Section A-Research paper

Ethnomedicinal Knowledge and Phytochemical Analysis of Schleichera Oleosa: A Potential Resource for Treating Skin Diseases in Odisha, India.

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ABSTRACT:

Purpose- The purpose of the study is to explore the ethnomedicinal knowledge and phytochemical analysis of Schleichera Oleosa (Kusum) as a potential resource for treating skin diseases in Odisha, India. The study aims to document traditional knowledge related to skin diseases and investigate the presence of secondary metabolites in the bark.**Methods**- The methods employed in the study include ethnomedicinal surveys, collection of plant specimens, phytochemical analysis using various techniques, and documentation of traditional knowledge related to skin diseases.**Results**- This study explores the ethnomedicinal knowledge and phytochemical analysis of Schleichera Oleosa (Kusum) as a potential resource for treating skin diseases in Odisha, India. Phytochemical analysis of Schleichera Oleosa bark shows the presence of tannins, flavonoids, saponins, alkaloids, oxalates, and cyanogenic glycosides, contributing to its antimicrobial properties and potential therapeutic benefits. **Conclusion**- In conclusion, this study contributes to the documentation of ethnomedicinal knowledge in Odisha, India. The presence of various phytochemicals in Schleichera Oleosa bark, such as tannins, flavonoids, and alkaloids, highlights its potential as a natural source of antimicrobial compounds for further exploration and development

Keywords: Ethnomedicine, Phytochemical analysis, Schleichera Oleosa, Skin diseases, Traditional knowledge.

INTRODUCTION

Forests have been the main source of gathering materials for ethnomedicine, a practice dating back to ancient times where plants were used for medicinal purposes. The use of plants for medicine can be traced back around 60,000 years ago, and various tribes in China, India, Romania, and Africa have been practicing ethnomedicine for ages (Das, et al.2013, Prasathkumar et al, 2021). Odisha, a state in India with a large tribal population, heavily relies on herbal medicine for healthcare. India, known for its rich biodiversity, has a vast array of plant species with medicinal properties.(Fig-1).The field of medicine has evolved and diversified into various practices, including modern, alternative, holistic, and traditional social medicine, all contributing to physical, social, and mental well-being. Indigenous tribes and communities have their unique beliefs and practices concerning health and medicine, and despite the advancements in modern medicine, about 88 percent of people still rely on traditional remedies and herbs for their primary healthcare needs. (WHO,2021). Ethnomedicine gives emphasis on healthcare systems, practices, beliefs, and therapeutic techniques that arise from indigenous cultural developments. Medical science recognizes three levels of treatment depending on the gravity of the suffering, i.e., (i) minor, (ii) medium, and (iii) major. The minor treatment can be handled by trained health workers, the second category can be attended to by a general physician, and the third category requires a specialist physician. It is estimated that most of the prescribed drugs contain plant extracts. This is the traditional and alternative health care system that increases the worlds economy, which stands at 120 billion dollars and is expected to reach seven trillion dollars by 2050.

Skin diseases are prevalent worldwide, affecting people of all ages, and their treatments often take considerable time to show results. It poses significant challenges in terms of treatment and impact on individuals and society. Though exact frequencies of skin diseases are not known in some countries, it is estimated that around 10-20 percent of patients seeking medical advice suffer from skin-related issues. Sun exposure is a significant cause of skin cancer and other skin traumas (American Academy of Dermatology, 2021). These conditions cause immense suffering, disability, and economic losses, and their visibility makes them a significant handicap on society. However, recent advancements in medical procedures like plastic surgery, laser therapy, and skin grafting offer successful removal of cutaneous sores. Ayurveda, an ancient healthcare system, provides a wide range of remedies for human ailments, utilizing various plant, animal, and mineral-based drugs. Different plant parts are used for medicinal purposes, with leaves, flowers, fruits, seeds, stems, wood, barks, whole plants, rhizomes, and roots all contributing to ethnomedicine. Among adults, the most common complementary health approaches include natural products, deep breathing, yoga, osteopathic manipulation, meditation, massage, special diets, homeopathy, progressive relaxation, and guided imagery.

