



Ethnobotanical Survey of Medicinal Plants used in the Treatment of Dermatophytic Infections in Some Selected Villages in Ondo State

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Abstract

Keywords:

Dermatophytes,
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*This survey examines the use of medicinal plants in treating dermatophytic infections in selected villages in Ondo north senatorial district, and also to know the efficacy of the plants against the organisms. Local knowledge of plants, preparation methods and application for skin conditions caused by dermatophytes were explored in the study. Twenty (20) plant species were identified and collected as plants used for treating tinea infection in the area. The location and accessibility were used as criteria to select ten of the plants for further antifungal potency screening. The selected plant includes *Abrus precatorius* (Oju Olongbo), *Ageratum conyzoides* (Imi esu), *Bixa orellana* (Osun buke), *Cassia alata* (Asumo oyinbo), *Ficus exasperate* (Erinpin), *Jatropha curcas* (Lapalapa), *Ocimum gratissimum* (Efinrin), *Pterocarpus erinaceus* (Imo osun), *Vernonia amygdalina* (Ewuro) and *Vitex doniana* (Oriri) The highest antifungal activity of *J. curcas* were obtained at a varied concentrations of 12.5, 25, 50, 100 and 200 mg/ml. These plants compared favourably with fungal observed to exhibit the highest antifungal activity of 22-30 mm zone of inhibition against all the isolates. Hence these plants can be used as an alternative for treating infections caused by *Trichophyton* species*

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1. INTRODUCTION

The Ondo North Senatorial District of Ondo State, Nigeria, is characterized by its rich cultural diversity and unique ecological features. The traditional healing practices within this region have thrived for centuries, with communities relying on indigenous knowledge and natural resources to address various healthcare needs. Among the prevalent health concerns in these communities are dermatophytic infections, which pose significant challenges to the well-being of the residents of the study area.

Dermatophytic infections, primarily fungal skin infections, affect a substantial portion of the population worldwide, leading to discomfort, pain, and, in severe cases, long-term morbidity. The

conventional medical approach to treating these infections often involves the use of synthetic antifungal drugs. However, accessibility to modern healthcare facilities and pharmaceuticals remains limited in many rural areas of Ondo State, including the villages within Ondo North Senatorial District.

Medicinal plants are widely used in management of diseases all over the world (Aliyu *et al.*, 2007; Adewunmi and Ojewole, 2004). Nigeria has thousands of plant species that are claimed to have medicinal properties and used in the treatment of diseases (Iweala and Oludare, 2011). Historically, the use of medicinal plants is as old as mankind and medicine. In Nigeria, several thousands of plants species have been claimed in possess medicinal

properties and employed in the treatment of many ailments (Okigbo and Mmeka, 2006). Medicinal plants have been identified and used throughout human history. The study of higher plant for the purpose of detecting anti-microbial agents in their tissues is of comparatively recent origin and the early investigation in this area focused on those plants that have found application in the age-old practice or their blind usage as therapeutics for human and animal diseases (Benjamine et al., 2003; Okigbo and Nmeka, 2005). The use of complementary medicines increased the interest of pharmacologist and herbalists over the past decade. The search for natural products to cure diseases represents an area of great interest in which plants have been the most important sources because of the prevalence of microbial resistance to existing synthetic drugs. In addition, in order to halt the trend of increased emerging and microbial resistance infectious diseases, it will require a multi prolonged approach that includes the development of new drugs (Iwu et al., 2009, Okigbo and Ajalie, 2005).

