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PHARMACEUTICAL AND ANALYTICAL SYUDY OF SAPTASARAM GHANA VATI: A FORMULATION FOR KASHTARTAVA

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ABSTRACT

Background: According to *Acharaya Sushruta*, pain is indication of *Vata Vikriti*. **'***Saptasaram'* is made of seven herbs, hence the name. It is well known for its therapeutic properties in the Indian traditional medicinal system. The presence of important bioactive compounds in plants makes them pharmacologically valuable. *Saptasaram* is a formulation mentioned in *Sahasra Yoga Kasahya Prakarana* 284. It was prepared by the classical method mentioned in *Sarangdhara Samhita*. Therefore, in the present study, Pharamaceutical and Analytic study of *Saptasaram ghana vati* was performed for its phytochemical profiling.

Results: The Pharmaceutical analysis of the tablet shows that it was Dark Brown in colour and Average wt. = 530mg, LOD = 1.70, DT=17.30 min, AV=7.3, AIA=4.0, WSE= 63, & ASE=11. The HPTLC analysis of the methanolic extract of *Saptasaram ghana vati* was carried out using CAMAG HPTLC system, and the results were obtained in the form of chromatograms (scanned at the wavelength of 254 nm) representing several peaks. The phytochemical profile of the drug was determined and presented in the tables showing the total number of peaks, peak heights, peak area, percent area, and Rf values.

Conclusion: The study concluded that methanolic extract of *Saptasaram ghana vati* contains a rich variety of phytochemicals which might be accountable for its therapeutic value and thus justifies its traditional use in India. The formulation is safe for use and free from any pathogenic microbes.

Keywords: Chromatography, HPTLC, *Kashtaratva,* Methanolic extract, *Saptasaram ghana vati*

BACKGROUND

Ayurveda is one of the Ancient-form of medical system practised in the Indian sub-continent, and now it is an integral part of the Indian Medical System. *Kashtartava* is not separately described as a disease anywhere in *ayurvedic* classics but *Kashtartava* is considered and described as a symptom. *Vega Avarodha* causes *Vata Prakopa* thus causing painful menstruation [1] *Saptasaram* is a very famous ayurvedic medicine mentioned in *Sahasra Yoga Kasahya Prakarana*. It is hugely used in curing menstrual aliments, low digestive power, balances Vata. [2] There are thousands of medicinal plants known to have a long history of usage for their curative

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properties against various diseases and ailments [3]. Medicinal plants, due to the presence of bioactive phytochemicals, play a very important role in human life for maintaining good health. The use of medicinal herbs in the treatment of infection is an age-old practice, and several natural products are used as phytotherapy for the treatment of many diseases [4].

MATERIALS AND METHOD

The raw drugs for the *Saptsaram ghana vati* preparation were procured from the Raw Herbal Drug Supplier, Vadodara, Gujarat. The P.G. Department of *Dravyaguna* identified the ingredients, and the voucher PU/PIA/DG/147 of the specimen sample was kept in the department.

Table No 1: Ingredients and composition of Saptasaram ghana vati

NAME OF DRUG	LATIN NAME	RASA	GUNA	VIRYA	VIPAKA	PART USED	PROPORTION
Varshabhu (punarnava)	*Boerhaavia diffusa*	Madhura,Tikta, Kashaya	Laghu, Ruksha	Ushna	Katu	Root	1 Part
Bilva	*Aegle marmelos*	Katu, Tikta, Kashaya	Grahi, Snigdha Tikshna	Ushna	Katu	Root/ Stem Bark	1 Part
Khalva purana	*Dolichos biflorus*	Kashaya	Laghu, Sara	Ushna	Katu	Seed	1 Part
Urubu(castor)	*Ricinus communis*	Madhura, Katu, Kashaya	Snigdha,Sukshma, Tikshna	Ushna	Madhura	Root	1 Part
Sahachara	*Barleria prionitis*	Tikta, Madhura	Laghu,	Ushna	Katu	Root	1 Part
Shunti	*Zingiber officinalis*	Katu,	Guru,Ruksha, Tikshna	Ushna	Madhura	Rhizhome	1 Part
Agnimantha	*Premna mucronate*	Katu,Tikta, Kashayaa	Laghu, Ruksha	Ushna	Katu	Root / Stem Bark	1 Part

Figure no 1: Raw Drugs of Saptasaram ghana vati

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Method of Preparation of Saptasaram ghana Vati

The *Saptasaram ghana vati* was prepared in GMP-approved Parul Institute of Ayurveda Pharmacy, Vadodara, Gujarat. The *Saptasaram ghana vati* was prepared as per standard operative procedures of the Ayurvedic Pharmacopeia of India for the *Ghana Vati* preparation. The first 7 drugs mentioned in Table 1 were taken in equal amounts, were converted into fine powder separately. For *Kwatha* preparation, soak these coarse powders in 8 times of potable water for the whole night (12 hrs). Gently heat the mixture to boil and continue the boiling to reduce the volume of the mix to the fourth of its original volume. Then the binder solution of 5% gum acacia powder was prepared by adding the required quantity of water. To get in the form of *Ghana,* filtered *kwatha* is then reduced to a stage where material becomes 'thick sticky mass'. The obtained damp material is spread in a 5-7 mm thick layer in a stainless

steel tray. This tray was kept in a hot air tray dryer at 55 0 C. Finally, the tablets were compressed in a rotatory multi-station tablet punching machine fitted with the punches and die of 500 mg. Store and pack the *Vati* in an airtight container to protect them from moisture and light.

