

PHARMACEUTICO ANALYTICAL STUDY OF UDAYABHASKARA RASA

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ABSTRACT

Udayabhaskara rasa is an eccentric formulation which is favourable in the management of *Amavata*. Regardless of its betterment in the management of *Amavata*, no research work has been carried out till date. The main aim of this study was preparation of *Udayabhaskara Rasa* as disclosed in the classics & Physico-chemical analysis of *Udayabhaskara Rasa*. *Udayabhaskara Rasa* was processed using *Kajjali*, *Vyosha*, *dwikshara*, *pancha lavana*, *jayapala* and *beejapoor* *swarasa*. The above ingredients were mixed to get a homogenous mixture of *Udayabhaskara Rasa* which was given 1 *Bhavana* with *beejapoor* *swarasa* and later it is dried and stored in air-tight container. The Physico chemical analysis of *Udayabhaskara Rasa* before (*UB-BB*) and after *bhavana* (*UB-AB*) was done.

Keywords: *Udayabhaskara Rasa*, XRD, FTIR, SEM-EDAX.

INTRODUCTION

Rasashastra is a branch of *Ayurveda* which deals with metallo-mineral preparations aimed at achieving *Lo-havada* & *Dehavada*. These preparations became acceptable due to its assimilatory property in the minute doses. There are mainly 4 *Rasa Kalpas* namely *Khalviya*, *Parpati*, *Pottali* & *Kupipakwa Rasayana*. *Udayabhaskara Rasa*¹(*UB*) is one such *Khalviya rasayana* mentioned in the classics which have a distinct method of preparation than any other formulation that is beneficial in the management of *Amavata*². There are numerous formulations in the name of

Udayabhaskara Rasa. In the present study the formulation is taken from the text *brihat nighantu ratnakara*. The analytical study reveals the chemical composition of the formulations as well as their concentration. By this it helps to ensure safety limits and accuracy of the drug. Physico-chemical analysis of the drugs is carried out by using current analytical methodologies for understanding and interpretation of physico-chemical changes occurring during and after pharmaceutical processing. The Physico chemical

analysis of *UdayabhaskaraRasa* before *bhavana* (UB-BB) and after *bhavana* (UB-AB) was done.

MATERIALS AND METHODS

Pharmaceutical stride involved in preparation of *UdayabhaskaraRasa*:

1. Extraction of *parada* from *hingula* by *hingulottha parada* method³.
2. *Shodhana* of *jayapala* by *swedana* in *dolayantra* with *godudha* for 3hrs and then

3. Preparation of fine powder of other ingredients.
4. Preparation of homogenous mixture of *Udayabhaskara Rasa* ingredients.
5. Adding *beejapooraa swarasa* and doing *bhavana* till it dries completely.

Table1: Table showing list of drugs with Quantity

Sl no	Drug Name	Quantity
1.	<i>Shuddha Parada</i>	1 part
2.	<i>Shuddha Gandhaka</i>	1 part
3.	<i>Shuddha Tankana</i>	1 part
4.	<i>Shuddha Jayapala</i>	1 part
5.	<i>Trikatu</i>	1 part each
6.	<i>Yavakshara</i>	1 part
7.	<i>Sarjakshara</i>	1 part
8.	<i>Panchalavana</i>	1 part
9.	<i>Beejapooraa swarasa</i>	Q. S

Procedure:

METHOD OF PREPARATION- Add 1 part of *Shuddha Parada* and *Shuddha Gandhaka* in a *khalvayantra* and triturate till *kajjali siddha lakshanas* are obtained. *Shuddha tankana* is added followed by *yavakshara* and *sarjakshara*, *lavana*, *trikatu*, *jayapala* and prepare a homogenous mixture. *Bhavana* with *beejapooraka swarasa* is given for 1 time. The obtained drug is collected and stored in an air tight container.

