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PHARMACOLOGICAL ACTIVITY OF MUCILAGE ISOLATED FROM MEDICINAL PLANTS

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I. INTRODUCTION

Medicinal plants have played an essential role in the development of human culture, for example religions and different ceremonies. Many of the modern medicines are produced indirectly from medicinal plants, for example Aspirin. Plants are directly used as medicines by a majority of cultures around the world, for example Chinese medicine and Indian medicine. Medicinal plants are resources of new drugs. It is estimated that there are more than 250, 000 flowering plant species. Studying medicinal plants helps to understand plant toxicity, protect human and animals from natural poisons.

Diabetes mellitus is a major disease characterized by de arrangement in carbohydrate, fat and protein metabolism, affecting nearly 10% of the population. In the recent past many hypoglycemic agents are introduced, still the Diabetes and the related complications continue to be a major medical problem not only in developed countries but also in developing countries. Many Indian medicinal plants are reported to be useful in diabetes.

A study of ancient literature indicates that diabetes (Madhumeha) was fairly well known and well conceived as an entity in India. The knowledge of the system of Diabetes mellitus, as the history reveals, existed with the Indians since prehistoric age. 'Madhumeha' is a disease in which a patient passes sweet urine and exhibits sweetness all over the body, (ie.). in sweat, mucus, breathe, blood, etc (Rajeev Kumar Jha, *et al.*, 2010).

Diabetes mellitus is wide spread disorder, which has long been in the history of medicine. Before the advent of insulin and oral hypoglycemic drugs the major form of treatment involved the use of the plants. But now from the last two decades there has been a new trend in the preparation and marketing of herbal drugs. Further it has been estimated that in the U.S. 25% of all prescription dispensed from community pharmacies contain plant extracts.

Hyperglycemia or Diabetes mellitus is caused by inherited or acquired deficiency in production of insulin by the pancreas or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentration of glucose in the blood, which in turn damage many of the body systems in particular the blood vessels and nerves. Chronic hyperglycemia during diabetes causes glycation of body proteins that in turn lead to secondary complications effecting eyes, kidneys, nerves and arteries (Singh Ayodhya, 2010). Diabetes mellitus is a clinical syndrome characterized by inappropriate hyperglycemia caused by a relative or absolute deficiency of insulin or by a resistance to the action of insulin at the cellular level (Wadkar, *et al*., 2008).

Hypoglycemia or Diabetes mellitus and periodontal disease are among the most prevalent human disorders. Frequently these two medical problems are present concurrently in many people.

Diabetes mellitus is a disorder that affects the body's ability to make or use insulin. Insulin is a hormone produced in the pancreas that helps to transport glucose (blood sugar) from the bloodstream into the cells so they can break it down and use it for fuel. People cannot live without insulin (ADA,

2007).Diabetes results in abnormal levels of glucose in the bloodstream. This can cause severe short-term and long term consequences ranging from brain damage to amputations and heart disease (Samreen Riaz, 2007).

Antioxidant compounds in fruits play an important role, as a health protecting factor. Scientific evidence suggests that antioxidants reduce the risk for chronic diseases including cancer and heart disease. An antioxidant is a molecule that inhibits the oxidation of other molecules. Oxidation is a chemical reaction that transfers electrons or hydrogen from a substance to oxidizing agent Primary sources of naturally occurring antioxidants is whole grains, fruits and vegetables.

Plant source food antioxidants like vitamin C, vitamin E, carotenes, phenolic acids, phytate and Phytoestrogens have been recognized as having the potential to reduce disease risk. Most of the antioxidant compounds in a typical diet are derived from plant sources and belong to various classes of compounds with a wide variety of physical and chemical properties. Some compounds, such as gallates, have strong antioxidant activity, while others, such as the mono-phenols are weak antioxidants.

The main characteristic of an antioxidant is its ability to trap free radicals. Highly reactive free radicals and oxygen species are present in biological systems from a wide variety of sources. These free radicals may oxidize nucleic acids, proteins, lipids or DNA and can initiate degenerative disease. Antioxidant compounds like phenolic acids, polyphenols and flavonoids scavenge free radicals such as peroxide, hydro peroxide or lipidperoxyl and thus inhibit the oxidative mechanisms that lead to degenerative diseases.

There are a number of clinical studies suggesting that the antioxidants in fruits, vegetables, tea and red wine are the main factors for the observed efficacy of these foods in reducing the incidence of chronic diseases including heart disease and some cancers. The free radical scavenging activity of antioxidants in foods has been substantially investigated and reported in the literature by Miller and Rigelhof *et.al.*

Importance of Antioxidants

The most vitamins like C and E which in addition to selenium, are essential. In fact, a deficiency of any of these nutrients will lead to a deficiency syndrome and death. In addition to acting as antioxidants, vitamins C and E, carotenoids and various polyphenols also have other mechanisms of action, including anti-inflammation, induction of phase 2 detoxification enzymes, and modulation of redox-sensitive signal transduction and gene expression (*Nutrients*, 2010; 2:929-949).

High intakes of vitamin C-rich fruits and vegetables may lower one’s risk of some types of cancer, including lung, breast and colon cancers. Additionally, vitamins C and E, as part of a multi nutrient combination that also includes beta carotene and zinc oxide, may significantly reduce risk of developing advanced stages of age-related muscular degeneration (AMD) and vision loss.

Mucilage is a thick, gluey substance produced by nearly all plants and some microorganisms. It is a polar glycoprotein and an Exopolysaccharides. Mucilage in plants plays a role in the storage of water and food, seed germination, and thickening membranes. Cacti (and other succulents) and flax seeds especially are rich sources of mucilage.

Occurrence

Exopolysaccharides are the most stabilizing factor for micro aggregates and are widely distributed in soils. Therefore Exopolysaccharides-producing "soil algae" play a vital role in the ecology of the world's soils. The substance covers the outside of for example, unicellular or filamentous green algae and cyanobacteria. Amongst the green algae especially, the group Volvocales are known to produce Exopolysaccharides at a certain point in their life cycle. It occurs in almost all plants, but usually in small percentages. It is frequently associated with substances like tannins and alkaloids.

Mucilage has a unique purpose in some carnivorous plants. The plant genera *Drosera* (Sundews), *Pinguicula*, and others have leaves studded with mucilage-secreting glands, and use a "flypaper trap" to capture insects.

Human uses

Mucilage is edible. It is used in medicine for its demulcent properties. Traditionally marshmallows were made from the extract of the mucilaginous root of the marshmallow plant (*Althaea officinalis*); due to the demulcent nature of the extract, it served as a cough suppressant. The inner bark of the slippery elm (*Ulmus rubra*), a North American tree species, has long been used as a demulcent, and is still produced commercially for that purpose.

Mucilage mixed with water is used as a glue, especially for bonding paper items such as labels, postage stamps, and envelope flaps. Differing types and varying strengths of mucilage can also be used for other adhesive applications, including gluing labels to metal cans, wood to china, and leather to pasteboard.[1]

During the fermentation of natto soyabeans, extracellular enzymes produced by the bacterium *Bacillus natto* react with soyabean sugars to produce mucilage. The amount and viscosity of the mucilage are important natto characteristics, contributing to natto's unique taste an1d smell.

