GC MS ANALYSIS OF UNRIPE FRUITS OF *ARTOCARPUS HETEROPHYLLUS* GROWING IN KANYAKUMARI DISTRICT

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ABSTRACT

Herbal medicines are derived from plants or some other natural sources. Plant kingdom is an unlimited resource of extra ordinary variety of compounds which are commonly called as primary and secondary metabolites. Their importance in making medicinal drugs flavours and industrial materials on commercial scale is well established. The use of plants as medicines is a valuable source in human history The phytochemical constituents of methanol extract of *Artocarpus heterophyllus* fruit revealed by GC MS depicts its importance as an anti oxidant, anti microbial, anti cancer activity etc. Traditionally used medicinal plants have recently attracted the attention of the biological scientific communities. This has involved the isolation and identification of secondary metabolites and their use as active principles in medicinal preparations

INTRODUCTION

Plants have been identified and used throughout human history. Plants has the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions and to defend against attack from predators such as insects, fungi and herbivores mammals. Chemical compounds in plants mediate their effects on the human body through identical processes. This enables herbal medicines to be as effective as conventional medicines. Even with the advent of modern or allopathic medicine (Balick and Cox, 1996) have noted that the number of important modern drugs have been derived from plants used by indigenous people. Traditional use of medicine is recognized as a way to learn about potential future medicines which were derived from ethno medical plant sources (Fabricant and Farnsworth, 2001). Plants are used in different countries as a source of many potent and powerful drugs (Srivastava *et al*., 1996, Mahesh and Sathish, 2008). Very few compounds exist pure in nature. They must be extracted and then purified and if not extractable they need to be synthesized. Plants are used medicinally in different countries and they are the source of many potent and powerful drugs. Plants have been an important source of medicine with qualities for thousands of years. Gas chromatography Mass spectroscopy, a hyphenated system which is a very compatible technique and the most commonly used technique for the identification and quantification purposes. The unknown organic compounds in a complex mixture can be determined by interpretation and also by matching the spectra with reference spectra Theivasanthi *et al*., 2012).

Artocarpus heterophyllus belong to genus *Artocarpus* and family Moraceae which is also referred to as Mulberry family or fig family which an integral parts of common diet and are freely available in Indian and adjoining continents. The generic name of the species comes from the Greek word "artos" means bread

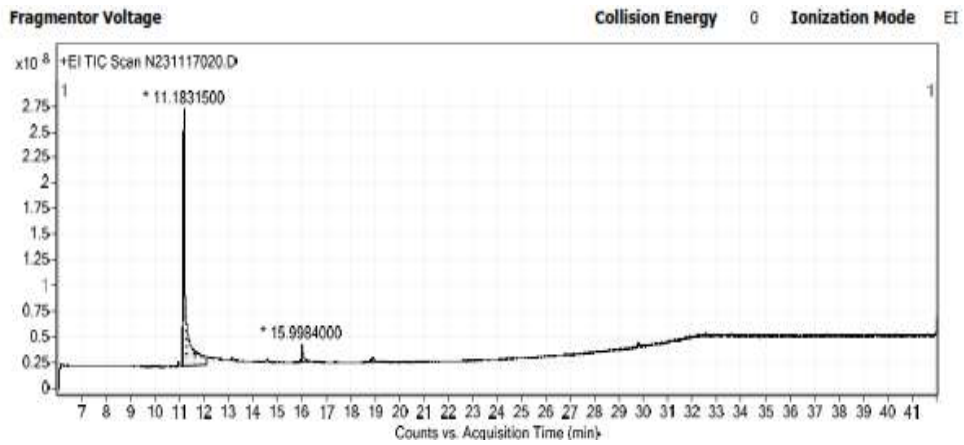
and "karpos" means fruit. Most are wide spread in tropical and sub tropical regions. *Artocarpus heterophyllus* is native to parts of South and Southeast Asia. Literature reveals that lot of pharmacological investigations have been carried on Artocarpus species (Naira 2013). The reported pharmacological uses are, the leaves of Jackfruit tree are used to treat fever, boils, ulcers, wounds and skin diseases. When heated, they prove useful in curing wounds. The seeds of *Artocarpus heterophyllus* are useful in relieving biliousness, while the roasted seeds are aphrodiasic. The roots of the plant are used to treat asthma, fever and diarrhea. The latex of the fruit is helpful in treating dysopia, opthalmities and pharyngitis. The latex can also mix with vinegar to heal abscesses, snake bites and glandular swellings. The wood of Jackfruit tree is used in manufacturing musical instruments, furniture, doors, windows and roof constructions. To heal ulcers, the ash of Jackfruit is burnt with corn and coconut oil is used. This plant has been extensively used in herbal medicine in many tropical and some subtropical countries.

