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PĀDUKĀVIṢA, THE GARAVIṢA ADHIṢṬHĀNA, IN VIEW OF FOOTWEAR CONTACT DERMATITIS- A CASE STUDY

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ABSTRACT:

Footwear contact dermatitis or footwear dermatitis is defined as dermatitis on the feet caused by any footwear. The pathophysiology is either a CD4-T-lymphocyte mediated type IV hypersensitivity reaction or an irritant dermatitis.^[1] Its prevalence in India is 11.7% but is often misdiagnosed and mismanaged.^[2] The common culprit agents are products in leather, colorants, adhesives like formaldehyde or even agents in stocks and stockings.^[3] These agents could be equated to “Garaviṣa” (*Kṛtrima viṣa* / artificial poison) mentioned in Ayurveda. The diagnosis of footwear dermatitis is done by Patch test to determine the specific allergen. Ācārya Suśruta explains the different modes of administration (*adhiṣṭhāna*) of *garaviṣa*, which include ‘Pāduka’ (footwear), whose clinical features- *śopha* (edema), *srāva* (oozing), *swāpa* (numbness) and *sphoṭa* (blisters) on feet are comparable with those of footwear dermatitis.^[4] Since the modern management consists of avoiding contact with the allergen as well as conservative methods including good skin care, use of barrier creams, etc. and the use of corticosteroids could cause adverse effects like thinning of skin,^[5] Ayurvedic treatment modalities especially in the lines of management of *viṣa* could be utilized for good results. A 19 year old female, presented with itching, discoloration and oozing over both feet was well managed with Ayurvedic treatment protocol.

Key words: Footwear contact dermatitis, *pāduka viṣa*, *garaviṣa*, *Agada* management

INTRODUCTION:

Footwear contact dermatitis or footwear dermatitis is defined as dermatitis on the feet caused by repetitive contact with allergens present in any footwear. The pathophysiology is either a CD4-T-lymphocyte mediated type IV hypersensitivity reaction or an irritant dermatitis.^[1] Its prevalence in India is 11.7% but is often misdiagnosed and mismanaged.^[2] The common culprit agents are products in leather, colorants, adhesives like formaldehyde or even contents of socks and stockings.^[3] The causative agents of footwear contact dermatitis could be mechanical irritants or chemical irritants. These chemical agents could be equated to “*Garaviṣa*” (*Kṛtrima viṣa*- artificial poison) mentioned in Ayurveda, which is considered as a combination of different substances which are usually mildly poisonous.^[6] In India, no scientific statistics is available separately for the involvement of chemical irritants. The mechanical irritants do not come under the purview of *pādukāviṣa*, which is a sub-classification of *garaviṣa*, based on the mode of application. The diagnosis of footwear dermatitis is achieved by performing Patch test to determine the specific allergen. Though the common clinical features of footwear dermatitis include erythema, vesicles, cracks, desquamation of skin, edema, pruritus, burning and pain; it can be an extremely disabling problem as blistering and weeping feet may become secondarily infected and painful fissuring often occurs, resulting in inability to walk.^[7] These clinical features are comparable with those of *pāduka viṣa* mentioned by different *Ācāryas*. Hence Ayurvedic treatment modalities especially in the lines of *pāduka viṣa* can contribute to effective management.

ETIOLOGICAL AGENTS RESPONSIBLE FOR FOOTWEAR DERMATITIS:

Footwear contact dermatitis is caused by various physical as well as chemical factors including several components used in the fabrication of footwear, including uppers/straps, soles, insoles, heel and toe counters, and the stiff elements that maintain shoe shape.^[8] Chemicals in leather, rubber, and adhesives have long been recognized as potential sensitizing agents. Dyes, anti-mildew agents, formaldehyde, and nickel eyelets or nickel arch supports are the other identifiable causes.^[9] Warm and moist environment and occlusion provided by shoes are thought to potentiate the development of allergic contact dermatitis (ACD).^[10]

Table 01: The common allergens found in footwear.^[1]

Leather and leather chemicals	Potassium dichromate
	Formaldehyde
	Colophony
Rubber and rubber chemicals	Black rubber mix
	Mercaptobenzothiazole
Plastic and plastic materials Adhesives	Epoxy resin
	Formaldehyde
	Urethane
Dyes	Para-phenylene-diamine (PPD)
Metals	Nickel sulphate
	Cobalt chloride

