



RESEARCH ARTICLE

IN-VITRO ANTHELMINTIC ACTIVITY AND PHYTOCHEMICAL INVESTIGATION OF *CARICA PAPAYA* LINN LEAVES AND ROOTS

¹Kiran Kumar, S.J. and ²Deenadayalan, K.

¹:PhD Research Scholar (Biotechnology), JAIN (Deemed-to-be) University, School of Sciences, Bengaluru-560011; ²:Principal, SSK PU College, 1st Stage, II Phase, Chandra Layout, Bengaluru, Karnataka, India - 560 072

ARTICLE INFO

Article History:

Received 20th October, 2024
Received in revised form
17th November, 2024
Accepted 24th December, 2024
Published online 31st January, 2025

Key Words:

Anthelmintic, *Pheretima posthuma*,
Carica Papaya, Albendazole.

*Corresponding author:

Kiran Kumar, S.J.

ABSTRACT

In the present work, experiments were conducted to evaluate the possible anthelmintic potential of *Carica papaya* Linn. leaves and roots using Indian earthworm (*Pheretimaposthuma*) at different concentrations i.e. 20, 50 & 100 mg/ml. The Albendazole 20mg/ml & Distilled Water were used as a standard & control respectively. Results were expressed in terms of time for paralysis and time for death of worms. The phytochemical testing of extracts of *Carica papaya* Linn. leaves & roots was done & it showed that *Carica papaya* Linn. leaves and roots contains Alkaloid, Glycosides Flavonoid, Saponin, Steroid and Anthraquinones. It was noticed in this investigation that the time of paralysis & death of worms was the dose dependent. The result revealed that root extracts of *Carica papaya* Linn has better activity than *Carica papaya* Linn. leaf extracts.

Copyright©2025, Kiran Kumar and Deenadayalan. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Kiran Kumar, S.J. and Deenadayalan, K. 2025. "In-vitro anthelmintic activity and phytochemical investigation of *Carica papaya* linn leaves and roots". *International Journal of Current Research*, 17, (01), 31576-31578.

INTRODUCTION

The demand for herbal products increases all over the world and major pharmaceutical companies are currently conducting research on medicinal plants on large scale for their potential medicinal value. Plant medicine has been used for the treatment of various ailments throughout the world before the advent of modern synthetic drugs. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several synthetic drugs and development of resistance to currently used drugs for infectious diseases have lead to increased emphasis on the use of plant material as a source of medicines for a wide variety of human ailments.^[1] Anthelmintics are the drugs used to treat infections of parasitic worms. This includes both flat worms (flukes and, tapeworms) and round worms, i.e., nematodes. They are of huge importance for human tropical medicine and veterinary medicine.^[2] Helminthiasis infection is the most common infection in man which affects the large proportion of world's population. The World Health Organization estimates that a staggering 2 billion people harbor parasitic worm infections. Albendazole, mebendazole, triclabendazole, thiabendazole, niclosamide, rafoxanide and other popular synthetic anthelmintic drugs were used in helminthiasis. However, resistance has been developing very fast as well as some Anthelmintic drugs, such as Praziquantel and Albendazole are contraindicated for certain groups of patients such as pregnant and lactating women.^[2,3] This increased the need for development of novel anthelmintic drugs. Utilization of

traditional medicine should be considered in this scenario to kill these parasitic worms and it will help to find out new molecular entities. Keeping this in view, the present study deals with the evaluation of the Anthelmintic activity of *Carica papaya* Linn. leaves and roots^[4] *Carica papaya* Linn.

Family: Caricaceae. The papaya is a short-lived, fast-growing, woody, large herb to 10 or 12 feet in height. It generally branches only when injured. All parts contain latex. The hollow green or deep purple trunk is straight and cylindrical with prominent leaf scars. Its diameter may be from 2 or 3 inches to over a foot at the base. Papaya is a powerhouse of nutrients and is available throughout the year. It is a rich source of three powerful antioxidant vitamin C, vitamin A and vitamin E; the minerals, magnesium and potassium; the B vitamin pantothenic acid and folate and fiber. Papaya contains many biologically active compounds. Two important compounds are chymopapain and papain, which are supposed to aid in digestion. It is also used as anthelmintic.^[5,6]

MATERIALS AND METHODS

Collection and Authentication of Plant material: Fresh leaves and roots of *Carica papaya* Linn. were collected from Lal Bagh and authenticated by Deenadayalan K. After authentication, fresh leaves and roots of *Carica papaya* Linn plants were collected in bulk, washed under running tap water, dried under shade for a period of 7 days and then pulverized in

mechanical grinder to obtain coarse powder. The dried powder was stored in airtight bottles.^[7]

Collection and Authentication of Worms: Indian earthworm *P. posthuma* were collected from GKVK, Bengaluru. Indian adult earthworms (*Pheretima posthuma*) were used to study anthelmintic activity. The earthworms were collected were washed with normal saline to remove all faecal matter. The earthworms of 5-8 cm in length and 0.2-0.3 cm in width were used for all experimental protocol.

