Analytical Study of Guggulu Apamarga Ksharasutra and Papaya Apagamrga Ksharasutra

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***Abstract*—Ayurveda is an Upaveda of Atharvaveda which is an ancient literature on earth, being the science of life has its roots in antiquity, even the historians cannot peep into the depths of that remote past. Whose antiquity goes back to Vedas. It put forward two methods for the maintenance of health. These are Swastha Parayana and Athura Parayana. This system of knowledge flourished through over 5000 years and has had an unbroken tradition of practice down the ages update. Ayurveda is a highly evolved and codified system of life and healthscience based on the unique & original fundamental principles.Ayurveda, the indigenous systems of medicine, has been practiced in India since ancient times. This plant-based system of medicine has already gained worldwide attention due to its safety and efficacy. With the growing need for safer drugs, attention has been drawn to their quality, efficacy and standards of the Ayurvedic formulations. The judicial processing or the Samskaras done to the drugs will render themfit for therapeutic administration made them more potent. The completeknowledge of drugs, including identification, procurement, processing, preparation and application under a separate branch of learning can be called as Bhaishajya Kalpana. In Astangas of Ayurveda Bhaishajya Kalpana was not mentioned as an independent branch. However, no branch of Ayurveda can exist independently without the aid of Bheshaja. The word Bhaishajya Kalpana is formed of two words, Bheshaja and Kalpana.**

I. INTRODUCTION

Plant products are attaining importance as medicinal products, nutraceuticals and cosmetics.[1,2] Health-care in both developed and developing countries are meat with herbal medicines. World Health Organization, have reported that about 80% of the world population still uses herbs and other traditional medicines for their primary health care needs.[3] The use of herbal medicines has increased remarkably in line with the global trend of people returning to natural therapies.[4] Ayurveda utilizes *Kshara* as a form of herbal preparation.The substance that helps to bring back the vitiated Doshas to their normal level or that which counter act the diseased condition and brings back the body to a healthy state is known as Bheshaja. Kalpana is a method, process or a kind of modification or plan of preparation of medicines, using either a singledrug or several drugs. Therefore Bhaishajya Kalpana is the science which dealswith process of preparation of single compound formulations.Medicinal plants have great potentials and have been shown to be verybeneficial in wound care, promoting the rate of healing. Some of the plants owetheir effects to direct effect on the wound healing processes and some to their anti-microbial properties. A combination of these properties is also possible in some ofthe medicinal plants used in wound healing. *Sushruta Samhita*[5] *Sharngadhara Samhita*,[6] *Rasatarangini*,[7] *Dravyaguna Vigyana*[8] and *Ayurveda Sara Samgraha*[9] described the method of kshara peraperations.

Conventionally prepared Ksharasutra is well known for its therapeutic effect in the diseases like Arshas, Bhagandara and Nadivrana. The herbs applied to the thread, viz, Snuhi latex (Euphorbia neriifolia), Apamarga kshara (Achyranthes aspera), Haridra (Curcuma longa) etc are having good antimicrobial activity and healing ability, which is expected in the treatment of the above said diseases. Majority of the works have been done on Snuhi based Apamarga Ksharasutra. Though, this Ksharasutra is highly effective, pharmaceutical standardization isnot carried so far. A surgeon, who uses Ksharasutra in his treatment, usually faces the followingdifficulties during its application:

a. Maintaining the potency of the drugs used in Ksharasutra

b. Uniform thickness of the Ksharasutra

c. Uniform adhesion of the medicated powder to the sutra

d. Falling of the powder while application/cutting/sealing of the Ksharasutra
e. Difference of opinion regarding the number of coatings to be done and variable tensile strength.
So, there is a need for the Standardization of Ksharasutra Pharmaceutico-analytically. The study is also intended to evaluate the Pharmacological action (cutting and scraping of the Dushtavrana, regeneration of tissue, analgesicproperty) and Anti-microbial effect of two successful Ksharasutras, determined pharmaceutico-chemically. Hence in this dissertation an attempt is being made to determine the importance of Ksharasutras on the basis of their Organoleptic characters, Physico-chemical characters and Chromatographical changes.

AIM OF THE STUDY

1.This study is the first attempt to trail the Standardize Apamarga Ksharasutra pharmaceutico-analytically.
2. It is a widely used pharmaceutical preparation; therefore it is essential to fix the standards for the process of preparation and finished product.
3. To estimate the Anti-microbial property of the prepared Ksharasutras.
4. To evaluate the Healing property of different types of Ksharasutra experimentally.

STANDARD[1]:

A Standard is a numerical value which quantifies the parameter and thus denotes quality and purity of a material. The Criteria or the parameters which is considered for making the standard is intimately related to the factor which is responsible for the expected quality and purity of the material.
In case of a synthetic drug the quality and purity depend on the most of biologically active chemical ingredient present in it which is capable of producing the therapeutic effect in the expected level.
But this procedure is not always true with natural drugs. The natural drugs are derived from plant, animal and mineral sources. So these are more complex than synthetic drugs in their chemical structure and composition.
In Ayurveda, the therapeutic effect produced by a drug is not always attributed to a single chemical substance. The therapeutic effect produced by an Ayurvedic dosage form is always multidimensional i.e. the main therapeutic effect is always accompanied by some supportive effects also.
"The efficacy of a drug combination depends on the purity, chemical nature, potency, rate of absorption, metabolic transformation and elimination. Different pre and therapeutic processing procedures of the various drugs are indicated for maintaining the purity, to increase the potency, easy metabolic transformation and elimination."

STANDARDIZATION ASPECTS:

The specific stages where Standardization steps attempted separately are the areas related to the processing aspects and product quality aspects. When these areas are properly monitored and controlled, then the important area of product quality will automatically be taken care of. That is not to say that there is no need for product quality checks. It is only intended to highlight process control measures. The practice is to have a separate set up for the purpose. An Ayurvedic preparation of medicine involves multi-step procedures. The complete composition increases the difficulties of Standardization and subsequent quality control of the finished product. It is therefore essential to document and standardize chemical characters of each sample. It is thus obvious that the Standardization and optimisation in the preparation stage and quality control in a later stage, is a complicated task, if the genuine formulations and concepts of Ayurveda are to be kept untouched.
Quality control can be conducted at 3 levels
(a) Ensuring that the materials used for the preparations are authentic
(b) Ensuring that the preparation is made according to accepted specification.
(c) Ensuring that the end product confirms to set standards.

This work has to be considered at following two stages -
(1) Standardization of the Pharmaceutical process.
(2) Standardization of finished products.

ANALYTICAL STUDY

The tests were carried out as per the Standard procedures.

II. RESULTS

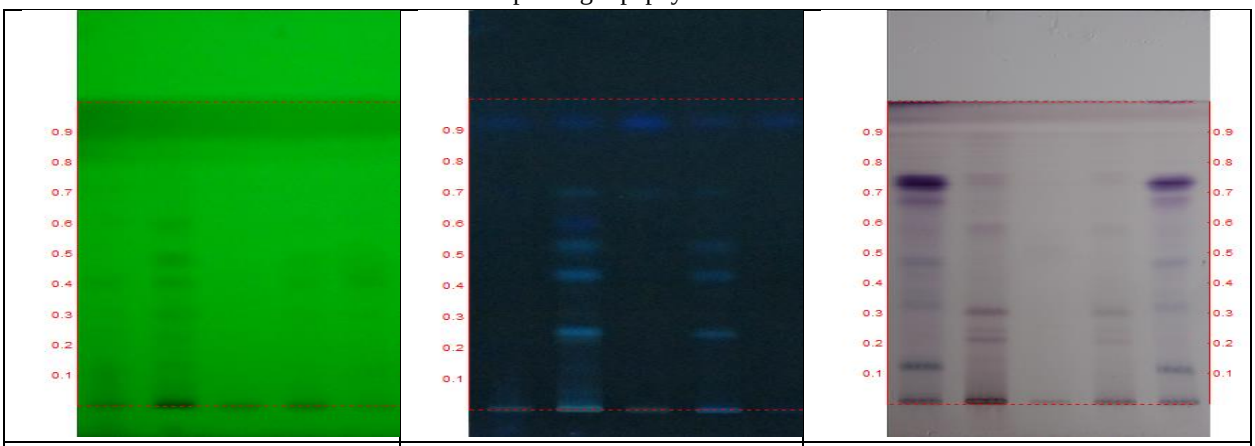
pH of Kshara: 10.89

Table No.1: Physico-chemical parameters

Parameter	Results n=3 %w/w				
	Snuhi apamarga haridra kshara sutra	Guggulu apamarga haridra kshara sutra	Papaya apamarga haridra kshara sutra	Papaya apamarga guggulu kshara sutra	Snuhi apamarga papaya kshara sutra
Length(cm)	35	35	35	35	35
Weight(gm)	0.25	0.198	0.17	0.161	0.153
Water soluble extract	44.378	29.914	52.24	30.581	31.93
Hexane soluble extract	5	2.5	0	7.5	10
Ph	9.56	9.75	9.98	10.14	10.25
Total Ash	16.39	15.6	17.56	14.56	18.04
Sulphated Ash	0.487	0	0.1984	0	0.588

