Paralysis, Weakness, male infertility,
48.	<i>Termitomyces robustus</i> (Beeli) R. Heim	Termite mushroom	Lyophyllaceae	Oru Aberedodolo	Food, Malaria fever, Stomach upset
49.	<i>Thelephora aurantiotincta</i> Corner.	Fiber fans, fiber vase	Thelephoraceae		Food, Cancer, Wounds, Inflammation
50.	<i>Trametes hirsuta</i> (Wulfen) Pilat	Hairy turkey tail	Polyporaceae	Apayi-Abedudu	Urinary tract infection, Fibroid, Wounds, Diabetes,
51.	<i>Trametes versicolor</i> (L.) Lloyd.	Turkey tail	Polyporaceae	Apayi	Fibroid, Cancer, Wounds, Dermatitis, Diabetes
52.	<i>Trametes villosa</i> (Sw.) Kreisel.	Hairy bracket fungus	Polyporaceae	Apayi	Digestive system disorder
53.	<i>Trichaptum abietinum</i> (Dicks.) Ryvarden	Violet toothed polypore	Polyporaceae	Apayi	Cancer
54.	<i>Trichaptum biforme</i> (Fr.) Ryvarden	Kurakding	Polyporaceae	Apayi	Cancer, Inflammation
55.	<i>Tricholoma lobayense</i> Heim	Matsutake	Tricholomataceae	Oru Ogbodo	Tumour
56.	<i>Volvariella volvacea</i> (Bul.) Singer	Paddy straw or straw mushroom	Pluteaceae	Oru Ekpè	Food, Tumor Hypetension

Mushroom Species Found in the Wild and Around Homes: Over 70% of respondents identified common mushroom species in the area. The respondents interviewed provided vital information on the indigenous uses (especially those of medicinal importance) of mushrooms identified. A total of 56 mushroom species belonging to 24 families were identified that are used for medicinal purposes by the Igala people, including *Auricularia auricula-judae*, *Lentinus tigrinus*, *Calvatia cyathiformis*, *Psathyrella atroumbonata*, and *Schizophyllum commune*. Less common species such as *Morchella esculenta* and *Thelephora aurantiotincta* were known by a smaller percentage (around 30%) of respondents.

Traditional Uses of Identified Mushrooms: 60% of respondents use mushrooms for food, while 40% utilize them for medicinal purposes. The results show that the Igala people use mushrooms for a wide range of ailments, common medicinal uses include treating fever, diabetes, wounds, cancers, digestive issues, respiratory ailments, hypertension, inflammation and skin infections. Some mushrooms are considered to enhance vitality and general health. The most commonly used mushroom species were *Ganoderma lucidum*, *Lentinula edodes*, and *Pleurotus ostreatus*. Most information on their medicinal uses was obtained from local herbalists who in most cases will not totally disclose how their preparations are made. It is worthy of note that almost all the polypore (Ganodermataceae and Polyporaceae) are called Apayi.

Awareness of Mushrooms' Medicinal Potential: Approximately 65% of respondents were aware of the medicinal benefits of mushrooms. The remaining 35% were unaware or skeptical about their therapeutic effects



Fig. 1: Pictures of some mushrooms used for medicinal purposes among the Igala people

