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Research Article

A ANALYTICAL STUDY OF *JAYPAL BEEJA* (*CROTON TIGLIUM* LINN.) W.S.R. TO ITS *SHODHANA* PROCESS IN *GOMUTRA* AND *GODUGDHA*

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KEYWORDS: *Shodhana*, *Jayapl Beeja*, *Croton tiglium*, Physic – chemical, TLC, HPTLC Chromatological evaluation.

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ABSTRACT

Jaypal beeja (*Croton tiglium* linn.), is classified under *Upvisha Dravya* (Semi poisonous drugs). In classical Ayurvedic pharmacopoeias it is advocated that *Shodhana* (purificatory procedures) of the *Beeja* (seeds) should be carried out before its internal administration. Though there are different *Shodhana* methods mentioned in Classics. In this study *Godugdha* and *Gomutra* and were used as media. They impact of *Shodhana* was evaluated by physico-chemical and chromatographical parameters. Chromatological evaluation of the media used (after purification) showed different Rf value. Among the 2 media used more Rf values showed in *Godugdha* media signifying more toxic removed from drug into media. Upon analyzing TLC, HPTLC and other parameter also *Godugdha* media has been proved significant purificatory media compared to *Gomutra.*

The HPTLC data interpreted for major component of this plant is Crotonoside showing major spots in the TLC and HPTLC data. At 0.8 Rf rest of the component are in traces amount.

INTRODUCTION

Jayapl is included in *Sthavar Upvisha* in *Rastarangini*[1], *Ras Ratna Samuchya*[2] and *Beeja Visha*[3] by *Acharya Shushrut*. *Jaypal beeja* has got very high therapeutic value. Many formulations are available in the classics containing *Jayapl Beeja*. *Jayapl Beeja* based Ayurvedic medicines are commonly used in conditions like *Jwara, Udararoga*[4] etc. In the present study *Jaypal Beeja* will be studied/purified by using different medias as per the classics and analysed accordingly. Whenever poisonous drugs (*Dravya*) used in medicine they need purification (*Shodhana*) before therapeutic use.

Otherwise it can be hazardous rather than beneficial. So the poisonous drugs which having higher concentration of toxin, may reduce their toxicity by the process of *Shodhana* and can be used as a medicine.

Shodhana is a process that converts the dreadful drug to a safest drug. A good definition for *Shodhana* process is given in *Ayurveda Prakasha*[5] the bad qualities those are present in the un-purified drug will be reduced or nullified after subjecting to *Shodhana* process. So *Vaidyas* should always use these *Vishas* in *Chikitsa* after proper *Shodhana* is considered as the submission of drug to different procedures are mentioned for different drugs same of them are specific to that particular drug.

For *Jaypal*, *Shodhana* has been prescribed and different methods are available for it, *Shodhana* by using *Godugdha*[6] and *Gomutra*[7] being two of them. For *Shodhana* of *Jaypal Beeja*, the *Swedan* and *Nimanjjana* procedure is done using different media like *Gomutra*, *Godugdha*. Thus, *Jayapl Beeja Shodhana* done by using different media may have different physiochemical characteristics and it will be observed and compared in this study.

AIM & OBJECTIVES

AIM

Analytical study of *Jaypal beeja* w.s.r. to its *Shodhana* process in *Gomutra* and *Godugdha.*

OBJECTIVES

1) *Shodhana* of *Jaypala beeja (Croton tiglium* Linn*.)* with *Gomutra* and *Godugdha*.
2) To evaluate the properties of *Jaypala beeja* before and after *Shodhana* (detoxification) procedure.
3) Comparing *Gomutra shodhita Jaypala beeja* with *Godugdha shodhita*.
4) Analytical study of purificatory media before and after *Shodhana*.

MATERIALS

1. Collection of *Jaypala beeja* and its authentication by pharmacognosist.
2. *Shodhana Sanskara* of *Jaypala beeja* was done by *Shodhana Dravyas* like
   i) *Gomutra* (Cow urine)
   ii) *Godugdha* (Cow milk)
3. Later on *Ashuddha* and two *Shodhit* samples were analyzed for physical and chemical parameters.

Jaypala beeja was collected from market of Bhopal city. *Beeja* cut into pieces and taken for *Shodhana* process. *Gomutra* and *Godugdha* collected from Sharda Vihar Goshaala Bhopal and used for *Shodhana*. *Shodhana Sanskara* was carried out according to *Rastarngini* and *Ayurved Prakasha*.

METHOD

***Shodhana* Procedure**

Shodhana of *Jaypala beeja* is done by two methods.

i) By *Gomutra Shodhana*

Reference-*Ayurvedprakash* (Upavishaprakarnam)

Ingredients-*Ashuddha Jaypalabeeja*-100gm *Gomutra*

Procedure

Quantity sufficient *Gomutra* taken in earthen pot and 100 gm of *Ashuddha Jaypala beeja pieces* immersed in it and the *Gomutra* should be changed daily and wait for 3 days, on fourth day take out these pieces from *Gomutra* and dried in intense sun heat.

ii) By *Godugdha Swedana*

Reference -*Rastaragini* (*Upavisha Prakarnam*)

Ingredients-*Ashuddha Jaypala beeja*-100gm *Godugdha.*

Procedure

A *Pottali* containing *Jaypala beeja* pieces was suspended in *Dolayantra* containing cow's milk and then heat will be applied for one *Yama* (3 hours), the process will be repeated for three times. In the end *Jaypalabeeja* will be washed thoroughly with water. A paste of this will be made applied over an earthen pot, so as their oily content would be absorbed to some extent. Then it will be collected and kept on blotting paper to remove still remained oily portion.

Thin Layer Chromatography

Thin layer chromatography gives information regarding chemical components present in sample. Thus, here change in the chemical composition due to *Shodhana* with respect to *Ashuddha* sample can be strained by TLC by comparing various band present.

High Performance Thin Layer Chromatography (HPTLC)

High Performance Thin Layer Chromatography is a powerful method quality suitable for qualitative and quantitative analytical tasks. Applications of HPTLC, such as a identification and quantitation of constituents, impurities, active substances, process development and optimization, process monitoring, and cleaning validation have been demonstrated. HPTLC has been reported to provide excellent separation, qualitative and quantitative analysis of wide range of compounds, such as herbal and botanical dietary supplements, nutraceuticals, traditional western medicines.[8]

OBSERVATION AND RESULTS

The obtained quantity of *Ashodhit* and *Shoahit Jaypal beeja* varies according to the media used. The analytical figures are shown in Table.

