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Medicinal Properties of *Cucumis melo* Linn.

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ABSTRACT

Cucumis melo Linn. fruit popularly known as Muskmelon is a pubescent or trailing herb with edible, polymorphous fruits. It is used for various ailments in Traditional System of Medicine. Fruit and roots have medicinal value. Traditionally it is used for the treatment of kidney stones, flatulence, leprosy, fever, jaundice, diabetes, obesity, cough, bronchitis, ascites, anaemia, constipation and other abdominal disorders. *C. melo* is a rich source of vitamin A, folate, flavonoids such as β -carotene, lentin, xanthin and cryptoxanthin. Its various pharmacological activities have been evaluated such as antihyperlipidemic, antidiuretic, gastroprotective, anti-hyperglycemic, anti-inflammatory and antihypothyroidism. The present review article covers the up to date information on the chemical constituents and pharmacological activities of *C. melo*.

Keywords: *Cucumis melo*, Pharmacological Activities, Chemical Constituents

INTRODUCTION

Cucumis melo commonly known as Kharboza in Hindi and musk melon or cantaloupe in English belongs to Cucurbitaceae family. Musk melon is beautiful, juicy, delicious fruit popular for its nutritive and medicinal value. Musk melon is growing in tropical and subtropical areas of the world [1].

Taxonomic classification

Kingdom	Plantae
Sub kingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta

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Class	Magnoliopsida
Order	Cucurbitales
Family	Cucurbitaceae
Genus	<i>Cucumis</i>
Species	<i>C. melo</i>
Bionomial name	<i>Cucumis melo</i>

Synonyms

Cucumis melo L. Group Conomon va. Makuwa, *Cucumis melo* L. var. makuwa Makino, *Cucumis melo* L. var. makuwa (Kitamura ex Makino), *Cucumis melo* ssp. Agrestis va. Makuwa.

Natural Habitat

C. melo prefer hot climate, medium textured soils

(loamy) but may grow on a wide range of soil types, pH should be above 5.8 preferably near 6.8. It grows near cultivated areas, townships and riverbeds [2].

GEOGRAPHICAL DISTRIBUTION

Native range: Iran, South Africa, India, Philippines, China and Australia.

Exotic range: Pakistan, Japan, India, Srilanka, Saudi Arabia, Indonesia, Yemen.

Africa: Angola, Ethiopia, Kenya, Mali, Nigeria, Senegals.

Pacific: Fiji Island, Guam, Tonga, New Britain and Samoa.

USA: California, New-York, Georgia, Arizona, Texas and Colorado.

BOTANICAL DESCRIPTION

C. melo has spreading, annual more or less hairy vines. Vines trail along the ground, though they can be trained on a trellis or other support. Vines are quite large, monoecious or andro-monoecious. Root system is large and superficial. Stems are rigid or striate. Leaves are broad dark green, rough somewhat heart shaped, ovate or angle with 5-7 lobes. Petioles long 4-10 cm with simple tendrils. Flowers yellow, seeds whitish, flat and smooth. Fruit rind varies in shape and size and has many seeds.



Figure 1: Cucumis melo
Fruit



Figure 2: Cucumis melo
seeds

Traditional uses

C. melo acts as purgative. It is used in dysuria, regulate the kidney functions, reduced blood pressure, dyspepsia, flatulence, leprosy, fever, jaundice, diabetes, obesity, cough, bronchitis, ascites, anaemia, constipation, other abdominal disorders, amentia and menorrhagia. The fruit is used as cooling agent, cleansing agent or moisturizer for the skin. It acts

as demulscent and stomachic. The seeds have antitussive, febrifuge and vermifuge properties. Fruit pulp is employed as a lotion for chronic and acute eczema [2].

