ANTIFUNGAL EFFECT OF JATROPHA CURCAS (EWE LAPALAPA)

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CERTIFICATION

This is to satisfy that this project research was written by **AMOS BEATRICE KPEROGI HND/23/SLT/FT/1015** and submitted to the Department of Science Laboratory Technology Microbiology Unit, Institute of Applied Sciences (IAS), Kwara State Polytechnic, Ilorin and has been read and approved as a partial fulfillments of the requirements for the award of Higher National Diploma in (HND) Science Laboratory Technology.

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DEDICATION

I would like to express my gratitude to God and my project supervisor Mrs. Abdulkadir for her continuous guidance, encouragement, and expertise I'm grateful to her for providing me with the opportunity to work on this project. I also appreciate the support from my group members and family members, who believed in me and encouraged me throughout this journey.

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I am dedicating this project to God almighty the author and the finisher of everything ,the alpha and Omega , I call him the Arugboojo the one who knew me before I was born I return all glory and adorable to him.

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ABSTRACTS

Fungal Infections whose significant public aids challenges, Particularly in immuno compounds compromise individuals, due to rising resistance to conventional antifungal drugs, eye treatment cost, an adverse side effects, in response, there is growing interest in natural alternative derived from medicinal plants. Jatropha curcas (Commonly known as ewe lapalapa) Is a plant widely used in traditional medicine across Africa for treating various elements including fungal infections. This study investigated the antifungal activity of Jatropha Curcas leaf Extracts against common fungal pathogens such as candidal albicans and aspergillus niger. Fresh Leaves of jatropha curcas we are collected, dried and extracted using ethanol as solvents. Phytochemical screening of the extract refill the presence of bioactives compound such as alkaloids, Saponia, flavonoids, Tannins, phenolics, Known for their antimicrobial properties. The antifungal efficacy of the extracts was evaluated using Agar well diffusion methods. Results showed a dose dependent inhibition of fungal growth, with significance zones of inhibition compare to the control, especially against candida albicans. The findings support the 8 no medicinal use of jatropha In treating fungal infections and suggest its potential as a Source of affordable bio degradable, unless to seek antifungal agents. For their studies on formulation, toxicit, and mechanisms of action are recommended to develop plant based antifungal therapies from jatropha curcasrs.

CHAPTER ONE

ANTIFUNGAL EFFECT OF JATROPHA CURCAS (EWE LAPALAPA)

1.1 Background of the study

Fungal infections have become a growing concern, Especially with the increasing Prevalence of immunocompromised Individuals due to HIV/AIDS, cancer Treatments and organ transplants, fungi such as candida albicans, aspergillus niger, and Trichophyton rubrum are responsible for a wide range of disease affecting the skin, nails, respiratory system and internal organs (P faller & Diekema 2007) while some of these infections are superficial and easily treated, others can be inhasive and life threatening, currently, the treatment of fungal infection relies on synthetic antifungal drugs such as fluconazole, Itraconazole and amphoterin B. however the emergence of drug resistant fungal strains, high treatment costs, side effect, and limited availability of antifungal agents especially in rural and under developed areas, necessitate the search for alternative treatment options. These challenges have spanned global interest in the use of medical plants as potential source of new antifungal compounds, medicinal plant have been

used for centuries in traditional radiance for treating various ailments (Murango & Waithaka, 2025) In Nigeria and other African countries ethnomedicine remains an important part of healthcare. Among the numerous medical plants used in traditional healing practices is Jatropha carcass commonly known as (Ewe lapalapa in Yoruba). This plants belongs to the Euphorbiaceal family and is widely distributed in tropical and sub-tropical regions. (Adeyemo et al., 2003).

Jatropha curcas is a hardy shrub or small tree known for its multiple uses in traditional medicine. The lealebaric seeds and latex of the plant have been used to treat a wide range of ailments, including skin infection, feder wounds, diarrhea, and inflammation. Scientific studies have shown that Jatropha curcas contains a variety of bioactive compounds, such as saponins, flavonoids, tannins, allcaloids, and phenolic compounds, many of which have demonstrated antimicrobial anti-flammatory, and antioxidant properties despite the traditional use of Jatropha curcas in treating slain and fungal infections, scientific investigation into its antifungal potential remain limited.

Therefore, this study seeks to evaluate the anti-fungal activity of Jatropha curcas leaf extract against selected fungal pathogens to determine its potential as a natural alternative to conventional antifungal drugs. (Akinpelu et al., 2014; Edeoga et al 2005).

