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# Anti-Ulcer Activity of Methanolic Extract of *Polycarpea aurea* in Asprin Plus Pylorus Ligation-Induced Ulcer Model in Rats

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**Abstract:**

**Background**: There is a consistent demand for safer drugs for the treatment of the peptic ulcer disease as this disease is progressing day by day in view of the change in one's living style. The main objective of the present study is to evaluate the potential antiulcer activity of methanolic extract of *polycarpea aurea*(MEPA).

**Methods:** Aspirin plus pylorus ligation method was used to evaluate the protective effect of MEPA against peptic ulcer in albino Wistar rats. The parameters determined for the assessment of the ulcer activity include gastric volume content, pH, Ulcer mean index, free and total acidity.

**Results:** Aspirin plus pylorus ligation treatment induced significant ulcer index in rats. MEPA treated rats exhibited significant (***$p \leq 0.001$) protection from ulcer development. MEPA treated rats also showed a significant difference in free acidity and total acidity content compared with that of the control rats.

**Conclusion:** The present study indicates that the methanolic extract of *Polycarpea aurea* is having an antiulcer activity in the aspirin plus pylorus ligated rat model.

**Keywords:** *Polycarpea aurea*, Aspirin, Antiulcer, pylorus ligation, mean ulcer index.

## 1. INTRODUCTION:

A peptic ulcer is an important gastrointestinal tract disorder that is progressing worldwide day by day. The urban life e style, work pressure, smoking, excess alcohol intake and fast foods are some of the factors contributing growing number of ulcer patients Imbalance between the gastro protective's (mucus, bicarbonates, prostaglandins) and causing factors like acid production, pepsin content and H. Pylori bacteria results in the development of peptic ulcer disease[1]. There are many drug therapies available for treating peptic ulcer disease. However, these treatments are far from satisfactory in terms of activity and/or associated with unwanted effects which are limiting their utility Hence there is a need for the development of safer and effective drugs.[2].

*Polycarpea aurea* commonly called as Rathirajuma belonging to the family Caryophyllaceae. It is native of India found in rocky crevices of Aakashaganga, Srikalahasthi, Tirumala hills of Andhra Pradesh, Kerala, Karnataka, Chattisgarh, Odisha, and Tamilnadu[3]. Traditionally it has been used in treating diarrhea, ulcers, jaundice and some CNS disorders[4]. The anti-diarrhoeal activity has tested and reported[18]. However, there are no reports in literature testing the potential antiulcer activity in animal models. Hence, the present work is aimed to evaluate the antiulcer effect of methanolic extract of *Polycarpea aurea* in aspirin +pylorus ligation models in rats.

## 2. MATERIALS AND METHODS:

### 2.1. Drugs and Chemicals:

Aspirin, Omeprazole is obtained as a gift sample from the Suppliers of Sigma Aldrich Pvt Ltd. All chemicals and solvents used in the study were of analytical grade.

### 2.2. Plant material:

The whole plant of *Polycarpea aurea* was obtained from the Tirumala hills, Tirupathi, Andhra Pradesh. The plant was identified and authenticated by Mrs. P. Prasanna Kumari, Head of the Department of Botany, D.N.R. College, Bhimavaram, A.P.

### 2.3. Preparation of extract:

Fresh plants were collected, were washed to remove adhered dirt, rinsed with distilled water, and dried in shade. The shade-dried specimens were powdered in a mixer. About 100g of the powdered root material was subjected to Soxhlet extraction using 200 mL methanol. This cycle was repeated many times, over hours until the color of the soxhlet faded away. The extract was concentrated under reduced pressure and preserved in refrigerator for further use.

### 2.4. Phytochemical screening:

The plant extract was subjected to the different phytochemical screening for the identification of the different phytochemical constituents[5,19,20,21].

**Test for Sterols**

Few drops of concentrated sulphuric acid ($H_2SO_{4|}$) was added, shaken and allowed to stand, instead of the appearance of red color indicates the presence of sterols.

**Test for Saponins**

Plant extract added to a small amount of 2N HCl, add a little amount of water and finally adds few drops of Mayer's reagent. If foam produced persists for 10 minutes, the presence of saponins.

