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PHYTOCHEMICAL, MINERAL, PROXIMATE ANALYSIS AND COMPARATIVE STUDY OF FTIR AND GCMS OF DIFFERENT EXTRACTS (ETHANOL, ETHYL ACETATE AND HEXANE) OF WONDERFUL KOLA SEED (*Buchholzia coriacea*)

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ABSTRACT

Wonderful kola (*Buchholzia coriacea*) is geographically distributed in some African countries. The seed of the kola contain phytochemical compounds, while the essential oil contains several chemical compounds that depict the medicinal properties of the plant. Several traditional claims and scientific validations have been made on the efficacy of the seeds of the wonderful kola plant. It is a plant with lot of benefits on human. Phytochemical constituents have been reported in seed of wonderful kola. It is reported that the presence of alkaloids, saponins, tannins, flavonoids, cardiac glycoside, steroids, legal test, reducing agent, alkaline and phenol in the seed of wonderful kola is important in our lives. The proximate analysis of moisture content and ash content showed that the wonderful kola seed consists of 80% moisture content and 34% ash content. Some Minerals are also present such as copper, iron, potassium, magnesium, sodium, zinc, phosphorus, lead and calcium in wonderful kola seed which helps the body in providing proteins and energy. The GC-MS and FTIR results revealed some of the compounds of pharmacological importance.

KEYWORDS: *Buchholzia coriacea*, Phytochemicals, Traditional medicine

INTRODUCTION

The wonderful kola is one of the "*Buchhlozia Coriacea*" medicinal plants, which is geographically widespread in certain countries in Africa. The leaves, bark, stem, and stem of the beautiful kola plant have been shown to have several traditional uses that have been supported by science. According to [1]**,** plants are used globally in the treatment of different diseases utilizing a variety of methods. Humans rely heavily on plants for their food, fiber, medicine, clothing, shelter, and other necessities. Humans eat from the roots, stems, leaves, flowers, fruits, and seeds of plants. In addition to providing the body with protein and energy, plants are an essential part of the human diet, providing the body with minerals, salts, vitamins, and several hormone precursors. Seeds are essential in diets because of their nutritional and caloric value. These plants include "Beautiful Kola" (*BuccholiziaCoricea*), which is recognized for its seed, leaves, bark, and stem. Over the years, many diseases have been said to be cured by the wonderful kola. The traditional users' use is corroborated by the findings of pharmacological study, and they are widely utilized in Africa. The seed is also useful for memory enhancement, which is why

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some nickname it the "memory nut" The usage of herbal medicines was also linked by [8] to the unavailability of contemporary medications, perhaps due to an economic aspect. An evergreen shrub called the wonderful kola can be found in some African nations, including Cameroon, the Central African Republic, Gabon, the Congo, Angola, Nigeria, Ghana and Liberia, among others [4]**.** As it has a fairly wide geographic range and is widespread locally, like as in Ghana, it does not appear to be in danger from genetic erosion as long as it's typical lowland rainforest still covers a substantial area. Wonderful kola blossoms can be seen virtually all year round in Nigeria. The tree blooms in Cameroon from September to January during the dry season. Flowers can be found in cote d'ivore from August to December, while ripe fruits can be found there from February to March. Elephants consume the fruit and distribute the seeds; in Ghana, elephants have been reported to germinate seeds[21]**.**Wonderful kola from the "Capparidaceae" family was given such name in honor of "R.W. Buchholzia," who gathered plants in Cameroon in the late 19th century. Local names for the plant include "Uworo" [Yoruba], "essonbossi" [Central Africa], and "Uke" [Ibo]. Common names for the plant include "Kai" [Edo] and "Apomu" Akure. The seeds, which can be either cooked or uncooked, are the plant parts that are most frequently consumed. Since the invention of man, historical experiences and observations have been used to document pertinent information about the value of herbal therapy. Man relied on the therapeutic effects of medicinal plants before the development of modern medications. Some individuals value these plants because Man relied on the therapeutic effects of medicinal plants before the development of modern medications. Some individuals place a high value on these plants because they adhere to the antiquated theory that plants were designed to give humans food, medicine, and other benefits. The "World Health Organization" WHO believes that around 80% of the 5.2 billion people in the world reside in less developed nations and that among them, traditional medicine is the only source of primary healthcare for these individuals[3]**.** More than 3.3 billion people in the less developed countries regularly use medicinal herbs since they form the foundation of traditional medicine. Herbal medicine is a widely accepted alternative form of healthcare that uses plants to cure and prevent ailments of the body, mind, and society [4]**.**It's used for the treatment of so many diseases, like cough, chest pain, waist pain, irregular menstruation, internal pile, malaria, Toothache, burning of belly fat, headache, gonorrhea, cholera, irregular or painful menstruation etc.

