

PITTED KERATOLYSIS

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Summary

Clinical features of 70 cases of pitted keratolysis are described. Bacterial and mycological cultures were done in 20 cases. Sixteen of these (80%) and 7 out of 10 (70%) controls yielded corynebacterium species in culture. The significance of this finding in relation to the aetiology of pitted keratolysis is discussed. An attempt to reproduce the lesions artificially in 5 healthy volunteers did not succeed.

Pitted keratolysis is a common skin disease of the tropics. It is characterised by asymptomatic, bilateral, symmetrical, discrete and confluent shallow pits on the soles and rarely on the palms.

Castellani¹ referred to this condition as 'Keratoma plantare sulcatum' when he described it first. As lysis of keratin was a predominant feature, Acton and Mcguire² suggested the name 'Keratolysis plantare sulcatum'. Zaias et al³ preferred a more apt descriptive name 'pitted keratolysis'.

Scarcity of literature on pitted keratolysis from India is surprising since it is a commonly seen condition here. We are reporting in this paper our observations on 70 patients with pitted keratolysis. These patients had attended the out-patient department of Dermatology and Venereology, Medical College Hospital, Calicut, during the monsoon period (July to October) of 1974, '75 and '76.

Materials and method

All patients who had clinical features of pitted keratolysis were included in this study. Their personal, familial and occupational histories were recorded. Socio-economic status, habit of using footwear, presence of hyperhidrosis if any, were particularly inquired into. Pre-treatment photographs were taken of selected cases. After washing the affected area with soap and dabbing it with 70% alcohol, scrapings were taken from the 'pits' from 20 randomly selected cases for Gram's stain, KOH mount and culture for bacteria (aerobic and anaerobic) and fungii. Tellurite agar medium was used for special culture of corynebacterium species. Biopsies were done from 12 cases. In

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Pr sented at the 3rd Annual Conference
of Indian Association of Dermatologists,
Venereologists and Leprologists, held in
Trivandrum, 1975.

Received for publication on 16—8—1980

addition to H & E, PAS and Gram's stains were done in all cases.

Ten barefooted individuals of comparable age were chosen as controls. After obtaining informed consent, 5 healthy volunteers were used for inoculation experiments. After thorough cleaning with soap and later with spirit the skin of the heels were pricked with sterile needle. Culture material from tellurite agar was applied with a sterile platinum loop and an occlusive dressing was applied for 7 days. The opposite heels were similarly treated, but without application of the culture material. At the end of 7 days the heels were inspected for evidence of any skin lesions.

Observations

Among the 70 patients there were 37 men and 33 women. The youngest patient was 11 years old and the oldest 52; average age being 22.8 years. The incidence of pitted keratolysis was highest in the 2nd and 3rd decades (Table 1). The duration of illness varied from 1 month to 10 years. All patients were of poor socio-economic status and majority were domestic servants or manual labourers. Pain while walking was complained of by 61 patients whereas 9 were asymptomatic. Only 12 patients reported of using an open footwear at least on occasions, while all others were always barefooted. Wet rainy season had an aggravating effect in all cases. Hyperhidrosis of soles was reported by 14 patients (20%) who did not show any seasonal variation, in the severity of the disease. Except for chronic paronychia of the toes in 8 patients and interdigital intertrigo of the feet in 10, there were no significant skin disease.

In all cases the lesions were symmetrical and more on the pressure points (Fig. 1). The size of the pits varied from 1 to 3 mm in diameter and 1 mm

to 2 mm in depth. Irregular lesions were common from confluence of 'pits' (Fig. 2). The floor of many pits had a dirty, brownish discoloration which resisted washing with soap.

TABLE 1
Age Incidence

Age Group	M	F	Total
11 to 20	17	17	34
21 to 30	16	7	23
31 to 40	3	7	10
41 to 50	1	1	2
51 to 60	0	1	1



Fig. 1
Showing the distribution of pits on the pressure areas.

No significant bacteria could be demonstrated by direct smears with Gram's stain. KOH mount and culture on Sabouraud's medium were negative for fungus in all the 20 cases. Bacterial cultures on blood agar and tellurite agar were also done in these 20 cases. Visible growth was seen in only

16 specimens. The colonies were greyish white on blood agar and greyish black on tellurite agar. Smears made from both showed short, Gram positive, branching organisms consistent with *Corynebacterium* species. Virulence tests done in rabbits from 10 cultures were negative. Scrapings from 10 of the control group yielded similar organisms in seven.

