Journal of Pakistan Association of Dermatologists. 2020; **30(3)**: 388-395.

Original Article

Acquired palmoplantar keratodermas: A study of clinical, histopathological and patch test findings

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Abstract

Background Palmoplantar keratodermas (PPK) are a group of conditions involving thickening of skin of palms and soles, and may be hereditary or acquired. Acquired PPKs (APPK) have diverse causes ranging from infections, systemic illness, malignancy or drugs and chemicals. This study aims at finding the prevalence of acquired PPK in dermatology outpatient department and to elucidate the cause and precipitating factors, if any.

Methods This was a prospective one year study which evaluated dermatology outpatients for APPK. Patients were included after informed consent. Exclusion criteria included hereditary causes for PPK. A structured and detailed history, clinical and systemic examination, along with histopathology and patch test was carried out. There were a total of 26 patients, with equal sex distribution.

Results Prevalence of APPK was 0.17/100 patients, with equal sex distribution. Average age of onset was 41-50, average age at presentation was 51-60 years. Psoriasis was the single common cause (16 patients) followed by eczemas (8 patients). Histopathology and patch test were helpful in diagnosis.

Conclusion APPK is mostly seen in middle age, with equal gender predisposition. Palmoplantar psoriasis is still the major single cause. Approach to APPK is mostly clinical, with histopathology and patch test being helpful in selected cases.

Key words
Acquired, palmoplantar keratoderma, agriculturist, housewife, histopathology, patch test.

Introduction

Palmoplantar keratodermas (PPK) are characterized by increased thickening of the skin, especially stratum corneum of palms and soles. These include varying etiologies, and are classified as either hereditary or acquired. Differentiation is based on family history, pattern of involvement, extension beyond palms and soles in contiguum (transgrediens) and associated abnormalities of teeth and nails. Involvement of the skin may be diffuse, focal, striate or punctate[1]. Acquired keratodermas are defined by Patel *et al.* as 'hyperkeratosis of palms, soles, or both involving more than half of the surface area which is not attributed to genetics or friction, and may or may not be associated with inflammation.[1] If severe, PPK may be complicated by painful fissuring and secondary infection[2], disabling deformities and can hinder day to day activities thus leading to

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decreased quality of life.

The various causes for acquired PPK (APPK) include: (i) dermatological conditions like psoriasis, hyperkeratotic eczema, lichen planus, pityriasis rubra pilaris, (ii) infections like Norwegian scabies, Secondary syphilis, (iii) systemic diseases like lupus erythematosus, Reiters syndrome, HIV, thyroid abnormalities (iv) malnutrition (v) drugs and chemicals - arsenic, halogens, verapamil, hydroxyurea, bleomycin (vi) Keratoderma climactericum, (vii) malignancy - tripe palms, as paraneoplastic syndrome in solid organ carcinomas, Sezary syndrome (viii) idiopathic (ix) pseudo PPK like corns callosities, extensive verrucae etc.

Aims and objectives

This study attempts at finding the prevalence of acquired keratoderma in dermatology outpatients and clinical correlation with histopathology and patch test findings.

Objectives

To determine the prevalence of acquired palmoplantar keratoderma (APPK) in dermatology outpatients.

To determine the etiology and associations, if any.

To correlate clinical, histopathological and patch test findings of APPK.

Materials and Methods

This was a prospective, cross sectional non blinded study which included patients presenting to a tertiary care hospital in south India with thickening of palms and soles.

Inclusion criteria: patients with acquired keratoderma of palms, soles or both.

Patients with keratoderma since birth, those who were not willing for biopsy and with warts, callosities, corns were excluded from the study.

The study duration was one year. After a detailed explanation of study purpose and written informed consent, patients were included. An exhaustive history was obtained as to the time of onset, duration, precipitating factors, occupation and hobbies, seasonal variations and family history. Clinical examination was carried out to determine the pattern of palmoplantar keratoderma and to look for lesions elsewhere on the body. Systemic examination was carried out to rule out any systemic comorbidities. Biopsy for histopathology was done from the affected palm or sole. Patch test with Indian standard series (ISS), Parthenium and fertilizer series was done, when indicated. Patch test readings were done according to the standard guidelines from International Contact Dermatitis Research Group. (ICDRG), and read at 48 and 72 hours, respectively. Special investigations like potassium hydroxide mount was done for relevant cases.

