Evaluation of antioxidant potential of Methanolic and Aqueous extracts of bark and pods of *Acacia concinna*

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ABSTRACT

To investigate the antioxidant activity of aqueous bark and pods extracts of *Acacia concinna*. The extract was screened for possible antioxidant activities by Scavenging of Superoxide radical, Scavenging of hydrogen peroxide radicals, Nitric Oxide Scavenging Activity, DPPH Radical Scavenging Assay and ABTS Radical Cation decolorization Assay The results showed that both the plant parts possessed antioxidant properties including, β-Carotene Linoleate Model and ABTS Radical Cation decolorization Assay The antioxidative activities were correlated with the total phenol. The bark extract of *Acacia concinna* was more effective than that of pods. This study suggests that aqueous bark and extracts of *Acacia concinna* exhibit great potential for antioxidant activity and may be useful for their medicinal functions.

1. INTRODUCTION

Nature, gods miraculous gift has come with a package for our health, healing and happiness. The remedy for many of humanity's illness has been pre-dispensed in the lushly-growing flora of all around us. In the past, almost all the medicines used were from the plants. Therefore plants were considered to be man's only chemist for ages. Today, a vast store of knowledge concerning therapeutic properties of different plants has been accumulated, of which conservative estimates has placed that, the total number of known species are approximately 33,500 yielding official and unofficial products of medicinal importance[1]. The world health organization has estimated that 80 % of earth's (about 6 billion) inhabitants relay upon traditional medicine for their primary health care needs [2]. And a major part of this therapy involves the usage of plant extracts or their active principles. Scientists from many parts of the world have provided to humanity the effective use of herbal medicine. Ayurveda the traditional medicinal practice of India has been recognized to have convincing and credible healing powers[3]. Peptic ulcer is also called as duodenal ulcer, gastric ulcer and ulcer. A peptic ulcer is a sore in the lining of the stomach or duodenum. The first part of small intestine. Walls of the stomach or duodenum.. Peptic ulcers will get worse if not treated. Treatment may include medicines to block stomach acids or antibiotics to kill ulcer causing bacteria, non-smoking and avoiding alcohol can help to prevent ulcers [4]. Surgery may help to cure the ulcers that don't healThe pharmacological treatment options for ulcer includes H_2 receptor blocking agents, proton pump inhibitors, drugs affecting the mucosal barrier and drugs that act on the CNS. Though a wide range of drugs are available for the treatment of ulcer, most of these agents do not fulfill all the requirements and they are also not free from side effects. The adverse clinical outcomes such as arrhythmias, impotence and hematopoietic changes cannot be underestimated[6]. Therefore indigenous drugs possessing antiulcer activity with fewer side effects should be screened to improve and expand the alternative treatment options for gastric ulcer [5].. As there were no studies conducted earlier to evaluate antiulcerogenic activity of pods and bark of *Acacia concinna*

In this study we hypothesized that, pods of *Acacia concinna* have anti ulcerogenic activity, because of the presence of Saponins and flavonoids they possess antiulcer activity. Therefore the studies were undertaken to evaluate the possible antiulcer activity isolated compounds of aqueous extract of pods and bark of *Acacia concinna*

2.METHODOLOGY

1. Collection and extraction of Plant Material [6]:

The bark and pods of *Acacia concinna* were collected from local area around Mangalore and the bark and pods of *Acacia concinna* freed from extraneous matter, shade dried for 10 days and then powdered. The powders were passed through 40-mesh sieve and then subjected to extraction. 900 gms of the powders were extracted separately using distilled water as a solvent in a soxhlet apparatus.

Preliminary phytochemical analysis

The preliminary qualitative phytochemical analysis of methanolic and aqueous extracts bark and pods of *Acacia concinna* was carried out. The methanolic extract aqueous extracts bark and pods of *Acacia concinna* showed the presence of alkaloids, carbohydrates, flavonoids, proteins, amino acids, steroids, fats and oils, and saponins; the methanolic extract of Sapindus emarginatus showed the presence of alkaloids, carbohydrates, flavonoids, triterpenoids, saponins and glycosides;

2. In-vitro antioxidant study:

i). Scavenging of Superoxide radical [7].

Methodology:

The extract (0.3ml) was diluted in DMSO at different concentrations to which 0.1ml of nitro blue tetrazolium was mixed to get ultimate volume of 1.4ml. Absorbance was measured at 560nm. The activity of scavenging in terms of % was estimated using the formula

% scavenging = (Abs $_{control}$- Abs $_{sample}$- /Abs $_{control}$) X 100

ii). Scavenging of hydrogen peroxide radicals[8].

Methodology:

Hydrogen peroxide solution of about 20mM was prepared at a pH of 7.4 in phosphate buffer saline.Various concentration of 1 ml of the extracts or standards in methanol was mixed to 2ml of hydrogen peroxide solutions in PBS. At 230nm the absorbance was estimated against blank solution with a time interval of 10 minutes and the extracts without hydrogen peroxide was found in phosphate buffer saline.

The percentage of activity of scavenging was determined using following technique. % scavenging = (Abs $_{control}$- Abs $_{sample}$- /Abs $_{control}$) X 100

iii). Nitric Oxide Scavenging Activity [9]

Methodology:

Different concentration of extracts ranging from 500-2500µg/ml in methanol was mixed with 2.5ml of phosphate buffer and Sodium nitro prusside. At 25°C the mixture was incubated for a duration of 30 minutes and 1.5ml of Griess reagent was added to reaction mixture of 1.5ml. At 546nm absorbance was measured which indicates the reaction mixture has greater reducing power.

The percentage of scavenging activity was determined using following formula.

iv) DPPH Radical Scavenging Assay,

Method

0.3mM DPPH solution in methanol was produced and 1ml of this solution was mixed to various concentrations of 1ml sample at 1ml and after vigorous shaking of reference compound it was sinisterly in the black at room temperature for a duration of 30 minutes and then absorbance was measured at 517nm and without the test

sample the control reaction was carried out. All the tests were performed in triplicate manner so as to get the mean value. The % inhibition percentage was determined comparing the test and control absorbance values. Antiradical activity was exhibited as inhibition percentage and was deliberate by the following. In the previous equation the term Abs sample was substituted with (Abs sample-Abs blank). Calibration curves and EC50 values were obtained using different sample concentrations.

v). ABTS Radical Cation Decolorization Assay [10]

Method

Prior to assay, $ABTS^{\bullet+}$ solution was diluted in aqueous and absorbance was adjusted to 0.70 (±0.02) at 734 nm. Each sample of aliquot (50 µl) was assorted with 950 µl of liquefied ABTS cation radical solution. At 734 nm absorbance was measured using an UV spectrophotometer after the solution had been permitted to stand for 6 min at room temperature. A control reaction was carried out without test sample.

