



## “FTIR STUDY OF DADRUHARA YOGA AND ITS OUTCOMES- A MULTIPLE CASE STUDY”.

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### Abstract

Fungal infections are a significant global health issue that has recently captured the interest of medical professionals, dermatologists, and microbiologists. Dermatophytosis is the most frequent superficial cutaneous fungal infection. In countries with tropical and subtropical climates, like India, where heat and humidity are key variables, it is more common. All skin conditions are referred to as "*Kustha*" in *Ayurveda*. *Dadru* is a *Pitta-Kapha pradhana twak vikara*. The symptoms of tinea and *dadru* are fairly similar, according to modern science. *Dadru* and dermatophytosis are thus correlated.

A couple aged 42 and 35 years came to the Kayachikitsa OPD with itchy circular lesions around the inguinal areas for 3 years. They've been complaining about severe itching for three months. For five months, they received modern treatment, but after ceasing the medication, the condition returned. So they made the decision to receive ayurvedic treatment for their condition. An ayurvedic lepa by the name of *Dadruharayoga* was instructed to apply locally with *go-mutra* distillate for 30 days after studying the *dosha dushya* and disease condition. A FTIR investigation was also carried out to identify the functional group most likely to have antifungal effects. Both the patient's great reduction in itching (pruritus) and the change in colour of the lesions were observed. No negative effects were noticed while receiving treatment. *Dadruhara yoga* can therefore be practised in *Dadru roga* for a longer time when a condition is persistent.

**Keywords:** *Dermatophytes, Dadru, Dadruharayoga, FTIR.*

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### Introduction:

Our skin acts as our first line of defence against infections and other environmental threats. Skin diseases are the fourth most common cause of disability worldwide, according to the 2013 Global Burden of Disease (GBD) Research<sup>1</sup>. The skin disorder known as dermatophytosis is currently widespread throughout the world and poses a serious public health risk, especially in poorer countries<sup>2</sup>. 20 to 25 percent of persons worldwide, according to the WHO, suffer superficial mycotic infections<sup>3</sup>. According to contemporary medical knowledge, tight shorts and synthetic fabrics that prevent the excess sweat produced in warm weather from evaporating are the primary causes of superficial mycosis. The chance of developing this disease increases when living in an unclean environment and unhealthy conditions. Today's most common skin diseases negatively impact quality of life and cause emotional embarrassment. The majority of skin issues are classified by Ayurveda as belonging to the "*Kustha*" category, which is further divided into *MahaKustha* and *KshudraKustha*. The *Kustha* include the *Dadru* as a subgroup. Recent years have seen an increase in the prevalence of *dadru* (Tinea), a serious skin disorder. It interferes with family life, social life, and personal life. *Kandu* (itching), *Raga* (redness), *Utsana mandala* (circular patches with elevated edges), and involvement of *Pidakas* are clinical symptoms (eruptions)<sup>4</sup>. With a predominance of *Pitta* and *Kapha* dosha vitiation, it is *Tridoshaja vyadhi*. In the modern medical system, ringworm is treated at different phases using tropical antifungal medications, oral antifungal medications, and steroids. Dermatophytic infections are currently running a chronic course, either as a result of inadequate therapy or growing medication resistance, and occasionally they also manifest adverse effects. Many lepas are listed in numerous classical Ayurvedic texts, but only a small number of these drugs are put to the test in the *Dadru Kustha*. After evaluating the cost-effectiveness, availability, and efficacy of the ayurvedic medications, those that are recommended for local application in classics for *Dadru Chikitsa* was chosen.

### Patient Information:

On November 10, 2022, a married couple, aged 42 and 35, came to the Kayachikitsa OPD of the Sir Sundarlal Hospital, BHU, Varanasi with the following details:

Husband Name: ABC, Age/Sex: 42 years/male, Occupation: Contractor, MRD NO: 5016349, DOA: 10/11/2022, Address: Mirzapur Wife Name:

XYZ, Age/Sex: 35 years/female, Occupation: Home maker, MRD NO: 5016348, DOA: 10/11/2022, Address: Mirzapur

### Chief Complaints:

- Itchy circular patches in both the inguinal areas for 3 years and spread to the thighs.
- Sever itching for 3 months in husband and intense itching for 4 months in wife.
- Wife gets inflammation and secretion occasionally due to secondary infection.
- Disturbed sleep for 3 months
- Loss of appetite for 3 months in wife but husband got moderate appetite.