Various parameters analyzed were prevalence and duration of the disease, age of onset, gender distribution, occupation, seasonal variation, aggravating factors and clinical, histopathological and patch test findings.

A preformed proforma was used to collect, tabulate and analyze the data.

Statistical methods used included simple proportions and percentages for comparing variables like age, sex, etc.

Results

In a one-year period, among 14696 patients attending the dermatology outpatient department

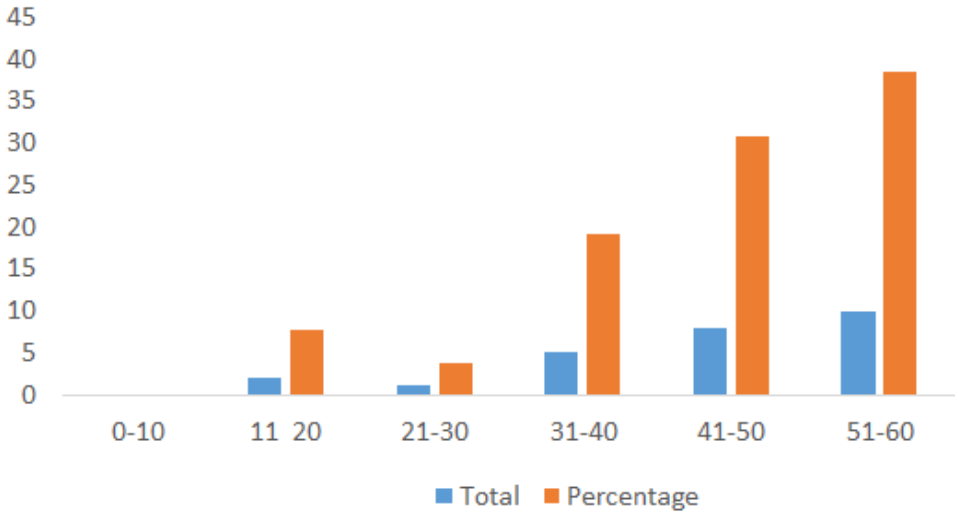

Chart 1 Age distribution

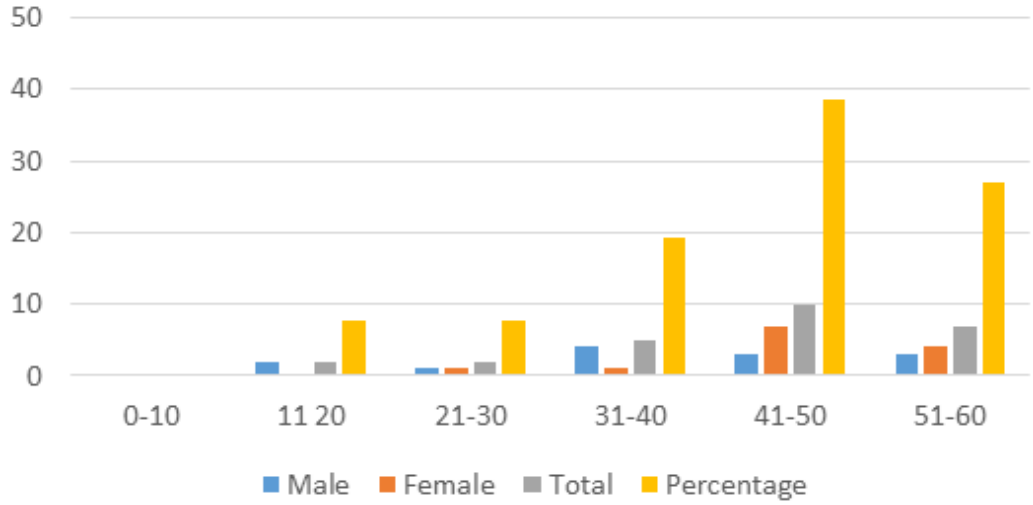

Chart 2 Age at onset

there were 26 patients diagnosed as APPK. (0.17/ 100 cases). There was no gender bias. The prevalence was highest in the 51-60 years age group (38.46%, followed by 41-50 group (30.76%) **(Chart 1)**.

The age at onset of the disease was again highest among 41-50 age group (38.46%), followed by 51-60 age group (26.92%) **(Chart 2)**.