**Test for Alkaloids**
The extract was heated by adding10% NaOH solution. The white for alkaloids
**Test for Tannins**
Plant extract by adding concentrated $HNO_3$ along with excess ammonia. The formation of white precipitation.
**Test for Carbohydrate**
plant extract treated with molisch reagent and concentrated sulphuric acid from test tube sides. A reddish violet ring shows the presence of carbohydrates.
**Test for Flavonoids**
Extract plus alcoholic solution added a few drops of NaOH. An intense yellow color disappeared after adding dilute HCl.
**Test for Amino acid**
plant extract and 3 drops of ninhydrin solution in boiling water bath for 10 minutes. If purple color indicates the presence of amino acids.

**2.5. Experimental animals:**
The Wistar rats weighing about 150-180 gm were procured the animal house of the Shri Vishnu College of Pharmacy, Bhimavaram. The animals were housed under standard well maintained 12:12 h dark and light cycle in a standard environment (Temp 23± $10^0$C) with relative humidity 50 ± 10 %. The animals were free to access to water and ad libitum with a standard rodent diet. The present study was approved by the institutional animal ethical committee (IAEC) bearing CPCSEA registration No-516/PO/C/01/IAEC.

**2.6. Grouping and Treatment protocol:**
Healthy Wistar rats were selected and randomly divided into four groups. Each group consist of h six rats The group treatments were assigned as follows - Group 1( Control Group) -received vehicle (X ml/kg, p.o. x 7 days); Group 2: (Standard group) received omeprazole (20 mg/kg, p.o.); Group 3 (Low dose treatment group) received MEPA (200 mg/kg, p.o.); and Group 4 (Treatment high dose group) received MEPA (400 mg/kg, p.o.)[6]. Each rat was given along with treatment aspirin (400 mg/kg, p.o. x 7 days).

**2.7. Pyloric ligation induced Gastric ulceration:**
Aspirin is a non-steroidal anti-inflammatory drug that is used in low doses for cardiovascular prophylaxis[10,11]. Chronic aspirin consumption leads the mucosal damage and gastrointestinal bleeding in more than 50% users of the aspirin[12]. It produces the ulcer through inhibiting the epithelial and microvascular effects[13].The acidic environment causes aspirin to remain nonionized, forcing it to accumulate in gastric mucosal cells, which alters the permeability of the cell and causes ulceration[14] overall aspirin turnout to be one of the emerging causes for the peptic ulcer in developing countries since from last two decades[15].
After the completion of the treatment protocol, all the rats were kept fasting for about 24 hrs, and the animals made anesthetized by using diethyl ether. Then the pre-treated animals were made incisions and the abdomen was open without any damage. The stomach was isolated, and the pyloric part was ligated using the absorbable sutures without damaging the blood vessels adhering the stomach wall. After the successful ligation of the pyloric region, the isolated stomach is again placed and sealed with the interrupted sutures. The animals were made deprived during the post-operative period. Four hours after the ligation the stomach was dissected out and gastric contents were taken into a clean petri dish and filtered. Gastric volume, pH, total acid contents were determined. Each stomach was examined carefully for the formation of the ulcers on the gastric wall and numbers of ulcers were counted and the scoring was given as given below[7].
a) Normal colored stomach – 0, b) Red coloration – 0.5, c) Spot ulcers – 1, d) Haemorrhagic streak – 1.5, e) Deep ulcers – 2, f) Perforations – 3

**2.8 Statistical analysis:**
The results were represented as Mean ±Standard error mean [Mean ± S.E.M.]. The data were analyzed using a one-way ANOVA followed by Tukey's multiple comparison post-hoc test. Significance is represented as in case of $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. The statistical analysis is done with the help of Graph Pad Prism (Version 8).

## 3. RESULTS:

**3.1. Phytochemical screening:**
Phytochemical analysis tests exhibited that MEPA contains the following constituents listed in Table: 1.

Table: 1. (+) indicates the presence of phytochemical constituents, (-) indicates the absence of phytochemical constituents

| S. NO | Phytochemical test | Inference |
|---|---|---|
| 1 | Carbohydrates | + |
| 2 | Flavonoids | + |
| 3 | Glycosides | - |
| 4 | Saponins | + |
| 5 | Aminoacids | + |
| 6 | Alkaloids | + |
| 7 | Sterols | - |