### History of present illness:

Around three years ago, the wife of the couple initially became ill. She observed some circular rashes around her right inguinal area, which later extended to her left inguinal area and had moderate irritation (Figure-1a). She first ignored the issue, which led to a slow deterioration of the symptoms. She experienced intense itching for four months, secondary infection with sporadic discharges, and inflammation. She experienced severe itching, inconsistent bowel movements, and a three-month loss of appetite, all of which caused her to have trouble sleeping. Once the wife's infection started for 20 days, the husband contracted it from her. He noticed small red circular spots around his crotch area that grew worse and turned into multiple dark patches that eventually formed a large patch around both inguinal areas (Figure 2a). For three months, he had excruciating scratching and sleep disturbances. They both went to adjacent clinics for contemporary treatment, but the sickness continued to advance unsatisfactorily. They applied antifungals topically and orally to address the condition, but after finishing the prescribed medication, the symptoms returned. As a consequence, they sought Ayurvedic treatment at Kayachikitsa OPD.

### Past History:

No History of DM /HTN/ abnormal thyroid function in both the patients.

### Personal History:

- Diet- Non-vegetarian
- Appetite- Husband: Moderate Wife: Poor
- Bowel- Husband: Normal Wife: Disturbed (irregular)
- Sleep- Disturbed because of severe itching

### Family History:

The husband's mother, who is 67 years old, lives with the couple and they have one male child, who

is 9 years old. They both had the infection for two months and had a history of sharing common toiletries.

### Clinical Findings:

Both patients appeared nervous and concerned about their infection; however, the female patient had dark pinkish elevated patches with secretions around the margins of the lesions, whereas the male patient had dark brown elevated patches around the inguinal sides with whitish skin flakes.

### On examination-

Female patient: *Nadi* (~pulse) -78 beats/min, *Mutra*(~urine) -frequency was 7-8 times in 24 hours. *Mala*(~stool)- *Sama* (irregular bowel improvement), *Shabda*(~voice)- *Spashta* (~clear), *Sparsha*(~tactile examination)- *Seeta*(~cold touch), *Jivha*(~tongue) – *Sama* (~white coated tongue), *Drik*(~eye and eyesight) - *Samanya* (~normal), and *Akruti* (~body stature)-*Madhyama* (~medium).  
Male patient: *Nadi* (~pulse) -72 beats/min, *Mutra*(~urine) -frequency was 6-7 times in 24 hours. *Mala*(~stool)- *Nirama* (~formed stool), *Shabda*(~voice)- *Spashta* (~clear), *Sparsha*(~tactile examination)- *Ushna* (~warm touch), *Jivha*(~tongue) – *Nirama* (~clear), *Drik*(~eye and eyesight) - *Samanya* (~normal), and *Akruti* (~body stature)-*Prabar* (~well built).

### Investigations:

CBC, FBS, PPBS and LFT were done to rule out any other diseases and to exclude diabetes patient. All the parameters were found within normal range in both the patients.

### Diagnostic Assessment:

10% KOH test to look after fungal hyphae was done to confirm the diagnosis. Blunt scalpel was used to take the skin scraping from edges of the lesions.

Diagnosis:

Dadru kustha (conclude from the sign and symptoms and from KOH test).

### Therapeutic Intervention:

*Dadruhara yoga* was given topically once daily for 30 days along with go-mutra distilled (GPM certified). Follow up was taken at an interval of 15 days.

### Preparation of Drug:

*Azadirachta indica*, *Pongamia pinnata*, and *Cassia tora* are the three components of *dadruhara yoga*. All the ingredients were identified from the department of *Dravyaguna*, IMS, BHU. The Ayurvedic Formulary of India's instructions were followed in order to prepare the *churna*. To create equally blended *churna*, each ingredient was powdered individually, put through mesh sieve no. 85 (180 microns), and then combined in the prescribed amounts. It was given to the patients after being encased within an airtight 100 grams packaging.

### FTIR Analysis:

The Fourier Transform Infrared (FTIR) Spectrophotometer, one of the most potent tools, was utilised to identify and validate chemical bonds and functional groups in plant extracts. For FTIR analysis, the KBr (potassium bromide) pellet method was employed<sup>5</sup>.

### Procedure

To create translucent sample discs, 1 mg of *Dadruhara yoga* powder and 1 ml of extract were separately encapsulated in 10 mg of KBr pellet. The FTIR spectra in the middle range of 400-4000 cm<sup>-1</sup> were created using a powerful, computer-controlled FTIR spectrophotometer of Jasco, Tokyo, model Tensor4700 with software version Opus65 coupled with ZnSe ATR. This analysis was carried out at the Chemistry Department of the BHU, Institute of Science.