All the Analytical tests were carried out according to the Standard Procedures

Figure 1. TLC photo documentation of Alcohol extract of Snuhi- apamarga- haridra kshara sutra, Guggulu- apamarga- haridra kshara sutra, Papaya- apamarga- haridra kshara sutra, Papaya- apamarga- guggulu kshara sutra, Snuhi- apamarga- papaya kshara sutra



At 254nm	At 366nm	Post derivatisation

Figure 1: TLC of SAH, GAH, PAH, SAP, PAG

Track 1- Snuhi- apamarga- haridra kshara sutra (SAH) – 8µl
Track 2– Guggulu- apamarga- haridra kshara sutra (GAH) – 8µl
Track 3- Papaya- apamarga- haridra kshara sutra (PAH) – 8µl
Track 4– Papaya- apamarga- guggulu kshara sutra (PAG) – 8µl
Track 5- Snuhi- apamarga- papaya kshara sutra (SAP) – 8µl
Solvent system: Toluene: Ethyl Acetate: Formic acid (7:2:0.1)

Table 2: R_f values of all the samples at 254nm

SAH	GAH	PAH	PAG	SAP
-	0.07(L. green)	-	-	-
0.12(L. green)	-	-	-	-
-	0.14(L. green)	-	0.14(L. green)	-
0.24(L. green)	0.24(D. green)	-	-	-

0.31(L. green)	0.31(L. green)	-	-	0.31(L. green)
0.41(L. green)	0.41(D. green)	-	0.41(L. green)	0.41(L. green)
-	0.49(D. green)	-	0.49(L. green)	0.49(L. green)
0.6(L. green)	0.6(D. green)	-	-	-

*L-Light, D-Dark

Table 3: R_f values of all the samples At 366nm

SAH	GAH	PAH	PAG	SAP
-	0.07(F.L.blue)	-	-	-
-	0.14(F.L.blue)	-	-	-
-	0.26(F.blue)	-	0.26(F.blue)	-
-	0.31(F.L.blue)	-	-	-
-	0.39(F.L.blue)	-	-	-
-	0.44(F.blue)	-	0.44(F.blue)	-
-	0.53(F.blue)	-	0.53(F.blue)	-
-	0.6(F.D.blue)	-	-	-
-	0.7(F.L.green)	0.7(F.L.green)	0.7(F.L.green)	-
0.92(F.D.Blue)	0.92(F.D.blue)	0.92(F.D.blue)	0.92(F.D.blue)	0.92(F.D.blue)

*F-Fluorescent,L-Light, D-Dark

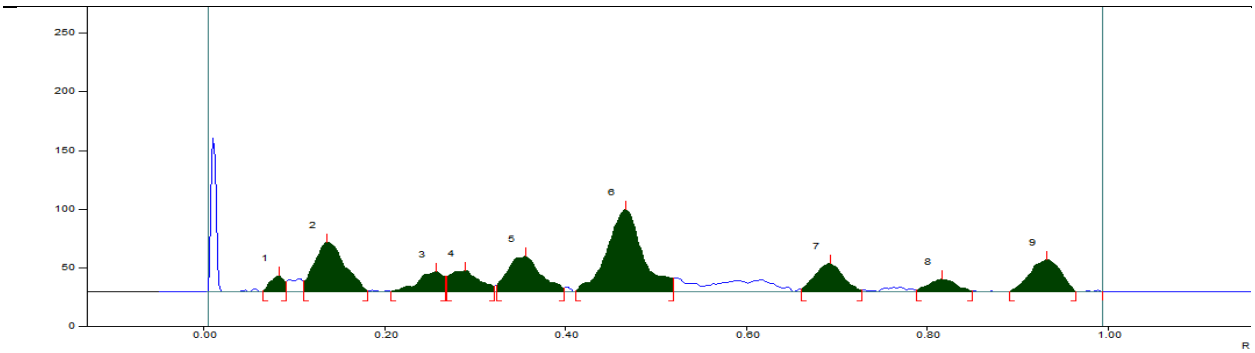
Table 4: R_f values of all the samples At Post chromatographic derivatisation

SAH	GAH	PAH	PAG	SAP
0.13(D.blue)	0.13(L.pink)	-	-	0.13(D.purple)
0.21(L.pink)	0.21(D.pink)	-	0.21(L.pink)	-
0.25(L.purple)	0.25(D.pink)	-	0.25(L.pink)	-
-	0.31(D.brown)	-	0.31(L.purple)	-
0.33(L.grey)	-	-	-	0.33(D.purple)
0.37(L.purple)	-	-	-	0.37(L.purple)
0.43(L.purple)	-	-	-	0.43(L.pink)
0.48(D.blue)	-	-	-	0.48(D.purple)
-	-	0.51(L.pink)	-	-
-	-	-	-	0.54(L.purple)
0.59(L.purple)	0.59(L.pink)	-	0.59(L.pink)	0.59(L.purple)
0.68(D.purple)	-	-	-	0.68(D.purple)
0.75(D.purple)	0.75(L.pink)	-	0.75(L.pink)	0.75(D.purple)

*L-Light, D-Dark

Fig 2. Densitometric scan at 254nm

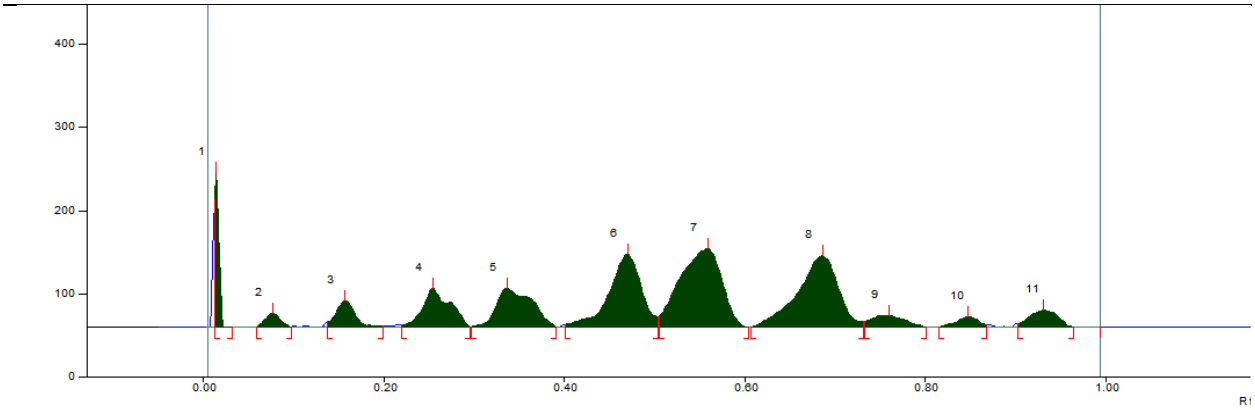
HPTLC



Track 1, ID: Snuhi apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.07 Rf	0.5 AU	0.08 Rf	13.9 AU	5.47 %	0.09 Rf	8.7 AU	148.9 AU	2.42 %
2	0.11 Rf	9.1 AU	0.14 Rf	42.2 AU	16.61 %	0.18 Rf	0.8 AU	1021.9 AU	16.65 %
3	0.21 Rf	0.2 AU	0.26 Rf	17.4 AU	6.85 %	0.27 Rf	13.1 AU	337.2 AU	5.49 %
4	0.27 Rf	13.2 AU	0.29 Rf	18.2 AU	7.15 %	0.32 Rf	4.8 AU	424.2 AU	6.91 %
5	0.32 Rf	5.3 AU	0.36 Rf	30.2 AU	11.87 %	0.40 Rf	3.4 AU	790.6 AU	12.88 %
6	0.41 Rf	0.5 AU	0.47 Rf	70.1 AU	27.59 %	0.52 Rf	11.4 AU	1973.0 AU	32.14 %
7	0.66 Rf	2.6 AU	0.69 Rf	24.0 AU	9.46 %	0.73 Rf	1.2 AU	535.2 AU	8.72 %
8	0.79 Rf	1.3 AU	0.82 Rf	10.7 AU	4.21 %	0.85 Rf	1.0 AU	235.4 AU	3.83 %
9	0.89 Rf	0.2 AU	0.93 Rf	27.4 AU	10.79 %	0.97 Rf	0.3 AU	672.5 AU	10.96 %