MATERIALS AND METHODS

Sample Treatment and Extraction

The seeds of wonderful kola were cut into pieces and washed with distilled water, air-dried for three weeks and ground into coarse form. Ethanol, Ethyl Acetate and Hexane extracts were prepared from the powder of wonderful kola. 200grams of the grinded sample was macerated with 700ml of Ethanol, Ethyl Acetate and Hexane in 1000ml beakers for 72 hours at room temperature. Thereafter, the extracts were filtered using Whatman No. 1 filter paper and the filtrates were evaporated to dryness on a water bath at 40^0 c. The percentage yields of Ethanol, Ethyl Acetate and Hexane extracts was obtained and calculated using

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$$\% \text{ yield} = \frac{\text{Weight of dried extract}}{\text{Weight of powdered sample}} \times 100$$

Which gives 10% of ethanol, 9% of ethyl acetate and 7% of n-hexane. Phytochemical (qualitative) contents of the seed extract were carried out for flavonoids, alkaloids, tannins, saponins, cardiac glycoside, reducing sugar, steroids, legal test, alkaline and phenols using the methods as described byAOAC (1990). The proximate composition of the wonderful kola in this investigation varies; this might be because to variations in processing. [22], for instance, observed that the magnificent kola's raw, blanched, and fermented seeds differ from one another. In addition, age and environmental conditions may potentially have an impact on the proximal compositions [19, 26]**.**By measuring the moisture content, the sample's weight (5.0g) was put into a moisture container that had already been weighed. The sample was dried in the oven for three hours at 105 °C. It was weighed after cooling in a desiccator. Returning it to the oven for additional drying, cooling, and weighing was done repeatedly every hour until there were no more weight losses.

Table 1: Phytochemical screening of the wonderful kola seed extracts

Phytochemical Constituent	Hexane Extract	Ethyl acetate Extract	Ethanol Extract
Flavonoid	+	+	+
Legal test	+	-	+
Alkaloid noid	-	+	+
Phenol	+	+	+
Steriod	+	+	+
Cardiac glycoside	+	+	-
Reducing sugar	+	+	+
Saponin	+	+	+
Alkaline reagent	+	+	-
Tannis	+	+	+

Keyword: Detected (+) Not detected (-)

Calculated and reported as a percentage of the weight of the sample being examined was the weight of moisture lost.

Ash content was calculated by weighing 5.0g of the sample into a porcelain crucible that had already been weighed. In a muffle furnace set at 550°C, the sample was reduced to ash. Whenit is entirely reduced to ash, it was weighed after cooling in a desiccator. Differences estimated as a percentage of the weight of the sample that was analyzed were used to calculate the weight of ash that was collected. Mineral contents of the sample were determined by atomic absorption spectrometry.

