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Original Article

PHARMACOLOGICAL STUDIES OF FRUITS OF *CARICA PAPAYA* ON ALBINO RATS

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ABSTRACT

The present study has been designed to elucidate the pharmacological activities like diuretic and anthelmintic activities of fruit extracts of *Carica papaya* on rats. The LD50 dose for alcoholic extract and petroleum ether extract was 200 mg/kg body weight and the LD50 dose for acetone extract, ethyl acetate extracts was 300 mg/kg body weight respectively. Diuretic activity was carried out and the parameters included were urine volume, P^H and electrolytes. Furosemide was taken as standard drug. The results indicated that all the extracts have been shown a significant activity by an increase in all the parameters which was compared to the standard drug treated groups. Anthelmintic activity was carried at two different concentrations. Albendazole was taken as standard drug. All the extracts have been shown a significant anthelmintic activity in causing paralysis and death of earthworms which was compared to the reference drug treated groups.

Key words *Carica papaya,* Diuretic, Anthelmintic, Furosemide and Albendazole

INTRODUCTION

Herbal formulation, sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. An herb is a plant or plant part valued for its medicinal, aromatic or savoury qualities. Herb plants produce and contain a variety of chemical substances that act upon the body [1].

In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity in both developing and developed countries because of their natural origin and less side effects. Many traditional medicines in use are derived from medicinal plants, minerals and organic matter [2]. A number of medicinal plants, traditionally used for over 1000 years named rasayana are present in herbal preparations of Indian traditional health care systems [3]. In Indian systems of medicine most practitioners formulate and dispense their own recipes[4]. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world. Among these 2500 species are in India, out of which 150 species are used commercially on a fairly large scale. India is the largest producer of medicinal herbs and is called as botanical garden of the world [4].

Carica papaya or pawpaw is the fruit where *Carica*, is the genus and *papaya* is the species belongs to family *Caricaceae.* The fruit of *C. papaya* has been used to treat variety of diseases like anti-ulcer, anti-fungal, anti bacterial, wound healing, anti-nutrient, anti-oxidant, and anti-hyperglycaemic conditions. They are traditionally used as digestive, abortifacient, to treat stomach ache, fungal infections, heart tonic, analgesic, inflammation. However, the ripe fruit of *C. papaya* has not been evaluated and it has not been reported for Diuretic and Anthelmintic activities. In view of this the present work was undertaken to evaluate Diuretic and Anthelmintic activities.

The objective of this study was preparation of the drug using alcohol, acetone, petroleum ether and ethyl acetate extracts using soxhlet apparatus and to evaluate the diuretic activity of different extracts in experimental animal model and also to evaluate the anthelmintic activity of different extracts in experimental worms.

MATERIAL AND METHODS

Reagents, standards and apparatus:

All chemicals were of analytical grade. Table. 1 shows the list of chemicals, reagents used in this experiment. Wistar albino rats and Swiss albino mice were purchased from Central Animal House National College of Pharmacy, Shimoga. Table. 2 shows the list of instruments used in this experiment.

Table. 1 List of materials

S. No	Name of the material	Description
1	Ethanol	Nice Chemical Pvt. Ltd, Kerala.
2	Acetone	Hi Media Labs Pvt. Ltd, Mumbai.
3	Petroleum ether	Sd. Fine Chemicals Ltd, Mumbai.
4	Ethyl acetate	Hi Media Labs Pvt. Ltd, Mumbai.
5	Sulphuric acid	Merck Specialties Pvt. Ltd, Mumbai.
6	Acetic acid	Merck Specialties Pvt. Ltd, Mumbai.
7	Chloroform	Hi Media Labs Pvt. Ltd, Mumbai.
8	Formic acid	Merck Specialties Pvt. Ltd, Mumbai.
9	Tween-80	Sd. Fine Chemicals Ltd, Mumbai.
10	Anisaldehyde	Sd. Fine Chemicals Ltd, Mumbai.
11	Furosemide	Aventis, Pharma Ltd, Thane.
12	Quercetin	Cayman Chemical Company, USA.
13	Silica gel 60 F_{254} Plate	Merck Specialties Pvt. Ltd, Mumbai.
14	What-mann filter paper	Sd. Fine Chemicals Ltd, Mumbai.

