



RESEARCH ARTICLE

Evaluation of the Antimicrobial Effect and Bioactive Content of *Monodora Myristica* Seed

Kwasi Benjamin

Department of Chemistry Kogi State College of Education, Ankpa.

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Abstract

For many decades, the area of alternative medicine has attracted considerable attention from researchers worldwide. Interestingly, evidence abounds that affirms the efficacy of alternative medicine in the various healthcare domain. Moreso, the plant's properties have been well explored relating to its medicinal compositions. The purpose of the present study was to analyze the antimicrobial and bioactive contents of the *M. Myristica* seed. The samples were collected and soaked for 24 hrs with different solvents to extract the medicinal component. The qualitative analysis shows the positive result in saponin, glycoside, steroid, and alkaloid, while flavonoid and tannin are negative. The quantitative analysis for *M. Myristica* seed show 32% to saponins, alkaloid 8.35%, phenol 55.7%, flavonoid 0.0707 mg/ml, and glycoside 5.2% while-tannin is negative. The result shows that *M. Myristica* can be used to produce vaccines because of saponin, while flavonoids were found to play biological and pharmacological activities, including antioxidants.

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Introduction:-

The area of alternative medicine has attracted a great deal of attention from researchers for many decades. The reason is attributed to the observed positive effects of alternative medicines in overall human health care (Andrade et al., 2020; Bahmani et al., 2015; Hart et al., 2017; Matowa et al., 2020; Sile et al., 2020; Tesfahuneygn & Gebreegziabher, 2019). Alternative medicine has proved to be an effective health care solution for many people in all cultures (Malami et al., 2020). Accordingly, there has been an increased dependence on alternative medicine for primary health care sources (Prinsloo et al., 2018). Traditional medicine represents the fundamental basis for conventional western medicine (Aslam et al., 2020; Bukar et al., 2016; Raina et al., 2014) and is essential for human health-promoting substances (Ozkan et al., 2016). Meanwhile, medicinal plants are commonly found across the Africa continents (Alaribe & Motaung, 2019). The extracts of medicinal plants have been found to possess essential bioactive components (Ugboko et al., 2020) and have been extensively deployed in the manufacturing of contemporary medicines (Ahmed et al., 2014; Modibbo, 2014).

An extensive report suggests that traditional health practitioners have relied on the curative potentials of plants for many years to treat ailments (Caballero-Serrano et al., 2019; Debashree et al., 2020; Hao, 2019). Thus, Therapeutic plants have assumed an impressive part in the global health care system (Oladeji, 2016; Zahra et al., 2019). Medicinal plants are the plant that contains essential bioactive 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.,

Corresponding Author:- Kwasi Benjamin

Address:- Department of Chemistry Kogi State College of Education, Ankpa.

2018; Ameh & Eze, 2010; Awotedu et al., 2018; Haruna, 2019; Njoku et al., 2011; Nkumah et al., 2015; Ogunwande et al., 2007; Okwu & Josiah, 2006; Olanipekun, 2013). The plant serves as indispensable salts, vitamins, and specific hormone precursors in addition to protein and energy.

Over the years, medicinal plants have been widely used in Nigeria as an alternative therapeutic provision. Insinuations suggest that the country is naturally endowed with plant biodiversity, generally employed in health care (Malami et al., 2020). Accordingly, Chukwuma et al. (2015) contend that medicinal plants have assumed a vital role in the Nigerian healthcare sector. Moreover, certain parts of the country are highly endowed with medicinal plants that have been used for decades (Abubakar et al., 2020). Evidence from Nigeria has shown that plants have the potential of treating health-related problems such as cancer (Fadeyi et al., 2013; Malami et al., 2020; Saidu et al., 2015), diabetes (Ezuruike & Prieto, 2014), malaria (Ene et al., 2010; Ibrahim et al., 2012), skin disease (Ajibesin, 2012; Rehamn and Sultana, 2016), arthritis (Salihu et al., 2018), leg ulcer (Nwafor et al., 2018), anti-typhoid (Iroha et al., 2010), hypertension (Eghianruwa et al., 2016; Gbolade, 2012), mental illness (Ior et al., 2017), antifertility (Saalu, 2016), tuberculosis (Mann et al., 2007). Indeed, Ukwubile et al. (2020) suggested that plants can cure the rampaging Covid-19 disease.

Monodora Myristica is a hardy tree with medicinal properties and belongs to the Annonaceae family (Ekeanyanwu, 2013). A growing insinuation suggests that all the parts of *M. Myristica* are richly endowed with economic and medicinal potentials. Nevertheless, research broadly implicates the seed in health care. They are embedded in the white sweet-scented pulp of the fruit. Generally, the seed is used as a spice in certain soups and as a stimulant in constipation. Also, it has been noted that the seed effectively controls passive uterine hemorrhage following child delivery. The seed yields a colorless volatile oil with a pleasant taste and aroma similar to nutmeg and is used as soup condiment (Nwaozuzu, 2015). The medicinal importance of *M. Myristica* has been widely documented (Akinyede et al., 2020; Feyisayo, 2013; Ibiroinke A. Ajayi, 2013; Koudou et al., 2007). *M. Myristica* is a dependent plant in Nigeria due to its broad culinary purposes and medicinal potentials. Accordingly, exploration of the antimicrobial and bioactive properties of *M. Myristica* indicates that the plant has not received much research attention relating to its health care potential. Thus, the present study aims to examine the antimicrobial constituents and bioactive components of *M. Myristica* seed. It assumed that knowledge from the research would provide augmented data to the existing *M. myristica* literature on the nutritional and medicinal value of the plant seed.