Table 1: Percentage of loss in weight due to *Shodhana* of various samples

Samples of *Jaypala Beeja*	Wt. Before *Shodhana*	Wt. After *Shodhana*	% of Loss in Wt.
Gomutra Shodhit	100 gm	89gm	11%
Godudha Shodhit	100 gm	85gm	15%

Table 2: Loss on Drying at 105⁰ C of various samples

Sample of *Jyapala beeja*	% of L.O.D.
Ashuddha	5.28
Gomutra Shodhit	7.18
Godugdha Shodhit	7.15

Table 3: Total Ash value of various sample of *Jaypala Beeja*

Sample of *Jaypala beeja*	Total Ash
Ashodhit	2.56%
Gomutra Shodhit	3.02%
Godugdha Shodhit	2.86%

Table 4: Total Acid insoluble ash of various samples of *Jaypala Beeja*

Samples of *Jaypal beeja*	Acid Insoluble Ash
Ashodhita	0.15%
Gomutra Shodhit	0.46%
Godugdha Shodhit	0.31%

Table 5: Alcohol Extractive values of various samples of *Jaypal beeja*

Sr. No.	Samples of *Jaypala beeja*	Alcohol Extractive Values
1	*Ashodhita*	7.89%
2	*Gomutra Shodhit*	9.07%
3	*Godugdha Shodhit*	13.15%

Table 6: Aqueous Extractive values of various samples of *Jaypal beeja*

Sr. No.	Samples of *jaypala Beeja*	Aqueous extractive Values
1	*Ashodhita*	7.24%
2	*Gomutra Shodhit*	4.51%
3	*Godugdha Shodhit*	5.83%

Table 7: Acid Values of Various samples of *Jaypala Beeja*

Sr.No.	Sample of *Jaypala beeja*	Acid value
1	*Ashodhita*	13.25
2	*Gomutra Shodhit*	9.61
3	*Godugdha Shodhit*	10.59

Table 8: Physico-chemical parameters of the media used for *Shodhana*

Parameters	*Gomutra*	*Godugdha*
Foreign matter (%w/w)	Nil	Nil
Alcohol-soluble extractive (%w/w)	3.156	4.268
Water soluble extractive (%w/w)	1.745	2.485
Acid Value	8.217	0.124
Loss on drying at 105°C (%w/w)	5.246	2.134

TLC Result in Various Samples

Solvent System: Chloroform: Acetone: Formic acid (75.0:16.5:8.5)

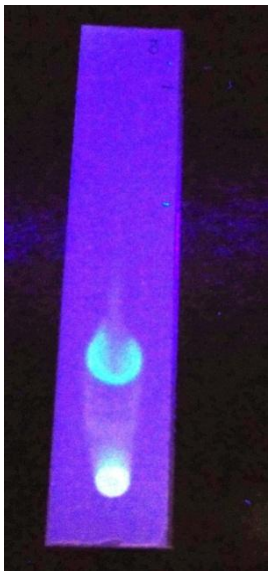
Table 9: Rf. Value of various sample in TLC result of *Jayapal beeja*

Code	Sample of *Jaypal Beeja*	No.of spots	Rf Value
1	*Ashodhit*	4	0.07, 0.120, 0.277, 0.397
2	*Gomutra shodhit*	4	0.07, 0.11, 0.21, 0.247
3	*Godugdh shodhit*	6	0.092, 0.11, 0.157, 0.197, 0.3, 0.39

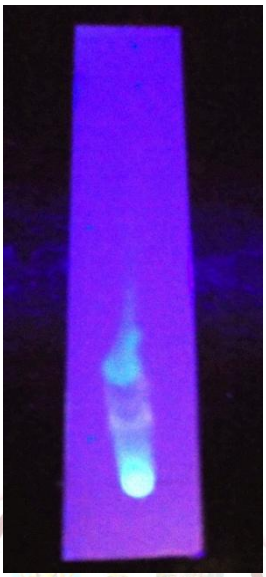
Solvent System – Chloroform: Acetone: Formic acid (75: 16.5: 8.5)

Table 10: Values of various sample in TLC result of media

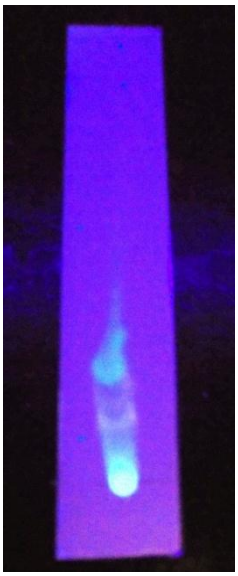
Sr. No.	Sample of media	No. of spot	Rf.value
1	*Gomutra*	1	0.94
2	After *Jaypal beeja shodhit Gomutra*	2	0.8, 0.94
3	*Godugdha*	6	0.2,0.26, 0.69, 0.84, 0.90, 0.93
4	After *Jaypal beeja shodhit Godugdha*	10	0.16, 0.23, 0.29, 0.58, 0.73, 0.78, 0.84, 0.90, 0.93, 0.96