India, being one of the 12 mega-biodiversity centers, is rich in ethnomedicinal knowledge, boasting thousands of plant species with medicinal properties. The country's vast floral diversity includes flowering plants, fungi, algae, lichens, bryophytes, and microorganisms. India is home to two of the world's ten biogeographic zones: the Eastern Himalayas and the Western Ghats. Numerous plant species contribute to ethnomedicine, with roots, fruits, barks, leaves, and flowers serving as essential sources for medicinal remedies. Odisha, a state with a large tribal population in India, relies heavily on herbal medicine for treating various diseases. Ethnomedicinal studies show that tribes in Odisha use numerous plants for treating ailments like diarrhoea, dysentery, toothache, cough, cold, headache, wounds, boils, and bleeding piles (Fig-2). The tribal community has become more aware of healthcare due to state-sponsored economic development and literacy programs. Schleichera Oleosa, is an important traditional medicine used in the treatment of various skin diseases. It is commonly known as Kusum or Kosamra. The ethnomedicinal use of Schleichera Oleosa for skin diseases has been documented in various regions of India. In a study conducted by Das et al. (2013) in the Malkangiri district of Odisha, it was revealed that the local tribal communities extensively rely on the plant for treating skin ailments like eczema, ulcers, ringworm, and rheumatism (Fig-4). The traditional healers, known as vaidyas, utilize the bark, leaves, and flowers, to prepare remedies for these conditions.

Commercialized Secondary Metabolites
Alkaloids-USS 4045m
Atropine, Hyoscyamine, Scopolamine, Camptothecin, Capsaicin, Codeine, Morphine
Terpenes and steroids—USS 12400 m
Artemisinin, Diosgenin, Hecogenin, Stigmasterol, and Taxol
Glycosides, USS 9230m
Digoxin, Digitoxin, and Sennosides
Others-USS 5014m
Ipecac, Podophyllotoxin
Some of Odisha's threatening plants
Celastrus paniculatus, Crataeva magna, Gardenia Gummifera, Gloriosa superb
Litsea glutinosa, Mesua ferrea, Oreoxylum indicum, Paederia foetida, Rauvolfia serpentine, Saraca asoca
Figure-1: Plant parts used as drugs

