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Pharmaceutico-Analytical and Antimicrobial Study on *Pruthvisar Tailam*

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ABSTRACT

Pruthvisar Tailam is one of the herbal preparations mentioned in *Bhaishajya Ratnavali* for the treatment of skin diseases. This is one of the rare formulations prepared by different and unique pharmaceutical process. This oil is prepared by *Suryapakam* process (oil and ingredients are mixed and subjected to strong sunlight till desired resultant is obtained). *Sneha* is a best media which can pass easily through the lipid membrane present in the skin. However very few research work has been done on this oil and oil based on *Suryapakam* process, also there is lack of enough analytical, anti-microbial and clinical evidences on the efficacy of the oil in skin ailments. Hence *Pruthvisar Tailam* is emerged as better and efficacious option for skin ailments with unique pharmaceutical procedure.

Key words: *Analytical Study, Antimicrobial Study, Pruthvisar Tailam, Suryapakam Process.*

INTRODUCTION

Ayurveda is the ancient science of the life which systematizes and applies the knowledge about health and disease. It is one of the oldest approaches of medicinal system. The present review highlights various fields of research including literary, fundamental, pharmaceutical and clinical research in *Ayurveda*. *Ayurveda* considered different dimensions of prevention and management of disease. Earlier, till *Samhita Kala* the main source of therapeutics was based on herbal preparation and use of metal and minerals. It is a branch of *Ayurveda* explaining pharmaceutical aspect of conversion metals and minerals into therapeutically potent drug. The idea behind combination of organic and metallic substance is to obtain quick therapeutic action using lesser dosage. There is ever increasing concern pertaining to safety aspects of metals and minerals. Drug from traditional medicine many a time do fulfill these requirements as the method of validation, quality control, and manufacturing process are globally accepted methodology. Skin is the most extensive and diverse organ of the human body. General skin condition is one of the important indicators of health. Medicated oils occupy an important section in *Ayurveda* pharmacology and holistic health care system prescribes usages of different medicated oil for the body. Huge Number of medicated oils and new dosages form are mentioned in Ayurvedic classical texts for various types of skin diseases. There are many *Taila Paka* have with herbal drugs which prepared with different method of *Snehapak. Snehpakkalpana* is a unique contribution to *Ayurvedic* science and it ensure

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the transformation of the active therapeutic properties of the ingredients to the solvent. Among the various preparation under *Sneha Kalpana*. *Tail* are commonly used for processing and hence *Sneha Kalpana* is broadly divided into *Ghritakalpana* and *Tail Kalpna. Pruthvisar Tailam* is one of the Ayurvedic herbal formulations indicated in *Kusthachikitsha* page 54/290-291 by *Bhaishajya Ratnavali* which is used external purpose in various skin disorders. This *Tailam* also have reference in *Chakradatt Kushth Chikitsa 49/164-165* and *Bharat Bhashjya Ratnaker* 3rd part *Kalpana* no. (4133). The proposed study has been planned to observe the Pharmaceutical, analytical and antimicrobial activities of prepared sample against both gram positive and gram-negative microorganism. However, the efficacy and mode of action of herbal based formulations are not well established due to insufficient antimicrobial studies. So, there is need to establish a Pharmaceutical, analytical and antimicrobial parameter for prepared of *Pruthvisar Tailam.*

Materials and Methods

Materials

1. All the raw materials and essential instruments shall be procured from the Dept. of Rasa Shastra and Bhaishajya Kalpana, Pt. K.L.S. Govt. Ayurveda College & Institute, Bhopal.
2. *Pruthvisar Tailam* will be prepared in the Dept. of Rasa Shastra and Bhaishajya Kalpana, Pt. K.L.S. Govt. Ayurveda College & Institute, Bhopal.

Table 1: Showing ingredients of *Pruthvisar Tailam*.