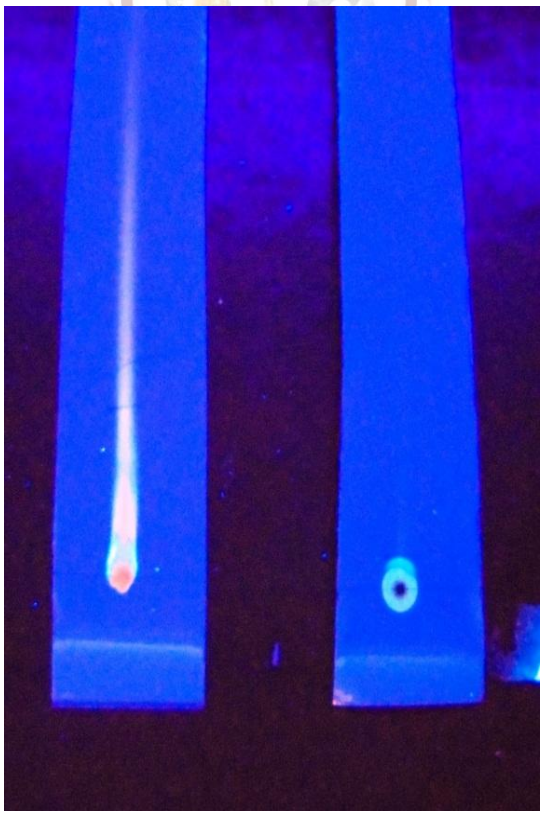
Ashodhit Jaypal beeja



Gomutra shodhit beeja



Godugdha shodhit beeja



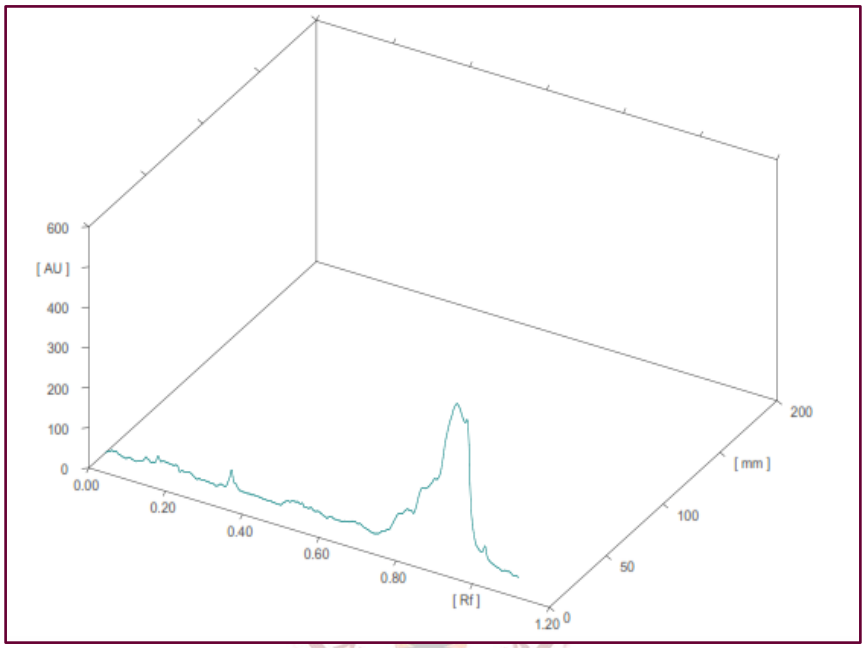
After *Jaypal beeja shodhit* media *Godugdha* and *Gomutra*

The area under the curve measured at RF 0.8 approximately.

Table 11: HPTLC Result of *Jayapal beeja* and its medias

Sample	Rf value	Area under Curve	Percentage(%) Crotonoside
Gomutra shodhit Jaypal beeja	0.8	24828	81
Godugdha shodhit Jaypal beeja	0.8	1720	8.9
Ashodhit Jaypal beeja	0.8	19210	100
After *Jaypal beeja shodhit Godugdha*	0.88	2481	12.9
After *Jaypal beeja shodhit Gomutra*	-	-	-

1) *Gomutra shodhit Jaypal beeja*



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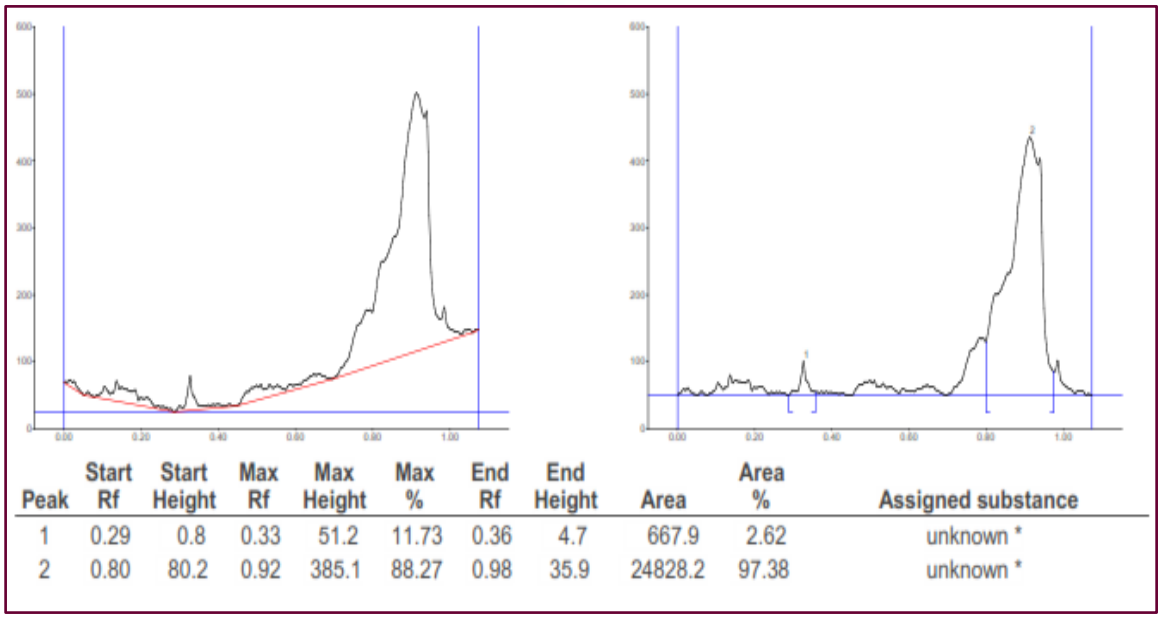
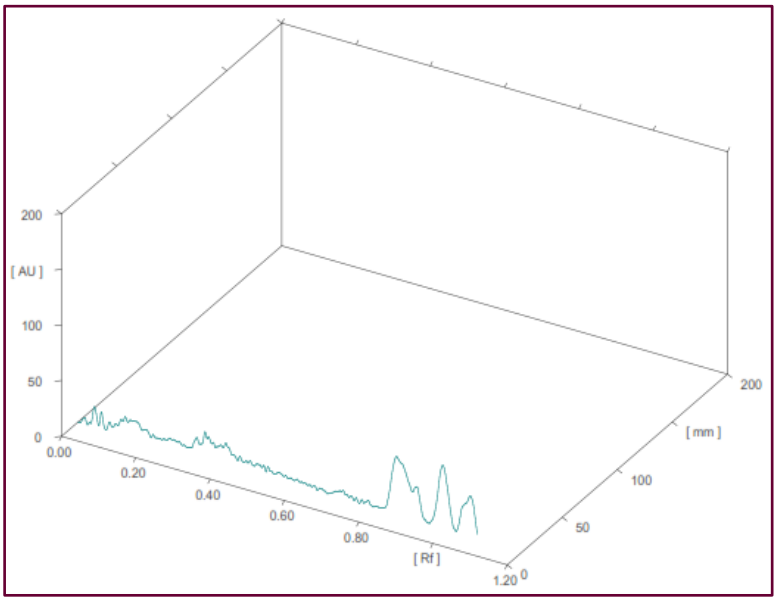


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.29	0.8	0.33	51.2	11.73	0.36	4.7	667.9	2.62	unknown *
2	0.80	80.2	0.92	385.1	88.27	0.98	35.9	24828.2	97.38	unknown *