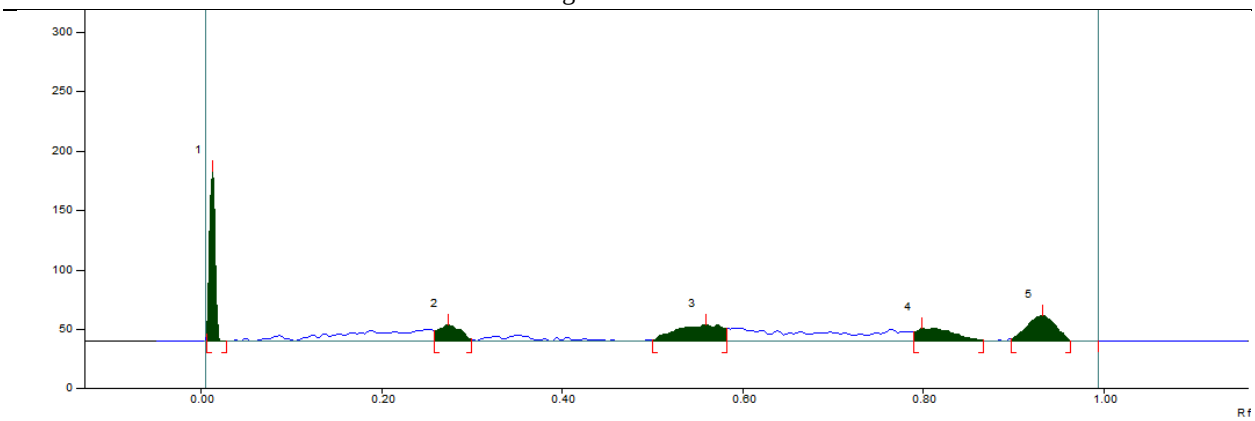
Figure 2.a SAH



Track 2, ID: Guggulu apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	152.8 AU	0.01 Rf	185.6 AU	29.04 %	0.03 Rf	0.1 AU	700.3 AU	5.44 %
2	0.06 Rf	0.4 AU	0.08 Rf	16.6 AU	2.59 %	0.10 Rf	0.5 AU	197.0 AU	1.53 %
3	0.14 Rf	6.2 AU	0.16 Rf	31.7 AU	4.96 %	0.20 Rf	1.1 AU	482.3 AU	3.75 %
4	0.22 Rf	2.3 AU	0.25 Rf	46.1 AU	7.21 %	0.30 Rf	0.2 AU	1009.1 AU	7.84 %
5	0.30 Rf	0.3 AU	0.34 Rf	46.3 AU	7.25 %	0.39 Rf	0.5 AU	1320.2 AU	10.25 %
6	0.40 Rf	3.3 AU	0.47 Rf	87.1 AU	13.63 %	0.50 Rf	12.7 AU	2233.5 AU	17.35 %
7	0.51 Rf	13.3 AU	0.56 Rf	94.1 AU	14.73 %	0.60 Rf	0.0 AU	3118.3 AU	24.22 %
8	0.61 Rf	0.0 AU	0.69 Rf	85.3 AU	13.34 %	0.73 Rf	6.2 AU	2754.0 AU	21.39 %
9	0.73 Rf	6.3 AU	0.76 Rf	13.8 AU	2.15 %	0.80 Rf	0.1 AU	374.4 AU	2.91 %
10	0.82 Rf	0.2 AU	0.85 Rf	12.2 AU	1.91 %	0.87 Rf	3.3 AU	221.6 AU	1.72 %
11	0.90 Rf	4.0 AU	0.93 Rf	20.4 AU	3.19 %	0.97 Rf	0.3 AU	465.0 AU	3.61 %

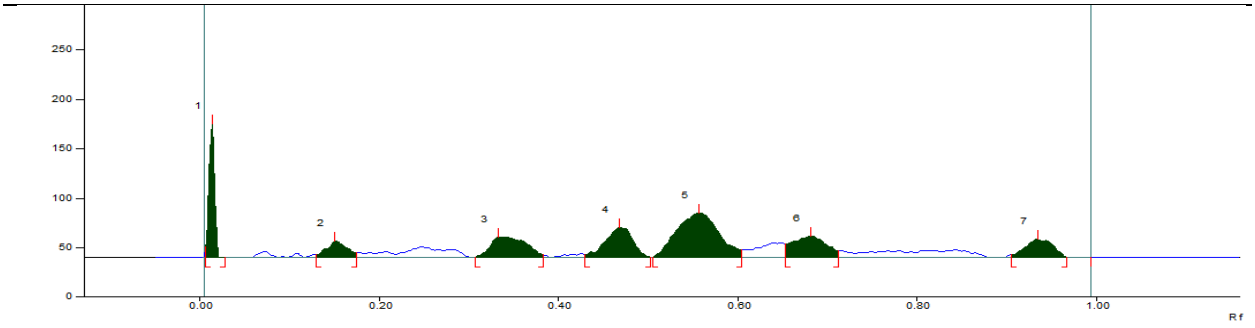
Figure 2.b GAH



Track 3, ID: papaya apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	6.0 AU	0.01 Rf	143.1 AU	70.54 %	0.03 Rf	0.0 AU	629.1 AU	28.69 %
2	0.26 Rf	8.6 AU	0.27 Rf	13.5 AU	6.64 %	0.30 Rf	2.0 AU	242.4 AU	11.05 %
3	0.50 Rf	0.5 AU	0.56 Rf	13.7 AU	6.73 %	0.58 Rf	10.3 AU	504.6 AU	23.01 %
4	0.79 Rf	7.8 AU	0.80 Rf	10.9 AU	5.39 %	0.87 Rf	0.6 AU	321.2 AU	14.65 %
5	0.90 Rf	2.1 AU	0.93 Rf	21.7 AU	10.70 %	0.96 Rf	0.3 AU	495.6 AU	22.60 %

