

ORA- Analytical Study



Preparation, Physicochemical Standardization with Gas Chromatography – Mass Spectrometry Analysis of *Drakshadi Taila* and its role in Nasal Disorders

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ABSTRACT:

Background: *Nasya karma* (Nasal instillation of medicine) is the procedure mentioned in Ayurveda where the medicine is given through nose. Preparation of *Drakshadi Taila* as explained in *Vaidya Chintamani* in the management of *Nasagata Rogas* (Nasal disorders), so the objective is to prepare and finding out the physico-chemical, organoleptic properties of the oil. **Aim:** To study the preparation, assuring the safety and identification of phytoconstituents and its potential mode of action in the management of Nasal disorders. **Objectives :** To understand the preparation of *Drakshadi taila* with ingredients *Draksha*, *Shunthi*, *Vidanga*, *Pippali*, *Kushta*, and *Tila Taila*, by classical method of *taila Kalpana*. To determine the analytical tests like physico - chemical parameters, and tests for heavy metals to assure the safety, purity of drug. Gas chromatography-mass spectrometry analysis to investigate potential properties of *Drakshadi taila*. **Material and methods** - For this study Ayurveda Samhitas authentic publications, the internet and modern medical literature, Instrumental analysis GC-MS carried out with instrument Shimadzu. **Result and Discussion** – The formulation complied with API standards like specific gravity less than 0.969, saponification value (190.26) less than 195, and peroxide value 1.41 Meq/kg, tests for heavy metals like lead, mercury, cadmium, and arsenic and it is under permissible limits, microbiological testing shows no detectable pathogenic contamination, all these fulfils WHO/API safety standards. GC-MS reveals 25 phytoconstituent molecules like Tetratetracontane, Glycidyl palmitoleate, etc aligning with the medicinal properties like anti- inflammatory, anti-asthmatic etc. **Conclusion** – As this drug is not mentioned in Ayurvedic Pharmacopoeia of India (API) and this is to establish the applicability of *Drakshadi Taila Nasya* in nasal disorders through quality control parameters mentioned in API includes physicochemical, microbial parameters and tests for heavy metals etc. to ensure its identity, purity and safety. Hence this study helps in validating the formulation in management of nasal disorders.

KEYWORDS: *Drakshadi Taila*, *Sneha Kalpana*, *Vataja Pratishyaya*, *Nasagatarogas*, GC-MS, Allergic rhinitis etc.

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1. INTRODUCTION

Sneha Kalpana as explained in Ayurvedic texts as a preparation technique for oil or *ghee*. It is the pharmaceutical procedure to prepare oleaginous substances by using substances like *Kalka (paste)*, *Drava dravyas* (Decoction), and *Sneha Dravya* (oil) in specific proportions. This method changes active medicinal properties included in the raw materials to the *taila* (oil). *Drakshadi Taila* as mentioned in *Vaidya Chintamani* in *Nasa Roga Prakaranam* in the management of all of *Nasagata Rogas*. [1] The preparation of *Drakshadi Taila* which includes ingredients like *Draksha (Vitis vinifera)*, *Shunthi (Zingiber officinale)*, *Vidanga (Embelia ribes)*, *Pippali (Piper longum)*, *Kushta (Saussurea lappa)* and *Tila Taila*. [1] As modern lifestyle human body is exposed to many allergens, pollens, dust mites, molds etc. and nasal mucosa is first line of defence against the allergens. This results into inflammatory reaction of nasal mucous membrane and causes activation of mast cells releases inflammatory mediators in the release of inflammatory mediators such as histamine, leucotrienes that causes cellular infiltration, oedema, nasal obstruction, rhinorrhoea etc. All these symptoms significantly interfere with routine daily activities. [2]

Drakshadi taila made utilizing the *Sneha Kalpana* method described in the Ayurvedic Classics, and physicochemical analysis and preliminary analytical standardization are carried out to determine its probable mode of action on nasal disorders. Gas chromatography–mass spectrometry (GC-MS) is essential for quality control and phytochemical profiling. Because it provides a way to identify the bioactive components of the *taila*. It is the method that offers the possibility of quantitative analysis. In this study *Drakshadi taila* is prepared as mentioned in *Vaidya Chintamani* according to *Sneha Kalpana* and GC-MS analysis is done to identify certain bioactive compounds found in complex formulation is specific for confirming and improving the *taila*

for its traditional applications, and to ensure its quality, safety, and probable mode of action in managing nasal disorders.