2) *Godugdha shodhit Jaypal beeja*



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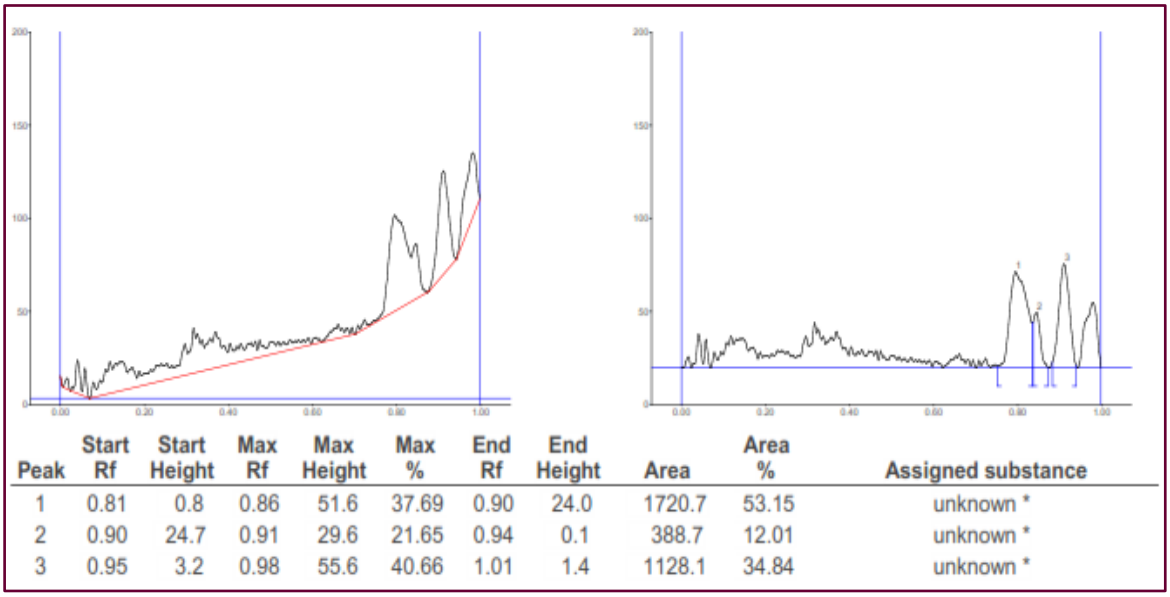
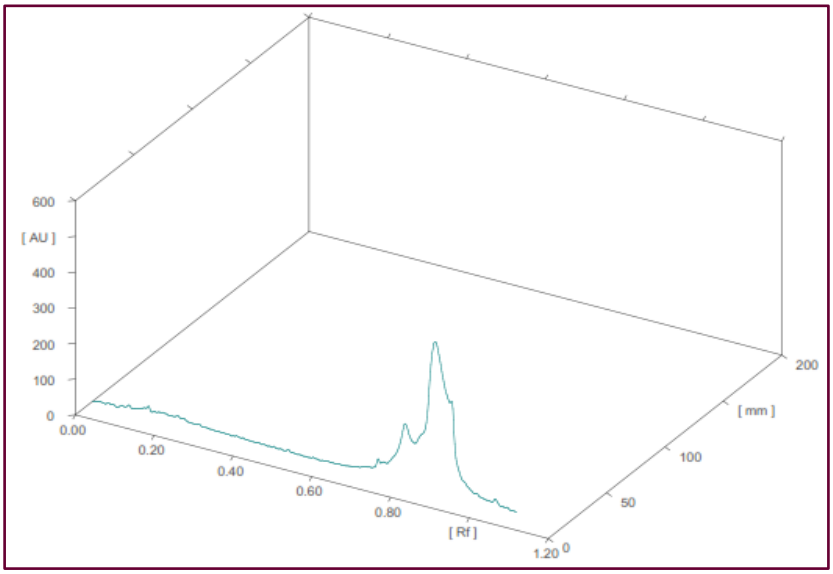


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.81	0.8	0.86	51.6	37.69	0.90	24.0	1720.7	53.15	unknown *
2	0.90	24.7	0.91	29.6	21.65	0.94	0.1	388.7	12.01	unknown *
3	0.95	3.2	0.98	55.6	40.66	1.01	1.4	1128.1	34.84	unknown *

3) *Ashidhit Jayapl beeja*



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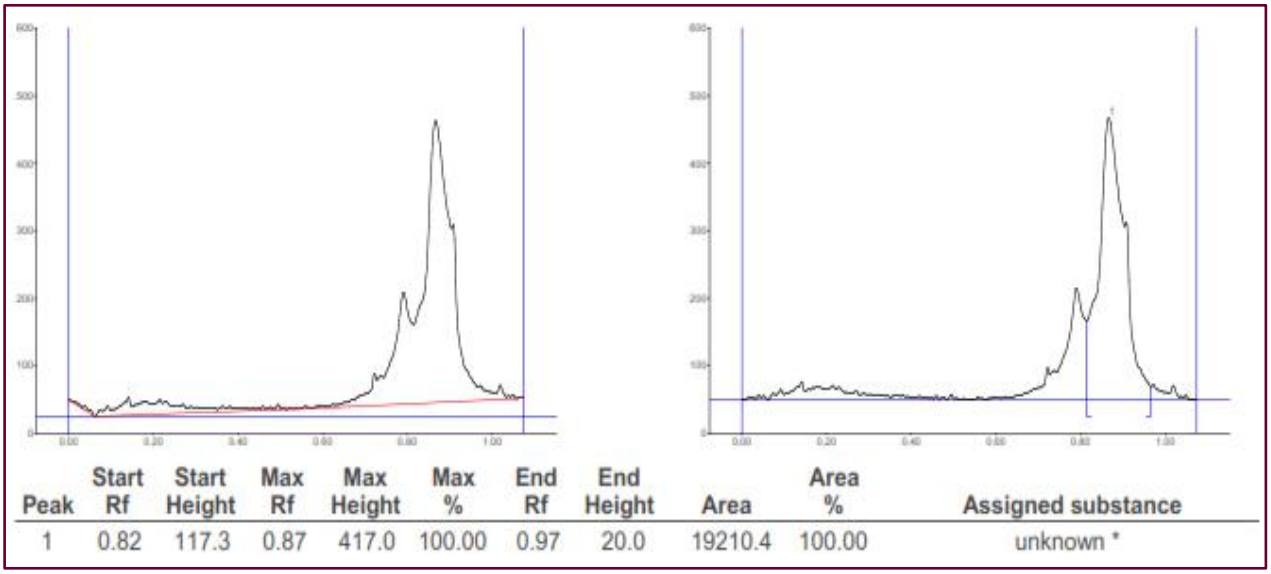
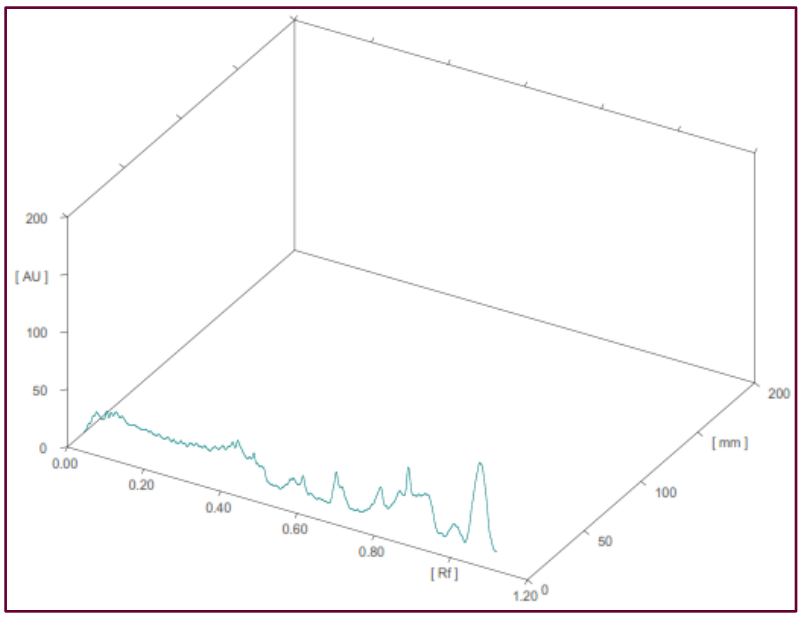