The mucilage of two kinds of insectivorous plants, sundew (*Drosera*) and butterwort (*Pinguicula*), is used for the traditional production of a yoghurt-like Swedish dairy product called filmjölk.

Medicine

Mucilage can be used in gastrointestinal inflammatory processes; associated to topical irritation agents. The mechanism of action is that mucilages cover the mucous membranes and prevent irritation of the nerve endings.

Plant sources

The following plants are known to contain far greater concentrations of mucilage than is typically found in most plants:

- *Aloe vera*
- *Basella alba* (Malabar spinach)
- Cactus
- *Chondrus crispus* (Irish moss)
- *Dioscorea opposita* (nagaimo, Chinese yam)
- *Drosera* (sundews)
- *Drosophyllum lusitanicum*
- Fenugreek
- Flax seeds
- Kelp
- Liquorice root
- Marshmallow
- Mallow
- Mullein
- Okra
- *Parthenium*
- *Pinguicula* (butterwort)
- *Psyllium* seed husks
- *Salvia hispanica* (chia) seed
- *Ulmus rubra* bark (slippery elm)

Description of the Experimental plant (*Hibiscus sabdaniffa - Kenaf*)

Kenaf [Etymology: Persian], *Hibiscus cannabinus*, is a plant in the Malvaceae family. *Hibiscus cannabinus* is in the genus *Hibiscus* and is probably native to southern Asia, though its exact natural origin is unknown. The name also applies to the fibre obtained from this plant. Kenaf is one of the allied fibers of jute and shows similar characteristics. They even prepare a kind of pickle with the leaves that lasts for one or two years. It is said to be rich in Iron.

It is an annual or biennial herbaceous plant (rarely a short-lived perennial) growing to 1.5-3.5 m tall with a woody base. The stems are 1–2 cm diameter, often but not always branched. The leaves are 10–15 cm long, variable in shape, with leaves near the base of the stems being deeply lobed with 3-7 lobes, while leaves near the top of the stem are shallowly lobed or unlobed lanceolate. The flowers are 8–15 cm diameter, white, yellow, or purple; when white or yellow, the centre is still dark purple. The fruit is a capsule 2 cm diameter, containing several seed.

Scientific Classification

Kingdom : Plantae
Order : Malvales
Family : Malvaceae
Genus : *Hibiscus*
Species : *Sabdariffa*

Medicinal uses

Kenaf seeds yield a vegetable oil that is edible with no toxins. The kenaf seed oil is also used for cosmetics, industrial lubricants and for biofuel production. Kenaf oil is high in omega polyunsaturated fatty acids (PUFAs) which are now known to help in keeping humans healthy. Kenaf seed oil contains a high percentage of linoleic acid (Omega-6) a polyunsaturated fatty acid (PUFA). Linoleic acid (C18:2) is the dominant PUFA, followed by oleic acid (C18:1). Alpha-linolenic acid (C18:3) is present in 2 to 4 percent. The PUFAs are essential fatty acids for normal growth and health. Furthermore, they are important for reducing cholesterol and heart diseases.

Kenaf Seed oil is 20.4% of the total seed weight which is similar to cotton seed. Kenaf Edible Seed Oil Contains:

- Palmitic acid: 19.1%
- Oleic acid: 28.0% (Omega-9)
- Linoleic acid: 45% (Omega-6)
- Stearic acid: 3.0%
- Alpha-linolenic acid: 3% (Omega-3)

II. SCOPE OF THE STUDY

Plants are directly used as medicines by a majority of cultures around the world, for example Chinese medicine and Indian medicine. Medicinal plants are resources of new drugs. It is estimated there are more than 250, 000 flowering plant species. Diabetes and the related complications continue to be a major medical problem not only in developed countries but also in developing countries. Many Indian medicinal plants are reported to be useful in diabetes. Antioxidant compounds in fruits play an important role, as a health protecting factor. Scientific evidence suggests that antioxidants reduce the risk for chronic diseases including cancer and heart disease.

Main objective of present study are,

- Collection of plant materials from *Hibiscus sabdariffa*
- Preparation of Extract using ethanol
- To screen phytochemical constituents by qualitatively.
- To evaluate the total antioxidant potentiality *by Invitro* method.

- To examine the *Invitro* antidiabetic activity by alpha amylase method.

III. REVIEW OF LITERATURE

The successful interspecific cross is reported for the first time between kenaf (Hibiscus cannabinus L.), a diploid species (2n=36) and roselle (Hibiscus sabdariffa L.), a tetraploid species (2n=72). Kenaf, grown for its bast fiber and also under investigation as a source of paper pulp, is fast-growing and well adapted to mechanical harvesting, but susceptible to root-knot nematodes. Roselle, also grown for its bast fiber, is slower growing, not well adapted to mechanical harvesting, but certain varieties are resistant to root-knot nematodes. Five hybrid plants were produced from the pollination of 4,445 flowers of kenaf with pollen from roselle; no hybrid plants were produced from 2,655 pollinations made in the reciprocal direction. One line of roselle was the parent of 3 of the 5 hybrids; one line of kenaf was the parent of 2 of these 3. The F1 hybrids were triploid, and varied in vigor, growth habit and vegetative morphology, but had similar flowers. Two of the F1 hybrids showed high pollen fertility, apparently as a result of restitution at first meiotic division leading to unreduced spores. These two hybrids each produced a small amount of seed, which gave rise to an F2 population of 22 plants. The F2 plants vary in vigor but are morphologically uniform, have thick leaves with mosaic sectors, and are presumably spontaneous allohexaploids. The theoretical possibilities of increasing the percentage of recovery of the F1 interspecific hybrids and of developing a synthesized hybrid variety useful for bast fiber and paper pulp are discussed (Wilson *et al.*, 1967).

A roselle (Hibiscus sabdariffa Linn.) tea extract was found to have high inhibitory activity against porcine pancreatic alpha-amylase. Hibiscus acid and its 6-methyl ester were respectively isolated as active principles from the 50% methanol and acetone extracts of roselle tea. The activity of each isolate was compared to that of structurally related citric acid, a previously known inhibitor of fungal alpha-amylase (Hansawasdi *et al.*, 2000).

The relation between antioxidant activity and anthocyanin was determined in Roselle (Hibiscus sabdariffa L.) petals. Petals from Roselle, cultivar F141, were collected and dried in Taitung, Taiwan. Roselle extract was prepared by extracting dried Roselle petals in boiling water. The relation between the anthocyanin color and antioxidant capacity was elucidated by comparing absorbance at 520 nm, with ferric reducing ability of plasma (FRAP), oxygen radical absorbance capacity (ORAC) and total antioxidant status (TAS) antioxidant assays. The results showed that the antioxidant capacity of Roselle extract increased when extraction time or weight of petals increased. The FRAP assay showed a linear relationship with anthocyanin as determined at 520 nm. Comparisons between FRAP and ORAC or FRAP and TAS assays gave a linear relation. These results suggest that anthocyanin is the major source of antioxidant capacity in Roselle extract. Further purification using Amberlite XAD-2 and HPLC indicated that anthocyanin and a brown pigment in the extract account for about 51 and 24% of the antioxidant capacity, respectively. Under different processing temperatures and storage periods, anthocyanin content declines. However, other phenolic compounds increase and overall there is only a relatively small decrease in total phenolic compounds and antioxidant activity (Pi-Jen Tsai *et al.*, 2002).

