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The medicinal qualities of the Bioactive compounds in Garcinia kola

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ABSTRACT:The chemical composition and biological activities of Garcinia kola leaf were investigated since it have long been used for the treatment of various ailments like cough, dysentery, respiratory tract infections, parasitic skin diseases, indigestion, pneumonia, cirrhosis of the liver and hepatitis. Therefore this work focused on identifying the bioactive compounds in Garcinia kola. Fresh Garcinia kola was washed with distilled water and dried in an oven at the temperature of 50^{O}C for 10 hours. The dried sample was then crushed with mortar and pestle to powdery form and soaked in 1000mLs of 96% ethanol in a plastic container and covered. The mixture was shaken intermittently for 48 hours after which it was filtered. The crude extract was recovered by heating the mixture in a water bath to evaporate the ethanol. Column chromatography was used to separate the crude extract into various eluates using a mixture of n-hexane and ethyl acetate as eluent. The various eluates collected were subjected to GC-MS analysis to determine the library identities of the bioactive compounds in them. The results obtained showed that it contains the following bioactive compounds: Beta pinene, Beta-myrcene, Thymol, Squalene, 11-Tricosene, cis-10-Nonadecenoic acid, Ethyl Oleate, Methyl stearate, 2,4-Di-tert-butylphenol, 14-Octadecenoic acid methyl ester and etc. Garcinia kola owes its anti-inflammatory, antitumor and anticancer properties to phenolic compounds in it.

KEYWORDS:Garcinia kola, anti-inflammatory, phenolic compounds

I. INTRODUCTION

Medicinal plants have for centuries contributed largely to human health and have made available a lot of information that has aided in the development of new drugs. A lot of research has gone into the bioactive compounds in several medicinal plants in search of new drugs that can be used to cure new diseases. Secondary metabolites in medicinal plants have been shown to confer pharmacological effectiveness to them.Garcinia kola is a species of flowering plants which grows in tropical climates across Western Africa, Asia, and Australia. Garcinia kola has a distinct bitter taste-hence its common name “bitter kola” and also its common name “male kola” because of its claimed aphrodisiac activity [1,2].

The seeds of bitter cola is being used to treat diseases such as cough, dysentery, and respiratory tract infections. The stem bark of bitter cola is a purgative. The powdered bark is applied to malignant tumors, used cutaneously because it will have a more direct contact with the target site of action.. The sap is used for curing parasitic skin diseases. The gummy sap of garcinia cola is used internally against gonorrhea. The seeds can treat indigestion, pneumonia, cough, Cirrhosis of the liver and hepatitis. Among the important constituents of Garcinia Kola are flavonoids having anti-inflammatory and antioxidant properties. The bitterness and microbial actions were suspected to be as a result of the presence of some phenolic compounds [3].

Several findings of chemotherapeutic potentials of plants have shown that they can be sources of antimicrobial compounds of value and a typical example of such plant is Garcinia kola. Presently, there are global problems of antibiotic resistance to infections coupled with the emergence of new and re-emerging diseases. There is also a belief that use of plants for medicinal purposes has been associated with fewer side effects. There is

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therefore a need to do more research on the bioactive compounds in Biter kola (Garcinia kola) extract to know its medicinal uses and properties [4,5].

This research work will enable us to get more insight on the importance and relevance of Bitter kola (Garcinia kola), its uses, medicinal properties and applications thereby reducing some health issues. This study is based on the analysis of all the bioactive compounds of Bitter kola extract using Fourier-transform infrared spectroscopy and Gas chromatography-Mass spectrometer

II. EXPERIMENTAL

500 grams of Garcinia kola was washed with distilled water and dried in an oven at the temperature of 50^{O}C for 5hours. The dried samples was then crushed with mortar and pestle to powdery form and soaked in 1000mLs of 96% ethanol in a plastic container and covered. The mixture was agitated hourly for 3days after which it was filtered using muslin cloth followed by filtration by whatman No 1 filter paper. The extract was heated in a water bath to evaporate the ethanol and recover the crude extract [6]. The slide for thin layer chromatography was prepared by mixing silica gel and ethanol using mortar and pestle and poured on two glass slides. The slides was dried in an oven at 80^{O}C. The crude extract was dropped on the thin layer chromatography slide and dipped into the beaker containing the mixture of N-Hexane, chloroform and ethyl-acetate with the side containing the drop of crude extract above the reagent. The second slide with the drop of the sample crude extract was dipped into a beaker containing a mixture of n-Hexane and chloroform. Silica gel, crude extract of the sample and N-Hexane was mixed together in a mortar with pestle.

