WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 11, 157-168. Review Article ISSN 2277–7105

UNDERSTANDING *KADARA* W.S.R. CORN: INSIGHTS AND MANAGEMENT IN AYURVEDA AND CONTEMPORARY SCIENCE

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Article Received on
05 April 2024,

Revised on 25 April 2024,
Accepted on 15 May 2024

DOI: 10.20959/wjpr202411-32482

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ABSTRACT

In the modern era, skin diseases pose significant challenges despite advancements in medical treatments. Often considered less critical compared to other illnesses, they can still profoundly affect individuals quality of life. This study seeks to explore the concept of "*Kshudra roga*" from ancient Ayurvedic texts, encompassing various skin conditions such as *Khalitya* (alopecia), *Palitya* (premature greying), *yuwanpidika* (acne), *Darunaka* (dandruff), *Jatumani* (birthmarks), and *Kunakha* (nail discoloration) etc, which resonate with contemporary dermatological issues. Among these conditions, *Kadara* stands out—a term found in both major and minor Ayurvedic texts, akin to corns observed on the feet or palms due to constant friction and pressure. Despite modern surgical interventions like excision, recurrence rates remain high, significantly impacting individuals' daily routines. This article endeavors to elucidate the etiology, pathogenesis, and effective management strategies for *Kadara* (corns) according to Ayurvedic principles and contemporary medical science, providing a comprehensive understanding of this ancient ailment and its relevance in today's context.

KEYWORDS: Kadar, Corn, Chedana, Agnikarma, Salicyclic acid.

INTRODUCTION

In India, a large segment of the workforce is involved in strenuous physical labor, often foregoing proper footwear and opting to walk barefoot. Similarly, in urban settings, there's a prevalent issue of wearing ill-suited or incorrectly sized shoes. These practices contribute to the emergence of various foot problems, with foot corns being the most commonly reported condition prompting individuals to visit healthcare professionals.

In a global scenario, corn accounts to 14 to 48% of the participants who visit a podiatric clinic.[1] India reports more than 10 million cases of foot corn every year.[2]

Sushrut Samhita is the main pillar of Ayurvedic surgery. According to Acharya Sushrut "*Kadar*" is one of the *Kshudra Roga*. It is *Kapha-Vataj* disorder that also vitiates *meda* and *raktdhatu*. Acharya Sushruta has described *Kadar* as *kshudra* in *Sushrut Samhita* Chapter 20 in *ChikitsaSthana*[3] and *Nidansthan* chapter 13.[4]

शर्करोन्मथिते पादे क्षते वा कण्टकादिभिः |
मेदोरक्तानुगैश्चैवदोषैर्वा जायते नृणाम् ||३०||
सकीलकठिनो ग्रन्थिर्निम्नमध्योन्नतोऽपि वा |
कोलमात्रः सरुक् स्रावी जायते कदरस्तु सः ||३१||

(SU NI. 13/30-31)

When the feet are placed on a hard or rough surface, a wound from thorns, etc., or when the doshas become aggravated along with fat and blood, it can lead to the formation of a tumour called *Kadara* that is hard like a bolt and grows in the centre or around the edges of the feet. It is painful and exudes fluid.

A corn is a callus of dead skin with a unique shape that develops on the glabrous or thin surface of the toe. It presses upon the adjacent tissues and causes severe pain when pressed due to pressure on the nerves.

A localised thickening or hardening of the skin is referred to as callosity in French. A corn or clavus is a dry, smooth, and slightly convex patch of hyperkeratosis on the skin that is brought on by sporadic direct pressure applied to a small area.[5, 6] Its dimensions range from 1 mm to 2 cm, and its form is conical. It is made up of a compressed hyperkeratotic stratum corneum wedge that resembles a cone, with the apex pointing inside and the base of the cone

facing the skin's surface. When it presses against nearby tissues, pressure on the nerves results in excruciating pain.[7, 8]

Review of *Kadara*

Vyutpatti- *Kadara* word is derived by the union of Ka+Dru+Ai.[9]