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.82	117.3	0.87	417.0	100.00	0.97	20.0	19210.4	100.00	unknown *

4) Before *shodhana Gomutra*



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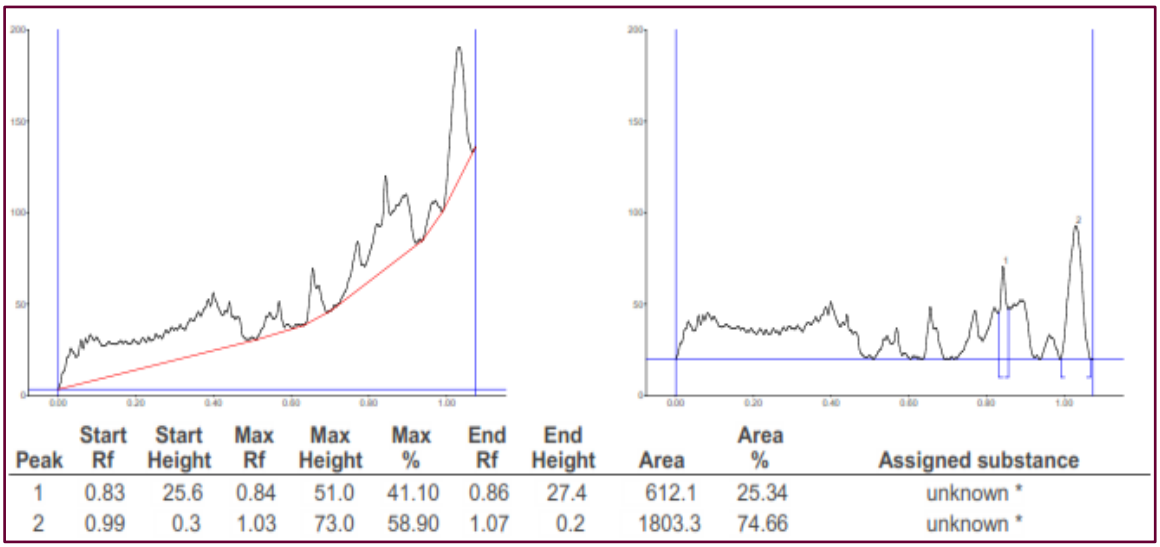
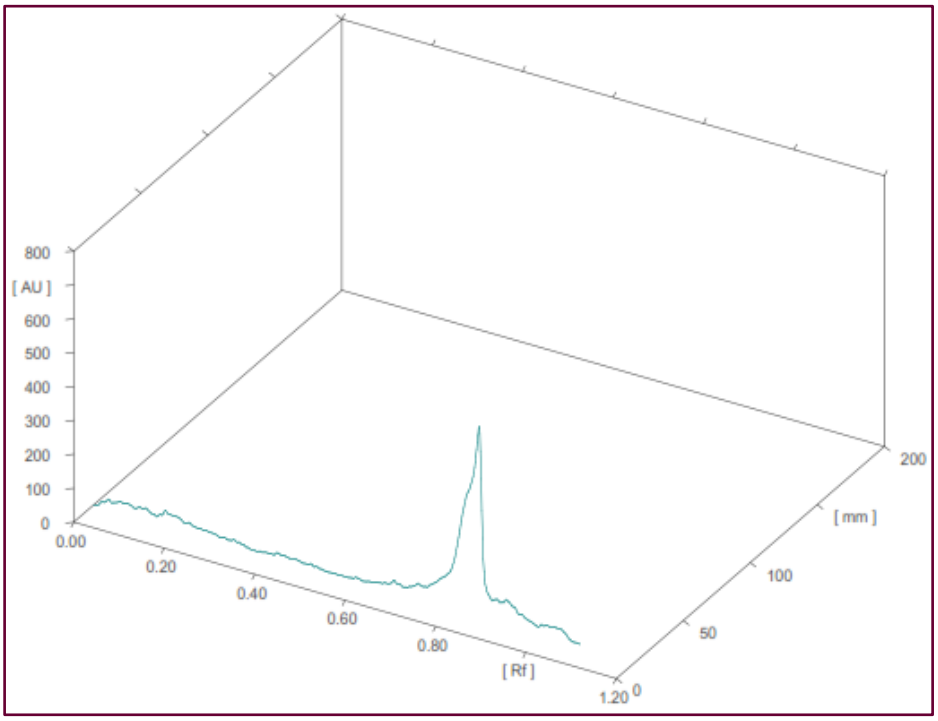


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.83	25.6	0.84	51.0	41.10	0.86	27.4	612.1	25.34	unknown *
2	0.99	0.3	1.03	73.0	58.90	1.07	0.2	1803.3	74.66	unknown *

5) Before *Shodhana Godugdha*



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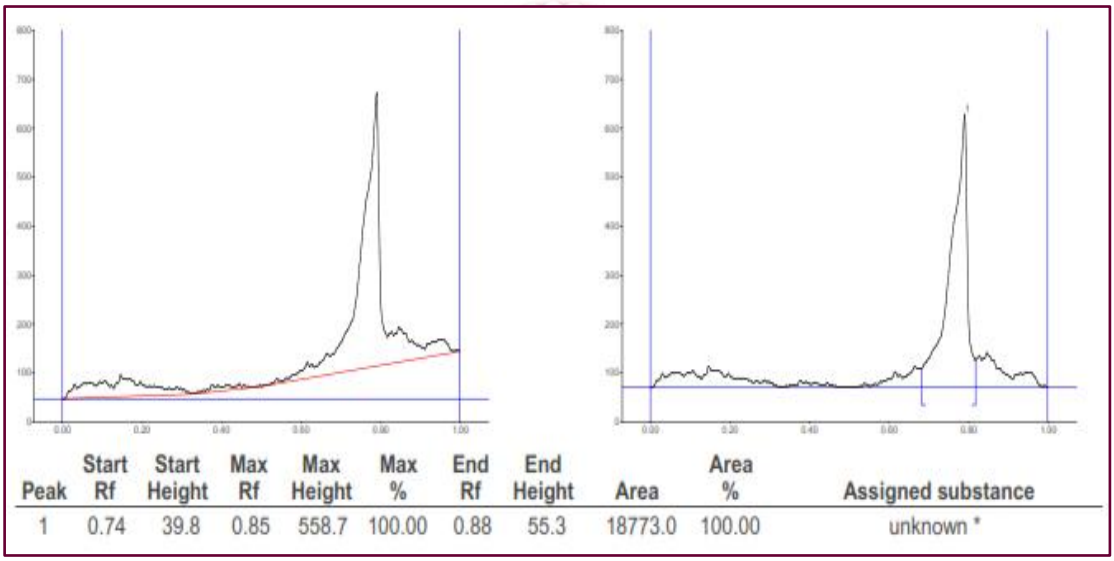
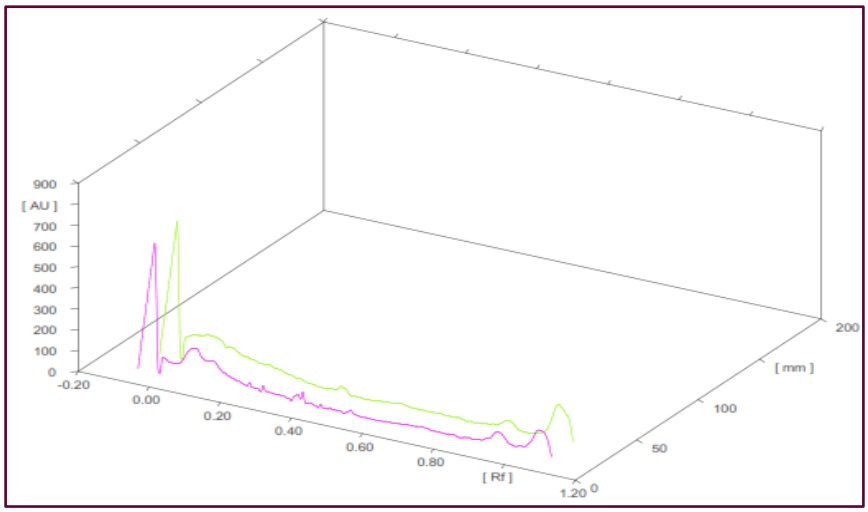


