



**ORIGINAL RESEARCH PAPER**

**Biotechnology**

**PHYTOCHEMICAL ANALYSIS AND ASSESSMENT OF PHENOL ON CHLOROPHYTUM BORIVILIANUM**

**KEY WORDS:**

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**ABSTRACT**

*Chlorophytum* genus has been extensively studied due to its diverse biological activities. We evaluated the methanolic and water extract of leaves of *Chlorophytum Borivilianum* (Green type) the species that is studied compared to methanolic and water extract. In addition to several phytoconstituents compounds were found among the most abundant constituents. In this present study we have found that carbohydrates, alkaloids, flavanoids, protein, Resin, Anthrocyanin, Saponin, Steroid, Tannin, *Starch, Glycoside, Phenol, Phlobatanin, Terpenoids present in leaves of Chlorophytum Borivilianum* (Green type) and we also analysed phenol. As reported Major phytochemical components from the roots of *C. borivilianum* include mainly phenolic compounds we were quantified the phenol compound. The quantity of phenol were 4.50 0.003 in respect to catechol as standard.

**INTRODUCTION**

*Chlorophytum Borivilianum* Safed Musli is a perennial herbaceous medicinal plant. There are a lot of species in Africa and India. A number of *Chlorophytum* species are referred to as medicinal herbs in the traditional medicine of India. The most commercially exploited and widely growing species to in is *Chlorophytum borivilianum*. Safed musli is used for lack of libido. [1,2].

Herbal remedies have attained much more popularity in the treatment of minor ailments, due to increasing awareness of personal health maintenance through natural products. Indeed, the market and public demand has been so great that there is a huge extinction risk to many medicinal plants and obviously the loss of genetic diversity. The use of plants for treatment of various ailments dates back to over 5000 years.

A great source of ancient information is contained in the 'Vedas' and more specifically 'Yajur Veda' is the main source of such information. In these 'Vedas' the medicinal importance of many plants has been mentioned. The WHO estimated that 80% of the world's population depends on traditional medicines for meeting their primary health care needs [3-4].

Safed musli (*Chlorophytum borivilianum* L.) is a herb with sub-erect lanceolate leaves and tuberous root system belonging to the family Liliaceae. It can grow up to a maximum height of 45 cm. Tubers can grow up to a depth of 25 cm. It is a tiny annual herb that grows well in tropical and sub-tropical climates with altitudes up to 1500 meters. There are about 256 species of *Chlorophytum* and 17 among them are found in India. Out of 17 species 3 species namely as *Chlorophytum borivillianum*, *Chlorophytum arundinaceam* and *Chlorophytum tuberosum* are commercially cultivated by the Indian farmers and *Chlorophytum borivillianum* is the only species, which is under commercial cultivation. *C. borivilianum* is a plant well known for its aphrodisiac as well as immunodilatory activity [2]. *C. borivilianum* is traditionally used for treating oligospermia, pre- and postnatal infections, arthritis, diabetes and dysuria [4-5]. Its antiviral, anticancer, immunomodulatory, antidiabetic, antistress, and anti-inflammatory properties have been evaluated [6-7].

**MATERIALS AND METHODS**

Plant collection and authentication The leaves of *C. borivilianum* was collected from the herbal garden of Jayanti Kunj authenticated by botanist. Plant preparation and extraction The leaves and stem of *C. borivilianum* was washed thoroughly under running tap water dried on paper towel then aerial parts of it blender, it was extracted in petroleum ether and methanol by macerating at room temperature (30 ° C) for 72 hours respectively. The product was filtered through

the filter paper. The percentage yields of extracts leaf (10.5 % w/v).

Preliminary phytochemical screening Air-dried and powdered plant materials were screened for the presence of alkaloids, glycosides, saponin glycosides, steroids and tannins using the methods described by [8-10]

**(iii) Test for Flavonoids:**

Sulphuric acid test: A fraction of the extract was taken and treated with concentrated H<sub>2</sub> SO<sub>4</sub> and observed for the formation of orange colour.

Shinoda test (HCl test): Few fragments of Mg and dropwise HCl were added to 1 ml plant extract, which gives pink reddish/ brownish pink or green or blue colour in few minutes.

**(iv) Test for Proteins:**

Biuret test: 1% of NaOH was added to 1 ml of extract and few drops of 1% CuSO<sub>4</sub> were then added. Blue/ purple or violet/ pinkish colour indicates the presence of proteins.