The treatment and control of diseases by the use of available medicinal plants in a locality will continue to play significant roles in medical health care implementation in the developing countries (Ekundayo *et al.*, 2011). The treatment and control of diseases by the use of available medicinal plants in a locality will continue to play significant roles in medical health care implementation in the developing countries. The intractable problems of antimicrobial resistance has led to the resurgence of interest in herbal products as sources of noble compound to suppress or possibly eradicate the ever increasing problems of emergence of newer diseases though to be brought under control (Wurochekker et al., 2007). *Jatropha* species belong to the family Euphorbiaceae and are used in traditional folklore medicine to cure ailments in Africa, Asia and Latin America (Burkill, 1994). *Jatropha curcas* is commonly called physic nut, purging nut or pig nut. Previous studies have reported that the plant exhibits bioactive activities for fever, mouth infections, jaundice, guinea worm, sores and joint rheumatism (Oliver-Bever, 2000). Aiyelaagbe (2001) reported the anti-parasitic activity of the sap and crushed leaves of *J. curcas*. The water extract of the branches also strongly inhibited HIV induced cytopathic effects with low cytotoxicity. Previous works have shown that many *Jatropha* species possess antimicrobial activities (Aiyelaagbe, 2001). The comparison of phytochemicals of old and new growth stem bark and leaves from nine trees used medicinally in Nigeria shows that *J. curcas* contains saponin, tannin, glycoside, steroid, alkaloid and flavonoid (Fasola and Egunyomi, 2005). These compounds are known to be biologically active and therefore

aid the antimicrobial activities of *J. curcas*. These secondary metabolites exert antimicrobial activity through different mechanisms. Herbs that have tannin as their main components are astringent in nature and are used for treating intestinal disorders such as diarrhoea and dysentery (Kan, 2002). In this paper, the antibacterial potency of ethanolic extract of the leaf and bark of *J. curcas* was investigated. Various antifungal agents are currently available for the treatment and control of fungal infections and diseases but the use of these medicines as therapeutic agents however is limited due to various challenges such as drug solubility, stability, adsorption and toxicity (Cedric, 2004). In addition, some of these drugs are expensive and generally unavailable to citizens of developing countries, especially those residing in the rural areas (Sule *et al.*, 2011). The risk in the use of chemotherapeutic agents as control agents in fungal diseases, further encourages the use of plants as a form of alternative medicine. Traditional medicine is the oldest method of curing diseases and infections and various plants have been used in different parts of the world to treat human diseases and infections (Nweze et al., 2004; Vineela and Elizabeth, 2005; Ekpo and Etim, 2009). According to the World Health Organization (WHO, 2002), traditional medicine using plant extracts continues to provide health coverage for over 80% of the world's population, especially in the developing world and, in African countries; this rate is much higher. In recent years, however, medicinal plants have represented a primary health source for the pharmaceutical industry (Ajose, 2007). No less than 400 compounds derived from plants are currently used in the preparation of drugs, such as vincristine and vinblastine used in the treatment of cancer (Ajose, 2007). Recently, some higher plant products have attracted the attention of microbiologists to search for some phytochemicals for their exploitation as antimicrobials, such plant products would be biodegradable and safe to human health (Kumar et al., 2008; Sugar et al., 2008; Krishnamurthy et al., 2008; Wang et al., 2010). Furthermore, the increasing awareness on the use of medicinal plants in industrialized countries has been traced to the development of several drugs and chemotherapeutics from the traditionally used herbs (UNESCO, 1998). Nigerians still depend largely on crude herbal remedies or traditional medicine. They also use wild plants for cosmetics and perfumery. Some of these herbal remedies have been observed to be effective in certain skin diseases (Ajose, 2007). Medicinal plants are known to owe their curative potentials to certain biological active substances, which exist in parts of the plants. The chemicals which are referred to as active principles or phytochemical substances include terpenes, flavonoids, bioflavonoids, benzophenones, xanthenes as well as some metabolites such as tannins, saponins, cyanates, oxalate and anthrax-quinones

(Ekpo and Etim, 2009). Identifying the critical roles of traditional medicine in these communities, this research embarks on an ethnobotanical survey with a specific focus on medicinal plants used to combat dermatophytic infections.

Aim and objectives

This survey aims to explore and document the rich reservoir of traditional knowledge and practices passed down through generations that play a vital role in addressing healthcare needs.

Objectives of the Study

The objectives of this study are to:

- i. Review existing information about dermatophytic infections through survey and administration of questionnaires;
- ii. Identify and document the medicinal plant that are commonly used by communities in the treatment of dermatophytic infection in the study area;
- iii. Assess the potential therapeutic value of these plants in combating dermatophytic infections.