The inhibition percentage of free radical by the sample was expressed as radical scavenging activity and was evaluated by using following calculation and IC_{50} are also estimated Inhibition percentage (I %) = $Abs_{control} - Abs_{sample} / Abs_{control}$) X 100

3.RESULTS

i)Preliminary Phytochemical Studies

Preliminary phytochemical analysis of successive aqueous bark and pods extract of acacia *concinna* was conducted and the results were as fallows except Alkaloids amino acids were absent Flavanoids, Tanins ,saponins phenolics co were as follows [11]

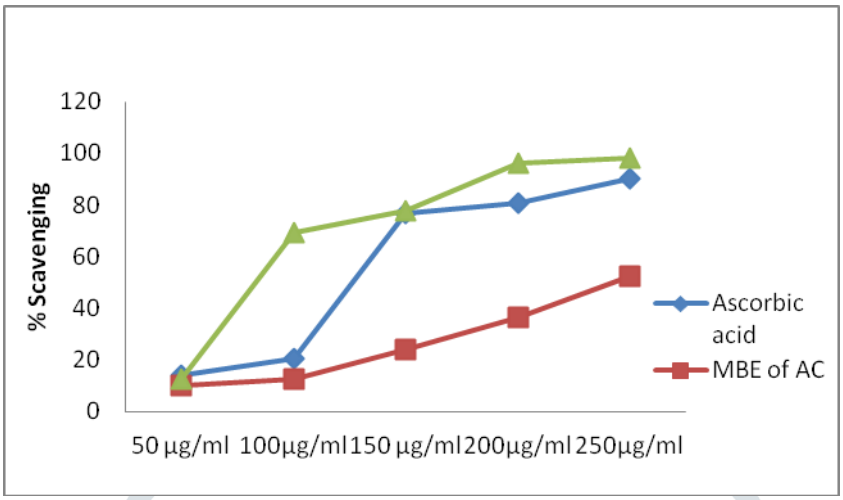
ii) *In Vitro* Antioxidant Activity

Aqueous and Methanolic bark and pods extracts were subjected to *in vitro* antioxidant studies of Superoxide, Hydrogen peroxide, Nitric oxide, DPPH, ABTS. And the results of this study are given in below tables and figures

Table: -1 Antioxidant activity of Methanolic and Aqueous bark extract of *Acacia concinna* and ascorbic acid in superoxide method of scavenging.

S.No	Concentration(µg/ml)	Absorbance	% Scavenging activity
	Control (blank)	2.115	
Ascorbic acid (STD)			
1	50	1.819	13.99
2	100	1.687	20.23
3	150	0.487	76.97
4	200	0.408	80.70
5	250	0.218	90.16
Aqueous bark extract of *Acacia concinna* (*ABE of AC*)			
1	50	1.847	12.67
2	100	0.648	69.36
3	150	0.467	77.91
4	200	0.077	96.36
5	250	0.041	98.06
Methanolic bark extract of *Acacia concinna (MBE of AC)*			
1	50	1.908	09.78
2	100	1.851	12.48
3	150	1.611	23.82
4	200	1.348	36.26
5	250	1.012	52.15

Graph: -1 Antioxidant activity of Methanolic and Aqueous bark extracts of *Acacia concinna* in superoxide method of scavenging

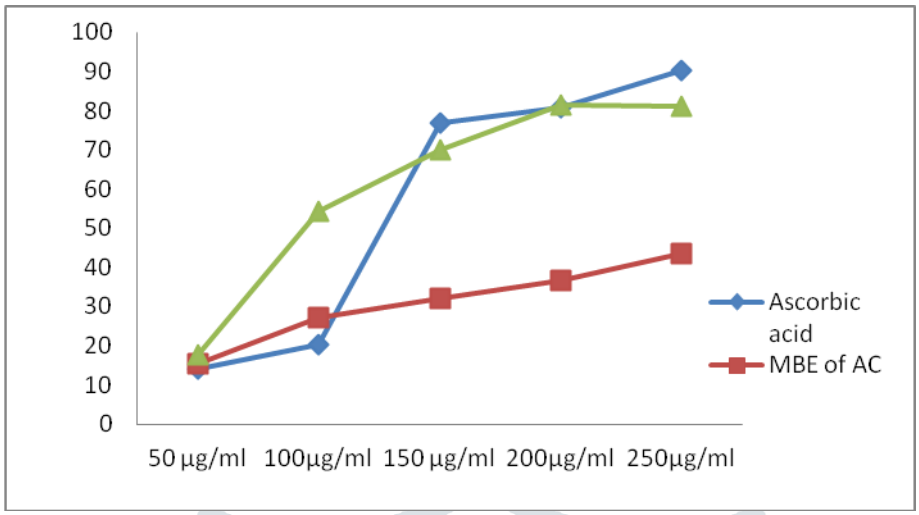


The methanolic and aqueous bark extract of *Acacia concinna* and known antioxidant ascorbic acid at various concentrations produced dose dependent inhibition of superoxide radicals, the % scavenging activity values for superoxide radical against methanolic and aqueous bark extract of *Acacia concinna* were found to be 52.15 and 98.16 with, 250mg/ml respectively. whereas for ascorbic acid it was found to be 90.16 at 250mg/ml. The results were remarkable when compared with standard. (Table: 1; Graph.1)

Table: -2. Antioxidant activity of Aqueous and Methanolic pods extract of *Acacia concinna* and ascorbic acid in Superoxide method of scavenging.

