

MEDICAL USES OF *HIBISCUS* *SABDARIFFA* (ROSELLE)

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Abstract: Over 300 species of hibiscus are found worldwide which are basically represented to the Malvaceae family. *Hibiscus sabdariffa* is first found in the areas of sudan. It is commonly known as “Roselle” and “Karkade”. The main focus of this plant is its fleshy sepals which are commercially very valuable and increased its quality. This plant is used to make plethora of food items such as jellies, candies, sauces and act as flavonoids and coloring agent as well as utilized in many kinds of drinks. *Hibiscussabdariffa* has many more uses like cultivated as ornamental plants, having medicinal qualities due to the presence of vitamins, proteins, fatty substances, minerals, nutritional components and acids. Plant has very powerful solution against anticancer, anti-hypertension, obesity and anti-hyperlipdemic etc. Instead of this, hibiscus is consumed for different purposes such as herbal drinks in the forms of beverages, food and hallocinogenic (a drug which causing hallucination) intakes to prevent from various ailments. Extract depicts anti-hypertensive, antioxidant, anti-pyretic, diuretic effect, anti-diabetic and anti-bacterial properties. *Hibiscus sabdariffa* is one of the famous crop which is gaining the popularity to tackle with many serious disorders. The extract of roselle consist of saponins, glycosides, alkonoids and flavonoids. It represents antibacterial activities against *Bacillus stearothermophilus*, *Clostridium sporogenes*, *Klebsiella pneumonia*, *Staphylococcus aureus*, *Escherichia coli* and *Bacillus cereus*.

Keywords: Hibiscus, Ethnobotanical, Traditional, Pharmaceutical, Therapeutic, Anti-cancer.

1. INTRODUCTION

Human beings are in close association with their environment from time immemorial. Various ingredients of environment are being used by human beings as food and for extracting medicine from them. Plants are being used as medicine for various ailments. Earlier these plants were used on hit and trial basis by the people and later on the the information regarding these medicinal plants was paseed on further generation to generation. By identifying the active ingredients of these plants, improvement can be made in the present healthcare system. Hence much research is being carried out in the field of medicinal plants. *Hibiscus sabdariffa* is one such economically important plant. Hence an attempt has been made to review the medicinal properties of *Hibiscus sabdariffa*

Hibiscus sabdariffa is representing the family Malvaceae (24). The plant needs 4-8 months care to grow by providing night time temperature at 20°C and 13 hours under sunlight. The yield and quality of calyces is effected by high humidity and rainfall. It is superior crop which is resistant to virus, insects, bacteria and fungi attacks. It gives 10t/ha yield from the leaves and 1-5 kg from the fruits which is nearby 8t/ha (25,26).

2. ETHNOBOTANICAL USES

One or more flowers are taken into water and remains stay until the liquid turns into red colour. After that, liquid extract get boiled and add some amount of butter and salt. This is prepared for malaria patients. They can take 3 tea-glasses of this mixture against malaria fever (27). Roselle is multi-task crop. For instance :- Chocolates, juice, pudding, fermented

drink, beverages, flavonoids, jellies, wine and cakes are prepared from outer leafy part which is known as calyx (28-30,14,31,26,21,32,33,34).

Herbal Tea:-In Sudan, karkade is well-defined as organic product and significant for its useful benefits. Dried flowers of this plant are used to prepare sweet herbal beverages and commonly sold in grocery stores (35).

Other Uses:-In North areas, Both leaves and flowers part are useful and people drink the aqueous decoction which is used to treat with high blood pressure and fever as well as low blood pressure (36). The seeds and flowers utilized against high cholesterol level (37).

Traditional food and medicine:-In some nations like Africa, India and Mexico, the mixture of calyces or leaves are conventionally utilized for its diuretic, febrifugal, declining the thickness of the blood and reduce choleric problems (16). In North African country, calyx part is used to prevent from sore throats, genital troubles and cough. On the other hand, the soften leaf pulp helps to recover external wounds and abscesses (38).

Source of fibre:-Along with other uses, strong and thick fibre is acquired from the stem which is further consumed in many household tasks involving twine, sackcloth and cord. Furthermore, yellow coloured dye is gain from flower part i.e. petal. It is rich source of oil and used to make medicines etc (39). *Hibiscussabdariffa* is one of the commercial crop which is mainly cultivated for fibre. Now india and Pakistan are extract jute from this plant which is helpful in preparing linen, ropes, clothes and net etc. (40)

Cosmetics:-Scrubs and various soaps are prepared by oil of *HibiscusSabdariffa* in Malaysia (14).

Animal feed :-Sheeps and poultry fed on seeds and the raw material of seed in oil extraction method is further used in making cattle feed and chicks feed (41-44, 14).

3. PHARMACEUTICAL USAGE

HibiscusSabdariffa shows various beneficial properties such as anticancer, antioxidant, antipyretic, antibacterial, hepatoprotective effects, diuretic effects, anticholesterol and antiobesity activities and so on. In past time Hibiscus was utilized for high blood pressure and source of many useful constituents like anthocyanins, quercetin and alkaloids etc. It reckons that roselle has antioxidant and diuretic properties. Which lower down the blood pressure and having relaxation potential.

