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Frictional melanosis and its clinical and histopathological features

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Background: A rippled type of pigmentation is observed on the arms, forearms, and bony prominences, more commonly in women with a history of chronic rubbing. The terminology (commonly referred to as frictional melanosis) and its relation with cutaneous amyloidosis has been debated.

Materials and Methods: Twenty one patients with pigmented skin lesions with manifestations suggestive of frictional melanosis were included in the study. Detailed history, clinical and histopathological examination were conducted on all patients.

Results: Brownish black macules without rippling were the most prevalent type of presentation. Arm was the most common site of involvement followed by forearm. Histopathology showed basal layer pigmentation, acanthotic epidermis, condensation of collagen and pigmentary incontinence in the dermis. Only six patients showed amyloid deposition on Congo red stain.

Conclusion: Amyloid can be demonstrated by Congo red stain in certain cases only, called frictional amyloidosis. Other cases, in whom amyloid cannot be observed may be termed frictional melanosis.

Keywords: friction, melanosis, amyloidosis, Congo red

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INTRODUCTION

Frictional melanosis is a benign localized pigmentary disorder of skin, seen commonly over forearms, arms and shoulder. Chronic mechanical friction is deemed as playing a major role in the pathogenesis. Considered to be related to macular amyloidosis, amyloid is difficult to demonstrate in several cases; thus, both its terminology and association with amyloidosis have been debated [1,2].

Frictional melanosis was first described by Hidano et al. in 1984 [1]. It is a common pigmentary skin disease caused by chronic friction. Clinically, it is characterized by brownish pigmentation over bony prominence distributed over arms, shoulder, forearms, back, and lateral aspect of thighs [2]. Frictional amyloidosis is a localized form of cutaneous amyloidosis at the site of chronic friction. It clinically presents as dark brownish rippled macules distributed on the back, upper and lower extremities [3]. Clinically, it resembles frictional melanosis. Whether both conditions are the same is a debated issue, as there is considerable clinical and histological similarities [2]. When amyloid deposits are demonstrated, in certain cases, they are diagnosed as frictional amyloidosis. Histopathology and electron microscopy are thought to be conducive to the diagnosis [4]. Moreover, the role of friction has been proposed to be the causative factor in the etiology. However, friction is not always noted in all cases [3]. This study was conducted to know the clinical features, friction prevalence, histopathological features and the demonstrability of amyloid in the lesions of such conditions.

MATERIALS AND METHODS

The study was conducted between May 2013 and May 2014. Included in the study were twenty one patients with a history of rubbing, and a rippled or diffuse type of pigmentation, seen over arms, forearms, and bony prominences. A detailed clinical history including age, sex, occupation, duration of the disease, progression, precipitating factors, such as sun exposure, history of rubbing, type of the used scrub and family history were noted. In each case, a thorough general physical and cutaneous examination was done.

All the patients were subjected to skin biopsy under local anesthesia employing 5mm disposable punch. Biopsy specimen was collected in 10% formalin bottle and sent for histopathological examination. Slides were stained with haematoxylline and eosin (H&E), and Congo red stains. All slides were examined under light microscopy.

RESULTS

Out of the 21 patients, 16 patients (76.19%) were female and 5 were male (23.80%). Patients were aged 20-51 years, the majority of whom, 14 (66.66%), were 21-30 years old (Table 1). Four patients (19.04%) had a positive family history, and the disease duration varied from 3 to 15 years (Table 2). Most of the patients, 17 (80.95%), were asymptomatic, and occasional scratching was noted in 4 cases (19.04%). All 21 patients had a prolonged history of scratching, ranging from 5 to 20 years (Table 3). The objects used for scratching included nylon sponge (1 case), brush (5 cases), stone (3 cases) and neem plant sticks (2 cases).

Arm was the most common site of involvement followed by forearm, upper back, legs, chest, neck and shoulder. Out of the 21 patients, brownish black macules with rippled pattern were noted in 6 (28.57%) (Figure 1), brownish black pigmentation without rippling was seen in 11 (52.38%), diffuse hyperpigmentation in 3 (14.28%) and slate grey pigmentation in 1 (4.76%) case.

