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Comparative Study Of Phyllanthus Niruri, Sphaeranthus Indicus And Tridax Procumbens With Respect To Qualitative & Quantitative Estimation Of Phytochemicals

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Abstract

The creation of new therapeutics and the promotion of health are the main goals of current phytochemical research. Thus, this study compares three different plant & their parts with chloroform & ethyl acetate solvent for qualitative & quantitative determination of phytochemicals. *Phyllanthus niruri* (Root and aerial part), *Sphaeranthus indicus* (Root and Stem) and *Tridax procumbens* (Root and Flower) were utilized for the study. Plant material was then exposed to extraction specifically by chloroform & ethyl acetate. The phytochemical test & total flavonoid content by AlCl3 method was then determined. Results showed that *Sphaeranthus indicus* (Stem) extract suggested the presence of carbohydrate, flavonoid, protein & diterpene. For ethyl acetate extract almost similar results were obtained with addition of alkaloid. The root extract of *Sphaeranthus indicus* showed the presence of carbohydrate & alkaloid only. The chloroform extract of the same was completely devoid of any phytochemical. In *Tridax procumbens* (Flower) extract the chloroform extract noticed to have chloroform, flavonoid, proteins, diterpenes. The ethyl acetate extract of the same contain additionally sterol & tannin along with previously reported phytochemicals. Total flavonoid content was found to be 2.72 mg/100mg in Aerial part of *Phyllanthus niruri*. For the stem part of *Sphaeranthus indicus* total flavonoids content in chloroform & ethyl acetate extract were found to be 1.30 mg/100mg & 2.87 mg/100mg respectively. From the above obtained results, it can by hypothesized that comparatively grater amount of phytoconstituents are present in aerial part of plants as compared to root. Also, it can be seen that in each & every case, the ethyl acetate extract yielded more amount of phytoconstituents as compared to chloroform. The fact that the aerial parts of plants in the current study contained the greatest concentration of phytochemicals suggests that plant extracts may have pharmacological effects so further research should be done to test its safety & efficacy.

Keywords: Phyllanthus niruri, Sphaeranthus indicus, Tridax procumbens, TFC, Phytochemicals, Herbal medicines

Introduction

Since the dawn of civilization, medicinal plants have been an integral element of human society's effort to combat sickness. They are frequently employed in the management and prevention of specific disorders. The use of medicinal plants in healthcare is usually advantageous. According to a protocol, 70–80% of people in the world are thought to primarily use herbal medicine to address their main healthcare needs (Akerele,1992; Rasool Hassan,2012).

The creation of new therapeutics and the promotion of health are the main goals of current phytochemical research. A field of research known as phytochemistry examines compounds derived from plants that have advantageous biological properties. According to estimates, 50% of current Western medications contain plant ingredients or are based on them. The main advantages of adopting herbal remedies. are that they are generally safer than synthetic equivalents, provide significant therapeutic advantages, and are more cost-effective than other forms of therapy. Thus, this study compares three different plant & their parts with chloroform & ethyl acetate solvent for qualitative & quantitative determination of phytochemicals (Chanda,2014; Ghorbanpour,2017; Jamshidi-Kia *et al*., 2017).

The traditional medicine of South and Southeast Asia has employed the perennial tropical shrub *Phyllanthus niruri* to treat a variety of ailments, including but not limited to jaundice, diarrhoea, dyspepsia, genitourinary infections, and kidney stones. *P. niruri* formulations are used as traditional treatments for renal and vesicular calculi in Brazil, where the plant is known as "Chanca Piedra" or "stone breaker." The fruit and leaves have been used as a treatment for gallstones and jaundice in traditional medical systems like Ayurvedic and Unani medicine. P. niruri, also called as "dukong anak" in colloquial Malay, is used to treat renal problems and coughs. The herb, known as Bhumyamalaki in South India, is thought to be effective in treating syphilis, gonorrhoea, and constipation. This plant, colloquially referred to as "pitirishi," has developed a reputation in northern India as a go-to treatment for bronchitis, asthma, and even tuberculosis. This herb's young shoots might occasionally be used as an infusion to treat chronic diarrhea (Lee *et al*., 2016; Kaur *et al*., 2017; Dahanayake *et al*., 2020).