2. AIM AND OBJECTIVE:

Aim of the study

To understand the efficacy of *Drakshadi Taila* when given in the form of *nasya* in Nasal disorders through pharmaceutical analysis and Standardization by modern quality standards through comprehensive organoleptic, physicochemical, microbial analyses and GC-MS analysis.

Objective of study

1. To determine organoleptic characteristics Color, form, odor, and physicochemical analysis and also the GC-MS Analysis.
2. To check for safety of the oil with microbial limit test.
3. To analyze phytoconstituents of *Drakshadi Taila* in managing Nasal disorders.

3. MATERIALS AND METHODS :

Collection and Authentication of Raw drugs materials

Draksha (Vitis vinifera), *Shunthi (Zingiber officinale)*, *Vidang (Embelia ribes)*, *Pippali (Piper longum)*, *Kushta (Saussurea lappa)* and *Tila Taila (Borassus flabellifer)* were collected from KLE Society's AYURVEDA PHARMACY, GMP-certified unit in Khasbag, Belagavi, Karnataka. All these raw materials were verified and authenticated at the ASU Drug Testing Laboratory (AYUSH approved ASU Drug Testing Laboratory), part of the Central Research Facility at SHRI B.M.K. AYURVEDA MAHAVIDYALAYA, Belagavi, Karnataka.

Instruments used for the analysis:

1. GC-MS Analysis – Shimadzu, model used is GCMS-QP 2010SE, Gas- Helium
2. Loss on drying - Halogen moisture analyzer (Temp 40–200 °C)
3. Saponification value - Reflux apparatus and titration with a standard burette
4. Refractive index - Abbe refractometer (1.300–1.700 RI) at 40 degree celcius

5. Specific gravity – Pycnometer (25–50 mL, at 25 degree celcius)
6. Tests for heavy metals – Atomic Absorption Spectrophotometer, Model: PerkinElmer AAnalyst 400, Detection limit -0.001–0.01 ppm
7. Tests for micro-organisms -It is done using sterile techniques in a laminar air flow cabinet, incubated in a temperature-controlled incubator (37 °C for bacteria, 25 °C for fungi), and observed under a compound microscope.

Voucher specimen numbers for drugs *Draksha* (CRF/Auth/10/2025-26), *Shunthi* (CRF/Auth/11/2025-26), *Kushta* (CRF/Auth/106/2025-26), *Vidanga* (CRF/Auth/107/2025-26), *Pippali* (CRF/Auth/538/2024), *Tila taila* (CRF/RM/3382024-25).

Method of preparation

Process of preparation of *Drakshadi taila* starts with collecting the raw herbal ingredients and drying them thoroughly. The dried materials are *Draksha*, *Shunthi*, *Vidanga*, *Pippali*, *Kusta* are grinded into a *churna* (coarse powder of 80 mesh size). *Drakshadi Taila* was prepared as per the reference of Vaidya Chintamani in KLE Society's AYURVED PHARMACY, GMP-certified unit in Khasbag, Belagavi, Karnataka.

Table 1 : Ingredients and proportions of *Drakshadi taila*

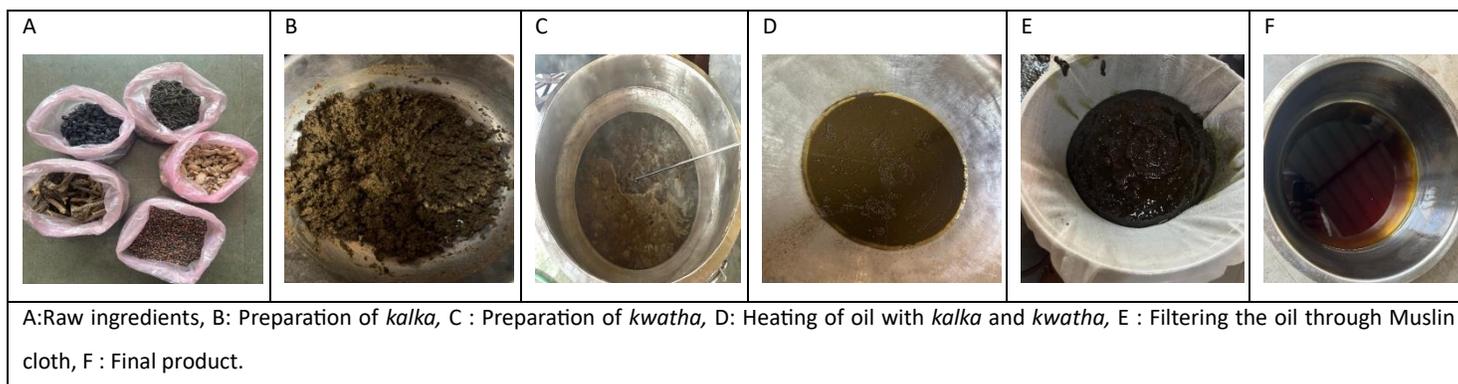
No.	Drug	Latin Name	Part used	Proportion
1.	<i>Draksha</i>	<i>Vitis vinifera</i>	Fruit	1 Part
2.	<i>Shunthi</i>	<i>Zingiber officinale</i>	In powder form	1 Part
3.	<i>Vidanga</i>	<i>Embelia ribes</i>	Seed	1 Part
4.	<i>Pippali</i>	<i>Piper longum</i> Linn.	Fruit	1 Part
5.	<i>Kushtha</i>	<i>Saussuarea lappa</i>	Root	1 Part
6.	<i>Tila taila</i>	<i>Borassus flabellifer</i>	Seed	4 Parts

