

RESEARCH ARTICLE



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EVALUATION OF PHARMACOGNOSTICAL AND LAXATIVE ACTIVITY OF LEAVES OF *NYCTANTHES ARBOR-TRISTIS* LINN.

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ABSTRACT

The aim of the “study was to evaluate the *Nyctanthes arbor-tristis* Linn. for its pharmacognostical properties and for its laxative activity”. Macroscopical study of *Nyctanthes arbor-tristis* Linn. showed that *Nyctanthes arbor-tristis* having light to dark green color, indistinct odor, bitter and astringent taste and heart shape, rough texture, 5-14 cm long and 2.5-5.7 cm wide size, entire margin and round base. Animal study showed that *Nyctanthes arbor-tristis* Linn initiates the laxative activity 0-8 hour and showed complete laxative activity on 8-16 hours, which was compared with the standard drug sodium picosulfate. Pure extract of *Nyctanthes arbor-tristis* was found effective as that of standard drug sodium picosulfate for the constipation in albino Wistar rats.

KEYWORDS: Laxative activity, *Nyctanthes arbor-tristis*, Sodium picosulfate, Gastro-intestinal tract (g.i.t.) motility, Intestinal transit

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INTRODUCTION

Laxative are the drug which are given to get relief from constipation. They can either soften the hard stool or increase the bulk of stool so that they may easily expel from the body. The basic examples are bulk laxative, isapgoal and stool softeners. Laxatives are the substance that increase of loose stools. The substance which looses the bowels or producing, increasing and hastening intestinal evacuation or which promote defecation are known as laxative ^[1].

Type of Laxative

- Bulk-Forming Agents
- Emollient Agents
- Lubricant Agents
- Hyper-Osmotic Agents
- Saline Laxative Agents

• Stimulants Agents

Constipation also known as costiveness refers to bowel movements that are infrequent and/or hard to pass. Constipation is a symptom with many causes. These causes are of two types: obstructed defecation and colonic hypomobility. About 50% of patients evaluated for constipation at tertiary referral hospitals have obstructed defecation. This type of constipation has mechanical and functional causes. Causes of colonic slow transit constipation include diet, hormones, side effects of medications, and heavy metal toxicity. Laxatives are among the most widely used drugs. However, their consumption is limited due to insufficient efficacy or the side effects, especially when used continuously or with contraindications. Bloating, cramping, diarrhea, and metabolic disturbances such as hypercalcemia, hyperphosphatemia, hyponatremia, and hypokalemia are among the most common side effects ^[2, 3].

Table 1: Food with Laxative Action

Food	Exp	Laxative action	Food	Exp	Laxative action
Flower	Cauliflower	Stimulant	Leaves	Aloe vera	Stimulant
Fruit	Apple	Bulk laxative		Bitter gourd	Digestive
	Berries	Colon cleanse		Barley	Digestive
	Banana	Bulk laxative		Garlic	Stimulant
	Melons	Digestive		Arugula	Nutritive
	Tomatoes	Bulk laxative		Mustard	Digestive
Natural oil	Hemp	Demulcent		Onion	Digestive
	Flax-seed	Lubricant		Senna	Stimulant
Seed	Almonds	Nutritive		Spinach	Digestive
	Cedar nuts	Digestive		Wheatgrass	Digestive
	Flax-seed	Digestive	Rhizome	Ginger	Stimulant
	Pumpkin	Digestive		Turmeric	Stimulant
	Sunflower	Digestive	Roots	Carrot	Bulk laxative
	Walnut	Digestive			

Plant Profile

N. arbor-tristis plants grow fine in a broad range of loamy soils and during soil originate in usual grounds situation, among pH 5.5–7.5 [4]. It is an earthly forested permanent have living “duration of 5 - 20 lifetime. *N. arbor-tristis* in a huge flowering plant increasing on the way to 10 m large among peeling ancient shout, firm white fur, little twigs, also coarse plants. The plants are aromatic between an orange-red middle through a 5-8 lobed grey corolla; they are collectively formed in a cluster of 2-7, with individual flower opportunities at nightfall and eventually at dawn. [5]. Leaves are conflicting, 5 to 10 through 2.5 to 6.3 cm, ovate, sensitive, whole or among a small number of big outlying teeth, tiny spherical hair curved, most important mental strain only some, obvious below, petiole 6 cm extensive covered with hair [6].

