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EVALUATING THE THERAPEUTIC IMPACT OF PATHYA AND APATHYA IN DADRU KUSHTHA: AN AYURVEDIC APPROACH

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ABSTRACT

Skin health is a crucial aspect of overall well-being, and Ayurveda, the ancient Indian system of medicine, provides a holistic approach to its management. Tinea corporis, a superficial fungal infection, closely resembles Dadru Kushtha in Ayurveda, a Kapha-Pitta predominant disorder. It manifests with symptoms such as itching (Kandu), redness (Raga), papular eruptions (Pidika), and raised, circular lesions (Utsanna Mandala). Ayurvedic texts emphasize that Apathya Ahara and Apathya Vihara aggravate Doshas, leading to skin disorders. Excess consumption of Amla (sour), Lavana (salty), heavy, unctuous foods, and incompatible food combinations disturb Agni (digestive fire), leading to Ama accumulation and *Dosha* vitiation. Psychological factors like excessive stress, fear, and grief further contribute to Kushtha development. Conversely, following *Pathya Ahara*, including Tikta (bitter) foods like Neem, Patola, and Mudga, and adopting a disciplined lifestyle with proper sleep, moderate exercise, and stress management, helps restore Dosha balance and improve skin health. Detoxifying herbs and dietary regimens purify microchannels, enhance

digestion, and stabilize skin tissues. Thus, integrating Ayurvedic dietary and lifestyle principles into modern dermatological practices offers a natural, preventive, and curative approach to managing *Dadru Kushtha* and other skin ailments effectively.

Sadar et al.

KEYWORDS: Pathya, Apathya, Dadru kushtha, Skin, Tinea corporis.

INTRODUCTION

The human skin, being the largest organ of the body, serves as the first line of defense against environmental factors. However, its size and external exposure make it highly susceptible to a wide range of disorders. Skin health is a major concern in society, as it plays a significant role in personal appearance and overall well-being. Ensuring healthy skin remains a challenging task for the medical field, particularly in tropical and developing nations like India, where skin diseases have been on the rise in recent years.

A significant proportion of skin ailments are attributed to bacterial and fungal infections, with factors like poverty, poor hygiene, inadequate sanitation, and environmental pollution exacerbating their prevalence. According to the World Health Organization (WHO), the global incidence of superficial fungal infections is estimated to be around 20–25%. Among these, Tinea corporis, a superficial dermatophytic infection affecting the arms and legs, is commonly observed. However, it may also appear on other parts of the body.

In *Ayurveda*, Tinea corporis can be closely associated with *Dadru Kushtha*,^[2] a skin disorder predominantly influenced by *Pitta* and *Kapha doshas*. The condition is characterized by symptoms such as *Kandu* (Intense itching), *Raga* (Redness or erythema), *Pidika* (Papular eruptions), and *Utsanna Mandala* (Raised, Circular skin lesions).^[3] Due to its widespread occurrence, effective treatment strategies are crucial for managing and preventing recurrence.

The *Ahara* (Food) and *Vihara* (Lifestyle) which are amiable to the channels, constitution and strength of an individual is termed as *Pathya* (Wholesome) and that which is not amiable is termed as *Apathya* (Unwholesome).^[4] The preventive and curative aspects of *Ayurveda* revolve around the central theme of *Pathya Ahara* and *Vihara*. *Ayurveda* emphasizes basic dietary guidelines in terms of appropriate food, combinations of food, methods of cooking, storage, eating atmosphere, hygiene and etiquette (*Ashtavidha ahara vidhi visesha ayatana*).^[2]

Kushtha

There are two types of *Kushtha* described in *Ayurvedic* classics, *Mahakushtha* and *Kshudra kushtha*. *Mahakushtha* is sub divided into seven and *Kshudra kushtha* into eleven types. ^[5]

Mahakushtha - Kapala, Udumbhara, Mandala, Rushyajihwa, Pundarika, Sidhma and Kakanak. [6]

Kshudrakushtha - Eka, Charmakhya, Kitibha, Vipaadika, Alasaka, Dadru, Charmada, Paama, Visphota, Shataru and Vicharchik. [6]

Dadru

Aacharya Charaka mentioned dadru in kshudra kushtha, and Aacharya Shushruta has mentioned dadru kushtha in Mahakushtha.