SN	Ingredients	Botanical Name	Family	Part Used	Quantity
1.	*Chitrak*	*Plumbago zeylanica*	Plumbaginaceae	Root	1 part
2.	*Nirgundi*	*Vitex negundo*	Lamiaceae	Root	1 part
3.	*Karvira*	Nerium indicum	Apocyanaceae	Root	1 part
4.	*Kebuk*	*Costus speciosus*	Zingiberaceae	Rhyzome	1 part
5.	*Vatsnabh*	*Aconitum ferox*	Ranunculaceae	Root	1 part
6.	*Kanji*	-	-	-	2 parts
7.	*Karanj Taila*	*Pongamia oil*	-	-	8 parts

Methods

1. Pharmaceutical study
2. Analytical study
3. Antimicrobial study

Pharmaceutical Study

- ***Vatsnabh Shodhan*:** Initially the *Shodhan* was done according to R.T 24/21-22. *Vatsanabh Mool* (*Aconitum ferox* root) is tied in a piece of cloth, kept dipped in Fresh cow urine. Now exposed in sunlight for three days. During this process Each day, cow urine is replaced with fresh one, After third day, it is dried, make powder and preserved in Air tight container Box.
- *Kanji* will be prepared by method mentioned in *Bhaishajya Ratnawali 4/52-53.*
- *Chitrak Mool, Nirgundi Mool, Peet Karveer Mool, Nadich (Kebuk) Beej* and *Vatsnaabh* powders, All these take equal quantity and mixed well with equal amount of *Kanji*.
- *Karanja Taila* 8 part and again *Kanji* 1 part shall be kept in intense sunlight *(Surya Sampakvam).* Till proper *Tail Paka* will be resultant. When only oil remains in the container shall be taken out filtered properly and stored in a suitable container.

Analytical Study

In this part of study sample of *Pruthvisar Tailam* was analyzed on the following parameter.

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Organoleptic test

1. Colour
2. Odour
3. Taste
4. Touch
5. Appearance

Physicochemical test

1. Saponification value
2. Specific gravity
3. Acid value
4. Peroxide value
5. Easter value
6. Optical rotation
7. Chromatographic value
8. Iodine value

Antimicrobial study

Antimicrobial activity is tested by various methods but in present study Agar well diffusion method was used for this study.

Principle

The antimicrobial present in the plant extract is allowed to diffuse out into the medium and interact in plate freshly seeded with the test organism. The resulting "Zone of inhibition" will be uniformly circular as there will be a confluent lawn of growth.

Selection of microorganism

(a) Gram positive bacteria: Staphylococcus aureus

(b) Gram negative bacteria: Echeria coli

(c) Fungal group: Candida albicans

RESULTS

(A) Result of Pharmaceutical Study

Table 2: Showing results of *Karvira Moola Shodhana*.

Parameters	*Karvira Moola*
Ashodhit Karavira Moola	500gm
Shuddha Karavira Moola	450gm
Total loss of weight	50gm
Total loss of weight %	10%

Table 3: Showing results of *Pruthvisar Tailam*

Ingredient	Qty
Vatsnabha	250 gm
Nirgundi	250gm
Kebuka	250gm
Chitraka	250gm
Karavira	250gm
Kanji	500ml
Karanja Taila	2L
Total weight of obtained *Pruthvisar Tailam*	1.8 L
Total weight loss of *Pruthvisar Tailam*	200ml
Total % loss of *Pruthvisar Tailam*	10%

(B) Result of Analytical Study

Table 4: Showing organoleptic parameter of *Pruthvisar Tailam*

Parameter	Characteristics
Colour	Dark yellow
Odour	Astringent
Touch	Slippery
Appearance	Liquid and lustre

Table 5: Showing Results of Analytical tests of *Pruthvisar Tailam.*

SN	Test Parameters	Test method	Unit	Results
1.	pH	API Part I, Vol.-VIII, 2011	-	5-6

