Anti- Diabetic Activity of Nyctanthes Arbortristis

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***Abstract*: Nyctanthes arbor tristis belongs to the oleaceae family. It is a huge shrub that can grow up to 10 cm tall in an upright manner. rhomboidal or widely oval in shape, with a sharp tip. The leaves are unifoliate, simple, opposite, and exstipulate. D-mannitol, flavonal glycosides, nicotiflorin, loeonolic acid, nycthanic acid, tannic acid, ascorbic acid, methyl salicylate, mannital, fructose, and benzioc acid are among the chemical components found in leaves. Pharmacological properties such as anti-diabetic, anti-malarial, anti-oxidant, anti-cancer, analgesic, anti-inflammatory, anti-parasitic, and anti-aggressive properties have been documented. Importantly, the indigenous people grow it in their backyards to preserve its therapeutic value for future generations.**

***Index Terms*—Nyctanthes, Flavonal, Nicotiflorin, Glycosides, Anti-diabetic.**

I. INTRODUCTION

The most prevalent endocrine condition in the world, diabetes results in improper protein, lipid, and carbohydrate metabolism. According to a WHO assessment, 150 million people worldwide suffer from diabetes mellitus, and by 2025, this figure may quadruple. India will have the largest diabetic population in the world by 2025, with an estimated 57 million people living with the disease, up from 15 million in 1995.Native Americans have traditionally utilized nyctanthes arbortristis (NA) as a medicine to cure a range of conditions. In India the plant is a staple in the traditional ayurveda, siddha and unani systems of medicine because of its numerous therapeutic applications (Anjaneyulu ASR, 1981). Following a comprehensive pharmacological analysis its significant biological qualities such as those against DIABETES (Suresh V G. A., 2012), allergens (Rani.C., 2012), antioxidants (Pandey, 2016), and inflammation (D. Sasmal, 2007) were identified .

II. TAXONOMY

KINGDOM: Plantae

DIVISION: Angiosperms

CLASS : Dicotyledonae

SUBCLASS: Gamopetale

SERIES : Bicarpellatae

ORDER : Gentiales

FAMILY : Oleaceae

GENUS : Nycthanthes

SPECIES : Arbor – tristis

VERNACULAR NAMES:

- Unani: Harasingaar.
- Sanskrit: Parijatha.
- Siddha: Pavazha mattigai.
- Hindi: Harsingar.
- Ayurvedic:Paarijaata, Shephaali, Shephaalikaa, Mandaara.
- English: Tree of Sorrow, Night Jasmine, Coral Jasmine
- Marathi: Parijathak.
- Kannada: Parijatha.

S.NO	CHEMICAL COMPONENTS	RESULT
1.	Color	Dark green
2.	Appearance	Viscous semi solid substance
3.	Moisture	50.01%
4.	Ash	13.98%
5.	Lignin	15.87%
6.	Crude fibre	9.41%
7.	Fat	2.10%
8.	Protein	15.02%
9.	Carbohydrate	9.48%
10.	Acid value	76.27
11.	Iodine Value	134.44

TABLE 1: Physicochemical Properties of *Nictates arbortristis.*

PLANT PARTS	PHYTO- CONSTITUENTS
Bark	Alkaloids, Glycosides
Flower oil	Anisaldehyde, Phenyl acetaldehyde, p-cymene, 1-deconol, 1- hexanol methyl heptanone, α-pinene
Flowers	Apigenin, Anthocyanin, D-Mannitol, Tanninm, Glucose, Carotenoid, Essential Oil, Nyctanthin, Glycosides, Quercetin.
Leaves	Ascorbic Acid, Benzoic Acid, Carotene, D-Mannitol, Flavanol Glycosides-Astragaline, Nicotiflorin, Nyctanthic acid
Seeds	3-4 Secotriterpene Acid, a Pale-Yellow Brown Oil (15%), Arbortristoside A & B, Glycerides of Linoleic Oleic, Lignoceric, Myristic Acids, Nyctanthic Acid, Palmitic, Stearic.
Stem	Glycoside-naringenin-4'-0-β-glucapyranosyl-α-Xylopyranoside, β-sitosterol.

TABLE 2: Phyto-constituents present in various parts of plant.

