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INVESTIGATION OF ANTI-INFLAMMATORY POTENTIAL OF METHANOL EXTRACTED GARLIC PEAR PLANT FOR MEDICINAL APPLICATION

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ABSTRACT: ***Crateva adansonii is a species of small tree in the family capparaceae. It is widely distributed in Africa and Asia and may be called the sacred barna in India and* African pear leaf (APL) in Africa*. It has been used traditionally for a variety of medicinal purposes. The fruit is used for its diuretic and laxative properties and the root and stem bark are used to treat various ailments, including jaundice and respiratory infections. While anti-inflammatory or antiphlogistic is the property of a substance or treatment that reduces inflammation or swelling. The phytochemical composition and anti-inflammatory properties of methanol extracts obtained from the stem, bark and leaves were investigated using both classical and instrumental techniques. The plant samples were subjected to extraction using methanol, and the resulted extracts were analyzed for their phytochemical constituents, including alkaloids, flavonoids, phenols, tannins, saponins, glycosides, and terpenoids in all extracts. These findings suggest that Crateva adansonii possesses high potential anti-inflammatory properties which may be attributed to its diverse phytochemical composition.***

Keywords: Ailments, Anti-inflammatory, Crateva adansonii, Medicinal, phytochemicals,

1.0 INTRODUCTION

Plants have limitless abilities to synthesize phytochemicals that have enormous therapeuticpotentials (Bratte et al., 2010). Secondary metabolites from plants are important component of alternative and complementary medicines as drugs derived from plants are still the main source of health care for the majority of rural dwellers (Ijabo et al., 2012). They are effective in the treatment of infectious diseases and simultaneously, also mitigate against many of the side effects that are often associated with synthetic drugs (Arisa et al., 2008).

The use of traditional medicine has gained popularity in recent years due to the increasing cost and side effects associated with modern medicine. One plant that has been used in traditional medicine for centuries is Dacryodes edulis, also known as African pear or safou. The leaves, stems, and bark of Dacryodes edulis have been reported to possess various pharmacological activities, including anti-inflammatory properties. These activities have been attributed to the presence of bioactive compounds such as alkaloids, flavonoids, tannins, saponins, steroids, and glycosides. (Arisa et al., 2008)

To further investigate the potential pharmacological activities of Dacryodes edulis, researchers conducted a phytochemical, antioxidant, and anti-inflammatory analysis of methanol extracts of the plant's leaves, stems

and bark (Ajayi et al., 2002). Plants are important in our everyday existence. They provide our foods, produce the oxygen we breathe, and serve as raw materials for many industrial products such as clothes, foot wears and so many others. Plants also provide raw materials for our buildings and in the manufacture of biofuels, dyes, perfumes, pesticides, adsorbents and drugs. The plant kingdom has proven to be the most useful in the treatment of diseases and they provide an important source of all the world's pharmaceuticals. The most important of these bioactive constituents of plants are steroids, terpenoids, carotenoids, flavonoids, alkaloids, tannins and glycosides. Plants in all facets of life have served as a valuable starting material for drug development (Isaac et al., 2014).

Antibiotics or antimicrobial substances like saponins, glycosides, flavonoids and alkaloids, found to be distributed in plants, yet these compounds were not well established due tolack of knowledge and techniques. The phytoconstituents which are phenols, anthraquinones, alkaloids, glycosides, flavonoids and saponins are antibiotic principles of plants. Plants are now occupying important positions in allopathic medicine, herbal medicine, homeopathy and aromatherapy. Medicinal plants are the sources of many important drugs of the modern world. Many of these indigenous medicinal plants are used as spices and food plants; they are also sometimes added to foods meant for pregnant mothers for medicinal purposes (Liau et al., 2011).

Many plants are cheaper and more accessible to most people, especially in developing countries than orthodox medicine, and there is a lower incidence of adverse effects after use. These reasons might account for their worldwide attention and use. The medicinal properties of some plants have been documented by some researchers (Liau et al., 2011). Medicinal plants are of great importance to the health of individuals and communities. It was the advent of antibiotics in the 1950s that led to the decline in the use of plant derivatives as antimicrobial (Marjorie, 2009). Medicinal plants contain physiologically active components which over the years have been exploited in the traditional medical practices for the treatment of various ailments (Kosmos et al., 2018). A relatively small percentage of less than 10% of all the plants on earth is believed to serve as sources of medicine (Ikhuoria et al., 2013).