**3.2. Effect of MEPA on gastric parameters by Aspirin + pyloric ligation induced ulceration in rats:**
To evaluate the effect of MEPA on Aspirin + pyloric ligation induced ulceration in rats, the rats were treated with respective doses for about 7 days and animals are deprived of food and water and pyloric ligation was done. As expected, The *Polycarpea aurea* with 400 mg /kg has significantly reduced the acid volume to (1.6 ± 0.09) compared to that of the standard treated group. pH was increased in the control animals (2.66 ± 0.66) as compared with the compound treated animals (5.3 ± 0.6). Total acidity (65.33 ± 1.14) and free acidity (57 ± 1.72) contents also get decreased with that of standard group, (Figure 1)
**Percentage inhibition** = {(UI of the control group- UI of the treatment group) / (UI of the control group)} X 100

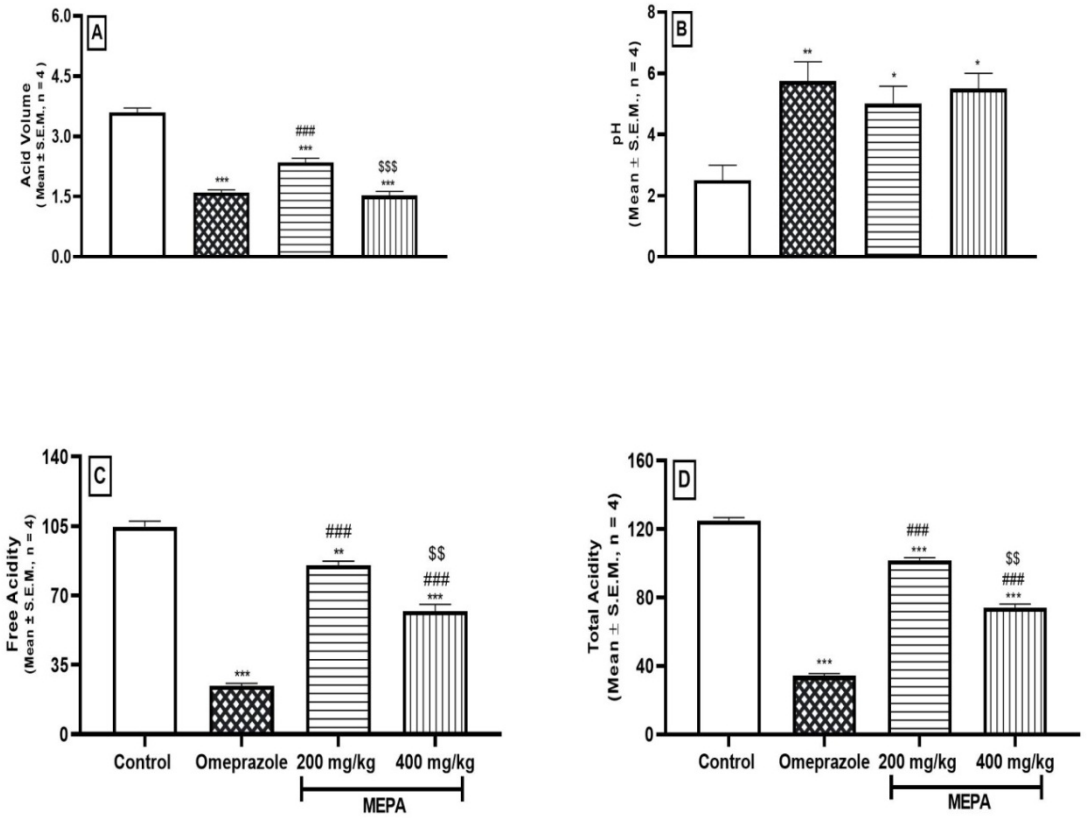


**Fig: 1.** Effect of MEPA on gastric parameters by Aspirin + pyloric ligation induced ulcer model
Rats were treated with Aspirin (400 mg/kg) and MEPA (200 &400 mg/kg) once daily for a period of seven days. A) Acid volume, B) pH, C) Free acidity D) Total acidity parameters were analyzed. The results are represented as the Mean ± S.E.M., n = 6, $^{***}p < 0.001$, $^{**}p < 0.01$ $^{*}p < 0.05$ Vs Control group. $^{###}p < 0.001$, $^{##}p < 0.01$ Vs Omeprazole group.

