Clinico-etiological analysis of linear skin eruptions: a cross-sectional study

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Background: Linear skin eruptions are commonly encountered in dermatology practice. They may be the manifestations of various skin diseases resembling each other, leading to difficulty in diagnosis and treatment. This study aimed to document linear dermatoses and analyze them demographically, clinically, and etiologically in order to facilitate diagnosis.

Methods: A cross-sectional study was conducted on 100 patients presenting with linear skin eruptions to a tertiary care center's dermatology outpatient/inpatient department over two years (2016 to 2018). These patients were evaluated and classified after clinico-etiological correlation into several subgroups of acquired and congenital linear skin eruptions.

Results: The major etiological group encountered was acquired dermatoses (79%), followed by nevoid/congenital dermatoses (21%). Among acquired dermatoses, the majority belonged to the papulosquamous group (33%), mostly lichen striatus cases (21%). The significant age groups were ≤ 40 years and ≤ 20 years in the acquired and papulosquamous groups, respectively (P = 0.001). In nevoid/congenital dermatoses, linear verrucous epidermal nevus was the predominant group (10%). We also attempted to find correlations with variables like gender, duration of symptoms, and distribution; however, there was no statistically significant correlation. Among other causes, 56% had the Blaschkoid distribution (P = 0.007).

Conclusion: This novel study attempted a comprehensive clinico-etiological compilation of linear skin eruptions by analyzing many variables and risk factors. It documents some uncommon dermatoses that occasionally present with linear configuration and need to be considered in the differential diagnoses.

Keywords: linear skin eruption, acquired dermatoses, nevoid/congenital dermatoses

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INTRODUCTION

Linear skin lesions are commonly encountered in the dermatology outpatient department. They vary in cause, are congenital or acquired, inflammatory or non-inflammatory, single linear lesions or linear patterns of multiple lesions, and can present as macules, papules, patches, plaques, vesicles, or nodules [1]. The various causes include lesions following Blaschko's lines [2], blood vessels, lymphatics, dermatomes, Koebner's phenomenon [3], and external factors.

The differential diagnoses of linear skin eruptions are quite extensive as they occur as manifestations of various skin diseases. Most lesions with this configuration are etiologically classified as acquired conditions [4], including papulosquamous disorders (lichen striatus, linear psoriasis, linear lichen planus, and Blaschko linear acquired inflammatory skin eruption), infective causes (herpes zoster and warts), neoplastic disorders (linear porokeratosis and leiomyomas), drug-induced cases (5-fluorouracil; linear lichenoid drug eruptions), immunological disorders (segmental vitiligo; linear morphea), physical conditions (dermatitis artefacta, dermatographism, and the Koebner phenomenon), metabolic derangements (linear mucinosis), and endocrine or miscellaneous disorders. Other major groups are congenital/nevoid conditions [4] (hypomelanosis of Ito, epidermal nevus, inflammatory linear verrucous epidermal nevus, linear nevus comedonicus, linear porokeratosis of Mibelli, linear and whorled nevoid hypermelanosis, etc.) and genodermatoses [4].

This study aimed to document linear dermatoses and analyze them demographically, clinically, and etiologically.

PARTICIPANTS AND METHODS

This cross-sectional study was conducted on 100 patients (irrespective of age and gender) presenting with linear skin eruptions to the dermatology outpatient/inpatient department of a tertiary care center of Maharashtra during a two-year period (2016 to 2018) after obtaining approval from the institutional ethics committee.

Clinical assessment

After obtaining written informed consent, in all patients, a detailed history was sought regarding the site of onset, rate of progression, associated symptoms, other comorbidities, and family history of similar lesions. We noted the lesions' morphology, distribution, extent of involvement, surface, color, symmetry, erythema, induration, and changes in the mucosa, hair, and nails during the clinical examination. Relevant systemic examination findings were studied for any association with an underlying condition. In every patient, the following investigations were carried out whenever required: complete metabolic panel, skin biopsy for histopathological examination (special stains wherever necessary), laboratory tests like ELISA for HIV 1&2, Tzanck smear, and other specific investigations. The final diagnosis was made after correlation of clinical, pathological, and laboratory features.

Statistical methods

Data analysis was done using SPSS software version 20.0. The chi-squared test and Fisher's exact test were used to find the association between age group, gender, and distribution with the final diagnosis. P-value < 0.05 was considered significant.

Ethical considerations

Approval was obtained from the institutional ethics committee.