Table2: Mineral analysis of wonderful kola

Parameter	mg/kg
Copper	2.225
Iron	8.86875
Potassium	68.63125
Magnesium	23.65
Sodium	16.13125
Zinc	26,1213125
Phosphorus	2.76875
Lead	0.257456
Calcium	24.63125

RESULTS AND DISCUSSION

Results

Table 3: Proximate analysis of wonderful kola seed

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Proximate analysis	%
Moisture content	80
Ash content	34

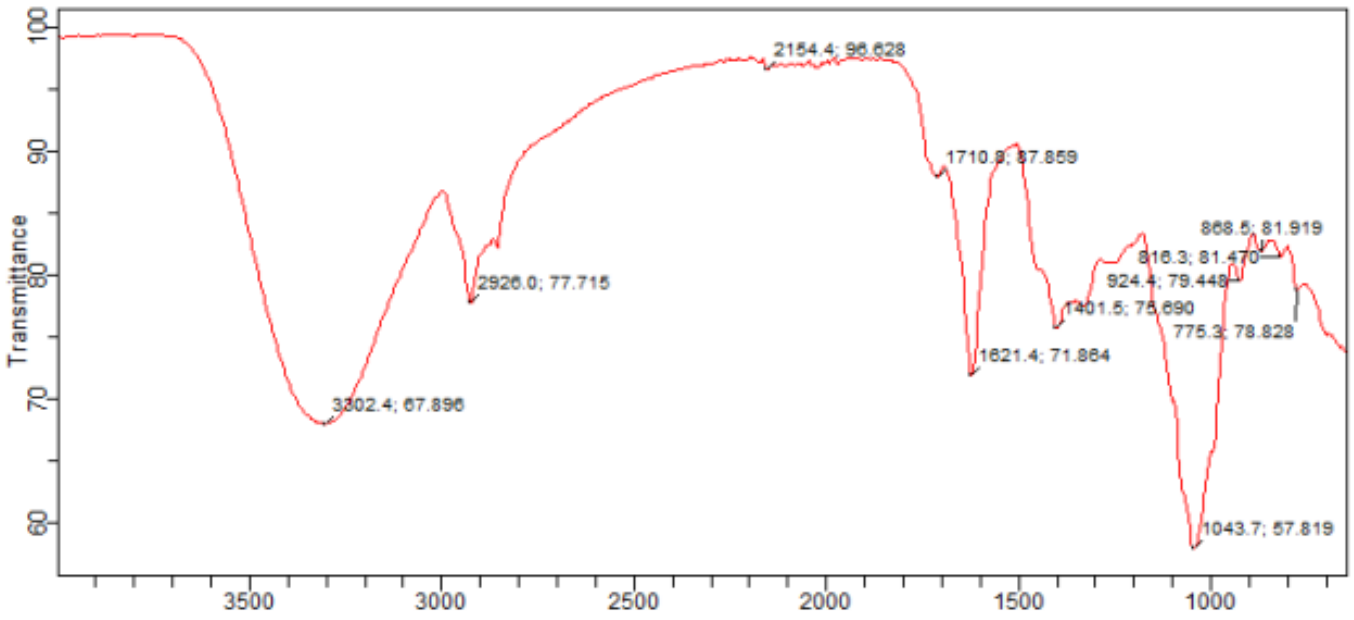

Figure 1: Ethanol extract by FTIR study

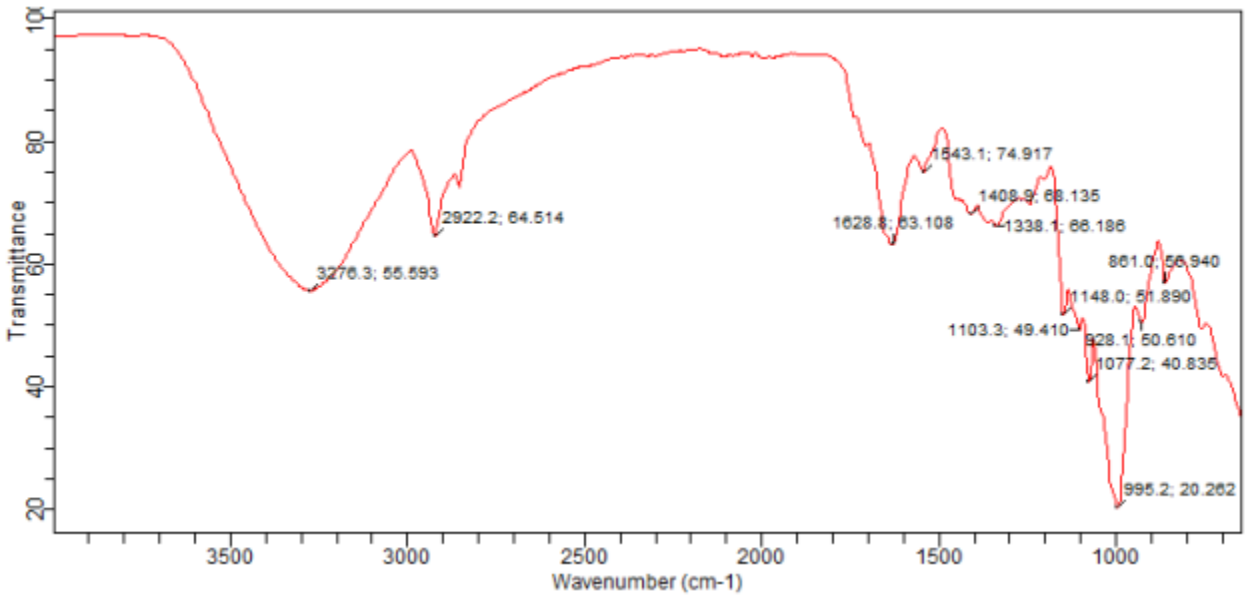

Figure 2: Ethyl acetate extract by FTIR study

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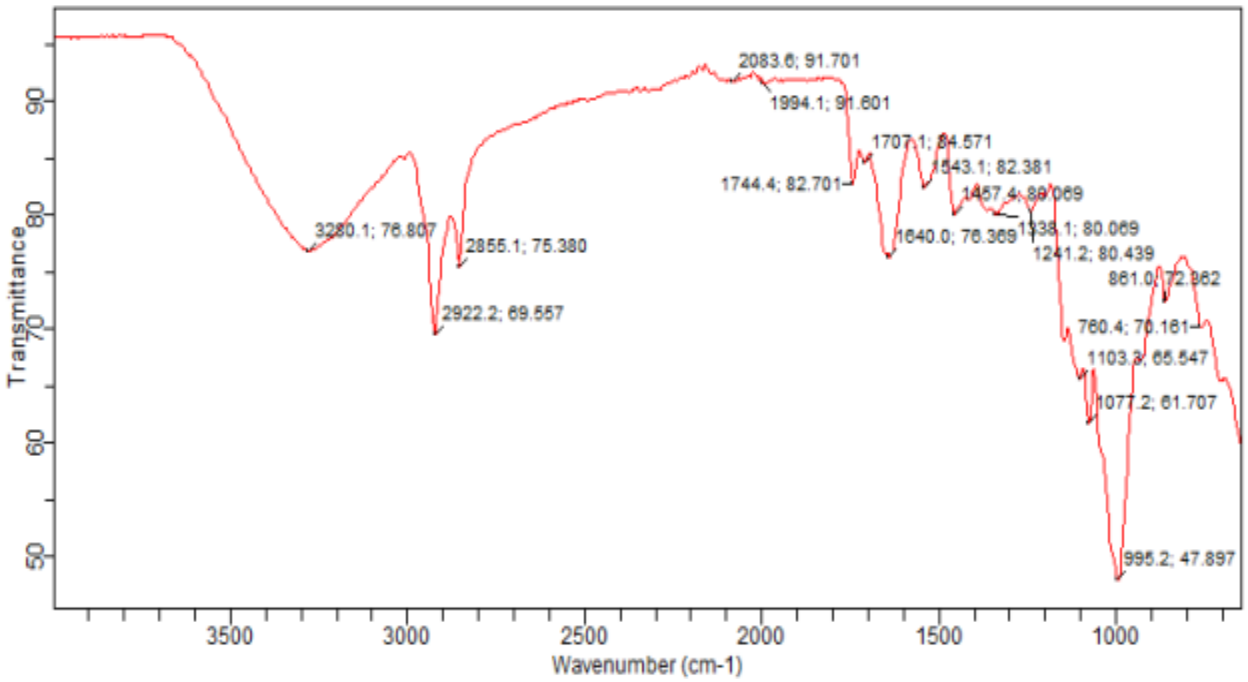