Chromium is reported to be the most common allergen to be responsible for 75% of shoe dermatitis cases reported in India.^[11] Other factors such as heat, pressure, friction, and sweating, (physical factors) which are often encountered in the foot environment, may contribute to the risk of sensitization. Anatomic foot deformities and ill-fitting shoes may cause excessive friction and wearing away of the shoe linings and thus allow more intimate contact of the allergens with the skin. Inflammatory changes in the skin produced by friction and pressure facilitate percutaneous absorption of substances. Occlusive tight-fitting shoes lead to retention of water in the stratum corneum and increase the chances of percutaneous absorption of substances by about 100 times.^[7] Sweat may leach out chemicals such as chrome salts from the shoes and contribute to development of leather sensitivity.^[9]

THE CONCEPT OF *GARA VIṢA*:

According to *Agada Tantra*, poison or *viṣa* is defined as a substance which causes *viśada* (sorrow or distress). It is classified into *kṛtrima viṣa* (artificial poison) and *akṛtrima viṣa* (natural poison), out of which *kṛtrima viṣa* is otherwise called *Garaviṣa*.^[6] It is of two types- *saviṣadravya saṃyogajanya* (formed by combination of poisonous substances) and *nirviṣadravya saṃyogajanya* (formed by combination of non-poisonous substances). According to *Ācārya Caraka*, *Gara* is a combination of different substances which does not prove fatal, which produces *cirakāri rogas*.^[12] According to *Ḍalhaṇa* commentary, *garaviṣa* is not always used intentionally and could be accidental in some instances.^[4] In traditional

Malayalam textbooks like *Kriyākaumudi* and *Prayogasamuccaya*, *Garaviṣa* is explained as *Kaiviṣa* which has *vaśīkaraṇa* property.^[13] *Ācārya Vāgbhaṭa* describes *Garaviṣa* as a combination of excreta and body parts of animals, *viruddha auśadhi* (incompatible drugs) or of mildly potent poisons.^[6] Thus, *Garaviṣa* can be considered as the permutations and combinations of poisonous or non-poisonous substances that harm the body.

In *Suśruta Saṃhita kalpasthāna*, different *gara adhiṣṭhānās* are explained in chapter 1, *Annarakṣāvidhi*. One among them is *Pādukāviṣa*, which is a toxin exposed to the body by means of footwear (smeared with or containing toxin). *Chandanādi lepa* is indicated as external application for the treatment of *Pādukāviṣa*.^[4]

CLINICAL FEATURES:

Clinical features may have some similarities based on the location, but can be varied depending upon the toxin to which the skin had exposure. Symptoms of contact allergic dermatitis may include erythema, vesicles, cracks, desquamation of skin, edema, oozing, pruritus, burning and pain. It can be an extremely disabling problem as blistering and weeping feet may become secondarily infected and painful fissuring often occurs, resulting in inability to walk. Typically, the rash is symmetrical, with the volar and dorsal aspects of the feet affected, the toe flexural creases and instep often being spared. Sometimes allergy to particular shoe components dictates the distribution of dermatitis (eg, heel box constituents affect the heel, nickel in zips, buckles, and ski hooks affect the adjacent skin only).^{[1],[7]}

The symptoms of *Pādukāviṣa* mentioned in *Suśruta Saṃhita* are *shopha* (edema), *srāva* (oozing), *swāpa* (numbness) and *sphoṭa* (blisters).^[4] In *Kriyākaumudi* additional symptoms i.e. fissuring and pain are also included.^[13] Thus the concept of *pādukāviṣa* has much developed from the period of *Suśruta Saṃhita* (B.C. 800-600) to the period of *Kriyākaumudi* (A.D.1986). These symptoms are comparable with those in Allergic footwear dermatitis.

MANAGEMENT

The basic concept of management is formatting the contemporary usage of poison, through various modes. Conservative methods of modern concentrate only on good skin care and introduction of barrier systems. Whereas *Agada Tantra* deals with elimination or neutralization of poison too. Typically, systemic corticosteroids would be used only after

more conservative treatment has failed. The stage of secondary infection, if developed, is to be managed sometimes with Ayurveda alone or with modern medicine, as per the severity of the condition, with due consideration given to the general health and immunity of the patient.^[5]

Ayurvedic management includes the following principles:

1. Nidāna parivarjana- avoiding the footwear which is sensitive to the patient, i.e. the footwear which do not contain the allergen causing their shoe dermatitis. Patients allergic to the chromate used to tan leather will benefit from wearing chromium-free leather shoes. If such shoes cannot be obtained, switching to a new pair of leather shoes every few months has been recommended as has wearing two pairs of socks and alternating shoes. Vegetable-tanned footwear and shoes from synthetic materials could benefit. Patients with rubber allergies could replace the insoles of their shoes with cork, composite or felt applied with a non-rubber cement. Socks may be worn as a barrier.^{[7],[14]}