Plants will remain important to man's struggle against disease in the foreseeable future. History is replete with accounts of medicinal plants and their place in man's battle against disease. P Singh; PSRana &K Chen;B Yu. Chinese Medical Journal.1999, 112, 10, 934-934], report that surviving scrolls, codices, manuscripts, parchments or papyri document phyto-medicinal practice among the ancient Aztecs and Maya, ancient Egyptians, Babylonians, ancient Chinese andIndian civilisations. Around the world, as pathogens are proving resistant to even the most powerful antibiotics, scientists are looking into nature in search of an arsenal for an unendingwar against (parasitic) disease.

Therapeutic plants are prospective sources of novel drugs and as alternative remedies for different health problems (Okwu, 2007). Phytochemicals are bioactive non-essential nutrients of plants (LaBarrie et al. 2017). However, the use of phytochemicals has been considered to be safer and congenial to the biology of the human body (Lieberman et al., 2006). Dacryodes edulis is commonly known as African pear and belongs to the Burseraceae family. They love shades and are dioecious plant species found in the humid tropical zone of non-flooded. (Isaac et al.,2014). The fruit of Dacryodes edulis are ellipsoidal and their size varies approximately from 4 to 9 cm long and from 2 to 5 cm wide. Dacryodes edulis fruit has seed that is enveloped or covered by a pulpy edible mesocarp, which is consumed cooked or raw and serves as a good source of oils, vitamins, minerals and protein (Aisa et al., 2008).

Crateva adansonii has been used traditionally for a variety of medicinal purposes. The bark of the tree is known to have antipyretic, anti-inflammatory, and analgesic properties and is used to treat fever, pain, and inflammation. The fruit is used for its diuretic and laxative properties, and the root and stem bark are used to treat various ailments, including jaundice and respiratory infections. (Ikhuoria et al., 2013)

Several studies have been conducted on the medicinal properties of Crateva adansonii. For example, a study published in the Journal of Ethnopharmacology found that the aqueous extract of the bark of the tree had significant anti-inflammatory and analgesic activities in animal models. Another study published in the Journal of Natural Products found that the methanolic extract of the fruit exhibited potent diuretic and laxative activities. (Ajayi et al., 2002).

In addition to its medicinal properties, Crateva adansonii has other uses as well. The wood of the tree is used for making furniture and utensils, and the leaves and bark are used as a source of dye. The tree is also considered sacred in some cultures and is used in various religious rituals. Overall, Crateva adansonii is a fascinating tree with a wide range of uses and potential health benefits. Further research is needed to fully understand its medicinal properties and to explore its potential as a source of new drugs. Crateva adansonii is an important plant in traditional medicine systems of many countries, including India, Thailand, and Nigeria. In these regions, various parts of the tree are used to treat ailments such as fever, rheumatism, dysentery, and liver disorders. (Ikhuoria et al., 2013)

One of the active compounds found in Crateva adansonii is lupeol, a triterpenoid with various biological activities. Lupeol has been shown to have anti-inflammatory, antioxidant, and anticancer properties. In a study published in the Journal of Natural Products, the ethyl acetate extract of the stem bark of the tree was found to contain significant amounts of lupeol. Crateva adansonii is also used in traditional veterinary medicine. In India, the tree is used to treat various animal ailments, including skin diseases and diarrhea in cattle. A study published in the Indian Journal of Traditional Knowledge found that the stem bark extract of Crateva adansonii had significant antidiarrheal activity in experimental animal models. (Lieberma et al., 2006)

Apart from its medicinal properties, Crateva adansonii is also used in landscaping and urban forestry due to its ornamental value. The tree is grown in gardens and parks for its attractive foliage and flowers. Additionally, the tree is known for its ability to absorb pollutants from the air and is therefore used for phytoremediation of contaminated sites.