MATERIALS AND METHODS (Bagavathi and Ramasamy, 2012)

GC-MS analysis of the methanol extract of *Artocarpus heterophyllus* was performed using a Perkin-Elmer GC Clarus 500 system comprising an AOC-20l auto sample and a gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite 5MS (5% biphenyl /95% dimethyl poly siloxance) fused a capillary column (30X0.25mm 1D X 0.25mm df). For GC-MS detection, an electron ionization system was operated in electron impact mode with ionization energy of 70ev. Helium gas (99.999%) was used as a carrier gas at a constant flow rate of 1ml/min, and an injection volume of 2ml was employed. The injector temperature was maintained at 200^{o}C, the ion source temperature was 200^{o}C, the oven temperature was programmed from 110^{o}C (isothermal for 2min), with an increase of 10^{o}C/min to 200^{o}C, then 5^{o}C/min to 280^{o}C, ending with a 9min isothermal at 280^{o}C. Mass spectra were taken at 70ev, a scan interval of 0.5S and fragments from 45 to 450 Da. The solvent delay was 0 to 2 min, and the total GC/MS running time was 36 min. The relative parentage amount of each component was calculated by comparing its average peak area to the total areas. The mass detector used in this analysis was Turbo Mass Gold Perkin Elmer, and the software adopted to handle mass spectra and chromatograms was a Turbo Mass Ver-5.2.

RESULTS AND DISCUSSION

GC MS chromatogram of the phytocomponents present in the methanol unripe fruit extract of *Artocarpus heterophyllus* was analyzed. The mass spectrum and structure of phytocomponents were also identified. Table 2 shows the molecular formula and molecular weight of the compound identified. The first compound Cis-9-Octadecenoic acid has the molecular formula of $C_{18}H_{34}O_2$ with molecular weight of 282.468 g/mol. Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester has a molecular formula of $C_{35}H_{68}O_5$ and molecular weight 568.91 g/mol. 2,4,6,8,10-Tetradecapentaenoic acid, 9a-(acetyloxy)-1a,1b,4,4a,5,7a,7b,8,9,9a-decahydro-4a,7b-dihydroxy-3-(hydroxymethyl)-1,1,6,8-tetr has a molecular formula of $C_{36}H_{46}O_8$ with molecular weight 606.756 g/mol.