Nirukti- *Kadara* means-that which destroys the particular part of the foot by the Influence of *Vata*.[10]

Definition- The *KADARA* (Corn) defines the knotty (*Granthi*), a painful, hard growth raised at the middle or sunk at the sides, which exudes a secretion and resembles an Indian plum (Kola—in shape), and appearing at the soles (palms according to—Bhoja) of a person.[11]

Historical Aspect

1.) Samhita Period (1000 BC-100AD) Samita period was the golden Era for Ayurveda. In Sushruta Samhita detail description of Nidan, Samprapti, Lakshan and Chikitsa of Kadar is available.

2.) Sushruta Samhita (1000 to 800 BC) Acharya Sushruta has explain about Kadara in Kshudra Roga in Nidanasthan chapter 13 & Chikitsasthana chapter 20.[12]

3.) Charaka Samhita (1000BC) In Charaka Samhita Acharya Charaka mentioned 36 Uppakrama of Vrana and its management in Dvivraniya Adhaya of Chikitsa Sthana.[13]

4.) Ashtanga Sangraha Agnikarma is explained in Sutra Sthan 40th Chapter Agni karma vidhiadyaha. Kadara is explained in Uttar Sthana 36th chapter Ksudraroga Vijnaniya.[14]

5.) Ashtanga hridaya In Uttar Sthan 31st chapter of Kshudra Rog Vigyaniyaadhyay explain after Kadara and 32nd chapter of Uttara Sthana explained about Chikitsa Karma.[15]

6.) Sarangdhara Samhita In 7th chapter explanation of Kadara is available.[16]

7.) Yogaratnakara In Kshudra Roga Yogaratnakar explain about Kadara Lakshana and its Chikitsa.[17]

8.) Bhavaprakash In Uttarardha part II 61st Chapter Kshudra Rogadhikar Lakshana and Chikitsa of Kadara is explained.[18]

9.) Madhava Chikitsa:- Kadara Roga is explained in 55th Chapter i.e.Kshudra Roga Adhyaya.[19]

10.) Bhoja Samhita Kadara Roga is explained. Kadara is denoted by Sarkara and Kandakam. Sringarahata and Jatakamala have explained about Kadara Roga by denoting it by Kina.[20]

Nidana

Nidana is defined as the factors which lead to the disease by deranging the equilibrium of *doshas* in the body. The knowledge of *Nidana* is essential for the understanding of *Samprapti* and to determine the *Sadhyasadhyata* and *Chikitsa*. In Ayurveda, *nidana* has been given the most important because the first line of treatment is *Nidanparivarjan*.[21]

The most important etiological factors described in *Sushruta Samhita* in respect of *Kadara* are injury to the *Pada* because of thorn prick, stone, and any type of cut injury or repeated pressure over the foot during bare foot walking. *Doshas* also play an important role as *Nidana*. Vitiation of *Vata* and *Kapha* along with *Rakta* & *Meda* gives rise to changes which are more confined to parts of the skin subjected to friction and pressure effects.[22]

Samprapti

KADARA is an outcome of the vitiated condition of the local blood and fat produced by the deranged *doshas* incidental to the pricking of a thorn etc. or of gravel is called a *Kadara* (corns).[23]

***Samprapti Ghatak*[24]**

Dosha	*Vata & Kapha*
Dooshya	*Twak, Rakta, Medas*
Jatharagni	*Manda*
Dhatwagni	*Manda*
Srotas	*Rakta and Medhovaha*
Srotodushti Prakar -	*Sanga*
Udhbhava Sthana	*Pada*
Sanchara Sthana	*Raktavahinisira*
Roga-Marga	*Bahya*
Adhisthana	*Pada*
Vyaktasthana	*Pada*