Chemical Profile: [7]**Arbortristoside A**Molecular Formula: $C_{27}H_{34}O_{13}$

Molecular Weight: 566.56

Melting Point: 226-228 °C

Arbortristoside BMolecular formula: $C_{26}H_{32}O_{15}$

Molecular weight- 584.527 g/mol

Melting point- 156-58°C

Arbortristoside CMolecular formula- $C_{24}H_{30}O_{12}$

Molecular weight- 552.529 g/mol

Melting point- 210-12°C

Arbortristoside DMolecular formula- $C_{26}H_{32}O_{15}$

Molecular weight- 584.52328 g/mol

Arbortristoside EMolecular formula- $C_{27}H_{34}O_{13}$

Molecular weight- 566.556 g/mol

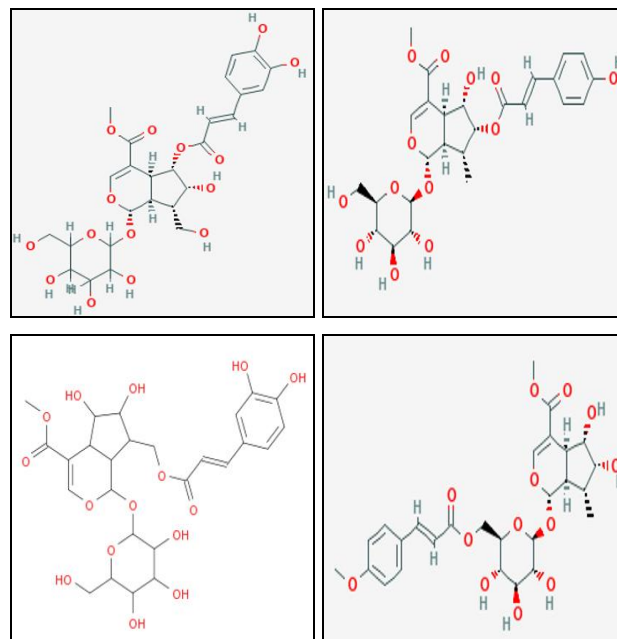
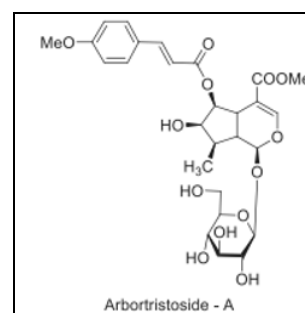
**Figure 1: Structure of Arbortristoside A, B, C, D, E**

Table: 2 Chemical constituents present in different part of *Nyctanthes arbor-tristis* [8-13]

Plants Parts	Phyto-constituents	Biological activity	References
Flower	“Apigenin, anthocyanin, Carotenoid, D-mannitol, Essential oil, Glucose, Kaemferol, Nyctanthin, Quercetin, Rengilone, α -crotin, β -monoge”	Antioxidants, Anti-inflammatory, Anti-filarial, Diuretic, Sedative	Ratnasooriya WD. <i>et al.</i> , 2005
Bark	Alkaloids, Glycosides	Antimicrobial	Vasudeva N, 2009
Flower oil	“Anisaldehyde, 1-deconol, phenyl acetaldehyde, 1-hexanol methyl heptanone, α -pinene”	Perfume	Chandra G. <i>et al.</i> , 1970
Stem	“Glycoside-naringenin-4'-O- β -glucapyranosyl- α -xylopyranoside”	Antioxidant, antipyretic	Girach RD. <i>et al.</i> , 1994
Leaves	“Ascorbic acid, benzoic acid, Friedeline, Flavanol glycosides-astragaline, Fructose, Glucose, Glycosides, Iridoid”	Anti-inflammatory, Anti-septic, Antifungal, Hepatoprotective	Saxena RS. <i>et al.</i> , 1984
Seeds	Arbortristoside A & B, brown oil	Antibacterial, Anti-leishmanial Antifungal, Immunomodulatory	Puria A <i>et al.</i> , 1994

Nyctanthes arbour-tristis Linn 's key chemical components are alpha-linolenic acid and oleic acid as the key fatty acids in the leaf ^[14].

