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Bioactive constituents, Therapeutic and Traditional Attributes of Astounding *Praecitrullus fistulosus* (Indian Round Gourd)

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ABSTRACT

Tinda (Indian apple gourd) is a popular cucurbitaceous vegetable native to India. The vegetable is characterized by its small size that resembles a cross between a green apple and a pumpkin. Indian round gourd (P. fistulosus) is a squash-like cucurbit grown for its immature fruit, a vegetable especially popular in South Asia. It is a diffuse annual, creeping or climbing herb with stout stem and rounded fruits of the size of a small turnip, pale or dark green in colour with blackish seeds. Round gourd supplies plenty of nutrition, being inherently high on water content providing a cooling effect on the body, having zero cholesterol thereby augmenting heart health and abounding in a plethora of vitamins and minerals to facilitate key metabolic functions in the body. This is owing to its noteworthy antioxidant and anti-inflammatory qualities, due to the presence of beneficial plant compounds like flavonoids and carotenoids. The presence of Vitamins viz. A, B12 and C in tinda makes it an immunity booster vegetable. P. fistulosus has been used as traditional medicine for curing heart diseases, strokes, controlling BP, cancer etc. This review attempts to encompass the available literature on Praecitrullus fistulosus with respect to its traditional use, pharmacognostic attributes, phytoconstituents and pharmacological activities.

Keywords: Carotenoids, Flavonoids, Terpenoids, Heart diseases, BP, Minerals and Vitamins.

INTRODUCTION

India round gourd (*Praecitrullus fistulosus*) is herbaceous plant having pointed hairy stem with curly long tendrils belongs to the family Cucurbitaceae and subfamily Cucurbitoideae. It's fruit is commonly known as "Tinda" and the other vernacular names include apple gourd, and Indian baby pumpkin. Tinda is native to India, very popular in Indian and Pakistani cuisine and many gourmet dishes. Indian round gourd also naturally grows in the wilderness in South-East Asian countries such as Sri Lanka, China, Nepal and Indonesia, as well as in the warmer southern regions in Australia. Vegetables from gourd category like bitter gourd, bottle gourd, pointed gourd are known for their immense beneficial properties.

Tinda, known as the round gourd, is also one of its types which are quite underrated, however, loaded with vital nutrients and antioxidants. *Tinda* is also called Indian squash, round melon, Indian round gourd or apple gourd or Indian baby pumpkin. In Rajasthan, it is famously known by the name *Tindsi*, while in Marathi it is referred to as dhemase. The round gourd is highly nutritious as it is loaded with antioxidants like carotenoids and many anti-inflammatory agents. It is low in calories and also contains important micronutrients like vitamin A. It is one of the exceptional plants gifted by nature having the composition of essential constituents that are required for normal and good human health. It has been cultivated in Asia since ancient times and has been considered as an under exploited crop in the western world. The tender fruits are picked at the immature stage and cooked as a cooked vegetable. The tender green fruit is about the size of a small turnip, depressed at each end, hispid when young afterwards glabrous. The fruit is a berry that has a fleshy fruit with several seeds each with hard coat. *Praecitrullus fistulosus* possess a wide range of pharmacological properties. The seeds of *Praecitrullus fistulosus* are used as fodder and in medicinal purposes for curing of many diseases. Its leaves are cooked as vegetables and are taken.

This green vegetable has been well-regarded for its significant medicinal value since ancient times and is widely documented in Ayurvedic texts. Today, it continues to be heralded for its immense health benefits and is widely incorporated, in popular local cuisine across India, as well as in alleviating illnesses of the stomach, liver and skin, to name a few. This vegetable when immature has white thick flesh which is sweet. By the time it reaches maturity, it loses the hairs and a waxy coating is developed which provides a long shelf life. *Tinda* is a fibre rich vegetable and is mild for the digestive tract. Its water absorption property relieves stomach acidity and prevents constipation. The antioxidants in round gourd fight against free radicals and also help in the production of skin connective tissue collagen. Round gourd comes along with vitamin A which is good for eye health. *Tinda* contains potent antioxidants that protect the heart from oxidative stress. Also, potassium content helps in reducing high blood pressure.

