

**ANALYTICAL STUDY OF BAKUCHI *Psoralea corylifolia* LINN****KUSHWAHA ALKA<sup>1</sup>, BANI SHASHIKALA B<sup>2</sup>**

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**ABSTRACT**

*Bakuchi (Psoralea corylifolia Linn.)* is a well-known drug which can be used in various diseases like *shvitra, kustha, kandu, jwara, swasa, kasa, prameha* etc. A large number of medicinally important chemicals present in it. This study has been undertaken to analyze the genuine drug comparing with the standard values mentioned in Ayurvedic Pharmacopoeia of India. Genuine *Bakuchi (Psoralea corylifolia)* seeds were procured from an authentic dealer and duly identified. Seeds were subjected for preliminary phytochemical analysis. *Bakuchi (Psoralea corylifolia) beeja taila* prepared as per the classics in pharmacy. Physico-chemical analysis of *Taila* was done. Observation and result of the analysis were recorded properly in the tabulated form.

**Keywords:** *Bakuchi*, preliminary phytochemical analysis, physico-chemical analysis, *beeja taila*, observation & result.

**INTRODUCTION**

Nature has been source of medicinal agents for thousands of years and a striking number of modern drugs have been isolated from natural source, many based on their use in traditional medicines or phytomedicines. Plants are one of the important sources of medicine. The medicinal plants are rich in secondary metabolites (which are potential sources of drugs) and Essential oils of therapeutic importance<sup>1</sup> *Bakuchi (Psoralea corylifolia Linn.)* is a well-known drug, which can be used in various diseases i.e. *swasa, kasa, jwara, prameha* etc but mainly in the diseases like *shvitra, kustha* etc<sup>(2-12)</sup>. *Bakuchi* is botanically identified as *Psoralea corylifolia linn.*<sup>13</sup>, is popular for its *kusthaghna* as well as *vata shamaka* property. It is described in ayurveda with several synonyms describing its qualities. Quality of

a product is ensured only when it is analyzed extensively with scientific parameters. Even though classical references are available quality testing may not be sufficient in modern era of standardization. In the present study sincere effort was done in this direction.

**AIMS & OBJECTIVES**

1. Microscopic study of *Bakuchi beeja*.
2. To evaluate powder microscopy of *Bakuchi beeja*
3. Preliminary phytochemical analysis of *Bakuchi beeja*
4. Preparation and analytical study of *Bakuchi beeja taila*.

**MATERIALS & METHODS (14, 15)**

Genuine *Bakuchi (Psoralea corylifolia)* seeds were purchased from an authentic dealer and were taken for preparation of *taila*. The seeds are cold pressed under very high pressure and *taila* was

Prepared Genuine seeds were subjected for organoleptic examination, based on colour, odour, taste & appearance of cut surface and Microscopic study. The tests conducted were:

**ORGANOLEPTIC STUDY<sup>13</sup>**

1. Powder microscopic study
2. Powder behavioral study
3. Fluorescence study
4. Histological study
5. Particular cell study

**PHYSICO-CHEMICAL ANALYSIS<sup>13</sup>**

1. Estimation of Foreign Matter
2. Estimation of Total Moisture Content or Loss on Drying
3. Estimation of Total Ash Value
4. Estimation of Acid Insoluble Ash
5. Estimation of Water Insoluble Ash
6. Estimation of Sulphated Ash
7. Estimation of Fixed Oil
8. Estimation of Volatile Oil

**PHYTO-CHEMICAL STUDY<sup>13</sup>**

1. Water soluble extract
2. Ethanol soluble extract
3. Test for Carbohydrates
4. Test for Glycosides
5. Test for Proteins
6. Test for Amino acids
7. Test for Tyrosine
8. Test for Cysteine
9. Test for Starch
10. Test for Salts
11. TLC Study

**OIL STUDY<sup>13</sup>:** For study of oil following tests were done

1. Determination of Saponification value
2. Determination of Specific Gravity
3. Determination of Acid Value
4. Test for Rancidity
5. Solubility Test: done in Alcohol, Water, Petroleum Ether, Acetone, Methanol