MATERIALS AND METHODS

Fresh leaves of *Nyctanthes arbor-tristis* Linn were composed from local area of Lucknow (India) in the month July 2019. The plant material identified and authenticated by CSIR- National Botanical Research Institute (NBRI), Lucknow, Authentication No. (LWG) 104617.

Preparation of the Plant Extract

The leaves of *Nyctanthes arbor-tristis* Linn were dried at room hotness for 25 days along with were ground keen on coarse fine particles among a chopper. 150 gm of coarse powder was macerated through ethanol (99.9% v/v) and kept for 72 hours on area heat (28-30 °C). The extract was filtered also evaporate towards dehydration at temperature 30-35 °C, the theoretical and practical yield of the extract was also calculated.



Figure 2: Plant Extract of *Nyctanthes arbortristis* Linn.

Drugs and Chemicals

Sodium picosulphate manufactured in India by medicament Biotech Limited 86-87, Sector -6A, IIE, SIDCUL, Haridwar- 249403 (Uttarakhand) and loperamide, Ethanol, Methanol, other chemicals used Mayer's reagent, Dragendroff's reagent, Hager's reagent, Wagner's reagent, Benedict's reagent, Molish's reagent, Chloroform.

Preparation of the Normal saline solution

- Evaluate 9 gm of sodium chloride (NaCl) among the assist of a weigh size. Currently

obtain 500 ml of distil water during the volumetric flask and near this add 9 gm NaCl.

- The container kindly towards combine the filling is developed the clarification during a glass through the assist of agitator. After NaCl dissolve absolutely after that insert distil water with formulate the last quantity 1 litre.

Preparation of 1% CMC

- 10 gm dry CMC measure. Measure 1000 ml of deionized stream inside a 1 litre (L)

glass at 25 °C (for 10 gm dry wt. of CMC; CMC is extremely absorbent and, depending on the level of humidity, the amount of water may need to be known).

- Implement a built-in stirrer with a triangular knife blade so that the blade is 7 cm from the beaker's base.

While continuously stirring at 600 rpm, slowly add carboxyl methyl cellulose to the centre of the current one. Continue to stir for 3 hours at 600 rpm.

Animal & Housing

In the present study rat of whichever sexual category be used. All animals were procured starting the syndrome without charge living thing residence of Central Drug Research Institute, Lucknow, India. The animal has liberated entrance towards foodstuff & intake stream since for each the CPCSEA dietary norms. They were subjected to the light-dark cycle (12 hours each).

Until examination, the animal was acclimatising, planned for at least 1 day in the laboratory environment. Through the Institutional Animal Ethics Commissions, the investigational procedure was approved. When for each CPCSEA guidelines, the animal's interest was taken up. India's Department of Forest Environments & Supervision.

Laxative Activity

Animal Model

The experimental work was carried out on 16 healthy albino Wistar rats, having an average weight of 120-150 gm. This study was performed as per the guidelines and norms of ethics. All the animals were procured since the disease-free animal residence of Central Drug Research Institute, Lucknow, India.

The animal was acclimatized used for at least 1 day to the laboratory circumstances prior to assessment. The investigational procedure was permitted the Institutional Animal Ethics Committees wide. The concern of the animal was occupied as the strategy of CPCSEA. Ministry of forest and environment and Government of India. The rats were housed on area temperature 25 ± 2 °C and comparative moisture of 60-70% before examination. The method of ^[15] with some modification was adopted here to study the laxative activity".

Experimental Procedure

Laxative Activity Test

During a fresh room between 12:12 hour light/dark period during the polypropylene enclosure, Albino Wistar rat (120-150 gm) animals were retained. For 12 hours, rats fasted, divided into 4 groups of 3 animals in each group. In addition, group 1 served as regular saline (3 ml/kg), group 2 served as standard medication sodium picosulphate (5 mg / kg), group 3 and 4 obtained an herbal extract of *Nyctanthes arbor-tristis* 200 and 400 mg/kg respectively".

The faeces were collected with weighed for 3 days immediately after the dose of the animals were individually put in a suitable cage intended for the compilation of the faeces later than 8 hours of medicine organization. All rats were certain after food with water and faecal production was once again after a 16-hour phase.

RESULTS

Macroscopical Study

The macroscopic and organoleptic characters of the leaves were experimental, i.e. shape, scale, colour, odour, margin, texture, taste, apex even petiole.