The entire *S. indicus* has therapeutic use. Asthma, leukoderma, dysentery, vomiting, urinary discharges, pain in the rectum, looseness of the breasts, hemicrania, elephantiasis, anaemia, indigestion, bronchitis, spleen diseases, piles, biliousness, epileptic convulsions, asthma, leukoderma, dysentery, spleen diseases, uterine and vaginal pain, and piles. In Ayurvedic formulations, the entire herb is utilised to cure epilepsy and mental illnesses. In doses of 20 grains twice daily, powdered leaves from dried in the shade are used to treat chronic skin conditions as an antisyphilitic and nervine tonic. The herb's hot water extract is employed as an aphrodisiac, a diuretic, a fish poison, and an anthelminitic. The plant is utilised as an emmenogogue throughout. For neck glandular swelling and jaundice, the entire plant is extracted in hot water (Galani *et al*., 2010; Singh *et al*., 2009; Saraswathidevi *et al*., 2019).

A perennial plant from the Asteraceae family, *Tridax procumbens* L., often known as "coat buttons," is native to Central America but is now widespread in the tropics and subtropics. It is a highly valued plant with the greatest amount of pharmacological action and one of the primary constituents in the majority of compound formulations described in Ayurvedic literature. According to tradition, it is used to cure diarrhoea, bronchial catarrh, dysentery, malaria, high blood pressure, as well as to stop bleeding from wounds, bruises, and cuts It has been shown to have anti-diabetic, anti-bacterial, anti-plasmodial, anti-hepatotoxic, anti-oxidant, and antimicrobial effects. In order to demonstrate the plant's significance to both the pharmaceutical industry and indigenous people (Dattaray,2022; Mundada & Shivhare, 2010; Pandey and Tripathi, 2014).

Materials & Methods

Method

Collection of Plant materials

Phyllanthus niruri (Root and aerial part), *Sphaeranthus indicus* (Root and Stem) and *Tridax procumbens* (Root and Flower) were collected from local area of Bhopal in the month of January, 2022. Drying of fresh plant parts was carried out in under the shade. Dried plant parts were preserved in plastic bags, closed tightly andpowdered as per the requirements.

Extraction by maceration method

Powdered plant materials were weighed (50 gram) and packed in air tight glass Bottle. The plant drug was defatted with petroleum ether for about 12 hrs. The defatted plant materials were subjected to Successive extraction by Chloroform and Ethyl Acetate solvents. The liquid extracts were collected in a tarred conical flask. The solvent removed from the extract by evaporation method using hot plate (Trusheva *et al*., 2007; Kokate,1994).

Phytochemical Screening

Phytochemical examinations were carried out for all the extracts as per the standard methods (Mukherjee ,2007; Shaikh and Patil,2020).

Estimation of total flavonoids content

Determination of total flavonoids content was based on aluminium chloride method[3]. 10 mg quercetin was dissolved in 10 ml methanol, and various aliquots of 5- 25µg/ml were prepared in methanol. 10mg of dried extracts of were dissolved in 10 ml methanol and filter. Three ml (1mg/ml) of this solution was used for the estimation of flavonoid. 1 ml of 2% $AlCl_3$ methanolic solution was added to 3 ml of extract or standard and allowed to stand for 15 min at room temperature; absorbance was measured at 420 nm (Parkhe & Bharti,2019).

Results & Discussion

The phytochemical test of chloroform & ethyl acetate extract of *Phyllanthus niruri* (Root) were performed. The chloroform extract contain carbohydrate only while in Ethyl acetate extract carbohydrate & alkaloid were found to be present. In aerial part of same plant, the carbohydrate, flavonoids, proteins & Diterpenes were found to be present.