Table. 2 List of Instruments

S. No	Instrument	Description
1	Metabolic cage	Sunshine Shoki, Bangalore.
2	Flame photometry	Shimadzu Corporation, Japan.
3	Electronic balance	Shimadzu Corporation, Japan.

Collection and Authentication of plant material

The fruits of the plant *Carica papaya* were used for the present study, and they were collected from Nizamabad district of Andhra Pradesh and were authenticated by Rudrappa, Taxonomist, Department of Botany, DVS College, Shimoga. The ripen fruits of 15.5 kg were cut into small pieces and shade dried. The dried fruit materials (1.6 kg) were then pulverized separately into coarse powder by a mechanical grinder. The resulting powder was then used for the extraction.

Preparation of fruit extracts

The powder was extracted directly with ethanol, petroleum ether, acetone and ethyl acetate extracts, which were used for biological investigations after subjecting it to preliminary qualitative phytochemical studies [5]. The extracts were concentrated under reduced pressure and stored in vacuum desiccators. The percentage yield of alcohol, petroleum ether, ethyl acetate and acetone extracts have been reported. Phytochemical analysis was carried out by using the standard procedures. Alkaloids, carbohydrates, flavonoids, glycosides, phytosterols/terpenes, proteins, tannins and saponins were qualitatively analyzed.

Preliminary phytochemical screening of the extracts

Phytochemical analysis was carried out by using the standard procedures. Alkaloids, carbohydrates, flavonoids, glycosides, phytosterols/terpenes, proteins, tannins and saponins were qualitatively analyzed

Test for sterols

a. **Salkowski's test** A few drops of concentrated sulphuric acid was added to the test solution in chloroform, shaken and allowed to stand, a red colour is produced in the lower layer. This indicates the presence of sterols.
b. **Liebermann–Burchardt's test** The test solution in chloroform was treated with few drops of acetic anhydride and concentrated sulphuric acid is added from the sides of the test tube, it shows a brown ring at the junction of the two layers and the upper layer turns green.

Test for saponins

a. **Froth test** Dilute aqueous extracts with distilled water separately to 20ml and shake in a graduated cylinder for fifteen minutes, formation of 1 cm layer of foam, which is stable for 15 min
b. **Haemolysis test** Sample was dissolved in physiological salt solution. To this 4% buffered equilibrated blood (P^H 7.4) is added. Haemolysis occurs.

Test for alkaloids

a. **Mayer's test** (solution of potassium mercuric iodide)**:-** To the test solution add Mayer's reagent, gives a cream coloured precipitate.

Test for tannins and phenols

a. **With gelatin solution** Treat the test solution with 1% gelatin solution containing sodium chloride, white precipitate is formed.
b. **With ferric chloride solution** Treat the test solution with few drops of neutral ferric chloride solution bluish black colour is formed.
c. **Lead acetate test** To the test solution add few drops of 10% lead acetate solution, yellow precipitate appears.

Test for carbohydrates and free sugars in glycosides

a. **Molisch's test** (Solution of α–napthol in alcohol) Treat the test solution with a few drops of Molisch's reagent and add 2ml of concentrated sulphuric acid slowly through the sides of test tube, violet ring appears at the junction.
b. **Fehling's test** Equal amounts of Fehling's A (Copper Sulphate in distilled water) and Fehling's B (potassium sodium tartrate and sodium hydroxide in distilled water) reagents are mixed and few drops of test solution are added and boiled, gives brick red precipitate.
c. **Benedicts test** Treat the test solution with a few drops of Benedicts reagent, (alkaline solution containing cupric citrate complex) and upon boiling on a water bath reddish brown precipitate is formed.
d. **Barfoed's test** To the test solution, Barfoed's reagent was added, boiled on water bath, brick red precipitate was formed.

