



Study of Fissure Soles: Prevalence and Their Association with Various Dermatoses

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Study Protocol

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ABSTRACT

Heel fissures are splits or cracks in the epidermis, which can manifest as a consequence of anhidrosis and may or may not present with hyperkeratosis. Epidermal fissures are superficial and not considered to be a wound at this early stage. However, with increased pressure these splits become deeper, involving the dermis so that they begin to bleed and result in pain on weight-bearing activities. These fissures are regarded as partial-thickness skin wounds and are at increased risk of developing infection.

In Theory anyone can get a cracked heel or fissure soles but certain conditions predisposing to fissure soles are Congenital causes - Juvenile Plantar Dermatitis

Acquired causes - Eczema, Atopic Dermatitis, Tinea pedis, Psoriasis especially Palmoplantar psoriasis, Palmoplantar Keratodermas, Leprosy, Systemic causes-Diabetes mellitus, Hypothyroidism, Scleroderma, Rheumatoid arthritis.

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Keywords: *Diabetes mellitus; hypothyroidism scleroderma; Rheumatoid arthritis.*

1. INTRODUCTION

Heel fissures are splits or cracks in the epidermis, which can manifest as a consequence of anhidrosis and may or may not present with hyperkeratosis. Epidermal fissures are superficial and not considered to be a wound at this early stage. However, with increased pressure these splits become deeper, involving the dermis so that they begin to bleed and result in pain on weight-bearing activities. These 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 [1].

Dry thickened skin (corn and callus) around the rim of the heel is the very first step towards cracking. Increased pressure on the fat pad under the heel causes it to expand sideways, leading to splitting or cracking of the callus. Some factors that contribute to cracking or splitting include: Excessive weight or obesity, Prolonged standing (especially on hard floors), Open-back shoes and sandals; as they provide no support to hold the fat pad under the foot [2,3].

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Fissure formation often develops at sites where the epidermis is under direct physical stress, such as the heel margin. The heel pad plays an important role as a shock absorber by reducing and transmitting impact forces. This transmission of load was investigated by Ahanchian et al who produced a finite model that also demonstrated propagation of tissue stress with increased contact load. These areas of high tissue stress are often associated with fissures, despite the

apparent lack of direct pressure, particularly when combined with anhidrosis [4]. Furthermore, it can be noted impact forces increase tensile deformation of soft tissue and can create short-term vascular changes in the heel pad. All of which can result in tissue breakdown and fissuring [5].

Hashmi et al identified the mechanical properties of both dermal and epidermal cells on plantar skin and how they react to physical stress by generating inflammatory cytokines that cause incomplete cell differentiation. This leads to a clumping of corneocytes, which manifests as hyperkeratosis and, frequently, fissures [6].

In most cases dry fissures are simply a nuisance and unsightly. However, when the fissure extends to the dermis, standing, walking or even lying in bed can be painful, in addition to providing a portal of entry for bacterial and fungal infection.

Hyperkeratosis is a physiologic process intended to form a protective barrier against further soft tissue damage. However, these lesions become pathologic when they split, become painful or exhibit signs of secondary infection. In cases of severe peripheral neuropathy or vascular disease, such as that seen in patients with diabetes, hyperkeratotic fissures may be a harbinger of ulceration because the associated anhidrosis, abnormal load distribution and stiffening of connective tissue can lead to failure of skin integrity. For the person with diabetes, having a foot ulcer can have a severely detrimental effect on their quality of life. Most amputations are preceded by a foot ulcer and there is a likelihood of psychological distress and anxiety. In addition to diabetes mellitus, other systemic conditions can also render patients more at risk of developing dry heel fissures, such as hypothyroidism, rheumatoid arthritis, systemic sclerosis and scleroderma, due to the associated anhidrosis and/or thickening of the soft tissues. This study aims to study the prevalence and the association of fissure soles with various dermatoses at Terna Medical College for the period of 2 years.

1.1 Aims & Objectives

Aim: To study the prevalence of fissure soles in patients coming to Dermatology OPD at an urban tertiary care hospital and to see their association with various dermatoses.

