



Dermatoses among paddy field workers - A descriptive, cross-sectional pilot study

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ABSTRACT

Background: Paddy farming is one of the main occupations in coastal South India. Dermatological problems in paddy field workers have not received much attention. **Aim:** The purpose of this study was to study the dermatoses of the exposed parts of the body, viz. face, hands, and feet, in paddy field workers. **Methods:** Three hundred and forty-one workers were questioned and clinical findings noted. Scrapings for bacterial and fungal examination were taken by random selection. **Results:** Seventy-three per cent had work-related itching. Melasma was the commonest facial lesion (41.1%). The main problems on the hands were hyperkeratosis (26.4%), nail dystrophy (15.2%) and paronychia (8.8%). Common feet dermatoses included nail dystrophy (57.1%), pitted keratolysis (42.5%) and fissuring (23.5%). Common aerobic and anaerobic bacteria isolated from pitted keratolysis and intertrigo were *Klebsiella* and *Clostridium* species. *Aspergillus* species were the commonest fungus grown from intertrigo. **Conclusions:** Occupational dermatoses are common in paddy field workers.

Key words: Paddy field workers, Dermatoses, Exposed areas

INTRODUCTION

Rice farming is one of the main occupations in South India. The initial preparation of the land (flooding, plowing the field, using manure, sowing the rice seeds in the soil) is done exclusively by men in the months of April and May. Seedlings (rice sprouts) are transplanted in the same field or a different one, a process called 'Natti' in the local language. This work is done exclusively by women. For the next 3 months, the rice plants are left to grow into paddy. Male laborers use pesticides during this time. Once the paddy turns light brown, water is drained and the field is left to dry. After the drained field is completely dry and the plants turn

hay-color, paddy harvesting is done by females, usually in October and November.

Paddy field workers are exposed to various agents, viz. irritants like mud, cow dung or other manure, fertilizers, pesticides and dust from the dried plant and grains during thrashing. The outdoor work also contributes to the effect of sunlight and wind. In addition, during the plowing and planting season, and sometimes in the harvesting season, the feet are constantly immersed in water. These factors can predispose workers to dermatoses of the face, hand and feet dermatitis, and bacterial and fungal infections. Cercarial dermatitis has been reported in paddy field

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workers in Assam,^[1] the snails in the water acting as intermediate hosts. There is a paucity of reports regarding dermatological problems in rice field workers in coastal Karnataka.

Hence, this study was designed to gauge the point prevalence of dermatoses on exposed areas in the paddy field workers of Udupi district.

MATERIALS AND METHODS

Field visits were undertaken during either the replanting (June-July) or harvesting season (October-November). A house-to-house visit was also carried out with the help of a guide who knew the local residents involved in paddy field work. The medical team consisted of one senior dermatologist, 12 dermatology residents and 3 laboratory technicians. The farmers were randomly chosen and interviewed. Exposed areas, like the face, hands and feet, were examined and the findings recorded.

Scrapings from the hands and feet were collected from cases of pitted keratolysis and intertrigo with moderate-to-severe involvement, and incubated in brain heart infusion (BHI) broth for aerobic culture and Robertson's meat medium for anaerobic culture. Aerobic subcultures were done from BHI broth after 12 hours to blood agar (BA), MacConkey's agar and BHI agar and incubated at 37°C for 72 hours. Colonies were identified by standard methods.^[2] Anaerobic subcultures were done from Robertson's meat medium after 24 and 48 hours on to neomycin blood agar, sheep blood agar and incubated in a Dyanox jar (Model 1:2) at 37°C for 72 hours. Effective anaerobiosis was ensured and

monitored by using both chemical and biological indicators. Colonies were identified by morphological, cultural and biochemical characteristics.^[3]

Scrapings from intertrigo in selected cases were examined with 10% KOH. Specimens were also cultured in Sabouraud's dextrose agar containing cycloheximide and chloramphenicol and incubated at 22°C and 37°C for up to 3 weeks.