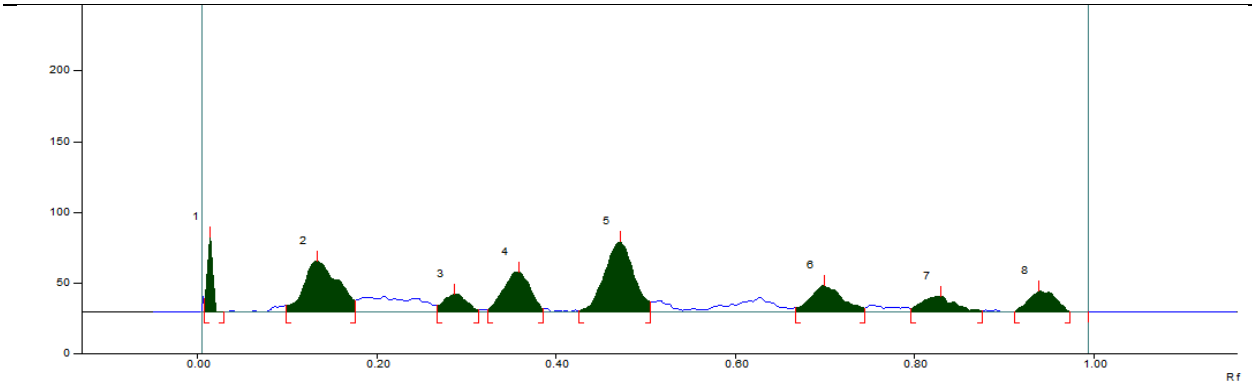
Figure 2.c PAH



Track 4, ID: Papaya apamarga guggulu

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	10.3 AU	0.01 Rf	135.2 AU	47.10 %	0.03 Rf	0.0 AU	600.7 AU	12.91 %
2	0.13 Rf	2.7 AU	0.15 Rf	16.4 AU	5.72 %	0.18 Rf	4.4 AU	272.6 AU	5.86 %
3	0.31 Rf	0.3 AU	0.33 Rf	20.6 AU	7.19 %	0.38 Rf	2.7 AU	594.1 AU	12.77 %
4	0.43 Rf	3.0 AU	0.47 Rf	30.2 AU	10.52 %	0.50 Rf	0.1 AU	669.4 AU	14.38 %
5	0.51 Rf	0.4 AU	0.56 Rf	44.9 AU	15.65 %	0.60 Rf	7.8 AU	1519.9 AU	32.66 %
6	0.65 Rf	13.8 AU	0.68 Rf	21.3 AU	7.44 %	0.71 Rf	6.4 AU	585.9 AU	12.59 %
7	0.91 Rf	2.9 AU	0.94 Rf	18.3 AU	6.39 %	0.97 Rf	0.4 AU	411.1 AU	8.83 %

Figure 2.d PAG

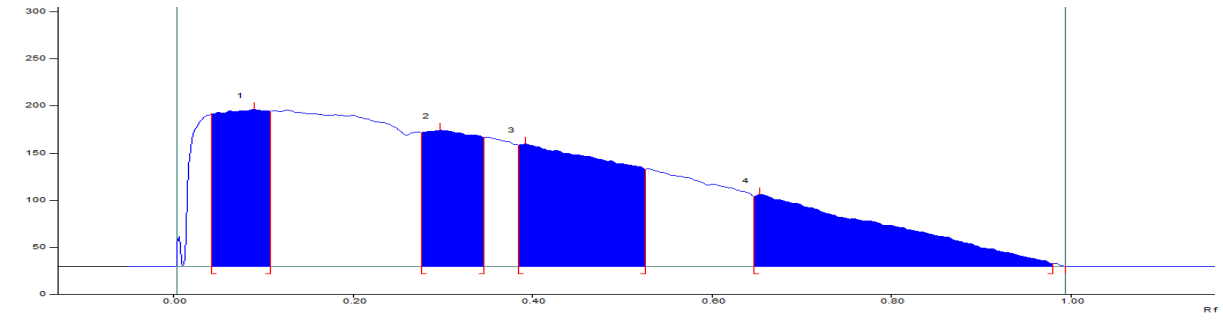


Track 5, ID: Snuhi apamarga papaya

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	9.0 AU	0.01 Rf	52.8 AU	23.69 %	0.03 Rf	0.0 AU	226.6 AU	5.29 %
2	0.10 Rf	4.7 AU	0.13 Rf	35.8 AU	16.09 %	0.18 Rf	8.2 AU	983.2 AU	22.93 %
3	0.27 Rf	4.5 AU	0.29 Rf	12.2 AU	5.48 %	0.31 Rf	1.5 AU	230.6 AU	5.38 %
4	0.32 Rf	1.3 AU	0.36 Rf	28.2 AU	12.68 %	0.39 Rf	2.1 AU	607.3 AU	14.17 %
5	0.43 Rf	0.9 AU	0.47 Rf	49.7 AU	22.31 %	0.51 Rf	7.3 AU	1156.1 AU	26.97 %
6	0.67 Rf	2.9 AU	0.70 Rf	18.5 AU	8.30 %	0.75 Rf	2.7 AU	472.5 AU	11.02 %
7	0.80 Rf	2.0 AU	0.83 Rf	11.1 AU	4.98 %	0.88 Rf	1.0 AU	290.9 AU	6.79 %
8	0.91 Rf	0.1 AU	0.94 Rf	14.4 AU	6.47 %	0.97 Rf	0.0 AU	319.7 AU	7.46 %

Figure 2.e SAP

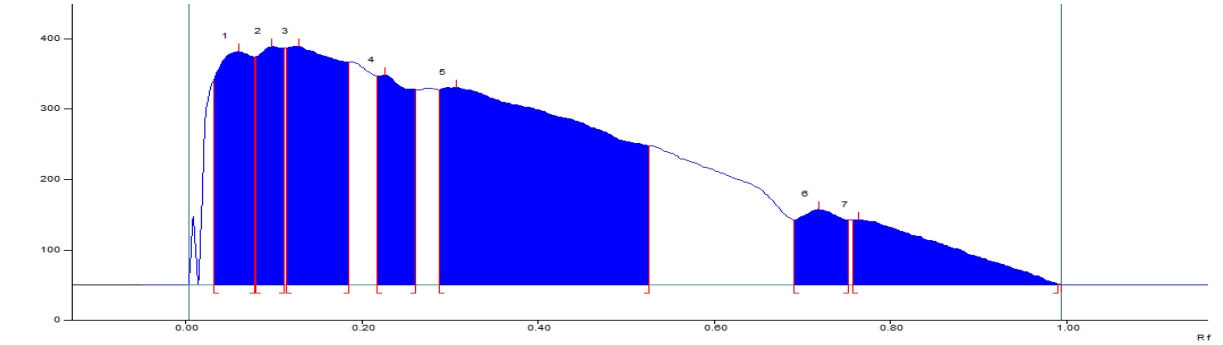
Figure 3. HPTLC photo documentation at 254 nm



Track 1, ID: Snuhi apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.04 Rf	161.7 AU	0.09 Rf	166.6 AU	32.21 %	0.11 Rf	64.6 AU	6743.3 AU	21.32 %
2	0.28 Rf	142.0 AU	0.30 Rf	144.4 AU	27.92 %	0.35 Rf	36.7 AU	6227.8 AU	19.69 %
3	0.39 Rf	128.8 AU	0.39 Rf	129.6 AU	25.06 %	0.53 Rf	03.0 AU	10421.9 AU	32.95 %
4	0.65 Rf	74.3 AU	0.65 Rf	76.5 AU	14.80 %	0.98 Rf	3.1 AU	8235.6 AU	26.04 %

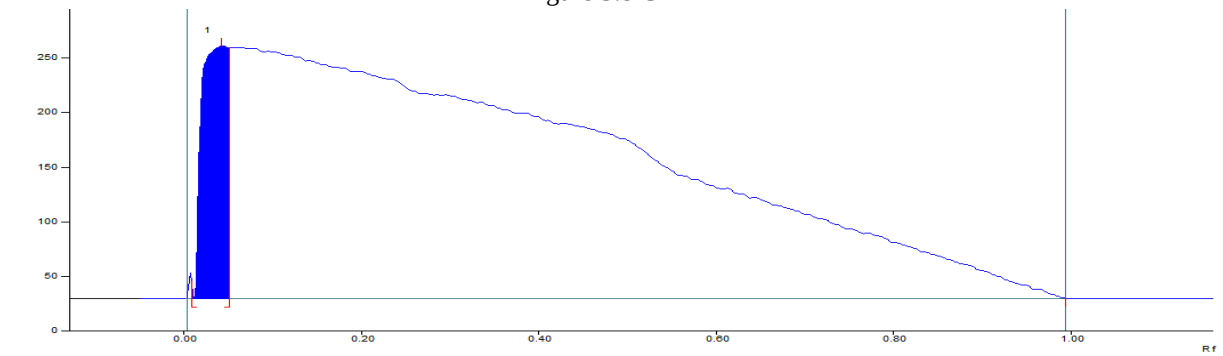
Figure 3.a SAH



Track 2, ID: Guggulu apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	289.8 AU	0.06 Rf	331.0 AU	18.54 %	0.08 Rf	23.6 AU	9637.2 AU	11.09 %
2	0.08 Rf	324.0 AU	0.10 Rf	338.2 AU	18.94 %	0.11 Rf	36.0 AU	7011.1 AU	8.07 %
3	0.11 Rf	336.2 AU	0.13 Rf	338.7 AU	18.97 %	0.19 Rf	16.0 AU	14770.5 AU	17.00 %
4	0.22 Rf	296.6 AU	0.23 Rf	297.7 AU	16.68 %	0.26 Rf	77.4 AU	8045.3 AU	9.26 %
5	0.29 Rf	277.0 AU	0.31 Rf	280.1 AU	15.69 %	0.53 Rf	97.8 AU	36174.8 AU	41.63 %
6	0.69 Rf	92.4 AU	0.72 Rf	106.9 AU	5.99 %	0.75 Rf	92.0 AU	3888.8 AU	4.48 %
7	0.76 Rf	92.1 AU	0.76 Rf	92.8 AU	5.20 %	0.99 Rf	1.6 AU	7362.5 AU	8.47 %