RESULTS

Demographic data

Out of 100 cases, 21% were nevoid/congenital and 79% were acquired dermatoses without any case of genodermatoses. In nevoid/congenital conditions, the majority of cases (10%) were linear verrucous epidermal nevus followed by hypomelanosis of Ito (3%), linear epidermal nevus (3%), nevus comedonicus (2%), linear and whorled nevoid hypermelanosis (1%), nevus depigmentosus (1%), and inflammatory linear verrucous epidermal nevus (1%). The predominant age group of presentation of nevoid/congenital conditions was up to 30 years. In acquired dermatoses, the maximum proportion of cases (33%) belonged to the papulosquamous group, followed by the infective (14%), miscellaneous (13%), physical (9%), immunological (7%), and drug-induced groups (1%). Age showed a significant correlation with the etiological group (up to 40 years in acquired dermatoses, up to 20 years in papulosquamous group and lichen striatus, and 31-40 years in linear morphoea) (Table 1, 2). Out of the total 100 cases, 57% were males and 43% were females. In nevoid/congenital conditions, 11 were males with ten females, while in the acquired dermatoses, 46 were males and 33 were females.

Table 1. Distribution of patients with nevoid/congenital conditions, acquired dermatoses, and genodermatoses according to age groups and gender

	Nevoid/Congenital conditions	Acquired dermatoses	Genodermatoses	Total	P-value
Age group, years					
≤ 10	6	18	0	24	
11-20	6	19	0	25	
21-30	6	12	0	18	
31-40	0	16	0	16	0.263
41-50	2	8	0	10	
> 50	1	6	0	7	
Total	21	79	0	100	
Gender					
Male	11	46	0	57	
Female	10	33	0	43	0.924
Total	21	79	0	100	

Table 2. Distribution of patients according to diagnosis and with age group

Final diagnosis	Age group (years)						Total	*P*-value
	≤ 10 (n=24)	11 - 20 (n=25)	21 - 30 (n=18)	31 - 40 (n=16)	41 - 50 (n=10)	> 50 (n=7)		
Lichen striatus	13	7	1	0	0	0	21	< 0.001
Herpes zoster	0	3	2	3	2	3	13	0.073
Linear lichen planus	1	2	4	3	1	0	11	0.352
Linear verrucous epidermal nevus	2	5	2	0	1	0	10	0.365
Linear morphea	0	1	0	3	2	0	6	0.044
Dermographism	0	0	1	2	1	0	4	
Hypomelanosis of Ito	3	0	0	0	0	0	3	
Linear epidermal nevus	0	0	2	0	0	1	3	
Lymphangioma circumscriptum	0	2	0	0	0	0	2	
Plaque psoriasis (Koebner phenomenon)	0	0	0	1	1	0	2	
Leiomyoma	0	0	1	0	0	0	1	
Linear and whorled nevoid hypermelonosis	0	1	0	0	0	0	1	
Nevus comedonicus	0	0	1	0	0	0	1	
Porokeratosis	0	1	0	0	0	0	1	
Tuberculosis verrucosa cutis	0	0	0	0	0	1	1	

Abbreviations: n, number.

We did not find any statistically significant correlation between gender and eruption or etiology of linear skin lesions. The majority of patients (38%) were students, followed by employed individuals (18%) and housewives (17%). Overall, 21% were diagnosed as lichen striatus, 13% as herpes zoster, 11% as linear lichen planus, 10% as linear verrucous epidermal nevus, 6% as linear morphea, and the rest were others (39%).

Clinical features

Out of 100 cases, most (57%) had asymptomatic lesions, and 27% presented with itching, 14% felt a burning sensation, and 14% had pain. Most (76%) patients had symptoms for less than or equal to one year, whereas 24% had symptoms of more than one year in duration. There was no statistically significant association.

Among all cases, 56% had lesions distributed along Blaschko's lines ($P = 0.007$), 14% were along the dermatomes, 4% showed Koebner's phenomenon, 2% were along the lymphatics, and 1% had occurred due to pseudo-Koebnerization.

According to the site of distribution, 44% had linear skin lesions over the upper extremities, followed by trunk (34%), lower extremities (29%), and face and neck (16%). The head (3%) was the least affected site, comprising two cases of linear verrucous epidermal nevus and one of linear

morphea. Notably, 77% had linear skin lesions over a single site, and 33% had involvement of multiple sites. The predominant site of involvement was the extremities (73%), followed by the trunk (34%). Also, 96% of patients presented with a single/first episode of lesions, while 4% had recurrent lesions. Interestingly, 97% had multiple lesions at the time of presentation, whereas only 3% had a single lesion. In terms of distribution, 99% of patients had an asymmetrical distribution of lesions over the body, while only one case had a symmetrical pattern.

Various morphologies observed were papules (51%), plaques (30%), vesicles (15%), macules (13%), nodules (5%), erosions (4%), crusts (4%), wheals (3%) and scars (2%). Out of 100 subjects, 77% had monomorphic lesions, and 23% had polymorphic lesions. The majority (32%) had erythematous color change over the lesions, followed by hypopigmentation (29%), and hyperpigmentation (22%). Also, 91% had monochromic and 9% had polychromic linear skin lesions.