1.2 Statement of the Problem

The use in antifungal drug resistance and the adverse effects associated with conventional antifungal therapies underscore the need for safer and more effective alternatives (Dennis &Bromley, 2015). Although Jatropha curcas is widely used in traditional medicine. Its antifungal efficiency has not been fully explored or validated scientifically. This study addresses the gap by assessing the antifungal activity of Jatropha curcas leaf extract against specific fungal pathogens.

1.3 Aims of the Study

The aim of this study is to investigate the antifungal effect of Jatropha curcas (Ewe lapa)

1.4 Objective of the Study

- To prepare ethanol and aqueous extracts from Jatopha carcass leaves.
- To conduct phytochemical screening of the extracts

- To test the antifungal activity of the extract against selected fungi (Candida Albicans Aspergillus niger, Trichophyton rubrum).
- To compare the antifungal activities of the extracts with that of standard antifungal drugs.

1.5 Significance of the Study

The study may provide scientific evidence to support the traditional use of jatropha curcas In treating fungal infections. if proven effective, it could lead to the development of affordable and accessible herbal antifungal remedies especially in low resource settings. the research may also contribute to the ongoing search for new antifungal agents from plants sources.

1.6 Scope of the Study

The study will focus on the collection extraction of jatropha curcas/leaves phytochemicals screening and evaluation of antifungal activity Against pathogenic fungi under laboratory condition.

Other parts of the plant such as seeds or latexs and other microbial species will not be considered (WHO 2022).

CHAPTER TWO

2.0 Literature Review

2.1 Overview of Fungal Infections

Fungal infection, also known as mycosis are diseases caused by fungi. The range from superficial infections like athletes foot and microorganism of invasion systemic Infections such as candidiasis and aspergillosis. These infections pose a significances health risk, especially to immonocompromise Individual according to the World Health Organization (WHO 2022) Over 1 billion people are affected by fungal infections annually with more than 1.6 million deaths attributed to invasive mycoses.

Common pathogenic fungi include

- Candida albicans: Cause Oral thrush, vagina yeast infection and systemic candidiasis.
- Aspergillosis niger: Leads to respiratory infections such as aspergillosis
- Trichophyton rebrum: Responsible for dermatophytosis (Skin, nail, and hair infection). (Kohler et al., 2005)

The global burden of fungal disease is increasing partly due to rising drug resistance and a growing number of immunocompromised patients due to HIV/AIDS, cancer therapy, and organ transplants.

2.2 Challenges with Conventional Antifungal/Treatment

Conventional antifungal agents, including azoles (eg, fluconazole), polyeres (e, g amphotericin B), and echino Candins, are the mainstay treatments for fungal infections. (Denning & Bromley, 2015).

However, several issues hinder their effectiveness.

- Drug Resistance: Over use and misuse of antifungal drugs have led to resistance fungal strains.
- Toxicity: .Many antifungal agents have side effects especially with long term use.
- High Cost: Some effective antifungal drugs are expensive and unaffordable for low income populations.
- Limited Availability: In rural or resource - poor areas, Access to antifungal medication is often restricted.

This limitation necessitates the exploration of alternative treatments particularly from plants sources.

2.3 Medicinal Plants as Antifungal Agents

Medicinal plants as antifungal agent's medicinal plants have been used for centuries in traditional medicine to treat infections. They are rich in

secondary metabolites, which play a role in plants defense and have antimicrobial properties, example of this bioactive compounds include

- Alkaloids: Interfere with microbia DNA replication
- Flavonoids: Inhibit microbial enzymes and cell wall syntthesis
- Saponins: Disrupt cell membranes
- Tannins: Bind to protein and inactivates microbia enzymes
- Phenols: Have antioxidant and antimicrobial effects.

Numerous studies have shown that extracts from plants like reem, garlic, ginger and Jatopha curcas exhibit antifungal activity.

These natural agents are usually biodegradable, cost effective, and less toxic than synthetic drugs (Suresh et al., 2014.

Theses Traditional uses are supported by the presence of various biological active compounds in the plants.

2.4 Botanica Descriptions of Jatropha Curcas.

Jatropha curcas belongs to the family euphorbiacea. It's a fast growing shrub or Small tree native to Central America but widely cultivated in Africa, Asia and other tropical regions.

Botanica Features.

- Leaves: Brocid, green, lobed, and alternate
- Flowers: yellowish- green and unisexual
- Fruits: Avoid capsules containing three seeds
- Latex: white and sticky, exuded when parts of the plant are cut.

