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Research Article

**COMPARATIVE EVALUATION OF THREE INDIAN
MEDICINAL PLANTS FOR THEIR ANTIULCER AND
ANTI- OXIDANT ACTIVITIES IN ALBINO RAT**

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Abstract:

*India has a vast variety of medicinal plants. Medicinal plants synthesize variety of phytochemical that helps to defend against wide variety of bacterial, viral and various other types of infections. The synthesized also has anticancer and antioxidant properties. Use of plant as a source of medicine has been an ancient practice and is important component of health system in India. General public, academic and government interest in traditional medicine is growing rapidly due to increase side effects of adverse drug reactions and cost factor of modern system of medicine. The present study focuses on comparison of three Indian medicinal plants *Jetropha curcas*, *Argemone maxicana* and *Nyctanthes arbor-tristis* for their antiulcer and antioxidant activities.*

Key words: *Anti-oxidant, Anti-cancer, Phytochemical*

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INTRODUCTION:

Herbal drugs are used for primary health care, not only in rural areas in developing countries, but also in developed as well, where modern medicine is predominantly used. Herbal medicines are used by 60% of world's population, while the traditional medicines are derived from medicinal plants, minerals and organic matter, the herbal drugs are prepared from medicinal plants only.

In western countries also the use of herbal medicine is growing rapidly with approximately 40% of population reporting use of herbs to treat diseases within past years. General public, academic and government interest in traditional medicine is growing rapidly due to increased side effects of adverse drug reactions and cost factor of modern system of medicine.

Plants have evolved the ability to synthesize chemical compounds that help them defend against attack from a wide variety of microorganisms, insects and animals. Some of these compounds whilst toxic to plant predators, they may have beneficial effects when used to treat human diseases.

The present study includes three Indian medicinal plants namely- *Jatropha curcas*, *Argemone maxicana*, and *Nyctanthes arbor-tristis*, for their comparative analysis of Anti-cancer and Antioxidant properties in albino rats.

1-*Jatropha curcas* :- *Jatropha* is a group of flowering plant belonging to the family Euphorbiaceae. In 2007 Goldman Sachs cited *Jatropha curcas* as one of the best candidate for future biodiesel production. It is resistant to draught and pests and produces seeds containing 27 to 40% oil. Igbinsola et al demonstrated potential broad spectrum antimicrobial activity of this plant. Phytochemical analysis of *J. curcas* shows the presence of Steroids, Flavonoids, Alkaloids, Saponins, Triterpenoids, Tannins and Carbohydrates. Studies also shows that *J. curcas* extracts shows significant wound healing activity in gastric ulcer.

2-*Argemone maxicana*:- *Argemone maxicana* (Maxican poppy, Maxican prickly poppy) is a species of flowering plant belonging to family "Papaveraceae". Maxican oil called argemone oil or Katkar oil contains toxic alkaloids "sanguinarine" and dihydrosanguinarine, four quaternary isoquinoline alkaloids- dehydrocorydalmine, jatrorrhizine, columbamine and oxyberberine have been isolated from whole plant of *Argemone maxicana*. As a popular medicinal herb in India, where it is known as "Satyanashi", it is used for cough, asthma, phlegm, in throat dysentery and rheumatism. The seeds are expectorant, sedative, and seed oil is purgative. Researches shows that maxican poppy may be useful in treating cancer and certain alkaloids inhibit viruses, bacteria and fungi.

3-*Nyctanthes arbor-tristis*:- *Nyctanthes arbor-tristis* (night flowering jasmine) is a species of *Nyctanthes*. It's leaves are antibacterial, anthelmintic, anti-inflammatory, hepatoprotective, immunopotential, antipyretic, antioxidant, and antifungal. Flowers are diuretic anti-bilious, antioxidant, anti-inflammatory, sedative and anti-filarial. Seeds are antibacterial, immunomodulatory, and anti-leishmanial. Bark is antimicrobial and stem is antipyretic and anti-oxidant. Phytochemical screening of *N.arbor- tristis* shows the presence of alkaloids, glycosides, saponins, tannins, flavonoids, steroids which shows significant Anti-oxidant and anti- cancer properties.

MATERIALS AND METHODS:**a- Plan of work-**

- i. The objective of the present study is to evaluate the anti-ulcer and anti-oxidant activity the methanolic leaf extract of three Indian medicinal plants in experimentally induced ulcer in albino rats.
- ii. The anti-ulcer activity was detected by the evaluation of ulcer score and ulcer index.
- iii. The Antioxidant activity was detected by evaluating the enzymatic levels of catalase, reduced Glutathione peroxidase, and Superoxide dismutase.

b- Plant material collection:-

Leaves of the plants were collected from the local garden of Utthan society, Jhalwa, Allahabad.

c- Drying and size reduction:-

The collected leaves were dried under shade for one month. The dried mass were processed into coarse powder and sieved by mesh size-12. The granules were stored separately in a closed vessel for extraction purpose.