GCMS profile of methanolic unripe fruit extract of *Artocarpus heterophyllus*

Structure of Cis-9-Octadecenoic acid

The bioactive compounds present in *Artocarpus heterophyllus* was isolated by preparing methanolic extract of unripe fruits in methanol chloroform solvent (9:1) ratio and subjected to column chromatography. From Column chromatography of methanolic extract of unripe fruits from *Artocarpus heterophyllus* 9 fraction were produced. These 9 fraction were subjected to TLC and single spot was identified at Rf = 0.63. This was the active fraction 7. This spot was eluted and subjected to GC MS analysis and it showed the presence of Cis-9-Octadecenoic acid, hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester and 2,4,6,8,10-Tetradecapentaenoic acid, 9a-(acetyloxy)-1a,1b,4,4a,5,7a,7b,8,9,9a-decahydro-4a,7b-dihydroxy-3-(hydroxymethyl)-1,1,6,8-tetr. Among the three compounds identified, Cis-9-Octadecenoic acid showed maximum peak area (100%) with the retention time (Rt) of 11.18 min and is followed by Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester with the peak area of 5.33% at 15.99 min retention time and 2,4,6,8,10-Tetradecapentaenoic acid, 9a-(acetyloxy)-1a,1b,4,4a,5,7a,7b,8,9,9a-decahydro-4a,7b-dihydroxy-3-(hydroxymethyl)-1,1,6,8-tetr with the peak area 2.86% at 18.89 min Rt. The molecular formula, molecular weight, boiling point, melting point, skeletal formula and 3D structure were interpreted using NMR. Cis-9-Octadecenoic acid is a monounsaturated fatty acid; $C_{18}H_{34}O_2$found naturally in many plant sources and in animal products and is commonly known as omega-9 fatty acid. Omega-nine fatty acid is considered to be one of the healthier sources of fat in the diet. Fatty acids are converted to energy through the process called fatty acid oxidation in liver cells and are used as basic building blocks of biological membranes, for long-term energy storage (the major components of triglycerides) as well as for the precursors of eicosanoid hormones. It's commonly used as a replacement for animal fat sources that are high in saturated fat. The term oleic means related to, or derived from, oil or olive. As a fat, Cis-9-Octadecenoic acid is one of the better ones to consume. As a replacement for other saturated fats, it can lower total cholesterol level and raise levels of high-density lipoproteins (HDLs) while lowering low-density lipoproteins (LDLs), also known as the "bad" cholesterol. Usually switching to oil high in Cis-9-Octadecenoic acid is not difficult since there are numerous sources available. From a health standpoint, Cis-9-Octadecenoic acid exhibits further benefits. It has been shown to slow the development of heart disease, and promotes the production of antioxidants (Russel, 1991).

Cis-9-Octadecenoic acid is a compound with maximum activity which exhibits, antioxidant property, reduces blood pressure, helps to burn fat, prevent ulcerative colitis, alleviates type 2 diabetes, promotes brain function, enhances memory and also as a best anticancer property mainly suppress the activity of breast cancer causing genes. All these compounds found in the unripe fruit extract of *Artocarpus heterophyllus* which are being used for pharmacological work. The molecular formula and molecular weight of the compound identified. The first compound Cis-9-Octadecenoic acid has the molecular formula of $C_{18}H_{34}O_2$ with molecular weight of 282.468 g/mol. Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester has a molecular formula of $C_{35}H_{68}O_5$ and molecular weight 568.91 g/mol. 2,4,6,8,10-Tetradecapentaenoic acid, 9a-(acetyloxy)-1a,1b,4,4a,5,7a,7b,8,9,9a-decahydro-4a,7b-dihydroxy-3-(hydroxymethyl)-1,1,6,8-tetr has a molecular formula of $C_{36}H_{46}O_8$ with molecular weight 606.756 g/mol.

CONCLUSION

A number of *Artocarpus* species are used as traditional medicine in Asia. They contain medically important secondary metabolites possessing useful biological activities. The medicinal actions of plants are unique to particular species. Therefore it is worthwhile to use modern tools for verifying therapeutic potential of *Artocarpus heterophyllus* fruit. Based on the arena of research data and review this study was taken to investigate phytochemical analysis fruit extract present in this plant which is known to have pharmacological importance. Plants are natural reservoirs of several phytonutrients and compounds which are inevitable and essential in life in general. The phytochemical constituents of methanol extract of *Artocarpus heterophyllus* unripe fruits revealed by GC MS depicts its importance in anti oxidant, anti microbial, anti cancer activity etc. Traditionally used medicinal plants have recently attracted the attention of the biological scientific communities.

ACKNOWLEDGMENT

The present work throws light into a tropical fruit which has great relevance today due to its high nutrition and medicinal value. Moreover being the common man's fruit, bringing out the medicinal importance of this fruits will be a boon in the percent day of antibiotic tolerant microorganisms and is a promising candidate for futuristic anticancer drug development.

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