Acharya Charak considered Dadru in Kshudra Kushtha, and the predominant Dosha (regulatory and functional entities of body) of Dadru Kushtha is Kaph- Pitta. As per his definition, the reddish colour Pidika (Papules) in the form of Mandala (Round swelling or lesion) with elevated borders and itching is known as *Dadru*.^[3]

Acharya Sushrut considered Dadru in Maha-kushth and involved Dosha is Kapha having Atasi Puspha (flax flower) colour appearance with Tamra Varna (Copper colour) spreading Pidika.^[7]

Dalhana, commentator of Sushrut Samhita, has divided Dadru into two parts-Sita (White) and Asita (Black). Dalhana further differentiated these two by saying that Sita type of Dadru is easily curable because it does not affect the deeper tissues, also it is associated with fewer signs and symptoms. There is no significant involvement of Tridosha. In comparation, 'Asita' Dadru is just opposite of Sita Dadru.

Acharya vagbhatt in Ashtang Samgraha mentioned that Dadru Kushtha is Kapha-pittaja variety of Kushtha having Durvavata dirgha pratana, Atasi flower colour appearance, elevated circle, itching and *Anushangini* symptoms.^[8]

Acharya Laghu vagbhatta has followed the same classification as that of Acharya Susrutha. Whereas, Acharya Kashyap demarcated Dadru as a skin disease having "Vridhimanta Mandala," i.e., disseminating discoid lesions with intense itching, burning sensation and discharge from it. Sometimes these lesions are dry, which is a crucial point through practical aspect.[9]

Prevalence

The World Health Organization (WHO) estimates that globally, up to 20% of the population may experience fungal skin infections, with tinea corporis (ringworm) being a common presentation.^[1]

Aims and Objectives

This article explores and reviews the potential role of *Apathya* and the significance of *Pathya Ahara* in managing *Dadru Kushtha*.

The specific *Pathya* and *Apathya* for *Dadru Kushtha* are not separately mentioned in *Ayurvedic* texts. However, since *Dadru Kushtha* falls under *Kshudra Kushtha*, its dietary and lifestyle recommendations can be inferred from the general guidelines for *Kushtha*. *Ayurveda* prescribes *Samanya Pathya* and *Apathya* for all types of *Kushtha* rather than distinct recommendations for each. This study aims to explore and identify the suitable *Pathya* and *Apathya* for *Dadru Kushtha* based on classical references.

Apathya in dadru kushtha

Acharyas have not specified a separate Nidana (Cause) for Dadru Kushtha. However, Dadru Kushtha can spread from person to person through Malaja krimi (Pathogenic organisms) via sweda (Sweat). This transmission occurs through direct contact with an infected person or contact with items used by the infected person, such as clothing, sharing towels, bed sheets, soap, handkerchiefs, and other personal items with an infected person can indeed facilitate the spread of microorganisms, including fungi, from one person to another. Dadru, which is similar to a fungal skin infection, often spreads through these methods

Aaharaj apathya (Dietary factors)^[10]

1. Adhyashana

- RASA- Excessive intake of Amla (Sour), Lavana (Salty).
- GUNA- Diet having excessive, Guru (Heavy), Drava and Snigdha (Unctuous) properties.
- GRAINS AND PULSES- *Navaanna* (Newly harvested grains), *Nispava, Uddalaka, Kullatha and Masha* (Black gram)
- MEAT- *Gramya*, *Anupa*, *Audaka*, *Mamsa* (Meat of animals from marshy region), *Matsya* (Fish), *Varaaha* (Pig).
- Dairy products- Excessive intake of *Dadhi* (Curd), *Takra* (Buttermilk) and *Kshira* (Milk).
- OILS- *Kusumbha* (Safflower) and *Tila* (Sesame)