MATERIALS AND METHODS

Study Area and Population

The study was conducted in selected villages within the Ondo North Senatorial District of Ondo State, Nigeria. This region was chosen due to its cultural diversity and traditional reliance on medicinal plants for healthcare. The selected villages represented a cross-section of communities within the senatorial district to ensure a comprehensive understanding of traditional healing practices.

Collection of plant materials

The research commenced with a thorough literature review to identify previously documented medicinal plants used for dermatophytic infections in the region. This preliminary information served as a foundation for the fieldwork.

Ethnobotanical survey

Plant collection and identification:

The survey was conducted with questionnaires administered and interviews were conducted with the old age and local traditional healers in the study area. Throughout the interviews, the local names of the plants, the parts used, method of preparation of crude drug from the plants, mode of application, dosage and duration of treatment (where specific) were recorded. Only species consistently used to treat the same illness by several healers/villages across the study area were selected.

Identification of medicinal plants:

The plants could not be identified with the botanical names at the point of collection (Togola *et al.*, 2005) but was done in the herbarium of the Department of Plant Science and Biotechnology in Adekunle Ajasin University, Akungba Akoko Ondo state Nigeria.

Ethical Considerations:

Ethical considerations were of paramount importance throughout the research process. Ethical principles were adhered to strictly while informed consent was obtained from all participants involved in interviews and interactions. Participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time. Cultural sensitivity and respect for local customs and traditions was maintained at all times. Permissions were sought from village elders and leaders before engaging with the community. Participants identity were kept confidential, and data were anonymized to protect the privacy of individuals and the communities involved.

The antifungal analysis of the plant extracts against the isolated dermatophytes, the preparation of plants extract and standardization of inoculum were done according to Akinyemi *et al.* (2005) and Bhalodia and Shuka (2011).

RESULTS

Twenty (20) plant species were identified and collected as plants used for treating tinea infection Ondo North Senatorial District (Table 1). The plants belong to different families including anacardiaceae, bixaceae, caricaceae, compositae, euphorbiaceae, fabaceae, labiatae, leguminosae, lamiaceae, liliaceae, meliaceae, moraceae, plumbaginaceae and verbenaceae. The plant leaves were observed to be predominant in the prescription followed by stem bark and bark (Table 1). The plants were collected from different locations namely Akungba-Akoko, Epinmi-Akoko, Ikare-Akoko, Iwaro-Oka Akoko, Supare-Akoko, Uba-Oka Akoko, Etioro, Owo, and Ose in the Northern Senatorial District of Ondo State.

The location and accessibility were used as criteria to future select ten of the plants for further antifungal potency screening. The selected plant includes *Abrus precatorius* (Oju Olongbo), *Ageratum conyzoides* (Imi esu), *Bixa orellana* (Osun buke), *Cassia alata* (Asumo oyinbo), *Ficus exasperate* (Erinpin), *Jatropha curcas* (Lapalapa), *Ocimum gratissimum* (Efinrin), *Pterocarpus erinaceus* (Imo osun), *Vernonia amygdalina* (Ewuro) and *Vitex doniana* (Oriri) (Figure 1-5). The leaves of *A. precatorius*, *A. conyzoides*, *F. exasperata* *J. curcas*, *O. gratissimum* and *P. erinaceus* were found to be useful in the treatment of *T. capitis* in all the study areas. Also *T. corporis* infection were treated using the stem bark and leaves of *B. orellana*, and *P. erinaceus* while the leaves of *C. alata* and *V. amygdalina* were used by

the residents in the survey area for treating *T. pedis* (Table 1).

The traditional uses of these identified medicinal plants were documented through interviews and interactions with local community members, including traditional healers and herbalists. The findings revealed a wide array of traditional uses, in which many of the identified plants were traditionally used to treat various types of dermatophytic infections, including ringworm, athlete's foot, and jock itch. Local community members would apply plant extracts or pastes directly to affected areas. Some plants were reported to possess anti-inflammatory properties, providing relief from itching and discomfort associated with dermatophytic infections.

In addition to treating infections, several plants were traditionally used for wound healing and preventing secondary infections in affected areas.

