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ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY OF EXTRACT OF Cucurbita maxima – A REVIEW

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Article Info	ABSTRACT
Received 19/04/2018	Cucurbita maxima is easily available in many parts of world. The creeper is having
Revised 01/05/2018	different medicinal uses. The different parts of the plant is taken by the people in their daily
Accepted 10/05/2018	food habbit. The major constituents present in the plant are amino acids, vitamins,
	minerals, fibres and carbohydrate etc. The plant have different pharmaceutical activity such
Key words: -	as anticancer activity, anti-diabetic activity, anti-bacterial activity, cardiotonic activity,
Cucurbita maxima,	anti-diuretic activity. One important approach for the treatment of type 2 diabetes mellitus
Anticancer activity,	is by decreasing the postprandial hyperglycemia in effect. This is possible by inhibiting
Amino acids.	certain carbohydrate hydrolyzing enzyme like α -amylase and α -glucosidase. Articles have
	reported that the methanolic extract of leaves of C. maxima showed strong antioxidant
	(DPPH scavenging) and α -amylase inhibition (IC50 125 µg/ml and IC50 2.1 mg/ml),
	respectively. The anti-diabetic activity is one of the major activity shown by the leaves.
	The antibacterial activity is also shown by the seeds and fruits. It was observed that the
	presence of the basic proteins as constituents are responsible for the antibacterial and anti-
	fungal activity. The presence of tannins present were mainly polyphenols which are
	responsible for the anthelmentic and wound healing property.

INTRODUCTION

Cucurbita maxima belongs to the Cucurbitacae family, which includes cucumber, melon and squash. Within this family is the genus *Cucurbita* which includes all varieties of *Cucurbita maxima*. The name *Cucurbita maxima* originated from pepon the Greek word for large melon. The *Cucurbita maxima* is grown in all the six continents of the world except in Antartica. *Cucurbita maxima* plants are hardy creepers or soil surface runners, but able to climb where there are supports. The biggest international producers of *Cucurbita maxima* include

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UnitedStates, Canada, Mexico, India and China. The color of *Cucurbita maxima* derives from orange carotenoid pigments, including beta-cryptoxanthin, alpha and beta carotene, all of which are provitamin A compounds converted to vitamin A in the body [1, 2].

Constituents

The main constituents present in the *Cucurbita* maxima were amino acids, vitamins, fats, fibres, minerals and carbohydrates. The fruits and seeds are rich in the amino acids mainly alanine, arginine, cucurbitin, cystine, glycine, histidine, isoleucine, lysine. Fatty acid such as linoleic acid, aspartic acid, oleic acid and palmatic acids are present in the flowers, fruits and seeds. Lecithin is present in the seeds. Minerals such as calcium, cobalt, boron, magnesium, zinc, potassium, iron present in the fruits.

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Carbohydrate mainly sucrose is present in the fruits of *Cucurbita maxima* [3].

Generally the cultivation of Cucurbita maxima can

be found worldwide. The different species of Cucurbita maxima grown in different parts of the world is mentioned below.