In order to compare the antihypertensive effectiveness and tolerability of a standardized extract from Hibiscus sabdariffa with captopril, a controlled and randomized clinical trial was done. Patients from 30 to 80 years old with diagnosed hypertension and without antihypertensive treatment for at least 1 month before were included. The experimental procedure consisted of the administration of an infusion prepared with 10 g of dry calyx from H. sabdariffa on 0.5 l water (9.6 mg anthocyanins content), daily before breakfast, or captopril 25 mg twice a day, for 4 weeks. The outcome variables were tolerability, therapeutic effectiveness (diastolic reduction X10 mm Hg) and, in the experimental group, urinary electrolytes modification. Ninety subjects were included, 15 withdrew from the study due to non-medical reasons; so, the analysis included 39 and 36 patients from the experimental and control group, respectively. The results showed that H. sabdariffa was able to decrease the systolic blood

pressure (BP) from 139.05 to 123.73 mm Hg (ANOVA po0:03) and the diastolic BP from 90.81 to 79.52 mm Hg (ANOVA po0:06). At the end of the study, there were no significant differences between the BP detected in both treatment groups (ANOVA p > 0:25). The rates of therapeutic effectiveness were 0.7895 and 0.8438 with H. sabdariffa and captopril, respectively (X2; p > 0:560), whilst the tolerability was 100% for both treatments. A natriuretic effect was observed with the experimental treatment. The obtained data confirm that the H. sabdariffa extract, standardized on 9.6 mg of total anthocyanins, and captopril 50 mg/day, did not show significant differences relative to hypotensive effect, antihypertensive effectiveness, and tolerability (Herrera-Arellanoa 2004).

The present study investigated the hypolipidemic and antioxidant effects of ethanolic extract of *Hibiscus sabdariffa* L (HSE) in rats treated with alloxan. The results were compared with the standard hypolipidemic drug lovastatin. HSE at doses of 100 and 200 mg/kg elicited dose-dependent effects on the biomarkers evaluated. In alloxan-treated rats, HSE at the dose of 200 mg/kg significantly attenuated the elevated blood glucose concentration by 57%. Lovastatin (10 mg/kg) similarly reduced the glucose level in alloxan-treated rats by 48%. HSE reduced the alloxan-induced increases in cholesterol, very low-density lipoprotein cholesterol (VLDL-C), low-density lipoprotein cholesterol (LDL-C) and atherogenic index by 29%, 36%, 40%, and 32%, respectively while lovastatin decreased the alloxan-induced increases in the parameters by 25%, 23%, 28%, and 31%, respectively. HSE (200 mg/kg) and lovastatin ($P < 0.01$) decreased the alloxan-induced increases in the lipid profiles both in the liver and the kidneys. HSE at 200 mg/kg attenuated the alloxan-induced decrease in the activities of superoxide dismutase (SOD), catalase (CAT) and the level of glutathione (GSH) by 36%, 44%, and 64% in the liver and by 20%, 43%, and 85% in the kidney of rats. Lovastatin similarly increased SOD, CAT and GSH by 32%, 29%, and 64% in the liver and by 17%, 26%, and 73% in the kidney of alloxan-treated rats. HSE (200 mg/kg) significantly decreased the alloxan-mediated increase in malondialdehyde (MDA) and protein carbonyl (PC) levels in the liver by 44% and 43% and in the kidneys by 45% and 38%, respectively, while lovastatin decreased the alloxan-induced elevation in MDA and PC in the liver by 42% and 41% and in the kidney by 45% and 33%, respectively. While HSE at a dose of 200 mg/kg and lovastatin normalized the activity of phosphatidate phosphohydrolase in the liver, the extract and lovastatin did not elicit significant changes in the kidney enzyme activity in rats treated with alloxan. Overall, our data demonstrate that HSE possesses strong hypolipidemic as well as antioxidant properties in alloxan-induced diabetic rats and as such *Hibiscus sabdariffa* could be useful in preventing the development of atherosclerosis and possible related cardiovascular pathologies associated with diabetes (Farombi, *et al.,* 2007).

Lipid peroxidation is becoming a popular biological marker of oxidative stress. Hibiscus sabdariffa has been reported to serve as a herbal remedy for various disease conditions, but studies on its antioxidant activity and the extent to which it acts remain scarce. The antioxidant activity of H. sabdariffa aqueous extracts, an indigenous herbal drink, was compared with that of ascorbic acid in Clarias gariepinus (African catfish) with ferrous sulphate-induced oxidative stress. Eye tissue and blood samples were collected for the assay of reduced glutathione, malondialdehyde, lipid hydroperoxide and glucose levels. Administration of H. sabdariffa aqueous extract (0.27 ml/kg body weight) resulted in a significant reduction ($p<0.05$) in glucose levels (75.48±10.87 mg/dl) as compared with ascorbic acid (88.06±4.44 mg/dl). It was also observed that the aqueous extract significantly reduced ($p<0.05$) the lipid hydroperoxide levels (1.66±2.24 nmol/ml) as compared with ascorbic acid (2.04±2.21 nmol/ml). The results obtained suggest that the H. sabdariffa aqueous extract possesses antioxidant potency comparable with that of ascorbic acid (Mowuogwu *et al.,* 2008).

To evaluate the α-amylase inhibitory activity of different extracts of Phyllanthus amarus against porcine pancreatic amylase in vitro.The plant extracts were prepared sequentially with ethanol, chloroform, and hexane. Each extract was evaporated using rotary evaporator, under reduced pressure. Different concentrations (10, 20, 40, 60, 80, and 100 µg/mL) of each extract were made by using

dimethyl sulfoxide (DMSO) and subjected to α-amylase inhibitory assay using starch azure as a substrate. The absorbance was read at 595 nm using spectrophotometer. Using this method, the percentage of α-amylase inhibitory activity and IC50values of each extract was calculated.The chloroform extract failed to inhibit α-amylase activity. However, the ethanol and hexane extracts of P. amarus exhibited appreciable α-amylase inhibitory activity with an IC50 values 36.05 ± 4.01 µg/mL and 48.92 ± 3.43 µg/mL, respectively, when compared with acarbose (IC50value 83.33 ± 0.34 µg/mL).This study supports the ayurvedic concept that ethanol and hexane extracts of P. amarus exhibit considerable α-amylase inhibitory activities. Further, this study supports its usage in ethnomedicines for management of diabetes (Iniyan G. Tamil *et al.*,2010)

Kenaf (Hibiscus cannabinus L.) was recently introduced in Malaysia as a crop to substitute tobacco under the East Coast Economic Region (ECER) program. As tobacco is widely planted on BRIS soil, there are challenges in establishing kenaf cultivation in those areas due to BRIS soil poor chemical, physical and microbiological characteristics. Over the years, charcoal has been proved to significantly enhances soil properties and increase plant growth. Its' recalcitrant characteristics is appropriate for tropical soil organic matter management. A study was conducted in Kg. Saujana, Setiu, Terengganu (05° 61393' N, 102° 73928' E) to assess kenaf response to charcoal and different rate of N fertilizer cultivated on BRIS soil. Five rates of N fertilizer (F1: 0, F2: 200, F3: 400, F4: 600, F5: 800 kg/ha) and four rates of charcoal (C1:0, C2: 5000, C3: 10000, C4: 15000 kg/ha) with five replications were established with Factorial Randomized Complete Blocked Design (RCBD) on Rudua series soil. The results showed that the application of charcoal have significant effects on soil CEC and exchangeable cations, kenaf yield and weekly plant heights and leaves length. The treatment of 10 t/ha charcoal + 400 kg/ha N fertilizer is recommended for increasing kenaf yield production on BRIS soils (Malisa *et al.*, 2011).