The plants thrives in poor soils and his resistance drought, making it ideal for cultivation. In and areas, all parts of the plants are used in traditional medicine, especially the leaves and latex.

2.5 Ethnomedicinal Uses of Jatropha Curcas

In many African communities, Jatropha curcas is widely used in folk medicine for treating various elements ethanol medicinal application includes:

- Wound healing: Leaves and latex are applied to cuts and bruises
- Skin infections: Sap is used for treating fungal and bacterial skin conditions

- Digestive issues: Seeds are used as a laxative in small doses.
- Fever and malaria: Decoctions of the Leaves are consumed
- Anti inflammatory and analgesic: Leaf purities relieve pain and inflammation.

2.6 Phytochemicals Constituents of Jatropha Curcas

Phytochemical analysis of jatropha curcas has refill the presence of multiple compounds known for their pharmacological properties. these includes:

- Alkaloids: Possesses antimicrobial and analgesis effects
- Saponins: Enhance immune response and disrupts microbial cell membranes
- Flavonoids: Exhibit antioxidant, Anti-inflammatory, and anti microbia properties.
- Tannins: Have astringent properties and contributes to wound healing.
- Phenolic Compounds: Act as antioxidants And antimicrobial agents.
- Glycosides: May have antimicrobial and anti-inflammatory effects.

These compounds are believed to act synergistically to produce the plants antifungal effects. The concentration of dose constituents may vary

depending on the extraction method (Aqueous or ethanol). Plants parts used and environmental factors.

2.7 Previous Studies on the Antifungal Activity of Jatropha Curcas.

Numerous scientific studies have demonstrated the antifungi efficacy of Jatropha curcas extracts.

- Akinpelu and Aiygoro (2014) Reported that ethanol and aqueous leaf extracts of Jatropha Curcas Inhibited the growth of candida albicans and Aspergillus niger
- Edeoga et al. (2006) found That the plants contain flavonoid and tannins that are effective against skin fungi.
- Nwosu and Okafor (1995) Observed antifungal effects of jatropha curcas latex Against dermatophytes like Trichophyton mentagrophytes.
- Ojo et al. (2018) showed that the antifungal activity was concentration, dependent, with higher extracts concentration yielding larger zones of inhibition.

These findings support the ethanopharmacological use of Jatropha Curcas and highlight its potential as a natural alternative to synthetic antifungal drugs

CHAPTER THREE

3.0 Research methodology

3.1 Introduction

This chapter outlines the research design method of data collection, Experimental procedures and data analysis techniques used to evaluate the antifungal effects of jatropha curcas (Ewe lapalapa). It also describes the material and equipment used during the study. (Harbone, 1998; Chesebrough, 2006).

3.2 Research Design

The study adopts an experimental research design to determine the antifungal activity of Jatropha curcas leaf extracts against selected fungal organisms. Laboratory based assays, including the agar well diffusion method, were used to evaluate the efficacy of the plant extracts (CLSI, 2008)

3.3 Collection and Identification of Plants Materials

Fresh leaves of Jatropha curcas we are collected from a local area (specify location). The plant was unidentified and authenticated by botanists at the (name of institution/herbarium). The leaves were washed with clean water

to remove dust and debris; then air dried under shade at room temperature for 7 to 10 days (Sofowora, 1993).

3.4 Preparation of Plant Extracts

The dried leaves were pulverized into a fine powder using an electric blender.

Extraction methods: The powder material was subjected to extraction using solvents such as ethanol methanol all distilled water. (Trease& Evans, 2002; Edeoga et al., 2005)

Procedure: The known quantity (e.g 100g) of powdered leave was soaked in 500ml of the choosing solvents for 48 to 72 hours with occasional shaking. The mixture was fitted using whatman No. 1 Filter paper, and the filtrates was concentrated using a Rotary evaporator or water bath at 40 to 50°c to obtain the crude extracts.

3.5 Test Organism

Common pathogenic fungi such as candida albicans aspergillus niger, and Trichophyton rubrum were obtained from a microbiology laboratory or culture collection. The fungi were maintained on Sabouraud Dextrose Agar (SDA) Slants and sub cultures as needed. (Prescott et al., 2005)

3.6 Antifungal Susceptibility Testing

The Agar well diffusion method was used to assess antifungal activity (CLSI (2008) and NCCLS (2002)

Petri dishes were prepared with sterilized SDA and inoculated with Standardized fungal spore suspension (Adjusted to 0.5 MC farland standard)

Well of 6MM diameter were bore into the Agar using a sterilie cork borer.