**OBSERVATIONS & RESULTS OF ANALYTICAL STUDY:**

**Table1: Organoleptic Characteristics of Bakuchi beeja**

Characters		Value
Measurement of Seeds	Length	3-4mm
	Breadth	2mm
	Weight	0.010mg
Shape		Partially kidney shaped, oval, Compilotropous
Colour		Black
External Surface	Texture	Hard and rough seeds
	Fracture	Not Applicable
	Smell	Strong pungent
	Taste	Bitter

**Table2: Powder Microscopic Study**

Reagents added	Observed Microscopic Features
Dil. HCl+ Phloroglucinal	Stone cells, vessels, spindle like fibers
Sudan red Sol+ water	Oil stains (red colour)
Iodine solution	Aurolin grains (proteinous)

**Table3: Powder Behavioral Study**

Acids added with powder	Change in colour
Conc. HCl	Light brown

Conc. H <sub>2</sub> SO <sub>4</sub>	Burgundy
Conc. HNO <sub>3</sub>	Red brick
H <sub>2</sub> O	No change
Ethanol	Light brown
Methanol	Dark brown

**Table4: Fluorescence study**

Colour shown by powder when treated with	Nature of light		
	White light	Short wave (250nm)	Long wave (365nm)
Conc. HCl	Light Brown	Dark brown	Black
Conc. HNO <sub>3</sub>	Red Brick Colour	Yellow colour	Fluorescent
Conc. H <sub>2</sub> SO <sub>4</sub>	Burgundy colour	Black	Black
H <sub>2</sub> O	No change	-	-
Ethanol	Light brown	Yellowish brown	Dark brown
Methanol	Dark brown	Dark violet	Black

**HISTOLOGICAL STUDY:** The cross section of the seed showed testa, embryo, cotyledon, tegmenta membrane, endosperm, outer testa and inner testa.

**Table5: Particular Cell Study**

Acids	Observed cells
Conc.HCl+heat	Pink conducting vessels, testa externa
Dil.HCl+Phloroglucinal	Pink lignified cells
Acetic acid (glacial)	Calcium oxalate crystals
SudanIII	Oil globules
Iodine sol.	Stained Aulorine grains
Picric acid	Calcium oxalate crystals

**Physico-Chemical Analysis of *Bakuchi Beeja*****Table6: Result of Physico-chemical Analysis**

Tests	Value	Tests	Value
Est. of Foreign matter	1%	Sulphated ash	7%
Total moisture content	1.5%	Fixed oil	6%
Total ash value	6%	Water soluble extract	48%
Acid insoluble ash	3%	Ethanol soluble extract	16.8%
Water soluble ash	2%	-	-

As per the known reference of *Bakuchi* it is containing very minute fraction of essential oil i.e. 0.05% (API), hence we could not get any specific essential vola-

tile oil by Clevenger's apparatus method. Thus it is suggested to follow the HPLC method to estimate the essential volatile oil in *Bakuchi*.

**Phyto-Chemical Analysis of *Bakuchi Beeja***

**Table7: Results of Phyto-chemical Study**

Tests performed by extracts of alcohol and water		
Tests for	Alcoholic extract	Water extract
Carbohydrates	+	+
Monosaccharides	+	+
Pentose sugar	+	-
Hexose sugar	+	-
Starch	+	-
Gum	-	-
Mucilage	-	-
Protein	+	-
Amino acid (tyrosine, cysteine)	+	-
Steroid	-	+
<b>Glycosides</b>		
Cardiac glycoside	+	+
Saponin glycoside	-	+
Anthroquinone glycoside	+	-
Alkaloids	+	-
Tannins	+	+
Non-reducing sugar	-	-

**Table8: Tests performed by Ash**

Salts	Test
Potassium	-
Sodium	+
Calcium	+
Carbohydrate	+
Nitrate	-
Sulphate	+
Chloride	+

**TLC:** of *Psoralea corylifolia* Seed Test solution

**R f: value**

0.25

0.34

0.41

0.49

0.62

0.67 (psoralens)

0.74

0.82

## OIL STUDY

**Table9: Results of Oil Study**

## Solubility Test for Oil

Tests	Value
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Saponification value	182.325
Specific gravity	0.9502
Acid value	2.131
Rancidity	Light pink

