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A Review on Heel Fissures and its Management

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***Abstract*: Heel fissures are splits or cracks in the epidermis, which can manifest as a consequence of anhidrosis (dry skin, xerosis) and may or may not present with hyperkeratosis. Fissures may get deep into the dermis and become painful. The formation of callus usually takes place around the rim of heel. The skin is normally dry and may have a thick callus which appears as yellow or dark brown discoloured area of skin, especially along the inside border of the heel. It is an indication of negligence in foot care as well rather than just overexposure or lack of moisturizing. This review presents different treatment for the heel fissures, some home remedies, topical adhesive, non-surgical method and some cosmetic treatments. The prevalence of foot problems also mention. Different causes of heel fissures and their remedies. Different herbal extract with their dosage form used in management of the heel fissures or cracked heel in Ayurveda. Several biophysical properties of the skin and the measurements of those properties. The classification of the fissure according to the xerosis assessment score measurement is mentioned.**

***Keywords*: Anhindrosis, callus, cracks, dry skin, emollient, heel fissures, hyperkeratosis, moisturizer, xerosis.**

1. Introduction

The heel fissures conditions are often unsightly and can be the source of discomfort and pain leading to the deterioration of the quality of life of the affected persons. The elderly patient and people with diabetes added complications of peripheral vascular disease place the foot at risk of ulceration, infection and amputation. In the older population callus can affect balance and consequently increase the risk of falls [1].

The fissures are regarded as partial-thickness skin wounds and are at increased risk of developing infection. Full-thickness ulcer formation can occur if the fissure progresses further, resulting in an open wound that has the potential to lead to deeper infection and cellulitis, especially in patients with diabetes and peripheral vascular disease [2].

It is usually found at sites where the skin is under stress, like around the heel margin, being associated with hyperkeratosis and anhidrosis. The main symptoms for patients are pain, itching, bleeding and embarrassment. Discomfort can make walking and weight bearing difficult, whilst the embarrassment of thick, callused heel fissures can psychologically affect a person [3]. Xerosis disorder is also characterized by redness, dry scaling, and fissures. In xerotic skin, the structure of the stratum corneum is modified by abnormalities in keratinization, proliferation, surface lipids, water metabolism, pH, and sebum [4].

In Ayurveda cracked heels are called as padadari. It is now considered as one of the major cosmetic health problem in both sex. Its major incidence is seen in people who cover long distances daily often without proper foot care. It directly affects routine of an individual. Heel fissures are a sign of lack of attention to foot care or lack of moisturizing. Medically, cracked heels are also known as heel fissures. Fissures are regular linear cut wounds on the epidermis. Sometimes it may get deep into the dermis and become painful. Excessive pressure on the feet pads make the feet expand sideway. As the skin, surrounding the sides of the feet are dry they crack and cause cracked heels [5].

2. Prevalence of Foot Problem in India

Few studies in India have assessed the impact of early interventions for foot complications in patients both with and without diabetes. This study showed that out of 224 participants; 93 (42%) participants were suffering with diabetes. Foot ulcer found in 30 participants. On examination the participants with diabetes presented with foot health issues known to be risk factors for ulceration, including fissures 29 participants (31%) and corns and/or callus 21 participants (23%), peripheral arterial disease 29 participants (31%) and peripheral neuropathy 23 participants (25%).

In those participants without diabetes 131 participants (58%), ulceration was found in 10 participants. On examination the number of diagnosed skin lesions, comparable with the diabetes group, fissures 41 participants (31%), corns and/or callus 32 participants (24%), peripheral arterial disease 12 participants (9%) and peripheral neuropathy 7 participants (5%) [6].

Neurosis is one of the most common abnormalities with prevalence higher than 40% observed in the diabetic foot, promoting ulceration through the development of fissures and hyperkeratosis [7].

3. Causes of Heel Fissures

Heel skin is composed of a thick stratum cornea to support the pressure of body weight. There are many ermine sweat glands on the soles of the feet and very few sebaceous glands, so there is a lot of water loss on the skin surface [8]. Poverty and illiteracy lead to improper footwear use. Sociocultural practices, such as barefoot walking, not wearing socks (especially in females) and the late presentation of foot lesions have all been found to contribute to development of

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hyperkeratosis and heel fissures in the Indian population [6]. Leading causes include standing for prolonged periods of time (specifically on hard floors), use of open-heeled shoes which cause the heel to expand and increase pressure. Medical conditions like diabetes facilitate dry skin formation. The psoriasis and eczema may also cause cracked heels. Obesity can cause the cracked heels. If feet continuously contact with water it may lose their natural oil and turn dry and rough. In extreme cases, cracked heels can get infected and lead to cellulitis [9]. It also caused by dried hyperkeratosis skin, open-back shoe, and systemic diseases [10]. The key causes are the formation of thick callus. Most of the foot problems arise due to neglect and oversight with regard to feet care [5]. The most common cause of the condition on the foot is as a response to the intermittent forces of locomotion although many dermatological conditions may demonstrate hyperkeratosis as part of their pathophysiology [11].

4. Management of Heel Fissures

A. Cosmetic product use to prevent heel fissures

Moisturisers are use as part of preventative care. Emollients containing urea have been shown to significantly increase the hydration and therefore directly increase skin elasticity and smoothness [7]. The skin integrity of superficial heel fissures can be positively influenced by regular reduction of hyperkeratosis with catalytic agents, along with regular application of a suitable emollient to hydrate the tissues and restore the epidermal barrier. Humectants are the added ingredients which act as an adjunct to the occlusive effect of emollients and retain cell hydration by attracting moisture from the dermis into the epidermis [2].