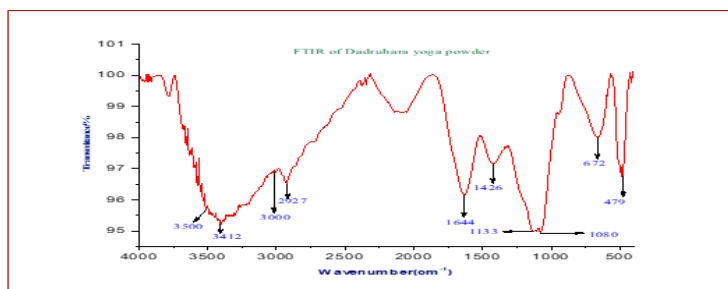


Figure:3. Showing FTIR Graph of the *Dadruhara yoga* powder.

**Interpretation:** The broad band from 3500-3000 peak at 3412 cm<sup>-1</sup> corresponding to the O-H of carboxylic group (H-bonded Stretch). Sharp peaks at 2927cm<sup>-1</sup> corresponding to the stretching of sp<sup>3</sup>  
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C-H refers to the presence of alkanes (H-C-H Asymmetric & Symmetric Stretch). Peak at 1644 cm<sup>-1</sup> represents sp<sup>2</sup> carbon of alkene(C=C). Peak at 1426 cm<sup>-1</sup> is due to the bending of CH<sub>2</sub> of  
5904

compound. Peaks ranging from 1133 - 1080  $\text{cm}^{-1}$  are due to stretching C-O of alcohol and ester. Peaks ranging from 672 - 479  $\text{cm}^{-1}$  are due to bending of C=C out of plane. The shown above in figure-3.

### Follow-Up and Outcome:

Effects of therapy were assessed by scoring pattern depending upon the signs & symptoms using Global Assessment scoring method (GAS)<sup>6</sup>. This is

shown in the table no-1. *Kandu* is evaluated by comparing it to the 5-D scale of itching<sup>7</sup>. The arbitrary scoring previously standardised in prior studies and the 5D-pruritus scale were correlated. From 5 to 25 points were assigned on the 5D-pruritus scale, and the following factors were used to assess the severity of the pruritus/*Kandu*: scoring ranging from 0 -5 considered as No *kandu* (0), 6–12 given as *Ishat kandu* (1), 13–19 assessed as *Bahu kandu* (2), and scoring 20–25 considered as *Ugra kandu* (3).

SINo	Parameters	Scoring pattern
1	<b><i>Kandu</i></b> (Correlated with 5-D pruritus scale)	No <i>Kandu</i> - 0 <i>Ishat Kandu</i> -1(occasionally) <i>Bahu Kandu</i> -2(frequent itching disturb mind but do not hamper routine activities) <i>Ugra Kandu</i> -3 ( disturb mind, sleep and routine activities)
2	<b><i>Raga</i></b> (Erythema)	Normal skin colour -0 Faint and near to normal -1 Blanching and red colour -2 Reddish colour -3
3	<b><i>Pidaka</i></b> (Macular rashes)	No <i>Pidaka</i> - 0 1-3 <i>Pidaka</i> - 1 4-6 <i>Pidaka</i> - 2 >6 <i>Pidaka</i> - 3
4	<b>Number of <i>Mandala</i></b> (Circular or ring shaped patches)	No <i>Mandala</i> -0 1-3 <i>Mandala</i> -1 4-6 <i>Mandala</i> -2 >6 <i>Mandala</i> -3

Follow was taken after 15 days, Patients get relief from itching from 3<sup>rd</sup> day of use of the medicine, there was less itching, no more spread, change in colour was noted after 15 days (Figure 1b & 2b). After 1 month completion of trial, both the patient got significant relief in *Raga* (~change in colour of the lesion), including number of *pidaka*(~papules). Number of *mandal*(~circular patches) remaining same after 1 month of treatment. Female patient had no itching while the male patient after wearing tight undergarments for long time due to professional need got mild itching sensation occasionally. Overall clinical improvement was noted in both the patients after 1month of treatment (Figure 1c & 2c).