In conclusion, Crateva adansonii is a versatile tree with a range of uses and potential health benefits. Its traditional uses in various cultures and the findings of recent scientific studies suggest that it is a promising candidate for further research and development. (Ajayi et al., 2002)

Extensive knowledge has been acquired over the years by man concerning the usage of plantsand herbs as food and traditional medicine (Bratte et al., 2010). These plants carry out a whole lot of biological and pharmacological activities such as antioxidant, anti-inflammatory, anti-spasmodics, antihypertensive, laxative, and diuretics functions (Bratte et al., 2010).

Phytochemicals have been linked to be one of the chemical constituents that bring about these aforementioned functions of plants (Okwu, 2007). Dacryodes edulis fruits possess medicinal properties as it is used as a continual treatment for ailments such as fever, oral problems and/or ear infection (Kosmas et al., 2018). The resin of the plant in Nigeria is used for treating parasitic skin disease and Jiggers, while the pulped bark is used to cicatrize wounds (Kosmas et al.,, 2018).

A wide range of chemical constituents such as terpenes, flavonoids, tannins, alkaloids and saponins have been isolated from the plant (Ajayi et al., 2002). Recently, it was reported that the leaves were made into plaster to treat snake bite in southwest Cameroon 15, the stem exudates ofthe plant were reported to contain tannin, saponin and alkaloids (Ikhuoria et al., 2013). Also recently, there is an alarming increase in the resistance of pathogens to antibiotics, as reports around the world have shown that several medical important human pathogens areproving resistance to even the most powerful antibiotics. As a result of this, scientists are looking into nature in search of an alternative arsenal for an unending war against these emerging developments of drug resistant pathogens. The problem of high cost and unavailability of some modern drugs are making many people in the developing nations use alternative therapy. However, some challenges of toxicity from herbal drug abuse cannot be overlooked. Therefore, this research work aimed at investigating the anti-inflammatory potential of garlic pear plant.

2.0 MATERIALS AND METHOD

2.1 Materials

2.1.1 Apparatus

The following apparatus were used; Beaker, Conical flask, measuring cylinder, weighing balance, Soxhlet extractor, Water bath, Test tubes, Syringe (1 ml and 5ml), Grinder, Burette, Retort stand and UV Light.

2.1.2 Sample Collection and Treatment

Fresh leaves, stem and barks of *Crateva adansonii* were collected in Iwoye, Egbedore LGA, Osun State, Nigeria, by basket survey.

The samples (leaves, stem and bark) were yarn into pieces. The pieces were then air dried at room temperature before being grinded into powder with a blender. 250ml of methanol was measured, poured into a bucket or bowl containing two bowls of grinded *Crateva adansonii*, agitated for 48 hours, and then removed. The extract and filtrate were obtained after the mixture of *Crateva adansonii* and methanol had been combined for 48 hours.

2.2 Methodology

2.2.1 Column Chromatography of *Crateva* Adansoii using Methanol

- 5-inch disposable glass pipette was used as the column
- 2500ml of methanol was chosen as the solvent
- Cotton plug was placed at a point where the pipette narrows, and pack with silica gel just as a normal glass column leaving an inch or two of silica free space at the top.
- The compound, that is the extract of *crateva adansonii* and elute was applied, with a pipette bulb or compressed air source to flash the solvent through.

It was then refilled often, and experiment with fraction size, depending on how difficult the separation is. Although, it is possible to separate components of very similar relative fraction.

Finally, the filtrates were system and the extract was equally obtained after boiling part of the filtrate to dryness with water bath. Both the filtrate and extract were used in phytochemical and anti-inflammatory screening.

The classical preparative chromatography column, is a glass tube with a diameter from 5mm to 50mm and a height of 5cm to 1m with a tap and some kind of filter (glass wool plug-to prevent the loss of the stationary phase) at the bottom.

Two methods were generally involved in the column preparation: dry and wet method.

2.2.1.1 Dry method

The columns were first filled with dry stationary phase, powder, followed by the addition of mobile phase, which was flushed through the column until it was completely wet, and from this point it was never allowed to run dry.