III. PHARMACOLOGICAL PROPERTIES:

ANTI- DIABETIC
ANTI- BACTERIAL
ANTI-MALARIAL
ANTI-PARASITIC
ANTI-AGGRESSIVE
ANTI-ANXIETY
ANTI-INFLAMMATORY
ANALGESIC

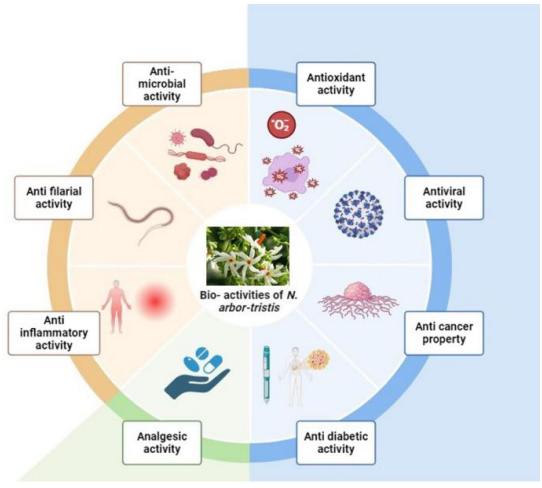

Figure 1: Different Activities of Nycthanthes Arbortristis

III. MATERIALS AND METHODS

MATERIAL COLLECTION:

The flowers and leaves of Nyctanthes arbortristis were collected from extensively grown plants in September and October.

EXTRACTION METHOD:

➢ ROOT EXTRACT:

Nyctanthes arbor-tristis has mainly ANTI-DIABETIC ACTIVITY.

The anti-diabetic effects of NAT root methanol extract are comparable to those observed in diabetic control. The extracts anti-diabetic effects are strong and comparatively risk free. The extract was made by employing a hot continous extraction method for 18 hrs with 50 g of root powder and 400ml of methanol. To get rid of impurities the methanolic extract was filtered and separated using petroleum ether. the solvent was evaporated using vaccum and pressure (Gharti, 2015). The extracts were made into a suspension in distilled water with 5% Tween-80 as a suspending agent (R.S. Saxena B. G., 1984).

HYPOGLYCEMIC EFFECTS of the resultant NAT dry extract was tested. Rats blood glucose levels are considerably lowered after 7 days at 500mg/kg when compared to the control drug. It was demonstrated that a methanolic extract of NAT was more effective at lowering blood glucose levels (Suresh V J. S., 2010).

➢ STEM BARK EXTRACT:

A study was carried out to look into the antidiabetic effects of an ethanol extract of Nyctanthes arbor-tristis L. stem bark in rats with diabetes induced by streptozotocin (STZ)-nicotinamide, then contrasted with the control group. In diabetic rats, an ethanol extract of Nyctanthes arbor-tristis stem bark was given orally. It was discovered that it dramatically and dose-dependently reduced the blood glucose

level. The external glucose load was significantly decreased by the extracts at 250 and 500 doses in the glucose tolerance test. The antidiabetic effects of ENA were similar to those of 39 medications used to treat diabetes. Rats were used in a different investigation to test the antidiabetic effects of ethanol extracts of the aerial stem and leaves of the N. arbortristis plant using the Soxhlet method. In normoglycemic and glucose-loaded rats, the ethanol extract with glipizide caused a notable drop in blood sugar level 40 (Gharti KP, 2020).

- FLOWER EXTRACT:

The boiled aqueous extract of flowers (AEF) of Nyctanthes arbor-tristis has been shown to have hypoglycemic and hypolipidemic effects in mice. Animals were fed orally, given 500 mg/kg and 750 mg/kg of AEF, and glucose tolerance tests were conducted both prior to and during the glucose challenge. 500 mg/kg of the extract was also used to examine glucose absorption from the gastrointestinal tract and perform an in vitro alpha-amylase experiment. Furthermore, a full lipid profile assay, toxicological and biochemical data, and the amount of glycogen in the liver and skeletal muscles were measured. 500 mg/kg and 750 mg/kg of AEF were found to significantly lower corresponding fasting blood glucose levels (39%) at 4 hours after treatment, and 500 mg/kg of AEF also markedly reduced the random blood glucose level by 32%. AEF showed suppression of alpha-amylase enzyme activity and greatly reduced intestinal glucose absorption (85%). Its hypolipidemic action was further demonstrated by the fact that it raised the high41 density lipoprotein cholesterol by 57% and decreased the levels of triglycerides by 53% and total cholesterol by 44.8% (Rangika BS, 2015).

- LEAF EXTRACT:

The leaves were properly cleaned with tap water before being dried in an oven set at 40 °C. Every day, the dried sample's weight was recorded till the weight remained constant. A standard blender (Waring, United States) was used to powder the leaves. 100% ethanol or distilled water at a 1:10 (w/v) ratio was used to extract the powdered leaves. For three days in a row, the mixture was swilled at room temperature and filtered every 24 hours. A rotary evaporator (Eyela, United States) was then used to fully remove the solvents from the collected filtrate, and the extracts were kept for later use at 4˚C (Sundarasekar, 2013).