Types

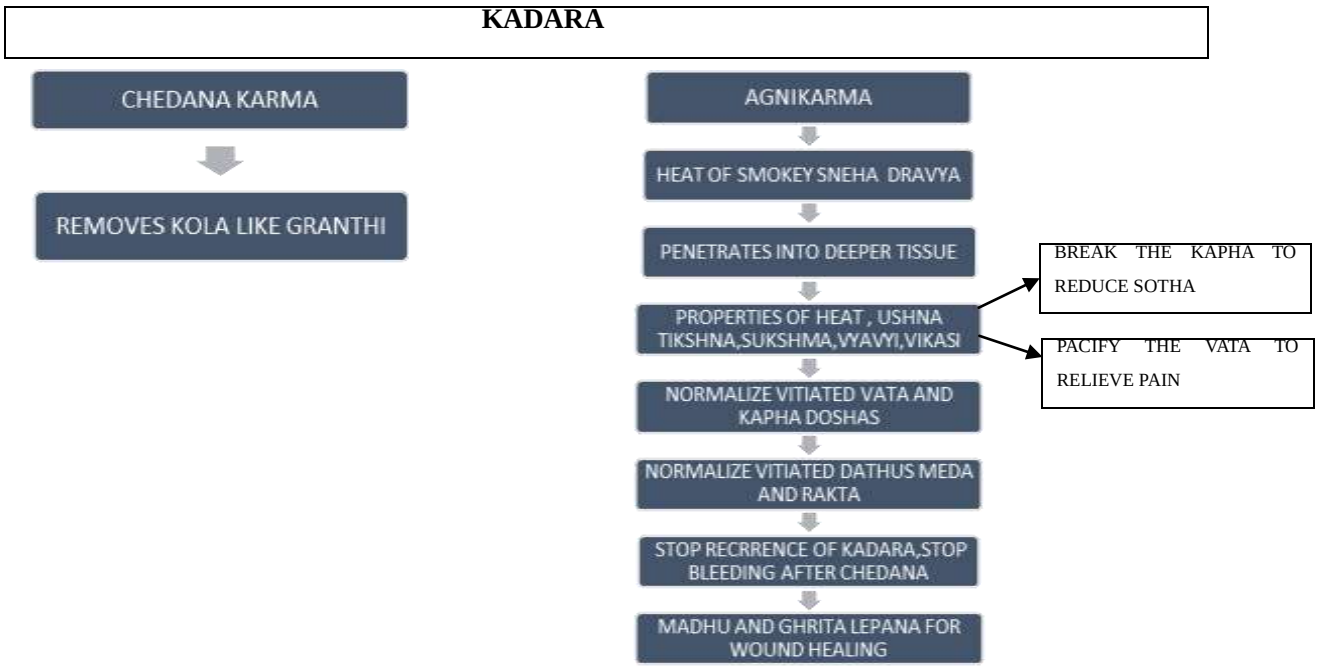
In Ayurvedic texts no specific types are mentioned in *Samhitas.*

In Contemporary Science, Corn are classified as Hard Corn (heloma durum) and Soft corn (Heloma Mollies). Based on the size, it can be classified as Corn or Callosity.

Corn- A small, tender, and painful raised bump on the side or over the joint of a toe. Corns are usually 4 mm to 10 mm in diameter and have a hard centre. Corn may be painful particularly when it is rubbed. A small, tender, and painful raised bump on the side or over the joint of a toe. Corns are usually 4 mm to 10 mm in diameter and have a hard centre. Corn may be painful particularly when it is rubbed.

Callosity- A rough, thickened area of skin that appears after repeated pressure or irritation. The area most commonly involved is feet, hand and knees. Callosities of the soles of the feet are the most troublesome. A callosity (French collocate) is a localized thickened or hardened part of the skin caused by friction. It is commonly occupational, e.g. on gardeners' hand or the finger of a violinist.[25]

Probable mode of action



Chikitsa Siddhanta

The author of *Sushruta Samhita*, *Ashtanga Hridaya*, *Yogratnakara*, *Gadnigraha* and *Bhavaprakash* agree on the line of treatment of *Kadara* that it is to be excised and should be followed by *Sneh Dahana*.