Figure 3: *Nyctanthes arbor-tristis* Leaf

Table 3: Macroscopic Study of *N. arbor-tristis* Linn. Leaf

Plant part and characters	Observation
Part	Leaves
Colour	Light to dark green
Odour	Indistinct
Taste	Bitter and astringent
Size	5-15 cm long, 2.5-5.7 cm wide
Texture	Rough
Shape	Heart
Base	Round
Margin	Entire
Apex	Acute
Venation	Reticulate

Experimental Procedure

Laxative Activity Test

Albino Wister rat (120-150 gm) animal maintain within a fresh room among 12:12 hour light/dark phase during polypropylene cage. Rats have fasted used for 12 hours divide 4 groups of 3 animals. Group 1st serve as normal saline (3 ml/kg) and 12 hours serve as standard drug sodium picosulphate (5 mg/kg), group 3rd and 4th

serve as herbal extract of *Nyctanthes arbor-tristis* 200 & 400 mg/kg corresponding. Instantaneously subsequent dose animal was individually located in cage acceptable intended the compilation of waste material later than 8 hours of drug organisation the faeces was collect with weigh. After foodstuff with water was certain near all rats even faecal production was once more weighed after a time of 16 hours.

Table 4: Laxative activity of Hydroethanolic Extracts of *Nyctanthes arbo-rtristis* in Rats

Group (Treatment)	Dose (mg/kg)	Faeces output (gm)	
		0-8 hr	8-16 hr
Control (Normal saline)	3 ml/kg	4.7 gm	4.8 gm
Std. (Sodium picosulfate)	5 mg/kg	5.3 gm	6.2 gm
<i>N. arbor-tristis</i> (low dose)	200 mg/kg	4.3 gm	5.2 gm
<i>N. arbor-tristis</i> (high dose)	400 mg/kg	4.9 gm	5.8 gm