The *kwatha* is prepared by taking *Draksha*, *Shunthi*, *Vidanga*, *Pippali*, *Kusta* are taken each 320gms totally 1.6kg of raw ingredients and are added into 10 parts of water that is 16 liters of water is taken as mentioned in the reference. [1] Applying constant mild heat until the volume of water reduced to 1/4th of the initial quantity. After reduction of the volume, 4 liters of *kwatha* was filtered through four folded cotton cloth and collected in a separate vessel and the residue present above cloth was discarded. Guidelines for *Taila* preparations are taken as per mentioned in the *Sneha Kalpana* and *kalka* is prepared by taking *Draksha*, *Shunthi*, *Vidanga*, *Pippali*, *Kusta* are taken in equal quantity as 50gm each These powdered herbs are taken 250gm to form the *Kalka dravya* (paste) by adding sufficient water to it. [3] Then as mentioned in [table no. 1](#), ¼ th part of *kalka* is prepared by taking *churna* of *draksha*, *shunthi*, *vidanga*, *pippali*, *kusta* in above mentioned quantity, 1 part of *tila taila* and 4 part of *kwatha* is prepared is taken. [1,3] By heating the 1 litre of *Tila Taila* in clean wide mouthed vessel that is heating the base oil, over *Manda Agni* (mild heat) until any froth has dissipated. This step marks to remove extra moisture content from the oil. Once the oil is free from froth, the liquid (*kwatha*) and paste (*kalka*) are added. Then the mixture is boiled on mild flame with continuously the mixture is stirred. [3]

Drakshadi taila is boiled on mild flame until the *Sneha Siddhi* then *taila* (oil) was filtered through a clean cloth, the obtained *taila* (oil) was measured and preserved in wide mouthed glass container.

Taila siddhi lakshana like able to role the *varti* of *kalka*, no any crackling sound heard when oil is heating over fire, froth is observed at the end if *taila*, dark brown colour was observed, odour of drugs is observed. [3]

Figure.1 : Stages in the preparation of *Drakshadi Taila* :



Analysis:

Place of analytical study: This study was carried out in the quality control laboratory of the teaching pharmacy of department of Rasashastra and Bhaishajya kalpana, SHRI B.M.K. AYURVEDA MAHAVIDYALAYA, Belagavi, Karnataka.

Place of gas chromatography: mass spectrometry (GC-MS): Amrith Labs (Nisargam Private Limited), Shimogga, Karnataka.

Instrument for Gas chromatography: GCMS-QP 2010SE Gas chromatography Shimadzu model.

Sample Preparation: 0.1ml sample was diluted with 10ml of petroleum ether and 1micro litre extract was injected and above instrument is used. After agitation of the sample for 10 seconds the sample was taken for gas-chromatography for analysis.

GC-MS protocol : The of 0.1 mL of the Taila sample was diluted with 10 mL of petroleum ether and a non-polar extract was prepared, filtered through a syringe filter (Nylon 13mm 0.2µm) and injected to GCMS. The GC–MS column consisting of DB 5MS (30 mm × 0.25 mm diameter × 0.25 micro meter thickness). Analysis was performed by injecting 1 µl of the sample with injection temperature 280.00 degree celsius and a split ratio 1:10. Helium gas (99.999%) was used as a carrier gas with a flow rate of 19.5ml/min. The analysis was performed in the EI (electron impact) mode with 70 eV of ionization energy. The injector temperature was maintained at 280°C constant. The compounds are identified by GC–MS

Library (NIST and WILEY). The ion source temperature was pointed at 200°C and interface temperature was pointed at 300°C. The solvent cut time was 1.40 min, minimizing solvent interference and the detector gain mode was set relative to the tuning result with a gain of 0.95 kV.