Test for cardiac glycosides

a. **Liebermann-Buchardt's test:-** Treat the extracts with chloroform and then add few drops of acetic anhydride, boil, cool and add few drops of con. Sulphuric acid through the sides of the test tube. Reddish brown ring is formed at the junction.
b. **Legal's test:-** Treat the extracts with pyridine and add alkaline sodium nitroprusside solution, the blood red colour is formed.

Test for Cyanogenetic glycosides

One gram of powdered drug moistened previously in a test tube, suspends a piece of sodium picrate paper above the drug trapping the top edge between the cork and the tube wall. After 30 minutes, the evolution of hydrocyanic acid turns the paper brick red (sodium isopurpurate).

Test for anthraquinone glycosides

a. **Borntrager's test** Powdered drug is boiled with dil.sulphuric acid and filtered. The filtrate is gently shaken with an organic solvent, separate out the organic layer to that adds ammonia solution. Pink colour appears.

b. **Baljet test** The test solution treated with sodium picrate gives yellow to orange colour.

Test for flavonoids

a. **Shinoda test (Mg-Hcl reduction test)** To the alcoholic solution, add a few fragments of magnesium ribbon, concentrated hydrochloric acid was added drop wise. Pink to crimson red colour was produced after few minutes.

b. **Zn-Hcl reduction test** To the test solution add a mixture of zinc dust and concentrated hydrochloric acid, which gives a red colour.

c. **Ferric chloride test** Test solution with few drops of ferric chloride solution shows intense green colour.

d. **Alkaline reagent test** Test solution when treated with sodium hydroxide solution, shows increase in the intensity of yellow colour which becomes colorless on addition of few drops of dilute acid.

e. **Lead acetate solution test** Test solution with few drops of lead acetate (10%) solution gives yellow precipitate.

Tests for proteins and amino acids

a. **Millon's test** When proteins and amino acids were treated with Millon's reagent (mercuric nitrate in nitric acid containing traces of nitrous acid) white precipitate is formed which turns, red upon gentle heating.

b. **Ninhydrin Test** When theamino acids and proteins were boiled with 0.2% solution of ninhydrin reagent, (indane-1, 2, 3 trione hydrate) violet colour is formed.

c. **Biuret test** When the test solution was treated with 40% sodium hydroxide and dilutes copper sulphate solution, where blue colour was developed.

d. **Xanthoprotein test** Test solution after treating with concentrated nitric acid and on boiling, gave yellow precipitate [6].

Thin layer chromatography

The various extracts were subjected to thin layer chromatography for the presence of Flavanoids in each extract. In this technique the readymade silica gel 60 F_{254} plate was used as adsorbant. After spraying the anisaldehydesulphuric acid reagent the TLC plate was kept in hot air oven for one hour at 121^0C and observed for the spots. Silica gel60 F_{254} is used as stationary phase, Chloroform: Acetone: Formic acid (75:16.5:8.5) is used as mobile phase.

Preparation of spray reagent

Anisaldehydesulphuric acid reagent was freshly prepared by adding 0.5ml of Anisaldehyde into 9ml of ethanol to that 0.5ml of conc. Sulphuric acid and 0.1ml of glacial acetic acid were added followed by heating at 100^0C for 5-15min. used as spraying reagent.

Experimental Animals

Albino Wistar rats weighing (150-250g) and *Swiss albino mice* (20-25g) were procured from Central animal house, National College of Pharmacy, Shimoga. Animals were maintained under controlled condition of temperature at $27^o \pm 2^o$ C and 12-h light-dark cycles. They were housed in polypropylene cages and had a free access to standard pellets and water *ad libitum*.

All the studies conducted were approved by the Institutional Animal Ethical Committee (IAEC), National College of Pharmacy, Shimoga (NCP/IAEC/CL/104/05/2012-13) according to prescribed guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Govt. of India.