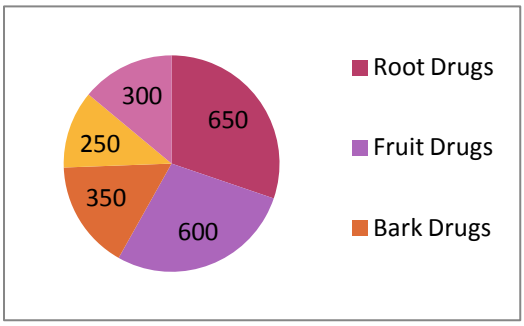
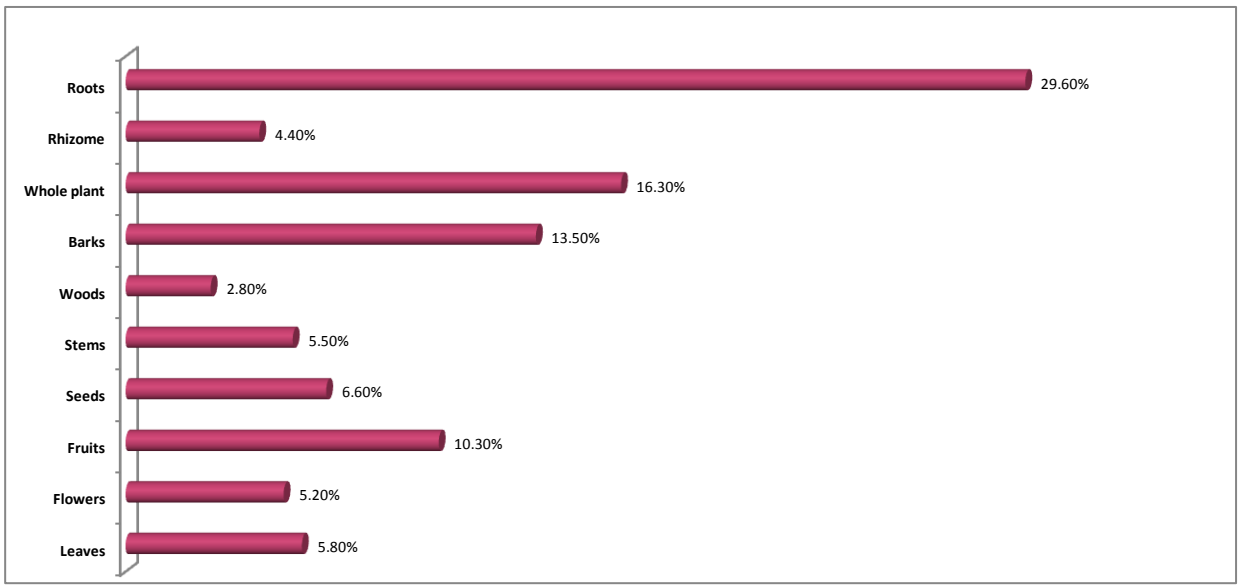


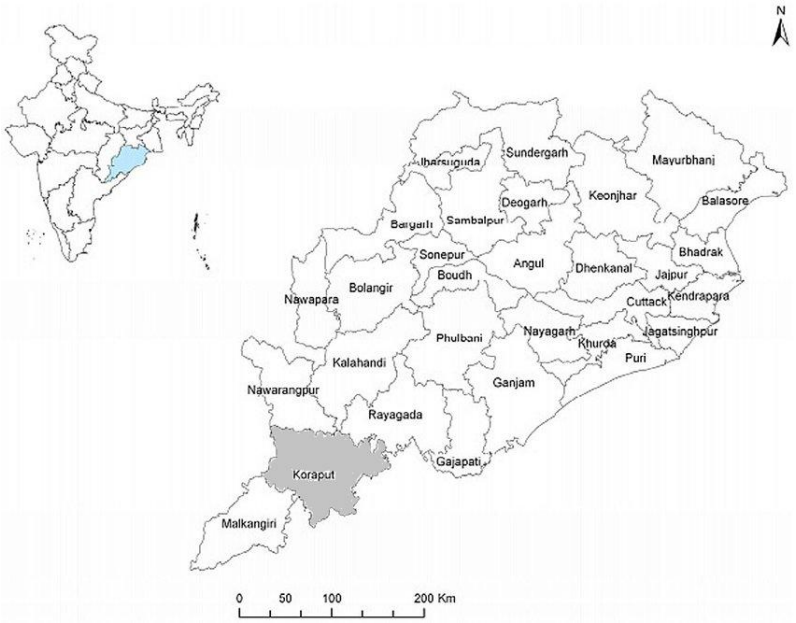
Figure-2: Plant parts used for medicinal purposes



MATERIALS AND METHODS

Study Area: The research was conducted in different villages of the Semiliguda block in Koraput district. These villages are located near forests with rich biodiversity and are primarily inhabited by tribal communities.(Fig-3)

Figure- 3 Map of Odisha showing study area



Data Collection: Questionnaires and surveys were used to collect information on traditional ethnomedicinal knowledge from local communities. Knowledgeable individuals, including vaidyas (traditional healers), experienced and elderly persons, villagers, family members, and local healers, were consulted to gather data on local plant names, plant parts used, preparation methods, and recommended doses for treating skin diseases. A comprehensive literature search was performed to gather information on Schleichera oleosa (Lour.) Oken. Various sources were utilized, including books, journals, magazines, and scientific search engines such as Google Scholar, Research Gate, Medley, Pub Med, Science Direct, and Scopus. These search engines were employed to locate relevant articles published on the topic of Schleichera oleosa (Lour.) Oken. Subsequently, the obtained information was edited and paraphrased for this purpose.