Figure No 2: Pharmaceutical unit operation of tablet formation

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Determination of Total Ash: About two gm accurately weighed the ground drug in a silica dish at a temperature not exceeding 450º C. Determination of Acid Insoluble Ash: Boil the ash from the procedure mentioned above for 5 minutes with 25 ml of diluted HCl, collect the insoluble matter on an ash-less filter paper, wash with hot water and ignite to constant weight.

Determination of Water-Soluble Ash: Boil the ash for 5 minutes with 25 ml of water; collect insoluble matter on an ashless filter paper, wash with hot water, and ignite for 15 minutes at a temperature not exceeding 450 º C. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash.

Determination of Alcohol Soluble Extractive: Macerate 5 gm of the air-dried drug, coarsely powdered, with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, frequently shaking for six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105 º C to constant.

Determination of Loss on Drying (Moisture Content): Place about 10 gm of the drug (without preliminary drying) after accurately weighing (accurately weighed to within 0.01 gm) it in a tared evaporating dish. After placing the above-said amount of the drug in the tared evaporating dish, dry at 105 º C for 5 hours and weigh. Continue the drying and weighing at one-hour intervals until the difference between two successive weighing corresponds to less than 0.25 per cent. Constant weight is reached when two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in a desiccator show not more than 0.01 g difference10. **Uniformity of Weight/ Weight variation test**: The test for uniformity of weight is performed by weighing 20 tablets randomly selected from a tablet batch and determining their weights. The individual weights are compared with the average weight10.

Disintegration Time Test: For tablets, the first important step towards drug dissolution is a breakdown of the tablets into granules or primary powder particles, a process known as disintegration. The apparatus consists of a basket-rack assembly containing six open-ended transparent tubes held vertically upon a 10-mesh stainless steel wire screen. During testing, a tablet is placed in each of the basket's six tubes, and through a mechanical device, the basket is raised and lowered in a bath of fluid at 30 to 32 cycles per minute for 15 minutes.[5]

RESULT AND DISCUSSION

Table No 2: Organoleptic properties:

Colour	Dark Brown
Odour	Characteristic
Taste	Pungent
Consistency	Tablet

Table No 3: Physiochemical parameters of Saptasaram Ghana Vati:

PARAMETER	RESULT
Loss on Drying at 110 c (%w/w)	1.70
Total Ash Value(%w/w)	7.3

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Acid Insoluble Ash (%w/w)	4.0
Water Soluble Extractive (%w/w)	63
Alcohol Soluble Extractive(%w/w)	11
Tablet Average Weight (in mg)	530Mg
Tablet Hardness (kg/ cm^2)	4kg/cm^2
Tablet Friability Test (%w/w)	5.9
Tablet Disintegration Time (in minutes)	17.30

Chromatograph profiling by HPTLC:

Instrumentation: A CAMAG HPTLC system equipped with LINOMAT 5 applicator fitted with 100 µl syringe, CAMAG TLC scanner, and winCATS software was used.

Chemicals and solvents: All the solvents used were of chromatography grade, and all the chemicals used were of analytical reagent grade. Preparation of 1 ml methanolic extract of Saptsaram ghana vati was used as a test solution for the HPTLC study.

Chromatographic conditions The HPTLC was performed on 7.0 × 10.0 cm precoated silica gel 60 F 254 HPTLC plate. No pre-washing and modification of the plate were done. The sample solution was applied as bands to the plate by CAMAG Linomat applicator fitted with 100 µl syringe (Table 1). The stable application rate was 150 nl/s. The sample loaded plate was kept in automatic development chamber with mobile phase—toluene ethyl acetate (8:2 v/v/). Densitometric scanning was performed with CAMAG TLC scanner-4 equipped with winCATS software. The bands were visualized using CAMAG visualizer, and the images were captured in white light and 254 nm (short UV) and 366 nm (long UV) wavelengths (Table 2). When exposed to short-wave UV light of 254 nm, UV-active compounds will undergo fluorescence quenching and appear as dark spots on a bright background. Conversely, compounds that absorb 366 nm UV light will appear as bright spots on a dark background [6].