Pharmacological studies

Acute toxicity study

The experiments were initiated only after the approval of the Institutional Animal Ethical Committee**.** Albino mice of either sex weighing 20-25 gm and of 90 days age were used to determine the dose. The animals were fasted overnight prior to the acute toxicity experimental procedure. The method of "up and down" (OECD Guideline No. 425) method of CPCSEA was adopted for toxicity studies, Tween-80 (1%) was used as a vehicle to suspend the extracts and was administered orally and the first animal receives a dose step below the level of the best estimate of the LD_{50} and dose progression factor should be chosen to be the antilog of $1/10^{th}$ (the estimated slope of the dose-response curve) and should remain constant throughout testing (a progression of 3.2 corresponds to a slope of 4). The initial dose in this experiment was 1500 mg/kg body weight

and there was no mortality or toxicity in animals hence the dose is increased to 3000 mg/kg b.w. which caused mortality for two extracts hence this dose is considered as lethal for those two extracts and to the extracts which did not cause any mortality or toxicity the dose is increased to 4000 mg/kg b.w. and at this dose there was mortality or toxicity for those two extracts hence considered as lethal. The petroleum ether, alcohol extracts caused mortality and/ toxicity at the dose of 2000 mg/kg body weight orally, similarly ethyl acetate, acetone extracts caused toxicity and/or mortality when administered at a dose of 3000 mg/kg body weight orally. To study various pharmacological activities the fraction was administered in the dose of 200 mg/kg, 300 mg/kg body weight which is equal to $1/10^{th}$ of 2000 mg/kg, 3000 mg/kg body weight [7].

Assessment of diuretic activity

In the present study albino rats of either sex weighing between 150 to 200 gm. were used for screening diuretic activity. Furosemide was used as standard diuretic agent, purchased from local market. All the extracts and standard drug were administered orally. The animals were maintained under a 12/12-light/dark cycle at room temperature with free access to a standard pellet diet and water *ad libitum.* The modified method of Lipschitz *et al* [8] was used for screening diuretic activity. The rats were deprived of food for 16 hours, with water *ad libitum* before the experiment. The animals were divided into groups of 6 each containing 6 animals after noting the weight, the animal used for the experiment were loaded with 0.9% sodium chloride (normal saline) solution (25 ml/kg body weight) by the oral route. The extracts were tested separately and the standard diuretics *viz.,* Furosemide was tested separately; since all the extracts used were insoluble in water hence their suspension in 1% Tween 80 solution was prepared. The standard diuretic agent Furosemide was given in dose of 100 mg/kg. b.w. The control received the normal saline solution. The doses were given by oral route and the volume of injection for each animal was kept constant by adjustable dose in 0.5 ml/100 gm b.w of saline. Immediately after the treatment the animals were placed in metabolic cages (2 animals per cage) and the urine samples were collected separately at the end of first, second, third, fourth and fifth hour for the measurement of P^H, sodium and potassium ions in (Meq/lit).

Estimation of P^H and urinary Na^+ and K^+

After measuring the urine volume with the help of 10 ml and 1 ml graduated syringe, the samples were used to estimate the sodium and potassium content by a flame photometer (Systronic

mediflame-127) which operates on the basis of emission flame photometry. Finally the first, second, third, fourth, and fifth hour urine samples from each cage were mixed and used for their P^H determination using a P^H meter (Systronic Digital PH meter 333).

Assessment of anthelmintic activity

The anthelmintic activity was evaluated on adult earthworm *Pheritima posthuma* according to the method of Ajaiyeoba *et al* [9]. All worms were divided into six groups (Six worms in each group) and used to assess the anthelmintic properties of various extracts of *C. papaya.* Group I was the control, worms placed in normal saline and groups II, III & IV were treated with extracts of *Carica papaya* respectively. In order to administer these doses, the extracts were measured respectively and were dissolved in minimum amount of 1% Tween 80. After proper mixing of extract and 1% Tween 80 normal saline was slowly added. Group V received Albendazole at the dose of 10 mg/ml. It was dissolved in minimum amount of 1% Tween 80 and finally the volume was adjusted with normal saline. The anthelmintic assay was carried out as per the method of Ajaiyeoba *et al*., observations were made for the time taken for paralysis (Paralysis was said to occur when worm did not revive in normal saline) and death. Time for death of worms was recorded after ascertaining that when the worms stopped the movement in the suspension even after touching with a pointed edge of the pin without injuring the worm. The time of death was ascertained by transferring it to a beaker containing hot water at 40^oC, which stimulated and induced movements if the worm was alive, followed with their body colours fading away.