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2.	Loss on Drying	API Part I, Vol.-VIII, 2011	%w/w	1.6%
3.	Refractive Index	API Part I, Vol.-VIII, 2011	-	1.487
4.	Specific gravity	API Part I, Vol.-VIII, 2011	-	1.06%
5.	Viscosity	API Part I, Vol.-VIII, 2011	cP	54.17
6.	Rancidity	API Part I, Vol.-VIII, 2011	-	Absent
7.	Acid Value	API Part I, Vol.-VIII, 2011	mg KOH/g	13.464%
8.	Saponification Value	API Part I, Vol.-VIII, 2011	mg KOH/g	58.905%
9.	Ester Value	API Part I, Vol.-VIII, 2011	mg KOH/g	45.441%
10.	Iodine Value	API Part I, Vol.-VIII, 2011	-	75%
11.	Peroxide Value	API Part I, Vol.-VIII, 2011	m eq of O2/Kg	NIL

Table 6: FTIR results for *Pruthvisar Tailam.*

Peak	Actual	Functional groups	Functional group source
900-600	721	Mono & polyclinic sub aromatic groups OH	Kebuk active constituents
1300-900	1016, 1096, 1117, 1160, 1232	C=O stretching & deformation	Karanjoil Aconite, Chitrak, nirgundi, kebuk active constituents
1470-1350	1376, 1419, 1458	Alkynes	Karanjoil
1760-1740	1646, 1743	Carbonyl compounds	Karanjoil Aconite,
			Chitrak, Nirgundi, kebuk active constituents
1712-1665	1743	A β unsaturated aldehyde	Aconite, Chitrak, nirgundi, kebuk active constituents
2140-2100	2127	C=-C alkyl (sub)	Aconite active constituents
2280-2440	2335	-NH component	Plumbago active constituent.
	2852, 2921, 3000	Methyl ether	Aconite and kebuk active constituent

Peak Number	Wave number (cm^{-1})	Intensity
1	721.96117	0.14360
2	1016.53375	0.07429
3	1096.72295	0.10586
4	1117.99764	0.10680
5	1160.54701	0.16273
6	1232.55365	0.08792
7	1376.56691	0.06122
8	1419.11628	0.04665
9	1458.39263	0.09548
10	1646.59178	0.05300
11	1743.14612	0.21550
12	2127.72700	0.00399
13	2353.56598	0.00647

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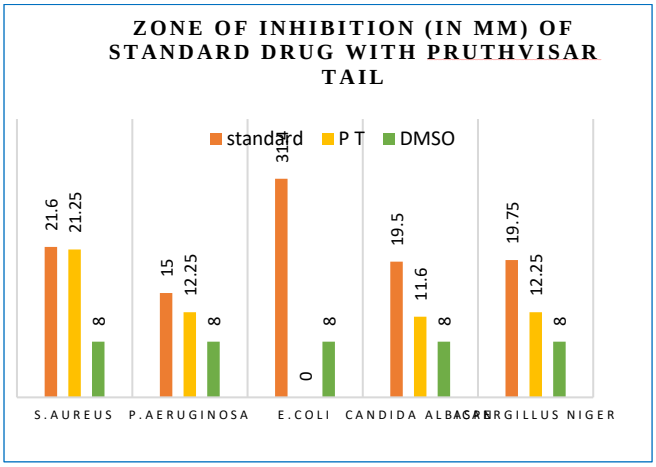
14	2852.70285	0.15748
15	2921.43646	0.22048
16	3006.53520	0.03682
17	3320.74596	0.05573

(C) Result of antimicrobial study

Table 7: Showing Result of Zone of inhibition of *Pruthvisar Tailam*

Test Report No: JAS/26/23, Sample No: PTVS/GK/01

SN	Sample name	Zone of inhibition (mm) (values are mean of Qudaripulate)						
		Microorganisms studied (sample DMSO)						
		Sample in mg	DMSO (ml)	S.aureaus	P.Aeruginosa	Candida Albicans	E.coli	A.niger
1.	PVT/GK/01	10	1	21.25	12.25	11.6	NIL	12.25
2.	Streptomycine	10	1	21.6	15	NA	31.4	NA
3.	Fluconazole	10	1	NA	NA	19.5	NA	19.75
4.	DMSO	-	-	8	8	8	8	8



Graph 1: Showing antimicrobial activity of *Pruthvisar Tailam*

Discussion

Sneha Kalpana has its own importance in *Ayurvedic* system of medicine. It is the only one *Kalpana* which can be used both internally as well as externally. References are available in our classics that by adding mineral drugs are preparations of *Sneha Kalpana.* We may potentiate the efficacy of formulation. The additional criteria of its importance go that there is no such formulation in Modern science.