Morpho-agronomical characterization was done for 16 kenaf accessions from 4 different geographic origins to assess the variation and genetic relationships according to their origin. To evaluate their genetic relationships, correlation matrix with 13 quantitative traits were used for Principal Component Analysis (PCA) analysis, which produced three groups. Similar grouping pattern was obtained by clustering the accessions using the dissimilarity matrix of Ward's method. Clustering of the accessions with origin showed the association of genetic variability among the accessions with their source of origin. To evaluate the genetic variability among the accessions, fishers distance was calculated with significant p-value. The highest distance was observed among the accessions originated from Australia and China. Discriminant analysis with two major factors revealed that days of 50 % flowering and maturity may be the important traits to differentiate the accessions according to the origins. The late to middle flowering accessions from different origins can be used to grow high fibre yield producing kenaf in the tropical environment (Faruq Golam *et al.*, 2011).

To evaluate antidiabetic activity of methanolic extract of Hibiscus cannabinus; family Malvaceae leaves in streptozotocin induced diabetic rats. The alcoholic extract of Hibiscus cannabinus was studied for antidiabetic activity in streptozotocin induced diabetic rats by oral administration of extract 400mg/kg body weight for 15 days. The effect was compared with oral dose of 0.5mg/kg libenclamide. The determination of blood glucose level by GOD-POD kit method. The result shows the alcoholic extract of Hibiscus cannabinus leaves significantly lowered the blood glucose of hyperglycemic rats. From the toxicity study it was observed that methanolic extract of Hibiscus cannabinus was nontoxic up to 5g/kg body weight and phytochemical study showed the presence of phytosterols, flavonoids and glycosides. It is concluded that Hibiscus cannabinus leaf extract has significant antidiabetic activity, which lowered the fasting blood glucose level in Streptozotocin induced diabetic rats (Raj Kumar 2011).

The prevalence of diabetes mellitus is on the increase and needs to be addressed appropriately. In this study area, herbal remedies are considered convenient for management of diabetes with postprandial

hyperglycemia due to their traditional acceptability and availability, low costs, lesser side effects. In developing countries, where the per capita ncome is low, it is necessary to seek affordable alternative therapies. The little epidemiological evidence is available on the role of dietary antioxidant intake in prevention of type 2 diabetes. The present study concern about isolation of anti oxidant and α-amylase inhibitory constituents from methanolic extract of Asystasia dalzelliana leaves. The antioxidant activity is done using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) scavenging, Nitric Oxide Scavenging, reducing power methods and also screened for anti-amylase activity. Methanolic extract upon the column chromatography yielded five fractions named (AD-01, AD-02, AD-03, AD-04, and AD-05) and were screened for their anti-oxidant and α-amylase inhibitory activity (Satish Kumar *et al.*,2011).

More than 300 species of Hibiscus are grown over the world. It is an annual herbaceous shrub belonging to the family Malvaceae. Sudan is considered as the country in which Roselle originated, particularly in the Kordofan and Darfur areas. Roselle is known as karkade in the Sudan and other Arab countries. It is mainly grown for its fleshy calyx (sepals), which is the commercially valuable part of the plant. The color of the calyx plays an important role in determining the quality of karkade. The plant has some medicinal uses; in Europe, it is used in food preparation in sauces, jams, juices, jellies, syrups and flavoring, and as coloring agent for food and drinks. This paper is a review of the applications and production of roselle plants, and points out that roselle is a promising crop for medicinal uses, which is an aspect that has not been widely studied to date (Bahaeldeen Babiker Mohamed *et al.,* 2012).Diabetes mellitus contributes to male sexual dysfunction and infertility by modulating oxida- tive damage. To date, a number of studies have demonstrated antioxidant properties of Hibis- cus sabdariffa Linn. This study was designed to investigate the effects of H. sabdariffa UKMR-2 variety on sperm functioning of streptozotocin-induced diabetic rats. Male Sprague- Dawley rats were allotted into four groups, namely control group (C), H. sabdariffa extract (HSE) group, diabetes group (D) and diabetes plus HSE group (D+HSE). HSE (100 mg/ kg/body weight) was administered orally for 28 consecutive days. After 28-days of supple- mentation, the rats were sacrificed to obtain epididymal sperm. Administration of HSE signif- icantly lowered the level of fasting blood glucose and increased plasma insulin level in D+HSE group as compared to D group ($p<0.05$). Sperm quality in the D+HSE group was im- proved with significantly higher sperm concentrations ($p<0.05$) and sperm motility ($p<0.001$) as well as lower percentage of sperm abnormality ($p<0.05$) as compared to the diabetic group. Plasma follicle-stimulating hormone (FSH) level was significantly elevated ($p<0.05$) in D+HSE group than in D group while no significant alteration in plasma testosterone and lute- inizing hormone (LH) level were seen between groups. In conclusion, this study suggested that H. sabdariffa UKMR-2 variety has a potential protective role against diabetes-induced sperm damage (Muhd Hanis Md Idris *et al.,* 2012).

Emran Md Chowdhury 2012 cloned a full-length gene from the kenaf plant putatively encoding hydroxycinnamoyl CoA:shikimate/quinate hydroxycinnamoyl transferase enzyme (HcHCT), which is involved in the lignin biosynthesis pathway. We examined the tissue and organ specific expression of an HcHCT ortholog during developmental stages and in response to abiotic stresses. The full-length of the HcHCT ortholog consisted of a 1,296 bp open reading frame (ORF) encoding 431 peptides. The molecular weight of deduced amino acids was 47.71 kDa, with an isoelectric point (pI) of 5.79. The deduced amino acid sequence showed 80-86% identities with HCTs of other plants. The deduced amino acid sequence of the HcHCT ortholog has a histidine containing motif (HHAAD), characteristic for acyl transfer catalysis. A second consensus sequence, a DFGWG block, is another acyl transferase of the BAHD family. Phylogenetic analysis showed the closest relationship (86%) with HCT of Populus trichodcarpa (ACC63882). According to quantitative real-time reverse transcription PCR (QPCR) analysis, HcHCT transcript was expressed in all the tissues and organs, but the highest expression was observed in roots and mature flowers. The expression of HcHCT transcript was also examined in stem tissues of 3-week-old kenaf plants in response to various abiotic stresses. The expression of HcHCT transcript was highly induced by all treatments, including wound, SA, NaCl, cold, H_2O_2 , ABA, and

drought. HcHCT was highly expressed in response to cold, SA, and H_2O_2 at 24 h, 6 h, and 6 h after treatment, respectively. Our results suggest that we have cloned the full-length gene putatively encoding for HCT, which is responsive to various abiotic stresses.