Figure 3: Hexane extract by FTIR study

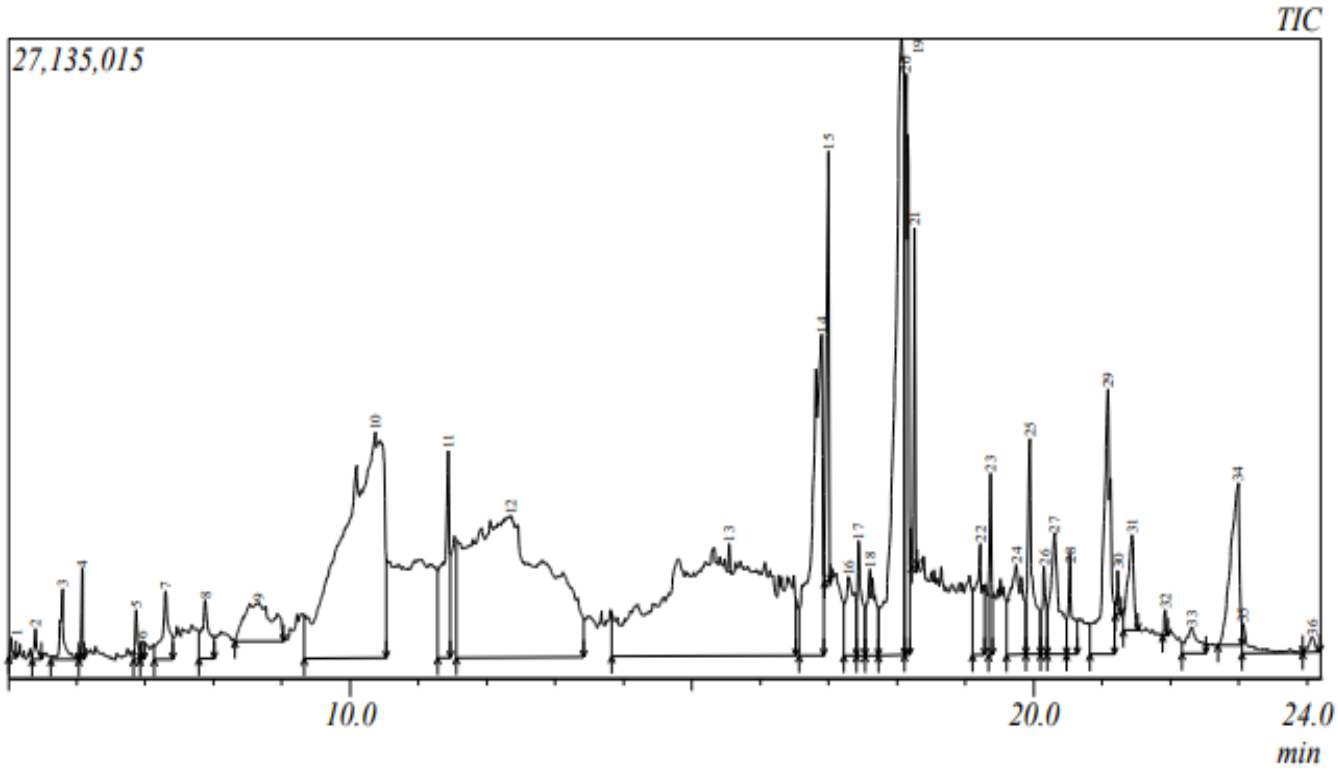

Figure 4: Ethanol extract by GCMS study