Statistical analysis

The prevalence of dermatoses and culture results were estimated and expressed in percentages. To understand the significance of prevalence, 95% confidence intervals of prevalence were also calculated. Statistical computation was done using SPSS package.

RESULTS

Out of 341 paddy field workers examined, there were 96 males and 245 females. Their age ranged from 16-80 years, with the maximum in the 31-40 year age group. One hundred and sixty workers (46.9%) were exposed to fertilizers and pesticides. One hundred and eighty-six workers (54.5%) had a past history of skin disease.

Two hundred and forty-nine workers (73%) complained of itching during and after work. It was worse during harvesting and thrashing. Other work-related symptoms were urticaria and asthma in nine workers each (2.6%), photosensitivity in three (0.9%), and rhinitis and burning sensation in two each (0.6%). Melasma (41.1%) and freckles (11.75%) were the commonest facial lesions each (2.6%), photosensitivity in three (0.9%), and rhinitis and burning sensation in two each (0.6%). Melasma (41.1%) and freckles (11.75%) were the commonest facial lesions [Table 1].

The commonest dermatoses observed over the upper limbs [Table 2] were nail dystrophy (15.24%), and paronychia (8.8%).

On the lower limbs [Table 3], the majority (57.18%) of workers had nail dystrophy [Figure 1]; other common

Table 1: Lesions observed over the face in paddy field workers

| Face | Lesions | No. of subjects (n = 341) | Percentage (%) | 95% Confidence interval |
|---------------------|-----------------------|---------------------------|----------------|-------------------------|
| Pigmentary problems | Melasma | 140 | 41.1 | 35.9 - 46.3 |
| | Freckles | 40 | 11.7 | 8.2 - 15.1 |
| Photo-induced | PLE | 4 | 1.2 | 0.04 - 2.35 |
| | Pityriasis alba | 2 | 0.6 | -0.2 - 1.41 |
| Infections | Pityriasis versicolor | 22 | 6.5 | 3.9 - 9.11 |
| | Furuncle | 1 | 0.3 | -0.3 - 0.9 |

Table 2: Lesions observed over the upper limbs

| Upper limbs | Lesions | No. of subjects (n = 341) | (%) | 95% Confidence interval |
|------------------------|--------------------|---------------------------|-------|-------------------------|
| Infections | Paronychia | 30 | 8.8 | 5.8 - 11.8 |
| | Verruca | 9 | 2.6 | 0.91 - 4.3 |
| | Intertrigo | 11 | 3.2 | 1.33 - 5.06 |
| | Pitted keratolysis | 5 | 1.5 | 0.20 - 2.8 |
| | Tinea versicolor | 2 | 0.6 | -0.2 - 1.41 |
| Dermatitis | Hand dermatitis | 4 | 1.2 | 0.04 - 2.35 |
| | Excoriations | 13 | 3.8 | 1.77 - 5.8 |
| | Papules | 5 | 1.5 | 0.20 - 2.8 |
| Keratinization defects | Hyperkeratosis | 90 | 26.4 | 21.7 - 31.0 |
| | Scaling, xerosis | 42 | 12.3 | 8.81 - 15.7 |
| | Callosity | 25 | 7.3 | 4.53 - 10.06 |
| | Fissuring | 13 | 3.8 | 1.77 - 5.8 |
| | Nail dystrophy | 52 | 15.24 | 11.43 - 19.05 |

Table 3: Lesions observed over lower limbs

| Lower limbs | Lesions | No. of subjects (n = 341) | Percentage (%) | 95% Confidence interval |
|------------------------|--------------------|---------------------------|----------------|-------------------------|
| Infections | Pitted keratolysis | 145 | 42.5 | 37.25 - 47.74 |
| | Intertrigo | 47 | 13.78 | 10.13 - 17.43 |
| | Chronic paronychia | 8 | 2.34 | 0.76 - 3.92 |
| | Folliculitis | 7 | 2.1 | 0.57 - 3.62 |
| | Verruca vulgaris | 1 | 0.3 | -0.2 - 0.9 |
| Dermatitis | Foot dermatitis | 6 | 1.8 | 0.38 - 3.21 |
| Keratinization defects | Fissuring | 80 | 23.5 | 18.99 - 28.00 |
| | Hyperkeratosis | 63 | 18.5 | 14.37 - 22.62 |
| | Xerosis | 49 | 14.4 | 10.67 - 18.12 |
| | Nail dystrophy | 195 | 57.18 | 51.93 - 62.43 |