Plant Selection: The study focused on Schleichera Oleosa, commonly known as Kusum or Koshamra in Ayurveda. This plant is widely used in rural areas for the treatment of skin diseases. Phytochemical tests were conducted to analyze the secondary metabolites present in this plant.

Plant Description: Schleichera Oleosa belongs to the Sapindaceae family and is a large deciduous tree found in Asia. The bark of this tree is rich in antioxidant properties and is used for various skin ailments, rheumatoid arthritis, joint pain, and headaches. The plant's physical characteristics, including its size, and medicinal use of bark, leaves, flowers, and fruits, were described.

Medicinal Uses: Different parts of Schleichera Oleosa have various medicinal uses. The leaves are used for treating piles, jaundice, rheumatism, eczema, ulcers, and as a dressing for ringworm. The flowers have purgative, febrifugal, biliousness, and astringent properties. The fruit is used for treating diabetes, reducing inflammation and heat in the body, and alleviating chest complaints, throat trouble, and eye diseases.

Figure-4: Schleichera Oleosa (Kusum Tree)

Active Principles in Plants: Phytochemicals are bioactive nutrients produced by plants through primary and secondary metabolism. There are around 250,000 secondary metabolites found in plants. Some of the commercialized secondary metabolites include alkaloids, terpenes, steroids, glycosides, flavonoids, curcumin, phenolic acids, and phytosterols. Flavonoids are the most common phytochemicals and play a crucial role in defending against pathogens and infections. Many secondary metabolites have medicinal properties and are used in traditional medicine.

Tests for Secondary Metabolites: The methods for testing the presence of specific secondary metabolites were described:

- Test for Terpenoids: Plant powder was mixed with distilled water and left for 24 hours. The extract was filtered and used for testing. Chloroform and sulfuric acid were added to the extract, and the presence of reddish-brown color indicated the presence of terpenoids.
- Test for Tannins: Powder was boiled with water, filtered, and an aqueous extract was prepared. A few drops of FeCl3 were added, and the mixture was heated. Blue color indicated hydrolyzed tannin, while green color indicated condensed tannin.
- Molish Test (for Carbohydrate): An aqueous extract was mixed with Molish reagent, and concentrated sulfuric acid was added slowly. The formation of a ring indicated the presence of carbohydrates.
- Flavonoid Test: Acid and alkaline extracts were prepared and compared for color. Darker yellow color indicated the presence of flavonoids.
- Test for Sterols and Triterpenes: Alcoholic extract was mixed with H2SO4, and the formation of a reddish-brown ring with no green colour in upper layer shows positive test.
- Test for Saponins-2ml of aqueous extract was taken. It was shaked for 5 minutes. Appearance of white forth shows presence of saponin.
- Alkaloid Test-1 ml of dragondorff''s reagent was added to 2ml of alcoholic extract. An orange precipitate was formed, indicating the presence of alkaloids.

RESULT AND DISCUSSION:

The phytochemical analysis was aimed to determine the presence of secondary metabolites in the bark of kusum. The results were obtained by observing precipitation reactions and color changes in the test tube. The phytochemical screening revealed the presence of tannin, flavonoids, saponins, alkaloids, oxalates, and cyanogenic glycosides in the kusum bark (Sarkar et.al, 2021, Bhatia, et al. 2013). Medicinal plants containing alkaloids, flavonoids, steroids, and their active derivatives are highly valued and commonly used in the pharmaceutical and drug industries. The extraction of kusum yielded higher percentages of compounds using various solvents such as hexane, diethyl ether, ethanol, ethyl acetate, acetone, and methanol. The analyzed fractions contained flavonoids, phenols, carbohydrates, proteins, amino acids, tannins (hydrolyzed), and terpenoids.