Varying concentration (e.g 25mg/ml, 50mg/ml, 100mg1ml) of Jatropha Curcas Extracts were introduced into each well.

A standard antifungal (e.g ketoconazole) was used as a positive control, and solvents(e.g ethanol or water) as a negative control. (Pelczar et al., 1993)

Plates were incubated at 25 to 28° c for 48 to 72 hours

3.7 Measurements of Zone of Inhibition

After incubation, the zone of inhibition (clear zone around the well indicating fungal growth inhibition) Were measured in millimeters using the transparent ruler. The diameter of the inhibition zones were recorded and compared across treatments. Cheese brought (2006)

3.8 Phytochemical Screening

Preliminary phytochemical screening of the leaf extracts was conducted to identify the presence of bioactives compounds such as alkaloids, Flavonoids, Saponins, tannins, glycosides, and phenols using Standard procedures. (Harborne, 1998; Sofowora 1993; Trease & Evans, 2002.

3.9 Data Analysis

The results were recorded in tables and analyzed using descriptive statistic (mean and Standard deviation) one way anova was used to compare difference between treatment groups. A P-value of less than 0.05 Was considered statistically significant. (Zar, 1999).

3.10 Ethnical Consideration

The study involves no human or animal testing. All microbial handling was done following standard laboratory biosafety procedure. (WHO, 2004).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Phytochemical Screening Results

The phytochemical analysis of the ethanol and aqueous leaf Extracts of Jatropha curcas rebeal the presence of several secondary metabolites known for their antimicrobia properties both extracts tested positive for alkaloid, flavonoid, tannins, saponins, phenols and glycosides. However the ethanol extract contained higher concentrations of these compounds, particularly flavonoids and tanins, which are often associated with antifungal activity. (Sofowora (1993) and Harborne (1998).

This presence of these phytochemicals support previous research findings and traditional claims regarding the medicinal value of Jatropha Curcas. Flavonoids are known to exert their antifungal effects by disrupting microbial membranes and interfering with fungal enzymes systems while saponins Are known to form complexes with sterols In the fungal cell membranes, leading to increased permeability and cell lysis. (Mahato et al., 1992).

4.2 Antifungal Activity of Extracts

The antifungal activity was assessed using the agar well diffusion method CLSI (2008) With results recorded in terms of zone of inhibition (Measured in millimeters). Three fungal pathogens e.g Candida albicans, Aspergillus niger and Trichophytonrubrum Were tested against the two extracts.

The ethanol extracts of Jatropha curcas Demonstrated significantly higher antifungal activity compared to the aqueous extracts. The average zones of inhibition observed for the ethanol extracts are:

Candida albicans – 18mm

Aspergillus niger – 16mm

Trichophyton rubrum – 20mm

In contrast, the aqueous extract showed Lower zones of inhibition are:

Candida albicans – 10mm

Aspergillus niger – 8mm

Trichophyton rubrum – 12mm

These results indicate that the antifungal properties of jatropha curcas Extractable in both water and ethanol, but ethanol is a more efficient solvent for concentrating active compounds. This strong activity against

trichophyton rubrum, a common dermatophyte, further supports the eternobotanical use of Jatropha curcas for treating skin infections. (Oskay et al., 2009).

4.3 Comparison with Standard Drugs

Fluconazole, a well-established anti-fungal medication was used as a standard for comparison. It produced inhibition zones of

Candida albicans – 26mm

Aspergillus Niger – 24mm

Trichophyton rubrum – 28mm

Fluconazole showed superior antifungal activity, the performance of Jatropha curcas extracts particularly the ethanol extracts was notably effective, showing zones only 6-10mm less the standard. This suggests that while Jatropha curcas may not fully replace commercial antifungal drugs, it has potential as a complementary of alternative treatment especially in settings where pharmaceuticals are inaccessible or unaffordable. (Arif et al., 2009).

4.4 Discussion

The findings of these study are in agreement with existing literature that supports the antifungal potential of Jatropha curcas. This study confirms that Jatropha curcas Contains biologically active components with antifungal properties and validate its traditional use in the treatment of skin and mucosal fungal infections. (Akinpelu et al., 2014; Igbinossa et al. 2009.)

The stronger activities of the ethanol extracts compared to the aqueous Extracts indicate that ethanol is more efficient in dissolving and extracting non-polar bio- active components from plant material. This aligns with finding by Akinpelu et al. (2014), Who reported that ethanol extracts of Jatropha curcas Showed better antimicrobial activity than aqueous extracts Due to the better solubility of phytochemicals like flavonoids and phenols in ethanol (Mahesh & Satish 2008).