Objectives :

1. To study the prevalence of fissure soles in patients of different age groups and different sexes.
2. To study the prevalence of fissure soles in patients with acquired dermatoses
3. To study prevalence of congenital fissure soles .
4. To study correlation between systemic diseases and fissure soles.

2. MATERIALS AND METHODS

Study setting: This study will be conducted in Department Of dermatology, venereology and leprosy in collaboration with department of Dermatology, venereology and leprosy at Navi Mumbai Municipal Corporation Hospital, Vashi situated in Navi Mumbai, Western India.

Duration of study: The duration of study will be from May 2021 to May 2023.

Study Group : Patients of all ages attending the Dermatology OPD at Terna Hospital and Research centre and the Dermatology OPD at NMMC Hospital, vashi.

Inclusion criteria :

1. Individuals of all age groups
2. Individuals presenting to the OPD with complains of fissures on soles
3. Individuals willing to give written and informed consent to this study.

Exclusion criteria :

1. Individuals presenting to the OPD with no complaints of fissure soles
2. Individuals not willing to give written and informed consent to this study.
3. Patients on long term medication like statins, isotretinoin and chemotherapeutic agents.(agents which dry out the skin in the long run)

2.1 Methods

Patients presenting to the OPD with complain of Fissure soles will be evaluated for detail history taking including patients personal data like age, sex, marital status, education, duration of disease, concomitant illnesses, concomitant drug intake and patients family history. A

thorough Clinical examination and Investigations such as wood's lamp examination, patch testing, biopsy as and when required will be done.

3. DISCUSSION

Nair, Pragya et al. [5]- A prospective observational study was conducted in the Department of Dermatology, Venereology, and Leprosy at a rural tertiary care centre from June 2014 to May 2015. A total of 202 patients were enrolled in the study. The Chi-square test was used to examine the data. A total of 202 patients were enrolled, with males accounting for 53.46 percent of the total. The 17–40 year old age group was the most commonly afflicted (42.57 percent). In 31.7 percent of the instances, the duration was less than one month, while 29.7% showed seasonal change. Itching was the most prevalent complaint (69.8 percent). With 28.22 percent of cases, palmoplantar psoriasis was the most frequent dermatosis, followed by keratinizing diseases with 26.72 percent cases. In 66.34 percent of cases, palms were implicated, 69.30 percent of cases involved soles, and 37.12 percent of cases involved both palms and soles. In 15.34 percent of the cases, other bodily parts were implicated. Diabetes and hypertension were both found to be common comorbid diseases in 11.4 percent of cases.

Patel, Bharti et al. (6) - A retrospective observational study of 500 patients was done in a tertiary care center. Detailed history was taken and clinical examination was done. Investigations and skin biopsy were performed when needed. There were 269 (53.8%) instances of psoriasis, 132 (26.4%) cases of palmoplantar keratoderma, 22 (4%) cases of phrynoderma, 19 (3.8%) cases of ichthyosis, 13 (2.6%) cases of acanthosis nigricans, 11 (2.2%) cases of porokeratosis, 3 (0.6%) cases of pityriasis rubra pilosa.

The age group 51-60 years old was the most commonly impacted (19.6 percent). The ratio of males to females was 1.13:1. The most frequent type of psoriasis was chronic plaque psoriasis (43.51 percent). The most common cause of erythroderma was psoriasis vulgaris (75%). All of the patients whose biopsy was done had histopathological findings that were consistent with the clinical diagnosis.

M Sivakumar et al. [7] A retrospective observation study was carried out in a village near Coimbatore with a sample of 80 families selected at random who were examined for the

presence of fissure soles. Out of 294 people examines, fissuring was present in 48% people. Prevalence ranges from 42% to 54% (95% confidence limits). Females had more prevalence (58.4%) than male (33.3%) and the difference was statistically significant ($p < 0.001$).

A number of related studies to different dermatological problems were reported [8-12]. Few of the related studies were reviewed [13-15].

4. CONCLUSION AND STUDY IMPLICATIONS

Fissuring or cracking of the feet is a common yet underappreciated dermatosis that has a high morbidity rate. Fissuring might be minor or severe enough to cause discomfort and tenderness, rendering the patient immobile. A thorough search revealed no studies or research that had been conducted to identify the prevalence of the ailment or the diseases that are likely to be connected with it.