**Millon's test:**

1 ml of test extract was mixed with H<sub>2</sub> SO<sub>4</sub> then Millon's reagent was added dropwise. White/ yellow precipitate appears which turns into red colour precipitate, after heating the mixture. This indicates the presence of proteins.

**(v) Test for Rasins:**

1ml of ethanolic extract was dissolved in acetone and then 1 ml of distilled water is added. Turbidity indicates the presence of resin.

**(vi) Test for Tannins:**

To 1 ml of the extract, 2ml of 5% FeCl<sub>3</sub> is added which gives dark blue or greenish black colour and a positive tannin test.

**(vii) Test for Steroids**

I. 1ml extract was treated with 1% lead acetate solution. Formation of white precipitates indicates the presence of saponins.

II. Foam test: A small amount of extract was shaken with water and observed for the presence of foam.

**(viii) Test of Saponin:**

Foam test: A small amount of extract was shaken with water and observed for the presence of foam. Sodium Bicarbonate test: Few drops of Sodium bicarbonate was added to 1 ml of plant extract. If honeycomb like structure forms, it confirms

saponin.

**(ix) Test for Anthocyanin and Betacyclin:**

1 ml of plant extract was treated with 1 ml of 2N NaOH then heated. Formation of bluish –green colour indicated the presence of Anthocynin while yellow colour indicated the presence of betacyclin.

**(x) Test for Starch:**

1 ml of I 2 solution is mixed in 1ml of extract, formation of blue colour indicated the presence of starch in the extract.

**(xi) Test for Glycosides:**

To 1 ml of plant extract, 1 ml FeCl<sub>3</sub> (5%), and equal amount of acetic acid is added, then few drops of H<sub>2</sub>SO<sub>4</sub> is added to the mixture. Greenish blue colour indicates the presence of glycosides.

**(xii) Test for phenols:**

1ml of plant extract, when treated with few drops of FeCl<sub>3</sub> solution; it gives blue green colour and confirms the presence of phenols.

**(xiii) Test for Phlobatannins:**

1ml of plant extract was treated with 1 ml of 1% HCl and heat. Red colour precipitate indicates the presence of Phlobatannins in the sample.

**(xiv) Test for Terpenoids:**

To 1ml of plant extract, 2ml of chloroform and 3ml of conc. H<sub>2</sub>SO<sub>4</sub> was added. A reddish brown precipitate appear, confirmed the presence of terpenoids.

**Determination of Total Polyphenolic content**

Total polyphenolic content of plant leaves extracts was measured by using Folin-Ciocalteu reagent Dwivedi et al., 2017 [17]. The 25 µl of plant extract diluted with 125 µl water followed by addition of 150 µl of Folin-Ciocalteu reagent (1N) & 25 µl of Na<sub>2</sub>CO<sub>3</sub> (20%w/v) and incubated at 45oC for 60 min then absorbance was measured spectrophotometrically at 765nm .

Absorbance was recorded triplicates. Quantification was performed with respect to the standard curve of Catechol (y= 0.006x+0.0966; R<sub>2</sub> =0.975). Result was expressed as milligram of Catechol equivalent per ml of extract. [11]

**RESULT AND DISCUSSION**

Table-1 presents the result of phytochemical screening in *Chlorophytum borivilianum*. Screening results indicated that all the leaves are rich in diverse advantageous phytoconstituents, like phenols, flavonoids, alkaloids, anthocyanins rasins, saponin, steroids, tannins, starch, glycosides, phlobatannins, terpenoids as well as proteins and carbohydrates.

Presence of phenolic compounds was observed in the *Chlorophytum borivilianum* leaves samples in the present work. Present investigation demonstrates the presence of flavonoid compounds in the studied samples. Aqueous and Methanolic extracts of the plants display flavonoids in phytochemical screening.

The alkaloids are one of the most diverse groups of secondary metabolites, found in living organisms and have an array of structure type, biosynthesis pathway and pharmacological activities. These are being used as drugs in potions, medicines, teas, poultices and poisons for 4000 years. These are pharmacologically active substances which possess various physiological activities in humans and animals. Alkaloid present in water and not present in methonolic extract

Terpenoids are also a class of secondary metabolites, widely distributed in plants. More than 40000 individual terpenoids

are known to exist in nature with new compounds being discovered every year. Our findings indicated that terpenoids were present in the extracts *Chlorophytum borivilianum* leaves.