Result of phytochemical analysis of *Sphaeranthus indicus* (Stem) extract suggested the presence of carbohydrate, flavonoid, protein & diterpene. For ethyl acetate extract almost similar results were obtained with addition of alkaloid.

The root extract of *Sphaeranthus indicus* showed the presence of carbohydrate & alkaloid only. The chloroform extract of the same was completely devoid of any phytochemical.

In *Tridax procumbens* (Flower) extract the chloroform extract noticed to have chloroform, flavonoid, proteins, diterpenes. The ethyl acetate extract of the same contain additionally sterol & tannin along with previously reported phytochemicals.

Total flavonoid content was found to be 2.72 mg/100mg in Aerial part of *Phyllanthus niruri*. For the stem part of *Sphaeranthus indicus* total flavonoids content in chloroform & ethyl acetate extract were found to be 1.30 mg/100mg & 2.87 mg/100mg respectively.

In case of *Tridax procumbens* the root Chloroform & Ethyl acetate extract found to have flavonoid as 0.64 mg/100mg & 1.00 mg/100mg respectively. While the flowers of *Tridax procumbens* observed to have flavonoid content as 0.67 mg/100mg & 0.76 mg/100mg for Chloroform & Ethyl acetate extract respectively.

From the above obtained results, it can by hypothesized that comparatively grater amount of phytoconstituents are present in aerial part of plants as compared to root. Also, it can be seen that in each & every case, the ethyl acetate extract yielded more amount of phytoconstituents as compared to chloroform.

Furthermore, among the three plants greatest number of phytochemicals were observed in *Tridax procumbens* flower ethyl acetate extract.

In quantitative examination studies it can be clearly observed that maximum amount of flavonoid was associated with *Sphaeranthus indicus* ethyl acetate extract.

Table 1: Phytochemical Test of *Phyllanthus niruri* (Root) extract

Sr. No.	Test	Chloroform	Ethyl acetate
1.	Carbohydrate Fehlings Test Benedicts Test	 +ve - ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 - ve - ve	 - ve - ve
3.	Phenols		

	Ferric chloride Test	- ve	- ve
4.	Saponins Foam Test	 - ve	 - ve
5.	Proteins Xanthoproteic Test	 - ve	 - ve
6.	Diterpenes Copper Acetate Test	 - ve	 - ve
7.	Alkaloid Wagner's Test	 - ve	 + ve
8.	Glycosides Conc. Sulphuric acid Test	 - ve	 - ve
9.	Lignin Labet Test	 - ve	 - ve
10.	Sterols Salkowski Test	 - ve	 - ve
11.	Tannins Gelatin Test	 - ve	 - ve

Table 2: Phytochemical Test of *Phyllanthus niruri* (Aerial Part) extract

Sr. No.	Test	Chloroform	Ethyl acetate
1.	Carbohydrate Fehlings Test Benedicts Test	 + ve - ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 - ve - ve	 + ve + ve
3.	Phenols Ferric chloride Test	 - ve	 - ve
4.	Saponins Foam Test	 - ve	 - ve
5.	Proteins Xanthoproteic Test	 - ve	 + ve
6.	Diterpenes Copper Acetate Test	 - ve	 + ve
7.	Alkaloid Wagner's Test	 - ve	 - ve
8.	Glycosides Conc. Sulphuric acid Test	 - ve	 - ve
9.	Lignin Labet Test	 - ve	 - ve
10.	Sterols Salkowski Test	 - ve	 - ve
11.	Tannins Gelatin Test	 - ve	 - ve

Table 3: Phytochemical Test of *Sphaeranthus indicus* (Stem) extract

Sr. No.	Test	Chloroform	Ethyl acetate
1.	Carbohydrate Fehlings Test Benedicts Test	 + ve + ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 + ve + ve	 + ve + ve
3.	Phenols		