Phytochemical Constituents of Different Mushrooms

Table 2: Mushrooms found in the wild and their phytochemical components

S/No	Botanical names	Akaloids	Flavonoids	Tannins	Saponins	Anthraquinone	Phenols	Glycoside	Terpenes	Sterols	Coumarin	Anthocyanins	
1.	<i>Agaricus arvensis</i>		+				+	+	+	+			Bhambri et al., (2022); Shevchuk et al., (2023)
2.	<i>Agaricus bisporus</i>		+				+	+	+	+			Kumar et al., (2021); Bhambri et al., (2022); Venturella et al., (2021)
3.	<i>Agaricus silvaticus</i>		+	+	+		+	+	+	+			Fogarasi et al., (2024)
4.	<i>Aleuria aurantia</i>		+				+		+	+			Boleslawska,(2024)
5.	<i>Amanita caesarea</i>	+	+	+			+	+	+	+			Bhambri et al. (2022)
6.	<i>Amanita muscaria</i>	+	+	+			+	+	+	+			Bhambri et al. (2022)
7.	<i>Amanita phalloides</i>	+	+	+			+	+	+	+			Bhambri et al. (2022)
8.	<i>Auricularia auricular- Judae</i>	+	+				+	+	+				Kumar et al., (2021); Shevchuk et al., (2023)
9.	<i>Auricularia polytrica</i>	+	+				+	+	+				Shevchuk et al., (2023)
10.	<i>Calvatia cyathiformis</i>		+				+		+				Hadewo , (2020)
11.	<i>Calvatia fragilis</i>		+				+		+				Hadewo , (2020)
12.	<i>Cantharellus cibarius</i>		+	+			+	+	+	+	+		Bhambri et al., (2022)
13.	<i>Chlorophyllum molybdites</i>		+	+			+	+	+	+	+		Zushang et al (2013)
14.	<i>Coprinopsis africana</i>	+	+				+	+	+				Bhambri et al., (2022)
15.	<i>Cortinarius orellanus</i>	+					+					+	Bhambri et al., (2022)
16.	<i>Daldinia concentrica</i>		+	+			+	+	+				Oni et al., (2020); Jonathan et al., (2011)
17.	<i>Ganoderma applanatum</i>		+	+	+		+	+	+	+			Lysakowska et al., (2023); Shevchuk et al., (2023)
18.	<i>Ganoderma lucidum</i>	+	+	+	+		+	+	+	+			Lysakowska et al., (2023); Shevchuk et al., (2023)
19.	<i>Ganoderma zonatum,</i>		+	+	+		+	+	+	+			Shevchuk et al. (2023)
20.	<i>Flammulina Velutipes</i>												Kumar et al., (2021)
21.	<i>Grifola frondosa</i>		+	+			+	+	+				Venturella et al., (2021); Bhambri et al., (2022); Shevchuk et al., (2023)
22.	<i>Helvella crispa</i>	+	+				+		+				Syed et al., (2024)
23.	<i>Ischnoderma resinosum</i>												Syed et al., (2024)
24.	<i>Lactifluus volemus</i>												Syed et al., (2024)
25.	<i>Lactarius trivialis</i>		+	+			+		+			+	Adejumo and Awosanya (2005)
26.	<i>Laetiporus sulphureus</i>		+	+			+		+			+	Zeb and Lee (2021)
27.	<i>Lentinula edodes</i>		+	+	+		+	+	+	+	+		Lysakowska et al., (2023); Shevchuk et al., (2023)
28.	<i>Lentinus subnudus</i>		+	+			+	+	+	+			Bhambri et al., (2022)
29.	<i>Lentinus tigrinus</i>												Bhambri et al., (2022)

30.	<i>Lepiota helveola</i>		+				+		+			Syed et al., (2024)
31.	<i>Macrolepiota procera</i>		+	+	+		+	+	+	+		Syed et al., (2024)
32.	<i>Morchella esculenta</i>	-	+	+	+	-	+	+	+	+		Syed et al., (2024)
33.	<i>Pleurotus tuber-regium</i>		+	+		+	+	+	+	+	+	Adejumo & Awosanya (2005); Venturella et al., (2021); Bhambri et al., (2022); Shevchuk et al., (2023)
34.	<i>Pleurotus ostreatus</i>		+	+			+	+	+	+	+	Silva et al., (2010); Venturella et al., (2021); Shevchuk et al., (2023); Bhambri et al., (2022)
35.	<i>Pleurotus pulmonarius</i>		+	+			+	+	+	+	+	Venturella et al., (2021); Kumar et al., 2021 Shevchuk et al., (2023)
36.	<i>Polyporus officinalis</i>	+	+				+	+	+			Zaidman et al. (2007)
37.	<i>Polyporus squamosus</i>	+	+				+	+	+			Syed et al., (2024)
38.	<i>Psathyrella atroumbonata</i>		+				+		+			Syed et al., (2024)
39.	<i>Psathyrella delineaata</i>		+				+		+			Syed et al., (2024)
40.	<i>Psilocybe cubensis</i> (Magic Mushroom)	+	+			+	+		+	+		Syed et al., (2024)
41.	<i>Russula delicata</i>		+	+			+				+	Zeb and Lee (2021)
42.	<i>Russula vesca</i>											Zeb and Lee (2021)
43.	<i>Schizophyllum commune</i>		+	+	+		+	+	+			Syed et al., (2024)
44.	<i>Termitomyces clypeatus</i>		+				+	+	+			Gebreyohannes (2023)
45.	<i>Termitomyces globules</i>		+				+	+	+			Gebreyohannes (2023)
46.	<i>Termitomyces letestui</i>		+				+	+	+			Gebreyohannes (2023)
47.	<i>Termitomyces microcarpus</i>		+				+	+	+			Gebreyohannes (2023)
48.	<i>Termitomyces robustus</i>		+				+	+	+			Gebreyohannes (2023)
49.	<i>Thelephora aurantiotincta</i>		+				+		+			Silver, (2023)
50.	<i>Trametes hirstura</i>		+	+			+	+	+	+	+	Bhambri et al., (2022)
51.	<i>Trametes flavida</i>		+	+			+	+	+	+	+	Bhambri et al., (2022)
52.	<i>Trametes versicolor</i>		+	+			+	+	+	+	+	Zeb and Lee (2021); Lysakowska et al., (2023)
53.	<i>Trametes vilosa</i>		+	+			+	+	+	+	+	Bhambri et al., (2022)
54.	<i>Trichaptum abietinum</i>		+	+			+		+			Zeb and Lee (2021)
55.	<i>Trichaptum bifforme</i>		+	+			+		+			Zeb and Lee (2021)
56.	<i>Volvariella volvacea</i>		+	+	+		+	+	+	+		Oni et al., (2020); Kumar et al., (2021)