Due to the anatomical and physiological resemblance to the human intestinal round worm parasite, the assay was performed on adult earthworm, *Pheretima posthuma* (Vidyarthi 1967; Chatterjee, 1967). The individual earthworms were placed in petridishes containing normal saline, two different concentrations of extracts (25 mg/ml and 50 mg/ml in saline water) and standard Albendazole (10 mg/ml) suspension. The Time for paralysis and time for death was noted. The earthworms in control (group I) were alive up to 24 hours of the experiment. Mean values of paralysis time and death time of *Pheretima posthuma* earthworm were calculated separately and tabulated [10,11].

Statistical analysis

The values were expressed as mean +/- S.E. of five cages separately. Analysis of variance and student "t" test were used to evaluate the results.

RESULTS

In the present study, phytochemical investigation was carried out for different extracts of the *Carica papaya* fruits and pharmacological studies were carried out for diuretic and anthelmintic activities. Table.3 shows the Percentage yield of extracts of fruits of *C. papaya*. Table. 4 Shows the phytochemicals present in the different fractions.

Table. 3 Percentage yield of extracts of fruits of *C. papaya*

S. No	Extract	Color & consistency	% yield
1.	Alcohol extract	Blackish and viscous	8.5%
2.	Petroleum ether extract	Greenish black and viscous	1.3%
3.	Acetone extract	Bluish black and viscous	3.76%
4.	Ethyl acetate extract	Brownish black and highly viscous	4.39%

Table. 4 Phytochemical investigations of extracts and various fractions

S. No	Phytoconstituents	Pet. ether fraction	Ethyl acetate fraction	Acetone fraction	Alcohol fraction
1.	Alkaloids	+	-	-	+
2.	Glycosides	-	-	-	+
3.	Tannins	-	-	+	+
4.	Flavonoids	-	+	-	+
5.	Carbohydrates	-	-	-	-
6.	Phytosterols	-	-	-	-
7.	Saponins	-	+	-	-

+ = Present; - = absent

In the present study, active constituents were isolated from the fractions of alcohol, petroleum ether, ethylacetate and acetone. The phytochemical analysis reveals that the presence of alkaloids, flavonoids, tannins, glycosides and saponins.

Identification of flavonoids by Thin layer chromatography

The fractions of alcohol and ethyl acetate extracts were subjected to thin layer chromatography for the presence of flavonoids in each extracts by using anisaldehyde sulphuric acid as the spraying agent. Two samples were separated into one sport identified by bluish black colour. The results were shown in Table. 5. TLC spots were shown in Figure. 1.

Table. 5 TLC of alcohol and ethyl acetate fractions

S. No	Extract	Observation		R_f values
		Number of spots	Colour of spots	
1.	Alcohol	1	Bluish black	0.84
2.	Ethyl acetate	1	Bluish black	0.86

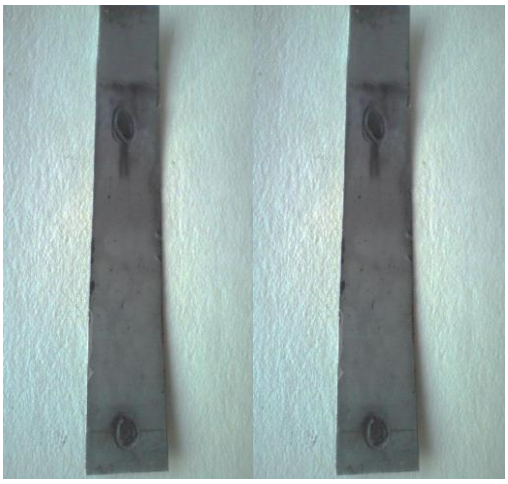

Figure. 1 Photograph showing the TLC of alcohol and ethyl acetate fraction

Pharmacological studies

Acute toxicity study

The "up and down" (OECD Guideline No. 425) method of CPCSEA was adopted for acute toxicity studies, Tween-80 (1%) was used as a vehicle to suspend the extracts. The alcohol and petroleum ether extracts did not cause any toxicity and/or mortality upto the dose of 2000 mg/kg

body weight orally. Similarly ethyl acetate and acetone extracts has not been shown any toxicity and/or mortality, when administered up to the dose of 3000 mg/kg body weight orally. To study various pharmacological activities the fractions were administered in the dose of 200 mg/kg body weight and 300 mg/kg body weight which is equal to $1/10^{th}$ of 2000 mg/kg body weight and 3000 mg/kg body weight.