The increasing demand for high-quality water has resulted in the development of new and cost-effective techniques for water softening. The main aim of the present study was to investigate the capillary effect of kenaf (Hibiscus cannabinus L.) on water softening. Water samples were taken from water distribution system of Shiraz city with hardness of 352, 466, 502, and 612 mg/l as $CaCO_3$. Two different lengths of kenaf (1.2 and 1.9 m) were tested. Hardness reduction efficiency for two lengths of kenaf were tested in the timescales of one, two, three, and five hours and were analyzed with linear mixed model (Alpha = 0.05). Results showed that the average of hardness reduction was 108.43 and 163.74 mg/l as $CaCO_3$ for kenaf with lengths of 1.2 and 1.9 m, respectively. The maximum hardness reduction was achieved at the first timescales of filtration and during the 5 h of filtration, the average of efficiency for the two lengths decreased from 53.03 to 4.54%. The results also indicated that the length of kenaf has a dominant positive effect on water hardness, while time has a negative effect. This study confirms that kenaf has a considerable potential in water softening (Ehsan Gharehchahia *et al.,* 2012).

Plant-based foods have been used in traditional health systems to treat diabetes mellitus. The successful prevention of the onset of diabetes consists in controlling postprandial hyperglycemia by the inhibition of α-glucosidase and pancreatic α-amylase activities, resulting in aggressive delay of carbohydrate digestion toabsorbable monosaccharide. In this study, five plant-based foods were investigated for intestinal α- lucosidase and pancreatic α-amylase. The combined inhibitory effects of plant-based foods were also evaluated. Preliminary phytochemical analysis of plant-based foods was performed in order to determine the total phenolic and flavonoid content (Sirichai Adisakwattana *et al.*,2012).

Kenaf (Hibiscus cannabinus L.) is a green resource of natural fibre. But our understanding of genotypic characteristics and relationships between kenaf genotypes grown up in certain environmental condition is limited, which is important for effective kenaf breeding program for mass commercial production and fundamental need for utilization of this resource. Thirty two kenaf genotypes originated from different parts of the world were cultivated in open field of Malaysian tropical environment. A total of 15 morphological data were collected and multivariate analysis was used to identify the genetic variation among the genotypes. There were significant differences among the genotypes in fibre weight, days to 50% flowering and days to maturity. Principal component analysis showed that days to flowering, days to maturity, plant diameter and leaf shape were the traits responsible for major variation among the genotypes. In cluster analysis different kenaf genotypes produce three distinct groups which can be used for selection of parents of in the breeding program. From total three clusters, high yielding late mature genotypes of the cluster 3 can be used to cross with middle flowering genotypes of cluster 2 to produce relatively photo insensitive variety with better fibre and stick yield in Malaysian tropical environment (Faruq *et al.,* 2013).

The haematinic activity of an orally administered aqueous extract of Hibiscus cannabinus leaves was studied on haemolytic anaemic rats. Anaemia was induced by an oral administration of phenylhydrazine for a period of 8 days. Red blood cell count, haemoglobin concentration, and pack cell volume were analysed as indices of anaemia. The mean cell haemoglobin, mean cell volume and mean cell haemoglobin concentration were calculated accordingly. Phenylhydrazine induced a significant decrease ($P<0.05$) in the blood parameters indicating anaemia and also resulted to significant increase ($P<0.05$) in the mean cell haemoglobin, mean cell volume values, which are indicators of macrocytosis. Leaf extract of H. cannabinus induced a significant ($P<0.05$) increase in the red blood cell count, haemoglobin concentration, and pack cell volume which had been originally decreased by phenylhydrazine administration within one week of treatment. The presence of macrocytosis turn

towards normal as the animals recovered from anaemic condition. The results obtained suggested that H. cannabinus leaves may have haematinic properties (Ngogang).

Betiku *et al.*, 2013 studied separating seed oil from sorrel (*Hibiscus sabdariffa*) oilseeds using application of solvent extraction method. The process was optimized using response surface methodology and the quality of the seed oil was determined. Optimization of oil extraction from the oilseeds using response surface methodology was carried out. The effects of three independent factors (extraction time, solvent volume and sample weight) and their respective interactions on the response, oil yield, were investigated. A total of 17 experimental runs were generated using Box- Behnken design. The extracted seed oil was characterized to determine its quality.

Adedayo O. Ademiluyi and Ganiyu Oboh 2013 investigated the inhibitory effect of aqueous extracts of two varieties (red and white) of Hibiscus sabdariffa (Roselle) calyces on carbohydrate hydrolyzing enzymes (α-amylase and α-glucosidase), with the aim of providing the possible mechanism for their antidiabetes properties. Aqueous extracts were prepared (1:100 w/v) and the supernatant used for the analysis. The extracts caused inhibition of α-amylase and α-glucosidase activities in vitro.The IC50 revealed that the red variety (25.2 µg/mL) exhibited higher α-glucosidase inhibitory activity than the white variety (47.4 µg/mL), while the white variety (90.5 µg/mL) exhibited higher α-amylase inhibitory activity than the red variety (187.9 µg/mL). However, the α-glucosidase inhibitory activities of both calyces were higher than that of their α-amylase. In addition, the red variety possessed higher antioxidant capacity as exemplified by the •OH scavenging abilities, Fe2+ chelating ability, and inhibition of Fe2+-induced pancreatic lipid peroxidation in vitro. The enzyme inhibitory activities and antioxidant properties of the roselle extracts agreed with their phenolic content. Hence, inhibition of α-amylase and α-glucosidase, coupled with strong antioxidant properties could be the possible underlying mechanism for the antidiabetes properties of H. sabdariffa calyces; however, the red variety appeared to be more potent.

Inhibition of α-amylase, enzyme that plays a role in digestion of starch and glycogen, is considered a strategy for the treatment of disorders in carbohydrate uptake, such as diabetes and obesity, as well as, dental caries and periodontal diseases. Plants are an important source of chemical constituents with potential for inhibition of α-amylase and can be used as therapeutic or functional food sources. A review about crude extracts and isolated compounds from plant source that have been tested for α-amylase inhibitory activity has been done. The analysis of the results shows a variety of crude extracts that present α-amylase inhibitory activity and some of them had relevant activity when compared with controls used in the studies. Amongst the phyto-constituents that have been investigated, flavonoids are one of them that demonstrated the highest inhibitory activities with the potential of inhibition related to number of hydroxyl groups in the molecule of the compound. Several phyto-constituents and plant species as α-amylase inhibitors are being reported in this article. Majority of studies have focused on the anti-amylase phenolic compounds (Paloma Michelle de Sales 2012).

Obesity is associated with a great diversity of diseases including non-alcoholic fatty liver disease. Our previous report suggested that Hibiscus sabdariffa extracts (HSE) had a metabolic-regulating and liver-protecting potential. In this study, we performed a clinical trial to further confirm the effect of HSE. Subjects with BMI ≧27 and aged 18-65, were randomly divided into control (n=17) and HSE-treated (n=19) groups, respectively, for 12 weeks. Our data showed that consumption of HSE reduced body weight, BMI, body fat and the waist-to-hip ratio. Serum free fatty acid (FFA) was lowered by HSE. Anatomic changes revealed that HSE improved the illness of liver steatosis. Ingestion of HSE was well tolerated and there was no adverse effect during the trial. No alteration was found for serum α-amylase and lipase. The clinical effect should mainly attribute to polyphenols of HSE, since composition analysis showed that branched chain-amino acid, which is associated with obesity, is not obviously high. In conclusion, consumption of HSE reduced obesity, abdominal fat, serum FFA and improved liver

steatosis. HSE could act as an adjuvant for preventing obesity and non-alcoholic fatty liver (Hong-Chou Chang *et al.*,2014).

