RESEARCH ARTICLE

Comparative Pharmacognostic Study of *Chlorophytum glaucum* Dalz. and *Chlorophytum breviscapum* Dalz.

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ABSTRACT

Chlorophytum glaucum Dalz. and *Chlorophytum breviscapum Dalz.* belong to family Liliaceae and is being used in the indigenous systems of medicine as a galactogogue and aphrodisiac. These species are commonly known as safed musali. The drug part is usually used as the white tuberous roots. The present studies include the macroscopic, microscopic characters, histochemistry and phytochemistry.

Key words: *Chlorophytum*, Pharmacognosy, phytochemical analysis.

INTRODUCTION

Chlorophytum glaucum Dalz. and *Chlorophytum breviscapum Dalz.* belongs to family Liliaceae. In India, it is found in rainfed areas. The plant generally grows along the forest margins, grassy slopes and rocky places along valleys (between 1300 and 2800m) (Hara, 1966). *C. glaucum* is an erect plant growing up to a height of 1- 1.5ft with sheathing leaf base acute to acuminate with entire margin. The tuberous root are fibers cylindrical and are measuring 10-14 cm long, 1-1.4 cm diameter and *C. breviscapum* is also the erect plant growing up to a height of 1.5-2ft with sheathing leaf base acute to acuminate with entire margin. Tubers are oblong; pendulous in the middle again it becomes fibrous and is measuring 8-12 cm long, 1-1.7 cm diameter (Cooke, 1958). The tuberous roots of both the species are medicinally important and are commonly known as safed musali in indigenous system of medicine. It is used as an aphrodisiac and galactogogue (Nadkarni, 1927; Chopra et al., 1956; Marais and Reilly, 1978) as well as for its nutritive, health promoting properties and immunoenhancing, hepatoprotective and antioxidants activities (Govindarajan et al, 2005; Anonymous, 2011; Dhuley, 1977; Nergard et al, 2004; Kirtikar and Basu, 1975). The tubers are also used in fever, leucorrhoea and also as an aphrodisiac (Kirtikar and Basu, 1975). The species *Asparagus, Bombax* and Orchids are also known as safed musali in the literature (Nadkarni, 1927; Chopra et al., 1956). Therefore, it is important to define specifications that will allow the correct identification of the plant which is being sold as safed musali. In addition, there are 17 species

of *Chlorophytum* recorded in India of which 11 species of *Chlorophytum* are found to be growing in Maharashtra (Sreevidya et al, 2003). Hence, *C. glaucum* Dalz. and *C. breviscapum* Dalz. choose for the present investigation as it is being sold widely in the market under the common name safed musali because of its white tuberous roots.

MATERIALS AND METHODS

Collection and identification of plant materials

The plant materials were collected from in and around Pune district of Maharashtra. Efforts were made to collect the plants in flowering and fruiting condition for the correct botanical identification. It was identified with the help of Flora of The Presidency of Bombay (Cooke, 1958). Herbarium specimens were prepared and authenticated from Botanical Survey of India, Pune. The voucher specimens number for *C. glaucum* Dalz. and *C. breviscapum* Dalz. are PAVICH4/2009 and PAVICH3/2009 respectively (The Wealth of India, 1992).

Microscopic and macroscopic evaluation

Permanently double-stained has been prepared as per the plant microtechniques method (Johansen, 1940). The macroscopic evaluation was studied by the suitable method (Trease and Evans, 2002) and Wallis (1967).

Histochemical study as per the method of Krishnamurthy (1988).

Phytochemical evaluation

Some roots were dried under the shade so as to avoid the decomposition of chemical constituents, powdered in a blender and finally stored in dry air tied containers for phytochemical screening. Ash and percentage extractive content was measured by standard pharmacopoeial techniques (Anonymous (1955). Fluorescence analysis was carried out as per Chase and Pratt (1949). Qualitative phytochemical tests were carried out by standard methods of Harborne (1973) and Trease and Evans (2002). Quantitative phytochemical analysis was determined for proteins, carbohydrates and saponins by the methods of Lowry *et al*. (1951), Nelson (1944) and Obadoni and Ochuko (2001) respectively.