- Vegetabels- Lakuch and Kakamachi (Black nightshade), Mulaka (Raddish),
- Excessive intake of *Guda* (Jaggery), *Madhu* (Honey) and *Phanita* (Jaggery by product), *Pista Anna* (rice preparations), alcoholic preparations

2. Mithya aahar

- *Vidahi* (Food that causes burning)
- Vidagdha (Improperly digested food) and
- Puti Anna (Putrefied food)
- Asatmya Bhojana (Uncongenial food)
- Ajirna Bhojana (Intake of food before previous food is properly digested)
- *Atibhojana* (Over-eating)

3. Viruddha aahar

- Don't eat Beans With Fruit, cheese, fish, meat, egg, yogurt
- Don't eat Eggs With Fruits, especially melons, lemon, fish, meat, milk
- Don't eat Fruits With Not to be taken with any other thing
- Don't eat Grains With Tapioca, fruit

Viharaj apathya (Lifestyle factors)

- *Diwaswapna*: Daytime sleeping.
- Chardhi Vegadharana: Suppression of vomiting reflex.
- Drinking cold water after coming from sunlight.
- *Ativyayama*: Excessive physical exercise.
- Ati Santapa Sevana: Excessive exposure to heat.

Maansik apathya (Psycological factors)

Psychological factors play a significant role in the development of *Kushtha*. These include:

- Ati bhaya: Excessive fear.
- *Ati shoka*: Excessive grief.
- *Ati chinta*: Excessive worry.
- Any imbalance in the mind can affect the skin's appearance, and any skin abnormalities can affect the mind, forming a vicious cycle

www.wjpr.net Vol 14, Issue 12, 2025. ISO 9001: 2015 Certified Journal 228

Other factors

- Krimij Apathya
- Dushivish
- Dushita Jalpaan
- Dhatu-Agnimandya

Pathya^[11]

The various *Pathya* include *Laghu-Anna*, *Tikta-Shaka*, *Purana-Dhanya*, *Jangala Mamsa*, *Mudga*, *Patola*, *Nimba*, *Triphala*, *Shali*, *Shastika*, *Yava*, *Godhuma*, *Masura*, *Makshika*, *Pana-Pariseka-Avagaha* of *Khadira Kashaya*, *Bakuchi*.

1. Aaharaj pathya

- Rasa- Tikta ras Pradhan dravya (Patol,Nimb)
- Guna- Dravya with laghu guna (Mudga), Ruksha (yava)
- Grains and Pulses- Shali, Shastika, Yava, Godhuma, Masura, Mudga
- Meat-Jangam Mans
- Dairy products- Avoid Diary products, milk and fermented food
- Oils- Karanj, Tila, Sarshap, Neem, Ingudi oils
- Vegetabels-Parval (Patol), Kantakari, Kakmachi, Nimbapatra, Lahsun, Punarnava, Chakramard
- Avoid sour, salty, spicy foods, hard to digest food, soft drinks, junk foods, bakery products, fish, alcohol and smoking must be avoided.

2. Viharaj Pathya & Mansik pathya

- Avoid excess drying or irritation of the skin.
- Avoid over exposure to sun
- Avoid over eating, over drinking
- Too much or too little sleep, avoid day sleeping
- Avoid Vega Dharana
- Avoid excessive anger

DISCUSSION ON APATHYA

On *Rasa* and *Guna*-Excessive consumption of *Lavana Rasa* provokes *Pitta*, increases blood volume, aggravates *Rakta*, and worsens dermal lesions, leading to muscle tissue depletion.^[12]

Overuse of *Lavana*, *Amla*, and *Madhura Rasa* results in *Kapha and Rakta Dushti*, ultimately contributing to *Kushtha*. It also exacerbates the *Doshika Lakshana* of the disease, such as *Kandu, Rakta-Varnata*, and increased *Mandalotpatti*. Excessive intake of *Amla Rasa* (sour taste) can lead to the vitiation of *Rakta Dhatu* (Blood tissue) and loosening of *Mamsa Dhatu* (Muscle tissue). It has a direct effect on *Pitta Dosha*, increasing its intensity, which may result in inflammation, burning sensations, and suppuration of wounds. Since *Amla Rasa* is predominantly composed of *Agni* and *Prithvi Mahabhuta*. It has an acidic nature that can cause irritation, excessive heat, and disturbances in metabolic processes, making the body more prone to inflammatory conditions. Excessive consumption of *Snigdh* and heavy (Guru) foods weakens digestion (*Agni*) and leads to indigestion.