Jatropha curcas plant was selected among all the plants for antifungal screening in the course of this study. The antifungal activity of *Jatropha curcas* extract using different solvents at a varied concentration (12.5, 25, 50, 100, and 200mg/ml) is represented (Figure 6-8). The plants extract test at the different concentrations on fungal isolates exhibited varied degree antifungal activities.

The antifungal sensitivity test showed that the antimicrobial potential of the extracts in ethanol on all the *Trichophyton* spp were higher than those of cold water except in some cases in *T. soudanesis*. It was observed that the synthetic drug showed high potency against all the isolates while the plant compared reasonably with the synthetic drug in the study.

Table 1: Ethnobotanical survey of medicinal plants found in Ondo North Senatorial District, Ondo State

	Botanical name	Family	Common name	Yoruba name	Type of Tinea infection	Part of plant used/met hod	Location
1	<i>Ficus excasperata</i>	<i>Moraccae</i>	Sand paper leaf	Erinpin	T. capitis	The leaves	All location
2	<i>Spondia mombin</i>	<i>Anacardaceae</i>	Hog plum, yellow nombin	Iyeye, okikan	T. pedis	The bark and leaves	Akungba, Ose, Iwaro, Ikare and Iwaro
3	<i>Vitex domana</i>	<i>Verbena ceae</i>	Black phum	Oriri	T. capitis	The leaves and bark	All location
4	<i>Casia alata</i>	<i>Febeceae</i>	Candle stick plant	Asurun oyinbo	T. pedis	Dried leaf	All location
5	<i>Carica papaya</i>	<i>Caricaceae</i>	Pawpaw	Ibepe	T. capitis	Leaves salt and black soap	Ikare and Iwaro Akoko, owo, etioro
6	<i>Ageratum conyzoides</i>	<i>Anarcadiaceae a</i>	Cashew	Kasu	T. pedis	The leaves	All location
7	<i>Aloe barbadensis</i>	<i>Liliaceae</i>	Aloe vera	Eti erin	T. capitis	The leaf gel	Iwaro, Ikare and Akungba-Akoko
8	<i>Alcalypha wilkesiana</i>	<i>Euphorbiaceae</i>	Copper leaf	Atare	T. capitis	The leaves	Akungba, epinmi Akoko, owo
9	<i>Jatropha curcus</i>	<i>Euphordiaceae</i>	Physic nut	Lapalapa/ Botuje	T. capitis	The leaves, stem latex and fruit, roots	All location

10	<i>Azadirachta indica</i>	<i>Meliaceae</i>	Neem	Dongoyaro	T. capitis	The bark and leaves	Iwaro, Ikare, Supare, Akungba Akoko
11	<i>Cassia alata</i>	<i>Vitex doniana</i>	Jatropha gossip	Orinla	T. pedis	The leaves	All location
12	<i>Abrus precatoris</i>	<i>Leguminosae</i>	Crab's eye/rosary pea	Ojuolgbo/I werejeje	T. capitis	Fresh leave	All location
13	<i>Jatropha gossypifolia</i>	<i>Euphobiaceae</i>	Wild Cassava	Botuje pupa	T. pedis	Stem latex	Akungba, owo and Ikare-Akoko
14	<i>Plumbago zeylanica</i>	<i>Plumbaginaceae</i>	Ceylon leadwort	Inabiri	T. capitis	The whole plant and salt,	Akungba, Iwaro, Uba, owo and Ikare-Akoko
15	<i>Ocimum basilicum</i>	<i>Labiatae</i>	sweet and hairy basil	Efirin wewe	T. pedis	The leaves	Akungba, Iwaro, Supare, Uba, owo and Ikare-Akoko
16	<i>Vernonia amygdalina</i>	Compositae	Bitter leaf	Ewuro	T. pedis	The leaves and root	Akungba, Iwaro, owo and Ikare-Akoko
17	<i>Bixa orellana</i>	Bixaceae	Bixa/lipstick plant	Osun-buke	T. corporis, T. capitis	Bark and leaves	All location
18	<i>Ocimum gratissimum</i>	<i>Labiatae</i>	Basil tea bush	Efirin nla	T. capitis	Leaves, whole plant	All location
19	<i>Pterocarpus erinaceus</i>	<i>Leguminosae</i>	African rosewood	Imo osun	T. capitis, T. corporis	Leave, stem	All location
20	<i>Pterocarpus osun</i>	<i>Leguminosae</i>	Osun	Bloodwood	T. corporis	Root, leave and stem-bark	Akungba, etioro, iwaro supare