Antihypertensive:-The calyx part of Hibiscus is source of anticyanin and organic acids. The plant reveals antihypertensive and antioxidant effects due to the presence of anthocyanins, generally cyanidin-3- sambubioside and delphinidin-3- sambubioside. These qualities are observed in liquid extract (45,46,47,48). The blood pressure can be decreased by the usage of sour tea and make comparison with black tea in case of type II diabetic with mild high blood pressure (49). In west Africa and Mexico, the decoction of *HibiscusSabdariffa* is used to cure hypertension. Many in vitro (50,51) and in vivo researches reveals the extraction of Hs calyces used to reduce diastolic and systolic pressure, act as vasodilator and slowing the heart rate (52,53,54,55,56,57). This activity may be through diuretic effect (58), histamine-like and acetylcholine like system (52) and vaso relaxant (52,53,51). In addition to this Hibiscus shows anti-platelet (59) and unwanted changes in gonatal process (57).

Antibacterial, Antifungal and Antiparasitic Activity:-Antibacterial property in *HibiscusSabdariffa* may be caused by polyphenolic nature of the flavonoids called gossypetin (60). Due to anti acetylcholinesterase quality in the extract of calyx, it proves powerful memory restoratant agent in case of dementia usually seen in elderly individuals (61). The protocatechuic acid act as anti-microbial agent towards Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella pneumonia and Acinetobacter baumannii (62). This effect is independent to temperature , like seen by thermo treatments (63). Three gram negative bacteria which reveals anti-microbial effect present in crude extract of *HibiscusSabdariffa* seeds. The bacteria are Salmonella, Shigella and Enterobactor (64).The liquid methanol extraction of Hs often deems in vitro inhibition opposite to these bacteria named as Bacillus stearothermophilus, Serratia mascences, S. aureus, K. pneumonia, pseudomonas. Fluorescence and do not allow fungus growth like Candida albicans (65).

Antioxidant activity:-Free radical scavenging and antioxidant effect of chloroform soluble and ethyl acetate soluble fraction is noticed from the dry flowers of Hibiscus (66). Three qualities of this antioxidant activity have been utilizing in liposome mechanism Cox-2 shows lower inhibition as compared to ethyl acetate and methonal inhibition (67). Several researchers depict roselle has antioxidant properties in case of in vitro (68,66,70,71,72,73) and in vivo condition

(66,74,65,75). The antioxidant potential is noticed in its flowers (66,71). Additionally, leaf extract of *Hibiscus Sabdariffa* revealed stronger antioxidant properties rather than leaf extraction of mulberry leaf due to the enrichment of polyphenolic compounds (76,77). Earlier studies shows that leaf extraction of *Hibiscus sabdariffa* had more radical scavenging effect and flavonoid content than flowers of Hibiscus Sabdariffa (76,70). Roselle consisting natural pigments in dried calyces which indicates liver protective property, antioxidant activity, hypocholesterolemic and cardioprotective (78,79).

Anticancerous property:-Anthocyanins may results as cancer causing cell apoptosis, mainly in case of HL-60,cells (80), Research depicts that this plant is a chemo-preventive agent against LDL-oxidation and Ox LDL-mediated macrophage apoptosis. It inhibits 12-0-tetradecano-lyphorbol -13-acetate (TDA) which cause skin tumour formation in mice (81) and stops the survival of promyelocytic leukaemia HL-60 cells in Humans (82). The roselle juice depicts antiproliferative effects by the usage of various cell lines such as breast (MCF-7,MDA-MB-231), ovarian (CaOv-3), also cervical. It is noticed as powerful anti-proliferative activities among the MCF-7 cancer cells (83). Currently, the cancer-preventive effect of *Hibiscus Sabdariffa* is found in leaf extract against the human prostate cancerous cells in both vivo and in vitro (84) and leaf extract represents a source of bigger polyphenolic compounds.

Antimicrobial uses:-*Hibiscus sabdariffa* is highly recommended to treat with various diseases. It is studied that the aqueous methanolic extract of this plant has antimicrobial and cytotoxicity potential is due to the abundance of flavonoids, alkaloids, cardiac glycosides and saponins. It shows antimicrobial activities like *Bacillus stearothermophilus*, *Escherichia coli*, *Bacillus cereus* etc(65). This property was preferred during agar dilution process (85). Take one ml of 0.5 McFarland microbial inoculation preparation using direct colony suspension of *Stephylococcus aureus* - ATCC 25923, *Escherichia coli* – ATCC - 25922 and *Klebseilla pneumoniae* – ATCC - 700603 containing 10^6 bacterial/ml was put into liquid extract of roselle in 1ml of two fold dilution in tubes and then incubation is done at 37°C for one day. Then, it poured into agar plats for duplication and again incubated at same temperature for one -two days (85). Roselle extract is very effective and considered as potential of antimicrobial activity in food items. The antimicrobial property is performed on *E.coli* and isolated from veterinity, food as well as clinical samples(86).

