

# Phytochemical Screening of *Nyctanthes Arbor-Tritis* (Flower) and *Punicagranatum* (Fruit) Used For Diabetes Mellitus Disease

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## Abstract

Diabetes mellitus is one of the most common metabolic diseases in the world that results from defects in endogenous insulin secretion/action and thereby contributes to the impairment of glucose disposal (hyperglycemia). The present study is carried out on two traditional medicinal plants *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit). Globally several medicinal plants have been evaluated for their efficacy and safety. The present study was conducted to investigate the morphological, physicochemical, phytochemical, fluorescence and pH profile of *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit). The physicochemical parameters such as ash value, extractive values, loss on drying, foreign organic matter were determined for *Nyctanthes arbor-tritis* and for *Punicagranatum* (fruit) respectively. The qualitative phytochemical analysis showed the presence terpenoids, carbohydrates, alkaloids, tannins, steroids, flavonoids etc. The powder of both leaves showed characteristic fluorescence with various chemical reagents in daylight and in ultraviolet-light. The percentage extractive yield of *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit) extract was found to be 31.2 % and 27.12 % respectively. It can be concluded from the present study that the leaves of *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit) contains various phytochemical constituents which may be used as phyto medicines. The result obtained from present investigation could help in identification, standardization and in carrying out further research in *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit) based herbal drugs.

## Keywords

Diabetes, Phytochemical screening, *Nyctanthes arbor-tritis*, *Punicagranatum* (fruit),

## Introduction

Diabetes is a chronic disease, which if not treated properly, generates serious complications that reduce patients' quality of life and raises the cost of their care. DM is not a single disease, but numerous disease and symptoms are associated with hyperglycemia. According to World Health Organization, approx 80% population in developed countries relies on traditional medicines, which has compounds derived from medicinal plants. Different traditional systems of medicines in India including Siddha, Ayurveda and Unani utilize a large number of medicinal plants for treating animal and human diseases [1]. Phytoconstituent can be derived from different part of plants including, seeds leaves, flowers, barks, roots, fruits etc. Knowledge of the chemical constituents of plants is desirable because such information will be value for synthesis of complex chemical substances [2]. *Nyctanthes arbor-tristis* Linn commonly known as parijat in Sanskrit, harsinghar in Hindi and night jasmine in English belongs to family Oleaceae have high medicinal value in Ayurveda. The plant is native to Southern Asia and is geographically distributed widely throughout through Northern India, Northern Pakistan, Thailand and other parts of the World. The plant is planted throughout India in different locations moreover as a decorative plant due to its fragrant blossoms including Rajasthan, Assam, Madhya Pradesh, Central India and South to the Godavari. The flowers of the plants bloom in the evening and fade in the morning. Leaves, bark, flowers, seeds and fruits of the plants possess enormous medicinal value. The entire plant and individual parts of the plants are used as herbal medicine for the treatment of malaria, arthritis, sciatica, spleen enlargement, as a laxative, tonic etc. [4,5]. Pomegranate (*Punica granatum* L.) appears to be native to some parts of Asia (Iran, Malesia, and India), America (USA, Peru), Africa (Equatorial region), and Europe (Turkey) [6]. The metabolites in various parts of the *Punicagranatum* L fruit and tree include various kinds of sugars, organic acids, polyphenols, flavonoids, anthocyanins, fatty acids, alkaloids, vitamins. *Punicagranatum* L fruit with abundant tannins show relatively strong astringent effects. Several infusions or decoctions of the plant flowers have been used in traditional medicine to treat simple diarrhea, vaginal discharge, and also this extract accompanied with pomegranate peel have usually been gurgled to relieve pancreas inflammation of the pancreas. Evaluation of herbal drugs in Ayurveda is about the whole drug rather than active phytoconstituents [7-8]. Pharmacognostic study includes parameters which help in identifying adulteration of drug in powdered form also. This is necessary as once the plant is converted into powder form, it loses its morphological identity, thus easily prone to adulteration. Pharmacognostic studies ensure plant identity, since substitution and adulteration have become a major problem due to the absence of standards relating to genuineness of herbal drug. Keeping this in view the leaves of *Nyctanthes arbor-tristis* and *Punicagranatum* (fruit) was standardized according to WHO guidelines available for herbal drugs. This type of studies can help in determining the authenticity of the plants and will ensures reproducible quality of herbal products which is essential for efficacy and safety of natural products. The present study reveals the morphological features, physicochemical constants and qualitative phytochemical study of leaves extract of *Nyctanthes arbor-tristis* and *Punicagranatum* (fruit) [9-11].

## Material and Methods:

**Preparation of extract:** The coarse powder (50gm) both plant materials was extracted separately by cold maceration using hydro-alcoholic solvent. The extract was filtered by using muslin cloth and whatman filter paper and the marc was re-extracted for the second and third time by adding another fresh solvent. The fluid extracts were combined and concentrated in a rotary evaporator under reduced pressure at 40°C. The percentage extractive yields of both leaves extract were calculated [12].