It is interesting to note that it was equally or slightly more predominant in males before the age of 40, whereas was more seen in females above the age of 40. This may be related to the increased household work, use of irritants and detergents among older women.

Duration of the disease majority of the patients had disease duration between 1-10 years (65.38%), whereas the duration was < 1 year in 8 and more than 10 years in 1 person each.

Occupation the prevalence was highest among agriculturists (38.46%), followed by home makers (34.61%) **(Table 1)**.

Table 1 Occupation and APPK

Occupation	*No. of patients*	*Percentage*
Agriculturists	10	38.46
Home makers	9	34.61
Students	2	7.69
Manual laborer	1	3.84
Bank employee	1	3.84
Canteen owner	1	3.84
Postman	1	3.84
Book binder	1	3.84

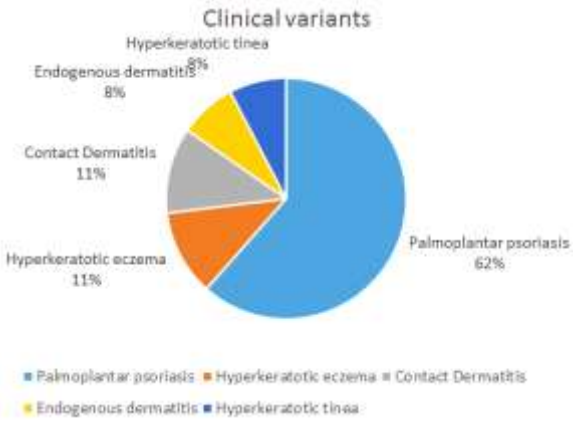

Chart 3 Clinical variants

Aggravating factors were reported in 14 patients (53.85%) and included soap and detergents in 8 (30.76%), followed by fertilizers and pesticides in 3, gardening in 2 and cement contact in one. Seven patients (26.92%) reported aggravation in winter season.

Morphological variants Out of 26 patients, 16 were clinically diagnosed as palmoplantar psoriasis, 3 as hyperkeratotic eczema, 3 as contact dermatitis and 2 each with endogenous dermatitis and hyperkeratotic tinea **(Chart 3)**.

Site of involvement Majority of patients had involvement of palms and soles (50%), followed by involvement of soles alone (19.23%). The keratoderma was symmetrical in 22 patients (84.61%).

Type of keratoderma focal hyperkeratosis predominated in 14 patients (53.84%) followed by diffuse thickening in 9 (34.61%), with transgrediens in 2 and punctate pattern in one.

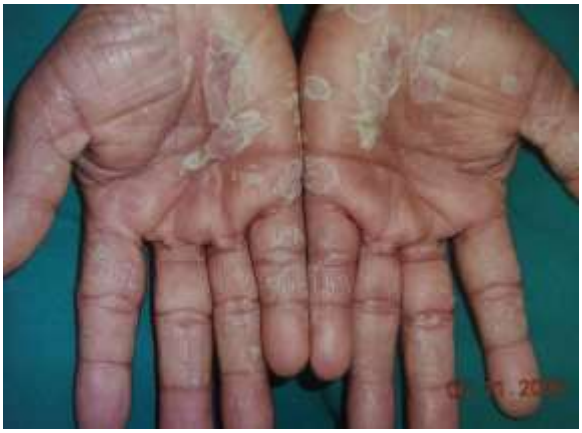

Figure 1 Palmoplantar psoriasis

Symptoms majority of patients had itching (21 patients =80.76%), followed by fissuring (19 patients = 73.07%). Pain bleeding, scaling and hyperhidrosis were also seen. The symptoms overlapped. Nail involvement was present in 12 out of 26 patients (46.15%).

Clinical patterns of various keratodermas

Palmoplantar psoriasis

In our study, psoriasis predominated accounting for 16 cases (61.53%). Male to female ratio was 7:9 with slight female predominance. While 14 patients had only palmoplantar psoriasis **(Figure 1)**, 2 had lesions elsewhere.