Oven temperature -

Rate	temperature (degree celcius)	hold time (min)
-	- 80.0	2.00
10.00	- 280.0	- 10.00
20.00	- 330.0	- 5.00

Mass Spectrometry, Group 1- Event:

Start time: 2 min; Scan speed: 1666
 End time: 33 min; Start m/z : 35.00
 ACQ mode: Scan; End m/z : 500.00
 Event time: 0.30 sec

These conditions are set and allowed for precise separation and identification of analysts.

4. OBSERVATIONS AND RESULTS OF ANALYTICAL STUDY:

Table 2: Organoleptic characters:

No	Particulars	<i>Drakshadi taila</i>
1	Appearance	Viscous liquid
2	Colour	Greenish brown
3	Odour	Pleasant

Table 3: Physico- chemical characteristics of *Drakshadi Taila*:

No.	Parameters	Permissible limits (API)	<i>Drakshadi taila</i>
1	Loss on drying (110degree celcius)	-	0.024%
2	Saponification value	180 and 200	190.264
3	Iodine value	80 to 110	144.115
4	Refractive index at 40 degree celcius	1.461–1.463	1.481
5	Acid value	≤5	3.362
6	Specific gravity	0.784–0.940	0.96
7	Peroxide value (Meq/kg)	≤5–6	1.41 Meq/kg

Table 4: Tests for specified Micro- organisms (Qualitative):

Sl no.	Bacteria	Limits	Results
1	<i>E. coli</i>	Absent / 100ml	Absent
2	<i>S. aureus</i>	Absent / 100ml	Absent
3	<i>P. aeruginosa</i>	Absent / 100ml	Absent
4	<i>S. abony</i>	Absent / 100ml	Absent

Table 5: Microbial limit test (Quantitative):

Sl no.		Limits	Results
1	Total Bacterial Count	30-300 cfu/ml	No growth
2	Total Fungal Count	10-100 cfu/ml	No growth

*cfu=colony forming units

Table 6: Tests for heavy metals:

Sl no.	Parameter	Results	Permissible limits (API)
1.	Lead (Pb)	Less than 0.1ppm	10 ppm
2.	Arsenic (As)	Less than 0.1 ppm	3 ppm
3.	Cadmium (Cd)	Less than 0.1 ppm	0.3 ppm
4.	Mercury (Hg)	Less than 0.1 ppm	1 ppm

*ppm= parts per million

Quantity of *taila* taken and loss:

***Taila* : Quantity**

Total *taila* taken-1 Litre

Obtained *taila*- 800 ml

Loss of *taila* -200 ml

GC-MS Analysis

Table 7: The retentions values, the types of possible compound, peak height, their Functional group and medicinal roles of each compound of GC–MS profile of *Drakshadi Taila*

No.	Retention time	Name of compound	Mol. formula	Mol. Wt.	Library used	% peak area	Possible medicinal role
1.	10.251	Caryophyllene	C15H24	204.35	NIST 20	0.20	Anti-cancer, Analgesic, anti-inflammatory activity. [4]
2.	10.594	Tetradecane	C14H30	198.38	NIST 20	0.14	It is active against gram positive and negative bacterias. [5]
3.	10.776	Trans-alpha-Bergamotene	C15H24	204.35	NIST 20	0.22	Anti-inflammatory, analgesic, anti-oxidant. [6]
4.	10.932	Beta-Bisabolene	C15H24	204.35	NIST 20	0.15	Anti-tumour, anti-inflammatory. [7]
5.	20.888	Dihydrodehydrocostus lactone	C15H20O2	232.32	NIST 20	0.37	Anti-inflammatory, immunomodulatory action. [8]
6.	21.724	Dehydrocostus lactone	C15H18O2	230.30	NIST 20	9.14	anti-inflammatory, anti-microbial activities, anti-cancer abilities. [8]
7.	21.590	Hexacosane	C26H54	366.71	NIST 20	1.55	Anti-inflammatory, anti-microbial activity. [9]
8.	21.831	Tetratetracontane	C44H90	619.20	NIST 20	7.84 + 22.11 =	Anti-oxidant activity, antibacterial properties. [10] [14]