**Table10: Result of Oil Solubility test**

Solution	Oil solubility
Alcohol	Partially dissolved
Water	Insoluble
Petroleum ether	Completely dissolved
Acetone	Completely dissolved
Methanol	Insoluble

## DISCUSSION

The *Bakuchi* is botanically identified as *Psoralea corylifolia* which is described widely in ayurveda. To understand the *Bakuchi* chemically, analytical study has been carried out and revealed following. Organoleptic parameters are even though simple, gives very useful information regarding the quality of the product. *Bakuchi* seed showed 3-4 mm length, 2mm breadth and 0.010mg weight, partial kidney shape, oval, compilotropous and black in color with hard and rough texture, strong pungent smell due to presence of fixed oil and bitter in taste.

Microscopic evaluation allows more detailed examination of a drug and it can be used to identify the organized drugs by their own histological characters for qualitative evaluation in its entire or powdered form. Microscopically, its powder contains stone cells, vessels, spindle like fibers, oil stains and aurolin grains. Seeds have testa, embryo, cotyledon, tegmenta membrane, endosperm, outer testa and inner testa. Particular cell study showed pink conducting vessels and testa externa, pink lignified cells, Calcium oxalate crystals, oil globules and stained aurolin grains.

Seed powder behavioral study showed change in the natural color of the powder when treated with different chem-

icals ruling out the presence of any adulterants. When the powder was treated with conc. HCl it showed change in light brown color, conc. H<sub>2</sub>SO<sub>4</sub> changed color to Burgundy, conc. HNO<sub>3</sub> red brick, when added water it showed no change in its natural color while ethanol and methanol changed to light brown and dark color respectively.

The color of the powder was observed in UV chamber, as it is the UV and visible light absorption technique to encompass the analytical method based on measurement of light absorption by the powder in the wave length region from 190-900nm. Absorption in the UV visible region arises from electronic transitions within the molecule. In white light, short wave (250nm) and long wave (365nm) powder showed its natural color while those powder samples which were treated with different chemicals showed variations in their color.

Physico-chemical analysis revealed the ash values and extract values of seed powder. 1% of foreign matter showed good quality of purchased seeds while 1.5% of total moisture content showed that due to dry whether the moisture content is low. Total ash 6%, Acid insoluble ash 3%, water soluble 2%, sulphated ash 7% and fixed oil about 6% all

the parameters were approximately equal to that of standard values mentioned in API. Ash showed the presence of sodium, calcium, sulphate and chloride salts with carbohydrates. The extraction value of the seed powder in water and alcohol is 48% and 16.8% respectively. The alcoholic extract showed presence of carbohydrates, sucrose, starch, proteins, glycosides, alkaloids and tannins.

The chemical compositions were mainly found in alcohol and water soluble extracts and the important ones are alcohol soluble. Hence the formulation of *Bakuchi* is based on *taila* or *sneha* rather than *kashaya*. The preparation of oil was done from the *Bakuchi* seeds at pharmacy by cold compression method since the contact of heat may cause evaporation of volatile oil (0.05%) present in the seeds. To ensure the quality of oil prepared it was undertaken for different tests. Oil showed saponification value 182.325, specific gravity 0.9502, acid value 2.13 and light pink rancidity. This oil was completely dissolved in petroleum ether and acetone, partially dissolved in alcohol and insoluble in water and methanol.

## CONCLUSION

- Naturally occurring medicinal plants are medicinal agents used in many disorders. *Bakuchi* is one such drug with multidimensional medicinal actions curing many diseases.
- Medicinal value of *Bakuchi* ranges varyingly by its different parts. Its seeds are used chiefly in skin disorders (*kustha* etc.) with infectious origin.
- As per the classical literature the reason for the antimicrobial effect of *Bakuchi beeja* is possible by the property of *tikta*, *katu* and *kashaya rasa*, *katu*

*vipaka* and *ushna*, *ruksha*, *laghu guna*.