The average age group was 49.75 years, with majority having onset between 40 to 60 years age group (43.75%). Agriculturists (37.5%) and home makers (37.5%) predominated. Three patients had systemic associations of diabetes mellitus, hypertension and pulmonary tuberculosis. Biopsy for histopathology was done in all patients, 13 could be correlated histologically, 2 had psoriasiform dermatitis and one had chronic spongiotic dermatitis. Out of 16,

13 patients were patch tested with Indian Standard Series (ISS), as three patients refused the test. Two patients tested positive, one for paraben and the other for fragrance mix and Balsam of Peru, at 48 as well as 72 hours.

Contact hyperkeratotic eruptions of palms and soles

This was seen in 3 cases, 2 males and one female **(Figure 2)**. All were in the 51-60 age group. Two were agriculturists and one was a book binder. Two of these reported aggravation with soap and detergents. Thickening was focal, and nails were normal in all three. Histopathological examination was performed, which revealed chronic dermatitis in 2 and psoriasiform dermatitis in one.

Patch test with ISS series done was positive in two cases of three. One patient reacted to PPD and fragrance mix and the other patient reacted to fragrance mix, at 48 as well as 72 hours.

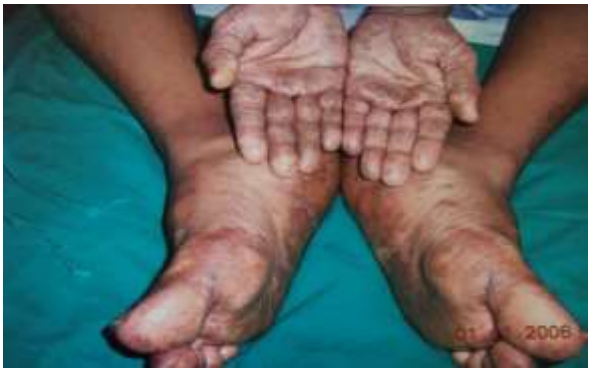

Figure 2 Contact hyperkeratotic eruptions of palms and soles.

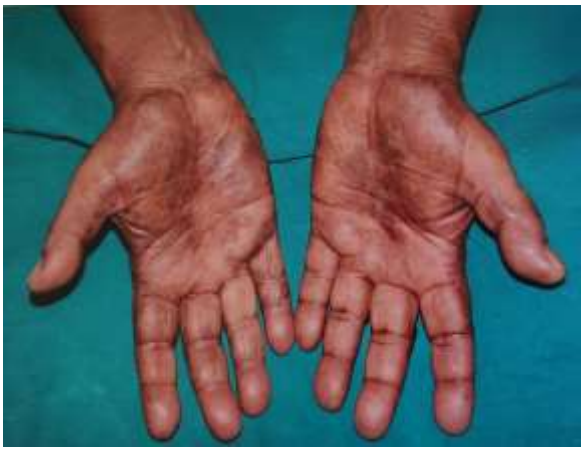

Figure 3 Hyperkeratotic eczema of palms.

Hyperkeratotic eczema

This was seen in 3 patients, 2 males and one female **(Figure 3)**. Average age group was 36.67 years, with average age of onset being 35.34 years. Duration of illness varied from 5 months to 2 years. Aggravating factors included soaps and detergents in one patient and cement in one patient. The disease was limited to soles in one, palms and soles as well as other sites in 2. Disease was symmetrical and focal in all three. Nails were involved in all three. Histopathological correlation revealed psoriasiform dermatitis in two and chronic dermatitis in one. Patch test with ISS showed positive results in 2: potassium dichromate and PPD in one, and cobalt chloride, paraben and mercaptomix in the other, both at 48 and 72 hours.

Endogenous plantar dermatitis this was seen in 2 patients, one male and one female. The average age of onset was 49.5 years, and average age of presentation was 52 years. Disease duration varied from 1 to 4 years. There was no seasonal aggravation or any other aggravating factors. Clinically only soles were involved, with symmetrical involvement, the distribution being focal in one and diffuse in one. Nails were spared in both. Biopsy done revealed features of psoriasis in one and chronic dermatitis in the other. Patch test was negative in both.

Hyperkeratotic tinea was seen in 2 patients, one male and one female. Duration of the disease varied from 8 months to 4 years. Both had asymmetrical involvement of palms and soles. Nail involvement in the form of pitting and longitudinal ridging was seen in one. Potassium

hydroxide mount was positive for fungal filaments, though histopathology showed psoriatic and chronic dermatitis features.