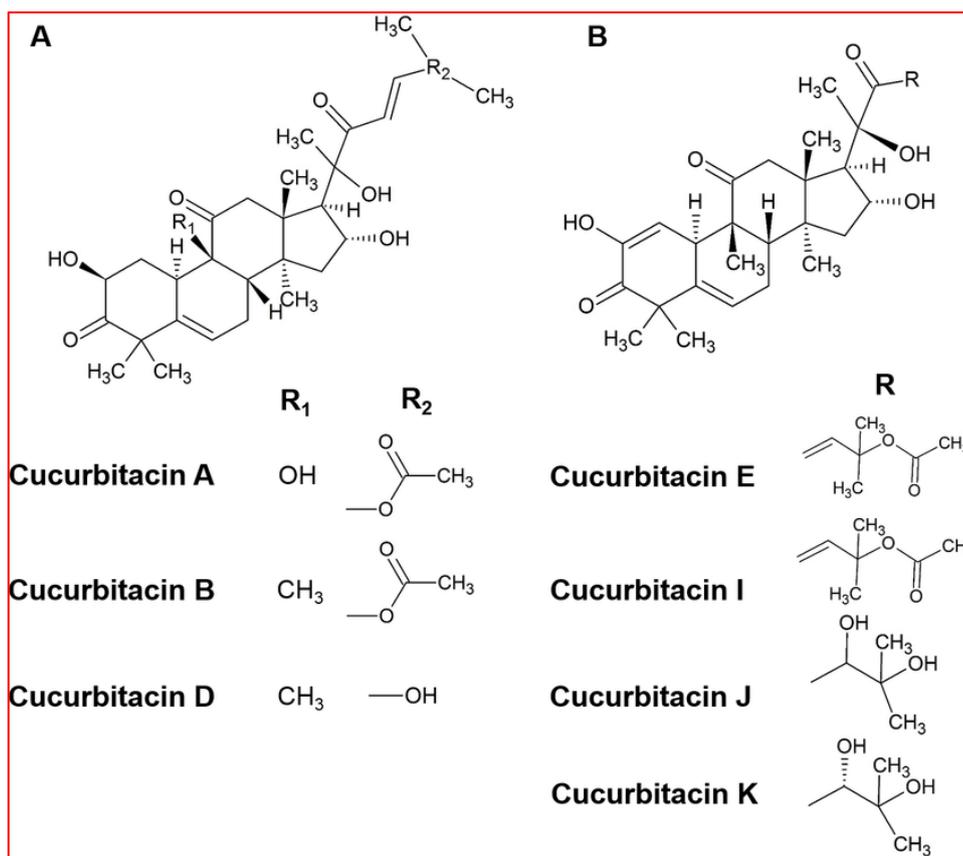
Pharmacophyto-constituents

Phytochemical analysis on the *Praecitrullus fistulosus* fruits extract revealed the presence of biologically active ingredients such as alkaloids, flavonoids, saponins, tannins, phytosterol and diterpenes. Phytochemicals are bioactive non-nutrient plant derivatives that have preventive properties. They confer plants with odor (terpenoids), pigmentation (tannins and quinines) and antioxidants (flavonoids). These bioactive components are said to be responsible for the broad spectrum of pharmacological activities of medicinal plants.



Nutritional Importance of Tinda gourd (Indian squash)

Round gourd has an intrinsic expectorant quality, which implies that it can readily loosen any excess phlegm or mucus secretions and remove them from the respiratory tract. This immensely benefits lung function and also prevents any allergies and breathing difficulties. Tinda or Indian round gourd comprises vast reserves of vitamin B6 i.e. pyridoxine, which is involved in smooth transmission of impulses and signals via the nerves, as well as in the synthesis of mood-regulating neurotransmitters serotonin and dopamine. This green vegetable is also packed with Ca, Mg, Mn and Zn – vital minerals to augment brain power, memory, concentration and effectively combat symptoms of anxiety, depression.