2. Specific management for Garaviṣa include-

- **Lehana:** *Tāpya, Suvarṇa* with honey and sugar; which is *viśahara* and acts as *rasāyana*.
- **Mūrvādi Cūrṇa:** specifically indicated for oral administration in conditions of *Garaviṣa* by Ācārya Vāgbhaṭa.^[15] It has *dīpaka, pācaka, grāhi, anulomaka, viśaghna, pitta sāraka* and *rasāyana* properties and helps in the correction of *agni māndya* caused by *garaviṣa* (*garopahata pāvaka*).^[16] If *Gara* enters into the *śarīra*, it causes disturbances in the *agni* due to its *apāki guṇa* and deranges it by causing *āma*, which further initiates the chain of *vyādhi utpatti*. The *agni* may be *dhātwaṇi* or *bhūtāṇi* or *jaṭharāṇi*. This gradually leads to *srotorodha*, resulting in further *doṣakopa* and impairment of *dhātupariṇāma*.^[17]

In case of *pādukāviṣa*, the toxins absorbed through the skin of feet affect the *dhātwaṇi* directly and cause deranged formation of *rasa, rakta* and even *māṃsa dhātu*. Thus the *twak* loses its normal structure and present with various dermatological manifestations. *Mūrvādi Agada* has the ability to correct the *agni* and correct *srotovaiguṇya*. *Mūrvādi cūrṇa* has *tikta-kaṣāya rasa, laghu-rūkṣa guṇa, uṣṇa vīrya* and *kaṭu vipāka*, and is *vāta-kapha śamaka*.^[18] The *tikta-kaṣāya rasas* and *laghu-rūkṣa guṇas* have *upaśoṣaṇa* property which dries up *dhātugata āma*. *Uṣṇa vīrya* and *kaṭu vipāka* attribute *dīpana, pācana* and

śoṣaṇa properties necessary to correct *agnimāndya*. *Rasāyana swabhāva* of ingredients like *kaṇā*, *amṛta* and *citraka*, as well as the *viśaghna* property of *viḍaṅga* and *nata* add to the effect of the drug in restoring the normal structure and function of *dhātu*.^[16]

3. Management of *viśaja śopha* by *viśahara* drugs:

Viḍaṅgatriphalādi lepa: In *Aṣṭāṅga Saṃgraha*, *Viśopadravīya adhyāya*, different formulations are mentioned for the treatment of *visa upadravās*. *Viḍaṅgatriphalādi yoga* is mentioned for the treatment of *viśaja shopha*.^[19] As *Pādukāviṣa* is an inflammatory condition which is produced by the contact of poisons present in the footwear, *Viḍaṅgatriphalādi yoga* may be employed.^[20]

4. Based on the predominant *doṣa*:

Symptomatic management according to the predominant *doṣa* is useful for faster results. For example, when symptoms like *dāha* (burning sensation), *rāga* (erythema), *ruk* (pain), etc. are present, *pittaśamana* is recommended for which, medicines like *Gulūcyādi Kaṣāya* and *Gopīcandanādi gulika* could be prescribed. In *kapha* predominant conditions with symptoms like *kaṇḍu* (pruritus), *srāva* (oozing), *śopha* (edema) without *rāga* (erythema), *kapha śamana* using medicines like *Triphala kashāya* could be used. When *rūkṣata* (dryness), *ruk* (pain) and fissures are present without oozing or inflammation, *vātaśamana* by application of medicated oils and other drugs are beneficial.

- In case of mild disease limited to the superficial layers of skin with a very short duration of exposure to toxin, external application of medicines might be enough.
- Need of internal medicine depends on the type of *garaviṣa* and longer duration of exposure.
 - *Śodhana* might be adopted in case of *doṣaparakopa*.
 - *Śamana Ouśadha* should include medicines which are *Viśahara* and *Doṣahara*.

A CASE REPORT:

A 19 year old female, who was a student, resident of Tirur, presented with itching, discoloration and oozing over both feet since three months. On examination, it was observed that erythematous plaques were present with exfoliating skin over the dorsum of feet

bilaterally along the contour of footwear associated with pruritus and oozing. She was using synthetic footwear. There was no history of relevant past illness or family history of dermatological conditions. The predominant *doṣa* were *Kapha* (*kaṇḍu*, *srāva*) and *Pitta* (*rāga*).