S. No	Concentration(µg/ml)	Absorbance	% scavenging activity
	Control (blank)	2.115	-
Ascorbic acid (STD)			
1.	50	1.819	13.99
2.	100	1.687	20.23
3.	150	0.478	76.97
4.	200	0.408	80.70
5.	250	0.218	90.16
Aqueous pods extract of *Acacia concinna* (APE of *AC*)			
1.	50	1.454	17.69
2.	100	0.620	54.40
3.	150	0.421	70.00
4.	200	0.060	81.30
5.	250	0.022	81.10
Methanolic pods extract of *Acacia concinna* (MPE of AC)			
1.	50	1.787	15.50
2.	100	1.539	27.23
3.	150	1.435	32.15
4.	200	1.341	36.59
5.	250	1.198	43.35

Graph: -2 Antioxidant activity of Methanolic and Aqueous pods extract of *Acacia concinna* in Superoxide method of scavenging

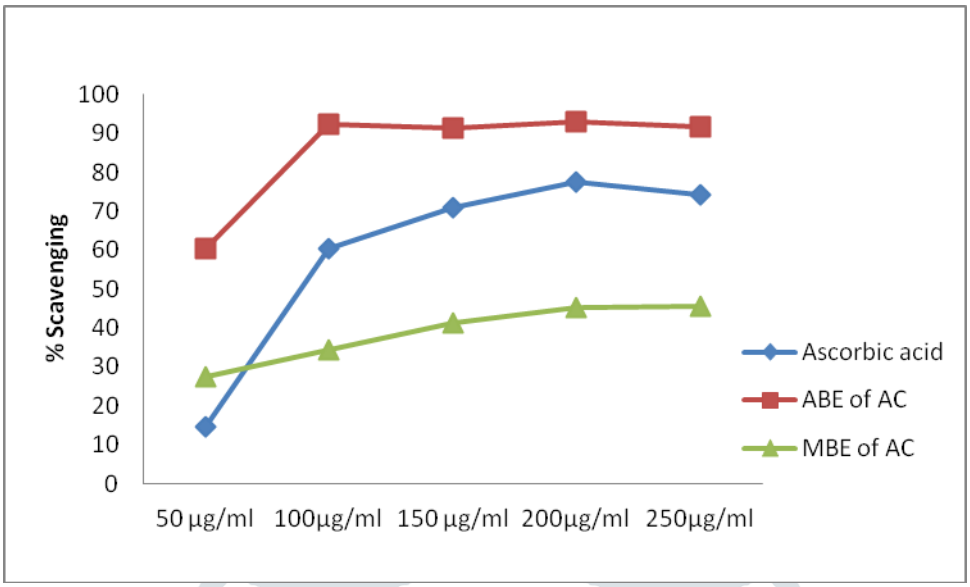


The methanolic and aqueous pods extract of *Acacia concinna* and known antioxidant ascorbic acid at various concentrations produced dose dependent inhibition of superoxide radicals, the % scavenging activity values for superoxide radical against methanolic and aqueous pods bark extract of *Acacia concinna* were found to be 81.10 and 43.35 with 250mg/ml respectively. whereas for ascorbic acid it was found to be 90.16 at 250mg/ml. The results were quite similar when compared with standard. (Table.2; Graph 2)

Table: -3 Antioxidant activity of Aqueous and Methanolic bark extract of *Acacia concinna* and ascorbic acid in Hydrogen peroxide method of scavenging activity

S.NO	Concentratios (µg/ml)	Absorbance	%of Scavenging activity
1	Control (blank)	2.026	
Ascorbic acid (STD)			
1	50	1.727	14.75
2	100	0.802	60.41
3	150	0.587	71.02
4	200	0.456	77.49
5	250	0.518	74.43
Aqueous pods extract of *Acacia concinna*(APE Of *AC*)			
1	50	0.805	60.27
2	100	0.153	92.24
3	150	0.175	91.36
4	200	0.142	92.99
5	250	0.166	91.80
Methanolic pods extract of *Acacia concinna*(MPE Of *AC*)			
1	50	1.467	27.59
2	100	1.328	34.45
3	150	1.187	41.41
4	200	1.111	45.16
5	250	1.100	45.70

Graph: -3 Antioxidant activity of Methanolic and Aqueous bark extracts of *Acacia concinna* in Hydrogen peroxide method of scavenging

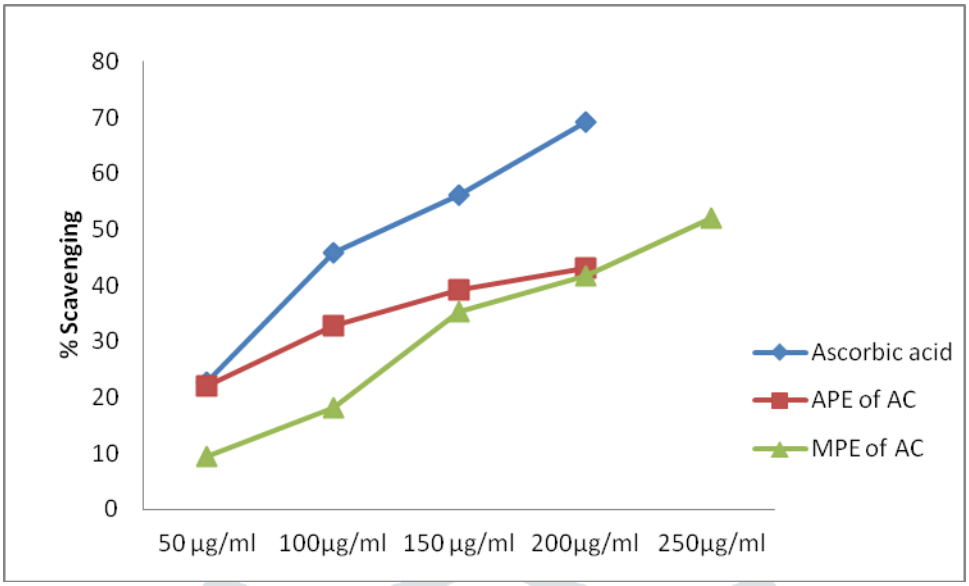


The hydrogen peroxide radical was significantly scavenged by *ABE* of *AC* when compare to the ascorbic acid which showed antioxidant potential of *ABE of AC*. The percentage scavenging activity of *MBE* and *ABE* of *AC* was found to be 45.70 and 91.68 at 250 µg/ml respectively, when compared to ascorbic acid, it showed 74.43 at 250 µg/ml. (Table 3, Graph 3)

Table:4 Antioxidant activity of Methanolic and Aqueous pods extracts of *Acacia concinna* in Hydrogen peroxide method of scavenging activity