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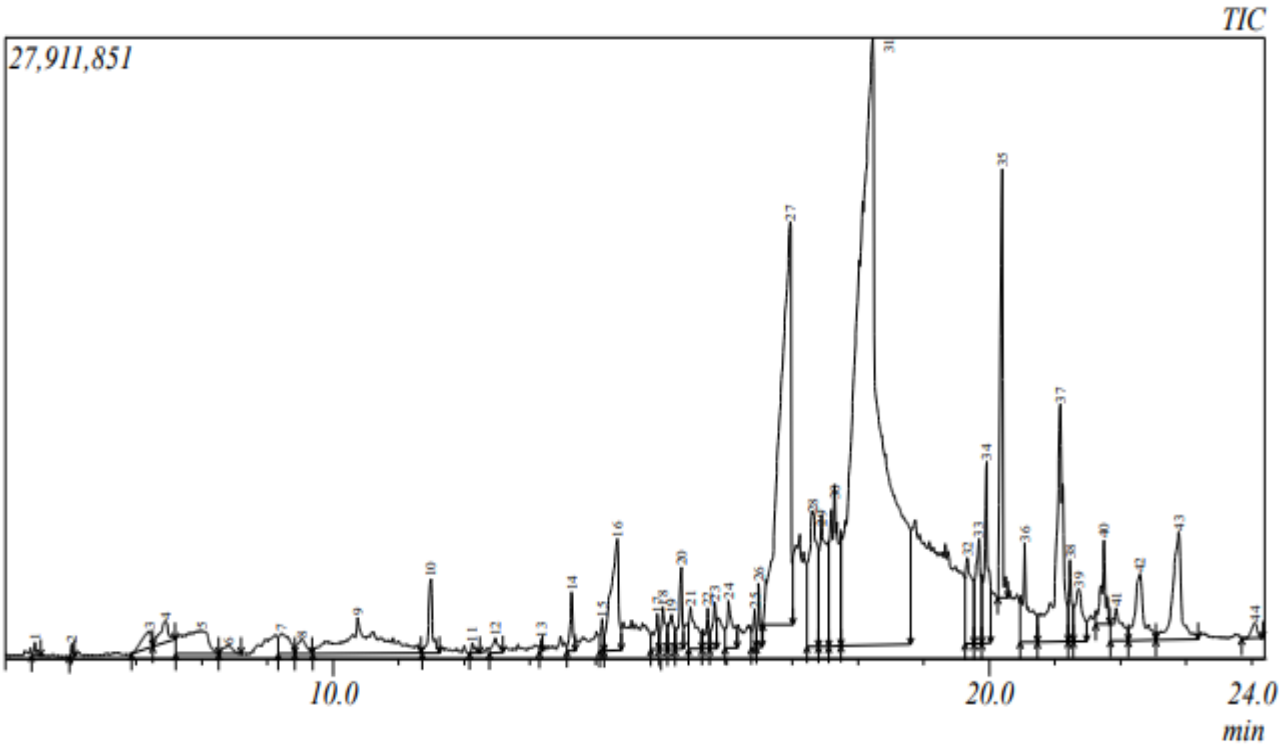