The condition was diagnosed as footwear contact dermatitis (*Pādukāviṣa*) since the symptoms commenced after the patient started using the particular footwear, the lesions were present along the contour of the footwear and there were no generalized symptoms of allergy. The *Viśabheda* is *Kṛtrima viṣa* (*Gara*) with *adhiṣṭhāna- pāduka*.^[4]

Management: The treatment was adopted in two phases, focused on *doṣaśamana* and *viśaharatva*:

Table 02: Treatment chart

Phase I: *Vāta-Kaphahara cikitsa*

	Medicine	Dose	Date	Observation
1.	<i>Vilwādi Gulika</i> ^[21]	1 BD before food	11/08/23 (7 days)	Oozing-reduced Pruritus-reduced
	<i>Mūrvādi Cūrṇa</i> ^[15]	5g BD before food with warm water.		
	<i>Varā Kaṣāya</i> ^[22]	<i>Avagāha</i>		

Phase II: *Kapha-pittahara cikitsa*

	Medicine	Dose	Date	Observation
2.	<i>Mūrvādi Cūrṇa</i>	5g BD before food with warm water.	18/08/23 (14 days)	No oozing No erythema Mild pruritus Dry skin, plaques reduced.
	<i>Paṭolamūlādi Kaṣāya</i> ^[23]	90 mL BD before food		
	<i>Varā Kaṣāya</i>	<i>Avagāha</i>		

3.	<i>Mūrvādi Cūrṇa</i>	5g BD before food with warm water.	01/09/23 (7 days)	No oozing No erythema No pruritus Mild dryness of skin
	<i>Gulūcyādi Kaṣāya</i> ^[24]	90 mL BD before food		
	<i>Nālpāmarādi Kerataila</i> ^[25]	External application		

Result: The patient attained significant relief from the symptoms. She had complete relief from pruritus, erythema and oozing. The plaques reduced significantly and only mild dryness persisted.



Before Treatment (11/08/2023)



After Treatment (08/09/2023)

DISCUSSION:

Considering the *doṣa* predominance as well as the involvement of *viṣa*, the first phase of treatment was planned by including medicines which are *viṣahara* and *vātakaphahara*. *Vilwādi gulika*, a widely used *viṣahara* drug which can be applied in almost all poisonous conditions, is *kaphavātahara*, thus reducing symptoms like *kaṇḍu*, *srāva* and acts directly against the effects of poison. The *sūkṣma guṇa* of the drug, attributed by its minute particle size achieved by repeated trituration in *basta mūtra* (*susūkṣmapīṣṭa*), contributes in countering any *viṣa* (which itself is *sūkṣma*), by acting upon minute *srotas*. The antioxidant activity exhibited by the ingredients help neutralize free radicals generated in body during interaction with most toxins. Its anti-inflammatory activity too, contributes to the relief in

pruritus and oozing, caused by contact dermatitis, which is a type IV hypersensitivity reaction.^[26] *Mūrvādi Cūrṇa* is specifically *garaviṣahara* and *dīpana*, thus overcoming the depletion of *jaṭharāgni* and *dhātvagni*. The *tikta-kaṣāya rasas* and *laghu-rūkṣa guṇas* of *Mūrvādi Cūrṇa* have *upaśoṣaṇa* property which aids in reducing *srāva*.^{[16],[17],[18]} *Varā* (*Triphala*) being *tridoṣahara*, *vraṇa ropaṇa*, and possessing antioxidant and anti-inflammatory properties, brings down the symptoms like *rāga* and *srāva*.^[27] Thus, after the first phase of treatment, the patient attained considerable relief from the main problems, which were pruritus and oozing.

In the second phase of treatment, more importance was given to reduce *pitta doṣa*, along with *kapha*. *Paṭolamūlādi kaṣāya* brings about *śodhana* of *pitta* and *kapha doṣas* and causes *kuṣṭhaharatva*.^[21] *Mūrvādi Cūrṇa*, when used after *doṣaśodhana*, acts as *rasāyana*, facilitating the proper formation and functioning of *dhātūs*, thus restoring the normal structure of skin.^[17] The use of *Gulūcyādi kaṣāya* alleviates the remaining *pitta* and *kapha doṣa*.^[24] The *pittakopa* which persisted was tackled by applying *Nālpāmarādi kerataila*, which is also *kuṣṭhahara*.^[25]

CONCLUSION:

Footwear dermatitis is a misdiagnosed type of contact dermatitis caused by repetitive contact with certain antigens in footwear,^[7] which could be correlated to *Pādukāviṣa*, a type of *gara viṣa* (artificial or combination poison) in Ayurveda.^[4] The condition can be an extremely disabling problem as blistering and weeping feet may become secondarily infected and painful fissuring often occurs, resulting in inability to walk, thus affecting the quality of life of the patients.^{[7],[14]} The management includes avoiding sensitive footwear and adopting *gara cikitsa*, using *viṣahara* drugs and improvement of general immunity. Treatment in lines of *viṣa* especially local application of *viṣahara* drugs helps removing the allergens or *gara* from the skin.

CONFLICT OF INTEREST: There is no conflict of interest.

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