For topical treatments of neurosis commercially available formulations have been widely used α hydroxyl acids (e.g., lactic acid, glycolic acid), salicylic acid, and urea. Salicylic acid is a catalytic agent it soften the stratum cornea. Urea increases water uptake and enhances water-binding capacity in the stratum cornea [4]. The appearance of dry or fissured skin should be managed by using moisturizers to restore skin softness and elasticity [13].

B. Topical tissue adhesive

Cochrane review indicated the benefit of this modality over the traditional type of closure. The cyanoacrylates, and the Octyl-Blend10™ tissue adhesive may have a place in the successful management of heel fissures [3].

C. Non-surgical treatment

Silicone Gel Heel Protector: This soft medical silicone gel product helps to protect the skin against peeling and cracking [14]. Kakato-tsurutsuru (Kt) socks: Kt socks may retain evaporated sweat with components of natural moisturizing factors, supporting the water-holding ability of the heel stratum corneum. These findings suggest that Kt socks may improve heel skin dryness [15].

D. Synthetic drug

Timolol promotes keratinocyte migration and re-epithelization. β2-antagonist affects the lamellar body secretion, thus restores the skin barrier. Similar mechanism might have played role in healing of heel fissures [10].

E. Herbal Extract used in Management of Heel fissures

1) Centella asiatica leaf extract

Centella asiatica is a perennial herbaceous creeper which belongs to the Umbelliferae (Apiceae) family and has extensively been mentioned in Ayurveda**.** Research articles have substantiated the use of *Centella asiatica* in various conditions including wound healing. In vivo studies report enhanced cell growth, collagen synthesis around wound sites and quicker epithelialization. A specific component of *Centella asiatica*, asiaticoside, is reported to increase the tensile strength of skin that newly forms around wounds [9].

2) Euphorbia caducifolia

Euphorbia caducifolia latex which is considered to be poisonous and irritant to the skin is also reported for its antibacterial, antifungal, and antimicrobial properties. *Euphorbia caducifolia* latex containing formulation probably regains the Sneha and Ushna Guna which subside vitiated Vata, thereby healing of the crack heel [16].

3) Terminalia chebula

According to Ayurveda, *Terminalia chebula* pacifies all three vitiated humours that is to say Vata, Pitta and Kapha. It especially pacifies Vata Dosha. Ghee pacifies vitiated Vata and Pitta. Therefore, paste of Haritaki helps to pacify vitiated Vata Dosha in patient suffering from Padadari and is beneficial in reducing the symptoms. The fruits of *Terminalia chebula* possess dose- dependent anti-inflammaory action in rats. Also the hydroalcoholic extract of *Terminalia chebula* fruit promotes significant wound healing in diabetic rats [17].

4) Vrukshamla beeja taila

Seed-oil of *Vrukshamla* is called as Ghee or oil of Kokum, which is used in cracked hands and feet. It helps to normalize vitiated *vatadosha* by being *Ushna* [18].

5) Shudha Hingul, Jatyadi tail, Ral (shudha) and Teel tail

Shudha Hingul, Jatyadi tail, Ral (shudha), Teel tail & Goghrit may help to keep skin hydrated, soft which can induce proper healing and decrease the symptoms and shows result in healing of Cracked feet [19].

6) Sesamum indicum

It is one of the plant origin oil extract. It possess the property of penetration into the tissues and spreading through the body and cures the cracked soles [20].

F. Home Remedies for Heel Fissures

1) Coconut oil

This oil possesses anti-bacterial and antiseptic and wound healing properties which prevent and protect skin against bacterial infection [21]. Coconut oil and mineral oil have comparable effects. Both shows significant improvement in skin hydration [22].

2) Almond oil

Heel fissures are associated with a defect in the skin barrier function. Almond oil contains fatty acids, which help in quick healing of heel fissures. It prevents water loss from skin [23].

3) Olive oil

Olive oil is a great source of vitamin E and other antioxidants. It possesses anti-oxidant and anti-inflammatory properties, which help in dermal re-construction. Topical application of oil improves the skin integrity and skin barrier function [23].

4) Honey

Honey is natural moisturizing agent. It prevents loss of moisture from the skin. It further softened the skin and help in healing dry and cracked skin. Honey is anti-bacterial agent and having wound healing activity [24].

5) Aloe Vera

It is having good moisturizing effect. Due to moisturizing effect it is used in treatment of dry skin. The vitamins and minerals are presents in aloe vera. Which contain powerful antioxidants that help in regeneration of the skin. Topical application of aloe vera gel increases the collagen synthesis. This help in healing cracked skin [25].

6) Turmeric

Turmeric have an anti-inflammatory and antiseptic properties. The mixture of castor oil and turmeric powder used to treat cracks [26].

5. Conclusion

As on today, the foot care is an important because it may cause the several disorders. In case of diabetes patients the heel fissures or cracking heel damage the epidermis, in deep fissures damage to dermis it may cause the bacterial infection and leads to ulceration and amputation also. The heel fissures cause discomfort in patients mind and lifestyle. It considered as a cosmetics problem. Different cosmetic solutions are available for heel fissures. The use of moisturizers is very much fruitful. The dry skin is main reason for the cracking. So the several cosmetics such as humectants, emollients are used to cure the fissures. Some non-surgical heel protector gel, socks are used. The tissue adhesive is also effective treatment for heel fissures.

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