Chemical composition

C. melo composed of many volatile compounds, biosynthetically derived from fatty acid, carotenoids, amino acid and terpenes. The volatile constituents such as Methyl acetate, Ethyl acetate, Ethanol, Ethyl butanol, Benzaldehyde, Benzyl acetate, Phenylmethyl acetate, Benzyl alcohol, Eugenol. Terpenoids such as β pinene; 1,8-Cineol; Limonene; p-Cymene etc [3]. Non volatile constituents such as β Carotenes, Flavonoids, Carbohydrates, Linoleic acid, α -Linolenic acid, Glycolipids, Phospholipids, Amino acids, Phenolic glycosides [4]. Phytochemical investigations of *C. melo* seeds revealed the presence of phenolic glycoside (E)-4 hydroxycinnmyl alcohol 4-O-(2'-O-b-Dapiofuranosyl) (1''_2')- b-D-glycopyranoside, benzyl O-b-D glucopyranoside, 3,29-O dibenzoylmultiflor-8-en-3_7b, 29-triol and 3-O-p-amino-benzoyl-29-O benzoylmultiflor-8-en-3 a , 7b, 29-triol [5]. Recently, six saturated fatty acids have been isolated from *C. melo* such as tetradecanoic acid, pentadecanoic acid, hexadecanoic acid, heptadecanoic acid, eicosanoic acid and octadecanoic acid and three unsaturated fatty acid named 9-hexadecenoic acid, 9-octadecenoic acid (Z) and 11-octadecanoic acid have been derived [6].

Pharmacological activities

Anti-Alzheimer effect

The seed kernels of *C. melo* are edible and nutritive in nature. The study was undertaken to evaluate the anti-Alzheimer effect of *C. melo* seed powder in mice. The brain acetylcholinesterase activity, blood cholesterol and blood glucose levels were also estimated in the study. The administration of extract significantly protected the animals from developing memory deficits due to diazepam and scopolamine. The study showed that the seed kernels exhibited memory improving effect as indicated by decreased transfer latency, increased TSTQ, decreased escape latency time, increased discrimination index and

increased step down latency. Extract also significantly decreased the acetyl cholinesterase activity indicating total blood cholesterol level and blood glucose levels. Thus, C. melo seeds extract may prove to be a useful remedy for the management of Alzheimer's disease due to its seven-fold mechanism (i) the flavonoids present in C. melo possess powerful antioxidant property (ii) linoleic acid and arachidonic acid present in C. melo seeds are responsible for growth and regeneration of cholinergic neurons (iii) phosphatidylethanolamine and phosphatidylcholine present in C. melo seeds serve as the precursors for the synthesis of acetylcholine (iv) α -linoleic acid abundantly present in the seed kernel stimulates the release of neuroprotectin D1, which performs a neuro-protective role (v) the inhibition of acetyl cholinesterase enzyme by C. melo seeds (vi) lowering of blood cholesterol and (vii) finally, anti-hyperglycemic effect of C. melo seeds help in the prevention of brain damage due to excessive glucose [7].

Gastroprotective effect

Peptic ulcer is the most common GIT disorder in the present day life of civilized world. The prevention or cure of peptic ulcers is one of the most important challenges confronting medicine nowadays. The present study was carried out to evaluate the gastro protective effects of aqueous extract of C. melo by pylorus ligated method. The result showed significant anti-secretory activity as evidenced by decreased pepsin secretion, gastric juice volume and acid output in pylorus ligated rats. The findings therefore demonstrated that aqueous extract of C. melo has potent antisecretory and gastro protective effects and justify the traditional usage of this herb to treat peptic ulcer [8].

Hepatoprotective activity

C. melo has protective effect against CCL4 intoxication and result showed that it improve hepatic function and increase gluconeogenesis [9].

Anti-Hyperglycemic Activity

C. melo L (Cucurbitaceae), from many centuries

have been used in traditional medicinal system, for the treatment of various disorders of heart such as Cardio protective and anti obesity. C. melo leaf extract was investigated for its antihyperglycemic effects against streptozotocin induced hyperglycemia in rats. The results concluded that methanolic extract of C. melo leaf have greater anti-hyperglycemic activity than aqueous extract in streptozotocin induced hyperglycemia model and when compared with Glibenclamide treated group. Therefore the study demonstrated that the methanolic extract of C. melo leaf having anti- hyperglycemic activity [10].