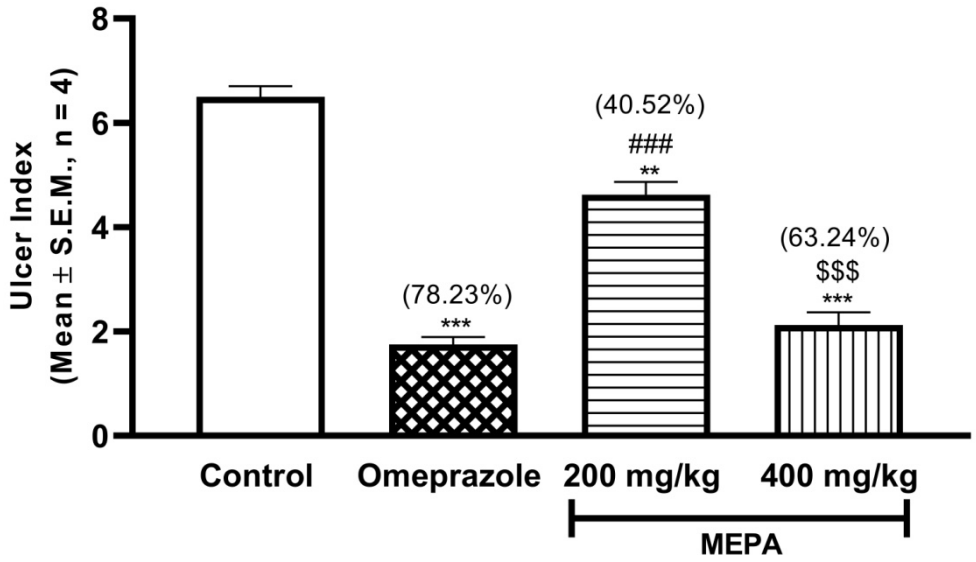


**Fig: 2.** Effect of MEPA on mean ulcer index and percentage protection by Aspirin + pyloric ligation induced ulceration in rats:
Rats were treated with Aspirin (400 mg/kg) and MEPA (200 &400 mg/kg) once daily for a period of seven days and gastric parameters ulcer index and percentage inhibition was calculated. The results are represented as the Mean ± S.E.M., n=6, $^{***}p < 0.001$, $^{**}p < 0.01$Vs Control group. $^{###}p < 0.001$, Vs Omeprazole group.

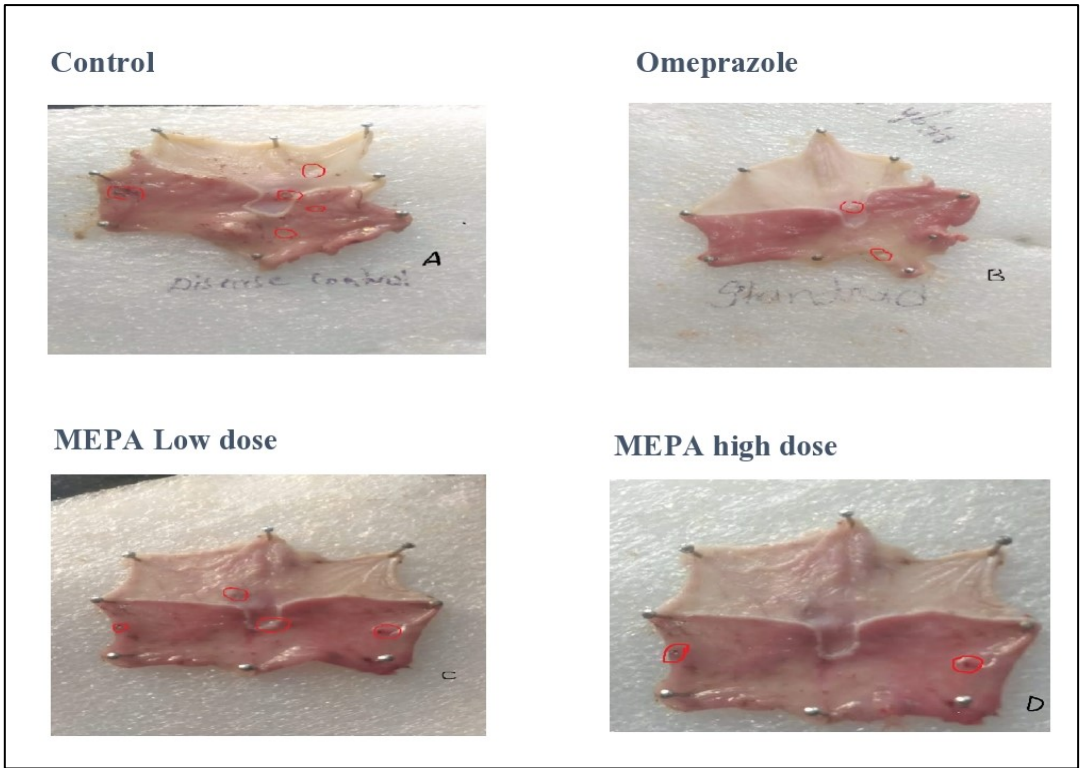


**Fig: 3.** Effect of MEPA on Aspirin + Pyloric ligation induced ulceration showing the ulcer index in different treated groups A) Control, B) Omeprazole, C) MEPA low dose, D) MEPA high dose.