Extraction methodology

Extract of *Carica papaya* Linn leaves and roots: The dried leaves /roots (40 g) of *Carica papaya* were placed in a soxhlet apparatus separately for 04 to 05 hrs. Extraction was performed with 200 ml of 95% ethanol for 48 h at a temperature not exceeding the boiling point of the solvent. Extracts were filtered & concentrated by keeping in water bath at 40°C until dry mass is obtained.^{8,9,10} Extract was filtered through a 45 µm filters.

Experimental worms: Indian earthworm *Pheretima posthuma* were used to study Anthelmintic activity. The earthworms were collected from the moist soil and washed with normal saline to remove all faecal matter. The earthworms in 5-8 cm in length were used for experimental protocol due to their anatomical and physiological resemblance with the intestinal roundworms parasites of human beings.^[11]

Anthelmintic screening: For the Anthelmintic activity, Indian adult earthworms (*Pheretimaposthuma*) in 5-8 cm in length were used. The earthworms were divided in eight groups of six earthworms in each group {Distilled Water (Control group), Albendazole (Standard group), *Carica papaya* Linn. Leaves (20, 50 & 100 mg/ml conc.) and *Carica papaya* Linn roots (20, 50 & 100 mg/ml conc.)}. The ethanol extracts (20, 50 & 100 mg/ml conc.) of both *Carica papaya* Linn. leaves and roots were dissolved in sterile distilled water and final volume was adjusted to 50 ml. The extract and standard drug Albendazole (20 mg/ml) were freshly prepared before starting the experiments. The extract of different concentration and standard solution were poured in different Petri dishes. All the earthworms were washed into normal saline solution before they are released in to Petri dishes. Observation was made for time taken to paralyze (paralysis was said to occur when earthworms fail to revive in normal saline) and death (death was concluded when earthworms lost their motility and followed with their body color fades away). All the results were expressed as a mean ± SEM of six earthworms in each group.^[12]

OBSERVATION TABLE

Table 1. Anthelmintic Activity of Ethanol extracts of *Carica papaya* Linn. leaves and roots against Earthworm

Treatment	Time taken by earthworms for	
	Paralysis (min) mean ± SEM	Death (min) mean ± SEM
Saline (Control)	Absent	Absent
Standard Albendazole (20 mg/ml)	18 ± 0.51	26 ± 0.20
Leaf Extract		
20 mg/ml	53 ± 0.31	59 ± 0.11
50 mg/ml	38 ± 0.23	50 ± 0.15
100 mg/ml	27 ± 0.23	36 ± 0.23
Root Extract		
20 mg/ml	39 ± 0.10	43 ± 0.39
50 mg/ml	26 ± 0.21	36 ± 0.14
100 mg/ml	20 ± 0.23	29 ± 0.28

Table 2: Phytochemical Evaluation of *Carica papaya* Linn. leaves extract^[13 and 14]

Chemical tests	leaves Result	Roots Result
Test For Carbohydrates		
A. Benedicts Test	+	+
B. Fehling's Test C. Molisch's Test	+	+
Test For Steroids		
A. Salkowaski test	+	+
Test For Alkaloids		
A. Dragendroff's test B. Wagner's test	+	+
C. Mayer's test	+	+
Test For Tannins		
A. 5% Ferric chloride	+	+
B. Acetic acid test	+	+
C. Dil. KMnO ₄ Test	+	+
Test For Flavonoids		
A. Lead acetate test	+	+
B. NaOH + Dil. acid	+	+
Test for Glycosides		
A. Borntrager's test	+	+

RESULTS AND DISCUSSION

The perusal of the data reveals that as the concentration increases, paralysis and death time decreases. Anthelmintic Activity of extracts *Carica papaya* Linn. leaves and roots, ethanolic extract at the concentration of 100 mg/ml showed both paralysis and death. In *Carica papaya* Linn. leaves, paralysis occurred at 27 min and death observed at 36 min. In roots of *Carica papaya* Linn., paralysis occurred at 20 min and death observed at 29 min. There were no paralysis or deaths observed at control group and predominant effect of Albendazole was observed on the worms that caused a flaccid paralysis and resulted in expulsion of the worms by peristalsis. The extract of both the plant and roots of *Carica papaya* Linn were comparable to standard Albendazole on earthworms. Root ethanolic extracts required least time to cause paralysis and death of the earthworms when compared to leaf ethanolic extracts.