Figure 1: Nail dystrophy



Figure 2: Pitted keratolysis

disorders were pitted keratolysis [Figure 2] (42.5%), and intertrigo (13.78%). Fissures, hyperkeratosis and xerosis were seen in 80 (23.5%), 63 (18.5%) and 49 (14.4%)

Table 4: Culture reports: Bacterial

| Bacterial | Organism culture | From pitted keratolysis (n = 48) | % | From intertrigo (n = 29) | % | |
|-----------------------------|---|----------------------------------|-------|--------------------------|------|------|
| Aerobic | <i>Klebsiella</i> | 26 | 54.16 | 10 | 4.48 | |
| | <i>Acinetobacter</i> | 16 | 33.33 | 2 | 6.89 | |
| | <i>Pseudomonas</i> | 12 | 25 | 6 | 0.68 | |
| | <i>Enterobacter</i> | 9 | 18.75 | 0 | 0 | |
| | Coagulase positive <i>Staphylococci</i> | 5 | 10.41 | 2 | 6.89 | |
| | Coagulase negative <i>Staphylococci</i> | 5 | 10.41 | 9 | 0.03 | |
| | <i>E. coli</i> | 3 | 6.25 | 3 | 0.34 | |
| | <i>Citrobacter</i> | 2 | 4.16 | 0 | 0 | |
| | <i>Dermatophilus</i> | 0 | 0 | 1 | 3.44 | |
| | No growth | 0 | 0 | 9 | 0.03 | |
| | Anaerobic | <i>Clostridium</i> spp | 10 | 20.83 | 3 | 0.34 |
| | | <i>Clostridium welchii</i> | 4 | 8.33 | 1 | 3.44 |
| <i>Clostridium septicum</i> | | 1 | 2.08 | 1 | 3.44 | |
| <i>Clostridium bordelli</i> | | 1 | 2.08 | 1 | 3.44 | |
| <i>Clostridium novyii</i> | | 0 | 0 | 1 | 3.44 | |
| <i>Propionibacterium</i> | | 1 | 2.08 | 0 | 0 | |
| <i>Bacteroides</i> | | 6 | 12.5 | 0 | 0 | |
| <i>Peptostreptococci</i> | | 0 | 0 | 1 | 3.44 | |
| <i>Coccobacilli</i> | | 1 | 2.08 | 1 | 3.44 | |

The molds isolated from intertrigo (n=40) were *Aspergillus* species in 10, *Penicillium* in 8, *Fusarium* in 4, *Curvularia* in 2, *Mucor* in 3 and *Synphelastrum* in 1.

workers respectively.

The results of bacterial culture are shown in [Table 4]. In pitted keratolysis (n=48), the commonest aerobic organisms grown included *Klebsiella*, *Acinetobacter* and *Pseudomonas*. In intertrigo (n = 29), the frequent aerobic isolates were *Klebsiella* and coagulase negative *Staphylococci*. The commonest anaerobic organisms

from pitted keratolysis and intertrigo were *Clostridium* species.

Two hundred and six workers (60.4%) took a bath after work and applied coconut oil as a protective measure to prevent or control itching.

DISCUSSION

In this pilot study of paddy field workers, there were more females (71.8%) than males. The female preponderance was due to the fact that the field visits were undertaken in the transplantation and harvesting season when mostly females are employed. The rest of the work like plowing, preparation of land and spraying insecticides is done exclusively by males in this part of the country.