d- Extraction of plant material:-

The extraction of plant material was carried out in Soxhlet extractor. The plant material to be extracted was weighed and packed in the extractor and heated under reflux. Heat was supplied through heating mantle. The extract was collected directly from round bottom flask and solvent was evaporated using Rota flask evaporator. The extract was filtered, concentrated in vacuume followed by freeze storage for further use.

e- Experimental animals:-

Albino rats of either sex, weighing 180- 230 g were selected for anti- ulcer activity. Animals were maintained under standered condition in an animal house approved by the committee for the purpose of control and supervision of experiments on animals.

f- Ethanol induction of Gastric mucosal ulcer:-

Healthy wister albino rats of either weighing 180-230g were taken for the studies. The animals were divided in six groups (each containing 6 animals). The animals in all groups were kept for 24 h fasting with free access to water and avoidance to copulation. Group first served as normal control group and received only distilled water. Group second served as ulcer control group. Group third served as standard group which received standard anti-ulcer group. Fourth, fifth and sixth groups received methanolic extract of *Jatropha curcas*, *Argemone maxicana* and *Nyctanthes arbor-tristis*. After one hour of treatment all rats received 1 ml of 99.5% ethanol to induce gastric ulcer. One hour later, the animals were sacrificed and stomachs were removed and opened along the greater curvature. The stomachs were gently rinsed with water to remove the gastric contents and blood clots.

g-Groups of Albino rats

Group 1	Control, untreated
Group 2	Ethanol induced ulcer, control
Group 3	Ethanol induced ulcer treated with standard drug (omeprazole)
Group 4	Ethanol induced ulcer treated with <i>J. curcas</i> leaf extract
Group 5	Ethanol induced ulcer treated with <i>A. maxicana</i> leaf extract
Group 6	Ethanol induced ulcer treated with <i>N. arbor-tristis</i>

h- Parameters accessed:- The following parameters were accessed-

Physical parameters:-

- Ulcer score
- Ulcer index

Antioxidant activity:- The following enzymatic levels were analyzed

- Catalase
- Reduced glutathione
- Superoxide dismutase

The following arbitrary scoring system was adopted to grade the incidence and severity of lesion.

Normal stomach.....	0
Red coloration.....	0.5
Spot ulcer.....	1.0
Hemorrhagic streak.....	1.5
Ulcers.....	2.0
Perforation.....	3.0

The catalase is a ubiquitous heme protein that reduces hydrogen peroxide to water. Hence catalase activity was determined by measuring decreasing absorbance of hydrogen peroxide.

Reduced glutathione level is determined by the method of Ellman.

The superoxide dismutase assay relies on the ability of the enzyme to inhibit phenazine methosulphate (PMS) mediated reduction of NBT dye. Reaction is initiated by addition of PMS, and the increase in absorbance at 560nm due to formation of reduced NBT recorded on spectrophotometer. Super oxide dismutase shows to inhibit the initial rate of PMS induced reduction of NBT hence less absorbance reported.

Review of Literature-

Ahirrao R A 2011 showed that phytochemical analysis of *J. curcas* shows the presence of steroids, flavonoids, alkaloids, saponins, triterpenoids, tannins and carbohydrate.

Verma Nihal et al 2011 reported that the root bark of *N. arbor-tristis* shows antibacterial activity against *E. coli*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Streptococcus fecalis*.

Savita G Agarawal 2013 reported that the different solvent extracts of *N. arbor-tristis* shows antibacterial activity against panel of bacteria responsible for common microbial diseases in humans and plants.

Priya K et al 2007 reported that fresh plant material of *N. arbor-tristis* had pronounced antibacterial activity as compared to dried plant parts.

Indranil Bhattacharjee et al 2006 reported that methanolic extract of *A. maxicana* showed inhibition against gram positive and gram negative bacteria.

Ahsan et al 2009 reported that extracts of different parts of *A. maxicana* shows antibacterial and toxic activities against *Staphylococcus aureus*, *Bacillus subtilis*, and *Shigella sonnei*.

Ehsan Oskoueian et al 2011 reported that the latex and leaf extract of *J. curcas* showed highest antioxidant activity. Root and latex extracts inhibited the inducible nitric oxide synthase in macrophages RAW 264.7, comparable to L- nitro arginine methyl ester, indicating appreciable anti-inflammatory activity. Cytotoxic assays results indicated the anticancer therapeutic property of root extract against human colon adenocarcinoma (HT-29) cell lines but cytotoxic effect on human hepatocyte was high.

Leon F. Villegas et al 1997 reported that *J. curcas* extracts shows significant wound healing activity in gastric ulcers.

Aiyelaagbe O et al 2007 reported the potency of *J. curcas* plant in treating infections including sexually transmitted diseases.