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.74	39.8	0.85	558.7	100.00	0.88	55.3	18773.0	100.00	unknown *

6) After *Jaypal beeja Shodhit Godugdh*



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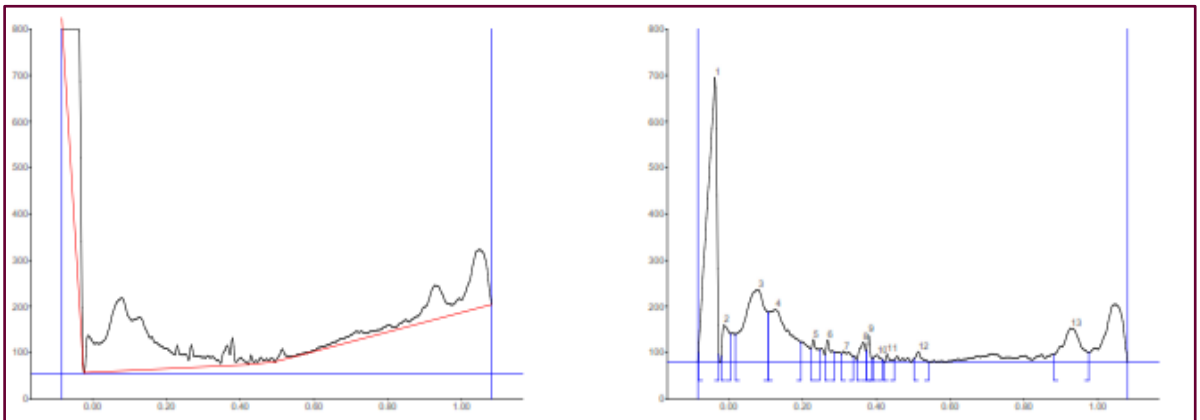
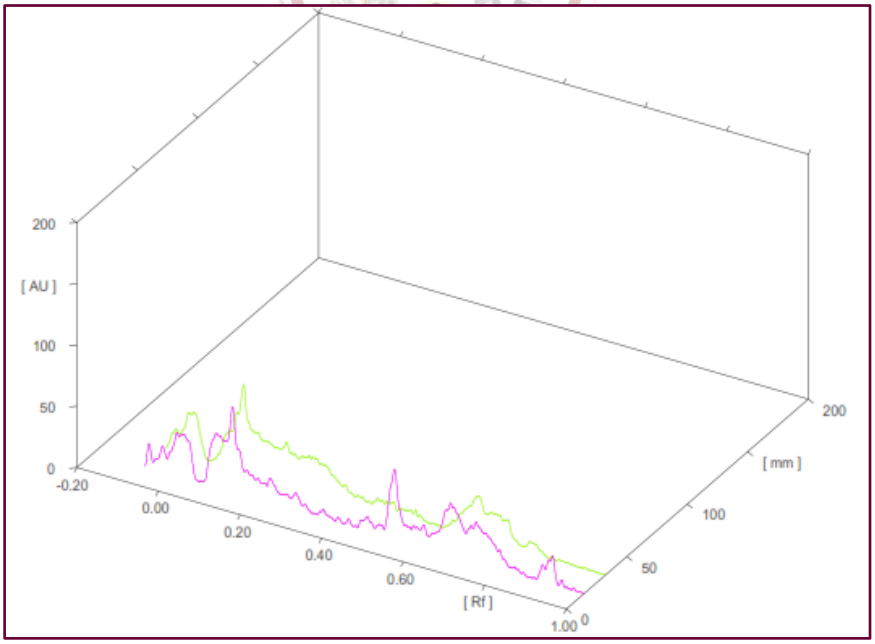
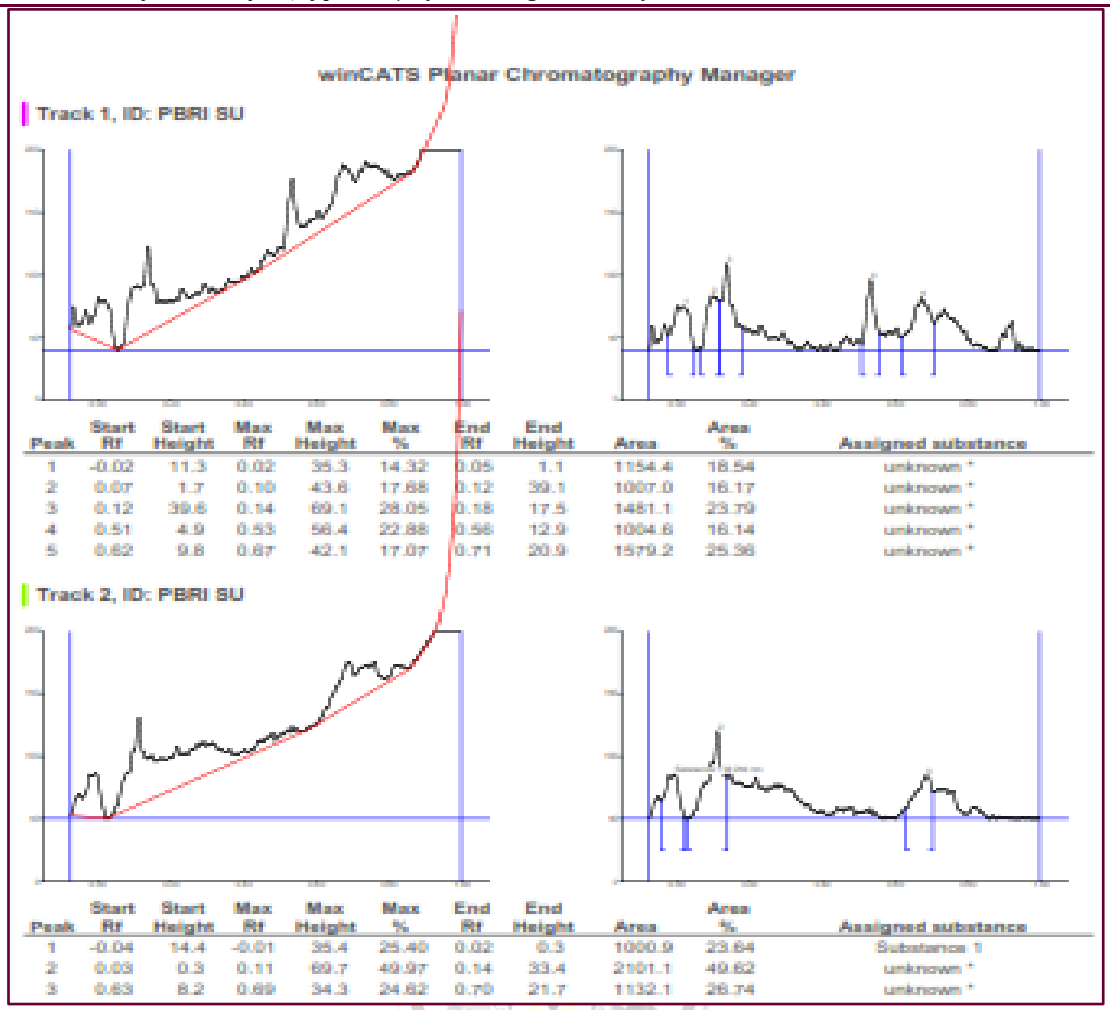


Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	-0.08	20.5	-0.04	615.7	46.60	-0.03	17.4	10751.9	39.22	unknown *
2	-0.02	13.0	-0.01	79.9	6.05	0.00	61.6	1039.8	3.79	unknown *
3	0.02	60.8	0.08	157.3	11.90	0.11	107.8	6155.8	22.45	unknown *
4	0.11	107.8	0.13	113.5	8.59	0.20	43.5	4307.1	15.71	unknown *
5	0.22	28.7	0.23	48.9	3.70	0.25	27.4	506.6	1.85	unknown *
6	0.26	15.5	0.27	48.0	3.64	0.29	22.6	479.2	1.75	unknown *
7	0.31	18.6	0.31	23.8	1.80	0.34	11.5	378.1	1.38	unknown *
8	0.35	5.4	0.37	43.1	3.26	0.37	23.1	457.5	1.67	unknown *
9	0.38	25.8	0.38	59.2	4.48	0.39	7.0	315.7	1.15	unknown *
10	0.39	7.7	0.40	16.0	1.21	0.42	6.4	174.8	0.64	unknown *
11	0.42	1.7	0.43	19.2	1.45	0.45	4.3	128.3	0.47	unknown *
12	0.50	7.7	0.51	23.1	1.75	0.54	0.6	239.1	0.87	unknown *
13	0.88	16.5	0.93	73.6	5.57	0.98	21.7	2481.1	9.05	unknown *

7) After *Jaypal beeja shodhit Gomutra*





Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	-0.02	11.3	0.02	35.3	14.32	0.05	1.1	1154.4	18.54	unknown *
2	0.07	1.7	0.10	43.6	17.68	0.12	39.1	1007.0	16.17	unknown *
3	0.12	39.6	0.14	69.1	28.05	0.18	17.5	1481.1	23.79	unknown *
4	0.51	4.9	0.53	56.4	22.88	0.56	12.9	1004.6	16.14	unknown *
5	0.62	9.8	0.67	42.1	17.07	0.71	20.9	1579.2	25.36	unknown *

Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	-0.04	14.4	-0.01	35.4	25.40	0.02	0.3	1000.9	23.84	Substance 1
2	0.03	0.3	0.11	69.7	49.97	0.14	33.4	2101.1	49.62	unknown *
3	0.63	8.2	0.69	34.3	24.62	0.79	21.7	1132.1	26.74	unknown *

DISCUSSION

There are 3 different sample *Ashodhit Jaypal beeja*, *Godugdha Shodhit*, *Godugdha Shodhit*. Which are analysed for different Physicochemical analytical parameters.

Physico-chemical parameters of *Jayapl beeja*

% Loss in wt.

The percentage of loss in weight is higher in *Godugdha Shodhit* which is 15% while 11% is in *Godugdha Shodhit*. Loss in wt indicates the amount of impurities and toxins in drug. As loss in weight less in *Gomutra Shodhana* signifying less impurities and toxins content are removed from *Gomutra* and hence *Godugdha* sample possess good qualities compared to *Godugdha Shodhit Jaypal*.

Loss on drying at 105 ^{0}c (% w/w)

Loss on drying in *Godugdha Shodhit Jaypal beeja* i.e. 7.18% *Godugdha Shodhit* shows 7.15% loss on drying.

Loss on drying indicates the amount of moisture in drug. As loss on drying less in *Godugdha Shodhana* signifying loss moisture content and hence possess good qualities compared to *Gomutra*, loss on drying.

Total ash (% w/w)

Total ash value of *Godugdha Shodhit*a *Jaypal beeja* (2.86%) where decreases in samples subjected to *Shodhana* with *Godugdha Shodhit*a *Jaypal beeja* (3.02%) and also in *Ashodhit* Sample i.e. (2.56%) respectively.

Total ash value indicates the presence of inorganic salts like calcium carbonate, silicates etc. There are changes of the presence of more impurities in *Shodhit Jaypal beeja* compare to *Godugdha Shodhit Jaypal* and *Ashodhit Jaypal beeja*.

Acid insoluble ash (%w/w)

Acid insoluble ash value of *Ashodhita* (0.15%) sample and *Godugdha Shodhit*a *Jaypal* (0.46%) whereas acid insoluble ash of samples carried out *Shodhana* with *Godugdha* (0.31%) respectively.

Acid insoluble ash where the value mentioned here represents the role of media *Gomutra* extracts. More toxins and impurities from the drugs hence increasing activity is found less in *Godugdha* respectively.

Acid value

Acid value of *Ashodhita* Sample is (13.25) which decrease in sample subjected to *Shodhana* with *Godugdha Shodhit Jaypal* (9.61), whereas decreases in *Godugdha Shodhit Jaypal* (10.59). There is slight high of range of extractives was observed in the *Gogugdha shodhit Jaypal* sample than the *Godugdha Shodhit Jaypal*, which signifies that the percentage of tannins, acid were at that slight higher range than *Godugdha Shodhit Jaypal*.