S.No	Concentration(µg/ml)	Absorbance	% Scavenging activity
	Control (blank)	**2.026**	**-**
Ascorbic acid (STD)			
1	**50**	**1.727**	**14.75**
2	**100**	**0.802**	**60.41**
3	**150**	**0.587**	**71.02**
4	**200**	**0.456**	**77.49**
5	**250**	**0.518**	**74.43**
Aqueous pods extract of *Acacia concinna* (APE of *AC)*			
1	**50**	**0.757**	**62.63**
2	**100**	**0.165**	**83.25**
3	**150**	**0.183**	**80.11**
4	**200**	**0.123**	**86.42**
5	**250**	**0.174**	**82.33**
Methanolic pods extract of *Acacia concinna* (MPE of AC)			
1	**50**	**1.891**	**6.66**
2	**100**	**1.722**	**15.00**
3	**150**	**1.672**	**17.47**
4	**200**	**1.401**	**30.84**
5	**250**	**1.338**	**33.95**

Graph.4 Scavenging Hydrogen peroxide radical activity of Methanolic and Aqueous pods extract of *Acacia concinna*

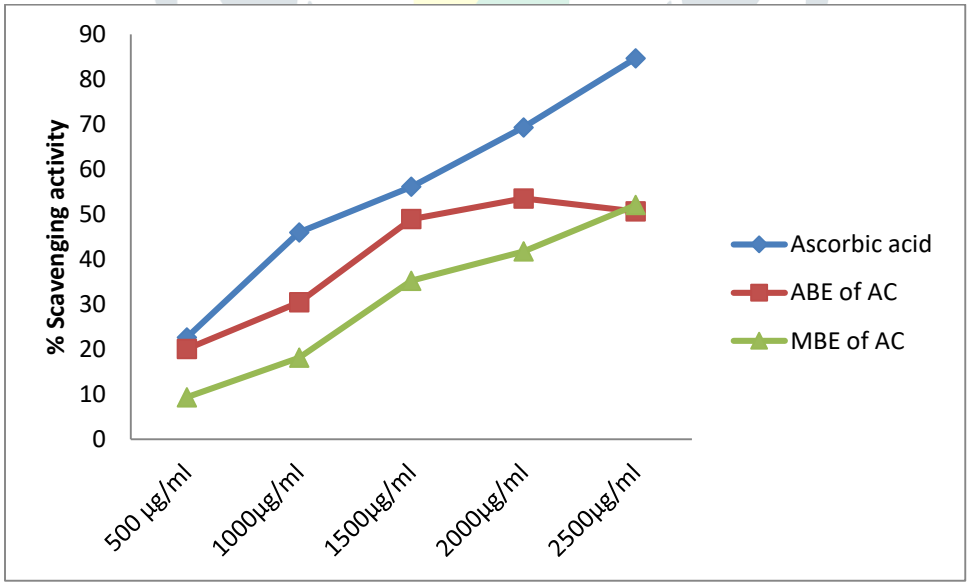


The hydrogen peroxide radical was scavenged by MPE of AC and APE of *AC* when compare to the ascorbic acid which showed antioxidant potential of MPE of AC and APE of *AC*. The % scavenging activity of MPE OF AC and APE of *AC* was found to be 33.95, 82.33 at 250 µg/ml respectively, when compared to ascorbic acid, it showed 74.11at 250 µg/ml (Table 4. Graph-4)

Table.5 Antioxidant activity of Methanolic and Aqueous bark extracts of *Acacia concinna* in Nitric oxide method of scavenging.

S.No	Concentration(µg/ml)	Absorbance	% Scavenging activity
	Control (blank)	**1.016**	**-**
Ascrobic acid (STD)			
1.	**500**	**0.786**	**22.63**
2.	**1000**	**0.549**	**45.96**
3.	**1500**	**0.446**	**56.10**
4.	**2000**	**0.312**	**69.29**
5.	**2500**	**0.156**	**84.64**
Aqueous bark extract of *Acacia concinna* (*ABE Of AC*)			
1.	**500**	**0.812**	**20.07**
2.	**1000**	**0.707**	**30.41**
3.	**1500**	**0.518**	**48.91**
4.	**2000**	**0.477**	**53.50**
5.	**2500**	**0.420**	**58.61**
Methanolic bark extract of *Acacia concinna* (*MBE of AC*)			
1	**500**	**0.921**	**9.35**
2	**1000**	**0.832**	**18.11**
3	**1500**	**0.658**	**35.23**
4	**2000**	**0.592**	**41.73**
5	**2500**	**0.487**	**52.06**

Graph.5: -Scavenging nitric oxide activity of Methanolic and Aqueous bark extracts of *Acacia concinna*

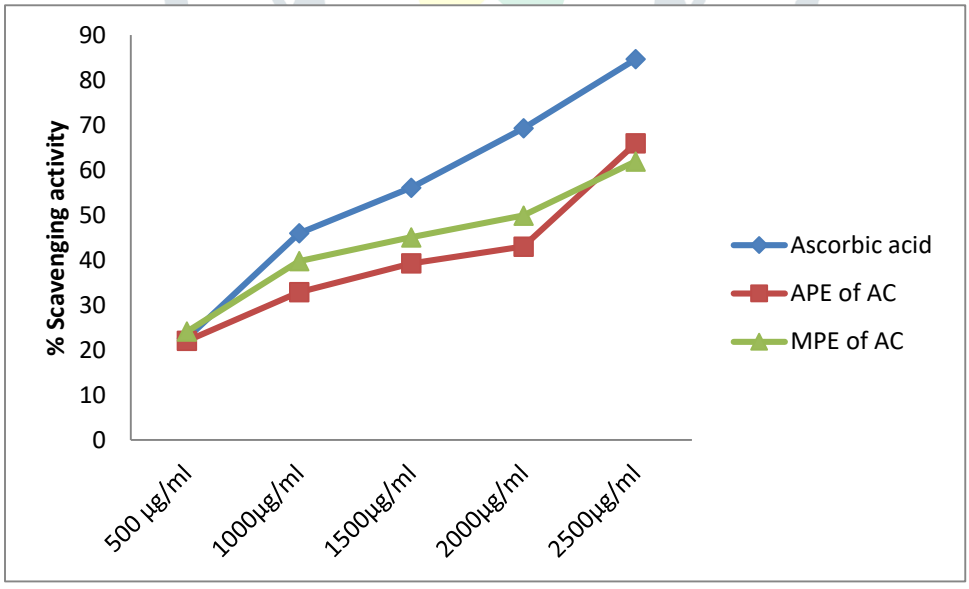


In scavenging of Nitric oxide radical, *MBE of AC* and ABE of *AC* similarly scavenged the nitric oxide radical when compared with the Ascorbic acid scavenging effect scavenging activity of MBE of AC and ABE of *AC* was found to be 58.61 ,52.06 at 2500 µg/ml respectively. when compared with ascorbic acid by 84.64at 2500 µg/ml (Table.5. Graph.5)

Table: -6 Antioxidant activity of Methanolic and Aqueous pods extract of *Acacia concinna* in nitric oxide method of scavenging.