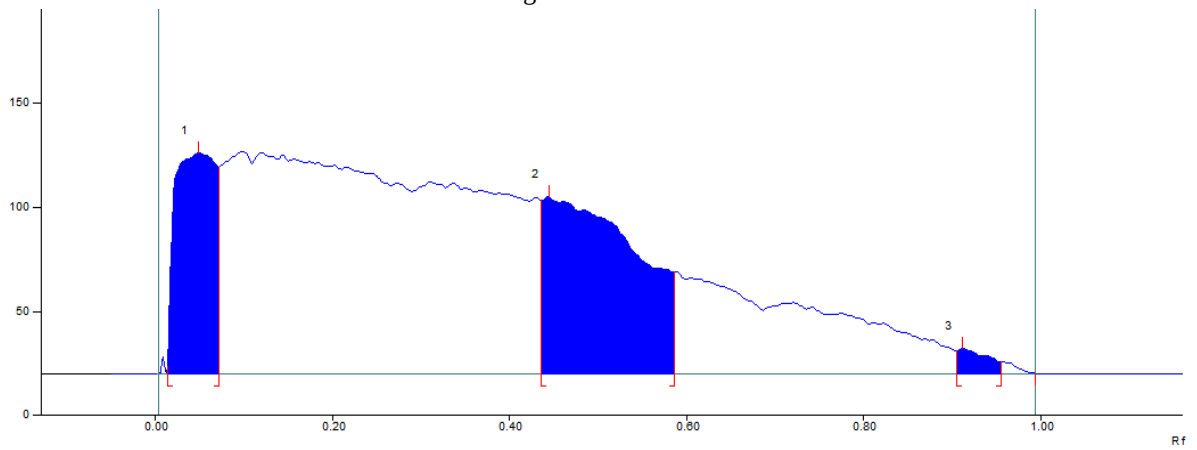
Figure 3.b GAH



Track 3, ID: papaya apamarga haridra

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	15.5 AU	0.04 Rf	231.5 AU	100.00 %	0.05 Rf	29.6 AU	4880.8 AU	100.00 %

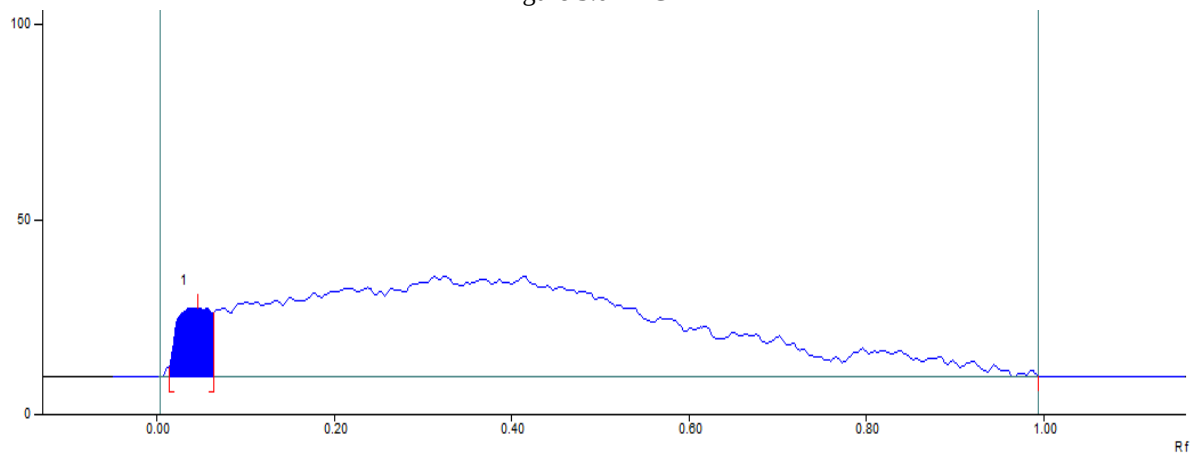
Figure 3.c PAH



Track 4, ID: Papaya apamarga guggulu

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	3.2 AU	0.05 Rf	106.3 AU	52.18 %	0.07 Rf	99.4 AU	3509.7 AU	34.10 %
2	0.44 Rf	83.3 AU	0.45 Rf	85.0 AU	41.76 %	0.59 Rf	48.9 AU	6483.0 AU	62.99 %
3	0.91 Rf	10.8 AU	0.91 Rf	12.3 AU	6.06 %	0.96 Rf	5.8 AU	298.9 AU	2.90 %

Figure 3.d PAG



Track 5, ID: Snuhi apamarga papaya

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.01 Rf	2.3 AU	0.05 Rf	17.7 AU	100.00 %	0.06 Rf	16.2 AU	485.1 AU	100.00 %