						29.95	
9.	22.067	2-Methylhexacosane	C27H56	380.75	NIST 20	0.71	Not known
10.	22.950	Heptadecanenitrile	C17H33N	251.46	NIST 20	1.69	Not known
11.	24.217	Glycidyl palmitate	C19H36O3	312.49	NIST 20	1.44	anti-asthma, antimicrobial, anticancer, anti-inflammatory activity. [11, 12]
12.	26.178	Glycidyl palmitoleate	C19H34O3	310.5	NIST 20	11.66	anti-asthma, antimicrobial, anticancer, and diuretic activities. [11]
13.	26.283	Sesamin	C20H18O6	354.35	NIST 20	7.70	Antioxidant, anti-inflammatory, anti-ulcer & wound healing, antimicrobial [13]
14.	21.421	Pentacosane	C25H52	352.69	NIST 20	2.14	Anti- bacterial activity. [15]
15.	29.285	5,5-Dimethyl-cyclohex-3-en-1-ol	C8H14O	126.20	NIST 20	0.67	Not known

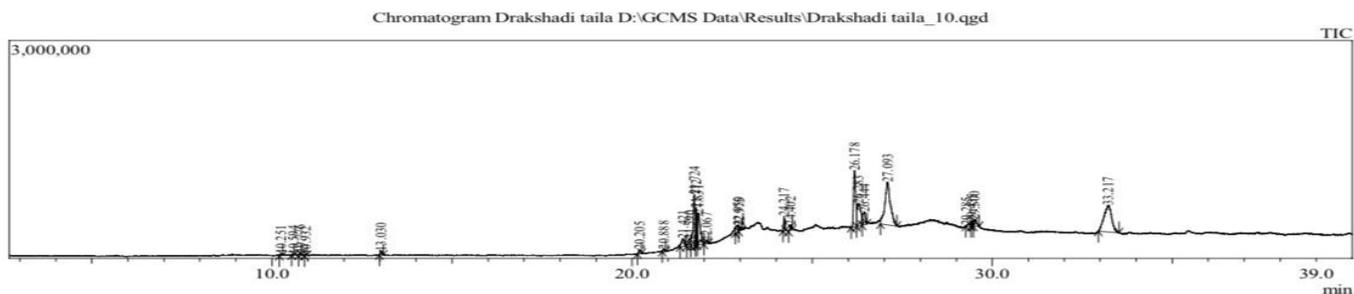


Figure 2. Represents the GC–MS profile of *Drakshadi taila*

Hit#:5 Entry:43364 Library:NIST20M2.lib
 SI:88 Formula:C44H90 CAS:7098-22-8 MolWeight:618 RetIndex:4395
 CompName:Tetratetracontane SS n-Tetratetracontane

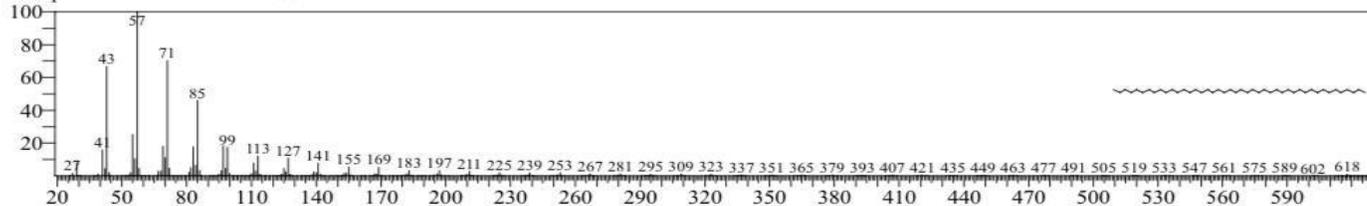


Figure 3. Tetratetracontane

Hit#:1 Entry:175431 Library:NIST20M1.lib
 SI:89 Formula:C19H34O3 CAS:213738-77-3 MolWeight:310 RetIndex:2176
 CompName:Glycidyl palmitoleate \$\$ 9-Hexadecenoic acid, 2-oxiranylmethyl ester, (9Z)- \$\$ 9-Hexadecenoic acid, oxiranylmethyl ester, (9Z)- \$\$ Palmitoleic