Main ingredient present in PT is *Vatsnabaha, Nirgundi, Kebuka, Chitraka, Karvira, Kanji* and *Karanja Taila.* Since all of them have anti-inflammatory, antibacterial properties, so it may be the prime cause of formation of *Bhanupaka Tail. Sneha* is a pharmaceutical preparation through which Water soluble and fat soluble active principles can be extracted from herbs. *Sneha Paka* can be done by *Agni Paka* or *Bhanupaka. Bhanupaka Sneha* is widely indicated in skin disorders. *Sneha* is a best media which can pass easily through the lipid membrane present in the skin. During *Bhanupaka, Sneha* absorbs the ultra violet rays which facilitates the penetrating property of *Sneha*. As UV rays helps for rapid shedding and growth of skin it can be applied on wounds for quick healing. *Karanja Taila* acts as a medium for rising the temperature to absorb the extract of all herbs use in this formulation. As the formulation is *Karanja Taila* dominant, so it acts as an antimicrobial, antifungal agent. Obtained amount of *Pruthvisar Tailam* is 1.8L from 2L of oil. Loss of 200 ml (10%) was observed. This loss might be due to oil absorbed by drugs and filtration.

Analytical study brings the standard for the quality drug and helps to explain the pharmacokinetics and pharmacodynamics of a drug.

Prepared sample of *Pruthvisar Tailam* was analyzed by the following parameters.

Discussion on Physicochemical Parameter

pH value:

pH of *Pruthvisar Tailam* is 5 -6, which is acidic in nature. Drugs get easily absorbable in acidic media and hence enter into the system and produce quick results. Acidic

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nature also destroys or inhibit the growth of micro-organism.

Loss on drying:

Moisture value of *Pruthvisar Taialam* is 1.6%, indicates long shelf life. Excess moisture value will encourage microbial growth, the presence of fungi or insects and deterioration following hydrolysis. In determining the shelf life of drugs moisture content plays an important role.

Refractive index:

RI of *Pruthvisar Tailam* is 1.487, it measures the density of a sample compared to air and liquid media.

Specific gravity:

S.G of *Pruthvisar Taialam* is 1.06%, the specific gravity indicates the presence of solute content in the solvent. S.G less than 1 indicates that the formulation is lighter than water and it will not leave a residue or oiliness in the skin after application.

Viscosity:

Viscosity of *Pruthvisar Tailam* is 54.17, viscosity is an index of a liquid to flow. The greater the viscosity of a liquid the higher is the resistance to flow.

Rancidity:

It was absent in the sample, which indicates its stability.

Acid Value:

Acid value for *Pruthvisar Tailam* is 13.464%, which indicates its stable nature. It measures the free fatty acids (FFA) present in the fat or oil, more amount of FFA in a sample of oil or fat indicates that triglycerides are hydrolyzed. More free fatty acids indicate more acid value. The less percentage of free fatty acids indicates low acid value or in other words stable nature of fatty acids.

Saponification Value:

It gives information concerning the character of the fatty acids of the fat. Low saponification value indicates long chain fatty acids found in fats because they contain few number of carboxylic functional groups per unit mass of the fat and thereforehigh molecular weight. Smaller is its saponification value, higher the molecular weight of the fat, the. Saponification value of *Pruthvisar Tailam* is 58.905%, which indicates the presence of higher content of low molecular weight fatty acids. Fatty acids with low molecular weight get quickly and easily absorbed into the body system.