Evaluation of Diuretic activity

Diuretic activity of fruits of *C. papaya* extracts were performed. There was an increase in urine volume and hence they were found to have good diuretic activity comparing with standard drug Furosemide.The results obtained are tabulated in Table. 6. Figure. 2 Showed the effect of different extracts on urine volume and P^H. Figure. 3 showed the effect of different fruit extracts on urinary electrolytes.

Table. 6 Effect of fruit extracts of *C. papaya* on urine volume, P^H and electrolytes

Treated groups	Urine Volume in (ml/kg B.W./5hr)	P^H of urine	Na^+ Meq/lit	K^+ Meq/lit	Cl^- Meq/lit
Control	1.2±0.05	7.4±0.12	96±1.63	71±1.22	83±1.52
Furosemide (100mg/kg)	3.2±0.15***	7.12±0.12***	142±2.1***	96±1.46**	91±1.44***
Alcohol (200mg/kg)	1.8±0.7*	7.20±0.20**	102±1.84*	82±1.34**	81±1.56***
Pet. Ether (200mg/kg)	2.7±0.021*	7.21±0.21**	126±2.13**	89±1.32*	88±1.32**
Ethyl acetate (300mg/kg)	1.4±0.15**	7.23±0.23***	92±1.91***	74±2.3**	85±1.12**
Acetone (300mg/kg)	3.8±0.01***	7.25±0.25***	135±1.95***	94±1.42**	90±1.65***

Note: Data was analysed using one way ANOVA followed by pairwise comparison.
Values are expressed as mean ± S.E.M. *n* = 6, ***P<0.001, **P< 0.01 and *P< 0.05

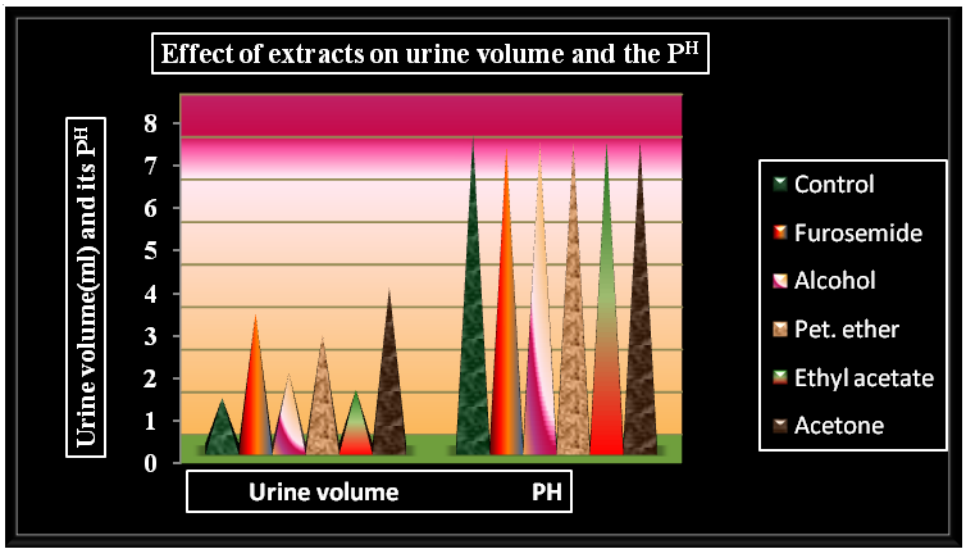

Figure. 2 Histogram showing effect of fruit extracts of *C. papaya* on urine volume and P^H