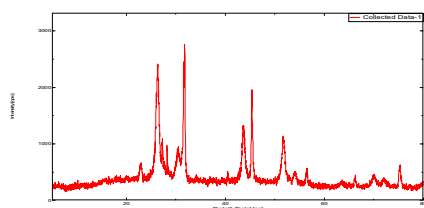
Observations:

Mixing of *kajjali* and *jayapala churna*, took 2 hour and the mixture was black in colour. Mixing of *pancha lavana* took 1 hour. The colour of mixture changed to grey. Mixing *trikatu churna* took 1 hour. The colour of mixture changed to brownish black colour with irritating pungent odour., Mixing of *dwi kshara* took 1 hour and colour of mixture changed to blackish brown., Initially when the *matulunga*

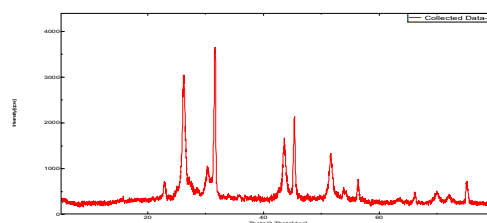
swarasa is added and as soon as *mardana* was started *UBR* became thin paste and there was very free movement of *Peshani* during *Bhavana*., After about one and half hours of *Bhavana* the paste started becoming sticky. After two hours of *Bhavana*, paste became stickier. After about three hours of *Bhavana*, the product was highly sticky, adhered to both *Peshani* and *Khalva* and it became difficult for the free movement of *Peshani* in the *Khalva*. At this there was flap of product observed while taking the product with the spoon to the centre of *Khalva*. By around 6 hours of *Bhavana*, the product completely got dried up., The colour of *UB-AB* was jet black.

XRD Results of UB-BB & UB-AB:

XRD peaks of *UB-BB* & *UB-AB* samples which were compared with standard D-space JCPDF values confirmed the presence of Meta-cinnabar (HgS) in Cubic, Sulfur (S) in Trigonal crystal system.



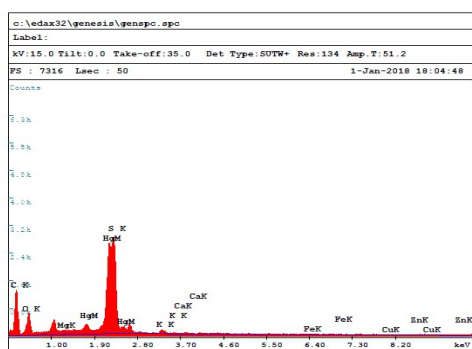
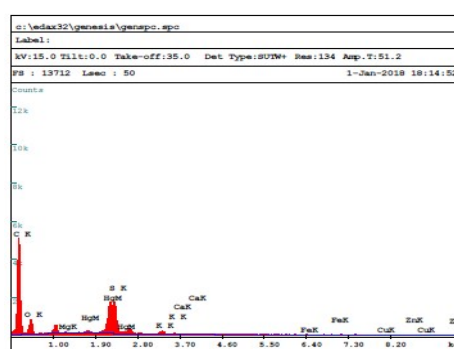
UB-BB



UB-AB

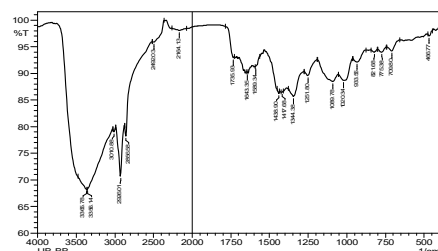
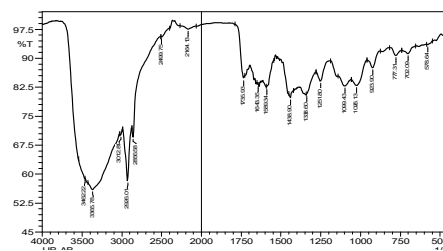
Table 2: Showing Comparative SEM-EDX results of *UB-BB* & *UB-AB*

UB-BB		UB-AB	
Element	Mass %	Element	Mass %
C	34.33	C	63.32
O	8.73	O	10.14
S	8.52	S	3.90
K	0.99	K	1.09
Ca	0.14	Ca	0.15
Fe	0.56	Fe	0.24
Cu	0.55	Cu	0.00
Zn	1.44	Zn	0.00
Mg	0.67	Mg	0.18
Hg	44.06	Hg	20.97

*UB-BB**UB-AB***FTIR:**

FTIR analysis shows that *UB-BB* contains functional groups like alcohol, amines, amide, phenol, acid, carboxylic acid, azide, isothiocyanate, aldehyde, aromatic groups, and conjugated anhydride. FTIR analysis

shows that *UB-AB* contains functional groups like alcohol, amine, amide, phenols, alkynes, acid, aldehyde, aliphatic, aromatics, nitro compounds, alkane, sulfone, fluoro.

