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ANALYSIS OF BIOACTIVE COMPOUNDS IN DIFFERENT STAGES OF *Mangifera indica L* KERNELS EXTRACT

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ABSTRACT

The phytochemical characters of the *M. indica* kernel investigated in stage I, II and III. The qualitative analysis showed that the presence of flavonoids, polyphenol, steroids, tannin, saponins, glycosides, alkaloids, terpenoids, triterpenoids and carbohydrate were present in all the stages of *M. indica* kernel while amino acid was absent in stage I only. The quantitative analysis was indicated that Total Phenol was 165.12, 172.45 and 193.88mg/gm for stage I, II and III respectively, Flavonoid was 58.99, 72.56 and 96.54 mg/gm for stage I, II and III respectively, Terpenoids was 15.0, 28.45 and 37.23 mg/gm for stage I, II and III respectively. Among the various stages, stage III shows the rich content of phytochemicals.

Keywords: *M. indica* kernel, Phytochemical,

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INTRODUCTION

Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. Plant produces these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases. There are many phytochemicals fruits and herbs and each works differently (Arora et al., 1998). The plant kingdom is a rich source of potential drugs. In India, medicinal plants are widely used by all sections of the population, either directly in different indigenous systems of medicine or indirectly in the pharmaceutical preparations of modern medicine. Research on natural resources has been encouraged by the World Health Organization since 1978. and Halliwell, 1996).

Most of the medicinal plants contain a number of chemical constituents such as flavonoids, alkaloids, tannins, saponins, steroids, terpenoids, rotenoids etc. The phytochemical screening of the plants is a preliminary for verification and then these plants may be utilized as new sources of herbal drugs (BNF, 2003). Phytochemicals are a field of increasing attention, both in science and in commerce. As is now generally recognized, many plant compounds and pigments have effects on animals and human beings. There is a great effort now to study and understand at a fundamental level and significant health effects of these compounds. This field is maturing and the health effects of these compounds are now getting the careful study they warrant at both a chemical and a molecular biological level. Identifying bioactive compounds and establishing their health effects are active areas of scientific inquiry. Phytochemicals are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for humans (Hasler and Blumberg,1999). They protect plants from disease and damage and contribute to the plant's color, aroma and flavor. In general, the plant chemicals that protect plant cells from environmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack are called as phytochemicals (Gibson et al., 1998: Mathai, 2000).

The mineral elements are separate entities from the other essential nutrients like proteins, fats, carbohydrates, and vitamins. Animal husbandry had demonstrated the need for minerals in the diet. In this century, biological assay methods clarified the significance and importance of mineral elements for human and animal nutrition and modern analytical techniques led to the detection of trace elements as essential nutrients and this is still an active area of current research. Micronutrient deficiencies are a major public health problem in many developing countries, with infants and pregnant women especially at risk (Batra and Seth, 2002). Infants deserve extra concern because they need adequate micronutrients to maintain normal growth and development. The micronutrient deficiencies which are of greatest public health significance are iron deficiency, causing varying degrees of impairment in cognitive performance, lowered work capacity, lowered immunity to infections, pregnancy complications e.g. babies with low birth weight, poor learning capacity and reduced psychomotor skills (Batra and Seth, 2002).

Recently, it is clearly known that they have roles in the protection of human health, when their dietary intake is significant. More than 4,000 phytochemicals have been cataloged and are classified by protective function, physical characteristics and chemical characteristics and About 150 phytochemicals have been studied in detail. Since there is no report on the phytoconstituents of methanolic fraction of Furcreaea foetida flower extract it was chosen as the subject of this study. Keeping in view, in the preset study to investigate the phytochemcal *M. indica* kernel

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MATERIALS AND METHODS

Collection of plant materials

The different stages (Stage I, II and III) of *M. indica* L. Kermel (Plate-3.1) were collected from Poyyundarkottai, (Plate-3.2) Thanjavur District, Tamilnadu, India. The collected plant species was carefully identified with the help of the Flora of Tamilnadu Carnatic by Mathew K.M (1983). The Kermal were identified and authenticated by Dr. M. Jegadeesan, Department of Environmental and Herbal science, Tamil University, Thanjavur, Tamil Nadu, India. A voucher specimen has been deposited at the Herbarium, Tamil University, Thanjavur, Tamilnadu, India, for future reference.