S.No	Concentration(µg/ml)	Absorbance	% scavenging activity
	Control (blank)	1.016	-
Ascrobic acid (STD)			
1	500	0.786	22.63
2	1000	0.549	45.96
3	1500	0.446	56.10
4	2000	0.312	69.29
5	2500	0.156	84.64
Aqueous pods extract of *Acacia concinna* (APE of *AC)*			
1	500	0.792	22.04
2	1000	0.682	32.87
3	1500	0.617	39.27
4	2000	0.579	43.01
5	2500	0.436	57.08
Methanolic pods extract of *Acacia concinna* (MPE of AC)			
1	500	0.921	09.35
2	1000	0.832	18.11
3	1500	0.658	35.23
4	2000	0.592	41.73
5	2500	0.487	52.06

Graph.6 Scavenging nitric oxide activity of Methanolic and Aqueous pods extract of *Acacia concinna*



In scavenging of Nitric oxide radical, APE of AC and *MPE of AC non* significantly scavenged the nitric oxide radical when compared with the Ascorbic acid scavenging effect. Scavenging activity of APE of *AC* and *MPE of AC* was found to be 57.08 and 52.06 respectively at 2500 µg/ml. when compared with ascorbic

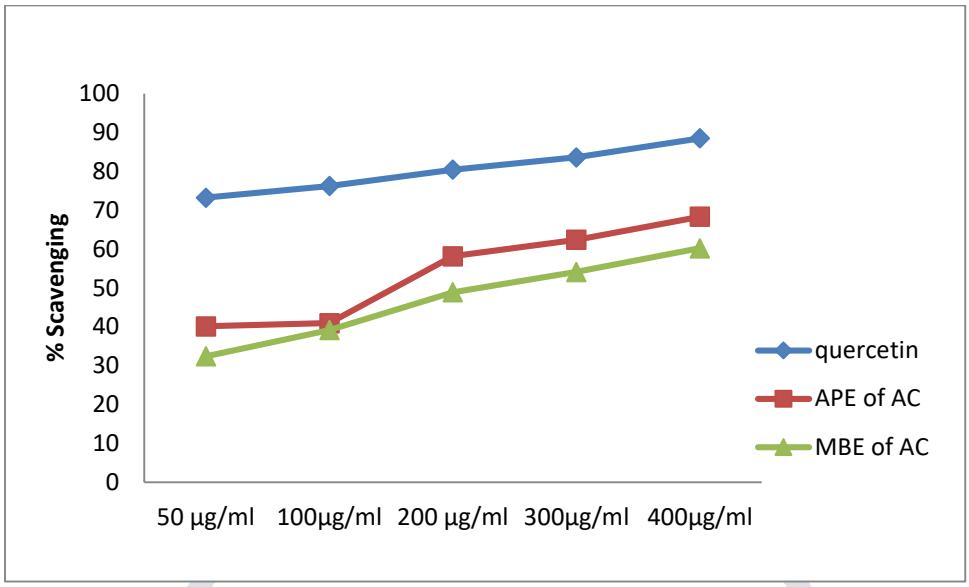
acid by 84.64 at 2500 µg/ml (Table.6; Graph 6.)

In scavenging of Nitric oxide radical, *MPE of AC* and APE of *AC* non significantly scavenged the nitric oxide radical when compared with the Ascorbic acid scavenging effect scavenging activity of ABE of *AC* was found to be significantly inhibited to 58.61 at 2500 µg/ml. when compared with ascorbic acid by 84.64 at 2500 µg/ml

Table 7: Scavenging activity of DPPH radical using Methanolic and Aqueous bark extract of *Acacia concinna*

S. No	Concentration (µg/ml)	% Scavenging activity
Quercetin (STD)		
1	**50**	**73.26**
2	**100**	**76.25**
3	**200**	**80.46**
4	**300**	**83.64**
5	**400**	**88.51**
Aqueous bark extract of *Acacia Concinna* (ABE of AC)		
1	**50**	**45.38**
2	**100**	**54.79**
3	**200**	**62.28**
4	**300**	**66.43**
5	**400**	**73.42**
Methanolic bark extract of *Acacia Concinna* (MBE of AC)		
1	**50**	**32.89**
2	**100**	**44.23**
3	**200**	**52.43**
4	**300**	**58.21**
5	**400**	**61.32**

Graph.7. Scavenging activity of DPPH radical using Methanolic and Aqueous bark extract of *Acacia concinna*

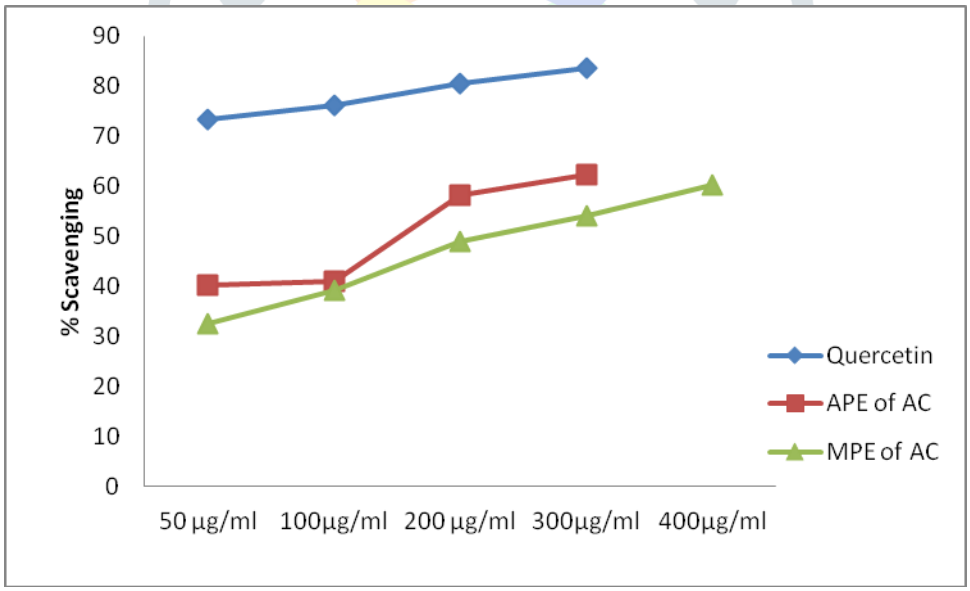


The scavenging activity of the ABE of *AC* was increased with increasing extract concentrations and that of the standard. MBE and ABE of *AC* showed the % scavenging activity by 73.42 and 61.32 at 400µg/ml respectively when compared to Quercetin showed 88.51 at 400 µ