Excessive fish (*Matsya*) disrupts *dosha* balance, while meat from aquatic (*Auodaka*) and marshy (*Anupa*) animals weakens digestion (*Agni*), slowing metabolism and causing toxin buildup. Overeating flour-based foods (*Pisthanna*) hampers digestion, leading to obesity and lethargy.

Sesame (*Tila*) aggravates *Pitta*, worsening hyperacidity and skin disorders like *Kushtha*. Jaggery (*Guda*) causes worm infestations, fat accumulation, weak digestion, and *Kapha* imbalance, increasing risks of diabetes and obesity.

New grains (*Kledakara*) cause bloating and digestive obstruction, especially in weak *Agni*. Long-term curd (*Dadhi*) intake is highly obstructive, raising *Kapha* and worsening *Kushtha*, allergies, and joint issues. Balanced eating is essential for health.^[15]

Excessive consumption of *Lakuch and Kakamachi* (black nightshade), *Mulaka* (raddish) causes vitiation of *Tridosha and Rakta* which worsens the symptoms of *Dadru Kushtha*.

Unwholesome dietary habits, such as consuming excessive cold drinks, red meat, red chili, hot spices, junk food, oily foods, tomatoes, and highly acidic foods, can act as triggers for psoriasis.^[16]

Unhealthy dietary habits weaken digestion (*Agni*), increase toxins (*Ama*), and imbalance *doshas*, aggravating *Kushtha*. *Vidahi* and *Atibhojana* raise *Pitta*, causing inflammation. *Vidagdha*, *Puti* Anna, and Ajirna Bhojana produce *Ama*, worsening skin issues. *Asatmya Bhojana* disturbs *doshas*, triggering allergies. These lead to chronic itching, scaling, delayed healing, and persistent skin disorders. *Viruddhahara*, *Dushit jala*, *Dushivish vitiates* Agni

leading to Agnimandya, does Srotodusti and produces Ama.^[17] It further produces Dushi Visha which tend to vitiate all the three Dosha.

Stress increases cortisol levels, which can lead to increased oil production and inflammation, exacerbating acne, eczema, psoriasis, and other conditions. It can trigger flare-ups of autoimmune and inflammatory skin disorders such as psoriasis, rosacea, and atopic dermatitis. Chronic stress affects the lipid barrier function, making the skin more prone to dehydration, infections, and irritants.

On pathya

Ahara is the best among all the medicines and is considered one among the three sub-pillars of Ayurveda (thrayo-upasthamba). Tikta Dravya (Bitter substances) enhance gut metabolism, despite causing temporary loss of appetite (Aruchi). Their Shodhana (purifying), Lekhana (scraping), and Laghu (light) properties cleanse microchannel, prevent toxin accumulation, and stabilize skin tissues. Being Vishghna (detoxifying), they help prevent Kushtha. [18]

Tikta Dravya stimulate gut hormones like CCK, GLP-1, and ghrelin, improving digestion, metabolism, and skin health.^[19]

Laghu Anna (light and easily digestible food) in managing Kushtha by reducing Ama (toxins) and balancing Kapha and Pitta Doshas. From a modern perspective, low-energy diets and fasting have been shown to reduce inflammation by altering fatty acid metabolism and modulating eicosanoids, which play a key role in inflammatory processes. Additionally, some psoriasis patients exhibit gluten sensitivity, and studies suggest that a gluten-free diet may alleviate symptoms, particularly in individuals with elevated IgA and/or IgG antibodies. [20]

Aged grains are preferred in *Ayurveda* as they enhance digestion, while fresh grains retain moisture and cause obstruction. Different grains balance *doshas*—**rice** nourishes *Vata-Pitta*, **barley** reduces *Kapha*, **wheat** builds strength, and **millets** support digestion and diabetes management. Lean meat from *Jangala* animals is recommended for its light, easily digestible nature, strengthening tissues without increasing *Kapha*. Ayurveda emphasizes **low-glycemic**, **high-fiber grains**, aligning with modern nutrition trends. Integrating these ancient dietary principles into contemporary diets ensures better digestion, metabolism, and overall health.