Materials and Method:-

Healthy seeds of *M. Myristica* seed (African nutmeg) were collected from the general market in Kogi state, Nigeria. The seeds were botanically identified and authenticated by a plant taxonomist to ensure that the seed was *M. Myristica* seed. The plant preparation and crude extraction were carried out using the standard procedure described in Adebayo and Ishola (2009). The following tests: Test for alkaloids, Test for saponin, Test for flavonoids, Test for steroids, Test for tannins, Test for glycosides, were conducted using standard procedures described in Abioye et al. (2013).

The phytochemical and antimicrobial screening of the extracts

The powdered stem bark of *M. myristica* 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 cup plate method on gram-positive and gram-negative pathogens such as *Salmonella typhi*, *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Enterococcus faecalis*, and *Escherichia coli* as described in previous studies (see., Abioye et al., 2013; Adebayo & Ishola, 2009; Gabriel & Onigbanjo, 2010)

Result:-

100g of the grounded seed of *M. Myristica* 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 Tables 1 and 2. While the antimicrobial assay results on the extracts are shown in Table 3. The phytochemical screening performed on the aqueous extract of the plant's stem bark revealed tannin, saponins, and flavonoids.

Table 1:- The table shows the qualitative phytochemical analysis of *M. Myristica* seed with flavonoids absent in all the extracts.

Alkaloids	+++	-	-
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Flavonoids	-	-	-
Glycosides	-	++	+
Phenol	+++	++	+
Steroid	+++	-	-
Saponin	-	++	+++

The key +++ = Highly present, ++ = Moderate present, + = slightly present - = Absent

Table 2:- Table showing the result of phytochemical determinants of *Myristicaseed*.

Phytochemical parameter

Saponins	Alkaloid	Phenol	Flavonoids	Glycosides
32%	8.35%	55.7%	.0707mg/ml	5.2%

The above table shows the plant seed's aqueous determinants, with phenol having the highest percentage composition of 55.7% and flavonoids having the lowest percentage composition of 0.0707 mg/ml.

Table 3:- Sensitivity test results of the extracts.

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

Discussion:-

The study was conducted to examine the phytochemical properties of *M. Myristica*. The qualitative analysis performed on the aqueous extract of *M. Myristica* seed revealed that ethanol, Hot water, and cold-water extracts of *M. Myristica* seed contain phenol glycoside alkaloids, saponins, and flavonoids and are more significant with phenol and saponin. The seed demonstrated less content in flavonoids, which have been implicated in anti-allergic, antioxidant, anticancer, and anti-viral activities(Okoro et al., 2016). Flavonoids usually act by chelating transition metal(Moreno et al., 2006). The antioxidant capacity could be attributed to the reducing power(Saito et al., 2008). The saponin is high in the *M. Myristicaseed*. The high concentration of saponins in the body can reduce certain nutrients' uptake, including glucose and cholesterol, leading to hypercholesterolemia. It is known for frothing foaming, which it produces when shaken in an aqueous solution. *M. Myristica* is being promoted as adjuvants in vaccines. The phenol was found at 55.7%, carrying the highest value. It is essentially used as a natural antioxidant and nutraceuticals and found in *M. Myristicaseed* for its enormous ability to combat cancer. It is also thought to prevent heart diseases to a significant degree and sometimes an anti-inflammatory agent. Tannin was absent in the seed but rich in medicinal plants and is used as a healing agent in several diseases like diarrhea.

Furthermore, the antimicrobial analysis showed that hexane, ethyl acetate, and methanol indicated varieties of activity on the microorganisms. The examination revealed that hexane and methanol are the most active in 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 result of the study revealed that Ethyl acetate exhibits the lowest sensitivity against the organisms. The study provides further evidence that *M. Myristica* exhibits antimicrobial activity against the tested pathogens.

Conclusion:-

The study was conducted to determine the antimicrobial and bioactive properties of *M. Myristica*. The analysis performed on the samples indicated that the seed of *M. Myristica* contains a significant level of antimicrobial capabilities and beneficial bioactive properties. The observation suggests that the seed's aroma is occasioned by the presence of flavonoids, which are believed to provide the basis for the development of valuable drugs. Accordingly, the study provides support to previous literature relating to the phytochemical potentials and antimicrobial capabilities of *M. Myristica*(Enabulele et al., 2014; Odoh et al., 2005). Hence, the study recommends frequent consumption of *M. Myristica* seed due to the high content of phenol, glycoside saponin, flavonoid, and alkaloid.

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