Plant steroids are a distinctive class of phytoconstituents found throughout the animal and plant kingdom, However, some adverse effects are also associated with their prolong use such as immunosuppression, hypertension, osteoporosis and metabolic disturbance.13 In our investigation we found that steroids were absent in both methanolic and water extracts of *Chlorophytum borivilianum*.

Saponins are high molecular weight compounds in which a sugar molecule is combined with triterpene or steroid aglycon, so there are two major groups of saponins; triterpene saponins and steroid saponins. These are therapeutically important as they show hypolipidemie and anticancer activity of cardiac glycosides.

Our preliminary screening were shown that methanol and water extract giving various phytochemical present in *Chlorophytum borivilianum* leaves. Tannins are phenol compounds of high molecular weight soluble in water and alcohol and found in root, bark, stem and other layers of plant tissues, due to presence of phenolic groups these are used as antiseptic. In ayurvedic medicine system, tannin rich plant based formulations are used to treat leucorrhoea, rhinnorhoea and diarrhea.

Tannins were not present in *Chlorophytum borivilianum* leaves. Anthocyanins are the members of the flavonoid group and are the most recognized visible members of bioflavonoid phytochemicals. Anthocyanin rich bioflavonoid mixtures and antocyanin isolates may provide protection from DNA cleavage, estrogenic activity, enzyme inhibition, increased production of cytokines, anti-inflammatory activity lipid peroxidation, decreasing capillary permeability and fragility.

Our results recommend that anthocyanins were present in methanolic and water extracts of *Chlorophytum borivilianum* leaves. Cardiac glycosides are the compounds used to treat congestive heart failure and cardiac arrhythmia. These compounds work by inhibiting the Na<sup>+</sup>/K<sup>+</sup> pump. [12-16]

In our preliminary screening we found that glycosides in *Chlorophytum borivilianum* leaves and bulb were present in methanolic and water extracts, Resins were, present in methanolic extract and absent in water sample. Starch were absent in *Chlorophytum borivilianum* leaves and Phlobatanins were absent in, *Chlorophytum borivilianum*.

**Quantitative Analysis of Total Polyphenolic Contents**

Polyphenolic compounds are commonly found in both edible and inedible plants, and reported for multiple biological effects, including antioxidant activity. It was reported that phenolic compounds were associated with antioxidant activity and play an important role in stabilizing lipid peroxidation by Dwivedi et al., 2019. Total polyphenolic content of selected part of the plant were shown in table-2.

**CONCLUSION**

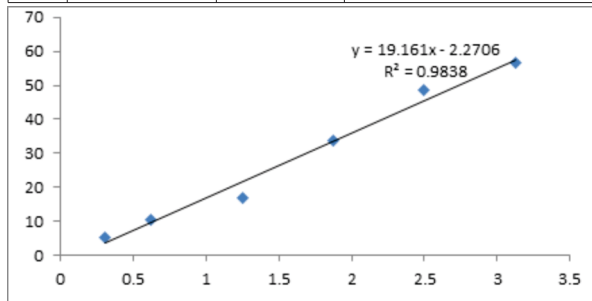
Based on the results in this research we have found that *Chlorophytum borivilianum* has rich active compounds. Leave can be used as medicinally important drug. Polyphenolic compounds are commonly found in both edible and inedible plants, and reported for multiple biological effects, including antioxidant activity. Plant-based compounds are known to be anti-aging. This means that they can stop the reaction of free radicals with other molecule in your body, preventing damage to your DNA as well as long-term health effects. Free radicals lose an electron and become unstable. This makes them vulnerable to damage. Free radicals can cause the molecule they react with to create even more radicals.

**Table 1. Qualitative phytochemical analysis**

S.No.	Phytochemical	Chlorophytum borivilianum leaves	
		Water	Methanol
1.	Carbohydrate	-	+
2.	Alkaloid	+	-
3.	Flavonoid	+	++
4.	Protein	+	+
5.	Resin	+	+
6.	Anthocyanin	-	-
7.	Saponin	+	++
8.	Steroid	-	-
9.	Tannin	-	-
10.	Starch	-	-
11.	Glycoside	+	+
12.	Phenol	+	+
13.	Phlobatanin	+	+
14.	Terpenoid	+	+

**Table-2- Concentration of polyphenolic contents :**

Sl. No.	Plant	Parts	TPC in µg/ml equivalent to catechol
Chlorophytum borivilianum			
	Chlorophytum borivilianum	Leaves	4.50 ± 0.003



**Figure 1- Standard graph of catechol**

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