	Ferric chloride Test	- ve	- ve
4.	Saponins Foam Test	- ve	- ve
5.	Proteins Xanthoproteic Test	- ve	+ ve
6.	Diterpenes Copper Acetate Test	+ ve	+ ve
7.	Alkaloid Wagner's Test	- ve	+ve
8.	Glycosides Conc. Sulphuric acid Test	- ve	- ve
9.	Lignin Labet Test	- ve	- ve
10.	Sterols Salkowski Test	- ve	- ve
11.	Tannins Gelatin Test	- ve	- ve

Table 4: Phytochemical Test of *Sphaeranthus indicus* (Root) extract

Sr. No.	Test	Chloroform	Ethyl acetate
1.	Carbohydrate Fehlings Test Benedicts Test	 - ve - ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 - ve - ve	 - ve - ve
3.	Phenols Ferric chloride Test	 - ve	 - ve
4.	Saponins Foam Test	 - ve	 - ve
5.	Proteins Xanthoproteic Test	 - ve	 - ve
6.	Diterpenes Copper Acetate Test	 - ve	 - ve
7.	Alkaloid Wagner's Test	 - ve	 + ve
8.	Glycosides Conc. Sulphuric acid Test	 - ve	 - ve
9.	Lignin Labet Test	 - ve	 - ve
10.	Sterols Salkowski Test	 - ve	 - ve
11.	Tannins Gelatin Test	 - ve	 - ve

Table 5: Phytochemical Test of *Tridax procumbens* (Flower) extract

Sr. No.	Test	Chloroform	Ethyl acetate
1.	Carbohydrate Fehlings Test Benedicts Test	 + ve + ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 - ve + ve	 + ve + ve
3.	Phenols Ferric chloride Test	 - ve	 - ve

4.	Saponins Foam Test	 - ve	 - ve
5.	Proteins Xanthoproteic Test	 + ve	 + ve
6.	Diterpenes Copper Acetate Test	 + ve	 + ve
7.	Alkaloid Wagner's Test	 - ve	 - ve
8.	Glycosides Conc. Sulphuric acid Test	 - ve	 - ve
9.	Lignin Labet Test	 - ve	 - ve
10.	Sterols Salkowski Test	 - ve	 + ve
11.	Tannins Gelatin Test	 - ve	 + ve

Table 6: Phytochemical Test of *Tridax procumbens* (Root) extract

Sr. No.	**Test**	**Chloroform**	**Ethyl acetate**
1.	Carbohydrate Fehlings Test Benedicts Test	 - ve + ve	 + ve + ve
2.	Flavonoids Lead acetate Test Alkaline Test	 - ve + ve	 + ve + ve
3.	Phenols Ferric chloride Test	 - ve	 - ve
4.	Saponins Foam Test	 - ve	 - ve
5.	Proteins Xanthoproteic Test	 - ve	 + ve
6.	Diterpenes Copper Acetate Test	 - ve	 - ve
7.	Alkaloid Wagner's Test	 - ve	 - ve
8.	Glycosides Conc. Sulphuric acid Test	 - ve	 - ve
9.	Lignin Labet Test	 - ve	 - ve
10.	Sterols Salkowski Test	 - ve	 - ve
11.	Tannins Gelatin Test	 - ve	 - ve

Conclusion

The presence of primary and secondary metabolites was significantly indicated in the current study's qualitative analysis of the extracts from all three plants. Mankind has utilised many types of plants for ages to treat a wide range of dangerous diseases because they are known for their propensity to create a richness of secondary metabolites. In fact, a lot of them have been found to have fantastic biological and pharmacological properties, making them potential candidates for use as chemotherapeutic drugs. Due to their anti-oxidant qualities in promoting health, plant phenolic compounds are currently of considerable attention. The fact that the floral extract in the current study contained the greatest concentration of phytochemicals suggests that plant extracts may have pharmacological effects. The non-toxic glycosides found in many plants can be degraded to produce phenolics, which are poisonous to microbial infections.