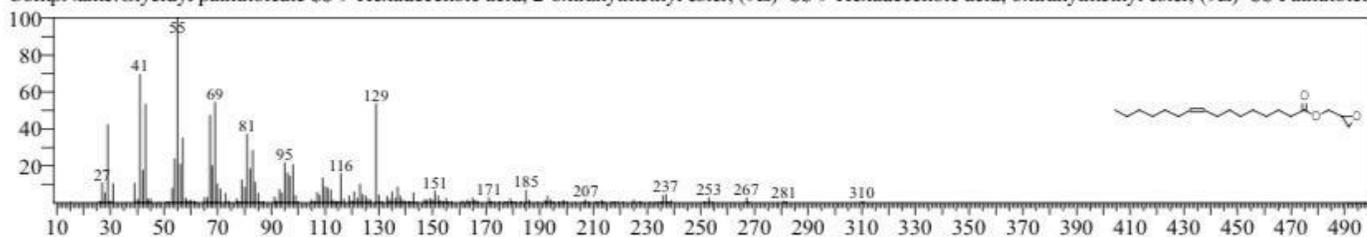


Figure 4. Glycidyl palmitoleate

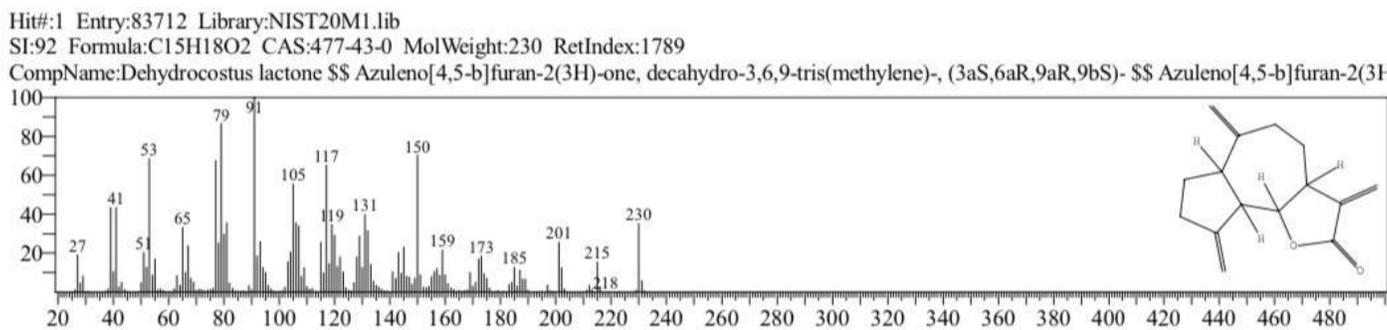


Figure 5. Dehydrocostus lactone

5. DISCUSSION:

Discussion on probable mode of action of *Drakshadi taila* according to Ayurvedic and Contemporary Perspective:

In modern lifestyle individuals are increasingly exposed to multiple allergens, due to air pollution, chemical irritants etc. and nose is the primary gateway for air and it is being continuously exposed to allergens. This continuous exposure may result into inflammatory reactions, primary results releasing IgE causes mast cells activation and releases mediators like histamine results into progression of nasal disorders like allergic rhinitis, chronic rhinosinusitis, and nasal polyposis etc. and this results into increase in oxidative stress that causes epithelial damage, impaired mucociliary clearance, and alters integrity of the nasal mucosa. Such changes result into deeper allergen penetration and immune activation resulting into chronic nasal disorders. *Drakshadi taila* is the formulation mentioned in *Vaidya chintamani* is indicated for all *Nasagata Rogas* (Nasal disorders), includes ingredients such as *Draksha* (*Vitis vinifera*), *Shunthi* (*Zingiber officinale*), *Vidang* (*Embelia ribes*), *Pippali* (*Piper longum*), *Kushta* (*Saussurea lappa*) and *Tila Taila*.

***Draksha* (*Vitis vinifera*)** is considered *Vata-pittahara* because of its *Madhura rasa* and *Vipaka* and *Sheeta Virya*. [16] It helps to balance *Vata* and *Pitta doshas* in the body, it is known for its antibacterial, anti-inflammatory activity also it has Anti-asthma activity as gallic acid contained in the alcoholic extract of dried fruits of *draksha* acts as an anti-asthmatic action by improving lung functioning with increasing lumen size and

decreasing cellular infiltration. [16] Anti flavonoids, proanthocyanins are natural compounds may help to overcome chronic inflammation and are a good natural source of antioxidants, can reduce the risk of oxidative damage reducing oxidative stress. [16]