Table 8: Scavenging activity of DPPH radical using methanolic and aqueous pods extract of *Acacia concinna*

S.No	Conc (µg/ml)	% Scavenging activity
Quercetin (STD)		
1	50	73.26
2	100	76.25
3	200	80.46
4	300	83.64
5	400	88.51
Aqueous pods extract of *Acacia Concinna* (APE of AC)		
1	50	40.11
2	100	40.94
3	200	58.16
4	300	62.42
5	400	68.33
Methanolic pods extract of *Acacia Concinna* (MPE of AC)		
1	50	32.43
2	100	39.18
3	200	48.89
4	300	54.12
5	400	60.23

Graph.8. Scavenging activity of DPPH radical using Methanolic and Aqueous pods extract of *Acacia concinna*



The scavenging activity of the APE of AC was increased with increasing extract concentrations and that of the standard. APE of AC showed the % scavenging activity by 68.33 and 60.23 at 400 µg/ml respectively when compared to quercetin showed 88.51 at 400 µg/ml.

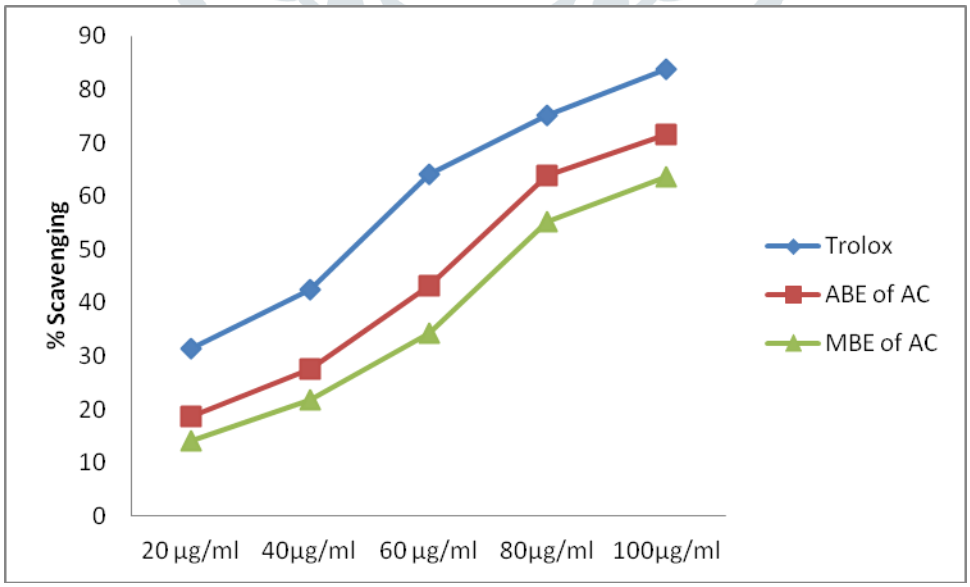
Hence comparing all the extracts radical scavenging activity of APE of AC was evident at all the concentrations but only at low level not as significant as that of quercetin used as standard. The scavenging activity of the APE of AC was increased with increasing extract concentrations and that of the standard APE of AC showed the % scavenging activity by 68.33 at 400 µg/ml when compared to quercetin showed

88.51 at 400 µg/ml. Whereas ABE of AC showed the significant % scavenging activity by 73.42 at 400 µg/ml when compared to quercetin showed 88.54 at 400µg/ml. and over all if we see ABE of AC has shown significant scavenging activity when compared with MBE, APE and MPE of AC.

Table 9: Scavenging activity of ABTS radical Cation assay using Aqueous bark and Methanolic bark extract of *Acacia concinna*

S. No	Concentrations (µg/ml)	% Scavenging activity
Trolox (STD)		
1	**20**	**31.34**
2	**40**	**42.42**
3	**60**	**64.12**
4	**80**	**75.21**
5	**100**	**83.67**
Aqueous bark extract of *Acacia Concinna* (ABE of AC)		
1	**20**	**18.74**
2	**40**	**27.52**
3	**60**	**43.22**
4	**80**	**63.78**
5	**100**	**71.46**
Methanolic bark extract of *Acacia Concinna* (MBE of AC)		
1	**20**	**14.22**
2	**40**	**21.90**
3	**60**	**34.41**
4	**80**	**55.32**
5	**100**	**63.56**

Graph.9: ABTS radical Cation assay of Methanolic and Aqueous bark extract of *Acacia concinna*



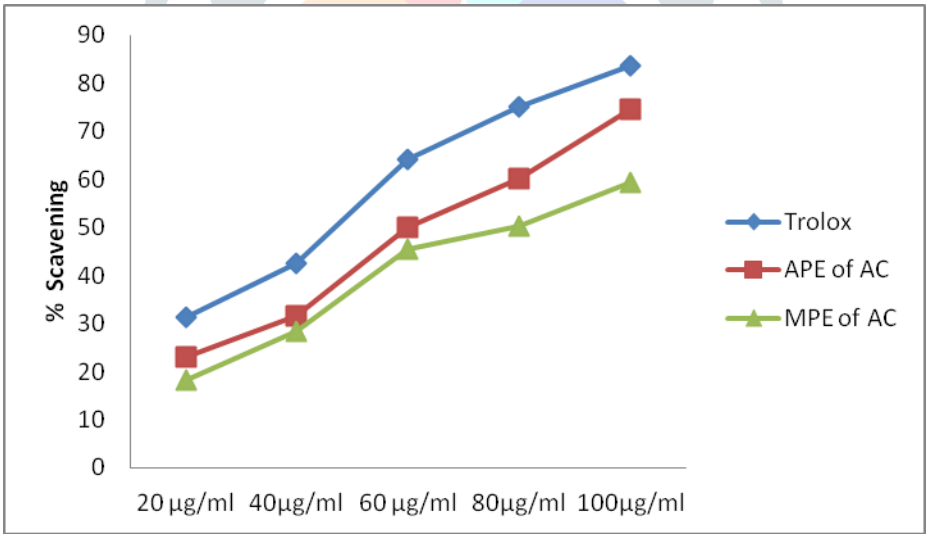
The antioxidant potential of MBE of AC and ABE of AC was significantly scavenged the ABTS radical by 63.46 and 71.46 at 100 µg/ml respectively, when compared to the standard which was 83.67 at 100µg /ml. The antioxidant properties were expressed as concentration dependent