The *sneha* to be used to particularly identified as *Taila* by *Chakradatta* and *Gadnigraha*.[26]

According to *Dalhana*- Excised surgically, but subsequently burnt using hot oil. *Snehana*– By oil heated on fire as it reaches the minute channels, others say that all *snehas* have such property and as such all of them may be used.[27]

According to *Acharya Sushruta- Kadara*, the seat of the disease should be scraped off (with the aid of a knife) and cauterised with (the application of) heated oil. *Acharya Sushruta* has advices *Chedana*' (excision) and '*Agnikarma*'.[28] After proper cauterization, Honey and ghee are applied profusely.[29]

In Contemporary science various procedures are available like.

Topical Treatments

1. Salicylic Acid

- Salicylic acid is a keratolytic agent, meaning it helps to break down keratin, the protein that makes up the thickened skin of calluses.
- For local treatment an ointment containing 10 to 40% salicylic acid in Vaseline or any other keratolytic agent should be liberally applied over the lesion which should be bandaged overnight.
- Salicylic acid in collodin (20%) applied for a few nights followed by soaking in hot water are often effective in removing a corn.
- It's available over-the-counter in various forms such as creams, gels, pads, and solutions.
- Before applying salicylic acid, it's important to soak the affected area in warm water to soften the callus and enhance the penetration of the medication.
- Follow the instructions provided with the product carefully, as overuse or misuse can lead to skin irritation or other complications.

2. Urea Creams

- Urea is a naturally occurring substance that helps to hydrate and soften the skin.
- Urea creams are available over-the-counter and may be used alone or in combination with other treatments.
- These creams work by increasing the water content of the skin, which helps to loosen and exfoliate the thickened layers of the callus.

3. Emollients and Moisturizers

- Regular application of emollients and moisturizers helps to keep the skin soft and supple, reducing the risk of callus formation.
- Look for products that contain ingredients like petrolatum, lanolin, or glycerin, which help to seal in moisture and protect the skin barrier.
- Apply moisturizer to clean, dry skin, focusing on areas prone to calluses, such as the heels and balls of the feet.

Minor Procedures

1. Debridement

- Debridement is a procedure performed by a healthcare professional to remove the thickened layers of skin from a callus.
- During debridement, the provider may use a scalpel, blade, or other sharp instrument to carefully shave away the excess skin.
- Debridement is typically performed in a clinical setting and may provide immediate relief from pain and discomfort associated with large or painful calluses.

2. Orthotics and Padding

- Orthotic devices, such as custom-made shoe inserts or pads, can help to redistribute pressure on the foot and reduce friction on the callused area.
- Padding materials, such as moleskin or felt, can also be used to cushion and protect the callus from further irritation.
- A podiatrist can assess your foot structure and gait to determine the most appropriate orthotic or padding options for your needs.

3. Corticosteroid Injections

- Corticosteroid injections may be recommended for calluses that are associated with inflammation or pain due to pressure on underlying structures, such as joints or nerves.
- These injections deliver a potent anti-inflammatory medication directly into the affected area, providing rapid relief from symptoms.
- Corticosteroid injections are typically reserved for cases where other treatments have been ineffective or when immediate symptom relief is needed.

4. Surgical Correction

- In severe cases or when calluses are caused by structural abnormalities or underlying conditions, surgical correction may be necessary.
- Surgical procedures may involve realigning bones, tendons, or ligaments to relieve pressure on the affected area and prevent callus recurrence.
- Surgical correction is usually considered after conservative treatments have been exhausted.
- The surgical treatment is undertaken under local anaesthesia and consists of removing the thickened keratin plug from underlying epidermis by dissecting at the level of stratum granulose, which is visible as a dark brown layer.