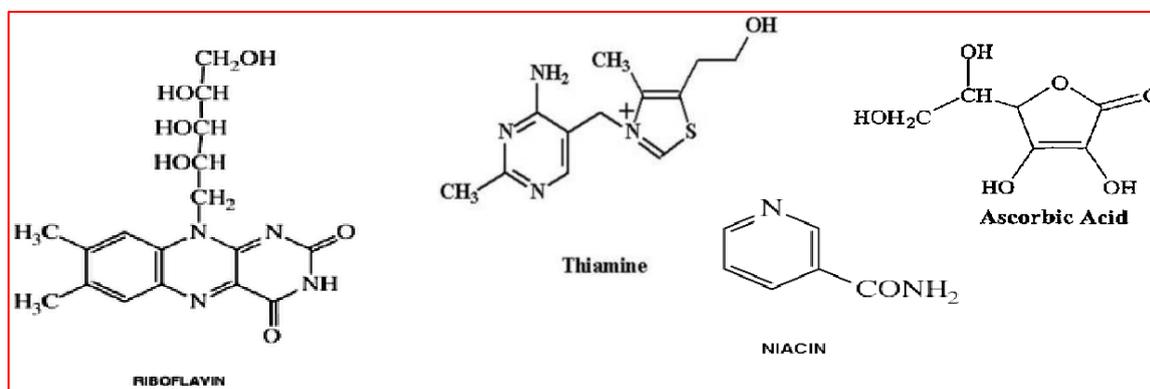
Bestowed with vitamin A, tinda works wonders in improving visual functions and is an ideal addition to the regular diet for promoting eye wellness. It is also rich in carotenoid antioxidants – lutein, zeaxanthin, which are key components of the retina and safeguard the delicate eye organelles. Furthermore, tinda helps in averting vision impairments, disorders like Age-related Macular Degeneration (AMD), glaucoma and cataracts in the later years. Indian round gourds are laden with polyphenol and cucurbitacin antioxidants, which possess powerful anti-inflammatory properties. These valuable bioactive components shield the cells in the body from oxidation by harmful free radicals and toxins. Tinda has innate content of the soothing or emollient Vitamin E that also has antioxidant properties. Tinda or round gourd has a multitude of vitamins and minerals which provide nourishment and vigour to the hair strands. Round gourd possesses moisturizing and anti-fungal properties, which act as a balm, soothing the irritated scalp and eliminating dandruff particles. When used once a month, this simple yet highly effective homemade round gourd hair gel prevents flaking of scalp and ensures nourished and lustrous tresses. Being a powerhouse of vitamin C and a host of flavonoids and carotenes, round gourd is a potent agent to boost immune system function in situations of illnesses. Tinda or round gourd supplies tremendous antioxidants for reducing inflammation during stress and infections. Round gourd is a rich source of dietary fibers to aid in digestion and performs vital biochemical functions.

As per the United States Department of Agriculture (USDA) National Nutrient Database, 100 gm of tinda contains 21 kcal, 1.4 gm of proteins, 0.2 gm of fat, 1.6 gm of fiber, 3.6 gm of carbohydrates, 0.9 mg of iron, 25 mg of calcium, 24 mg of phosphorus, 0.3 mg of niacin, 18 mg of vitamin C and 13 µg of carotene. Seeds and kernels contain 52.8 and 37.8%, respectively of a fatty oil with the following Characteristics: $[\alpha]_D, -1.4758$; saponification

value, 192.5; and iodine value, 126.5. The fatty acid composition of oil is: myristic, 1.74; palmitic, 11.85; stearic, 10.70; oleic, 21.23; and linoleic, 50.80%. The oil free-kernel has been found to contain protein in the range of 60 to 70% (Wealth of India., 1950). Like most flora of the gourd family, the round gourd vegetables, seeds, leaves and juice extracts are enriched with a multitude of crucial fundamental dietary components like carbohydrates, fats, proteins and fibers, vital trace compounds such as vitamins and minerals and a host of plant substances including phenolics and cucurbitacins.

