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SCILLA INDICA BAKER - A SUBSTITUTE FOR INDIAN SQUILL

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ABSTRCT

Indian squill i.e. *Urginea indica* Kunth is one of the ancient medicinal plants and its bulb has several therapeutic uses. It is used as diuretic, deostruent, emetic, emmenogogue, expectorant, cathartic, anticancer agent etc. According to previous literature the marketed sample of *Urginea indica* is often mixed with the bulbs of *Scilla indica* Baker. As pharmacognosy is considered as reliable tool to confirm the controversial status of any crude drug, an extensive pharmacognostic study of *S. indica* was done for the first time. It involved various pharmacognostic parameters such as macroscopy, microscopy, powder study, physicochemical analysis and preliminary phytochemical screening. In comparative pharmacognostic studies of the said plants, many external and internal features were found to be similar. The preliminary phytochemical analyses and alcohol extractive values of both plants were almost matching. The overall study indicated that *S. indica* can be used as substitute of *U. indica.* However the detailed phytochemical and pharmacological studies of *S. indica* are necessary to be performed.

KEYWORDS: Indian squill, *Urginea indica*, *Scilla indica*, Pharmacognosy.

INTRODUCTION

The botanical source of Indian squill consists of dried slices of the bulbs of *Urginea indica* Kunth, belongs to the family Liliaceae. The therapeutic uses of the plant are mentioned in all standard books of Ayurveda, medicinal plants and material medica. *U. indica* resembles *Digitalis* in its cardio-tonic activity and also found to possess anticancer, expectorant, diuretic, deostruent, emmenagogue, emetic, antibacterial effects.[1, 2, 3, 4, 5, 6] The plant is of

great market demand and there is always shortage of the crude drug to the users. This is due to seasonal (ephimeral) nature of plant which also has restricted distribution. If a substitute for Indian squill can be found out, market problem can be solved to a certain extent. In previous literature, it is mentioned that some species of *Scilla* are synonymous with the species of *Urginea*. The information about pharmacognosy *Urginea indica* Kunth is incomplete, while *Scilla indica* Baker has not been studied at all.[7, 8] It is reported that *Scilla* species are sold for *Urginea* as an adulterant.[9] In order to finalize the status of *Scilla*, whether it is a substitute for *Urginea* or an adulterant, pharmacognosy of *Scilla indica* Baker was done. After comparing the pharmacognostic standards of both the plants, the status of *S. indica* was confirmed.

MATERIAL & METHODS

Scilla indica is found in almost all parts of India including grassy areas or sea coasts of Konkan and Suarashtra. It appears with the first rain fall after summer. Authentic sample was collected from Kalawa (Dist-Thane) and Khandala (Dist-Pune) of Maharashtra. The sample was authenticated for its botanical identity using the standard herbaria. After collection, some of the bulbs were preserved in F.A.A solution in labeled bottles. Powder was made from the remaining bulbs. The complete systematic pharmacognostic study of drug involved macroscopy, microscopy, powder study, determination of ash values, extractive values, preliminary phytochemical screening and fluorescence analysis. It was done using standard methodology.[10, 11, 12, 13, 14, 15, 16, 17, 18, 19]

OBSERVATIONS

1. Macroscopy

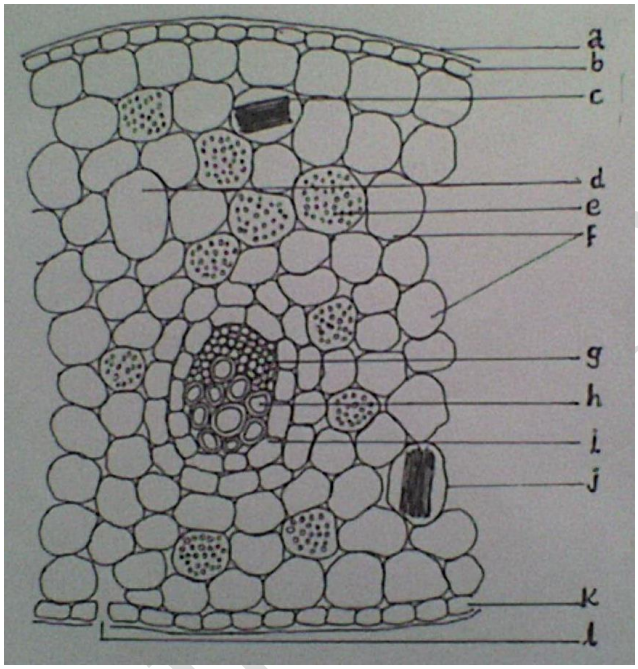
Table 1: Macroscopy of *Scilla indica* Baker.