Figure 3.e SAP

Figure 4. 3-D chromatogram

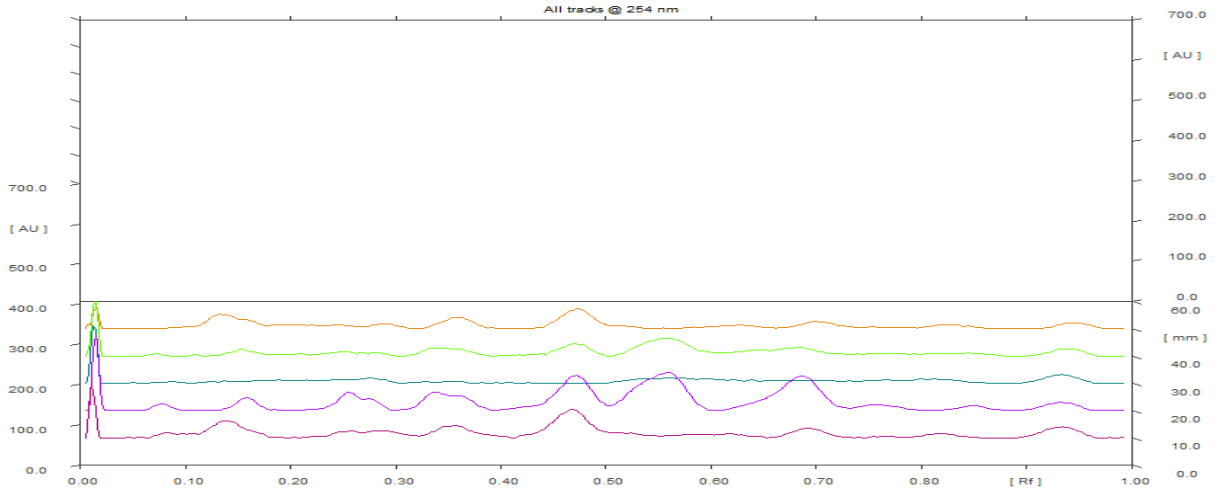


Figure 4a. 3-D chromatogram at 254nm

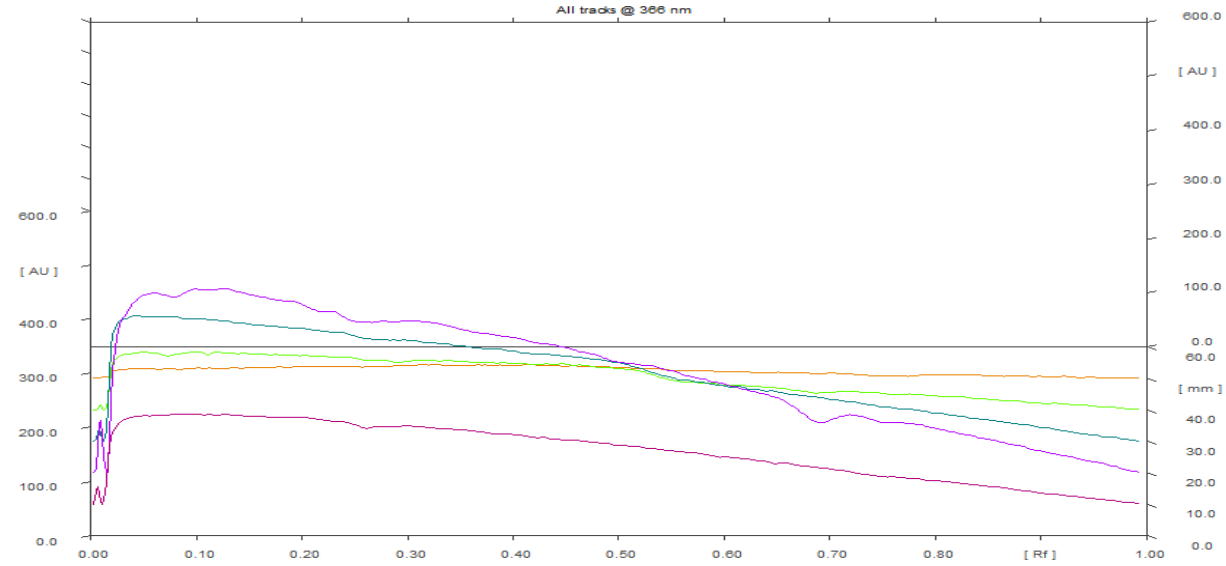


Figure 4a. 3-D chromatogram at 366nm

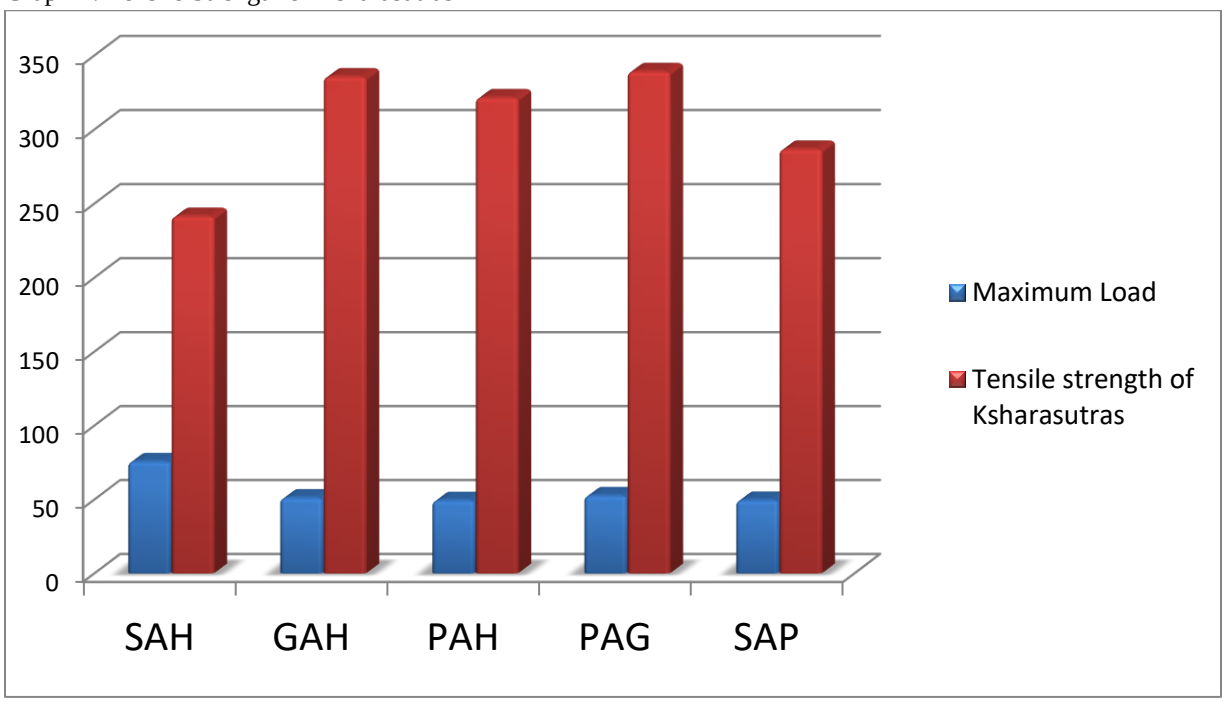
Remarks

The given sample has been standardized as per standard testing protocol. Results of standardization parameters &HPTLC are presented in table 1to 4 and the figure1 to 4.

Table 5: Tensile Strength of Ksharasutras:

Group	Maximum Load	Tensile strength of Ksharasutras
SAH	75.62	241.42
GAH	51.1	335.59
PAH	49.39	321.53
PAG	52.61	339.14
SAP	49.53	286.72

Graph 1: Tensile Strength of Ksharasutras



Snuhi Apamarga Haridra Ksharasutra:

Specimen label	SAH
Work Order Number	WE DPL Y39.Y13
Load cell	100 N
RATE	100 MM/MIN
Date of Testing	16-01-2014
Operator ID	SATHEESH
Laboratory Name	Dental Products Lab,BMT Wing
Institute	SCTIMST
Temperature (deg C)	24.00
Humidity (%)	61.00000
Number of specimens	6

	Diameter (mm)	Maximum Load (N)	Tensile stress at Maximum Load (MPa)
1	0.63000	77.57335	248.85
2	0.64000	65.75214	204.39
3	0.63000	64.11903	205.69
4	0.59000	79.25388	289.89
5	0.63000	87.41073	280.41
6	0.68000	79.64025	219.29
Mean	0.63333	75.62490	241.42
Standard Deviation	0.03	8.96	37.58
Coefficient of Variation	4.54	11.85	15.57
Maximum	0.68000	87.41073	289.89
Minimum	0.59000	64.11903	204.39
Median	0.63000	78.41362	234.07
Range	0.09000	23.29170	85.50