*UB-BB**UB-AB***Particle Size Results****Table 3:** Showing result of Particle Size of kajjali, R.B-B.B, *UB-AB*

Sample	Mean diameter(nm)	Standard error	Effective diameter(nm)
<i>Kajjali</i>	339.1	9.7	338.1
<i>UB-BB</i>	464.7	19.3	462.0
<i>UB-AB</i>	322.2	12.7	321.7

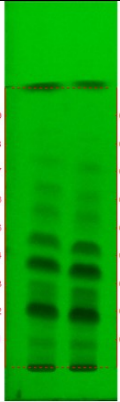
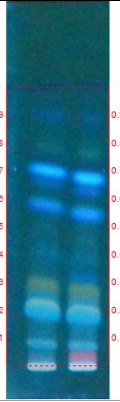
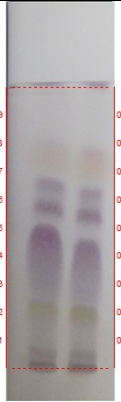
HPTLC**Table 4:** Showing R_f Values Of Samples UB-AB, UB-BB At 254nm & 366 nm

Short UV		Long UV	
UB-AB	UB-BB	UB-AB	UB-BB
-	-	0.05 (F. blue)	0.05 (F. blue)
0.08 (Green)	0.08 (Green)	0.08 (F. blue)	0.08 (F. blue)
0.19 (D. green)	0.19 (D. green)	0.19 (F. blue)	0.19 (F. blue)
0.27 (Green)	0.27 (Green)	0.27 (F. blue)	0.27 (F. blue)
0.32 (Green)	0.32 (Green)	0.32 (F. blue)	0.32 (F. blue)
0.35 (D. green)	0.35 (D. green)	-	
-	-	0.39 (F. blue)	0.39 (F. blue)
0.45 (D. green)	0.45 (D. green)	0.45 (F. blue)	0.45 (F. blue)
-	-	-	-
0.55 (Green)	0.55 (Green)	-	-
-	-	0.56 (FD. blue)	0.56 (FD. blue)
0.63 (Green)	0.63 (Green)	0.63 (FD. blue)	0.63 (FD. blue)
-	-	0.67 (FD. blue)	0.67 (FD. blue)
0.72 (Green)	0.72 (Green)	-	-
-	-	0.76 (F. green)	0.76 (F. green)
0.82 (Green)	0.82 (Green)	-	-
-	-	0.90 (F. blue)	0.90 (F. blue)

Table 5: Showing R_f Values Of Samples UB-AB, UB-BB after derivatisation

Post derivatisation	
UB-AB	UB-BB
0.05 (Purple)	0.05 (Purple)
0.21 (Green)	0.21 (Green)
0.48 (Purple)	0.48 (Purple)
0.55 (Purple)	0.55 (Purple)
0.63 (Purple)	0.63 (Purple)
0.76 (Purple)	0.76 (Purple)

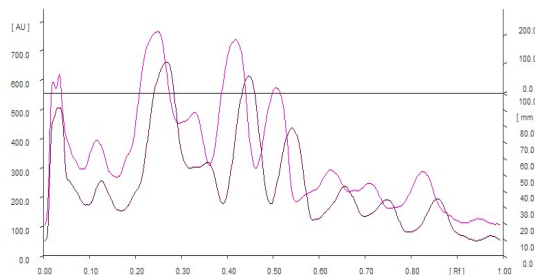
HPTLC photodocumentation of Ethanol extract of sample of UB-AB and UB-BB

		
Short UV at 254nm	Long UV at 366nm	Post derivatization At 620nm

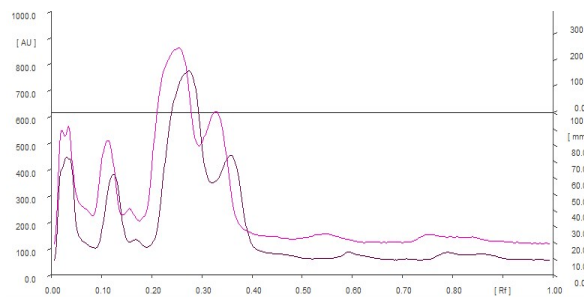
Track 1: UB-AB - 5 μ l, Track 2: UB-BB - 5 μ l