Table 10: Scavenging activity of ABTS radical Cation assay using Aqueous pods extract

and Methanolic pods extract of Acacia concinna

S. No	Concentrations (µg/ml)	% Scavenging activity
Trolox (STD)		
1	**20**	**31.34**
2	**40**	**42.42**
3	**60**	**64.12**
4	**80**	**75.21**
5	**100**	**83.67**
Aqueous pods extract of *Acacia Concinna* (APE of AC)		
1	**20**	**23.14**
2	**40**	**31.45**
3	**60**	**49.98**
4	**80**	**60.13**
5	**100**	**74.56**
Methanolic pods extract of *Acacia Concinna* (MPE of AC)		
1	**20**	**18.10**
2	**40**	**28.45**
3	**60**	**45.53**
4	**80**	**50.22**
5	**100**	**59.22**

Graph10: ABTS radical cation assay using Methanolic and Aqueous pods extract of *Acacia concinna*



The antioxidant potential of MPE of AC and APE of AC was significantly scavenged the ABTS radical by74.56 and 59.22 at 100 µg/ml respectively, when compared to the standard which was 83.67 at 100µg /ml. The antioxidant properties were expressed as concentration dependent. The antioxidant potential of MPE of AC 59.22 % less scavenging activity than APE of AC was significantly scavenged the ABTS radical by 74.56 at 100 µg/ml, when compared to the standard

Hence from the findings of the above In vitro antioxidant study aqueous extract ABE of AC was found to be potent when compared with MBE of AC, MPE of AC and APE of AC Based on the *In vitro* antioxidant potential of Aqueous extract of bark and pods of *Acacia concinna* in all the methods **Aqueous extract of bark of *Acacia concinna*** has shown the more significant results, so bark extract

has been taken for further isolation studies.

DISCUSSION

Oxidative stress is described in common as surplus formation or inadequate destruction of highly reactive molecules of such as oxygen species (ROS) and reactive nitrogen species (RNS). ROS comprise of free radicals such as superoxide(*O2), hydroxy1(*OH), peroxyl (*RO2), hydroxyperoxyl (*HRO) as well as non-radical species such as hydrogen peroxide (H202) and hypochlorous acid (HOCL). RNS comprises of free radicals like nitric oxide and nitrogen dioxide as well as non-radical such as peroxynitrite (ONOO) nitrous oxide(HNO2) and alkyl peroxynitrites (RONOO.) [12]

Among all the three extracts tested for their antioxidant potential to scavenge Superoxide radical, hydrogen peroxide radical, Nitric oxide radical, DPPH radical and ABTS by in vitro antioxidant models, aqueous bark extract significantly scavenged all the free radicals tested when compared with other extracts

Hydrogen peroxide (H202), which in turn produce hydroxyl radicals (*OH), resulting in propagation of lipid peroxidation.Physiological processes such as relaxation of muscle, signaling of neuron, platelet aggregation inhibition and regulation of toxicity of cell media in biological systems by Nitric oxide (NO) since it is a strong pleiotropic inhibitor.

One of the important plant constituent Phenolic compounds possessing scavenging ability and powerful chain-breaking antioxidant property due to the presence of hydroxyl groups. In our study we have observed that Total phenolic content very significantly scavenged the Superoxide radical (98.16 % scavenging activity at 250 µg/ml when compared with Ascorbic acid by 87.89% at 250 µg/ml), hydrogen peroxide radical (91.68 % scavenging activity at 250 µg/ml when compared to ascorbic acid showed 74.11 %only at 250 µg/ml) , Nitric oxide radical(35.71 % at 2500 µg/ml when compared with ascorbic acid by 78.57at 250 µg/ml). These findings are very well comparable with findings ofJamuna S, Paulsamy S, Karthika K. 2012 [13-15]

Electrons become matched off and it loses the color of solution stoichiometrically based on the number of electrons utilized. Illustrates a remarkable decline in the mass of DPPH radical due to the capability of scavenging of the extract and the standard quercetin as a reference compound. By comparing all the extracts radical scavenging activity of ABE of AC was evident at all the concentrations but only at a low level not as significant as that of quercetin used as standard. The scavenging activity of the ABE of AC was increased with increasing extract concentrations and that of the standard. ABE of AC showed the % scavenging activity by 72.42 at 400 µg/ml when compared to quercetin showed 88.44 at 400 µg/ml. Whereas APE of AC showed 68.33 µg/ml.

AEPQ significantly scavenged the DPPH radical. The l, 1-diphenyl -2-picryl hydroxyl (DPPH)radical was extensively used as the model system to examine the activities of scavenging of several pure compounds such as extract of plants in a relatively short time. Scavenging of DPPH radical by antioxidants through the contribution of proton forming the minimized DPPH)" After reduction the purple color changes to yellow (diphenyl picryl hydrazine), which was expressed by its reduction of absorbance at 517 nm wavelength. In the present study, AEPQ showed significant scavenging of DPPH radical when compared with other extracts and standard compound[16]

The ABTS radical cation procedure gives a count of carotenoids and phenolics antioxidant activity, and also some antioxidants of plasma, estimated by the decolorization of the ABTS-l, through determining the radical cation reduction as the inhibition of percentage of absorbance at 734 nm. ABTS-l assay of decolorization in contrast to myoglobin assay recorded at 6 min. The assay of latter involves constant development of the ABTS radical cation by ferryl myoglobin which is derived from hydrogen peroxide and met-myoglobin in the existence of the reductants.

The antioxidant potential of ABE of AC was significantly scavenged the ABTS radical by 71. 46 at 100 µg/ml, when compared to the standard, APE of AC which has shown 64.51 at 100µg /ml The antioxidant properties were expressed as concentration dependent.