Histopathological findings 15 patients (57.69%) had a histopathological diagnosis of psoriasis **(Figure 4)**, whereas in six (23.07%) the diagnosis was chronic dermatitis **(Figure 5)** and in five (19.23%), the histopathological diagnosis was of psoriasiform dermatitis **(Figure 6)**.

Patch test findings A total of 22 patients were patch tested.

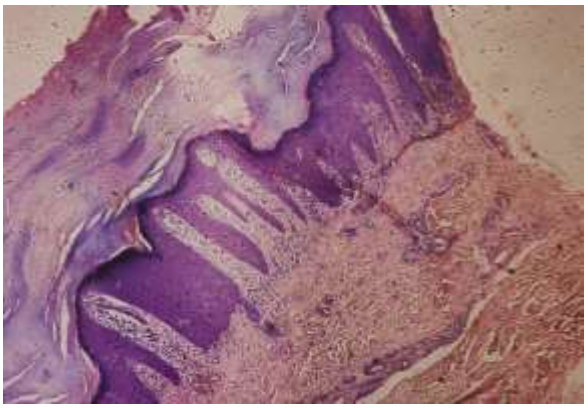

Figure 4 Psoriasis HPE, 10X magnification showing hyperkeratosis, Munro microabscess, focal parakeratosis, focal hypogranulosis, suprapapillary thinning, regular elongation of rete with lymphocytic infiltration in dermis.

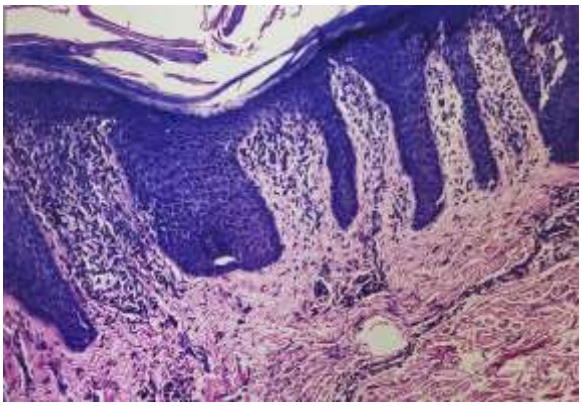

Figure 5 Chronic dermatitis HPE, 10X magnification showing acanthosis with spongiosis in epidermis, lymphocytic infiltrate present diffusely and perivascularly in the papillary dermis.

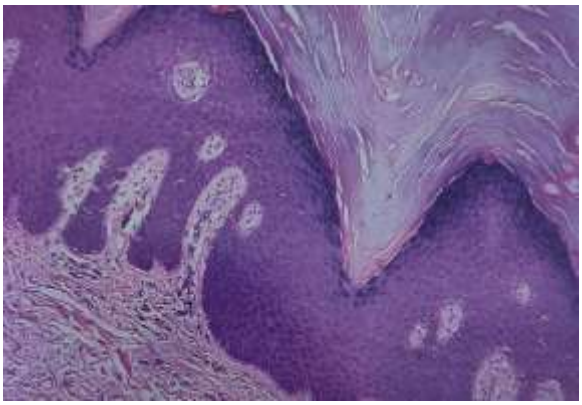

Figure 6 Psoriasiform dermatitis HPE, 10X magnification showing hyperkeratosis, hypergranulosis, acanthosis of epidermis, perivascular infiltrate in papillary dermis and diffuse infiltrate in reticular dermis.

Patch test with ISS was done in 21 patients, with ISS, parthenium and fertilizer series in one patient. Out of 22 patients, 15 (71.42%) were negative to patch test. Six patients (28.57%) gave postivie results with ISS. The allergens positive were fragrance mix in 3 (50%) and paraben and PPD in two each (33.33%). Potassium dichromate, cobalt chloride, Mercaptan mix and Balsam of Peru were positive in 1 patient each.

Discussion

There are very few studies on acquired palmoplantar keratodermas for comparison, though a few studies on palmoplantar keratodermas per se exist. There are no large scale systematic studies on etiology or incidence of PPK in India.

A relatively similar study to ours is by Kodali who evaluated 100 consecutive patients with APPK, aged 10 and above.[3] The common age group affected was 41-50 years, almost similar to our study, there was a slight male preponderance (1.17:1) and farmers, manual laborers and house wives were most affected. The common causes were palmoplantar psoriasis, eczema, lichen planus and warts. He

found a relatively high number of non-specific cases (39%), which couldnot be correlated histopathologically.