- Analytical study showed the presence of effective chemicals devoid of toxicity suggests the drug to be safer and its use in proper dosage makes it a valuable and significant drug to be used in different diseases thus *Bakuchi beeja* is safer to use. It is therapeutically efficacious, cost effective and easily available which can be considered as drug of choice in varied clinically infectious cases.
- This study seems very much fruitful in the scenario of multiple drug resistant therapies, since this drug is proved to be acting in various infectious diseases without any side effect, due to all the attributes present in it. Analytical study of the drug revealed the active constituents present in it were solely responsible for the different therapeutic actions of this drug. Also proves the efficacy of the drug which was mentioned by ancient *acharyas* in their texts.

## REFERENCES

1. www.elsevier/locate/apjtbon15.2.2013
2. Acharya Agnivesha, Charaka Samhita, Shri Chakrapanidutta teeka Ayurveda dipika Vyakhya, utterardha, chikitsa sthana, adhyaya7, sloka no.169-171, edited by Yadavji Trikamji Acharya, ed.reprint2011.Varanasi:Chaukhambha Prakashan ; 2011.p.458.
3. Maharshi Sushruta, Sushruta Samhita, Nibandha Sangraha Vyakhya, chikitsasthana, adhyaya-9, sloka 10, 21, 37. Dalhana editor. Reprint Ed. 2012. Varanasi: Chaukhamba Sanskrit Sansthana; 2012. p. 443.
4. Vagabhatta, Astang Hridaya, Sarvang Sundari Vyakhya & Ayurveda Rasayana Teeka, Chikitsa sthana,

- adhyaya19, sloka53. Arundutta & Hemadri editor. Reprinted.2011. Varanasi: Chaukhambha Sanskrit Sansthana; 2011.p.715.
5. ShriMada Bhav Mishra, Bhav Prakash Nighantu, poorvardha, haritakyadi varga, sloka 206-209, Varanasi: Chaukhambha Sanskrit Bhawan, 11<sup>th</sup>ed.2007.p.123.
  6. Shri Govind Das, Bhaisajya Ratnavali, Hindivyakhya, Adhyaya 54, kustharog chikitsa prakarana, sloka 9,12,41,42,47,55-57,67-70,73,312-314,315-320, Shri Rajeshwar DuttaShastri editor, 16<sup>th</sup>ed. Varanasi: Chaukhambha Sanskrit Sansthana; 2002. p. 637.
  7. Data Base On Medicinal Plants Used In Ayurveda. vol.2, P.C.Sharma, M.B. Yelne & T.J.Dennis editors. Reprint 2005. New Delhi: Documentation and Publication Division CCRAS; 2005 .p . 89.
  8. Bapalal G. Vaidya, Nighantu Adarsh, poorvardha, vol.1, 1<sup>st</sup>ed.Varanasi: Chaukhambha Bharati Academy; 1968.p.417
  9. Vaidya Bhagwan Dash, Materia Medica of Ayurveda (Based on
- Madanapala Nighantu), Abhayadi varga. reprint1994. New Delhi: B.Jain Publishers Pvt. Ltd.; 1994 .p.81.
  10. Kaiyyadeva, Kaiyadeva Nighantu, aushadhi varga. Editor Acharya Priya Vrata Sharma. 1<sup>st</sup>ed.1979. Varanasi: Chaukhambha Orientalia; 1979. p.131
  11. Divo Das Dhanwantari, Dhanwantari Nighantu, Guduchyadi varga-prathama varga, Editor Acharya P.V. Sharma. 3<sup>rd</sup>ed Varanasi: Chaukhambha orientalia; 2002.p.46.
  12. Shri Nara Hari Pandit, Raj Nighantu, satavhyadi varga, sloka 62-65. 2<sup>nd</sup>ed. Varanasi:Krishna, Das Academy; 1998. p.73.
  13. The Ayurvedic Pharmacopoeia of India, Part1, Vol.1, 1<sup>st</sup>ed, Delhi: The Controller of Publications; 2004. p.31
  14. S. B. Gokhale, Dr. C. K. Kokate, Practical pharmacognosy, 16<sup>th</sup>ed. Pune: Nirali Prakashana; 2014. p.13-19
  15. Khandelwal K.R., Practical Pharmacognosy, 19<sup>th</sup> ed., Pune: Nirali Prakashana; 2008.p. 149-161.

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