231

Viharaj pathya

Prioritize Sleep: Quality sleep is essential for skin regeneration. Ayurveda recommends aiming for 7-8 hours of restful sleep each night to allow the body to heal and rejuvenate. Adequate sleep also helps regulate hormone. Exercise Regularly: Physical activity enhances blood circulation and promotes detoxification through sweating. Ayurveda suggests moderate exercises like yoga, walking, or swimming to maintain both bodily and skin health. Specific yoga poses, like *Viparita Karani* (Legs-up-the-wall) and *Sarvangasana* (Shoulder stand), are believed to increase blood flow to the face, promoting a healthy complexion.

Manage Stress: Chronic stress increases cortisol production, which can lead to skin conditions such as acne, eczema, and dryness. Ayurvedic practices like meditation, pranayama (breathing exercises), and mindfulness can effectively help manage stress and maintain Skin vitality preventing skin irritations and imbalances.

CONCLUSION

The Ayurvedic perspective on *Dadru Kushtha* (Tinea corporis) highlights the crucial role of *Pathya* (Wholesome diet and lifestyle) and avoidance of *Apathya* (Unwholesome habits) in managing and preventing skin diseases. Ayurveda identifies *Kapha-Pitta* imbalance as the primary cause of *Dadru Kushtha*, exacerbated by improper dietary choices, poor hygiene, stress, and environmental factors. Excessive intake of *Amla* (Sour), *Lavana* (Salty), heavy, unctuous, and incompatible foods aggravates *Kapha* and *Pitta*, leading to *Rakta dushti* (vitiation of blood) and worsening of skin lesions. Additionally, sedentary lifestyle habits, excessive heat exposure, and mental stress further contribute to the pathogenesis of the disease.

To counteract these factors, Ayurveda prescribes *Tikta* (Bitter) and *Laghu* (Light) foods, such as *Neem*, *Patola*, *Triphala*, and aged grains, which aid in detoxification and metabolic regulation. Lifestyle modifications, including proper sleep, moderate exercise, and stress management through yoga and meditation, play a pivotal role in maintaining skin health. By adopting Ayurvedic dietary guidelines and lifestyle practices, individuals can effectively prevent and manage *Dadru Kushtha*, reducing recurrence and promoting overall well-being. Integrating these holistic principles into modern healthcare can offer a sustainable, natural approach to skin disease management.