Tinda gourd is very low calorie vegetable; just holds 21 cal/100g, relatively same calories as in pumpkins (26 cal/100g). Nonetheless, it carries ample concentrations of vitamins, minerals and fiber that help in overall health and wellness. Indian squash peel is a good source of dietary fiber which helps in smooth bowel movements and offers protection against colon cancers by eliminating toxic compounds from the gut. Tinda squash is gluten-free food items and is one of better alternative food substitute in people suffering from spectrum of gluten-related disorders. Gluten is a protein molecule in foods that causes severe food intolerance in non-celiac (gluten sensitivity) as well as celiac disease patients. Fresh Tinda squash holds relatively more amounts of vitamin-C (18 mg/100 g or 20% of RDA /100 g) than cucumbers. Vitamin-C is a water-soluble anti-oxidant that plays role as immunity booster, collagen synthesis in bones, cartilage, and blood vessels, and aids in the absorption of iron. It provides small amounts of (5 µg/100 gm) of folates.

Folate is an essential element for cell division and DNA synthesis. When taken adequately during early pregnancy, it may help prevent neural-tube defects in the newborn. Being a squash vegetable, it is very low in sodium but compose higher amounts of potassium, an important intra-cellular electrolyte. Potassium is a heart friendly electrolyte and helps bring the reduction in blood pressure and heart rates by countering pressing effects of sodium.



Further, Tinda squash carry modest levels of other B-complex groups of vitamins like thiamin, riboflavin, and minerals like calcium, iron, manganese, phosphorus, and zinc. In traditional ayurvedic medicine, Tinda squash has been thought to be alkaline in nature, and hence its consumption has a cooling and neutralizing effect on stomach acids and as such used effectively for treating digestive ailments like hyperacidity, dyspepsia, and ulcers. It is also used to treat diabetes.

Tinda is best known for its beneficial effects to the digestive system. The vegetable contains soothing properties that alleviate various digestive issues. In Pakistan, tinda is widely used as a remedy to piles and constipation. The superfood's high water and fiber content facilitates digestion and inhibits the absorption of toxic chemicals in the intestines. Aside

from this, tinda is found to improve the stomach's pH balance, which in turn relieves stomach acidity. Tinda is also touted for its anthelmintic properties that effectively eliminate parasitic worms — such as tapeworm, roundworm, and other intestinal parasites — from the body. Tinda juice is found to paralyze the worms in the same way Albendazole (a common anthelmintic drug) does. Additionally, the superfood's high water content promotes satiety and helps facilitate weight loss. Likewise, the high water supply in tinda offers diuretic properties that stimulate urination and help flush out excess water and toxins from the body. In addition, tinda is touted for its cardiovascular benefits. The vegetable contains potent antioxidants that protect the heart from oxidative stress. Likewise, the superfood's low-fat, high-fiber content regulates the body's blood pressure levels. Tinda is also believed to be a potent food fare against prostate cancer due to its high antioxidant content. Moreover, tinda's powerful antioxidants are known to counter the effects of free radicals and fortify the body's immunity against a host of diseases. Besides this, tinda contains antimicrobial properties that help stave off a variety of infections. Additionally, the globulin in tinda seeds is found to promote nutrient transport across the body and improve the overall circulation. Furthermore, tinda seeds contain omega-6 fatty acids that bolster brain function and support the nervous system. Likewise, the superfood is known to improve skin and hair health.

Therapeutic Uses and Body systems supported by Tinda

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Tinda is particularly helpful in maintaining a healthy digestive profile. Likewise, the high antioxidant levels in tinda are beneficial to the immune system. Tinda is also shown to be especially helpful in boosting the body's cardiovascular status. The superfood greatly supports the urinary system as well. The high nutrient content in tinda is also notably effective in improving the circulatory and nervous systems.