Table 1. Age distribution of study subjects

Age in years	No. of patients (n=21)
10-20	2 (9.52%)
21-30	14 (66.66%)
31-40	2 (9.52%)
41-50	2 (9.52%)
51-60	1 (4.76%)

Table 2. Duration of lesion in years

Duration in years	No. of patients (n=21)
1-5	11 (52.3%)
5-10	8 (38 %)
>10	2 (9.5%)

Table 3. Duration of scratching in study subjects

Duration of scratching in years	No. of patients (n=21)
1-5	2 (9.52 %)
6-10	11 (52.38 %)
11-15	5 (23.80 %)
16-20	3 (14.28 %)

Histopathological examination showed increased basal layer pigmentation, acanthotic epidermis, condensation of collagen and pigmentary incontinence in all cases (Figure 2). Basal cell vacuolization was not seen in any of our cases. In 6 patients (28.57%), Congo red stain indicated the deposition of amyloid in papillary dermis (Figure 3), and enabling the diagnosis of macular amyloidosis; the remaining 15 patients (71.42%), in whom amyloid could not be demonstrated by Congo red stain, were diagnosed as frictional melanosis.

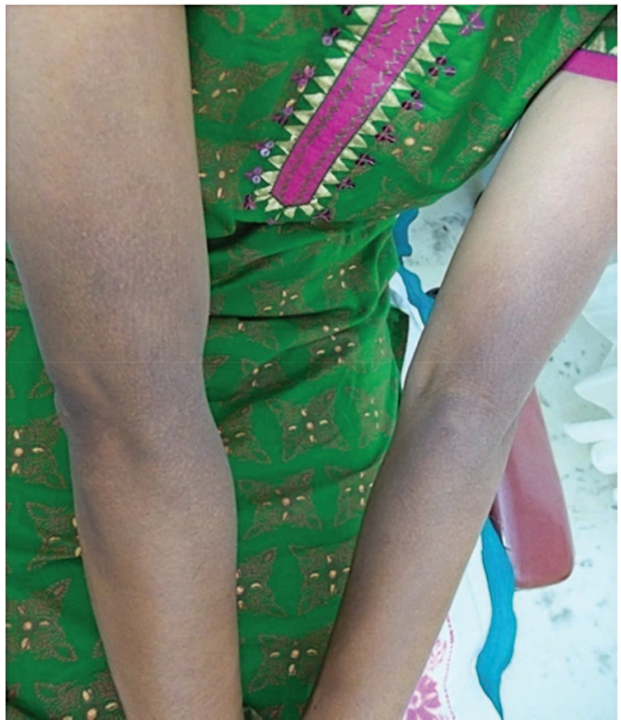

Figure 1. Brownish pigmentation over the upper extremities

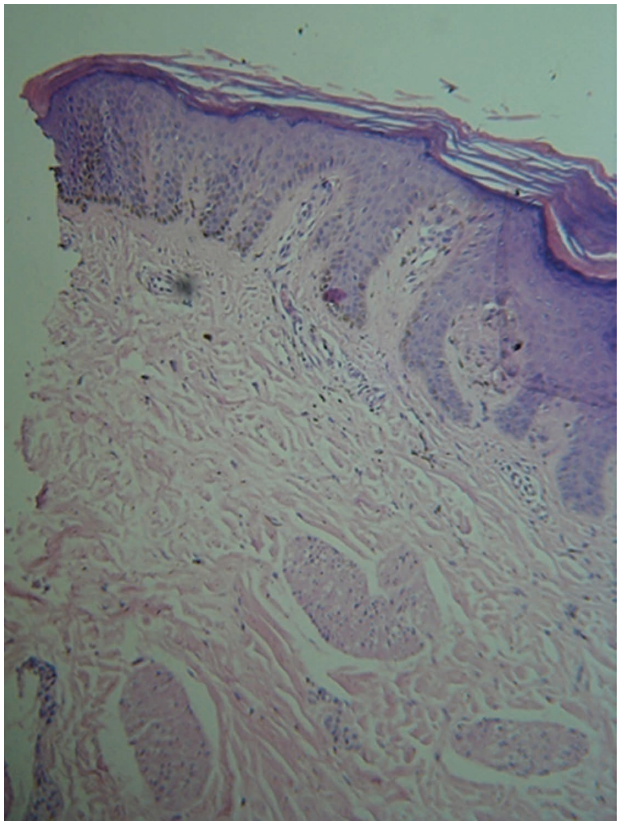

Figure 2. Histopathology shows epidermis with hyperkeratosis, acanthosis, elongated rete ridges, with increased pigmentation of the basal layer. Dermis shows pink homogenous deposits in papillary dermis (H & E ×10)