RESULTS:**Table 1: Evaluation of Antiulcer activity of *J. curcas*, *A. maxicana* and *N. arbor-tristis* leaf extract**

Groups	Body weight	Treatment	Ulcer index						Total score
			Normal stomach	Red colouration	Spot ulceration	Ulcer	perforation	Haemorrhagic streaks	
1	180	Normal control	0	-	-	-	-	-	-
	176		0	-	-	-	-	-	-
	188		0	-	-	-	-	-	-
	100		0	-	-	-	-	-	-
	185		0	-	-	-	-	-	-
	190		0	-	-	-	-	-	-
2	185	Ethanol induced ulcer	-	0.5	1.0	2.0	0	0	3.5
	188		-	0.5	1.0	2.0	3.0	1.5	7.5
	180		-	0.5	1.0	2.0	0	0	3.5
	190		-	0.5	1.0	0	0	0	1.5
	195		-	0.5	1.0	2.0	0	0	3.5
	198		-	0.5	1.0	2.0	3.0	0	6.5
3	187	standarded	-	0.5	0	0	0	0	0.5
	190		-	0	0	0	0	0	-
	196		-	0.5	0	0	0	0	0.5
	198		-	0	0	0	0	0	-
	191		-	0.5	0	0	0	0	0.5
	200		-	0	0	0	0	0	-
4	197	<i>J. curcas</i>	-	0.5	1.0	0	0	0	1.5
	199		-	0.5	1.0	0	0	0	1.5
	196		-	0.5	1.0	0	0	0	1.5
	198		-	0.5	1.0	0	0	1.5	3.0
	195		-	0.5	1.0	0	0	0	1.5
	200		-	0.5	1.0	0	0	0	1.5
5	195	<i>Argemone maxicana</i>	-	0.5	1.0	0	0	1.5	3.0
	180		-	0.5	1.0	0	0	1.5	3.0
	187		-	0.5	1.0	0	0	0	1.5
	190		-	0.5	1.0	2.0	0	0	2.5
	200		-	0.5	1.0	0	0	0	1.5
	197		-	0.5	1.0	0	0	1.5	3.0
6	199	<i>N. arbor-tristis</i>	-	0.5	1.0	0	0	0	1.5
	197		-	0.5	0	0	0	0	0.5
	180		-	0.5	1.0	0	0	1.5	3.0
	200		-	0.5	1.0	0	0	1.5	3.0
	187		-	0.5	0	0	0	0	0.5
	188		-	0.5	1.0	0	0	0	1.5

(0= normal stomach, 0.5= red coloration, 1.0= spot ulcer, 1.5= Hamorrhagic streak, 2.0= ulcer, 3.0= perforation)

Table 2: Evaluation of Antioxidant level in ethanol induced ulcer

Groups	Superoxide dismutase	Catalase	Glutathione peroxidase
Group 1			
Rat 1	3	3	2
Rat 2	3	3	3
Rat 3	2	2	1
Rat 4	1	1	2
Rat 5	2	3	3
Rat 6	1	2	1
Group 2			
Rat 1	0	1	0
Rat 2	1	1	1
Rat 3	0	0	0
Rat 4	0	1	0
Rat 5	1	0	1
Rat 6	0	0	0
Group 3			
Rat 1	1	2	2
Rat 2	1	3	2
Rat 3	1	2	2
Rat 4	1	1	1
Rat 5	1	3	2
Rat 6	3	2	3
Group 4			
Rat 1	1	0	1
Rat 2	0	1	1
Rat 3	1	1	1
Rat 4	2	1	2
Rat 5	1	1	1
Rat 6	1	2	2
Group 5			
Rat 1	1	2	1
Rat 2	2	1	1
Rat 3	2	1	0
Rat 4	1	1	0
Rat 5	0	1	1
Rat 6	0	0	1
Group 6			
Rat 1	1	1	1
Rat 2	1	2	1
Rat 3	1	0	1
Rat 4	2	2	1
Rat 5	1	1	1
Rat 6	1	2	1

(3= high level, 2= moderate level, 1= low level, 0= negligible)

DISCUSSION:

The levels of Catalase, Superoxide dismutase and Glutathione peroxidase was significantly decreased in diseased control as compared to normal group. Administration of methanolic extract of the three plants had shown significant increase in levels of the three enzymes as compared to the diseased control animals, which suggest its efficacy in preventing various types of cancers, free radical induced damage and ulcers.

The results led to the conclusion that leaves extract of *J. curcas*, *A. maxicana* and *N. arbor-tristis* exhibited a significant anti-ulcer activity in experimental animals. The difference in the evaluated activity could be due to the number or quantity of phytochemicals present in these extracts.

It is evident from the analysis that *J. curcas* shows significant antiulcer activity than *A. maxicana* and *N. arbor tristis*.

The analysis also shows that the three medicinal plants also show marked Antioxidant activity.

The *J. curcas* and *N. arbor- tristis* shows significant antioxidant activity than *A. maxicana*.

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