Diuretic activity

The diuretic effect of ethanolic seed extracts of Macrotyloma uniflorum and C. melo in Albino rats were evaluated. Furosemide (5mg/kg) was used as a drug. The diuretic effect was evaluated by measuring the Urine volume, Sodium, Potassium, Chloride and Bicarbonate contents. A significant Diuretic effect was observed treated with extracts of Macrotyloma uniflorum and C. melo individually in experimental animals compared to the control. However, extract of C. melo showed more diuretic effect than standard. The results, therefore, explains the use of Macrotyloma uniflorum and C. melo as a cure for renal diseases in traditional medical practice [11].

Antioxidant activity, Analgesic and anti-inflammatory activity

C. melo methanol extract of seeds possesses analgesic activity and also inhibited the leukocytes influx and diminished LTB4 levels, there by producing anti-inflammatory effect [12]. C. melo methanol extract showed DPPH and hydroxyl radicals scavenging activity particularly due to the presence of phenolic compounds especially flavonoids [13].

Antiulcer activity

Anti-ulcer activity of methanol extract of seed of C. melo evaluated and was observed by the result that C. melo seed exhibited anti-ulcerogenic activity. This may be due to the presence of triterpenoids and sterols [14].

Protect against hypothyroidism

An investigation was made to evaluate the pharmacological importance of fruit peel extracts of *C. melo* with respect to the possible regulation of tissue lipid peroxidation (LPO), thyroid dysfunctions, lipid and glucose metabolism. Pre-standardized doses 200mg/kg and 100mg/kg of *C. melo* were administered to Wistar albino male rats for 10 consecutive days and the changes in tissue (heart, liver and kidney) LPO and in the concentrations of serum triiodothyronine T3, thyroxin T4, insulin, glucose, alpha-amylase and different lipids were examined. Administration of test peel extracts significantly increased both the thyroid hormones T3 and T4 with a concomitant decrease in tissue LPO, suggesting their thyroid stimulatory and antiperoxidative role [15].

Antimicrobial activity and anthelmintic activity

Antibacterial screening of ethanol and chloroform extracts of fruits of *C. melo* and whole plants of *Phyllanthus maderaspatensis* were determined in both disc and well diffusion method against four human skin pathogenic bacteria. The ethanol extracts of both the plants in disc diffusion method showed maximum broad-spectrum antibacterial activity against all four pathogens *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella sp.* and *Staphylococcus aureus* compare to chloroform extract [16].

Anti-fertility activity

C. melo is a favorite plant of Bhat community which uses it for the regulation of fertility [17].
Anti-atherosclerosis activity
C. melo juice prevents atherosclerosis and liver steatosis. Active agent Adenosine isolated from aqueous melon extract inhibited human platelet aggregation induced by epinephrine, ADP, collagen, thrombin, sodium arachidonate, prostaglandin endoperoxide analogue U-46619 and PAF-acether. This activity of *C. melo* helps in the management of cardiovascular diseases [18].

Cytotoxic potential of Cucumis melo

Cytotoxic effects of aqueous fruit extract of *C. melo* in human prostate cancer cell line (PC-3) were evaluated using MTT and neutral red assays. The study confirms the anti-cancer and cytotoxic potential of the fruit of *C. melo*. Three components found in *C. melo* are Cucurbitacin- β , Lithium and Zinc which exhibit promise in cancer prevention. Therefore the anticancer activity might be any one of these three components [18].

CONCLUSION

Medicinal plants are used for the therapeutic purpose from the beginning of human civilization. *C. melo* is a beautiful juicy, tasty and delicious fruit used for its nutritive and medicinal properties. Pharmacological studies conducted on *C. melo* showed that it exhibited immense potential for the treatment of conditions such as pain, liver disorders, cancer, inflammation, kidney stones and hypothyroidism. This fruit holds extraordinary promise for the future. Therefore, more work is required to explore its therapeutic potential as it has more therapeutic properties which are still not known.

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