The alcoholic fractions of kusum were particularly rich in flavonoids, phenols, and tannins, which are known for their medicinal properties (Karthikeyan et al 2023). Comparing the bark and seed extracts, the concentration of phenolic compounds was found to be lower. The phenolic compound profile in kusum indicates non-uniform distribution throughout the plant. It is suggested that certain compounds are more concentrated in the roots and seeds, while others are prevalent in the green tissue of the aerial parts. This variability in phenolic compound distribution may be due to organ specialization and physiological functions. For instance, bark has been observed to synthesize phenolic metabolites as a rapid response to external stimuli such as microbial attacks or light exposure (Kyaw, et al. 2019). Additionally, the synthesis of secondary metabolites can be influenced by seasonal variations and the growth stage of the plant.

Antimicrobial and Anti-inflammatory Properties: The biologically active compounds are believed to contribute to the plant's antimicrobial properties The presence of secondary metabolites in Schleichera Oleosa contributes to its antimicrobial and anti-inflammatory properties, which are beneficial for treating various skin

diseases. A study investigated the antimicrobial activity of different parts of the plant, including the bark, leaves, and fruits (Anjum, et.al 2022). The results demonstrated significant inhibitory effects against both Gram-positive and Gram-negative bacteria, suggesting the plant's potential as a natural antimicrobial agent. The mechanisms through which these secondary metabolites exert their antimicrobial effects vary. Tannins, for example, can form reversible complexes with proline-rich proteins, inhibiting cell protein synthesis (Goswami & Singh, 2017). Traditional herbal remedies containing tannins have been used to treat intestinal disorders such as diarrhoea and dysentery.

Anti-inflammatory and Wound Healing Effects: The anti-inflammatory and wound healing effects of Schleichera Oleosa have been explored in several studies. Santha, et al. (2017) evaluated the anti-inflammatory potential of the plant's bark extract using an animal model. The results demonstrated a significant reduction in inflammatory markers, indicating its anti-inflammatory activity. Furthermore, the study also observed enhanced wound healing properties of the extract.

Antioxidant Activity: Skin diseases often involve oxidative stress, which can exacerbate the condition. Schleichera Oleosa possesses antioxidant properties that can help mitigate oxidative damage and promote skin health. In a study by Boima et al. (2016), the antioxidant activity of the plant's leaves was investigated The results revealed potent antioxidant effects, attributed to the presence of phenolic compounds and flavonoids. Alkaloids were also identified in the bark extract of kusum (Dubey et al. 2019, Mall &. Tripathi 2017). Alkaloids are known for their analgesic effects and have been clinically utilized. They have demonstrated antimicrobial activities, particularly against gram-positive bacteria. Another secondary metabolite with antimicrobial properties found in kusum is saponins. However, it is worth noting that the presence of oxalates and cyanogenic glycosides in kusum bark renders it toxic. Oxalates act as anti nutrients and acute toxins, while cyanogenic glycosides release hydrogen cyanide, which can cause oxidative stress (Khandekar et al. 2015).

CONCLUSION:

In conclusion, this study contributes to the documentation of ethnomedicinal knowledge in Odisha, India, and highlights the potential of Schleichera Oleosa (Kusum) as a valuable resource for the development of novel therapeutic agents. The identification of secondary metabolites in Kusum bark provides insight into the plant's antimicrobial properties, which may explain its traditional use in treating skin diseases. Further research and exploration of traditional medicinal plants can lead to the discovery of new drugs and contribute to the preservation of indigenous knowledge and biodiversity. It is crucial to combine traditional knowledge with modern scientific advancements to harness the full potential of ethnomedicine in improving human health and well-being.

Conflict of interest-None

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