CONCLUSION

From the above results, it is concluded that the ethanolic extract of *Carica papaya* Linn leaves and roots showed potent Anthelmintic activity as shown by standard Anthelmintic drug. Some of these phyto-constituents may be responsible to show a potent Anthelmintic activity. It is also confirmed that these drugs trigger natural immune system to fight against various parasites and helminthes. The result revealed that root extracts of *Carica papaya* Linn. has better potent activity than leaf extracts.

ACKNOWLEDGEMENT

As a pre-factory exercise, I owe my heartiest gratitude and unflinching thankfulness to Deenadayalan K, Principal, SSK PU College, 1st Stage, II Phase, Chandra Layout, Bangalore, Karnataka, India - 560 072 for his guidance and planned execution throughout our study.

REFERENCES

1. Kazinahid Akter, Palash Karmakar, Abhijit Das, Shamima Nasrin, Anonna, Shamin Akter Shoma, Mahammad Mafruhi Sattar, Evaluation of antibacterial

- and anthelmintic activities with total phenolic contents of *Piper betel* leaves Avicenna J. Phytomed, Sep-Oct, 2014; 4(5):320–329.
2. Lakshmi Kanta Kanthal*, Prasenjit Mondal, Somnath D E, Soma Jana, S. Aneela, K. Satyavathi, Evaluation of Anthelmintic Activity of *Carica Papaya* Latex Using *Pheritima Posthuma*, International Journal of Life Science & Pharma Research, Jan-Mar, 2012; 2(1).
 3. Sengupta Rupa, Banik Jayanta, Comparative Studies on Anthelmintic Potential of *Curcuma Maxima* (Pumpkin) Seeds and *Carica Papaya* (Papaya) seeds, Int. J. Res. Ayurveda Pharm., Jul-Aug, 2013;4(4).
 4. Pallavi S. Adate, Dr. S. Parmesawaran, Yamani Chauhan, In vitro Anthelmintic Activity of Extracts of Piper betle Linn Against *Pheritima Posthuma*, Pharmacognosy Journal, May-June 2012; 4(29):61-65.
 5. IkeyiAdachukwu P*, Ogbonna Ann O and Eze Faith U, Phytochemical Analysis of Paw- paw (*Carica Papaya*) Leaves, Int. J. LifeSc. Bt& Pharm. Res., July 2013; 2:3.
 6. J. Lohidas, S. Manjusha and G. Glory Gnana Jothi, Antimicrobial Activities of *Carica Papaya* L., Plant Archives, 2015; 15(2):1179-1186.
 7. Vandana Dwivedi, Shalini Tripathi, Review study on potential activity of *piper Betle* Linn., Journal of Pharmacognosy and Phytochemistry, October, 2014;93-95.
 8. K. Kayalvizhil, Dr. L. Cathrine, K. Sahira Banu, Phytochemical and antibacterial studies on the leaf extracts of female *Carica papaya*. linn, International Journal of Pharm Tech Research Coden (USA): IJPRIF, ISSN: 0974-4304, 2015; 8(7):166-170.
 9. E. Ewrierhurhoma, M. C. Ugwu, C. O. Eze, C. Annie, F. O. Enwa, P. M. Eze and C. O. Esimone, Antibacterial Evaluation of Aqueous and Ethanol Extracts of *Ocimum Gratissimum* and *Carica Papaya*, ARRB, 2015; 7(1): 54-60. ARRB.2015.105, ISSN: 2347-565X.
 10. Lakshmi Kanta Kanthal*, Nama Sreekanth, P. Leela Madhuri, Kausik Bhar, Sreejan Manna, Evaluation of Anthelmintic Activity of *Carica Papaya* Root using *Pheritima Posthuma*, International Journal of Pharmaceutical Letters and Reviews, 2015; 1(1):8-9.
 11. Pallavi S., In vitro anthelmintic activity of stem extract of piper betle Linn. Against *pheritimaposthuma*, pharmacognosy journal, May-June, 2012; 4:29.
 12. Kishan Singh, Krishn Kumar Agrawal, Jeetendra Kumar Gupta, Comparative anthelmintic activity of *Aegle marmelos* Linn leaves and pulp, IOSR Journal of Pharmacy, May-June, 2012; 2(3): 395-397.
 13. P. B. Ayoola & A. Adeyeye, Phytochemical and Nutrient Evaluation of *Carica Papaya* (Pawpaw) Leaves, IJRRAS, December 2010;5(3).
 14. Sasmita Biswal, Phytochemical analysis and a study on the antiestrogenic antifertility effect of leaves of *Piper betel* in female albino rat, Anc Sci Life, Jul-Sep, 2014; 34(1): 16–22.