(+) Indicates presence of the phytochemical

About 55% of respondents had some understanding of the medicinal properties of mushrooms, attributing benefits to "special compounds" or "healing properties." Majority of the people (87.3%) were not aware of the phytochemical constituents of mushrooms in relation to their medicinal value, very few were familiar with specific phytochemical terms such as alkaloids, flavonoids, tannins, saponins, and phenols. The result on table 2 above provides a comprehensive overview of various mushrooms commonly found in the Igala region along with their bioactive or chemical constituents that are known to be present or

absent in these species based on credible sources from academic literature that contribute to their potential health benefits.

Importance of Mushrooms in Traditional Medicine: 70% of respondents emphasized the cultural significance of mushrooms in Igala traditional medicine. Mushrooms are seen as a vital natural remedy and an affordable alternative to modern medicine.

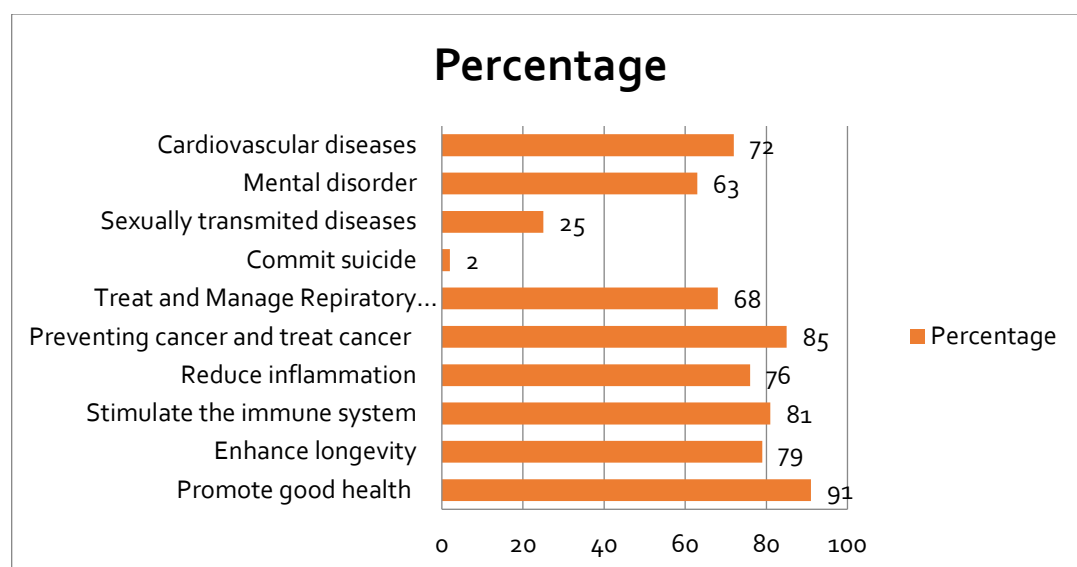


Fig 2: The importance of Mushrooms in traditional medicinal practices

Fig 2 above indicated how traditional medicinal practices using mushrooms are valued for their diverse medicinal properties among the Igala people, this includes anti-cancer, anti-diabetes and anti-inflammatory effects, and are used for treating various ailments and promoting overall health and longevity. Mushrooms like *Ganoderma lucidum* are highly regarded for their health-promoting and longevity-enhancing properties. Some mushrooms are known to stimulate the immune system, helping the body fight off infections and diseases. Certain mushrooms such as *Ganoderma lucidum* have been used in cancer treatment and preventing cancer development. Mushrooms are rich in antioxidants, which help protect the body against damage caused by free radicals and promote overall health. Mushrooms can help reduce inflammation, which is a key factor in many chronic diseases. Some mushrooms have been traditionally used to treat conditions like diabetes, high cholesterol, and cardiovascular diseases.