CONSENT

As per international standard or university standard, patients' written consent will be collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Pavicic T, Korting HC. Xerosis and callus formation as a key to the diabetic foot syndrome: Dermatological view of the problem and its management. *J Dtsch Dermatol Ges.* 2006;4(11).
2. Ahanchian N, Nester C, Howard D, Ren L. 3D modelling of the human heel pad. *Salford Postgraduate Annual Research Conference.* 2012;31-36.
3. Longhurst B, Steele C. Dry heel fissures: Treatment and prevention. *Dermatological Nursing.* 2016;15(3):46-49.
4. Hashmi F, Nester C, Wright C, Newton V, Lam S. Characterising the biophysical

5. Nair PA, Diwan NG, Singhal R, Vora RV. A Prospective Study of Clinical Profile in Patients of Palmoplantar Dermatoses. *Indian Dermatol Online J.* 2017;8(5):331-335. DOI:10.4103/idoj.IDOJ_308_16
6. Bharti K. Patel, Nilam K. Selot, Neela V. Bhuptani, Pooja R. Raja, A clinico-epidemiological study of various keratinization disorders. *International Journal of Research in Dermatology Patel BK et al. Int J Res Dermatol.* 2020 Jul;6(4):493-498
7. Sivakumar M, Sivapriya N, Mathew AC, Chacko TV, Srinivas C R. Prevalence and correlates of fissure foot in a rural area in Tamil Nadu. *Indian J Dermatol Venereol Leprol.* 1999;65:26-27.
8. Jawade, Sugat A., Vishal S. Chugh, Sneha K. Gohil, Amit S. Mistry, and Dipak D. Umrigar. "A Clinico-Etiological Study of Dermatoses in Pediatric Age Group in Tertiary Health Care Center in South Gujarat Region. *Indian Journal Of Dermatology.* 2015;60(6). Available: <https://doi.org/10.4103/0019-5154.169147>
9. Singh, Adarsh Lata, Meenakshi Chandak, Divya Jain, and Rupali Mogre. "Haller mann-Streiff Syndrome with Cutaneous Manifestations." *International Journal of Dermatology.* 2015;54(9):1068-70. Available: <https://doi.org/10.1111/ijd.12172>
10. Patwa, Prerna, Pratap Singh Hanuman Parihar, Rohan Kumar Singh, and Rajasbala Pradeep Dhande. "Atypical Bony Extension in Recurrent Dermatofibrosarcoma Protuberance of Foot." *Journal Of Evolution Of Medical And Dental Sciences-Jemds.* 2020;9(37):2773-75. Available: <https://doi.org/10.14260/jemds/2020/603>
11. Shashank, Bansod, Madke Bhushan. Injectable Platelet-Rich Fibrin (PRF): The Newest Biomaterial and Its Use in Various Dermatological Conditions in Our Practice: A Case Series. *Journal Of Cosmetic Dermatology, n.d.* Available: <https://doi.org/10.1111/jocd.13742>
12. Verma, Shyam B, Bhushan Madke. Topical Corticosteroid Induced Ulcerated Striae.

- Anais Brasileiros De Dermatologia. 2021;96(1):94–96.
Available:<https://doi.org/10.1016/j.abd.2020.07.003>
13. Verma, Shyam B, Bhushan Madke, Rajiv S. Joshi, Uwe Wollina. Pseudoedematous Striae: An Undescribed Entity. Dermatologic Therapy. 2020;33(4).
Available:<https://doi.org/10.1111/dth.13754>
 14. Tambekar, Anil, Nishant Burnase, Abhay Gaidhane, Punit Fulzele, and Zahiruddin Quazi Syed. Foldscope Assisted Microscopy for the Examination of Soil Transmitted Helminths (STH). Medical Science. 2020;24(101):102–6.
 15. Karadbhajne, Priti, Anil Tambekar, Abhay Gaidhane, Zahiruddin Quazi Syed, Shilpa Gaidhane, and Manoj Patil. “Giardiasis in Tropical Region in the State of Maharashtra: Case Series. Medical Science. 2020;24(103): 1684–88.

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