Alcohol extractive value (% w/w)

Alcohol extractive value of *Godugdha* sample is (13.15%) Which decrease in sample carried out *Shodhana* with *Ashodhita* (7.89%) whereas decreases in samples carried out *Shodhana* with *Gomutra* (9.07%) respectively. As the value are slightly elevated in the *Godugdha Shodhit Jaypal* than the *Godugdha Shodhit Jaypal* signifies that the *Godugdha Shodhit Jaypal* contain more number of resin tannins and other alcohol soluble chemical constituents.

Water soluble extractive (% w/w)

Aqueous extractive value of *Ashodhita* Sample is 7.24% which decrease in sample subjected to *Shodhana* with *Godugdha Shodhit* (4.15%), whereas decreases in *Godugdha Shodhit* (5.83%).

There is slight high range of extractives was observed in the *Godugdha Shodhit Jaypal* sample than *Godugdha Shodhit Jaypal*, which signifies that the percentage of tannins, sugar, acid glycosides were at that slight higher range than the *Godugdha Shodhit Jaypal*.

Physico-chemical parameters of the media used for *Shodhana*

Loss on drying

Loss on drying in *Godugdha Shodhit Jaypal* i.e. (2.134%) and *Godugdha Shodhit Jaypal* (5.246%). It is indicates the amount of moisture in media. It in *Godugdha* signifying less moisture content and hence possess good qualities compared to *Gomutra*.

Acid value

Acid value of *Godugdha* (0.124), where as increases in *Gomutra* (8.217). There is slight high of range of extractives was observed in the *Gomutra* than *Godugdha*. Which signifies that the percentage of tannins, acid were at that slight higher range than *Godugdha*.

Alcohol extractive value of *Godugdha* (4.268%). Which decrease in *Gomutra* (3.156%) respectively. As the value are slightly elevated in the *Godugdha* than the *Gomutra* signifies the *Gomutra*, which signifies that the percentage of tannins, sugar, acids glycosides were at that slight higher range than *Godugdha*.

TLC

On analyzing TLC it has been observed that there are 4 and 6 spots in *Godugdha Shodhit Jaypal beeja* and *Godugdha Shodhit Jaypal beeja*. Highest number of the active components (6 spots) were found in the *Godugdha Shodhit Jayapl beeja* and minimum were observed in *Godugdha Shodhit Jaypal beeja* and upon observing the TLC it is found before *Jaypal beeja shodhit godugdha* media showed total no. of 6 spots. After *Jaypal beeja shodhit Godugdha* media showed total no. of 10 spots. Before *Jaypal beeja shodhit Gomutra* media showed total no. of 1 spots, after *Jaypal beeja* shodhit *Gomutra Jaypal beeja shodhit Gomutra* media showed total no.of 2 spots, which signifies that the percentage of impurities and toxins is high of range in *Godugdha* media than the *Gomutra*.

More water and alcohol soluble extractives signifies more of extraction. There in the study water and alcohol soluble extractive in *Godugdha* media is found more which signifies more extraction of toxins in the media. While in other media it is found decreasingly in *Gomutra*, *Ashodhit* sample accordingly.

HPTLC

The HPTLC data interpreted for major spots common in all three sample at Rf 0.8 approximately *Ashodhitbeeja* and *Godugdha*, *Gomutra* treated sample. In HPTLC data *Ashodhit Jaypalbeeja* are treated as control the area under sample 3 *Ashodhit Jaypalbeeja* taking 100% rest two treated sample area calculated which is as above calculated. In *Godugdha Shodhit Jaypalbeeja* the area under peak decreased 91.1% but in *Godugdha Shodhit Jaypalbeeja* area decreased by 19%.

In plain *Godugdha* and *Gomutra*, Crotonoside the fluorescent active component is absent, the source of this active component is the seeds of plant and in TLC and HPTLC the extracted active component from *Beeja* showed absorbance.

The major component of this plant is Crotonoside showing major spots in the TLC and HPTLC data. At 0.8 Rf rest of the component are in traces amount.

Hence from the result of the analytical study it is observed that media *Godugdha* help in more detoxification compared to *Gomutra*. While *Gomutra* even though has similar activity but lesser compared to *Godugdha*.

CONCLUSION

- *Acharya Charka* Included *Jaypal* under *Virechka dravya.* In present era all poisoning cases reported to *Jaypal* related to its kernel ingestion. Whenever poisonous drugs used in medicine they need purification (*Shodhana*) before therapeutic use.
- To remove the toxicity of these poisonous drugs some procedure like *Nimmanjana, Swedana, Bhavana* etc. are carried out. These detoxification processes in Ayurveda known as *Shodhana.*
- While comparing with 2 purificatory media *Gomutra* majorly plays only one chemical action with *Jaypal beeja,* osmotic dehydration. By this chemical action that much toxic principle will not be removed when comparing with *Godugdha*. Because in *Godugdha* in addition to osmotic dehydration, externally heat (*Swedana*) also supplied to purificatory media, so that more and more toxins was extracted from the *Jaypal beeja.* So comparing 2 purificatory media *Godugdha* plays a best role in detoxifying the *Jaypal beeja.*
- In the present study alternate hypothesis will be accepted as there is media *Godugdha* help in more detoxification compared to other media. While *Gomutra* even though has similar activity but lesser compared to *Godugdha.*

REFERENCE

1. Pandit Kashinath Shashtrina, Ras Tarangini, Motilal BanarasiDas, Delhi, 2000, chapter 24:489-495,pg-738-739.
2. Shri Vagbhatacharya, RasaRatna Samucchaya, Prof.Siddi Nandan Mishra, Hindi Commentary, Chaukhamba Orientalia, Varanasi.2011;pg248, chapter 10:84.
3. Maharsi Shusruta, Sushrut Samhitaby Kaviraja Ambikadutta Shastri, 2011,Chaukhambha Sanskriti Samsthana, Varanasi, Kalpa Sthana Chapter2:5.
4. Prof.Priyavrata Sharma, Kaidev Nighantu pratham sanskaran 1979 Chaukhambha Orientalia, Varanasi, pg.631,632.
5. Acharaya Madhava, Ayurveda Prakasha, Translated by Shri Gulraj Mishra, Reprint Edition, Chaukhambha Bharati Academy, Varanasi 2007. (A.P.5/49, 50,52)
6. Shri Vagbhatacharya, Rasa Ratna Samucchaya, Prof.Siddi Nandan Mishra, Hindi Commentary, Chaukhamba Orientalia, Varanasi.2011; chapter 29:50, pg 657.
7. The Ayurdvedic Formulary of India Vol-1 Part B: Sarangadhara samhita, Madhyama khanda, Adhyaya 12; 300.
8. Indian Pharmacopoeia, Government of India Ministry of health & Family Welfare Published By the Indian Pharmacopoeia Commission, Ghaziabad, Vol.lll (2010).

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