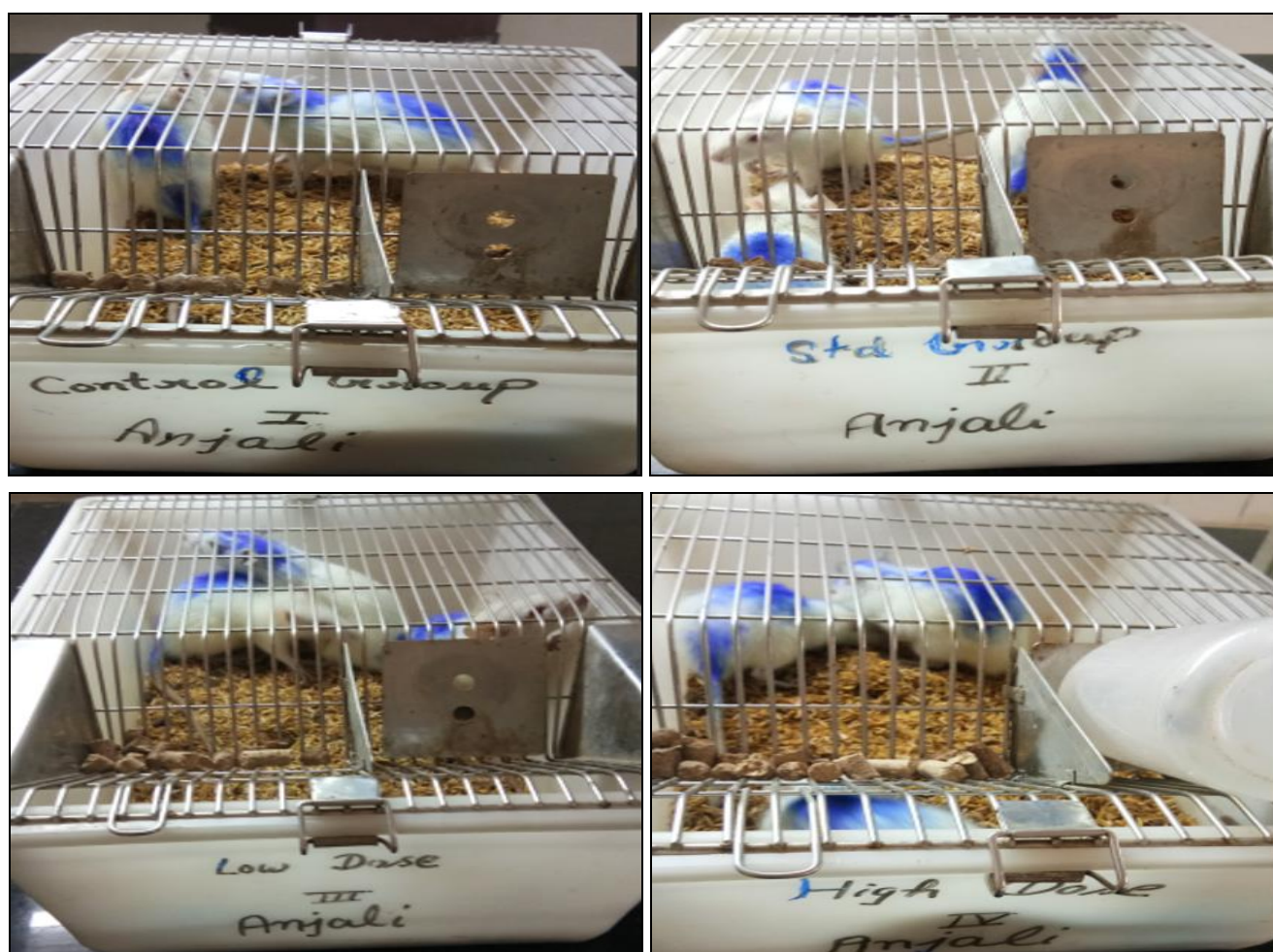


Figure 4: (A) Control Group, (B) Standard Group, (C) Herbal Extract (Low Dose) (D) Herbal Extract (High Dose)

Laxative activity

Effect of Laxative Activity Hydroethanolic Extract of *Nyctanthes arbor-tristis* in Rats

Extract dose tests indicate a dose based on the increase of the dose during the faecal development rat after contrasting the control group. The extract differentiation at a dosage of

200 mg/kg (p.o.) was less important. The hydroethanolic extract of *Nyctanthes arbour-tristis* Linn 400 mg / kg dose control group (p.o) increases the faecal development of rats relative to the control group. The manufacturing extract at a dosage of 400 mg/kg (p.o.) was similar to the typical sodium picosulfate drug (5 mg/kg, p.o.).



Figure 5: Oral suspension of *Nyctanthes arbor-tristis* Linn.

Table 5: Effect of Laxative Activity of Hydroethanolic Extracts of *Nyctanthes Arbor-Tristis* in Rats

Group (treatment)	Dose (mg/kg)	Faeces output (gm)	
		0-8 hr	8-16 hr
Control (normal saline)	3 ml/kg	4.7±0.2449	4.8±0.3368
Sodium picosulfate	5 mg/kg	5.3±0.3224	6.2±0.2711
<i>Nyctanthes arbor-tristis</i> (low dose)	200 mg/kg	4.3±0.1414	5.2±0.3868
<i>Nyctanthes arbor-tristis</i> (high dose)	400 mg/kg	4.9±0.6240	5.8±0.1322

DISCUSSION AND CONCLUSION

Nyctanthes arbour-tristis plants have historically been included in many diseases and have recorded pharmacological activities. Although the extensive usual make use of *Nyctanthes arbor-tristis* intended for treating a variety of disorder, there are no information of scientific assessment of its laxative activity. *Nyctanthes arbour-tristis* leaves are plain, 5 to 14 cm long, 2.5 to 7.5 cm thick, acute to acuminate, ovate, both rough outside, whole margin or distinctly toothed base in circles to very cuneate, venation reticulate, 3-6 pairs of side veins, indistinguishable odour, bitter with astringent taste. The extract was dark green in colour, greasy in texture, with an indistinct smell and a bitter taste. The percentage yield was measured and set at 6.48% w/w. When an effect has been absorbed by the colon, water resoaked softness of faeces is decreased anywhere they induce familiar laxative. In this mechanism of action of sodium picosulfate, laxative activity of hydroethanolic extract of *Nyctanthes arbour-tristis* can be mediated by intestinal obstruction, appendicitis, abdominal pain, nausea, vomiting and faecal effects, etc. This study demonstrated that the extract of *Nyctanthes arbortristis* has a laxative property for the purpose of hydroethanolic leaves. The characterised bioactive ingredient that is responsible for the experimental activity inside the plant can be absorbed in other experiments.

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Nil

CONFLICT OF INTEREST

Nil

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