***Shunthi* (*Zingiber officinale*)** *Shunthi* has *ushna Virya* (hot potency) and *Madhur Vipak, Katu Rasa sleşma-vilayana* (mucolytic) and *Srotoshodhaka* (purification of channels) contributes to *Kapha vatahara* properties. It has *Swasa, Kasahara* (cough) and *shothaghna* (relieves inflammation) properties [17] and mucolytic action of *Shunthi* on local application through *nasya* may result into mucociliary clearance suggests removal of thick mucus, debris, allergens, and pathogens results in improving airflow and nasal obstruction. [17]

***Pippali* (*Piper longum*)** It is mentioned as *Shirovirechaniya Dravya* in classics. It alleviates the vitiated *Kapha, Pitta* and *Vata dosha* and is used to treat the disorders that arise due to misbalance in *Kapha, Vata* also *Shunthi* has *ushna Virya* (hot potency) and *Madhur Vipak, Katu Rasa sleşma-vilayana* (mucolytic) and *Srotoshodhaka* (purification of channels) contributes to *Kapha vatahara* properties. It has *Swasa, Kasahara* (cough) and *shothaghna* (relieves inflammation) properties [17] and mucolytic action of *Shunthi* on local application through *nasya* may result into mucociliary clearance suggests removal of thick mucus, debris, allergens, and pathogens results in improving airflow and nasal obstruction. [17]

Kushta (*Saussurea lappa*) It helps to eliminate excess *kapha dosha* from the respiratory tract as it contains *tikta, katu rasa, rooksha guna, ushna virya* and *tiksha guna* helps to penetrate into deeper channels. [19] The extract of extract of *kushta* has shown effect against chronic bronchitis and asthma, also activities such as anti-inflammatory, antimicrobial and antiviral activity activities, which may be useful in managing inflammatory nasal disorders. [19]

Vidang (*Embelia ribes*) It is also one among *Sirovirechana dravya* and *Katu, Tikta rasa, Ushna Virya, Katu Vipaka* and possesses *vatahara properties*. It does *shirovirechana* and *expelling doshas from head when given in the form of nasya* hence may be effective in reducing inflammation of tissues of sinuses. [20] *Vidanga* is having antibacterial, lung diseases, fungus infections, sore throat, pneumonia, analgesic, anti-inflammatory, antioxidant etc. [20] *Vidanga* contains Embelin it is a plant-based benzoquinone derivative found to have significant anti-tumour activity and anti-inflammatory action, which may be effective in managing conditions with chronic inflammatory condition of nasal mucosa. [20]

Tila taila (Sesame oil) The saponins in sesame oil contains alphanatocopherol and gamma-tocopherol, which act as powerful antioxidants may help in reducing oxidative stress in inflammatory conditions of nasal mucosa. [21] *Tila taila* possesses *snigdha* (unctuous) and *sookshma* (penetrating) qualities, *vyavayi gunas* (quick acting) along with *vata-kaphahara* action which is ideal for *nasya* (nasal) administration. [21] also contains *Tikta rasa* which possess *lekhana* property, aiding in *srotoshodhana* (clearing minute channels), releasing *dosha avarana* (obstruction of toxins) when administered locally through *nasya*. [23]

Discussion on Physico-chemical parameters :

The greenish brown colour and pleasant odour indicate appropriate extraction and preservation of phytoconstituents during the *Sneha paka* process. As mentioned in [table no. 3](#), The saponification value of *Drakshadi taila* is 190.264, means

it suggests that the oil contains short to medium chain fatty acids. [24]. A high saponification value suggests that the oil is lighter, more absorbable and more spreadable on mucosal surface. Iodine value 144.115 suggest the oil is rich in polyunsaturated fatty acids. [26] A refractive index of 1.481 at 40°C falls under upper range of *Eranda taila* (castor oil) and near within acceptable limits for herbal oils, confirming no adulteration. [27] According to standards of API loss on drying is a measure of amount of water and volatile substances lost when the substance is heated under specified conditions. A result of 0.024% is extremely low suggesting the oil is highly stable and with minimal moisture so that reducing the risk of microbial contamination. Acid value suggests presence of free fatty acids 3.362 indicates minimal hydrolytic degradation suggests less moisture content and good stability. Specific gravity of *Drakshadi taila* reported as 0.969 which is lower than water suggests less moisture content suggests that the oil is not adulterated. [25] Peroxide value reported is 1.41 meq/kg, as it is less than 10 mEq O₂/kg suggestive that the oil with oxidative stability and with less rancidity as mentioned in API. [28] The microbial analysis is provided essential validation of safety. The absence of *E. coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Salmonella* confirms the aseptic conditions during preparation, suggests its safety as shown in table 4. [30] Microbial limit test reported no any bacterial and fungal growth is shown suggests safety and stability of *taila* according to standard limits mentioned in API (table no.5). [30] Tests for heavy metals was done for Lead, Mercury, Arsenic, Cadmium reports suggest all these metals are present in less than 0.1 ppm and are under the permissible limits as described in API Standards mentioned in [table no. 6](#). These tests depict safety, stability of drug as presence of heavy metals are capable of causing neurotoxicity and mucosal irritation when given in the form of *nasya*. [29] All this tests together suggests that *Drakshadi taila* is