Fig 1: (a) Photograph of *Abrus precatorius* plant (Oju alongbo)



(b) Photograph of *Ageratum conyzoides* plant (Imi Esu)



Fig2: (a) Photograph of *Bixa orellana* plant (Osun-buke)



(b) Photograph of *Cassia alata* plant (Asunmo oyinbo)



Fig 3: (a) Photograph of *Ficus exasperata* plant (Erinpin)



(b) Photograph of *Jatropha curcas* plant (Lapalapa)



Fig 4: (a) Photograph of *Ocimum gratissimum* plant (Efinrin)



(b) Photograph of *Pterocarpus erinaceus* leaves)



Fig 5: (a) Photograph of *Vernonia amygdalina* plant (Ewuro)



(b) Photograph of *Vitex doniana* plant (Oriri)

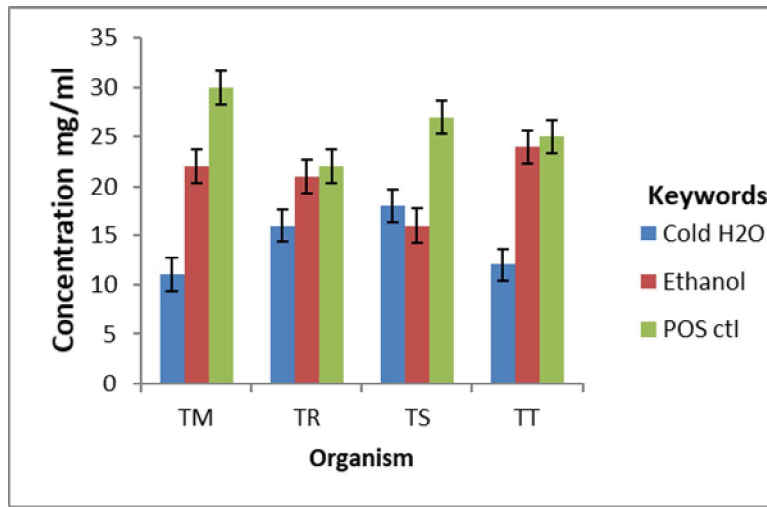
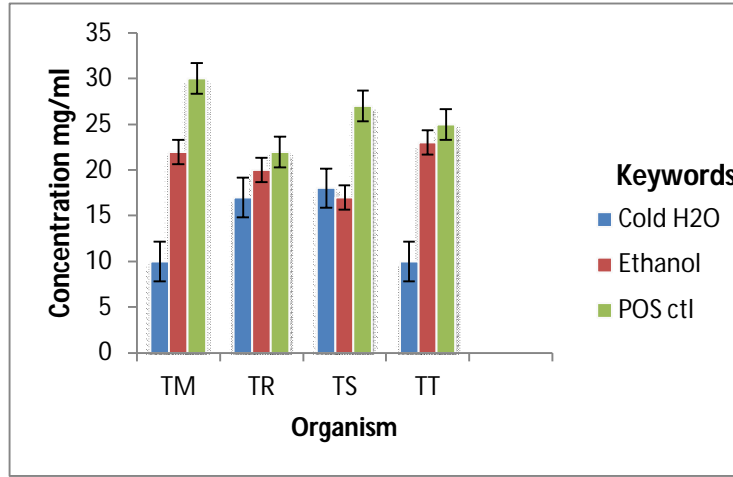
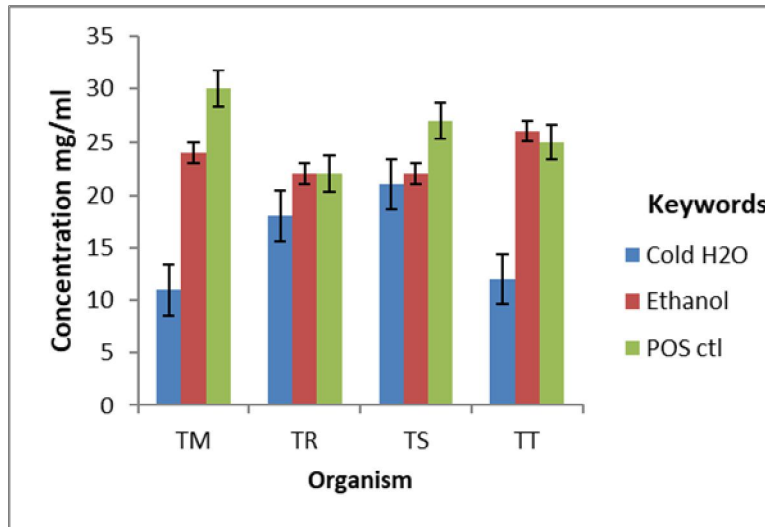