### Discussion:

The prevalence of cutaneous dermatophytosis is rising all throughout the world, especially in tropical and subtropical countries like India. Tinea is commonly caused by improper diets, filthy living conditions, and fungi. Fungal infections are more prevalent in middle class and lower-class communities as a result of industrialization and

lifestyle changes. The rising resistance to antifungal medications, which has been a serious concern for dermatologists and patients, is another factor contributing to the morbidities of tinea infection in addition to its recurrent relapses. *Tridoshaja* are found in all *Kushta roga*. However, *Dadru* is *Pitta-Kapha* dominance, according to Acharya *Charak* and *Vagbhata*, and according to Acharya *Sushruta*, it is *Kaphapradhan*, and he identified *krimi* as one of the factors for *Kustha*. *Rasa* and *Rakta* are involved in the *samprapti*. As a result, in this case, the course of treatment is intended to reduce *Pitta* and *Kapha doshas* as well as to calm vitiated *Rasa* and *Rakta dhatu*. Drugs with *Kandughna* and *Krimighna* characteristics were therefore employed in this case study.

To determine the functional groups contained in the medicine and to establish that the trial drug has antifungal characteristics, FTIR analysis was conducted. According to an FTIR spectrum, the *Dadruhara yoga* powder has carboxylic acids, aldehydes, alkanes, alkenes, and ester. Carboxylic acids, which also contain a carbonyl group and an alcohol group, and aldehydes, ketones, and

alcohols all share some basic physico-chemical characteristics<sup>8</sup>. All carboxylic acid ester compounds surpassed fluconazole in terms of antifungal activity<sup>9</sup>. An organic substance with a formyl group is an aldehyde. Glutaraldehyde is a crucial dialdehyde among the aldehydes and is utilised as a sterilant and disinfectant. Glutaraldehyde contains a wide range of antibacterial, antifungal, and antiviral properties. Formaldehyde and Cinnamaldehyde are also used as fungicide<sup>10</sup>. The growth of six strains of T. mentagrophytes that have been previously reported was suppressed by aldehydes<sup>11</sup>. The ability of alkane compounds to inhibit the growth of mould and yeast was examined. The substances were more effective against various fungus strains than moulds<sup>12</sup>.

Mode of action of *Dadruhara yoga*- All of the drugs in this current clinical investigation, comprising *Nimba*, *Karanja*, and *Chakramarda*, possess *Tikta*, *Katu*, *Kasaya*, and *Madhur rasa*, *Laghu* & *Ruksha guna*, *Ushna virya*, and *Katu vipaka*, which lessens the *kandu*, *pidaka*, *raga*, and *utsanna mandala* of the *Dadru kustha* (Tinea) by resolving the vitiated *Pitta-Kapha doshas* & *Raktaprasadan*.

We can consider probable *Samprapti Vighatana* in terms of elimination of disease with the trial drug.

#### **Samprapti Vighatana-**

**Pitta Kapha dosha vitiation-** *Tikta*, *Katu*, *Kashya rasa* helps in mitigation of vitiated *doshas*.

**Rasa and Rakta dhatu vitiation-** *Tikta*, *Kashaya rasa* helps to bring vitiated *dhatu*s to normal state.

**Aamvisha-** *Katu*, *Tikta rasa* and *Ushna virya* helps in *Aampachan*.

**Krimi** – Elimination or destruction of *krimi* was carried out by *Tikta*, *Katu*, *Kashaya rasa* and *Ushna dravyas* which were present in the *Dadruhara yoga*.

According to recent scientific studies, every component of *Dadru hara yoga* formulation has antifungal, antimicrobial, and antibacterial properties. Water and cow urine (*gomutra arka*) were employed in the preparation of *Dadru hara Lepa*, which hydrates skin and enhances *Lepa's* action and absorption because of the inclusion of diverse *gomutra* constituents<sup>13</sup>.

**Conclusion:** In this case study, there was a noticeable improvement in both of *Dadru Kustha's* patients. The treatment that was so carefully

prepared was beneficial for *Kledaharan*, *Kandushaman*, *Rakta Prasadan*, and *Shaman* of vitiated *Kapha Pitta dosha*. And hence the treatment was found to be effective to relieve the symptoms quite significantly and no adverse effect was observed during or after treatment. A similar treatment can be followed in other cases of *dadru* and for longer period in case of chronicity judiciously.

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**Conflict of Interest-** There is no conflict of Interest.

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Figure- 1(a)



Figure- 1(a)



Figure-1(c)



Figure- 2(b)



Figure- 2(b)



Figure- 2(c)