Preparation of kernel powder

Mango fruits were collected in tree different stages of growth, seeds extracked and cracked to obtain the kernels. The kernel were washed several times with distilled water to remove the traces of impurities from the kernels. Then examined carefully old, infected and fungus damaged portion of the kernel were removed. Healthy kernel were spread out in a plain paper and shade dried at room temperature for about 10 days. The kernels were then ground in a food grinder to reduce the particle size to a maximum diameter of 500 mm as measured by a sieve, sealed in a plastic container and stored in a refrigerator until extractions.

Preliminary phytochemicals screening

Chemical tests were carried out on the alcoholic extract using standard procedures to identify the preliminary phytochemical screening following the methodology of Harborne (1973), Trease and Evans (1989) and Sofowara (1993).

RESULTS AND DISCUSSION

Phyto is the Greek word for plant. There are many families of phytochemicals and they help the human body in the variety of ways. Phytochemicals may protect human from a host of diseases.

Phytochemicals are known as secondary plant metabolites and have biological properties such as antioxidant activity, antimicrobial effect, modulation of detoxification enzymes, stimulation of the immune system, decrease of platelet aggregation and modulation of hormone metabolism and anticancer property. There are more than thousand known and many unknown phytochemicals. It is well-known that plants produce these chemicals to protect themselves, but recent researches demonstrate that many phytochemicals can also protect human against diseases (Narasinga,2003).

An assessment of the previous trends and impact of research into the phytochemistry on medicinal plants of the world is quite desirable before considering recent trends. After centuries of empirical use of herbal preparation, the first isolation of active principles alkaloids such as morphine, strychnine, quinine etc. in the early 19th century marked a new era in the use of medicinal plants and the beginning of modern medicinal plants research. Emphasis shifted away from plant derived drugs with the tremendous development of synthetic pharmaceutical chemistry and microbial fermentation after 1945. Plant metabolites were mainly investigated from a phytochemical and chemotaxonomic viewpoint during this period. Over the last decade, however, interest in drugs of plant and probably animal origin has grown steadily (Hamburger and Hostettmann, 1991).

Utilization of medicinal plants has almost doubled in Western Europe during that period. Ecological awareness, the efficacy of a good number of phytopharmaceutical preparations, such as ginkgo, garlic or valerian and increased interest of major pharmaceutical companies in higher medicinal plants as sources for new lead structures has been the main reasons for this renewal of interest. With the development of chemical science and pharmacognosy physicians began to extract chemical products from medicinal plants. A few examples of the products extracted from medicinal plants are - in 1920, quinine was isolated from Cinchona by the French pharmacist, Peletier & Caventou. In the mid-nineteenth century, a German chemist, Hoffmann obtained Aspirin from the bark of the willow. With the active principles in medicinal plants identified and isolated, plant-based prescriptions began to be substituted more and more with pure substances, which were more powerful and easier to prescribe and administer (Harvey, 2000).

Phytomedicine almost went into extinction during the first half of the 21st century due to the use of the 'more powerful and potent synthetic drug'. However, because of the numerous side effects of these drugs, the value of medicinal plants is being rediscovered as some of them have proved to be as effective as synthetic medicines with fewer or no side effects and contraindications. It has been proved that although the effects of natural remedies may seem slower, the results are sometimes better on the long run especially in chronic diseases.

Secondary metabolites are reported to have many biological and therapeutic properties. Pharmacists are interested in these compounds because of their therapeutic performance and low toxicity (Inayatullah et al., 2012). On the basis of therapeutic potential of secondary metabolites, the phytochemical characters of the M. indica kernel investigated in stage I, II and III (Table 1). The qualitative analysis showed that the presence of flavonoids, polyphenol, steroids, tannin, saponins, glycosides, alkaloids, terpenoids, triterpenoids and carbohydrate were present in all the stages of M. indica kernel while amino acid was absent in stage I only. The quantitative analysis was indicated that Total Phenol was 165.12, 172.45 and 193.88mg/gm for stage I, II and III respectively, Flavonoid was 58.99, 72.56 and 96.54 mg/gm for stage I, II and III respectively, Terpenoids was 15.0, 28.45 and 37.23 mg/gm for stage I, II and III respectively (Table 2). Among the various stages, stage III shows the rich content of phytochemicals.