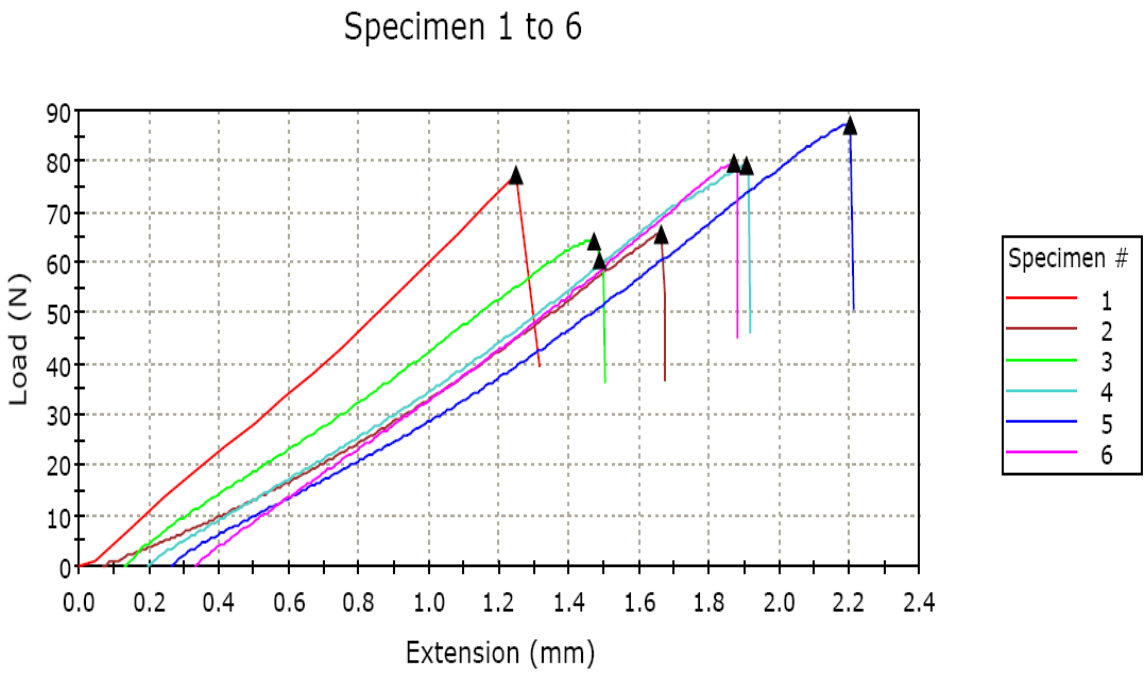


Figure:5a: Tensile strength and Graph report of SAH

Guggulu Apamarga Haridra Ksharasutra

Specimen label	GAH
Work Order Number	WE DPL Y39.Y13
Load cell	100 N
RATE	10 MM/MIN
Date of Testing	16-01-2014
Operator ID	SATHEESH
Laboratory Name	Dental Products Lab,BMT Wing
Institute	SCTIMST
Temperature (deg C)	24.00
Humidity (%)	61.00000
Number of specimens	6

	Diameter (mm)	Maximum Load (N)	Tensile stress at Maximum Load (MPa)
1	0.49000	45.54997	241.55
2	0.43000	56.04066	385.90
3	0.43000	50.62608	348.62
4	0.48000	61.50427	339.89
5	0.43000	38.81393	267.28
6	0.40000	54.07609	430.32
Mean	0.44333	51.10183	335.59
Standard Deviation	0.03	8.04	71.00
Coefficient of Variation	7.77	15.74	21.16
Maximum	0.49000	61.50427	430.32
Minimum	0.40000	38.81393	241.55
Median	0.43000	52.35108	344.25
Range	0.09000	22.69034	188.77

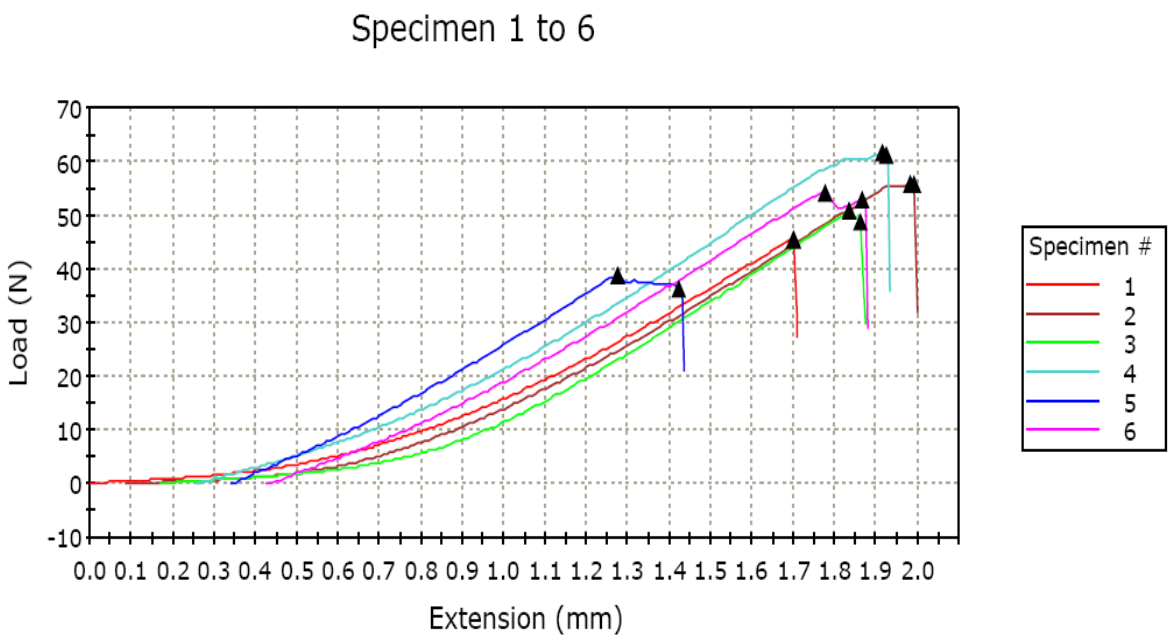


Figure:5b: Tensile strength and Graph report of GAH

Papaya Apamarga Haridra Ksharasutra

Specimen label	PAH
Work Order Number	WE DPL Y39.Y13
Load cell	100 N
RATE	10 MM/MIN
Date of Testing	16-01-2014
Operator ID	SATHEESH
Laboratory Name	Dental Products Lab,BMT Wing
Institute	SCTIMST
Temperature (deg C)	24.00
Humidity (%)	61.00000
Number of specimens	6

	Diameter (mm)	Maximum Load (N)	Tensile stress at Maximum Load (MPa)
1	0.45000	59.69416	375.33
2	0.53000	58.71105	266.12
3	0.40000	45.19394	359.64
4	0.42000	41.51347	299.64
5	0.43000	39.73587	273.63
6	0.43000	51.53007	354.84
Mean	0.44333	49.39643	321.53
Standard Deviation	0.05	8.61	47.54
Coefficient of Variation	10.25	17.43	14.79
Maximum	0.53000	59.69416	375.33
Minimum	0.40000	39.73587	266.12
Median	0.43000	48.36201	327.24
Range	0.13000	19.95829	109.21

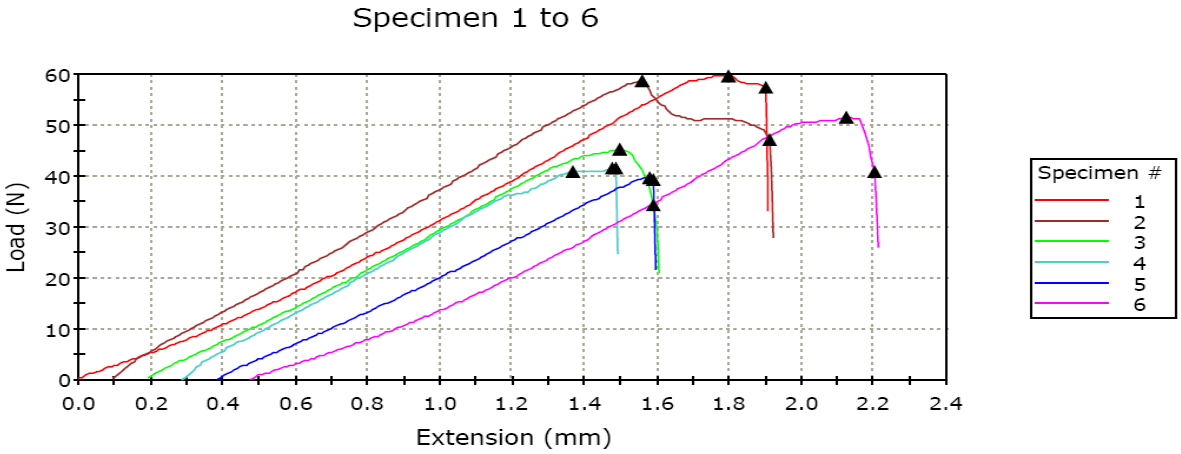


Figure:5c: Tensile strength and Graph report of PAH

Papaya Apamarga Guggulu Ksharasutra

Specimen label	PAG
Work Order Number	WE DPL Y39.Y14
Load cell	100 N
RATE	10 MM/MIN
Date of Testing	16-01-2014
Operator ID	SATHEESH
Laboratory Name	Dental Products Lab,BMT Wing
Institute	SCTIMST
Temperature (deg C)	24.00
Humidity (%)	61.00000
Number of specimens	6

	Diameter (mm)	Maximum Load (N)	Tensile stress at Maximum Load (MPa)
1	0.45000	46.38851	291.67
2	0.44000	52.79368	347.21
3	0.46000	59.53891	358.26
4	0.45000	43.81832	275.51
5	0.44000	54.72814	359.93
6	0.43000	58.41829	402.27
Mean	0.44500	52.61431	339.14
Standard Deviation	0.01	6.36	47.22
Coefficient of Variation	2.36	12.09	13.92
Maximum	0.46000	59.53891	402.27
Minimum	0.43000	43.81832	275.51
Median	0.44500	53.76091	352.73
Range	0.03000	15.72058	126.76

