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RESEARCH ARTICLE

PHYTOCHEMICAL AND ANTIMICROBIAL SCREENING OF THE STEM BARK EXTRACTS OF *PTEROCARPUS ERINACEUS* (POIR)

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Abstract

Medicinal plants are very rich in phytochemicals and have been widely used in modern-day processing drugs. *Pterocarpus Erinaceus* has been commonly utilized in Nigerian folk medicine to treat various illnesses such as diarrhea, dysentery, urethral discharges, fever. In this study, the phytochemical constituents and antimicrobial activities of *Pterocarpus Erinaceus* were analyzed. The result of the phytochemical analysis revealed the presence of tannins, saponins, and flavonoids. The antimicrobial screening showed that the plant is active against *Salmonella typhi*, *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Enterococcus faecalis*, and *Escherichia coli*.

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Introduction:-

Nature has provided humanity with many floras that contain essential medicinal value (Biba et al., 2014). Plants are an important source of many human needs. There is a growing focus on the importance of medicinal plants in health care (Farnsworth & Soejarto, 2010; Sarwar et al., 2011). Plants are the essential foundation of medicine (Aslam et al., 2020; Bukar et al., 2016; Raina et al., 2014) and sources of health-promoting substances (Ozkan et al., 2016). Medicinal plants are very rich in phytochemicals (Ugboko et al., 2020) and have been widely used in modern-day processing drugs (Ahmed et al., 2014; Modibbo, 2014). Over the years, plants have been used in traditional medical practice due to their curative potentials (Caballero-Serrano et al., 2019; Debashree et al., 2020; Hao, 2019). Medicinal plants have assumed an impressive part in the global health system (Oladeji, 2016; Zahra et al., 2019). Medicinal plants are the plant that contains substances in any part of its organ that is crucial in therapeutic purposes and drugs processing (Bajpai & Agarwal, 2015; Sofowora et al., 2013). Medicinal plants are enriched with various phytochemical and biological potentials, which has been widely investigated (Abba et al., 2018; Ameh & Eze, 2010; Awotodu et al., 2018; Hadiza Haruna, 2019; Njoku et al., 2011; Nkumah et al., 2015; Ogunwande et al., 2007; Okwu & Josiah, 2006; Olanipekun, 2013).

Pterocarpus Erinaceus is an essential medicinal tree (Noufou et al., 2016), and a leguminous tree commonly used for timber (Adjonou et al., 2020; Johnson et al., 2020). It is of high socio-cultural importance because of its multipurpose uses (Segla et al., 2015). The tree is among the most exploited trees in Africa (Dumenu, 2019; Goba et al., 2019; Habou et al., 2019; Segla et al., 2020). Perhaps, uncontrolled exploitation of the species is implicated in regeneration capacity and a decrease in socioeconomic and medicinal activities (Kossi et al., 2019). *P. Erinaceus* has been widely utilized in Nigerian folk medicine to treat various illnesses such as diarrhea, dysentery, urethral discharges, fever (Hage et al., 2014; Oladije et al., 2020; Saidu et al., 2015; Salawu et al., 2008). *P. Erinaceus* contains nutritious foliage which is essential fodder for livestock (Nacoulma et al., 2011). The leaf is high in protein and safe for farm animals. Research has investigated the anti-inflammatory, analgesic and anti-plasmodial activities

of *P. Erinaceus* (Noufou et al., 2016), antidiarrheal activity (Ezeja et al., 2012), antiulcerogenic properties (Olaleye et al., 2013), Antimalarial activity (Karou et al., 2003), Antioxidant (Patrick, 2018), antimycotic activity (Etuk et al., 2008), and antifungal properties of its bark, leaves, and roots (Tittikpina et al., 2019). Evidence has affirmed the importance of this tree species. The current study aims to evaluate the aqueous contents of this plant and its antimicrobial activities against some pathogens. Phytochemical evaluation is fundamental in uncovering bioactive components existing in medicinal plants (Alqethami & Aldhebiani, 2021). The primary purpose of this study is to screen the phytochemical and antimicrobial contents of the stem bark extracts of *P. Erinaceus*.

Material And Method:-

Plant Collection

The stem bark of *Pterocarpus Erinaceus* was collected and sent to the laboratory for proper identification. The plant preparation and crude extraction were carried out using the standard procedure described in Adebayo and Ishola (2009).

The phytochemical and antimicrobial screening of the extracts

The powdered stem bark of *P. Erinaceus* was tested for secondary metabolites such as tannins, anthraquinones, saponins, flavonoids, and phenols using standard methods described by Abioye et al. (2013). Antimicrobial activity was carried out using hexane, ethyl acetate, and methanol fractions together with the crude methanol on cupplate method on gram-positive and gram-negative pathogens such as *Salmonella typhi*, *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Enterococcus faecalis*, and *Escherichia coli* (Abioye et al., 2013; Adebayo & Ishola, 2009; Gabriel & Onigbanjo, 2010).

Result:-

500g of the grounded stem bark of *P. Erinaceus* was successively extracted with n-hexane, ethyl acetate, and methanol to obtain some reddish-brown, brown, and yellowish solid masses. The bioactive components of the plant are shown in Table 1. While the antimicrobial assay results on the extracts are shown in table 2.

The phytochemical screening performed on the aqueous extract of the plant's stem bark revealed the presence of tannin, saponins, and flavonoids. It was found that phenol was absent contrary to a previous study (e.g., Gabriel & Onigbanjo, 2010). The reason for the absence of phenol is unclear. However, the probable explanation could be attributed to the screening process.

Table 1:- Phytochemical screening results of *Pterocarpus erinaceus*.

Compounds	Positive /Negative
Tannins	+
Saponins	+
Flavonoids	+
Phenols	-

key: (+) = Presence; (-) = Absence

Table 2:- Sensitivity test results of the extracts.

Extracts	Organisms / Zones of Inhibition (mm)				
	<i>Escherichia</i>	<i>Klebsiella</i>	<i>Enterobacter</i>	<i>Enterococcus</i>	<i>Salmonella</i>
Hexane	20	20	30	20	10
Ethyl acetate	-	-	-	20	10
Methanol	30	20	20	10	20

Discussion:-

The study aimed to investigate the phytochemical and antimicrobial basis of the stem bark of *Pterocarpus Erinaceus*. The analysis showed that *P. Erinaceus* is rich in bioactive components, including tannins, flavonoids, and saponins. However, the presence of phenol was negative in the plant's extract. Perhaps, the secondary

metabolites revealed in the plant have been proven to possess antimicrobial activity (Ajiboye & Olawoyin, 2020; Dakheel et al., 2020; Othman et al. Following the antimicrobial activity screening, hexane, ethyl acetate, and methanol indicated varieties of activity. The investigation revealed that hexane and methanol are the most active in the sense that they were found to be active in the isolated organisms. However, Ethyl acetate was found to act in *Klebsiella* and *Enterococcus*. Consistent with (Gabriel & Onigbanjo, 2010), the analysis showed that Ethyl acetate exhibits the lowest sensitivity against the organisms. The study provides further evidence that *P. Erinaceus* exhibit antimicrobial activity against the tested pathogens.

Conclusion:-

The present study's findings support the use of the stem bark extract of *Pterocarpus Erinaceus* against *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Enterococcus faecalis*, and *Salmonella typhi*. The bioactive constituent of the plant's stem bark has been demonstrated to act against the isolated pathogens. The result contributes to the literature by providing valuable data to the medicinal properties of *P. erinaceus*.

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