Effect on lipid metabolism/Anticholesterol property:- The petals extraction of red and green tree helps to decline plasma amounts in rats which depict cardio-vascular protective activity (87). The roselle is studied for creatinine, lipid profile and serum electrolytes mainly in hypertensive patients and observed the high rate of cholesterol and high density lipid (HDL) - cholesterol is effective factor for heart disorders (88). The roselle seed contains palmitic, linolenic acid , oleic acid (21) as well as stearic acid (89) which are main fatty acid components. *Hibiscussabdariffa* has some properties as similar as cotton seeds for the constitute of crude castor oil. There are numerous fatty acids abundant in seeds of roselle, which are palmitoleic (2.0%), myristic (2.1%), linoleic (14.4%), steric (2.9%), palmitic (35.2%), stearic (3.4%) and 12, 13 epoxylieic (4.5%) and malvalic (1.3%) (90). Various studies have declared that this plant helps to reducing lipids, which protects from serious diseases like cardiovascular and hyper- lipidemia (78, 91-97).

4. THERAPEUTIC USES

As studied roselle has antioxidant properties, anti-proliferative effect, nutritional constituents and apoptotic, *Hibiscussabdariffa* is taken as folk medicine which is known by its laxative effect and also has potential to rise urination. These are main two diuretic ingredients, namely glycolic acid and ascorbic acid. Since the presence of citric acid, it is observed as cooling herb which is used during summer season and get relief by dilating the pores to cool down the skin and by inclining the blood flow to the skin surface (16).

Nutritional and medicinal significance of *Hibiscus sabdariffa*:-Roselle having both medicinal and nutritional values (98) which is major used against inflammatory ailments, heart diseases and act as anti-cancerous plant (99). The seed consists of crude protein (27.78%), fatty acid oil (21.85%), crude fibre (16.44%) and ash (6.2%). Main minerals are sodium, potassium phosphorus, calcium and magnesium and list of unsaturated fatty acids in seed oil are stearic acid (5.88%), palmitic (20.84%), linoleic and oleic acid are 39.3%,32.06% respectively (100).

Traditional Uses:-Various parts of roselle is utilized in traditional medicines and few food items. In Sudan, the dry calyx part of *Hibiscus sabdariffa* is used for making healthy drink like wine, soft drinks (without alcohol) and some flavonoids. Despite this, many deserts are made from dried calyx part such as ice cream, jelly, sour tea, pies, butter and tarts etc. (101). Leaves, roots seeds and fruits all sections are used to prepare food in whole world. It is rich source of riboflavin, absorbic acid, calcium, vitamin C ,cartene and anthocyanins. Also the young leaves can be eaten as green

vegetable (102). Roselle is multi used crop to prepare pudding, jam, cake, flavouring, syrup, ice cream, wine, jelly etc. Addition to this, due to amazing reddish color, it enhances its food productivity (28).

Herbal Tea:-This special beverage is made from the dried fruits known by calyx which is fully caffeine free part, red in color and as tasty as berries [103] and stored as refrigerated ice tea. In 2019, Hibiscus tea from Saudi Arabia or black tea are given by 60 type 2 diabetics patients, they drink 1 cup couple of a day. It helps to reduce total cholesterol (7.6%), triglycerides (14.9%), increase HDLC (16.7%) [49]

Anti-diabetic Activity:-It is a therapeutic process on the basis of inhibition of α -amylase and α -glucosidase to control postprandial hyperglycaemia. It shows the ability of pancreatic α -amylase inhibitor [104] and inhibited intestinal α -glucosidase and pancreatic α -amylase enzyme [105,106]. The report depicts polyphenolic extract of roselle has anti-insulin preventing potential by using 200mg/kg dose level and decrease in hyper insulinemia and hyper glycaemia [107]. According to ethno-botanical survey in Caribbean, *Hibiscus sabdariffa* helps to clean the blood and liver, reduce urinary and high cholesterol troubles. As a result, roselle is referred to decrease hypertension for diabetic patients, high blood pressure and jaundice [108].

5. CONCLUSION

Hibiscus sabdariffa is well-known plant all over the world. It is also called by roselle and karkade. This plant is good source to earn money. It is used to make pharmaceutical, folk as well as therapeutic medicines. Moreover, it is utilized to prepare various food items such as jams, jellies, sauces, candies and containing flavoring properties. All plant parts consist of proteins vitamins and minerals. Roselle shows anti-hypertension, anti-cancerous, antibacterial, anti-fungal, anti-pyretic, anti-parasitic, antioxidant, anti-cholesterol and anti-microbial activities. Some people used it as herbal tea against diabetic, heart and blood pressure diseases. It can be consumed as dye, cold drink due to its natural dark reddish color. Overall, it is best choice to prevent from some serious ailments and can also be used for cosmetic and animal feed purposes.

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