Table 1.Different Species of Cucurbita maxi	та
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S. No	Types	Characteristics
1	Boston marrow	Boston marrow is also known as Autumnal Marrow it is a late-summer squash it begins to
		ripen in August and will continue until frost. The weight of the fruit is about 8 to 9 pounds
		and the length of the veins is about 14-16 feet. The thickness of skin of the fruit is similar to
		that of egg shell and may get easily damaged if not stored well.
2	Banana Squash	This is also known as Mexican Banana and Plymouth Rock it is much more popular in the
		West and on the West Coast than in the East. The fruits gets ripe in early mid Septembers
		The fruit measures about 18 to 20 inches long and 5 to 6 inches in diameter, and weighs 10
		to 12 pounds. The flesh is yellowish orange, fine textured, and dry.
3	Turban Squash	This is also known as Turk's Cap and in France it is popularly known as the giraumon
		turban. Its produces veins of about 8 to 10 foot in length with dark green leaves because of
		their smaller they are suitable to be grown in the gardens. It is of about 8 to 12 inches in
		thickness
4	Kabocha	Kabocha is the member of the cucurbit or Cucurbita maxima family. In Japan, kabocha is
		known as nutty flavoured Cucurbita maxima. Kabocha varieties are hybrids originally
		developed from open pollinated C. maxima strains.
5	Hubbard Squash	This is the most famous of all American winter squashes it takes about115 days to get
		matured on trailing vines up to 15 feet long. The leaves are lobed and somewhat large. The
		fruit is about 12 to 15 inches in length and no more than 10 inches in circumference. The
		maximum weight is generally between 9 and 12 pounds. The skin of the squash is rough,
		wrinkled, and warty, with a prominent corky button on the blossom end.
6	Olive Squash	Olive squash is also known as 'Courge Olive' Squash This may be considered the French
		equivalent of the Hubbard squash and from botanical point of view they both are similar. The
		French claim that the squash looks similar to that of an unripe olive hence it is named as olive
		squash. The veins are very pale green in color the fruit is about foot long and 6 inches in
		diameter and the squash weigh about 6-8 pounds
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7	Pike's Peak	Pike's Peak Squash is also known as 'Sibley' Squash The veins is about 12-15 feet in length
	Squash	and the squash takes about 120 days to ripe. The length of fruit is about 1 foot and 9 inches in
		diameter. The skin of the squash is much smoother then blue hubbed. In storage, the skin
		changes color to a pinkish bull, somewhat similar to the blue bahana squash. The flesh becomes
		line, moist, and pale orange in color. It is an ideal storage squash because the fiesh becomes
0	Detinon nonce rif	The finite riser in 120 days or viscous since reaching 18 to 20 fact in length. The finite from
0	rouron rouge vii	The truns ripen in 150 days on vigorous vines reaching 18 to 20 feet in length. The fruit offen
	d'Etampes'	is thick and a deep vallow color, but leading in flowour
	Squasn	is the k and a deep yenow color, but lacking in havour
9	Buttercup Sausch	Buttercup Squash are part of the Turban squash family and are a popular variety of winter
Í	Datter cup Squash	squash This squash has a dark-oreen skin sometimes accented with lighter oreen streaks and
		it has a sweet and creamy orange flesh. This squash is much sweeter than other winter
		varieties
		various.

Cultivation of Cucurbita maxima

Planting techniques are essential for cultivation the process of cultivation is almost similar to all types of *Cucurbita maxima* the seeds should be sown in a gap of 3-4 feet between each plant, depending on the leaf size large-leafed varieties should be farther apart. At first the cultivation should be started indoor and the stronger plants should be transferred to the pots and allow the plants to

grow and become well established in the pots, then set them out on hills as soon as the weather is warm. If the plants are large and growing vigorously before the end of June when the squash beetles come into season, they will better survive the attacks of this insect. Most of the time the plant get effected due to fungus such as Pseudomonas syringae, Pseudoperonospora cubensis, Didymella bryoniae, Septoria

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cucurbitacearum etc hence proper fungicides have to be used to avoid such attacks [4,5].

Seed Saving

To save seed, allow the fruit to ripen on the vine until the plants begin to die. Finest specimens with the best varietal characteristics has to be selected for seed. Harvest the fruit and store in a cool, dry place. Further aging in storage raises seed viability. Scrape out the seeds and wash them in a colander to remove the placenta, the stringy flesh surrounding the seeds. Spread the seeds on screens or paper towels to dry. Let it dry 2 to 3 weeks, then store in dated, airtight jars in a cool, dark closet. When properly stored, squash seed will remain viable for about six years [6].

PHARMACOLOGICAL ACTIVITIES

Antidiabetic Activity

Researchers have evaluated the antidiabetic activity of methanolic extract of aerial part of Cucurbita maxima. They under gone the experimentation on Wistar albino rats against streptozotoein (50 mgkg⁻¹,i.p.,) at the doses of 200 and 400 mgkg⁻¹, p.o.for 14 days. Glibenclamide was used as the reference. They determined the antioxidant activity of the extract by measuring lipid peroxide, catalase and glutathione level of kidney, liver and pancreas. The fasting blood glucose levels were measured on days of 0, 4, 8 and 15 respectively the decrease in the blood glucose level when compared to their initial values were observed from the 15 day. From the investigation they concluded that the methanol extract of aril part of Cucurbita maxima has a good anti-diabetic activity and antioxidant activity which may be due to presence of flavonoids, polyphenolic or polysaccharide in extract [7].

Antimicrobial activity

It was found that the anti-bacterial and anti-fungal activity was found in the isolated components of the ethyl acetate extract of *Cucurbita maxima*. The extract was having significant anti-bacterial against bacterial and fungi. The drug was collected to destroy the growth of bacteria and fungi. Bacterial strains such as *S.typhi, E.coli, E.faecalis* and *B.cereus* were used and fungal strains are the *C.lunata* and *C.albicans*, tested by using disc diffusion method. In bacterial activity isolation of ethyl acetate was also compared with the standard Chloramphenicol and the fungal activity for isolated compound was compared with the standard Fluconazole [8].