F.O. Mowuogwu and B.O. George(2008) Comparative anti oxidant activity of hibiscus sabdariffa and ascorbic acid on ferrous sulphate induced oxidative stress in clarias gariepinus east and central african journal of pharmaceutical science *Vol* 11, pp: 39-42.

Pi-Jen Tsai, John McIntosh, Philip Pearce, Blake Camden, Brian R Jordan., (2002)' Anthocyanin and antioxidant capacity in Roselle (*Hibiscus Sabdariffa* L.) extract Food Research International Volume 35, Issue 4, 2002, Pages 351–356.

Farombi, E.O. and Ige, O.O. (2007), Hypolipidemic and antioxidant effects of ethanolic extract from dried calyx of *Hibiscus sabdariffa* in alloxan-induced diabetic rats. Fundamental & Clinical Pharmacology, 21: 601–609.

Muhd Hanis Md Idris, Siti Balkis Budin, Mohamad Osman, Jamaludin Mohamed., (2012). Protective Role Of Hibiscus Sabdariffa Calyx Extract Against Streptozotocin Induced Sperm Damage In Diabetic Rats *EXCLI Journal* 2012;11:659-669.

IV. MATERIAL AND METHODS

Sample Collection

The plant *Hibiscus Sabdariffa* (leaves) was collected from Thanjavur district in Tamil Nadu. The collected plant material was allowed to shadow dried for 10 days. The dried plant materials were powdered and analyze the activity by following methods.

Extraction of Plant Material

The 20g of the shade dried plant material was crushed and extracted by cold percolation method using Ethanol sequentially at 48hrs. The extract was filtered using Whatmann filter paper and concentrated. The extract was put in airtight container and stored in refrigerator which was subjected to following analysis.

PRELIMINARY PHYTOCHEMICAL ANALYSIS

The extract of *Hibiscus Sabdariffa* was subjected to qualitative test for the identification of various plant constituents by Harborne method (1973).

1. Test for Alkaloid

A small quantity of the extracts were separately treated with few drops of dilute hydrochloric acid and filtered. The filtrates were used for the following tests.

a. Mayers test

0.5ml of extract was treated with few drops of Mayer's reagent were added by the side of the test tube. A white or creamy precipitate indicated the test as positive.

b. Dragendroff's test

0.5 ml of extract was treated with Dragendroff's reagent (potassium bismith iodide). Formation of orange or orange red precipitate indicates the presence of alkaloid.

c. Wagner's test

0.5 ml of extract was treated with few drops of Wager's reagent gives an brown or reddish brown precipitate indicates the presence of alkaloid

Preparation of Wagner's reagent: Iodine (1.27 g) and potassium iodide (2 g) was dissolved in 5 ml of water and made up to 100 ml with distilled water.

2. Test for Carbohydrate

0.5 ml of extract was dissolved in 5ml of distilled water and filtered. The filtrate was subjected to following tests to detect the presence of carbohydrates.

a. Molish's Test

0.5ml of extract was treated with 1 ml of Alpha napthol & Conc. H_2SO_4, which gives a purple color.

b. Fehling's Test

0.5 ml of extract was treated with add equal qty of Fehling's sol A & B. After heating brick red precipitate was obtained.

3. Test for Phytosterols

0.5 ml of extract was dissolved in 5ml of chloroform separately then this chloroform solution was subjected to salkowaski and Libermann Burchard test for the detection of Phytosterols.

a. Libermann's Burchard Test

0.5ml of extract was treated with few ml of chloroform, acetic acid and conc. H_2SO_4 which gives bluish green color.

b. Salkowaski Test

0.5 ml of extract was treated with chloroform was treated with Conc. H_2SO_4, gives red color.

c. Saponin Glycosides

0.5 ml of extract was treated with 80% H_2SO_4, gives deep yellow color indicates the presence of saponin glycosides.

4. Test for Saponins

a. Foam Test

Dilute 1ml of alcohol in 0.5 ml of extract separately with distilled water to 20ml and shake in a graduated cylinder for 15min. The formation of foam indicates the presence of Saponins.

5. Test for Tannins

0.5 ml of sample was treated with lead acetate solution; formation of precipitate indicates the presence of Tannins.

0.5 ml of sample was treated with sodium acid phosphate and 2% Phenazone, formation of bulky precipitate often colored indicates the presence of Tannins.

6. Test for Pseudo Tannin

0.5 ml of sample was treated with gelatin and warmed. Presence of pseudo tannins was indicated by the absence of precipitation formation.

0.5 ml of sample was treated with 2 drops of neutral ferric chloride. Formation of brownish green indicates condensed tannins. Formation of bluish black indicates hydrolyzed tannin.

7. Test for Chlorogenic Acid

0.5 ml of sample was treated with few ml of aqueous ammonia and was exposed to air which gradually develops a green color indicates the presence of Chlorogenic acid.

8. Test for Flavonoids

0.5 ml of sample was allowed in a few ml of ammonia. The mixture was observed under UV and visible lights - formation of fluorescence colour indicates the presence of flavonoids.

a. Shinoda's Test

0.5 ml of sample was treated with magnesium foil and conc. HCl given intense cherry red indicates presence of flavonoid. The orange red color indicates the presence of flavonols.

0.5 ml of sample was treated with Sodium hydroxide gives yellow to orange color indicates the presence of presence of flavonoids.

0.5 ml of sample was treated with conc. H_2SO_4 gives orange crimson color indicates the presence of flavonoids.

9. Test for Coumarin

0.5 ml of sample was treated with 10% Sodium chloride, formation of yellow colour indicates the presence of Coumarin.

10. Test for flavones

0.5 ml of sample was treated with sodium hydroxide; formation of yellow color indicates the presence of flavones.

0.5 ml of sample was treated with conc. H_2SO_4, formation of yellow or orange indicates the presence of flavones.

11. Test for anthocyanin

0.5 ml of sample was treated with aqueous sodium hydroxide indicates the presence of anthocyanin with the formation of blue violet color.

0.5 ml of sample was treated with conc. H_2SO_4; formation of yellowish orange color indicates the presence of anthocyanin.

2. Determination of total antioxidant capacity (Prieto *et al,* 1999)

The total antioxidant capacity (TAOC) of hexane, ethyl acetate, chloroform-ethanol (2-1, v/v) and butanol fractions of *AVLS* was evaluated by the method of Prieto et al. An aliquot of 0.1 ml of sample solution (1 mg/ml) was combined with 1 ml of reagent solution (600 mM sulphuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The tubes were capped and incubated in a boiling water bath at 95°C for 90 min. After the samples had cooled to room temperature, the absorbance of the aqueous solution of each was measured at 695 nm against a blank. A typical blank solution contained 1 ml of reagent solution and the appropriate volume of the same solvent used for the sample and it was incubated under the same conditions. The antioxidant capacity was expressed as the number of equivalents of α-tocopherol (μg/g of extract).