IV. PROCEDURE

EXPERIMENTAL ANIMALS:

Throughout the investigation, adult male Long Evans rats weighing 180–200 g were employed. Five rats per cage were kept in an environment with a temperature of 22±2°C, a 12-hour light/12-hour dark cycle, and unlimited access to water and a normal pellet diet for feeding. The rats were starved for 12 hours before to and throughout the blood collection procedure.

RIPE SEED AND LEAF EXTRACT EFFECT ON GLUCOSE LEVELS FASTING RATS:

Prior to the experiment, the rats were fasted for twenty-four hours. Rats were given the ripe seed and leaf extracts (1.25 g/kg) orally. Rats were given moderate ether anesthesia for 0 minutes after their tail tips were severed, and blood samples were taken for the glucose level assessment 60 and 120 minutes.

RIPE SEED AND LEAF EXTRACTS EFFECT ON GLUCOSE LEVELS OF RATS WHEN FED SIMULTANEOUSLY WITH GLUCOSE:

Prior to the blood glucose level being measured, the rats were kept fasting for at least 12 hours and denied unrestricted access to water. Rats were anesthetized for one minute using saturated ether vapor in an airtight jar or desiccator before being fed the extracts. The excerpts Rats were given 1.25 g/kg orally concurrently with 2.5 g/kg of glucose, and blood samples were taken at 0 minutes, 30 minutes, and 75 minutes.

RIPE SEED AND LEAF EXTRACTS EFFECT ON BLOOD GLUCOSE LEVELS OF RATS WHEN FED 30 MIN BEFORE GLUCOSE LOAD:

Rats fasting for 12 hours under mild ether anesthesia were given extracts (1.25 g/kg) via metallic smooth tubes. After the extracts were administered, all rats received 2.5 g/kg of glucose 30 minutes later. At 0 minutes, 60 minutes, and 105 minutes, blood samples were taken (V. Babu, 2003).

Blood collection and serum glucose level determination

Under moderate ether anesthesia, the tail tip was amputated in order to obtain blood. After the serum was separated by centrifugation, the automated colorimetric method (Peridochrom Glucose GOD-PAP) was used the same day to evaluate the serum samples' glucose levels. Boehringer, Germany) at 510 nM absorbance (NAHAR, 2000).

V. EVALUTION

- GLUCOSE TOLERANCE TEST:

Seven groups of six rats each were created from the acclimated animals, and they were given free access to water and a 24-hour fast. The number of Groups 1 that received distilled water as the control. Number of Groups Following the removal of the first 0 hours of blood samples and 30 minutes of extract administration, 2 g/kg glucose was given orally to the rats in each group. Glibenclamide (10 mg/kg) was administered orally to Group 2, while 50, 100, and 200 mg/kg of chloroform extract leaves and flowers were administered to Groups 3 to 7. Blood samples were obtained from the retro-orbital plexus under general anesthesia at 30, 90, and 180 minutes after the glucose loading. After that, these blood samples underwent centrifugation (S. Badole, 2006).

- EVALUATION OF HYPOGLYCEMIC ACTIVITY:

Three groups of six rats each were formed from the acclimated animals, and they were given free access to water and a 24-hour fast. A 5% Tween 80 solution in 0.5 milliliters was given to the control group. Following the removal of the initial blood sample (0 hours) and at intervals of 1, 2, 3, and 5 hours after the administration of the flower and leaf extract, Groups 2 and 3 were administered Nyctanthes arbortristis flower and leaf chloroform extracts at a dose of 8 gm/kg, respectively. Blood was drawn from the retroorbital plexus while under anesthesia, spun at 1000 g for 15 minutes to extract serum, and then the glucose kit and the star-21plus (R.S. Saxena B. G., 1987) (S. Das, 2008).

VII. CONCLUSION

The study's findings suggest that N. arborists ripe seed and leaf extracts have intriguing potential as a source of oral hypoglycemic medications. We think that this plant should be regarded as a prime option for further research on identifying the active hypoglycemic drugs and figuring out the mechanisms behind their hypoglycemic action.

Pharmacological properties are found in many therapeutic plants, and they are shown to be crucial to the herbal and ayurvedic approaches for the efficient treatment of a range of illnesses. The initial biomedical experimentation.

Research on metabolic disorders such as inflammation, allergies, diabetes, stress, hepatoprotection, or immunomodulation has proven useful in highlighting the relationship between the chemical constituents' biological activity and toxicity in certain situations.

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