### 3.3. Effect of MEPA on mean ulcer index and percentage protection by Aspirin + pyloric ligation induced ulceration in rats:

As expected, the ulcer index number has increased compared to the omeprazole group and the compound treated group. Control group almost raised to 4 folds to that of treated groups both the test groups with doses 200 and 400 mg/kg have significantly reduced the ulcer formation. The high dose of the test compound has equally reduced the ulcer formation with that of the standard compound. Coming to the percentage inhibition the values were represented in the below-given graph. The standard group has reduced the ulcer index to 78.23%, both the test compound also gets inhibited the ulcer formation test compound with dose 400 mg/kg reduced to about 63.24%. shown in fig: 2

### 3.4. Photographs showing the Aspirin + Pyloric ligation induced gastric ulcers:

Aspirin + Pyloric ligation induced gastric ulcers are represented in fig:3

## 4. DISCUSSION:

The present study aimed at evaluating the potential anti-ulcer activity of extract of *Polycarpea aurea* (*200* and400 mg/kg, p.o.) in Aspirin + pyloric ligation induced ulcers in rats, which is a well-established model for the screening of the antiulcer activity. The ligation of the pyloric region in the stomach causes the accumulation of the gastric contents like gastric acid and the pepsin which further causes the ulcer formation on the gastric mucosa, due to the autodigestion of the gastric mucosa[8].

Aspirin is a non-steroidal anti-inflammatory drug that causes the blocking of the cyclo-oxygenase enzyme responsible for the synthesis of the production of the prostaglandins useful in the gastric mucosal protection. Aspirin also causes the back diffusion of the $H^+$ ions into the stomach and causes the increased production of the acid in the stomach[9].

In our study 200 and 400 mg/kg of Methanolic extract of the *Polycarpea aurea* shows the decreased gastric acid production, free acidity, total acidity and mean ulcer index number has decreased compared with that of the standard omeprazole group. At higher doses, MEPA has shown the 63.24% of protection.

Both the 200 and 400 mg/kg of MEPA has shown a significant decrease in the acid volume formation when compared to the control group.

A significant decrease was seen in the free acidity and total acidity levels when compared to the control group.

Significant decrease in the severity of ulcer formation have shown with at 400 mg/kg of MEPA compared to the control group showing the ulcer scoring of 6.33 ± 0.32 and treated group shows 2 ± 0.28

Previous scientific reports studies say that the phytochemical constituents like flavonoids, tannins and saponins are responsible for the gastro protective activity, therefore methanolic extract of *Polycarpea aurea* possess the anti-ulcer activity may be due to the presence of flavonoids[16 17].

## 5. CONCLUSION:

The present study concludes that the methanolic extract of *Polycarpea aurea* possesses antiulcer activity. This may

be due to the presence of the flavonoids phytochemical constituent and can be further studies that have to been done for the exact role in the ulcer mechanisms.

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## REFERENCES:

1. Dhasan PB, Jegadeesan M, Kavimani S. Antiulcer activity of aqueous extract of fruits of Momordica cymbalaria Hook f. in Wistar rats. Pharmacognosy research. 2010 Jan;2(1):58.
2. Bandyopadhyay U, Biswas K, Chatterjee R, Bandyopadhyay D, Chattopadhyay I, Ganguly CK, Chakraborty T, Bhattacharya K, Banerjee RK. Gastroprotective effect of Neem (Azadirachtaindica) bark extract: Possible involvement of H+-K+-ATPase inhibition and scavenging of hydroxyl radical. Life sciences. 2002 Nov 1;71(24):2845-65.
3. Mastakar VK, Lakshminarasimhan P, Modak M. A report on the extended distribution of Polycarpaeaaurea (Caryophyllaceae), an endemic herbaceous species, to Chota Nagpur Plateau, Jharkhand, India. Journal of Threatened Taxa. 2015 Oct 26;7(12):7950-2.
4. Basha J, BR SM, Prakash P, Anuradha KC. Preliminary Phytochemical Investigation and In Vitro Anti-Bacterial Studies of Polycarpaeaaurea Wight and Arn (Caryophyllaceae) Emulgel. Asian Journal of Pharmaceutical Research. 2018 Sep 30;8(3):151-7.
5. Wadood A, Ghufran M, Jamal SB, Naeem M, Khan A, Ghaffar R. Phytochemical analysis of medicinal plants occurring in local area of Mardan. Biochem Anal Biochem. 2013;2(4):1-4.
6. Ingale Anand M, Vijaya R, Pinnelli VB. A comparative evaluation of the anti-ulcer activity of the extracts of seed and skin of Vitis vinifera (grape) in wistar albino rats. Intl. J Clin. Diag. Res. 2014;2(2).
7. Ganguly AK, Bhatnagar OP. Effect of bilateral adrenalectomy on production of restraint ulcers in the stomach of albino rats. Canadian journal of physiology and pharmacology. 1973 Oct 1;51(10):748-50.
8. Vogel HG, editor. Drug discovery and evaluation: pharmacological assays. Springer Science & Business Media; 2002 Jun 13.
9. Whittle BJ. Gastrointestinal effects of nonsteroidal anti-inflammatory drugs. Fundamental & clinical pharmacology. 2003 Jun;17(3):301-13.
10. Baigent C, Blackwell L, Collins R, Emberson J, Godwin J, Peto R, Buring J, Hennekens C, Kearney P, Meade T, Patrono C. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials.
11. Bhatt DL, Steg PG, Ohman EM, Hirsch AT, Ikeda Y, Mas JL, Goto S, Liau CS, Richard AJ, Röther J, Wilson PW. International prevalence, recognition, and treatment of cardiovascular risk factors in outpatients with atherothrombosis. Jama. 2006 Jan 11;295(2):180-9.
12. Valkhoff VE, Sturkenboom MC, Kuipers EJ. Risk factors for gastrointestinal bleeding associated with low-dose aspirin. Best Practice & Research Clinical Gastroenterology. 2012 Apr 1;26(2):125-40.
13. Fendrick AM, Scheiman JM. Helicobacter pylori and NSAID gastropathy: an ambiguous association. Current rheumatology reports. 2001 Mar 1;3(2):107-11.
14. Lettino M. Inhibition of the antithrombotic effects of clopidogrel by proton pump inhibitors: facts or fancies? European journal of internal medicine. 2010 Dec 1;21(6):484-9.
15. Lichtenberger LM, Phan TM, Okabe S. Aspirin's Ability to Induce Intestinal Injury in the Rat is Dependent on the Presence of Bile and Can Be Reversed If Pre-Associated with Phosphatidylcholine (PC). Gastroenterology. 2011 May 1;140(5) :S-470.
16. Brown JC, Huang G, Haley-Zitlin V, Jiang X. Antibacterial effects of grape extracts on Helicobacter pylori. Appl. Environ. Microbiol. 2009 Feb 1;75(3):848-52.
17. Kim TH, Jeon EJ, Cheung DY, Kim CW, Kim SS, Park SH, Han SW, Kim MJ, Lee YS, Cho ML, Chang JH. Gastroprotective effects of grape seed proanthocyanin extracts against nonsteroid anti-inflammatory drug-induced gastric injury in rats. Gut and liver. 2013 May;7(3):282.
18. T. Sunil Kumar Reddy, P. Rakesh Kumar Reddy, M. Vidyadhar Reddy, M. Balaji Naik, J. Akhila and MV. Sireesha. Evaluation of Anti-Diarrhoeal Activity of Methanolic Extract of Polycarpaea Aurea Wight &Arn in Albino Wistar RatsInternational Journal of Innovative Pharmaceutical Research. 2011,2(1),84-87.
19. Njoku VO, Obi C. Phytochemical constituents of some selected medicinal plants. African journal of pure and applied chemistry. 2009 Nov 30;3(11):228-33.
20. Abba D, Inabo HI, Yakubu SE, Olonitola OS. Antibacterial activity of some powdered herbal preparations marketed in Kaduna metropolis. Science World Journal. 2009;4(1).
21. Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. African journal of biotechnology. 2005;4(7):685-8.