**Table 1: Morphological character of *Nyctanthes arbor-triti* (flower) and *Punicagranatum* (fruit)**

S No.	Characters	<i>Nyctanthes arbor-tritis</i> (flower)	<i>Punica granatum</i> (fruit)
1	Shape and Structure	orange, cylindrical floral tube and about 10 white, bean-shaped lobes	rounded fruit with a dry outer covering
2	Colour	orange-white flowers	Red-purple
3	Odour	Sweet aromatic	Characteristic
4	Taste	bitter	Sweet
5	Size	6-11 cm long by 2-6 cm wide.	6-11 cm diameter
6	Touch	Smooth	Hard-outer layer called an epicarp, a soft inner layer called a mesocarp.

### Macroscopic characteristics:

Macroscopical studies of the *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit) were carried out and observed for the various parameters including size, color, shape, taste, surface characteristic and texture [13].



**Figure 1: Macroscopy of plant (a) *Nyctanthes arbor-tritis* (flower) (b) *Punica granatum* (fruit)**

**Fluorescence analysis:**

The fluorescence nature of powdered leaves of both plants was analyzed after suspending the powder with various reagents. The powder of leaves was prepared after passing it through mesh 40 and its fluorescence character was studied both in daylight and in UV light (255 and 278 nm) using different solvents like acetic acid, hydrochloric acid, sulphuric acid, ferric chloride etc.

**Determination of pH:**

pH 1% solution: An accurately weighed 1.0 g of powdered drug was dissolved in 100 ml of distilled water and filtered. Then by using standardized glass electrode the pH of the filtrate was recorded. pH 10% solution: An accurately weighed 10 gm of powdered drug was dissolved in 100 ml of distilled water and then filtered. Then with the help of pH meter, the pH of filtrate was recorded [14].

**Physicochemical evaluation:**

Shade dried powder of leaves were used for determining physicochemical parameters like foreign matter, water soluble extractive value, alcohol soluble extractive value, loss on drying, swelling index and foaming index as per WHO guidelines [15].

**Table 2: Physicochemical parameters of *Nyctanthes arbor-triti* (flower) and *Punica granatum* (fruit)**

S. No.	Physicochemical parameter values	<i>Nyctanthes arbor-tritis</i> (flower) (% w/w)	<i>Punica granatum</i> (fruit) (% w/w)
1	Total ash	8.82±0.48	9.92±0.12
2	Acid insoluble ash	1.51± 0.23	2.11± 0.04
3	Water soluble ash	0.89±0.16	1.28±0.16
4	Sulfated ash	11.09±0.12	13.09±0.06
5	Foreign organic matter determination	2.98	3.34
7	Loss on drying	17.18±0.10	27.23±0.12

**Preliminary Phyto-chemical screening:** Phytochemical analysis was done in *Nyctanthes arbor-tritis* and *Punica granatum* (fruit) extracts to assess various phyto-constituents present like alkaloids, glycosides, carbohydrates, phenolics, tannins, proteins, amino acids, saponins, flavonoids, resins, steroids and terpenoids using reported methods [17].

**Table 2: Qualitative phytochemical screening of *Nyctanthes arbor-tristis* (flower) and *Punica granatum* (fruit) extract**

S. No.	Chemical class	<i>Nyctanthes arbor-tristis</i> extract	<i>Punica granatum</i> (fruit) extract
1	Alkaloids	+	-
2	Napthoquinone	+	-
2	Steroids	-	+
3	Carbohydrate	+	+
4	Terpenoids	+	+
5	Tannin	-	+
6	Glycoside	-	+
7	Proteins	+	-
8	Flavonoids	+	+
9	Saponins	+	-
10	Fixed oils and fats	+	-
11	Gum & mucilage	+	-

## Results and Discussion:

The hydro-alcoholic extracts of plants were obtained by cold maceration method and percent yield of *Nyctanthes arbor-tristis* and *Punica granatum* (fruit) extract was found to be 31.2% and 28.12 % respectively. The morphological characters of both leaves were observed and reported. The mean pH value of 1% solution of *Nyctanthes arbor-tristis* was found to be  $6 \pm 0.04$  and for *Punica granatum* (fruit) to be  $6.3 \pm 0.12$  respectively. The foaming index for *Nyctanthes arbor-tristis* leaf powder was found to be less than 100 and foaming index for *Punica granatum* (fruit) was found to be  $160 \pm 0.03$ . The swelling index for *Nyctanthes arbor-tristis* leaf powder was found to be  $1.08 \pm 0.35$  and swelling index for *Punica granatum* (fruit) powder was found to be  $3.2 \pm 0.13$  respectively. The powdered leaves of *Nyctanthes arbor-tristis* and *Punica granatum* (fruit) (mesh size 40) was examined under day light and UV light. The extractive values were studied on dried leaf powders as mentioned in methodology. All the values were taken in triplicate and the mean average was taken. The loss on drying was found to be  $7.2 \pm 0.83$  w/w and  $4.2 \pm 1.58$  is done to determine the moisture as well volatile component in the crude drug. The percentage of foreign organic matter in *Nyctanthes arbor-tristis* and *Punica granatum* (fruit) was found to be  $0.39 \pm 0.21\%$  w/w and  $0.03 \pm 0.01\%$  w/w respectively. The results obtained reveal the presence of the compounds like carbohydrate, alkaloids, gums, mucilage, tannins, phenolic, steroids and terpenoids, saponins etc of both plants viz *Nyctanthes arbor-tristis* and *Punica granatum* (fruit).