Flavonoids are a group of polyphenolic compounds with known properties which include free radical scavenging, inhibition of hydrolytic and oxidative enzymes and anti-inflammatory action. Flavonoids are 15 carbon compounds generally distributed throughout the plant kingdoms. Some isoflavones widely used in insecticides. They might also play a role in disease resistance. Some flavonoids such as quercetin and rutin, are known to support human health by serving anti-inflamatory, anti-histaminic and anti-viral agents (Okwu, 2004). Flavonoid compounds exhibit inhibitory effects against multiple viruses. Numerous studies have documented the effectiveness of flavonoids, such as glycyrrhizin and chrysin (Duraipandiyan *et al*., 2006) against HIV. Flavonoids are potent water soluble antioxidants and free radical scavengers which prevent oxidative cell damage and have strong anticancer activity (Del-Rioa *et al.*, 1997). Flavonoids have been referred to as nature's biological response modifiers, because of inherent ability to modify the body's reaction to allergies and virus and the showed their anti-allergic,

anti-inflammatory, anti-microbial and anti-cancer activities (Duraipandiyan *et al.,* 2006).

It has been recognized that alkaloids and flavonoids shows antioxidant property and their effects on human nutrition and healthcare are considerable. Flavonoids also known as nature's tender drugs possess numerous biological and pharmacological activities. The anti-inflammatory capacity of flavanoids has been long utilized in Chinese medicine and the cosmetic industry as a form of crud plant extracts (Duraipandiyan *et al.,* 2006). Anthroquinones possess antiparastic, bacteriostatic, antidepressant and antimicrobial and antioxidant activities. Their potential effects against cancer through different mechanisms have been studied. Many human Physicological activities such as stimulation of phagocytic cell host mediated tumour activity and a wide range of anti-infective actions have been assigned to tannins. Tannins have stringent properties, hastening of wounds and inflamed mucous membrane. Tannins are responsible for colour changes in food (Agoha, 1974).

Alkaloids have been indicated as a starting material in the manufacture of steroidal drug. Pure isolated alkaloids and their synthetic derivatives are used as basic medicinal agents for their analgesic, antispasmodic and bactericidal effects. They exhibited marked physicological activity when administered to animals (Okwu, 2004). Alkaloids have established broad spectrum antibacterial activity and are also used as analgesics and narcotics for pain relief. Alkaloids are very important in medicine and constitute most of the valuable drug. They have marked physicological effect in animals (Edeoga *et al.,* 2006).

CONCLUSION

The results of this study clearly indicate that preliminary The qualitative analysis showed that the presence of flavonoids, polyphenol, steroids, tannin, saponins, glycosides, alkaloids, terpenoids, triterpenoids and carbohydrate were present in all the stages of *M. indica* kernel while amino acid was absent in stage I only. The quantitative analysis was indicated that Total Phenol was 165.12, 172.45 and 193.88mg/gm for stage I, II and III respectively, Flavonoid was 58.99, 72.56 and 96.54 mg/gm for stage I, II and III respectively, Terpenoids was 15.0, 28.45 and 37.23 mg/gm for stage I, II and III respectively (Table 4.2). Among the various stages, stage III shows the rich content of phytochemicals. Supplementation of this *M. indica* kernel may be useful for human health associated emerging diseases such as cardiovascular diseases, diabetes, hypertension and cancer.

Table 1 Qualitative phytochemical analysis of different stages of *M. indica* kernel

S.No	Phytochemicals	Stage -I	Stage -II	Stage -III
1.	Tannin	+++	+++	+++
2.	Saponin	+++	+++	+++
3.	Flavonoids	++	++	+
4.	Steroids	++	+++	++
5.	Terpenoids	+++	+++	+++
6.	Alkaloids	+	+	+
7.	Carbohydrate	++	++	++
8.	Anthroquinone	+++	+++	+++
9.	Polyphenol	++	++	+++
10.	Phlobatannins	+++	+++	++
11.	Amino acid	_	+++	+++
12.	Glycoside	++	++	+++
13.	Triterpenoids	+++	+++	+++

Present (+), highly present (++ & +++) and absent (-)

Table 2 Quantitative analysis of different stages of *M. indica* kernel

	Stage –I (mg/ml)	**Stage –II** (mg/ml)	**Stage –III** (mg/ml)
Total Phenol	165.12 ±11.55	172.45 ±12.35	193.88 ±14.32
Flavonoids	58.99±3.53	72.56±4.67	96.54±6.23
Terpenoids	15.0±0.78	28.45±1.52	37.23±2.30

Values are expressed as Mean ± SD for triplicates

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