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Medicinal and Health Benefits of Mestapat-A Review

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SUMMARY

Hibiscus sabdariffa, often referred to as "mestapat" "red sorrel" or "roselle" is renowned for its medicinal properties and is part of a larger genus of Hibiscus species and a member of malvaceae family. The Hibiscus genus includes over 300 species, many of which are found in tropical and subtropical regions globally. Adaptability of this crop makes it a versatile crop for many regions where it grows in a variety of soil in a warmer and more humid climate. Roselle, having various medically important compounds called The calyces of mestapat are high in calcium, iron, niacin and riboflavin and are a rich source of organic acids including citric, malic, tartaric, allo-hydroxycitric acids, antioxidants, anthocyanins which acts as free radical scavengers and inhibit lipid per-oxidation. The plant is also known for its Beta carotene, vitamin C, protein and total sugar. Consumption of roselle products such as fresh juice, tea, jam, jelly or in the form of capsule rich in anthocyanin plays a crucial role in treating different medical problems including many cardiovascular disorders, helmenthic disease, cancer and obesity management. Mestapat can be grown as a multipurpose crop and has great potential to increase the income of farmers which can fetch them a good price both from national and international market.

INTRODUCTION

Roselle (*Hibiscus sabdariffa* L.) is a short day annual or perennial herb recognized as 'mestapat' or 'chukur' in Indian subcontinent (Rao, 2008) belonging to the Malvaceae family. It is mainly used as a vegetable and traditionally valued for medicinal purpose. Being a crop of tropics and subtropics, it is widely cultivated in Tropical Africa, Sudan, Egypt, Ethiopia, Mali, Nigeria, Chad, India, Indonesia, Phillipines, Malaysia, Brazil, Australia, Mexico, Hawai and Florida of USA. In India, its cultivation is more in states like Andhra Pradesh, Telangana, Karnataka and in North east regions of India (especially in Assam). Generally, two varieties of mestapat is grown i.e., green stemmed and red stemmed leaf (more sour). During the hotter weather of summer months the leaves get more sour taste and require around six months to complete its production cycle.

The plant bears fleshy-shaped, beautiful flowers. It is purple in color, emerging from the axillary leaves, and has a very short neck, and the flower parts are thick and lubricated with color dark red, the fruits are in the form of capsules with a number of brown seeds, spherical and wrinkled inside surface. The used part is the flower and leaf hibiscus plant is known by several names such as hibiscus Jokers, gypsies, clams, stirrups, red acidosis, hibiscus is known scientifically as *Hibiscus sabdariffa*. It is therefore, one of the most important economic plants in food and pharmaceutical industries (Singh *et al.*, 2017). The subspecies is the most economically important member of the genus Hibiscus in terms of fiber production. It is closely related to Kenaf (*Hibiscus cannabinus* L.) and okra (*Hibiscus esculentus* L.), young seed pods of the latter being widely used for food in many temperate, subtropical and tropical countries. The fiber may be used as a substitute for jute in making burlap.

Nutritional value of Mestapat

Mestapat is considered as a miracle plant with various utilizations (Crane, 1949). It is mainly cultivated for its calyx, which are of mainly three types: green, red and dark red. The calyx of red and dark red types are usedto extract juice for fresh drink after sweetened and are the most used characterized by their concentration anthocyanin. Delphinidin 3-Sambubioside and Cyanidin3-Sambubioside are the major anthocyanin. The leaves of green types are usually used as vegetables (Babalola, 2000). The red calyxes are also rich in organic acids, minerals, amino acids, carotene, vitamin C and total sugar depending on the variety and geographical area (Mady *et al.*, 2009). It can also be used in salads, as a potherb as well as for seasoning in curries, contains an acid, which have rhubarb-like flavor. Seeds are dried and make into a powder and can be used in oily soups and sauces. The oven dried seeds have been used as a coffee substitute has aphrodisiac properties. Hibiscus tea is caffeine free herbal tea, made out of the dried fruit part of Roselle, called calyx. It is in red color and tastes like berries.

Roots are also edible but are very fibrous, mucilaginous, without flavor. The seed has 20% oil content (Puro *et al.,* 2014). Compounds such as flavonoids, anthocyanidins, triterpernoids, steroids and alkaloids also been isolated and characterized from Roselle (Mishr, 1999). Nutritional composition of different part of *Hibiscus sabdariffa* per 100 gram is stated in table 1.