## Conclusion:

The present work was taken up with a view to lay down standards, which could be useful to establish the authenticity of these two medicinally useful plants. In the present study, we have found that most of the biologically active phytochemicals were present in the extract of *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit). Phytochemical studies on *Nyctanthes arbor-tritis* and *Punicagranatum* (fruit) indicate that these plants can be used as an important ingredient of herbal formulations.

## Conflict of Interest:

The authors declare no potential conflicts of interest with respect to research, authorship and/or publication of this article.

## References

1. Handral HK, Pandith A, Shruthi SD, “A Review on *Murraya koenigii*: Multipotential Medicinal Plant”, *Asian J Pharm Clin Res*, 5, 4, (2012), 5-14
2. Yadav RNS and Agarwala M, “Phytochemical Analysis of Some Medicinal Plants”, *Journal of Phytology*, 3, 12, (2011), 10-14.
3. Akhila H and Hiremath US, “Physico-Chemical Properties of Jamun (*Syzygium cumini* L.) Fruits And Its Processed Products”, *Int. J. Pure App. Biosci.*, 6, 6, (2018), 1317- 1325.
4. Kulkarni DM, Dhakne RB, Patil RR, “Review Of *Nyctanthes arbortristis* as a Medicinal Plant”, *Ind. J. Res. Methods Pharm. Sci.* 1, 1, (2022), 21-26.
5. Singh AK, “Medicinal Value of The Leaves of *Nyctanthes arbortristis*: A Review”, *Journal of Medicinal Plants Studies*. 10, 1, (2022), 205-207.
6. Eshwarappa RS, Iyer RS, Subbaramaiah SR, Richard SA, Dhananjaya BL, “Antioxidant Activity of *Syzygium cumini* Leaf Gall Extracts”, *Bioimpacts*, 4, 2. (2014), 101–107.
7. Qamar M, Akhtar S, Ismail T, Wahid M, “Phytochemical Profile, Biological Properties and Food Applications Of The Medicinal Plant *Syzygium Cumini*”, *Foods*. 11, 3, (2022), 1-21.
8. Gowri S and Vasantha K, “Phytochemical Screening and Antibacterial activity of *Syzygium cumini* (L.) (Myrtaceae) leaves extracts”, *International Journal of Pharmtech Research*. 2, 2, (2010), 1569-1573.
9. Ruan ZP, Zhang LL, Lin YM, Ruan ZP, Zhang LL, “Evaluation of the Antioxidant Activity of *Syzygium cumini* Leaves”, *Molecules*. 13, 10, (2008), 2545-2556.
10. Shivani S, Ansari SH, Zahiruddin S, Parveen R, Ahmad S, “Quality Standards of Leaves of *Nyctanthes arbor-tristis* Linn”, *Int J Drug Dev & Res*. 7, 3, (2015), 1147-1156.
11. Wallis TE, “Text Book of Pharmacognosy”, 5th edition, New Delhi, CBS Publishers and Distributors, (2005), pp. 571.
12. Meharie BG, Amare GG, Belayneh YM, “Evaluation of Hepatoprotective Activity of the Crude Extract and Solvent Fractions of *Clutia abyssinica* (Euphorbiaceae) Leaf Against ccl4-Induced Hepatotoxicity in Mice”, *J Exp Pharmacol*. 12, (2020), 137– 150.

13. Tanwar S, Jain J, Verma S, Solanki D, “Standardization and Phytochemical Evaluation of *Tinospora cordifolia* (Willd.) Miers. (Menispermaceae) ”, *Int J Pharm Pharm Sci.* 4, 1, (2012), 219-223.
14. Anonymous, “Quality Control Methods for Medicinal Plant Material”, *Who Geneva*, (1998), pp.28-78.
15. Goswami S, “Preliminary Phytochemical Screening and Standardisation of Leaves of *Catharanthus Roseus*”, *Indian Journal Of Research In Pharmacy And Biotechnology*, 1, 1, (2013), 24-27.
16. Trease GE and Evans WC, “Pharmacognosy”, 11th edition, London, Casse Il and Collier Macmillan Publishers Ltd , (1996), pp 832.
17. Harborne “Textbook of Phytochemical Methods a Guide to Modern Techniques of Plant Analysis”, 5th edition, Chapman And Hall Ltd, London, Scientific Research and Academic Publisher, (1998), pp.21-72.