Fig 6: Antifungal activity of *Jatropa curcas* leaf extract using different solvent at 12.5 mg/ml and 25mg/ml

Legend: TM- *T. mentagrophytes*, TR- *T. rubrum*, TS- *T. soudanases*, TT- *T. tonsurans*



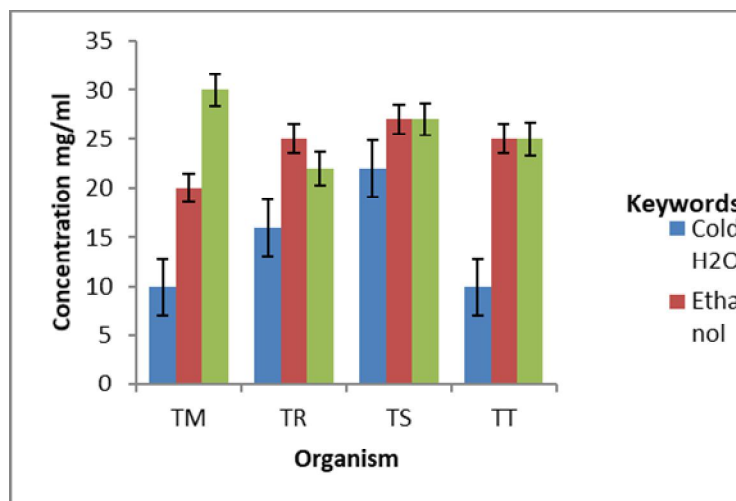


Fig 7: Antifungal activity of *Jatropa curcas* leaf extract using different solvent at 50 mg/ml and 100mg/ml

Legend: TM- *T. metagrophytes*, TR- *T. rubrum*, TS- *T. soudaneses*, TT- *T. tonsurans*

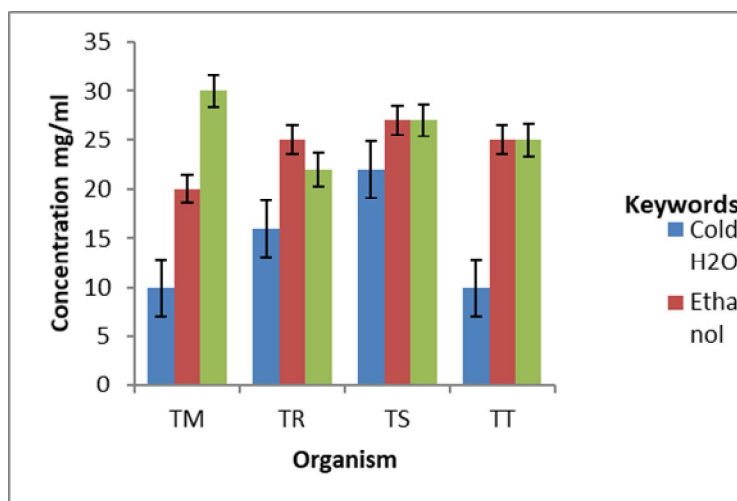


Fig 8: Antifungal activity of *Jatropa curcas* leaf extract using different solvent at 200mg/ml

Legend: TM- *T. metagrophytes*, TR- *T. rubrum*, TS- *T. soudaneses*, TT- *T. tonsurans*

DISCUSSION

The ethnobotanical survey observed that there were variations in plant use and practices among different villages within the study area. These variations were influenced by factors such as local customs, availability of specific plant species, and traditional beliefs.