Two hundred and forty-nine workers (73%) complained of itching during and after work, especially during the harvesting and thrashing season. Severe pruritus upon exposure to grain dust is common during rice harvesting and is due to mechanical irritation from fibers in the dust and resolves after bathing.^[4]

Paddy (*Oryza sativa*) belongs to the grass (*Graminae*) family. Many grasses, including paddy, can traumatize the skin by their thin prickly spikes or by laceration.^[5] They can also produce urticarial papules in workers handling crops or litter straw.^[6] Dermatitis has been reported in Europe and America from de-husking rice, millets and barley,^[6] but in India there are few cases where dermatitis could be definitely attributed to working with these grains.^[5]

Parasites of grain can cause skin irritation from grain dust due to parasito-phytodermatitis or pseudo-phytodermatitis. 'Straw itch', 'grain itch' and itching from contact with cereals can be caused by the *Pyemotes* species which is a mite parasitic on the larvae of many insects.^{[7],[8]}

Although most workers reported itching, there was a low prevalence of hand and feet dermatitis possibly due to the cleanliness measures adopted by the workers. A noteworthy point was that most workers took a bath after work and applied coconut oil.

Although the sensitization potential of *Oryza sativum* is low, we have observed a positive patch test to 10% paddy extract in four patients with suspected plant dermatitis in our hospital (unpublished observation).

The commonest pigmentary disease on the face was melasma (41%), followed by freckles (11.7%). Although the pathogenesis of melasma is unclear, hormonal factors have been implicated.^[9] Both melasma and freckles are known to worsen after sun exposure. Tinea versicolor, a superficial fungal infection, was seen in 6.5% of cases over the face. This infection seems to prefer hot and humid weather.^[10]

Chronic paronychia of the fingernails was seen in 8.8% of cases and, of toenails, in 2.1%. Chronic paronychia, earlier believed to be a candidal infection, is now considered as a type of hand dermatitis precipitated by environmental exposure.^[11] Mechanical trauma is an important predisposing factor in chronic paronychia.^[12] Most of our subjects were housewives and were exposed to various irritants like mud, cow dung and manure during their work, in addition to soaps and detergents at home.

Pitted keratolysis was found in 43.40% of cases. It is a superficial infection of the skin confined to the stratum corneum and characterized by bilaterally symmetrical discrete and confluent shallow pits on the pressure-bearing areas of the soles and rarely on the palms. Palmar involvement was seen in 1.5% of patients. The various organisms implicated include *Corynebacteria* species,^[13] *Micrococcus sedentarius*^[14] and *Dermatophilus congolensis*.^[15] In our study, the most frequent organisms isolated were *Klebsiella*, *Acinetobacter*, *Pseudomonas* and *Clostridium* species.

Intertrigo was seen in 17.01% of the workers. Foot intertrigo is usually a mixed infection caused by dermatophytes, yeasts, and Gram-positive and Gram-negative bacteria.^[16] In our series, no dermatophyte or candida was isolated. The commonest organisms cultured included *Klebsiella*, coagulase negative *Staphylococci*, *Clostridium* and *Aspergillus*.

A large proportion of the workers had palmar and plantar hyperkeratosis, fissuring and scaling. Palmar

lesions were attributed to the manual work, while feet lesions were due to constant trauma to the bare feet, as the workers did not use footwear in the fields.

Dystrophy of fingernails was seen in 15% of workers and, of toenails, in 57%. The causes could be fungal infection, secondary to chronic paronychia or due to occupational trauma. No attempt was made to culture the nail plate or the subungual debris for fungi.

In a study of Polish farmers, allergic contact dermatitis was the commonest dermatosis, followed by infections, irritant contact dermatitis and urticaria.^[17] In a Scandinavian study of farmers, toenail maceration was the most common dermatosis seen on clinical examination, but not reported.^[18]

In conclusion, toenail dystrophy, pitted keratolysis and melasma were the most frequent conditions encountered in paddy field workers.

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