Figure 5: Ethyl acetate extract by GCMS study

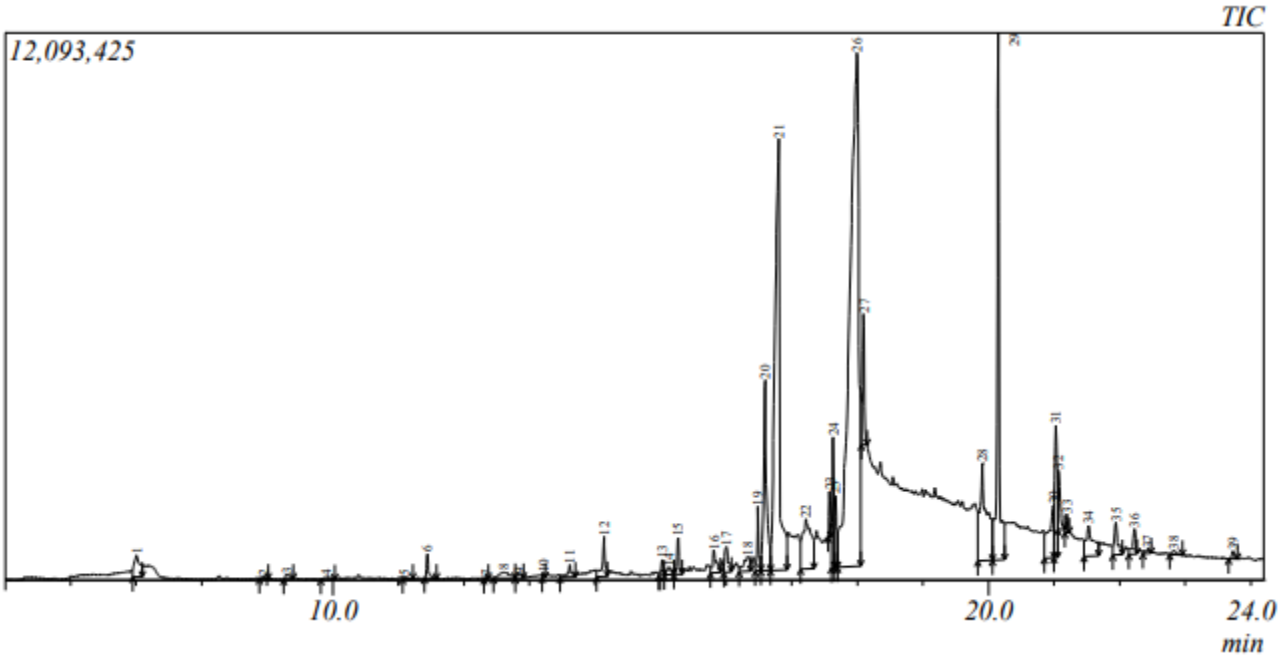

Figure 6: Hexane extract by GCMS study

Discussion

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The seed of the *Buchholzia coriacea*has been shown to contain phytochemical components. Alkaloids, saponins, tannins, flavonoids, cardiac, steroids, legal test, reducing agent, alkaline, and phenol are said to be present in the seed of the *Buchholzia coriacea*and are said to be significant in our lives. The extraction solvent has an impact on the outcome of sensitivity testing of plant materials. *Buchholzia coriacea*seed preparations, according to [36], have weak alkaloids when extracted using n-hexane and ethyl acetate, but have high alkaloids when extracted using ethanol. Hexane, ethyl acetate, and ethanol are three strong reducing agents found in seeds.[25] reported that fresh express extract of *Buchholzia coriacea*seed have superior efficacy compared to oven dried uncooked and cooked seed. Plants' existence of phytochemical components or substances is a sign of their biological activity [13]**.** Alkaloids were regarded by [20] as the plant elements that were most effective for medicinal purposes. Alkaloids have some therapeutic promise, including as stimulants for the central nervous system and as painkillers**.** The presence of phenol compounds in plants is a sign of its ability to act as a pesticide. Generally, phenolic compounds are employed to disinfect surfaces, and they continue to serve as a benchmark against which other microorganisms are measured[20]**.** The proximate analysis of moisture content and ash content showed that the wonderful kola seed consists of 80% moisture content and 34% ash content. There are some minerals in the plant that shows proper information of the body such as; Copper, Iron, Potassium, Magnesium, Sodium, Zinc, Phosphorus, Lead and Calcium. Lead is present in small quantity but should be absent because of is toxicity but maybe due to the environment where the plant is being located.