Vitamin C is a chief antioxidant, it remarkably lowers the harmful consequences of reactive species such as ROS and RNS which can be the source for oxidative damage to macromolecules such as lipids, DNA and proteins which are involved in the development of chronic diseases by scavenging/ neutralizing them. Ascorbic acid the antioxidant vitamin significantly lowers the harmful consequences of reactive species such as ROS and RNS which can be the source for oxidative damage to macromolecules. Vitamin C reduces the harmful consequences of reactive species such as reactive nitrogen species as it is a prime antioxidant that can cause damage to oxidative macromolecules which are involved in chronic diseases by scavenging/ neutralizing such as lipids and DNA.[17]

CONCLUSION

Research on natural products often is guided by ethnopharmacological knowledge, and has brought substantial contributions to drug innovation by providing novel chemical structures and their mechanism of action [65]. In India, a large number of herbal extracts are used in the medicine to treat various types of disorders. *Acacia concinna* is one such plant renowned for its various medicinal properties, but no scientific information is available regarding its antiulcer activity. The present study has, therefore been designed to evaluate the antiulcer activity of methanolic and aqueous bark and pods of *Acacia concinna* on various ulcer inducing models. Results from this study indicates that among all the four extracts tested for their antioxidant potential to scavenge Superoxide radical, hydrogen peroxide radical, Nitric oxide radical, DPPH radical and ABTS by in vitro antioxidant models, aqueous bark extract significantly scavenged all the free radicals tested when compare with other extracts so the *in vivo* activity was conducted with Aqueous bark extract of *Acacia concinna* against pylorus ligation induced ulcers, NSAID"S induced ulcers and Cold stress induced ulcer. The standard antiulcer drugs used in the experiment were Omeprazole.In all the four ulcer inducing models, the *Acacia concinna* bark extract showed dose-dependant decrease in the ulcer index at concentrations of 100, 200 and 400 mg/kg (p.o). The extract, at a dose of 400 mg/kg was found to exert maximum antiulcer activity indicated by a decrease in ulcer index. Hence the antiulcer effect of *Acacia concinna* was found to be dose dependant.

The preliminary phytochemical screening of the methanolic and aqueous bark and pods extract of *Acacia concinna* confirmed the presence of various phytochemicals like alkaloids, flavonoids, tannins, triterpinoids, steroids and saponins. The significant antiulcer potential could be attributed to

the presence of saponins and flavonoids, tannins, terpenoids and sterols all of which exerts gastroprotective effect [66]. Flavonoids such as quercetin have been reported to prevent gastric mucosal lesions in various experimental models by increasing the amount of neutral glycoproteins, mucosal prostaglandins and by inhibition of histidine decarboxylase in the mast cells. Further the free radical scavenging property of flavonoids has been reported to protect the gastrointestinal tract from ulcerative lesions. They also act by chelation of transition metal ions, inhibition of oxidant enzyme and regeneration of α-tocopherol from α-tocopheroxyl radicals thereby promoting mucus formation, diminishing acid secretion and inhibiting the production of pepsinogen causing a decrease in the ulcer severity

Triterpinoids have been implicated in the antiulcer activity mediated through the formation of protective mucosal layer. They reduce excess acid secretion by reduceing vascular permeability and activating cellular proteins

Almost all the plant parts possess astringent activity which may be due to the presence of tannins . Taninns are bitter polyphenolic compounds that possess astringent and free radical scavenging properties due to their ability to complex with other molecules such as proteins, polysaccharides and amino acids, hence prevents the gastric mucosa from free radical mediated injury. On the other hand, tannins may prevent ulcer development due to their protein precipitating and vasoconstricting effects causing shrinkage of the mucosa. Their astringent effect can help to precipitate the microproteins on the ulcer site thereby forming an impervious layer over the lining which hinders the gut secretions and protects the underlying mucosa from toxic and other irritants .

Aqueous bark extract of *Acacia concinna* displayed antiulcer activity as demonstrated by all the three ulcer inducing models which may be either due to its antisecretory effect or antioxidant activity resulting in cytoprotection. The activity of the extract may be due to the presence of core phytoconstituents present in the plant. All these obseravations justify the ethnomedical use of the plant as an anti-ulcerative. Further studies to identify the active moieties and elucidation of their mechanism of action are recommended.

References

1. Roger Walker, Cate Whittlesea: Clinical Pharmacy and Therapeutics, Vol. 4; Peptic ulcer disease, pg. 150-151
2. http: // en. wikipedia.org/wiki/Zollinger_Ellison_syndrome.
3. http: // en.wikipedia.org/wiki/peptic_ulcer.
4. www.umm.edu>Medical Reference>Patient Education.
5. Heartburn.about.com/cs/articles/a/ulcer complicate.htm.
6. Indian Pharmacopoeia, Volume-II. Government of India, Ministry of Health and Family Welfare. New Delhi. 1996. 37.
7. Pullock KM. Quality Control of Herbal Drugs, 1st edn. Business Horizons, Pharmaceutical Publishers. New Delhi. 2002, 379-382.
8. Khandelwal K.R. Practical Pharmacognosy, 9th edn. Nirali Prakashan, Pune. 2002, 149-56.

9. Kumar. R.S, Rajkapoor. B and Perumal. P. Anti oxidant Activities of *Indigofera cassioides rottl*. Ex.DC. using various *In vitro* assay models. Asian Pacific Journal of Tropical Bio medicine. 2012; 2(4), 256-261.
10. PAGUIGAN ND, CASTILLO DH, CHICHIOCO-HERNANDEZ CL. Anti-ulcer activity of leguminosae plants. Arquivos de gastroenterologia. 2014 Mar;51(1):64-7.
11. Jamuna S, Paulsamy S, Karthika K. Screening of in vitro antioxidant activity of methanolic leaf and root extracts of Hypochaeris radicata L.(Asteraceae). J Appl Pharm Sci. 2012;2(7):149-54.
12. Jayaprakasha GK, Singh RP, Sakariah KK. Antioxidant activity of grape seed (Vitis vinifera) extracts on peroxidation models in vitro. Food chemistry. 2001 May 1;73(3):285-90.
13. Naidu KA. Vitamin C in human health and disease is still a mystery? An overview. Nutrition journal. 2003 Dec;2(1):7
14. Hatano T., Edamatsu R., Mori A. Effect of interaction of tannins and related poyphenols on superoxide anion radical and on DPPH radical. Chem Pharm Bull. 1989; 37: 2016-2021.
15. Shahidi F., Wanasundara PKJPD. Phenolic antioxidants. Food Sci. Nut. 1992; 32: 67-103.
16. Jayaprakash. G.k, Singh. R.P, Sakariah. K.K. Antioxidant activity of graph seed extracts on peroxidation models In Vitro. Food chemistry. 2001; 73(3), 285-290.
17. Naidu K.A.K. Vitamin C in human health and disease in still a mystery? An overview. Nutritional journal. 2003; 2, 7.