RESULTS AND DISCUSSIONS

Macroscopic evaluation

The details of the macroscopic examination are mentioned in Table 1 and illustrated in Fig1 (a & b).

Table 1: Macroscopic examination of *Chlorophytum spp.*

Characters	*C. glaucum* Dalz.	*C. breviscapum* Dalz.
Herb	1 - 1.5 ft. in height.	1.5 - 2 ft. in height.
Roots	Tuberous root are fibers cylindrical and are measuring 10-14 cm long, 1-1.4 cm diameter.	Tuberous root are slightly broad at the base and gradually tapering at the end. Tubers are oblong, pendulous in the middle again it becomes fibrous and are measuring 8-12 cm long, 1-1.7 cm diameter.
Leaves	Green, 6 – 9 in number, oblanceolate, acute, glaucous, glabrous, 20 – 35 × 2.8 – 4.5 cm, short broad petiole.	Green, 6 – 9 (10-15 also) in number, slightly thick dark green, flat with undulate margin, apex acuminate, linear, oblong or lanceolate, membranous, shining above with sheathing leaf base. 60 – 66 × 2.70 – 3.5 cm long.
Scape	Densely clothed with sheaths, erect, 3 – 12 ft. long.	Unbranched, Naked, 60 – 65 cm long.
Flower	White, dense raceme, lanceolate, acuminate.	White, racemose, clusters of 2 – 3 flowers, 2 – 4 cm long, erect.
Bract	Persistent forming a terminal coma before flowering, the lower 0.5 cm long, upper 0.5 – 0.8 cm long.	Membranous, Ovate- lanceolate, lower bracts 0.5 – 1.5 cm and upper 0.8 cm long.
Pedicels	Ascending, 0.5 – 0.8 cm long, slender, jointed at or below the middle.	0.5 – 0.8 cm long, jointed near the top.
Perianth	White, naked, segments less than 0.8 cm long by 0.5 cm filaments minutely papillose, 5 nerved.	Segments, linear acute, 3 nerved, 0.9 × 0.3 cm in broad.
Stamen	0.5 – 0.8 cm long, anther 0.5 cm long.	0.5 – 1 cm long, anther- 0.7 cm long, linear, oblong.
Style	0.8 cm long, stigma minute.	0.6 cm long, slender, stigma minute.
Capsule	Globose, emarginate, 3 winged.	Globose, 0.8–1.2 cm in diameter, 3 winged, emarginated.
Seeds	Black, orbicular, 2- 4, 0.3 – 0.5 cm.	Black, globose, compressed 0.1–0.3cm diameter, papillose.

Figure 1a: Habit of *C. glaucum*

Figure 1a: Habit of *C. breviscapum*

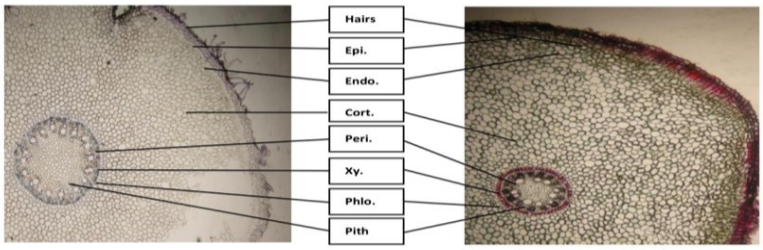

Figure 2a: Transverse section of root of of *C. glaucum* (10× × 3.3×)

Figure 2b: Transverse section of root *C. breviscapum* (10× × 3.3×)

Table 2: Ash and acid insoluble ash of *Chlorophytum spp.*

Parameter	C. *glaucum* Dalz.	C. *breviscapum* Dalz.
Total Ash	10.7 %	12.8 %
Acid Insoluble Ash	3.5 %	5.1 %