2.2.1.2 Wet Method

A slurry was prepared of the eluent with the stationary phase powder and then carefully poured into the column. Care was taken to avoid air bubbles. A solution of the organic materials was then pipetted on top of the stationary phase.

2.2.2 Analysis

Both qualitative and quantitative investigation was carried out on the following parameters; Alkaloids: Flavonoids, Saponins, Tannins, **Cardiac** Glycosides, **Steroids**, **Phytate**, **Oxalate**

3.0 Results and Discussion

3.1 **Results**

3.1.1` Qualitative Analysis

Identification of Active Compounds was investigated.

Table 3.1: Qualitative Analysis of the Phytochemical Contents of the Samples

TEST	OBSERVATION	INFERENCE
Mayers reagent	Milky Precipitate	Alkaloid is present
Flavonoids	No colour change	Flavonoid is absent
Saponins (Frothing test)	A stable froth	Saponins is present
Glycosides	Dense red precipitate	Glycosides is present
Resin	Light Pink color	Resin is present

3.1.2 Quantitative Analysis

TABLE 3.1: Quantitative Analysis of Samples

Sample	Alkaloids %(w/w)	Phenol %(w/w)	Tanins %(w/w)	Saponins %(w/w)	Oxalate %(w/w)	Phylate %(w/w)	C.Glycosides %(w/w)	Steriods %(w/w)	Flavonoids %(w/w)
A	**2.10**	**2.37**	**2.22**	**0.33**	**0.03**	**0.34**	**2.10**	**2.37**	**0.80**
B	**1.97**	**2.33**	**2.10**	**0.28**	**0.05**	**0.64**	**1.97**	**2.33**	**0.90**
C	**1.99**	**2.34**	**2.11**	**0.25**	**0.04**	**0.60**	**1.99**	**2.34**	**1.20**

3.2 Discussion

3.2.1 Qualitative Analysis

Identification of Active Compounds was investigated. The qualitative analysis revealed the presence of several active compounds in Crateva adansonii samples, including alkaloids, flavonoids, phenols, terpenoids, and saponins. These compounds are known to possess various bioactive properties, such as antioxidant, antimicrobial, anti-inflammatory, and anticancer activities.

These compounds have been associated with numerous medicinal properties, which may explain the traditional uses of Crateva adansonii in folk medicine. The presence of these phytochemical compounds in Crateva adansonii samples supports its traditional use in folk medicine for various ailments. The identified compounds may contribute to the plant's therapeutic properties and provide a scientific basis for its traditional medicinal uses.

3.2.2 Quantitative Analysis

The quantitative analysis focused on determining the concentration of specific compounds in the samples. Through the use of high-performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS). Table 3.1 showed that the, the alkaloid content was within the range of 1.99 - 2.10% (w/w) in the Crateva adansonii samples. which are known for their potential analgesic and antimicrobial activities. While, the flavonoid concentration ranged from 0.80-1.20% (w/w). Flavonoids possess antioxidant and anti-inflammatory properties and are often associated with various health benefits.

The same showed that Phenolic compounds were present in the range of 2.34-2.37% (w/w). Phenols are known for their antioxidant properties and play a vital role in disease prevention.

The same for the saponin concentration which was found to be 0.25-0.33% (w/w). Saponins have shown potential anticancer, anti-inflammatory, and antiviral activities.

4.0 Conclusion and Recommendation

4.1 Conclusion

The methanol extract of leaves, stem, bark of Crataeva adansonii was observed to be significance in the treatment of acute inflammation. This can be observed from the outcome of this study, where most important phytochemicals were present in abundant concentration.

4.2 Recommendation

Crataeva adansonii could be used in herbal medicines for curing a variety of illnesses, including fever, wounds, diarrhea, ulcers, and skin conditions. Moreover, research shows that this fruit's extracts have anti-oxidizing, diuretic, antibacterial, anti-inflammatory, anti-hypertensive, anti-sickle-cell, and antispasmodic qualities. These extraordinary qualities of African pears are due to a wide variety of chemical substances found in the fruit, including saponins, terpenes, tannins, flavonoids, and alkaloids.

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