REFERENCES

- 1. https://www.google.com/search?q=prevalence+of+tinea+corporis+according+to+who+&sca_esv=da34502b1ff0439d&rlz=1C1GCEA_enIN1126IN1129&sxsrf=AE3TifO-l7TEaf0YMLIw8zdHu-cu7YPlyw%3A1748843582347&ei=Pjw9aKiBFfmeseMP0OTpkAY&ved=0ahUKEwiomPmDhtKNAxV5T2wGHVByGmIQ4dUDCBA&uact=5&oq=prevalence+of+tinea+corporis+according+to+who+&gs_lp=Egxnd3Mtd2l6LXNlcnAiLnByZXZhbGVuY2Ugb2YgdGluZWEgY29ycG9yaXMgYWNjb3JkaW5nIHRvIHdobyAyBBAjGCcyCBAAGKIEGIkFMgUQABjvBTIFEAAY7wUyCBAAGIAEGKIEMggQABiABBiiBEiHEFDrAliFDHABeAGQAQCYAbkCoAGJDqoBBzAuMy40LjG4AQPIAQD4AQGYAgKgAu4BwgIKEAAYsAMY1gQYR5gDAIgGAZAGCJIHBTEuMC4xoAfZTrIHAzItMbgHzAHCBwUzLTEuMcgHKQ&sclient=gws-wiz-serp#cobssid=s
- Raman Kaushik & Dr. Pragya Sharma: Ayurvedic Management of Dadru Kustha Vis-À.-Vis Tinea Corporis: A Case Study. International Ayurvedic medical Journal {online}, 2016.
- 3. Vd. Tripathi B. Agnivesha, Charaka Samhita with Ayurveda Dipika Commentary edited, Chaukambha Surabhi Prakashana, Varanasi, Chikitsasthana Chapter, 2, 7(23): 305.
- 4. Agnivesha, Charaka samhitha of Acharya Charaka, Drudhabala krit, edited by Vaidya Jadavji Trikamji Acharya, Sutra Sthana Ch. Reprint Edition Choukhambha Surbharati Prakashan, Varanasi, 2005; 129: 25-30.
- 5. Acharya Susruta, Susruta Samhita, Reprint Edition, Part I Edited with Sushrut Vimarshini Hindi Commentry by Dr. Ambika datt Shashtri, Chaukhambha Sanskrit Sansthan, Varanasi, Su. Nidan sthana, 2010; 5, 5: 320.
- 6. Vd. Shastri Kashinath B. Agnivesha, Charaka Samhita, Chaukambha Bharti Academy, Varanasi, Chikitsa sthana Chapter, 2, 7(13): 224.
- 7. Acharya Susruta, Susruta Samhita, Reprint Edition, Part I Edited with Sushrut Vimarshini Hindi Commentry by Dr.Ambika datt Shashtri, Chaukhambha Sanskrit Sansthan, Varanasi, Su. Nidan sthana, 2010; 5, 8: 321.
- 8. Dr.Brahmanand Tripathi, Vaghbhsata Ahtanga Hridaya, Chaukhambha Sanskrit Pratishthan Delhi, Nidansthana, chapter, 14/24: 530.
- 9. Dr. Premvati Tiwari, Kashyap Samhita (vridhha Jivakiya Tantra) Choukhamba Vishwa Bharti, Varanasi Chikitsa Sthan, 9/2: 197-198.
- 10. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Nidan sthana Chapter, 2: 5/6-569.
- 11. Dr Brahmanand Tripathi, Pathya-Apathyavinirnayah, Chaukhambha Sanskrit Pratishthan Delhi, Nidansthana, Kushtha Roga Pathya, 409-415, 86-87.

- 12. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Sutra sthana Chapter, 1, 26/42(3): 440.
- 13. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Sutra sthana Chapter, 1, 26/42(2): 439.
- 14. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Sutra sthana Chapter, 1: 26/40-437.
- 15. Harish Chandra Singh Kushwaha, editor. Charak Samhita. Varanasi. Chaukhama Orientalia Sutra Sthana, Chapter, 2018; 1, 27: 56-58, 416.
- 16. Kuchekar AB, Pujari RR, Kuchekar SB, Dhole SN, Mule PM. Psoriasis: A comprehensive review. International Journal of pharmacy & life sciences, 2011; 1: 2(6).
- 17. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Nidan sthana Chapter, 1: 5/6-569.
- 18. Pandit Kashinath Pandey, Charak Samhita, Chaukambha Bharti Academy, Varanasi, Sutra sthana Chapter, 1: 26/40(5): 441.
- 19. Rezaie, P.; Bitarafan, V.; Horowitz, M.; Feinle-Bisset, C. Effect of Bitter Substances on GI Function, Energy Intake and Glycaemia-Do Preclinical Findings Translate to Outcomes in Humans Nutrients, 2021; 13: 1317. https://doi.org/10.3390/nu13041317
- 20. Wolters M. Diet and psoriasis: experimental data and clinical evidence. Br J Dermatol, 2005; 153(4): 706-14. doi: 10.1111/j.1365-2133.2005.06781. PMID:16181450.

www.wjpr.net Vol 14, Issue 12, 2025. ISO 9001: 2015 Certified Journal 234