Functional Group from FTIR

In Figure 1, Ethanol extract by FTIR study shows the following distinct peaks and their functional groups: OH- stretching vibration at 3302.4 cm^{-1}, Alkane (sp3 C-H stretching vibration) at 2926.0cm^{-1}, the peaks observed at 1710.9cm^{-1} (a weak carbonyl presence) is more likely an aromatic compound and that at 1621.4 cm^{-1} a C=C stretching vibration for a conjugated alkene predicts that the compound is aromatic.

In Figure 2, Ethyl acetate extract by FTIR study shows the following distinct peaks and their functional groups: OH- stretching vibration at 3276.3 cm^{-1}, Alkane (sp3 C-H stretching vibration) at 2922.2cm^{-1}, the C=C stretching vibration at 1628.8cm^{-1} and C=C bending alkene having a sharp peak at 995.2cm^{-1} shows the compound is an aliphatic compound.

In Figure 3, Hexane extract by FTIR study shows the following distinct peaks and their functional groups: OH- stretching vibration at 3280.1 cm^{-1}, Alkane (sp3 C-H stretching vibration) at 2922.2cm^{-1} and 2855.1cm^{-1}, the peaks observed at 1744.4 cm^{-1} and that at 1640.0 cm^{-1} a C=N stretching vibration shows a possible imine compound and the .C=C bending alkene having a sharp peak at 995.2cm^{-1} shows the compound is an aliphatic compound.

The GCMS Result

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In Figure 4, Ethanol extract by GCMS study shows strong peaks fragments at peaks 14 - n-Hexadecanoic acid, 15 - Hexadecanoic acid, ethyl ester, 19 - cis-9-Hexadecenal, 20 - Ethyl Oleate, 21 -Octadecanoic acid, ethyl ester.

In Figure 5, Ethyl acetate extract by GCMS study shows strong peaks fragments at peaks 27 - n-Hexadecanoic acid, 31 - cis-9-Hexadecenal, 35 - Bis(2-ethylhexyl) phthalate.

In Figure 6, Hexane extract by GCMS study shows strong peaks fragments at peaks 21 -n-Hexadecanoic acid, 26 - Oleic Acid, 29 - Bis(2-ethylhexyl) phthalate.

CONCLUSION

Due to the presence of phytochemicals, minerals, and bioactive components, it can be concluded from the findings of this study that the *Buchholzia coriacea*seed extract in hexane, ethanol, and ethyl acetate will be effective in treating illness. A common compound among the three extracts is n-Hexadecanoic acid (a human and plant metabolite) useful in drug synthesis. Another compound found in the GCMS study is Bis(2-ethylhexyl) phthalate and other families of the alkanoic acid esters have been reported to show antimicrobial activities such as antibacterial, antiviral and antifungal activities.

RECOMMENDATION

This research will be useful to all the communities, Pharmacological industries and traditionalists using this plant since they will be the first beneficiaries. It will create awareness to local communities to enhance the traditional knowledge with scientific findings. It will be useful to pharmaceutical companies for them to appreciate the benefits the local users and most communities will be exposed to and the need to gives adequate orientation and advice on planting of the plant. However further work will be necessary to clearly elucidate the mechanism of action of these extracts and hence project the plant as a therapeutic target in control of disease.

AUTHOR'S CONTRIBUTIONS

Author FSO conceived the idea, managed literature search, wrote the initial draft and managed correspondence. Authors SOJ, AAE, TSA, OOE, GAO and DAA proofread the manuscript and corrected tenses. All authors read and approved the final manuscript.

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