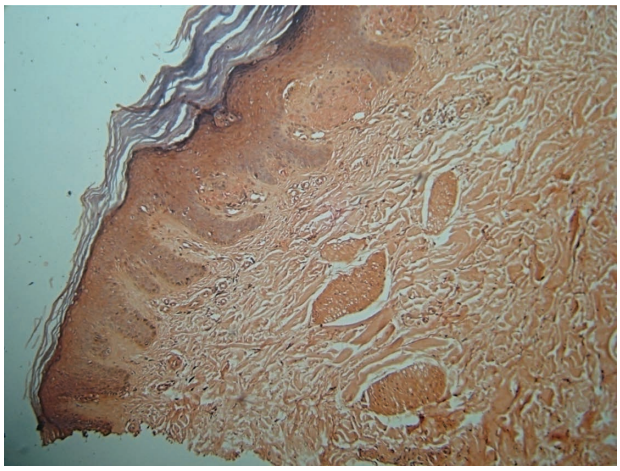

Figure 3. Congo red stained section showing amyloid deposits in the papillary dermis (×10)

DISCUSSION

Frictional melanosis is a distinctive clinical entity characterized by brown pigmentation over bony prominence. It was first described by Hidano et al. in 1984 [1]. Sharquie et al. described similar term "frictional dermal melanosis" as pigmentation resulting from the use of scrub pad (loofah) in Iraq [5].

Chronic friction plays an important role in the pathogenesis. Repeated friction results in squeezing of epidermis between bone and the frictional agent. Damage to basal layer and melanocytes leads to pigmentary incontinence [6,7].

Histopathology and electron microscopy have demonstrated small quantities of amyloid in some of these cases and hence the name frictional amyloidosis has been proposed [8].

In the present study, majority of the patients, 16/21 (76.19%), were female, aged 21-30 years. Al-Aboosi et al. studied 13 cases of frictional melanosis over a period of 2 years, of which, 10 were females and 3 were males [2]. Magana-Garcia et al. studied 10 patients in which all were females [8].

In the present study, occasional itching was noted in only 4 patients. Duration of scratching was 0-5 years in 3 cases, 5-10 years in 10 cases, 10-15 years in 4 patients, 15-20 years in 1 subject, and 20-25 years in one other, hence emphasizing the role of friction. Our study also confirms the role of prolonged friction in macular amyloidosis. Sumitra et al. showed role of friction in cutaneous amyloidosis [9].

Clinical findings of frictional melanosis resemble that of macular amyloidosis. Rippled pattern of pigmentation with symmetric distribution, moderate to severe itching and positive Congo red stain are characteristic features of macular amyloidosis [2]. A generally held opinion is that both these conditions represent the same disease process [2].

In our study, all patients showed basal cell layer pigmentation, acanthosis, pigment incontinence and collagen condensation upon histopathology, which is suggestive of frictional melanosis. Basal cell vacuolation was not seen in any of our cases. Among all the cases (21 patients), positive Congo red stain was noticed in the papillary dermis of 6 cases, suggesting that some of the cases diagnosed with frictional melanosis represent cutaneous amyloidosis as well.

Histochemical stains are not always conducive to the detection of amyloid. Mysore V et al. studied 10 cases of frictional amyloidosis, where a mere 6 patients showed positive amyloid on Congo red stain. In the remaining 4 cases, electron microscopy demonstrated amyloid material, which was not demonstrable by histopathology [7].

Electron microscopy and histochemistry conduce to confirming amyloid in tissue specimen [7]. This study postulated that frictional melanosis represents the early cases of frictional amyloidosis, where amyloid is either too small to be demonstrated by Congo red or not yet formed. Electron microscopy is the most sensitive tool for demonstrating amyloid. It is further thought that friction not only leads to changes in epidermis such as acanthosis and increased basal pigmentation, but also damages keratinocytes and alters keratinization, which, in turn, entails the conversion of alpha helical keratin into beta structured amyloid [2,5]. This process is further aggravated in lichen amyloidosis which also shows the effects of prolonged scratching and formation of amyloidosis.

The current study examined the lesions only with light microscopy, which is a limited approach to confirming the diagnosis. However, the study confirmed the presence of amyloid and the role of friction in frictional amyloidosis.

CONCLUSIONS

Our research highlights the role of friction in frictional melanosis and frictional amyloidosis. It supports the view that frictional melanosis and frictional amyloidosis have the same underlying pathophysiological process and differ only with respect to the presence of amyloid in frictional amyloidosis and its absence in frictional melanosis. Accordingly, all cases of frictional melanosis may be investigated to detect the presence of amyloid.

Conflict of Interest: None declared.

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