Prieto, P, Pineda, M. Aguilar, M (1999), *Anal Biochem.*, *269*, 337

3. *In Vitro* Inhibition of Antidiabetic Activity by A – Amylase Method

A starch solution (0.1% w/v) was obtained by stirring 0.1g of potato starch in 100ml of 16 mM of sodium acetate buffer. The enzyme solution was prepared by mixing 27.5mg of α-amylase in 100 ml of distilled water. The colorimetric reagent is prepared by mixing sodium potassium tartarate solution and 3, 5 di nitro salicylic acid solution 96mM. Both control (Acarbose) and plant extracts were added with starch solution and left to react with α- amylase solution under alkaline conditions at 25 ºC. The reaction was measured over 3 minutes. The generation of maltose was quantified by the reduction of 3, 5, dinitro salicylic acid to 3-amino-5- nitro salicylic acid. This reaction is detectable at 540 nm (Temperature 25ºC±0.1 ºC, pH 4.8; O.D. at 540 nm).

V. CALCULATION

$$\% \text{ Reaction} = \frac{\text{(Maltose) test}}{\text{(Maltose) control}} \times 100$$

% Inhibition = 100- % reaction ± SD

VI. RESULTS AND DISCUSSION

The present study shows the herbal plant *Hibiscus Sabdariffa* was extracted in Ethanol. The result reveals the following information.

1. QUALITATIVE PHYTOCHEMICAL ANALYSIS

There is a growing focus on the medicinal plants use as a therapeutic agent because of their limited side effect and retention of appropriate period of activity.

The preliminary qualitative analysis of phytochemical investigation revealed the presence of alkaloids, steroids, and phenol in the aqueous extract of plant *Hibiscus Sabdariffa* and result was tabulated. Thus the preliminary screening test may be useful in the detection of the bioactive compounds.

The preliminary qualitative analysis of phytochemical investigation revealed the presence of alkaloids, saponin, phenol, tannin and in ethanolic extract, where as the carbohydrate, flavonoids,

steroids, flavones, Anthocyanin and Coumarin are absent in aqueous extract of *Hibiscus Sabdariffa* and the result are tabulated in Table – 1.

Total Antioxidant Activity

The reducing ability of a compound generally depends on the presence of reductants which have been exhibited antioxidative potentially breaking the free radical chain, donating a hydrogen atom. The presence of reductants (i.e. antioxidants) in *Hibiscus Sabdariffa* cause the reduction ions by measuring at 695 nm.

The total antioxidant activity of sample shows 50.9% compared with standard Ascorbic acid. Hence, the compound possess high anti oxidant which is used for the treatment of various diseases.

ANTI DIABETIC ACTIVITY

The present study has detected the antidiabetic effect of the methanolic extract of *Hibiscus Sabdariffa* leaves by *invitro* inhibition of alpha amylase activity in both normal plant and regenerated plant.

ALPHA AMYLASE METHOD

The *in vitro* α-amylase inhibitory studies demonstrated that Ethanolic extract of normal and regenerated *Hibiscus Sabdariffa* had α-amylase inhibitory activity. The percentage inhibition at 1ml concentration showed a high reduction glucose (Table 2). Where as the plants showed 22 % of inhibition. Thus, data indicate that Ethanolic extract of *Hibiscus Sabdariffa* possesses significant *in vitro* antidiabetic activity.

The mechanism by which *Hibiscus Sabdariffa* exerted action may be due to its action on carbohydrate binding regions of α- glucosidase enzyme, α- amylase, endoglucanases that catalyse hydrolysis of the internal α-1, 4 glucosidic linkages in starch and other related polysaccharides have also been targets for the suppression of postprandial hyperglycemia**.** This enzyme is responsible in hydrolyzing dietary starch into maltose which then breaks down to glucose prior to absorption.

Since α-amylases play an important role in starch break down in human beings and animals, the presence of such inhibitors in food stuffs may be responsible for impaired starch digestion (Marshall JJ. 1975 and Jaffe, 1968). α-amylase inhibitor may be of value as novel therapeutic dietetic agents (Plus W, 1971). Hence, the Ethanolic extract has potential to emerge as new remedy for treatment of type-II diabetes mellitus.

Diabetes mellitus contributes to male sexual dysfunction and infertility by modulating oxida- tive damage. To date, a number of studies have demonstrated antioxidant properties of Hibis- cus sabdariffa Linn. This study was designed to investigate the effects of H. sabdariffa UKMR-2 variety on sperm functioning of streptozotocin-induced diabetic rats. Male Sprague- Dawley rats were allotted into four groups, namely control group (C), H. sabdariffa extract (HSE) group, diabetes group (D) and diabetes plus HSE group (D+HSE). HSE (100 mg/ kg/body weight) was administered orally for 28 consecutive days. After 28-days of supple- mentation, the rats were sacrificed to obtain epididymal sperm. Administration of HSE signif- icantly lowered the level of fasting blood glucose and increased plasma insulin level in D+HSE group as compared to D group ($p<0.05$). Sperm quality in the D+HSE group was im- proved with significantly higher sperm concentrations ($p<0.05$) and sperm motility ($p<0.001$) as well as lower percentage of sperm abnormality ($p<0.05$) as compared to the diabetic group. Plasma follicle-stimulating hormone (FSH) level was significantly elevated ($p<0.05$) in D+HSE group than in D group while no significant alteration in plasma testosterone and lute- inizing hormone (LH) level were seen between groups. In conclusion, this study suggested that H. sabdariffa UKMR-2 variety has a potential protective role against diabetes-induced sperm damage (Muhd Hanis Md Idris *et al.,* 2012).

Overall, our data demonstrate that *Hibiscus sabdariffa* could be useful in preventing the development of atherosclerosis and possible related cardiovascular pathologies associated with diabetes (Farombi, *et al.,* 2007).

Table 1: Preliminary phytochemical analysis of *Hibiscus Sabdariffa*

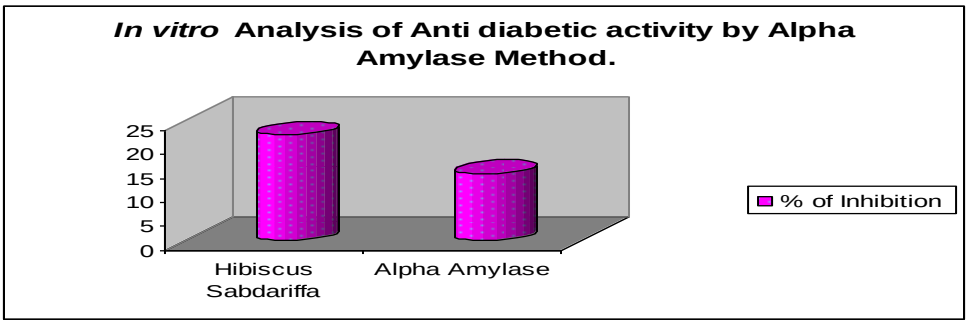
SI.No.	Name of the Test	Phytochemical constituents	Ethanolic Extract
1	Mayer's test Dragondraff test Wagner Test	Alkaloids	+ + -
2	Folin Test	Phenol	+
3	Foam Test	Saponins	+
4	Lead Acetate	Tannins	+
5	Sulphuric acid	Steriod	-
6	Ammonia	Flavonoids	-

+ : Present _ : Absent

Table:2 *In vitro* Analysis of Anti diabetic activity by Alpha Amylase Method.