The mixture was then dried in an oven at 63^{O}C. The column burette was clamped to a retort stand. The prepared dried sample powder was filled into the column burette and connected to a vacuum pump. The N-Hexane was poured into the burette and the N-Hexane fraction collected in a conical flask. Afterwards chloroform was poured into the sample in the column burette and the chloroform fraction collected in another conical flask. Lastly, the ethyl-acetate was poured and the ethyl-acetate fraction was also collected in a separate conical flask [7]. The eluates were separately concentrated in a rotary evaporator connected to the vacuum pump at temperature of 70^{O}C.The eluates were subjected to GC-MS analysis.

III. RESULTS AND DISCUSSION

From the GC-MS analysis of the first eluate of bitter kola extract beta pinene was found. Beta pinene is known to possess antibiotic resistance modulation, anticoagulant, antitumor, antimicrobial, antimalarial, antioxidant, and anti-inflammatory potentials. This supports other findings that attributed the microbial properties of Garcinia kola to its bioactive contents. Beta-myrcene was also found in bitter kola and this bioactive compound is (7-methyl-3-methylene-1,6-octadiene) known to have neuro-behavioural activity as well as antioxidant properties which is accountable for the prevention of degenerative diseases such as atherosclerosis, cardiovascular diseases, cancer, diabetes and neurological illnesses [8].

The FT-IR analysis confirmed ten functional groups that include: 1,2,4-trisubstituted, sulfoxide, aromatic ester, conjugated alkene, allene, alkane, amine salt, carboxylic acid, Aliphatic primary amine, and alcohol. GC-MS analysis shows the sample contains five bioactive chemicals which include; β-pinene, β-myrcene, thymol, aromadendrene and squalene. From this study, it can be affirmed that composition of Garcinia kola has a role in its therapeutic and pharmaceutical qualities.

Table 1: Library IDs of the GC-MS analysis of Garcinia kolaExtract

Beta pinene
Beta-myrcene
Thymol
Squalene
11-Tricosene
cis-10-Nonadecenoic acid
Ethyl Oleate
Methyl stearate
2,4-Di-tert-butylphenol
14-Octadecenoic acid methyl ester
3,6,6-trimethyl-1-p Indazol-4-one
Cycloeicosane
Aromadendrene

Oxalic acid
Cyclohexanol
1-Hexacosene
Diisooctyl phthalate

IV. CONCLUSION

The bioactive compounds in bitter cola improves digestion by relaxing smooth muscles, prevents menstrual cramps, and attenuates respiratory problems. The presence of thymol in bitter kola could be responsible for the effect of the traditional use of bitter kola in easing menstrual pain. Aromadendrene belong to a class of sesquiterpenes, structurally characterized by a dimethyl cyclopropane ring fused to a hydroazulene skeleton. It has an effect on the body's endocrine system. Squalene is a known cardioprotector, antioxidant, antibacterial and antifungal, anticancer and detoxifying agent. This compound might be responsible for the efficacy of bitter kola as a treatment for hypertension by traditional medicine practitioners [9].

The design and synthesis of novel drug structures are carried out to increase activity, to reduce side-effects, and to provide easy and efficient methods of administration. The structural modifications used to improve the quality of the synthesized drug include: variation of substituents, extension of the structure, chain extensions or contractions, ring expansions or contractions, ring variations, simplification of the structure and rigidification of the structure. All these activities are carried out to improve the quality of the initial natural, medicinal plant. In addition, some researchers argue that natural herbal drugs have fewer side effects and strengthens the immune system, besides being cheaper to obtain and more available.

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