Traditional Uses

Since time immemorial, the Indian round gourd has been utilized in the vegetable, leaf, root and juice forms, as these are imbued with potent antioxidant and anti-inflammatory plant elements, to prepare ayurvedic concoctions and tonics, to remedy sicknesses such as fevers, jaundice, heart ailments and bone disorders. In general, tinda is highly beneficial for promoting physical wellness and appearance of skin and hair. Besides enhancing the fitness traits in healthy individuals, round gourd is also routinely utilised in Ayurveda, as an effective home remedy for various ailments. In most cases, it is entirely safe to take round gourd vegetables, leaf and juice extracts, but keep in mind to buy only fresh stock of the vegetable. Tinda is a superfood that can be consumed regularly, in moderation, for effectively augmenting overall well-being. The phytonutrients or plant compounds in round gourd have an inherent temperature reducing potential. The leaves of round gourd, when rubbed on a person suffering from high fever, provides immediate relief, reducing body temperature and symptoms of fatigue. Moreover, since normal metabolism is affected during fevers, round gourd leaves also expel excess water and salts from the body, in order to help maintain ideal electrolyte balance. The leaves of round gourd contain substances called cucurbitacins, which play the crucial role of boosting the defense system and liver function in the body. In addition, round gourd leaves also contain remarkable amounts of Vitamin C, which adds to the defense function and antioxidant capacity in those suffering from jaundice. Round gourd extract is considered as one of the best remedies for cardiac ailments such as palpitations, irregular heartbeats, chest pain, high blood pressure and coronary heart disease. In traditional Indian medicine, a dose of two cups of round gourd extract is given to those suffering from heart problems, to promote blood circulation and ameliorate the difficulties in performing normal day to day activities. Round gourd gel, when prepared and applied in instances of severe hair fall, invigorated the blood circulation and nerve function in the scalp, promoting rapid hair growth. Alopecia is characterized by prominent bald spots and excessive hair loss, and the high carotene content in tinda gel extract counters these factors, to reduce constant hair fall and enhance the strength and smoothness of hair. Being an effective anti-inflammatory, round gourd juice actually reduces bone and muscle pain and heals joint disorders such as arthritis, osteoporosis, gout and fractures. In addition, it is packed with the three essential bone-fortifying minerals namely calcium, magnesium and phosphorous, which in turn increases bone mass and helps regain flexible movement in muscles and joints.

Other uses

Indian round gourd is commonly considered a vegetable, which is used in cooking a variety of staple Indian dishes such as kootu, curry, sabzi and dal. The therapeutic and remedial traits offered by the vegetable, as well as round gourd seeds and leaves are extensive. Moreover, the roots and juice of round gourd also have applications in skin and hair care. Juice of Indian round gourd heals hair and scalp disorders like dandruff and bald patches. The leaves are cooked as vegetable and taken for blood pressure.. The fruits are also used to make pickles. The unripe fruit is commonly used in candied preserves and pickles, while its seeds are consumed as a snack. Tinda goes well with other vegetables such as eggplants, potatoes and peas. Tinda is also usually used in a vegetable dish called subzi, which includes curry and other spices.

CONCLUSION

Tinda is particularly helpful in maintaining a healthy digestive profile. Likewise, the high antioxidant levels in tinda are beneficial to the immune system. Tinda is also shown to be especially helpful in boosting the body's cardiovascular status. The super food greatly supports the urinary system as well. The high nutrient content in tinda is also notably effective in improving the circulatory and nervous systems. The zero cholesterol content of tinda promotes heart health. Tinda enhances the blood circulation to and from the heart, ensuring optimal functioning of cardiac muscles. The extract of tinda is beneficial in many heart complaints such as chest pain, palpitations, high blood pressure, irregular heartbeats, and CHD. The antioxidant property of vitamin E, which is present in tinda has skin smoothening properties thus, moisturizing the skin. Tinda helps combat skin infections, it decreases fungal infections, boils, or carbuncles. The abundant minerals and vitamins present in Indian squash offer nourishment to the hair the potent chemicals present in tinda helps in reducing dandruff on the scalp. Tinda promotes rapid hair growth, increases the strength of the hair, and reduce hair fall. The iodine content present in tinda helps reduce the increased thyroid hormone levels The zinc content of tinda plays an important role in helping enzyme function for optimizing thyroid concentrations. Apart from the benefits mentioned above, tinda also produces few more benefits such as battles fevers, maintain, ideal electrolyte balance, fights jaundice, boosts the defense system and liver function, heals joint disorders, uplifts immunity, alleviates insomnia, detoxifies the kidneys, enhances digestive system and strengthens respiratory processes. Excellent source of Vitamin A, antioxidants, tinda vegetable is believed to help people suffering from acute stomach acidity. Tinda is 95% water, hence an excellent vegetable for people on weight loss and detox programs.

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