Research Article

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COMPARATIVE STUDIES ON ANTHELMINTIC POTENTIAL OF *CUCURBITA MAXIMA* (PUMPKIN) SEEDS AND *CARICA PAPAYA* (PAPAYA) SEEDS

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ABSTRACT

The crude extract of *Carica papaya* (papaya) seeds **(**CP) and *Cucurbita maxima* (Pumpkin) seeds (CM) were assayed against adult earthworms *(Pheretima posthuma)* for the evaluation of anthelmintic activity. Various concentrations of both extracts were tested and results were expressed in terms of time for paralysis (P) and time for death (D) of worms. Albendazole was used as a reference standard. The result showed that in both of the extracts (i.e. CP and CM) dose of 60 mg / ml possesses more wormicidal activity. The time of paralysis was 1.88 ± 0.52 minute and 1.93 ± 0.57 minute whereas the time of death was 3.45 ± 0.17 minute and 4.90 ± 0.18 minute in the case of *Carica papaya* and *Cucurbita maxima* respectively. In conclusion, the use of seeds of *Carica papaya* (CP) and *Cucurbita maxima* (CM) for anthelmintic activity have been confirmed and further studies are suggested to isolate the active principles responsible for the activity. Both the extracts showed significant anthelmintic activity, but the comparative study showed that out of these two, *Carica papaya* proves to be a better anthelmintic remedy.

Keywords: Anthelmintic, *Pheretima posthuma, Cucurbita maxima*, Albendazole, *Carica papaya*.

INTRODUCTION

The World Health Organization estimates that a staggering two billion people harbor parasitic worm infections. Development of resistance to most of the commercially available anthelmintics became a severe problem worldwide[1]. Moreover, these drugs are unaffordable, inaccessible or inadequately available to the poor farmers of the developing countries[2]. These factors paved the way for herbal remedies as alternative anthelmintics[3]. Evaluation of the activities of medicinal plants claimed for possessing the anthelmintic property is getting attention these days[4,5]. Screening and proper evaluation of the claimed medicinal plants could offer possible alternatives that may be both sustainable and environmentally acceptable[5]. In the current study, we have attempted to investigate pumpkin seeds and papaya seeds for their claimed anthelmintic activity. *Cucurbita maxima* Duch. (Family Cucurbitaceae) commonly known as Squash is widely used as vegetable and a source of vitamin A, iron, phosphorus and calcium. The fruits after harvest can be stored many months, if kept dry. Research on this plant reported that Spinasterol isolated from the flowers of *Cucurbita maxima* showed potential anticarcinogenic, antigenotoxic[6], antimutagenic and antitumorigenic activity[7]. The seeds were used in the treatment of liver and digestive disorders[8], while the oil from the seeds exhibited anthelmintic property[9]. *Carica papaya* L. (family Caricaceae) is a fast growing small tree, about 5-10 meter in height with straight, cylindrical, soft; hollow, grey trunk roughened by the presence of large leaf- and inflorescence scars. Papaya fruit is a source of nutrients such as provitamin A, carotenoids, vitamin C and dietary fiber. Papaya skin, pulp and seeds also contain a variety of phytochemicals, including lycopene and polyphenols. It is cultivated in tropical countries mainly in Australia, Hawai, India, Sri Lanka, Philippines, South Africa and Nigeria. Its seeds are black, tuberculous and enclosed in a transparent aril. The seeds are considered as carminative, emmenagogue, abortifacient, vermifuge, thirst quencher and counter-irritant. Seed extract is used to treat bleeding piles and enlarged liver and spleen. Seed paste with glycerine can be applied to cure ringworm and psoriasis[10]. The ripe seeds are taken with rice and useful to treat diarrhoea. The seeds are effective to control diabetes mellitus, hypertension and hypercholesterolemia[11-13]. A seed decoction is beneficial to cure liver and renal disorders[14]. The seeds contained a fixed oil composed of myristic, palmitic, stearic, arachidic, behenic and unsaturated fatty acids[15], phospholipids, carpaine, benzylisothiocyanate, benzyl glucosinolate, glucopaeolin[16], hentriaontane, β-sitosterol[17], caricin (sinigrin) and myosine. The papaya seed extracts showed antifertility effect[18-22], inhibited jejunal contraction and suppressed cauda epididymal sperm motility[23,24].

MATERIALS AND METHODS

The methodology adopted to evaluate the anthelmintic activity of seeds of *Cucurbita maxima* (pumpkin) and *Carica papaya* (papaya).

Plant Material

The seeds of *Cucurbita maxima* (pumpkin) and seeds of *Carica papaya* (papaya) were collected. The seeds were identified, authenticated and Voucher herbarium specimen was deposited in the Department of Pharmacognosy of ROFEL, Shri G. M. B College of Pharmacy for future reference bearing Nos-RPC/RS/003

and RPC/RS/004 respectively. The seeds were shade-dried, grinded and stored in room temperature in a closed container for further use.

Preparation of Extract

The seeds are procured from pumpkin and papaya from the local market of Vapi, India. Seeds are dried at about 50°C in hot air oven for over-night then pulverized to course powder, extracted by Soxhlet using 70 % (v/v) Hydro-alcoholic solution. Both extracts were dried at 40-60°C.