Almost all plants in study appears to have a high energy content that might be used as a source of raw materials for the pharmaceutical industry given the presence of carbohydrates and reducing sugars in it.

References

1. Akerele O. Importance of medicinal plants: WHO's programme. Importance of medicinal plants: WHO's programme.. 1992:63-77.
2. Rasool Hassan BA. Medicinal plants (importance and uses). Pharmaceut Anal Acta. 2012;3(10):2153-435.
3. Chanda S. Importance of pharmacognostic study of medicinal plants: An overview. Journal of pharmacognosy and phytochemistry. 2014;2(5):69-73.
4. Ghorbanpour M, Hadian J, Nikabadi S, Varma A. Importance of medicinal and aromatic plants in human life. Medicinal Plants and Environmental Challenges. 2017:1-23.
5. Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. Medicinal plants: Past history and future perspective. Journal of herbmed pharmacology. 2017 Dec 29;7(1):1-7.
6. Lee NY, Khoo WK, Adnan MA, Mahalingam TP, Fernandez AR, Jeevaratnam K. The pharmacological potential of Phyllanthus niruri. Journal of pharmacy and pharmacology. 2016 Aug;68(8):953-69.
7. Kaur N, Kaur B, Sirhindi G. Phytochemistry and pharmacology of Phyllanthus niruri L.: a review. Phytotherapy research. 2017 Jul;31(7):980-1004.
8. Dahanayake JM, Perera PK, Galappaththy P, Arawwawala M. A mini review on therapeutic potentials of Phyllanthus niruri L. Trends in Phytochemical Research. 2020 Sep 1;4(3):101-8.
9. Galani VJ, Patel BG, Rana DG. Sphaeranthus indicus Linn.: A phytopharmacological review. International Journal of Ayurveda Research. 2010 Oct;1(4):247.
10. Singh S, Semwal BC, Upadhaya PK. Pharmacognostic study of Sphaeranthus indicus Linn.: A Review. Pharmacognosy Journal. 2019;11(6).
11. Saraswathidevi HN, Mahesh CD, Pradeep S. A Classical Review on Mundi (Sphaeranthus Indicus Linn.). Journal of Ayurveda and Integrated Medical Sciences. 2019 Aug 31;4(04):300-10.
12. Dattaray D. Traditional Uses and Pharmacology of Plant Tridax procumbens: A Review. Sys Rev Pharm. 2022 May 1;13(5):511-7.
13. Mundada S, Shivhare R. Pharmacology of Tridax procumbens a weed. Int J Pharm Tech Res. 2010 Apr;2(2):1391-4.
14. Pandey A, Tripathi S. A Review on Pharmacognosy, Pre-phytochemistry and Pharmacological analysis of Tridax procumbens. PharmaTutor. 2014 Apr 1;2(4):78-86.
15. Trusheva B, Trunkova D, Bankova V. Different extraction methods of biologically active components from propolis: a preliminary study. Chemistry Central Journal. 2007 Dec;1:1-4.
16. Kokate CK. Ed. Practical pharmacognosy, 4th Edn., *Vallabh Prakashan*: 1994; 112:120.
17. Mukherjee PK. Quality control of herbal drugs, 2nd Edition, Business Horizons, 2007; 2-14.
18. Shaikh JR, Patil M. Qualitative tests for preliminary phytochemical screening: An overview. International Journal of Chemical Studies. 2020 Mar;8(2):603-8.
19. Geeta Parkhe, Deepak Bharti. Phytochemical investigation and determination of total phenols and flavonoid concentration in leaves extract of *Vitex trifolia* Linn. Journal of Drug Delivery & Therapeutics. 2019; 9(4):705-707.