Preventive Measures

- Wearing properly fitting footwear that provides adequate support and cushioning.
- Avoiding activities that put excessive pressure on the feet, such as standing for long periods or wearing high heels.
- Regularly inspecting your feet for signs of callus recurrence or other foot problems.
- Keeping the skin clean, dry, and moisturized to prevent dryness and cracking.
- Seeking prompt medical attention for any signs of infection, such as redness, swelling, or drainage from the callused area.

DISCUSSION

Hyperkeratosis, a typical physiological reaction to persistently high pressure or friction on the skin, is the cause of corns and calluses. High levels of activity, improper footwear, and poor foot mechanics can cause pressure and friction that can result in corns and calluses.

Factors that may lead to development of callosities.

Extrinsic factors: Poor footwear, Tight shoe, Irregularities in shoe, Open shoes, Activity level Athletes.

Intrinsic factors

- Bony prominences, Prominent condylar projection, Malunion of a fracture.
- Faulty foot mechanics, Cavovarus foot, Toe deformity (claw, hammer, mallet), Short first metatarsal, Hallux rigidus, Transfer lesion from osteotomy or removal of adjacent metatarsal head.

Majority of the lesions can be conservatively treated with appropriate footwear, orthoses, and if required, regular paring. Usually the lesions go away when the mechanical forces that caused them are eliminated. Surgery should only be performed with explicit intent to repair the aberrant mechanical stresses, as the accompanying scars may exacerbate the original complaints. Treatment should therefore not only provide symptomatic relief (such as by regular paring or using keratolytic agents) but should also alleviate the underlying mechanical cause.

Acharya Sushruta in *Shalyatantra* explains eminent branches of Ayurveda, which consists of major therapies like *Bheshaja karma, Kshara Karma, Agnikarma, Shastrakarma* and *Raktamokshana*. Among these, *Agnikarma* is more effective and beneficial for local *vataj* and *kaphaj vyadhi* since it treats ailments that do not recur and provides patients with immediate relief.[28] Of all the parasurgical techniques, *Agnikarma* is the best and has shown to be beneficial in cases where the disease exhibits localised involvement of the *Vata* and *Kapha doshas*.[29] *Agni's ushna guna* facilitates the efficient removal of *Avarana* and stabilises *vata* movement, relieving *Shoola*. The application of topical heat (thermotherapy) can alleviate pain and excruciating muscular spasms by speeding up metabolic processes, which lowers the concentration of toxic metabolites that cause pain. A rise in local circulation is the main means by which this is achieved. Inflammation will resolve faster if the inflammatory response is accelerated in response to resolution, even though it may initially cause more discomfort.

It is recommended to perform daily *Pada Abhyanga* (foot massage) using *vatahara* oils on the feet to soften the skin and stop corns from coming back. Lipids provide the skin barrier by shielding it from external chemical assaults and preventing water loss from the skin.[17] As a result, the lipid profile of the skin determines how well the skin functions as a barrier.

Lipids play multiple roles during corneocyte development and are expressed during this process.

In addition to supporting corneocyte cohesiveness in the stratum corneum, they are located in the intercellular gaps where they control water permeability to prevent desiccation through their multi-lamellar organisation, which enhances the skin's ability to retain water and act as a barrier.[18,19] Also, mechanical shocks to the skin can immediately lead to a loss in barrier function and, consequently, moisture.[20] In the event that external loading and callus are

related, the loads applied to the callused region may directly impact the epidermal barrier before changing chemical triggers.

CONCLUSION

The disease *Kadara* was first explained by *Acharya Sushruta* in *Kshudra Roga* and later almost similar explanations were given by other *Acharyas*. On the basis of clinical presentation the disease can be compared with Corn/Callus/ Callosity in the Modern Medical Science. *Kadar* is an acquired disease entity which is formed due to friction of foot with the hard surface. Disease may not be fatal but can hamper daily routine activities. Lower and Lower middle class people who were labor or indulge in manual hard work are more prone to this disease. According to contemporary science, corn can recur after being treated locally with medication and then excised, which is painful and time-consuming. However, when *agnikarma* is used, there is no danger of recurrence and the least amount of difficulties are reported.

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