Solvent system- Toluene: Ethyl acetate (7.0: 1.0)

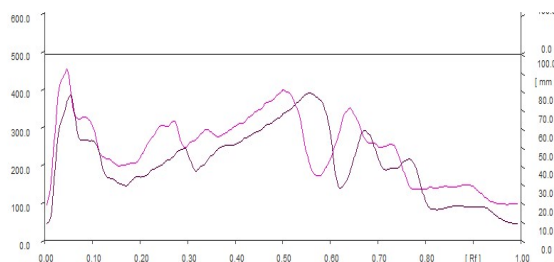
3-D Display of sample



At 254nm



At 366nm



At 620nm

Sample ID	Color
UB-AB	Dark Purple
UB-BB	Bright Pink

DISCUSSION

Angle 2θ of Metacinnabar (26.27,30.42,43.56,51.58,54.06,69.76,71.85) is approximately matching with Angle 2θ the of UB-BB. (26.3843, 30.3388, 43.682, 51.7296, 54.03, 69.9431, 71.92) respectively. Angle 2θ of Metacinnabar (26.33,30.50,43.67,51.71,72.04,54.20) is approximately matching with Angle 2θ the of UB-AB. (26.2355,30.30,43.551,51.6804,72.087,53.97) respectively. These peaks of UB-BB & UB-AB the sample which were compared with standard Angle 2θ JCPDF values confirmed that the presence of Cinnabar (HgS) in Cubic crystal system,

DISCUSSION ON SEM-EDX- The reduction in major elements S, Hg and increase in C, O is due to the addition of organic matter during *bhavana*, Apart from that these may be due to organic compounds which were used for pharmaceutical procedure or these elements might have got imparted due to the minor contaminations during various processes like *Shodhana* and *Bhavana*. The additional elements are in trace level i.e. below permissible limits. Hence the drug can be considered as safe.

Discussion on FTIR:

FT-IR Analysis of UB-BB and UB-AB Shows that they contains Organic Compounds with functional groups like Alcohol, Phenols, Primary -secondary amines and amides, Carboxylic acids, Alkanes, Alkenes, Ester, Anhydride, Sulfones, sulphates, Sulfonamides, Aromatics, Chloride, Fluoride. All other functional groups might be present in the herbal ingredients of the formulation.

Discussion on Particle Size by ZETAPALS: Particle size is one of the factors which will affect dissolution and absorption of drug. Particle size and surface area are inversely proportional to each other, as particle size decreases surface area increases. This leads to increase in dissolution of drug and rapid absorption is measure of rate of solution. Here in case of UB-AB where it contains *dwi kshara*, *pancha lavana* etc drug which are readily soluble in water because of which particle size may be reduced.

Discussion on HPTLC:

HPTLC is the sophisticated analytical parameter for the evaluation of the herbal drugs. HPTLC also serves as Fingerprinting technique for identification and quantification of the herbal and herbo-mineral formu-

lations. Through HPTLC technique major phytochemical present in the drug or formulation can be estimated. It helps to find out the adulteration in the formulation and is used as a standard for the herbal compounds. The Rf values at 254nm, 10 peaks were identified at *UB.BB* which are exactly matching with 10 peaks of *UB. AB* & at 366 nm 12 peaks were identified at *UB.BB* which are exactly matching with 12 peaks of *UB.AB.*, which indicates that the drugs which were present before *bhavana* are present even after *bhavana* and even the colours are matching.

CONCLUSION

Udayabhaskara rasa is one of the *karaliya rasayana*, there are many references with variations in the ingredients method of preparation and dosage, among them *Brihat nighantu ratnakara* reference was taken for the preparation. Chemically *Udayabhaskara Rasa* is considered as a compound of meta-cinnabar, sulfur with organic compounds with their functional groups like alcohol, amine, amide, acid etc, HPTLC was also followed to get unique finger printing technology.

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