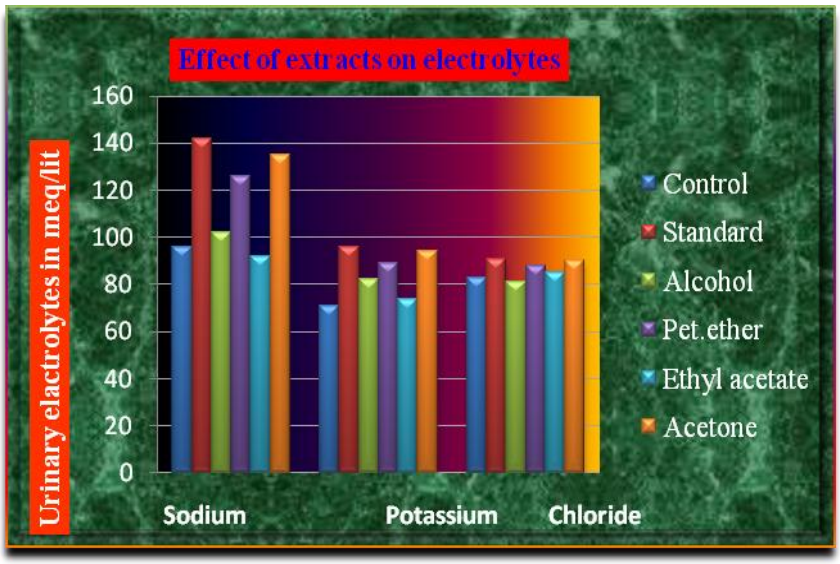

Figure. 3 Histogram showingeffect of fruit extracts of *C. papaya*on electrolytes

Evaluation of anthelmintic activity

In this anthelmintic actvity, fruit extracts of *Carica papaya* has shown paralysis as well as death of worms and were found to be effective when compared to control and the values are comparable with the standard drug Albendazole. As shown in Table. 7. Figure. 4 showed the effect of different extracts on the worms.

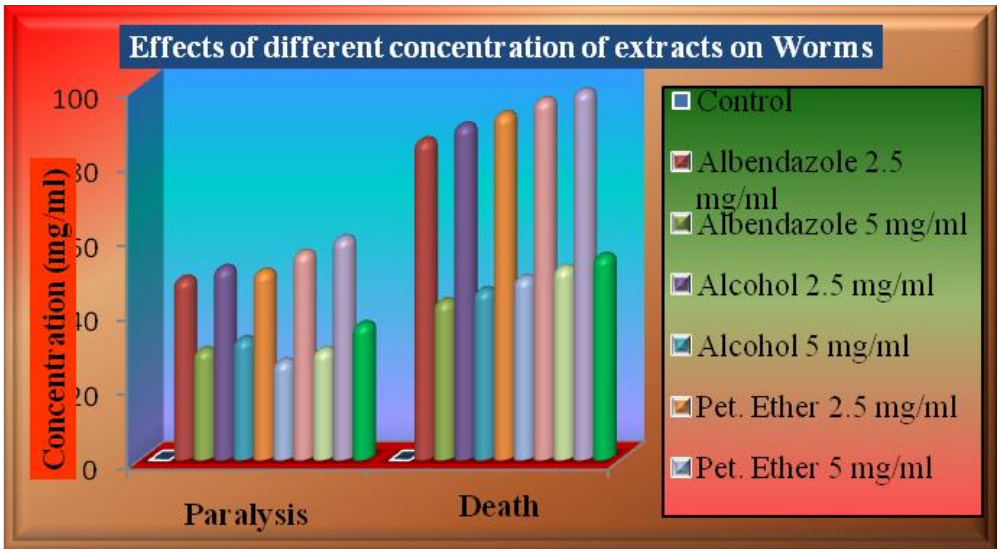

Figure. 4 Histogram showing effect of fruit extracts of *C. papaya* on worms at different concentrations

Table. 7 Effect of fruit extracts of *C. papaya* on worms at different concentrations