Table No 4

Track	Vial ID	Description	Volume	Position	Type
1	1	*Saptasaram ghana vati*	5.0 µl	N/A	Reference
2	1	*Saptasaram ghana vati*	10.0 µl	N/A	Reference
3	1	*Saptasaram ghana vati*	15.0 µl	N/A	Reference

Table No 5

Parameters used for HPTLC:

Calibration Parameters:

Calibration mode	Single level
Statistics mode	CV

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Evaluation mode	Peak height

Linomat 5 application Parameters:

Sample solvent type	Methanol
Dosage speed	150nl/s
Predosage volume	0.20ul
Syringe size	100 µl
Application position	Y;8.0mm, length :8.0mm, width: 0.0mm
Solvent front position	80mm
Band length	8.0mm

Integration Parameters:

Bounds	(-0.001, 1.000)
Smoothing	Savitzky- Golay of order 3 and window 7
Baseline correction	Lowest slope with noise 0.05
Profile subtraction	None
Peaks Detection	Gauss (legacy) with sensitivity 0.1, separation 1 and threshold 0.1

Measurements

Wavelength	254nm
Measurement Mode	Absorbance
Detector Mode	Automatic
Lamp	Deuterium & Tungsten

RESULTS

The HPTLC analysis of *Saptasaram Ghana Vati* revealed the presence of various phytochemicals as illustrated in the figures and tables below.

The chromatograms (Fig 3) were obtained upon scanning at UV 254 nm, and peak tables were generated. The Rf values, peak height, peak area, and percent area of the unknown substances are depicted in the figures (Fig.4,5)

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Figure no 3

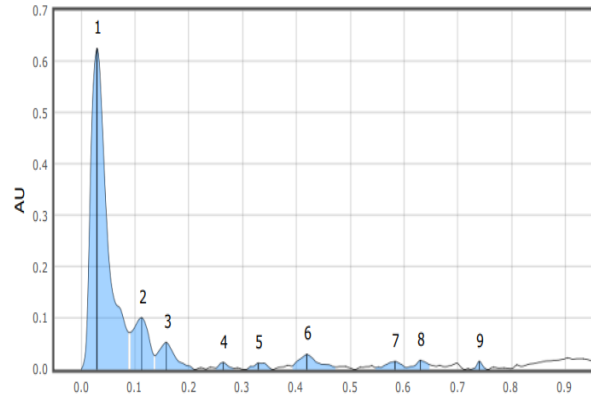

Figure No 4

dr.nidhi 24-03-23_20230324_145024 visionCATS

Peak #	Start R_F	Start H	Max R_F	Max H	Max %	End R_F	End H	Area A	Area %	Manual peak	Substance Name
1	0.000	0.0000	0.029	0.6259	70.76	0.089	0.0718	0.02262	72.53	No	
2	0.090	0.0716	0.113	0.1009	11.41	0.136	0.0274	0.00351	11.25	No	
3	0.138	0.0272	0.158	0.0527	5.96	0.211	0.0000	0.00188	6.04	No	
4	0.250	0.0027	0.264	0.0135	1.53	0.285	0.0021	0.00027	0.85	No	
5	0.304	0.0000	0.329	0.0126	1.42	0.356	0.0000	0.00036	1.16	No	
6	0.392	0.0067	0.419	0.0294	3.33	0.474	0.0047	0.00126	4.05	No	
7	0.547	0.0035	0.583	0.0155	1.75	0.606	0.0036	0.00054	1.73	No	
8	0.606	0.0036	0.631	0.0178	2.01	0.660	0.0064	0.00055	1.76	No	
9	0.724	0.0004	0.740	0.0162	1.83	0.756	0.0000	0.00019	0.62	No	

Figure No 5

DISCUSSION

The HPTLC performed on the methanolic extract of *Saptasaram Ghana Vati* showed the presence of various phytoconstituents in different concentrations as illustrated in figures and tables. The chromatogram scanned at 254 nm represents 8-9 peaks in (Figure no 3). The number of peaks indicates the presence of different phytoconstituents present in the sample. The Rf values (Figure no 4) calculated for the phytoconstituents present in the tested sample would be helpful in the identification of the unknown compounds by comparing them with the reference standards, and from the values of peak area, the concentration of the compounds can be determined. The bands of separated compounds can be seen (Figure no 5) on the TLC plates visualized under white light and UV of wavelengths 254 nm.

The findings of the present study are limited to the HPTLC analysis methanolic extract to estimate the presence of different phytochemicals from the chromatogram peaks and obtain the peak tables.

CONCLUSION

The contents of *Saptasaram Ghana Vati* are predominantly *Vata Shamaka*, work on vitiated *Vata Dosha*. All the ingredients were proven authentic and readily available in the market.

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The development of the present study will also serve as reference standards for drug formulation and help in further pre-clinical and clinical research studies.

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