Murthy *et al.* studied 85 patients with PPK presenting consecutively for a one year period in a tertiary care hospital in South India[4] and found the prevalence to be 0.28 per 100 cases. 73 out of 85 had acquired PPK (48 males and 25 females) making the prevalence of APPK 0.24 per 100 cases. The mean age was 31.7 years. They found manual laborers and farmers (34.1%) most commonly affected followed by students (22.4%) and housewives (20%). There was winter aggravation in 34.2% cases, and focal thickening was seen in more than half the cases.

Mahajan *et al.* studied 82 consecutive patients attending the outpatient department of a tertiary care hospital in central India[2] and found that males predominated (64.63%), and psoriasis was the commonest cause of APPK (17.07%). Highest incidence was found in 11-20 age group (32.92%), and manual laborers contributed to 48.16% of cases, followed by students (33.15%) and housewives (18.69%). They found winter aggravation in 41.46% cases. Our study had a prevalence of 0.17 per 100 cases in a one year period, Samanta *et al.* found a prevalence of 0.47 per 100 cases in an 18 month period, but this study was in 200 consecutive patients with plantar keratoderma.[5] Murthy *et al.* had a prevalence of 0.24 per 100. The prevalence rate in our study may be skewed by the fact that it cannot be considered as a population based prevalence as it was calculated in dermatological patients.

Age at onset and age distribution: this study had an older age group with onset being commonest in the 5th decade, and prevalence being highest in the 6th decade. Mahajan *et al.*[2] and Samantha *et al.*[5] found highest prevalence in second APPK was evaluated. The age of onset was 0-15 years in the study by Mahajan[2]. Again these results cannot be compared as they had included congenital as well as acquired keratodermas.

Gender distribution: Both Samanta *et al.* and Mahajan *et al.* have a male preponderance constituting 71% and 64.63%, respectively, Kodali has a slight male preponderance which is not statistically significant. This study had an equal gender distribution. This is again perhaps due to our study including only acquired causes, thus negating the male preponderance seen in congenital PPK.

Duration of the disease varied anywhere between one month to 15 years. This is similar to other studies. Chopra *et al.* reported a duration of 1-10 years for palmoplantar psoriasis and hyperkeratotic eczema.[6]

Occupation Highest prevalence rates were seen in agriculturists (38.46%) followed by housewives and students. This is similar to the study by Mahajan *et al.*[2] and Kodali[3]. The higher prevalence among working class may be explained by their predisposition to trauma and mechanical injury. Working barefeet can also be a possible cause.

Aggravating factors were soaps and detergents in 30.76% patients, followed by pesticides in 11.53%. In previous studies, manual labour[7,8], and working or playing barefooted[2,5] were found to exacerbate PPK.

Clinical pattern our study had a predominance of palmoplantar psoriasis (61.53%) followed by hyperkeratotic eczema(11.53%) and contact dermatitis (11.53%), whereas Samanta *et al.* reported exogenous eczema and callosities and corns in 28.5% and 18.5% cases[5], respectively. Mahajan *et al.* had psoriasis and PRP as predominant causes for acquired PPK[2], whereas

Chopra *et al*. reported hyperkeratotic eczema followed by palmoplantar psoriasis.[6]

In conclusion, acquired palmoplantar keratodermas are a diverse conditions of disorders which may affect both genders equally. Age of onset is in 4-6 decades. Agriculturists and home makers who are exposed to wetwork, trauma and irritant contact are more prone. Psoriasis, followed by hyperkeratotic eczema are the most common causes. Hyperkeratosis was symmetrical and focal in majority of the patients.

We conclude that approach to APPK is mostly clinical, with histopathology and patch test being helpful in selected cases.

Limitations of our study

This study could not reflect the actual prevalence of the condition in general population.

The final sample size we got was much less than expected from a population which was mainly involved in manual work. This was confounded by the fact that it was a time bound study.

We could address only diagnostic, not treatment issues.

A widespread multicenter study focusing on both hereditary and acquired keratodermas is necessary to find the true prevalence in India.

Acknowledgements

Mrs. Meera P, Mr. Dinesh B. Senior Laboratory Technicians. Department of Dermatology & Venereology, KMC, Manipal. For their help with patch testing.

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