Table3:Percentage extractives of *Chlorophytum spp*

Solvent	Extract (%)	
	C. *glaucum* Dalz.	C. *breviscapum* Dalz.
Distilled Water	4.7 %	2.95 %
Absolute Alcohol	0.28 %	0.175 %
Petroleum ether	0.24 %	0.185 %
Benzene	0. 195 %	0. 115 %
Chloroform	9.315 %	8.89 %
Diethyl ether	0. 32 %	0. 145 %
Acetone	0.35 %	0.165 %

Table 4: Fluorescence analysis of *Chlorophytum spp.* at 230 nm

Treatments	Color emits	
	C. *glaucum* Dalz.	C. *breviscapum* Dalz.
Powder as such	Yellowish white	Pale white
Powder as such in UV-light	Pale white	Pale yellow
Powder + Nitrocellulose	Grayish white	Whitish gray
Powder + 1 N NaOH in Methanol	Whitish gray	Blackish gray
Powder + 1 N NaOH in Methanol dry for 30 min. + Nitrocellulose	Grayish white	Grayish white

Table5:Quantitative estimation of *Chlorophytum spp.*

Quantitative estimation	C. *glaucum* Dalz.	C. *breviscapum* Dalz.
Protein	1.69 mg/g	1.38 mg/g
Reducing Sugar	0.03 mg/g	0.75 mg/g
Non - Reducing Sugar	0.06 mg/g	0.01 mg/g
Starch	0.04 mg/g	0.28 mg/g
Saponins	1.10 mg/g	1.11 mg/g

Microscopic characters

In both the species, transverse section of the roots had a circular outline. The outermost layer is the epidermis consisting of uniseriate trichomes followed by a very large zone of the cortex. Just below the epidermis, outermost layer of the cortex consists of cells which are mostly rectangular, appearing longer than wide. The rest of the cortex are rounded to polygonal parenchymatous cells and have no intercellular spaces The innermost layer of the cortex is a single-layeredendodermis. The stellar structure shows that the endodermis is followed by the pericycle layer. The xylem is exarch variety and the phloem is in between the xylem along with the parenchyma. The central region is occupied by large pith mostly polygonal in shape (Figure 2a & b respectively).

Histochemical screening

Histochemical screening showed the presence of starch, protein, fat, saponins, tannin, sugars and alkaloids.

Phytochemical studies

The tubers had a total ash and acid insoluble ash content is more in *C. breviscapum* as compare to *C. glaucum*. The values of percentage extractives were higher in chloroform and lower in benzene solvent (Table 3). Fluorescence analysis was carried out to check the purity of the drug. The powder drug was observed in visible light and then powder was treated with nitrocellulose, 1N sodium hydroxide, 1 N sodium hydroxide in nitrocellulose and dried for 30 min. After this it was observed under ultraviolet light and it emits the color as shown in Table 5 for both the species. Qualitative analysis of the roots indicated the presence of proteins, reducing and non-reducing sugars, saponins, fats, tannin, glycoside and alkaloids. The quantity of proteins is higher than saponins and carbohydrates in *C. tuberosum* as compare to *C. laxum* (Table 5). Saponins are the important chemical and justify the use of tubers of these plants and are used as a well-known health tonic, aphrodisiac and galactogogue (Nadkarni, 1927; Chopra et al, 1956; Govindarajan et al, 2005; Obadoni and Ochuko, 2001).

CONCLUSIONS

The plant *C. glaucum* and *C. breviscapum* showed the correct taxonomy which is helpful for the standardization of the drug. The morphological characters and histochemical study with double staining of the root, percentage extractives, fluorescence, ash analysis and phytochemical screening of the plants. As in case of saponins and stegmasteroids, the peaks are denoted by the Rf values. These investigations will be useful for the correct botanical identification and authentication of the drug. After getting the overall results of *C. glaucum* and *C. breviscapum* and if data is comparable with the above mentioned species of safed musali, it can be used as a substitute for them.

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