Discussion

A diverse range of mushroom species were identified as having medicinal properties, used for treating various ailments. Mushrooms are used for treating skin diseases, fever, digestive problems, and other ailments. The Igala people possess a rich knowledge of mushroom utilization, which could be valuable for future research and conservation efforts.

Mushrooms are an important part of the local diet and traditional practices. . Ayodele *et al.*, (2011) and Adejumo *et al.*, (2015) have also reported the value traditional healers placed these mushrooms for their therapeutic effects, although the active compounds responsible for their therapeutic effects are often unknown. The Igala people possess a rich repository of ethnomedicinal knowledge passed down through generations. Mushrooms are valued for their ability to treat ailments ranging from fever, wounds, and respiratory issues to digestive disorders and infections. Local names often describe their appearance, habitat, or therapeutic effects. For instance, mushrooms that grow on decaying wood and possess antibacterial properties are favored for treating skin infections.

Studies on mushrooms have revealed the presence of various bioactive compounds, including alkaloids, flavonoids, tannins, saponins, anthraquinones, phenols, glycosides, terpenes, and sterols (Kumar *et al.*, 2021; Venturella *et al.*, 2021; Zeb and Lee 2021; Bhambri *et al.*, 2022; Gebreyohannes 2023; Shevchuk *et al.*, 2023; Syed *et al.*, 2024). These compounds contribute to their medicinal properties, such as antioxidant, antimicrobial, anti-inflammatory, and immune-boosting effects. For example, alkaloids and flavonoids in mushrooms are known for their pain-relieving and antioxidant properties, while tannins and saponins exhibit antimicrobial and cholesterol-lowering effects.

Mushrooms serve as a natural source of medicine for the Igala people, offering remedies for various health conditions. Despite their medicinal potential, limited awareness and the inability to distinguish edible from poisonous species remain challenges to their full utilization (Ranghoo-Sanmukhiya *et al.*, 2014; Adejumo *et al.*, 2015).

Conclusion

The Igala people have a rich tradition of using mushrooms for medicinal purposes. The ethnomedicinal use of mushrooms among the Igala people showcases their deep understanding of nature and traditional healing practices and the importance of preserving indigenous knowledge. Proper documentation, education, and research into the bioactive compounds of mushrooms can enhance their utilization in modern medicine, benefiting the Igala people and the surrounding communities. Emphasizing sustainable harvesting practices and fostering awareness can ensure the continued availability of these valuable resources.

Recommendations

Although mushrooms are essential, concerns about the sustainability of mushroom harvesting in Kogi State persist. Overharvesting, along with habitat destruction from agricultural expansion and urbanization, threatens wild mushroom populations. To address these challenges, conservation efforts are needed, focusing on educating local communities about sustainable harvesting while preserving traditional knowledge. To enhance the ethnomedicinal potential of mushrooms among the Igala people, the following steps are recommended:

- **Document Indigenous Knowledge:** Systematic documentation of traditional mushroom-related knowledge among the Igala people can help safeguard this valuable information.
- **Validate Traditional Claims:** Scientific research on the pharmacological properties of locally used mushrooms among the Igala people can confirm their traditional uses and support their integration into modern medicine.
- **Promote Community Involvement:** Engaging local communities in conservation efforts fosters a sense of ownership and ensures sustainable practices.
- **Conduct Further Research:** More studies are needed to understand the mechanisms of action and long-term effects of medicinal mushrooms.
- **Ensure Safety and Proper Use:** It is vital to differentiate between edible and toxic mushrooms, as some can cause serious health issues. Proper preparation and cooking methods are necessary to maximize medicinal benefits and ensure safety. Additionally, awareness of potential interactions with medications and monitoring for side effects are crucial.

Conflict of Interest

The authors declare that no conflict of interest could have influenced the work. This work is original and has not been published or submitted for publication elsewhere.

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