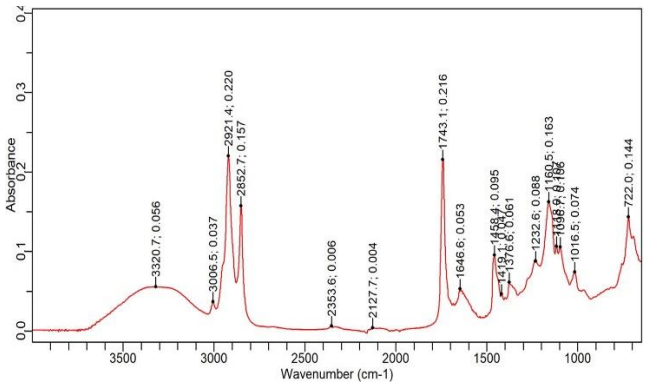
Ester Value:

Ester value of *Pruthvisar Tailam* is 45.441%, high ester value indicates the presence of high amount of ester and low molecular weight fatty acid content.

Iodine Value:

It determines the amount of unsaturation contained in fatty acids. Iodine value of *Pruthvisar Tailam* is 75% indicates less iodine value. Low Iodine value indicates that it is less vulnerable to lipid peroxidation (Rancidity).

Graph 2: Showing the result of FTIR of *Pruthvisar Tailam.*



To evaluate the Anti-microbial activity of "*Pruthvisar Tailam*" was prepared, Agar well diffusion techniques mentioned for evaluating antimicrobial activity in the modern Microbiology were followed. For Antimicrobial activity, *Pruthvisar Tailam* was prepared as per *Bhaishajya Ratnawali* and tested on bacteria *S. aureus, P. aeruginosa, Ecoli* and fungus *Candida albicans, Aspergillus niger.*

Muller-Hinton agar media was used for the study. Kirby-Bauer method was adopted for assessment of the antimicrobial activity of drug of *Pruthvisar Tailam*.

Anti-microbial test for zone of inhibition was performed.

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Streptomycine (10mg/ 1ml DMSO) for bacteria and fluconazole (10mg/1ml DMSO) for fungus were used as positive control.

The antimicrobial activity results of *Pruthvisar Tailam* were significant when compared to the negative control DMSO. When compared to the positive control standard antibiotic drug Streptomycin, the antibacterial activity of *Pruthvisar Tailam* was less significant towards P.Aerugenosa and E.coli and equally significant towards S.aureus , It has no effect on E.coli.

When compared to the positive control standard antifungal drug Flucanozole, the antifungal activity of *Pruthvisar Tailam* was less significant towards C. albicans and A. Niger.

Pruthvisar Tailam working well as compared to Standard drug.

Conclusion

At the end of the study, the following conclusion is drawn on the basis of interpretation of result obtained and discussion in the present context which is listed below. *Sneha Kalpanas* are the only *Kalpana* which can be used internally as well as externally. The formulation is easy to prepare and cost effective. *Pruthvisar Taila* showed better activity against microbes. The formulation of *Pruthvisar Tailam* prepared by *Bhanupaka* method. *Sneha Paka* can be done by *Agni Paka* or *Bhanupaka*. *Bhanupaka Sneha* is widely indicated in skin disorders. *Sneha* is a best media which can pass easily through the lipid membrane present in the skin. During *Bhanupaka, Sneha* absorbs the ultra violet rays which facilitates the penetrating property of *Sneha*. As UV rays helps for rapid shedding and growth of skin it can be applied on wounds for quick healing. The formulation *Pruthvisar Taila* has mentioned in *Bhaishajya Ratnavali,* written by *Acharya Govindnath Sen.* Method of preparation of *Pruthvisar Taila* is found in *Bhaishajya Ratnavali*. *Pruthvisar Taila* is an herbal formulation. Analytical parameters like Saponification value (58.905%), Specific gravity (1.06%), Acid value (13.464%), Peroxide value (Nil). Ester value (45.441%), iodine value (75%), ph (5-6), loss on drying (1.6%), viscosity (20.12), rancidity (absent).

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