Name of the Plant	% of Inhibition
Hibiscus Sabdariffa	22
Alpha Amylase	14

Fig:2 *In vitro* Analysis of Anti diabetic activity by Alpha Amylase Method.



VI. SUMMARY AND CONCLUSION

In recent years there is an upsurge in the areas related to newer developments in prevention of disease especially the role free radical. So it will be pertinent to examine the possible role of "free radical" in disease and "antioxidants" in its prevention.

Free radical and reactive oxygen species are closely associated with many pathological conditions. In living organism the activity of reactive oxygen species are counteracted by antioxidants. Many non-herbal antioxidants have shown toxic or unwanted side effects and so it shifted the attention towards the naturally occurring antioxidants. In this study the *Hibiscus Sabdariffa* investigated for their antioxidant potentiality.

It was found showed the highest antioxidant capacity and is a valuable source of antioxidant for preparation of crude extracts of antioxidant components. There is good scope in examining the sample for its antioxidant and free radicals scavenging activity invivo.

Diabetes is a life-long disease marked by elevated levels of sugar in the blood. Hyperglycemia or diabetes mellitus is caused by inherited or acquired deficiency in production of insulin by the pancreas

or by the ineffectiveness of the insulin produced. Medicinal plants have played an essential role in the development of human culture, for example religions and different ceremonies. In India, drugs of herbal origin have been used in traditional systems of medicines such as Unan*i* and Ayurveda since ancient times. The herbal plant *Hibiscus Sabdariffa is* also known as valued mainly for prevent and control the hyperglycemia. Its also acts as tonic, stimulant and antiseptic properties.

BIBLIOGRAPHY

[1] **Adedayo O. Ademiluyi and Ganiyu Oboh. (2013)** Aqueous Extracts of Roselle (Hibiscus sabdariffa Linn.) Varieties Inhibit α-Amylase and α-Glucosidase Activities In VitroJournal of Medicinal Food. vol. 16(1),pp: 88-93.

[2] **Bahaeldeen Babiker Mohamed, Abdelatif Ahmed Sulaiman and Abdelhafiz Adam Dahab (2012)** Roselle (Hibiscus sabdariffa L.) in Sudan, Cultivation and Their Uses Bull. Environ. Pharmacol. Life Sci, Vol.1(6),pp: 48 – 54.

[3] **Betiku E. and Adepoju T. F. (2013)** Sorrel (*Hibiscus sabdariffa*) Seed Oil Extraction Optimization and Quality Characterization *American Chemical Science Journal*

[4] **Danalatos N.G and Archontoulis S.V. (2004)** Growth And Biomass Productivity Of Kenaf (Hibiscus Cannabinus L.) Under Central Greek Conditions: Ii. The Influence Of Variety, Sowing Time And Plant Density Industry and Climate Protection, vol.10-14.

[5] **Ehsan Gharehchahia, Amir Hossein Mahviabc, Seyed Mahmood Taghavi Shahria & Rahim Davanid (2012)** Possibility of application of kenaf fibers (Hibiscus cannabinus L.) in water hardness reduction

[6] **Emran Md Chowdhury, Bo Sung Choi, Sang Un Park, Hyoun-Sub Lim, and Hanhong Bae (2012)** Transcriptional analysis of hydroxycinnamoyl transferase (HCT) in various tissues of *Hibiscus cannabinus* in response to abiotic stress conditions POJ vol.5(3),pp:305-313.

[7] **Faruq G, Alamgir , Rahman M. M, Motior M. R, Zakaria H. P, Marchalina B (2013)** Morphological Charecterization Of Kenaf (*Hibiscus Cannabinus L*.) In Malaysian Tropical Environment Using Multivariate Analysis Mohamed The Journal of Animal & Plant Sciences, vol.23(1): 2013, Pp: 60-67.

[8] **Faruq Golam, Alamgir M.A, Rahman M.M, Subha B and Motior M.R (2011)** Evaluation of genetic variability of kenaf (Hibiscus cannabinus L.) from different geographic origins using morpho-agronomic traits and multivariate analysis AJCS vol.5(13),pp:1882-1890.

[9] **Gabriel A. Agbor, Julius E. Oben , Jeanne Y. Ngogang (2013)** Haematinic activity of Hibiscus cannabinus vol.

[10] **Hansawasdi C, Kawabata J, Kasai T. (2000)** Alpha-amylase inhibitors from roselle (Hibiscus sabdariffa Linn.) tea. Biosci Biotechnol Biochem. vol. 64(5), pp:1041-3.

[11] **Herrera-Arellanoa A, Flores-Romerob S, Chavez-Soto M.A, Tortorielloa J., (2004)** Effectiveness and tolerability of a standardized extract from Hibiscus sabdariffa in patients with mild to moderate hypertension: a controlled and randomized clinical trial Phytomedicine vol.11,pp: 375–382.

[12] **Hong-Chou Chang, Chiung-Huei Peng, Da-Ming Yeh, Erl-Shyh Kao and C.-J. Wang (2014)** Hibiscus sabdariffa extract inhibits obesity and fat accumulation, and improves liver steatosis in humans *Food Funct.*, 2014,

[13] **Iniyan G. Tamil, B. Dineshkumar,[1] M. Nandhakumar, M. Senthilkumar, and A. Mitra .** (2010) Indian J Pharmacol. 2010 October; 42(5): 280–282.

[14] **Malisa M.N, Hamdan J and Husni M.H.A (2011)** Yield Response of Kenaf (Hibiscus cannabinus L.) to Different Rates of Charcoal and Nitrogen Fertilizer on Bris Soils in Malaysia Middle-East Journal of Scientific Research vol. 10 (1),pp: 54-59.

[15] **Paloma Michelle de Sales, Paula Monteiro de Souza, Luiz Alberto Simeoni, Pérola de Oliveira Magalhães, Dâmaris Silveira (2012)** α-Amylase Inhibitors: A Review of Raw Material and Isolated Compounds from Plant Source J Pharm Pharmaceut Sci (www.cspsCanada.org) vol.15(1),pp 141 – 183.

[16] **Raj Kumar T, Udhayakumar E, Sekar M and Senthil Kumar M.K (2011)** Antidiabetic Activity Of Methanolic Extract Of Hibiscus Cannabinus In Streptozotocin Induced Diabetic Rats *International Journal of Pharma and Bio Sciences vol*.2.

[17] **Satish Kumar, Vivek Kumar, Chandrashekhar MS (2011)** In-vitro Anti-Oxidant and alpha-Amylase Inhibitory Activity of Isolated Fractions from Methanolic Extract of Asystasia dalzelliana Leaves International Journal of PharmTech Research Vol. 3, No.2, pp 889-894.

[18] **Sirichai Adisakwattana, Thanyachanok Ruengsamran, Patcharaporn Kampa and Weerachat Sompong (2012)** In vitro inhibitory effects of plant-based foods and their combinations on intestinal α-glucosidase and pancreatic α-amylase Adisakwattana et al. BMC Complementary and Alternative Medicine vol.12, pp:110
vol. 3(4), pp: 449-458.

[19] **Wilson F. D, Margaret Menzel Y. (1967)** Interspecific hybrids between kenaf (Hibiscus cannabinus) and roselle (H. sabdariffa) Euphytica Vol. 16, pp: 33-44.