Worm Collection and Authentication

Indian adult earthworms (*Pheretima posthuma*) were collected (due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human being) from moist soil and water logged areas at Vapi, Namdha Road, India and was identified at the Department of Pharmacology, ROFEL, Shri G. M. B College of Pharmacy Vapi, India. Then all collected worms were washed with normal saline to remove all the faecal matter and used for the anthelmintic study. The earthworms of 3-5 cm in length and 0.1-0.2 cm in width were used for all the experimental protocol.

Sample Preparation

The solutions of pumpkin seed extract (CM), Papaya seed extract (CP) and albendazole were made in the concentrations of 20, 40, 60 mg / ml in normal saline as vehicle.

Drugs and Chemicals

Albendazole (BANDY, Mankind Pharma Ltd., New Delhi, India), Saline water (Claris Life sciences Ltd., Ahmedabad, India)

Anthelmintic Activity

The anthelmintic activity was performed according to the method of Ghosh *et al*.[25] on adult Indian earthworm *Pheritima posthuma* as it has anatomical and physiological resemblance with the intestinal roundworm parasites of human beings[26,27]. *Pheritima posthuma* worms are easily available and used as suitable model for screening anthelmintic drugs[28]. Ten groups were made, each containing six adult earthworms of approximately equal size. The solutions of Papaya seed extract (CP), Pumpkin seed extract (CM) and albendazole were made in the concentrations of 20, 40, 60 mg / ml in normal saline as vehicle. Groups of earthworms were released into 10 ml of desired formulations as made above and one group was treating as control in normal saline. The observation was made for the time taken to cause paralysis and death of individual worms. Paralysis was said to occur when the worms did not move even in normal saline. Death was concluded when the worms lost their motility followed by fading away of their body colours.

RESULTS

As shown in Table 1, Papaya seed extract (CP) and Pumpkin seed extract (CM) exhibited anthelmintic activity in dose-dependent manner giving shortest time of paralysis (P) and death (D) with 60 mg/ml concentration. The Papaya seed extract (CP) caused paralysis (P) of 1.88 minutes and time of death (D) of 3.45 minutes. While Pumpkin seed extract (CM) revealed paralysis of 1.93 and death of 4.9 minutes. respectively against the earthworm *Pheretima posthuma*. The reference drug, albendazole showed paralysis at 1.15 and 3.23 minutes respectively.

Table 1: Anthelmintic Potential of *Cucurbita maxima* (CM) Seeds and *Carica papaya* (CP) Seeds

Treatment	Concentration used in mg / ml	Time taken for paralysis (minutes)	Time taken for death (minutes)
Control (Normal Saline)	-	No paralysis (up to 7.2 minutes)	No paralysis (up to7.2 minutes)
CP extract	20	2.43 ± 0.08	6.16 ± 0.42**
	40	2.12 ± 0.64	4.81 ± 0.54**
	60	1.88 ± 0.52	3.45 ± 0.17**
CM extract	20	2.93 ± 0.81	7.20 ± 0.72*
	40	2.57 ± 0.58	6.32 ± 0.48*
	60	1.93 ± 0.57	4.90 ± 0.18*
Albendazole	20	1.93 ± 0.78	5.55 ± 0.34
	40	1.44 ± 0.55	4.12 ± 0.44
	60	1.15 ± 0.38	3.23 ± 0.88

Each value represents mean ± S.D (N = 6), analyzed by Dunnett's test *= $p < 0.01$, **= $p < 0.05$. This activity was Concentration dependent. The potency was found to be inversely proportional to the time taken for paralysis and time of death of the worms

DISCUSSION

Albendazole by increasing chloride ion conductance in worms muscle membrane produce hyperpolarization and reduce excitability that which led to muscle relaxation and flaccid paralysis[29]. Phytochemical screening of the *Carica papaya* extracts revealed the presence of alkaloids, saponins, flavonoids, triterpenes, tannins, steroids, phenols, phytate and steroids etc. The phytochemical and pharmacological studies performed indicated the different extracts (petroleum ether, ethyl acetate and alcohol) of *Cucurbita maxima* also contain carbohydrates, flavonoids, tannins, phenolics and saponins[30]. The presence of tannins in the seed of *Carica papaya* can support its strong use for healing of wounds, ulcers, hemorrhoids, frost-bites and burns in herbal medicine[31]. Tannins were shown to produce anthelmintic activities, chemically tannins are polyphenolic compounds. It is possible that tannins contained in the extracts of *Carica papaya* and *Cucurbita maxima* produced similar effects. Reported anthelmintic effect of tannins is that they can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and may cause death. The exact mechanism of the anthelminthics activity of *Carica papaya* and *Cucurbita maxima* cannot be explained on the basis of our present results. From the observations made, higher concentration of extract produced paralytic effect

much earlier and the time to death was shorter for all worms. Further studies are in process to identify the possible phytoconstituents responsible for anthelmintic activity. As seeds are cheap, easily available in the local market, therefore seeds of these plants could be categorized under Anthelmintic herbal drugs and could become a key ingredient of Anthelmintic herbal formulation.

CONCLUSION

From the above result it is concluded that extract of seeds of *Carica papaya* (CP) have a potent anthelmintic activity when compared with extract of seeds of *Cucurbita maxima* (CM) as *Carica papaya* has taken lesser time in terms of paralysis and death. It is comparable with standard drug. Further studies using *in vivo* model are required to find out and to establish effectiveness and pharmacological rationale for the use of these seeds as anthelmintic drug. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of these two plants seeds as anthelmintic. These seeds may be further explored for its phytochemical profile to recognize the active constituent responsible for anthelmintic activity.

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