In most cases, villages primarily relied on a particular plant species for

dermatophytic infections, others had a more diverse array of plants in their traditional pharmacopoeia. Variations in preparation methods and application techniques were also observed, reflecting the unique cultural context of each village. The results of the antifungal sensitivity test showed that the antimicrobial potential of the extracts in ethanol on *Trichophyton* species was higher than those of cold water. The high inhibitory activity in

these extracts could be due to the concentration of the antimicrobial constituents of the solvent. Although, ethanol has the highest ability to extract the phytochemical than water, the effectiveness of solvent extraction is ranked as the best for methylene chloride, methanol and least for water (Makinde *et al.*, 2007).

This study has revealed that ethno medicinal practices are well accepted by the people of the study area and plants constitute an effective source of both traditional and modern medicine. Larger percentage of rural populace depends majorly on herbal medicine for their primary health care compared to the use of synthetic drugs. This could be as a result of cost of drugs via low standard of living in the rural area

CONCLUSION AND RECOMMENDATIONS

The ethnobotanical survey conducted in selected villages of Ondo North Senatorial District, Ondo State has yielded significant insights into the traditional use of medicinal plants against dermatophytic infections. Through a thorough investigation of local knowledge, practices, and the ecology of the region, the ethnobotanical survey has unveiled the wealth of traditional knowledge and practices related to medicinal plants in combatting dermatophytic infections. This research serves as a testament to the resilience of indigenous wisdom and offers practical solutions for healthcare, cultural preservation, and biodiversity conservation within the study area of Ondo North Senatorial District.

The use of other plants and more solvents should be encouraged in further research with different concentration. The use of medicinal plants in the treatment of dermatomycoses will help to reduce the dependence on the use of chemically synthesized antimicrobials, and thus overcome the problem of the emergence of fungi being resistant to antifungal chemicals on various etiological agents of dermatophytic infection.

RECOMMENDATION

1. Community Education and Awareness:

Promote Local Knowledge: Collaborate with local healthcare providers, traditional healers, and community leaders to raise awareness about the effectiveness of specific medicinal plants in treating dermatophytic infections.

Organize workshops and seminars within the communities to educate residents about the proper identification, preparation, and application of medicinal plants. Encourage the sharing of traditional knowledge.

2. Sustainable Harvesting and Conservation:

Advocate for sustainable harvesting practices of medicinal plants. Emphasize responsible collection techniques that do not harm local plant populations.

Encourage the establishment of community gardens where specific medicinal plants can be cultivated, reducing the pressure on wild populations and also ensuring a steady supply.

3. Collaboration between Traditional and Modern Healthcare:

Facilitate collaborations between traditional healers and modern healthcare providers. Promote dialogue and knowledge exchange to integrate traditional medicine into formal healthcare systems.

Develop training programs for traditional healers and herbalists that align with modern healthcare standards. This can enhance their capacity to provide safe and effective treatments.

4. Further Research Needs:

Advocate for clinical trials to evaluate the safety and effectiveness of traditional remedies in dermatophytic infection management, considering potential side effects and long-term use.

5. Cultural Preservation and Documentation:

Collaborate with local cultural organizations and institutions to document traditional healing practices, including the use of medicinal plants. Create archives or records that safeguard this valuable cultural heritage.

6. Policy Advocacy:

Advocate for the recognition of traditional medicinal plants within regional and national healthcare policies. Encourage the incorporation of traditional practices into healthcare strategies.

7. Public Health Campaigns:

Launch public health campaigns that focus on dermatophytic infection prevention and management, incorporating both traditional and modern treatment options. Promote the responsible use of medicinal plants.

8. Community Empowerment:

Explore microenterprise opportunities related to the cultivation and processing of medicinal plants. Empower local communities to generate income while preserving their traditional knowledge.

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