Biopsies showed small 'pits' with irregular walls confined to the stratum corneum (Fig. 3). In 10 specimens the wall and floor of the 'pits' on Gram's staining showed Gram positive, short, branching organisms (Fig. 4). The epidermis and dermis below the pit did not show any inflammatory reaction.

Therapeutic response to local application of Whitfield's ointment or Castellani's paint were equal when patients were advised to use footwear also regularly. Castellani's paint was more effective in patients with hyperhidrosis. Regular use of footwear and dry surroundings alone cleared the lesions in 5 patients. None of the 5 patients on whom artificial production of lesions was tried showed any pit at the end of 7 days.

Discussion

Pitted keratolysis is indeed a disease

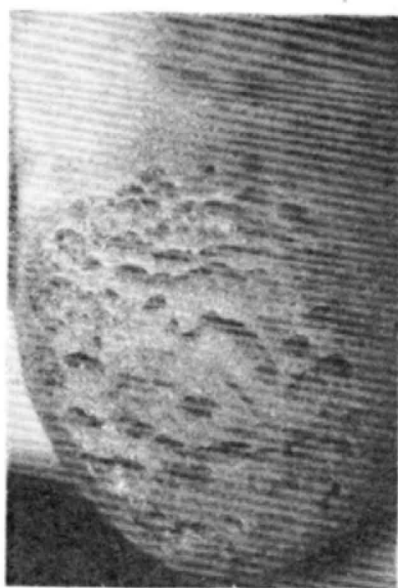


Fig. 2

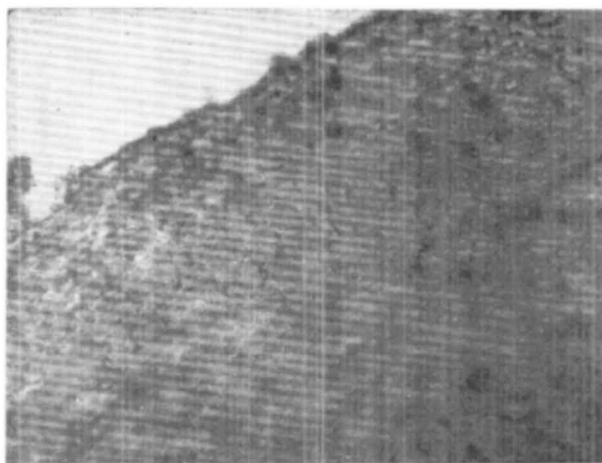
Neighbouring Pits have coalesced to form large irregular lesions.

of the poor in India. The naked feet apparently aggravates it. Sexes are equally affected. Hyperhidrosis of the soles is reported to be a major predisposing factor according to western literature. This was found only in 14 patients (20%) in this series. In our country damp environment and repeated trauma to the soles due to lack of



Fig. 3

Pit is confined to the stratum corneum.

**Fig. 4**

Photomicrograph of the floor of the Pit showing short, filamentous, branching organisms.

footwear seems to be major predisposing factors.

Though reported to be a painless condition by many workers^{3,4,6,9} 61 patients (87%) in the present study complained of pain while walking. The lesions were mainly seen on pressure areas probably because of maximum trauma to these sites. Interdigital intertrigo and paronychia may co-exist but does not influence the onset or course of the disease.

Aetio-pathogenesis of pitted keratolysis is still uncertain. Actinomyces^{2,7} Streptomyces^{4,8,9} and Corynebacterium species¹⁰ are all incriminated as aetiological agents. Taplin et al¹⁰ reproduced the lesions of pitted keratolysis in 5 subjects with corynebacterium culture material. DNA analysis and serological studies showed that this species of C. bacterium species was different from C. minutissimum and C. acnes. In the present series, 16 out of 20 cases (80%) and 7 out of 10 controls (70%) yielded C. bacterium species in culture. Further identification of these organisms was not done in this study. It is likely that these organisms are opportunistic invaders of the skin and repeated trauma and maceration favour their colonisation, on the sole. Further well planned studies are indicated in this field.

Acknowledgement

Thanks are due to Dr. M. Balaraman Nair, Principal, Medical College, Kottayam (Formerly Professor of Pathology, Medical College, Calicut) and Dr. P. Sugathan, Associate Professor of Dermatology & Venereology, Medical College Hospital, Calicut for their valuable help and assistance.

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