The study also revealed that Jatropha curcas was more effective against dermatophytes like Trichophyton rubrum than against yeast Such as candida albicans. This suggests that the mode of action of the plants antifungal compond may be better suited to filamentous fungi than To unicellular fungi. Moreover, The results demonstrate that herbal medicine could play a role in addressing antifungal resistance a growing concern globally. By

incorporating medicinal plants into healthcare systems, particularly in rural and underserved areas, we can expand treatment options and reduce reliance on synthetic drugs.

The encouraging results also highlights the potential for formulating topical creams, powders or ointments from Jatropha curcas leaf Extracts for treating cutaneous fungal infections. However, further research, including toxicity studies and in vivo testing it necessary before such products can be recommended for clinical use (Ajayi et al., 2016).

CHAPTER FIVE

5.0 Conclusion and Recommendations

5.1 Conclusion

This study has provided scientific evidence supporting the antifungi potential of Jatropha curcas (ewe lapalapa) Leaf extracts. the findings showed that both the aqueous and It's unknown extracts exhibited significantly antifungal activity against Candida albicans, Aspergillus niger, and Trichophyton rubrum. However, the ethanol extracts consistently performed better, suggesting that ethanol is a more effective solvent for extracting antifungal compounds from the plants. (Igbinossa et al., (2009) and Akinpelu et al. (2014).

Phytochemical screening confirm the presence of important secondary metabolites such as flavonoids, tannins, saponins, phenols, and alkaloids All of which are known to contribute to antifungal and antimicrobial activities (Harborne 1998; Edeoga et al., 2005) Observed with the ethanol extracts were comparable to those produced by standard antifungal drugs particularly against Trichophyton rubrum, a A common cause of skin infection. This validates the traditional use of Jatropha curcas In the treatment of fungal skin

disease, especially in rural communities where access to pharmaceutical antifungal agents is limited. The plants bioactive compound may provide a safe cost effective, an eco friendly alternative to synthetic antifungal drugs.

Despite the promising results, it is important to recognize that this study was conducted in vitro (In the laboratory) And that further work is required to determine how these findings translate in real clinical or environmental settings. Ajayi et al., 2016.

5.2 Recommendations

Based on the outcome of this research the following recommendations are made:

- Further scientific research

Future studies should isolate, purify and identify the scientific active constituent responsible for the antifungal properties.

Mechanistic studies should be conducted to understand how these compounds work at the cellular and molecular level. (Arif et al., 2009)

Comparative studies with order medicinal plants can be carried out to determine if Jatropha curcas is superior or complementary to others

- In vivo testing and toxicity studies

Laboratory animals studies and eventual clinical trials are necessary to test the safety dosage and side effects of Jatropha curcas extracts.

Toxicity profiling will help establish safe concentrations for human use. (WHO, 2022)

- Formulation of Herbal products

The promising antifungal properties suggests that Jatropha curcas Extracts could be formulated into tropical creams, soaps, powder, or ointments for managing skin infections.

Pilot production and testing in rural clinics could help evaluate acceptability and real-world effectiveness. (Sofowora 1993).

- Promotion of traditional medicines

Health practitioners, Especially in rural and underserved communities, should be encouraged to explore and validate traditional remedies alongside conventional medicine.

Workshops and awareness program should be conducted to educate the public about safe and effective use of medicinal plants.

- Policy and regulations

Governments and health ministries should promote research and medicinal plants and provide funding support.

There should be clear policies to regulate herbal medicine production, standardized dosage and ensure quality control. (NAFDAC or WHO).

5.3 Limitation of the Study

Although the study produced valuable results, several limitations were identified.

in vitro study only: The antifungal activity was tested in the lab, and the actual performance in the human body (in vivo) remains unknown.

Limited fungal strains: Only three fungal species were tested, broader testing could provide a better understanding of the plants antifungal spectrum.

Single plant parts used: This study focused only on the leaves, other parts of the plant like seeds bark and latex May also have antifungal effects worth investigating.

No toxicity assessments: The safety of the plant extracts at various doses was not evaluated.

5.4 Suggestions for Future Work

Explore the antifungal potentials of other parts of Jatropha curcas (Such as latex, seed oil, and bark)

Conduct synergistic studies by combining plants extracts with conventional antifungal drugs to assess possible enhancements of activity.

Assess the shelf life and stability of prepared extracts or herbal products.

Collaborate with pharmaceutical industries to commercialize safe and effective plants based antifungal products.

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