Morphological Parameters	***Scilla indica* bulb scale**
Size	2.5cm in length 2.0 cm in breadth
Shape	Round to oval
Outer surface	Dark brown
Inner surface	Yellowish cream
Taste	Bitter
Odour	Slight characteristic

Picture 1: *Scilla indica* Baker whole plant.

2. Microscopy

Transverse section of *Scilla indica* bulb scale showed upper epidermis, mesophyll, vascular bundles and lower epidermis. Upper epidermis consisted of elongated parenchymatous cells, covered by cuticle. It showed very few stomata, which were nearly circular. Mesophyll made up of large polyhedral parenchymatous ground tissue. Mucilage ducts were few and scattered in mesophyll tissue. Bundles of acicular calcium oxalate crystals were observed in many idioblast cells. Starch grains were also present in many mesophyll cells. Vascular bundles were conjoint, collateral and closed, embedded in the ground tissue. Each one was surrounded by parenchymatous bundle sheath. Xylem was placed towards lower epidermis and phloem towards upper epidermis. Lower epidermis contained elongated parenchymatous cells covered by cuticle. Many stomata were observed in it.



a- Cuticle,
b- Upper epidermis,
c- Calcium raphides crystals,
d- Mucilage cell,
e- Starch grains,
f- Ground tissue,
g- Phloem,
h- Xylem,
i- Bundle sheath,
j- Ideoblast
k- Lower epidermis
l- Stomata

Figure No.1

3. Study of Powder Drug

The powdered samples showed few polygonal parenchymatous cells (180-210µm in diameter), abundant acicular calcium oxalate crystals (350-480µm in length and 25-30µm in breadth), many simple starch grains (60-90µm in diameter), few fibres with tapering ends (470-510µm in length and 25-30µm in breadth) and thin walled rectangular epidermal cells (1100-1200µm in length and 500-510µm in breadth).

4. Physicochemical Evaluation

Table No. 2 Physicochemical analysis.

Ash values	Total ash	Not more than 27%
	Acid insoluble ash	Not more than 0.5%
	Water soluble ash	Not more than 10%
Extractive values	Alcohol	Not less than 24%
	Water	Not less than 16%
	Chloroform	Not less than 16%

5. Preliminary Phytochemical Screening

The results obtained are shown in Table No. 3

TESTS FOR PHYTOCONSTITUENTS	WE	CE	AE
Tests for Alkaloids	+	+	+
Tests for Tannines	-	-	-
Tests for Sugars	+	+	+
Tests for Proteins	-	-	-
Test for Amino acid	-	-	-
Test for Cardiac Glycosides	+	+	+
Test for Mucilage	+	+	+
Test for Saponins	-	-	-
Test for Starch	+	+	+
Test for Sterols	+	+	+
Test for Steroids	-	-	-
Test for Flavonoids	-	NA	NA
Test for Terpenoids	NA	+	NA

Key: WE – Water Extract, CE – Chloroform Extract, AE – Alcohol Extract, '+' – Present, '-' – Absent, NA – Not applicable.

6. Flourescence Analysis

Table no. 4

Sr. No.	Tests	Fluorescence at Long/Short UV
1	Drug + Nitrocellulose	Light yellowish green
2	Drug + 1N NaOH(M)	Light yellowish green
3	Drug + 1N NaOH (M) + Nitrocellulose	Light yellowish green
4	Drug + 1N NaOH (Aq.)	Light yellowish green
5	Drug + 1N NaOH (Aq.) + Nirocellulose	Light yellowish green
6	Drug + 1N HCl	Light Green
7	Drug + 1N HCl + Nitrocellulose	Light yellowish green
8	Drug + 1N HNO_3	Light yellowish green
9	Drug + 1N H_2SO_4	Light yellowish green

RESULTS AND DISCUSSION

Morphologically bulbs of *Urginea indica* and *Scilla indica* were found to be almost similar except for their size. *U. indica* bulbs were bigger than the bulb of *S. indica*. All the anatomical features of transverse sections of *U. indica* bulb are matching with *S. indica*. [20] Alcohol extractive value of *S. indica* closely matches with the extractive value of *U. indica*. [21] Preliminary phytochemical investigation gives the general idea of chemical composition of the crude drug. The secondary metabolites of *S. indica* were found to be almost same like that of *U. indica*. The sterols were detected only in *S. indica* while flavonoid found only in *U. indica*. [22] Cardiac glycosides responsible for pharmacological action of *U. indica* were also found in bulbs of *S. indica*.