Treated groups	Concentration (mg/ml)	Time taken for paralysis of worms (min)	Time taken for death of worms(min)
Control	0.9 % mg/ml	-	-
Albendazole	2.5 mg/ml	48.35±2.2*	85.39±3.1**
	5 mg/ml	29.25±1.5***	42.29±2.8***
Alcohol	2.5 mg/ml	51.23±2.4*	89.42±4.5**
	5 mg/ml	32.18±1.8**	45.26±2.8***
Pet. Ether	2.5 mg/ml	50.28±2.3*	92.45±4.2*
	5 mg/ml	26.19±1.7**	48.56±4.8***
Acetone	2.5 mg/ml	55.32±2.5*	96.25±2.9*
	5 mg/ml	29.19±1.5**	51.25±2.4**
Ethyl acetate	2.5 mg/ml	59.24±2.9	98.58±6.3*
	5 mg/ml	36.14±1.8*	54.45±3.5**

Note: Data was analysed using one way ANOVA followed by pairwise comparison.
Values are expressed as mean ± S.E.M. *n* = 6, ***P<0.001, **P< 0.01 and *P< 0.05.

DISCUSSION

Herbs and botanicals offer a natural safeguard against diseases. The present study has been designed to elucidate the pharmacological activities like diuretic and anthelmintic activities of fruit extracts of *Carica papaya* on rats. The findings of results revealed that the extracts showed significant diuretic and anthelmintic activities. Thus from the results of the current investigation it may be inferred that the fruit extracts of *C. papaya* possess diuretic and activities. Further study regarding isolation and characterization of active principle responsible for the pharmacological activities is needed.

Diuretics have proved to be extremely valuable in the treatment of mild to moderate hypertension and also in enhancing the effect of other antihypertensive agents. Diuretics relieve pulmonary congestion and peripheral oedema. All the fruit extracts of *C. papaya* showed significant activity by increase in both urine excretion and excretion of sodium, potassium and chloride. Previous studies have demonstrated that there are several compounds which could be responsible for the plants diuretic effects such as flavonoids, saponins or organic acids. A previous investigation of the composition of *C. papaya* has suggested the presence of flavonoids. It may be suggested that these substances might be responsible, at least in part, for the observed diuretic activity and that they may act individually or synergistically. The effect may be produced by stimulation of regional blood flow or initial vasodilation, or by producing inhibition of tubular reabsorption of water and anions, this result in diuresis.

Urine output and their parameters of all the extracts were found to be more than that of control and comparable with the effect of standard drug except the urine output of acetone extract. These features suggest that the fruit extract is acting in a similar way as furosemide, which increases urinary output and urinary excretion of sodium by inhibiting $Na^+/K^+/Cl^-$ transporter system in the thick ascending loop of Henley [12,13].

The anthelmintic activity was evaluated at two different concentrations. It is clear from the results shown in the Table. 7 that all the extracts showed comparable anthelmintic activity with standard drug (Albendazole) at the concentration of 2.5 & 5 mg/ml. All the extracts along with standard drug took long time to cause paralysis and death of worms at the concentration of 2.5 mg/ml but at the concentration of 5 mg/ml they took least time for both the paralysis and death of worms. Preliminary phytochemical screening of all extracts showed the presence of alkaloids, tannins,

saponins, flavonoids. These phyto constituents may be responsible for the anthelmintic activity. These results may lend support for the traditional use of the plant. Further investigation is needed for the phytoconstituents responsible for anthelmintic activity [14].

CONCLUSION

The investigations undertaken to study the effects of extracts of fruits of *Carica papaya* on diuretic and effects shown a significant results. Diuretic activity was carried out and the parameters included were urine volume, P^H and electrolytes. Furosemide was taken as standard drug. All the extracts had shown a significant activity by an increase in all the parameters when compared to control. It can be concluded that active constituents responsible for diuretic activity might be present in the fruit extracts. Anthelmintic activity was carried out at two different concentrations. Albendazole was taken as standard drug. All the extracts have been shown a significant anthelmintic activity in causing paralysis and death of earthworms in comparison to control. It can be concluded that active constituents responsible for anthelmintic activity might be present in the fruit extracts.

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