matching with API standards for general safety, stability limits for *taila* and suggests its suitability for nasal administration.

Discussion on GCMS analysis of *Drakshadi Taila* :

The GC-MS analysis of *Drakshadi Taila* revealed presence of 25 bioactive compounds such as terpenes, hydrocarbons, lactones, amides, fatty acid, and alcohol derivatives along with its retention time and peak areas as depicted in [table no. 7](#). Among these 25 compounds 15 compounds are taken with higher percentage areas and its pharmacological action can be referred from previously conducted researches as shown in [table no 7](#). along with graphical presentation mentioned in [figure no 2](#). It detected compounds such as Caryophyllene [4] (10.251), Trans- α -Bergamotene [6] (10.776), β -Bisabolene [7] (10.932) and Sesamin [13] (26.283). Tetratetracontane [10, 14] was observed with two different retention time with 7.84% and 22.11% peak area that identified for having anti-oxidant properties that suggests its activity on reducing oxidative stress contributes to nasal mucosal oedema, sneezing, nasal polyposis. [10, 14] Glycidyl palmitate [12] and Glycidyl palmitoleate are fatty acids which are precursor of prostaglandin biosynthesis and are important constituent of cellular membranes that help in epithelial repairing during inflammatory reaction of nasal mucosa. [11] Dehydrocostus lactone with peak percentage area (9.14%) contributes to transcriptional regulation of COX-2 gene, which plays important role in the progression of cancer by increasing proliferation and resistance to apoptosis. [8] Hence it may suggest its potential in regulating different stages of tumour development, those observed in nasal polyps. Similarly Beta-Bisabolene present with less quantity (0.15%) have shown Anti-tumour activity. [7] Sesamin with 7.70% peak area have shown properties like antioxidant, anti-inflammatory, anti-ulcer & wound healing, antimicrobial, Antinociceptive activity as it consists wound healing properties that may help supporting mucosal integrity and epithelial repair of nasal mucosa support suitability in Atrophic rhinitis. [13] Similarly

Pentacosane (2.14%) [15], Tetradecane (0.14%) [5] have shown anti-bacterial activity which suggests its suitability when it administered in the form of nasal route. [5] Also presence of Caryophyllene (0.20%) has analgesic and anti-cancer action although it is present in mild quantity, [4] Trans- α -Bergamotene (0.22%) [6], Hexacosane (1.55%) [9] mainly have anti-inflammatory action, which may also contribute in the management of nasal disorders.

Limitation of the study: As there is absence of API monograph standards for newly formulated *Taila* limits definitive interpretation of phytochemical analysis. These formulations was newly prepared and evaluated using a single laboratory batch, so for batch to batch preparation is required so confirmatory standard analytical evaluation can be drawn.

6. CONCLUSION:

The evaluation of *Drakshadi taila* establishes its preliminary standardization through classical ayurvedic methodology and its usefulness with the help of analytical parameters like physico-chemical tests, microbial limits, tests for heavy metals and GC-MS analysis. These analytical tests provide baseline data that the *taila* possesses desirable organoleptic and physicochemical qualities, along with microbial safety, making it suitable for therapeutic use especially for nasal route. Also the GC-MS analysis of *Drakshadi Taila* revealed the presence of diverse bioactive compounds, including major constituents such as Tetratetracontane (22.11%), Glycidyl palmitoleate (11.66%), Dehydrocostus lactone (9.14%) and sesamin (7.70%) etc as mentioned in [table 7](#), were identified along with some other phytoconstituents. Based on previous studies these compounds suggests for their anti-inflammatory, antimicrobial, antioxidant, immunomodulatory and analgesic properties which supports scientifically the traditional therapeutic applications of *Drakshadi taila* mentioned in classics in the management of nasal disorders. Based on all scientific analytical evaluation,

the formulation indicates its suitability and safety for integrative management of nasal disorders.

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