CONCLUSION

In crude drug market, morphological characteristics help in identifying the plant drug in whole form while microscopy is essential in confirming the authenticity in broken form of drug. Physicochemical constants like ash values, extractive values, fluorescence analysis along with the powder study become useful to prove genuity of the powdered drug, as these are very specific characteristics. Through the present work, sufficient data has been generated which may prove its applicability in quality control of crude drug of *S. indica.*

The comparative study of both the plants showed many external and internal similarities. Hence it has been confirmed that *S. indica* is not an adulterant for *U. indica* and it can be used as a substitute. *U. indica* Kunth and *S. indica* Baker are monsoon ephimerals of family Liliaceae. Among these, *S. indica* Baker has wide distribution and frequent occurrence compared to *U. indica*. If *S. indica* is used as a substitute, it may solve the problem of shortage of crude drug of *U. indica*, so also will reduce the marketed price of the same. The similar phytochemical characteristics and alcohol extractive values of the said plants can be of pharmacological interest. They indicate possibility of analogous pharmacological action of *S. indica* like that of *U. indica*. However the detail phytochemistry and pharmacology are necessary to confirm the potency of the *Scilla indica* crude drug and can be an extension of this work.

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REFERENCES

1. Bashir S, Abbas S, Khan A, Gilani AH. Studies on bronchodilator & cardiac stimulant activities of *U. indica*. Bangladesh Journal of Pharmacology, 2013; 8: 249-254.
2. Rathabai V, Baskaran C, Shivmani. Phytochemical analysis & In-vitro antimicrobial activity of *Urginea indica*. Journal of Pharmacognosy & Herbal Formulations, 2012; 2(10): 6-12.
3. Kapoor LD. Hanbook of Ayurvedic Medicinal Plants. Boca Raton; CRC publications: 2005, pp.328.
4. Kar A. Pharmacognosy & Pharmacobiotechnology. New Delhi; New age international publishers: 2003, pp.176.
5. Anonymous. The Wealth of India (Raw Materials). Vol IX and X, New Delhi; Publication & information Directorate, CSIR, 1991; 256-257: 416-418.
6. Gokhale SB. Textbook of Pharmacognosy. Pune; Nirali Prakashan, 1979; 195.
7. Miller LG, Pharm D, Wallace BCPs, Murray Ph.D. Herbal Medicines. New Delhi; Viva Books Ltd., 2005; 312.
8. Dewick PM. Medicinal natural products. UK; Wiley publication, 2001; 252.
9. Qadry JS, Shah CS. Textbook of Pharmacognosy. Ahmedabad; B.S. Shah Prakashan: 1990; 74-78.
10. Kumavat U, Shimpi S. Pharmacognostic studies of the *Costus pictus* D.Don. Journal of Herbal medicine and Toxicology, 2009; 3(1): 127-130.
11. Mukherjee PK. Quality Control of Herbal Drugs - An Approach to evaluation of Botanicals. New Delhi; Business Horizons Pharmaceutical Publishers, 2002.
12. Trease GE, Evans WC. Pharmacognosy. 15th ed, Edinburgh London; Harcourt brace & Co. Asia, Pvt. Ltd., W.B. Saunders Company Ltd., 2002.
13. Anonymous. The Ayurvedic Pharmacopoeia of India. Government of India, Ministery of Health & Family Welfare, Vol. I, New Delhi; The Controller of Publications, Civil Lines: 2001.
14. Khandelwal KR. Practical Pharmacognosy. 5th ed, Pune; Nirali Prakashan, 1998.
15. Wallis TE. Practical Pharmacognosy. 5th ed, London; J & A Churchill Ltd., 1984.
16. Brain KR, Turner TD. Practical evaluation of Phytopharmaceuticals. Bristol; Wright Scientechnica, 1975.
17. Harborne JB. Phytochemical Methods. Chapman & Hall International Edition, Japan; Toppan Company Ltd., 1973.

18. Kokoski CJ, Kokoski RJ, Salma FJ. Fluorescence of Vegetable Powdered Drugs under Ultra-Violet Radiation. Journal of American Pharmaceutical Association (Sci.Ed.), 1958; XLVII(10): 715-717.
19. Chase CR (Jr.), Pratt R. Fluorescence of Powdered Vegetable Drugs with Particular Reference to Development of a System of Identification. Journal of the American Pharmaceutical Association (Sci.Ed.), 1949; 38: 324-331.
20. Kokate CK. Practical Pharmacognosy. Delhi; Vallabh Prakashan, 1999.
21. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 7th ed, Pune; Nirali Prakashan, 1999; 251.
22. Kameshwari MN. Chemical constituents of wild onion *Urginea indica* Kunth Liliaceae. International Journal of Pharmacy & Life Sciences, 2013; 4(2): 2414-2420.