Table 1.Nutritional composition of 100 g fresh roselle calyces, leaves and seeds

Constituents	Fresh Calyces (g)	Fresh Leaves (g)	Seeds (g)
Moisture	9.20	85.60	8.20
Protein	1.15	3.30	19.60
Carbohydrates	10.00	9.20	51.30
Fat	2.61	0.30	16.00
Fiber	12.00	10.00	11.00
Ash	6.90	1.00	7.00
Calcium	12.63 mg	213.00 mg	356 mg
Phosphorus	273.20 mg	93.0 mg	462 mg
Iron	8.98 mg	4.80 mg	4.2 mg
Carotene	0.03 mg	4135 µg	-
Thiamine	0.12 mg	0.2 mg	0.1 mg
Riboflavin	0.28 mg	0.45 mg	0.15 mg
Niacin	3.77 mg	1.2 mg	1.4 mg
Ascorbic acid	670 mg	54 mg	trace

Sources: Leung *et al.* (1968); Duke and Atchley (1984); Morton (1987); Morton and Dowling (1987)

Medicinal uses of Mestapat

In the tropical region of many parts of the country, it is used as an aromatic, astringent and cooling herb. It has diuretic effects, which helps to lower fevers and being high in vitamin C it is also antiscorbutic. The leaves and fruits showed antiscorbutic effect, though leaves are diuretic, emollient, sedative and refrigerant. The leaves taste very mucilaginous and used as emollient and use to cough remedy. Flowers contain gossypetin, glycoside hibiscin and anthocyanin, which might have choleretic and diuretic effects, decreasing blood viscosity, stimulating intestinal peristalsis and reducing blood pressure. The Roselle leaves, flowers and seeds are used as a tonic for internal digestive and kidney functions. Mestapat is also reported to have properties like antiseptic, astringent, aphrodisiac, cholagogue, digestive, demulcent, purgative and resolvent. This plant is used as folk remedy in treatment of abscesses, bilious conditions, cancer, cough, debility, dyspepsia, dysuria, fever, heart ailments, scurvy, hypertension, hangover, neurosis, and strangury (Nnam and Onyeke, 2003).

Health benefits of Mestapat

This plant is widely used for the treatment of several diseases. Olaleye (2007) used the aqueous methanolic extract of mestapat and reported that the extract contained cardiac glycosides, flavonoids, saponins and alkaloids. It also exhibited antibacterial activities against *Staphylococcus aureus, Bacillus stearothermophilus, Micrococcus luteus, Serratia mascences, Clostridium sporogenes, Escherichia coli, Klebsiella, pneumoniae, Bacillus cereus, Pseudomonas fluorescence.*

Roselle-Hibiscus anthocyanins (HAs) which are a group of natural pigments existing in the dried calyx exhibited antioxidant activity and liver protection manner. HA antioxidant bioactivity in rat primary hepatocytes and hepatotoxicity was studied by (Wang *et al.,* 2000). The results revealed that HA's, at the concentrations of 0.10 mg/ml and 0.20 mg/ml, significantly decreased the leakage of lactate dehydrogenase and the formation of malondialdehyde and the serum levels of hepatic enzyme markers (alanine and aspartate aminotransferase) significantly decreased and reduced oxidative liver damage. An antioxidative activity was also reported in cancerous cell lines (Akim *et al.,* 2011).

Antiproliferative activities of Roselle juice by using different cell lines like ovarian (Caov-3), breast (MCF-7, MDA-MB-231) and cervical (HeLa) cancer cell lines were evaluated by Akim et al., 2011, and found that it exhibited the strongest anti-proliferative potentiality towards the MCF-7 cancer cells. Protocatechuic Acid (PCA), a phenolic compound isolated from the dried flower, was found to inhibit the survival of human promyelocytic leukemia (HL-60) in a concentration and time dependent manner **(**Tseng *et al.,* 1997**),** and

apoptosis was induced via reduction of retinoblastoma phosphorylation and down regulation of Bcl-2 protein expression **(**Tseng *et al.*, 2000)**.**

The consequence of hypertension is implicated in the development of cerebrovascular diseases, cardiac ischemia as well as cardiac and renal failure, and is now considered a global health problem. Efficacy of aqueous extract in hypertensive human showed significant reduced pressure difference in both systolic and diastolic compared to control group. Roselle extract contains antihypertensive constituents (Odigie *et al.,* 2003). Several studies were conducted and found that the results were comparable and suggested that the synergistic mechanism of diuretic and ACE inhibition results in exerting hypotensive effects (Herrera *et al.*, 2007). When compared to antihypertensive drug captopril, lisinopril in humans (Herrera *et al.*, 2004).

CONCLUSION

"Mestapat" or "Roselle" is a worldwide medicinal plant famous for having various medically important compounds called phytochemicals. There are so many varieties developed, released and used at farmer's level for commercial cultivation. Seeds, leaves, fruits and roots of the plant are used as food and herbal medicine. Extracts from Roselle plays a crucial role in treating different medical problems including cancer and many cardiovascular disorders. The effectiveness of Roselle extract for metabolic disorders like type II diabetes should be examined further, as previous clinical studies have shown encouraging effects on hyperlipidemia and hypertension, conditions strongly correlated with type II diabetes or metabolic syndrome. This plant might also have diuretic and choleretic effects, decreasing the viscosity of the blood, reducing blood pressure and stimulating intestinal peristalsis. The plant is also reported to be antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, purgative and resolvent. Therefore Roselle leaves, fleshy red calyces, roots have great importance in terms of human nutrition and health care. Though further research is necessary to know its exact mechanism of action and to formulate food products using mestapat with locally grown food items.

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