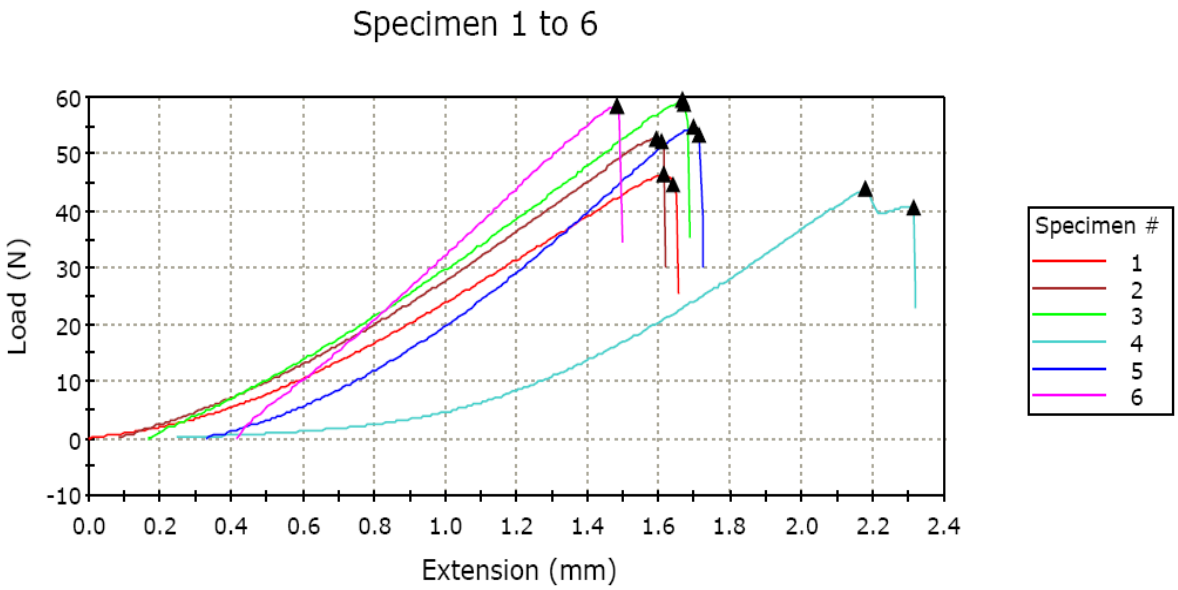


Figure:5d: Tensile strength and Graph report of PAG

Snuhi Apamarga Papaya Ksharasutra

Specimen label	SAP
Work Order Number	WE DPL Y39.Y13
RATE	10 MM/MIN
Date of Testing	16-01-2014
Operator ID	SATHEESH
Laboratory Name	Dental Products Lab,BMT Wing
Institute	SCTIMST
Temperature (deg C)	24.00
Humidity (%)	61.00000
Number of specimens	6
Load cell	100 N

	Diameter (mm)	Maximum Load (N)	Tensile stress at Maximum Load (MPa)
1	0.43000	39.06097	268.98
2	0.47000	59.82218	344.81
3	0.50000	47.40866	241.45
4	0.48000	48.49316	267.98
5	0.45000	40.83256	256.74
6	0.48000	61.59125	340.37
Mean	0.46833	49.53480	286.72
Standard Deviation	0.02	9.40	44.42
Coefficient of Variation	5.30	18.99	15.49
Maximum	0.50000	61.59125	344.81
Minimum	0.43000	39.06097	241.45
Median	0.47500	47.95091	268.48
Range	0.07000	22.53028	103.36

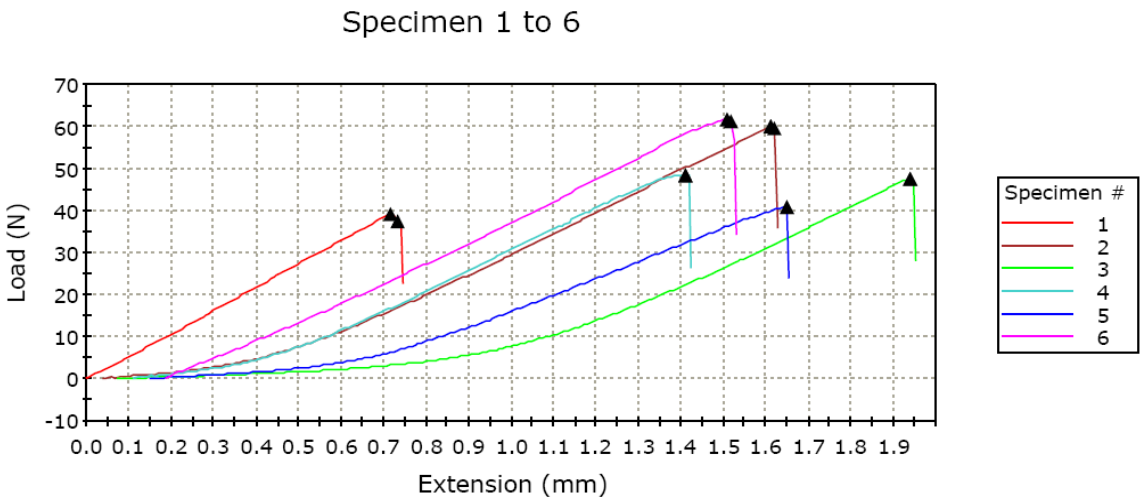


Figure:5e: Tensile strength and Graph report of SAP

III. DISCUSSION

A Standard is a numerical value which quantifies the parameter and thus denotes quality and purity of a material. The Criteria or the parameters which is considered for making the standard is intimately related to the factor which is responsible for the expected quality and purity of the material. In case of a synthetic drug the quality and purity depend on the most of biologically active chemical ingredient present in it which is capable of producing the therapeutic effect in the expected level. But this procedure is not always true with natural drugs. The natural drugs are derived from plant, animal and mineral sources. So these are more complex than synthetic drugs in their chemical structure and composition. In Ayurveda, the therapeutic effect produced by a drug is not always attributed to a single chemical substance. The therapeutic effect produced by an Ayurvedic dosage form is always multidimensional i.e. the main therapeutic effect is always accompanied by some supportive effects also. "The efficacy of a drug combination depends on the purity, chemical nature, potency, rate of absorption, metabolic transformation and elimination. Different pre and therapeutic processing procedures of the various drugs are indicated for maintaining the purity, to increase the potency, easy metabolic transformation and elimination."

The specific stages where Standardization steps attempted separately are the areas related to the processing aspects and product quality aspects. When these areas are properly monitored and controlled, then the important area of product quality will automatically be taken care of. That is not to say that there is no need for product quality checks. It is only intended to highlight process control measures. The practice is to have a separate set up for the purpose. An Ayurvedic preparation of medicine involves multi-step procedures. The complete composition increases the difficulties of Standardization and subsequent quality control of the finished product. It is therefore essential to document and standardize chemical characters of each sample. It is thus obvious that the Standardization and optimisation in the preparation stage and quality control in a later stage, is a complicated task, if the genuine formulations and concepts of Ayurveda are to be kept untouched.

Quality control can be conducted at 3 levels

(a) Ensuring that the materials used for the preparations are authentic

(b) Ensuring that the preparation is made according to accepted specification.

(c) Ensuring that the end product confirms to set standards.

IV. CONCLUSION

Charaka samhita was the first treatise mentioning about the Kshara, and Chakradatta was the first to explain about the preparation of Ksharasutra in Arsha chikitsa adhikara. Organoleptic characters of the samples revealed that, GAH imparts brownish red colour, and non-pungent odour. Physico-chemical parameters describe that pH of SAH, GAH and PAH are less compared to SAP and PAG, as SAH, GAH and PAH are very ideal and acceptable to the body than other samples. Hence, Guggulu Apamarga Haridra Ksharasutra is considered good for its analytical values and therapeutic efficacy.

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