Antihelmintic activity

It was found that the *Cucurbita maxima* have good anthelmintic activity against the adult earthworms (*Pheretima posthuma*). The crude extracts of were assayed against adult earth worms) for the evaluation of antihelmintic activity. The method used to perform antihelmintic activity was done by Ghosh method. Various concentrations of these both *Cucurbita maxima* seeds and Carica papaya (papaya)seeds extracts were tested and results were expressed in terms of paralysis and death of warms. Albendazole was used as reference standard which shows more wormicidal activity at 60mg/ml. The time of paralysis was noted to be 1.88 ± 0.52 minutes and 1.93 ± 0.57 and the death time was found to be 3.45 ± 0.17 minute and 4.90 ± 0.18 minutes respectively [9].

Antidepressant activity

Antidepressant activity was also found in the extracts of the *Cucurbita maxima* seeds powder. The studies were performed with the two different tests like Forced -Swimming Test and Tail suspension test to study anti-depressive activity. The standard drug was used for the experiments was Imipriamine. Methyl Isobutyl Ketone (100 mg/kg) was used as the depression inducer in rats. The result shows that there was a significant decrease in duration of immobility time (sec) of all experimental rats compared with depressed control group in Force Swimming Test and a significant decrease in duration of immobility time (sec) of all experimental rats compared with depressed control group in Force Swimming Test and a significant decrease in duration of immobility time (sec) of all experimental rats compared with depressed control group for Tail Suspension Test[10].

Antidiuretic activity

Researchers have undergone studies on Adult albino rats to determine the antidiuretic activity of ethanolic extract of *Cucurbita maxima* seeds. The rats may be of either sex weighing in between 150-200gms were used. The diuretic activity of *Cucurbita maxima* at the dosage of 150mg/kg and 300mg/Kg was compared with Standard drug Furosemide at the dosage of 20mg/Kg. Diuretic activity was measured by collecting total excreted urine (0-5hrs) the rats being kept in metabolic cage. They concluded that the ethanolic extract of *Cucurbita maxima* produces significant diuresis however its effect is not as strong as standard drug Furosemide [11].

Anti cancer activity

The methanol extract of *Cucurbita maxima* seed against Ehrlich ascites carcinoma. Methanolic extract of *Cucurbita maxima* treatment significantly reduced tumor volume probably by lowering the ascitic fluidvolume. The packed cell volume and number of viable EAC tumor cells in peritoneum were significantly lower in mice treated with methanolic extract of *Cucurbita maxima* when compared to tumor control group. Thus it indicates a directcy to toxic effect of methanolic extract of *Cucurbita maxima* ntumor cells or an indirect local effect, which may involve macrophage activation and vascular permeability inhibition [12].

Cardiotonic activity

Primitive pharmacological screening with crude extract of *Cucurbita maxima* seeds revealed that it produces



inotrophic effect on frog heart and a slight transient rise in mean arterial blood pressure in dog which was not dose dependant. Study of ECG in dog revealed elevation of QRS complex and decrease in heart rate. The extract has beta adrenergic stimulant activity. So C.M shows cardiotonic activity [13].

Other medicinal uses

Cucurbita maxima seed is used to treat ailments of the prostate gland. The seeds of Cucurbita maxima consists of a substance called curbicin which noticeably improved the symptoms of enlarged prostate. Cucurbita maxima seed oil is also found to be beneficial in ailments of the urinary system. The seeds are still a popular de-worming remedy, especially for children, as they are nontoxic and safe. Cucurbita maxima seed oil improved arthritic conditions, while a decoction of the seeds is used to remedy intestinal inflammation. Cucurbita maxima flesh is high in fibre and acts as a gentle laxative .The decoction of leaves of Cucurbita maxima reduce fever. (Boil a handful and a half of Cucurbita maxima leaves per liter of water for 10 minutes. Let stand for half an hour. Take four cups a day.). Cucurbita maxima favours the intestinal transit, being specially interesting the fact that it does not t irritate the intestinal tract. It is also used as Anti-prostatic Recent studies seem to suggest it is very effective, when combined with the lipophilic extract of the palm " Serenoa repens " for the treatment of benign prostate hyperplasia. By decreasing the inflammation, this gland doesn't make so much pressure on the urethra, which makes easier the expulsion of urine.

CONCLUSION

From all the above articles we found that different parts of the *Cucurbita maxima* plant have various pharmacological activities. The seeds of the plant have shown more therapeutical activities. It was found that the seeds are the rich source for different secondary metabolite such as various amino acids, fats, fibres, carbohydrates and other important compounds. The presence of different constituents have provided a vast scope for the pharmacological studies on the seeds of *Cucurbita maxima*.

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Nil

CONFLICT OF INTEREST No interest

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