Investigations

In our study, amongst 13 patients tested for HIV serostatus, 2 cases with herpes zoster were HIV seropositive. Of the 38 patients who gave consent for skin biopsy, histopathological findings confirmed the clinical diagnosis in 36 (94.74%). In 62 cases, a biopsy was not required because of classical clinical features. As mentioned earlier, the 100 cases comprised 21 of lichen striatus (Figure 1), 13 of herpes zoster, 11 of linear lichen planus, 10 of linear verrucous epidermal naevus (Figure 2), 6 of linear morphea, as well as the Koebner phenomenon (n = 5), dermographism (n = 4), hypomelanosis of Ito (n = 3), linear epidermal nevus (n = 3), lymphangioma circumscriptum (n = 2), segmental vitiligo (n = 2), irritant contact dermatitis (n = 2), prurigo simplex (n = 2), and single cases of tuberculosis verrucosa cutis (Figure 3), porokeratosis (Figure 4), nevus comedonicus (Figure 5), Blaschkitis, collagen nevus, inflammatory linear verrucous epidermal nevus, leiomyoma, linear and whorled nevoid hypermelonosis, linear nevus comedonicus with

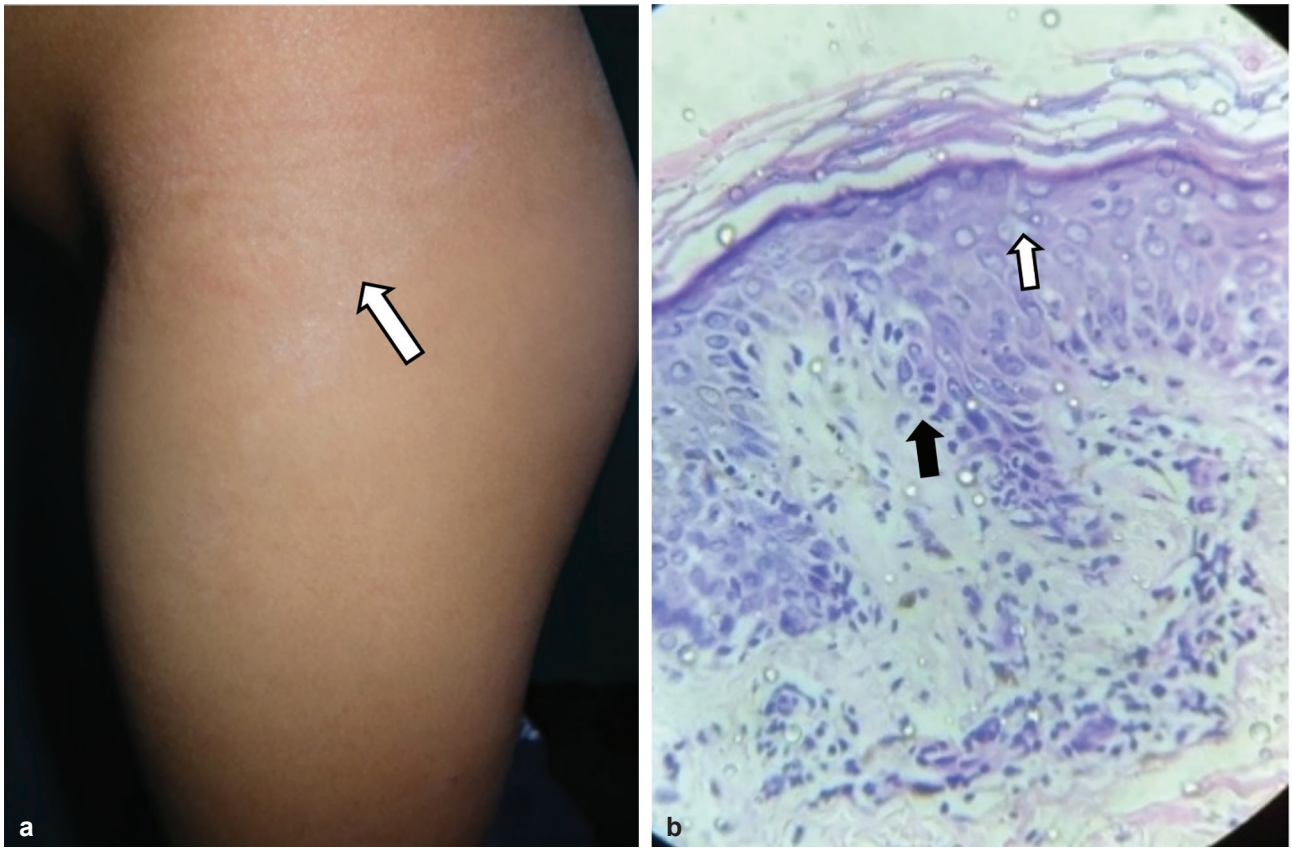

Figure 1. Lichen striatus; (a) Clinical image showing hypopigmented papules in linear distribution over left lateral thigh; (b) Epidermis: mild spongiosis (white arrow), vacuolar degeneration of basal layer (black arrow) with tagging of lymphocytes (H&E staining; 400×).

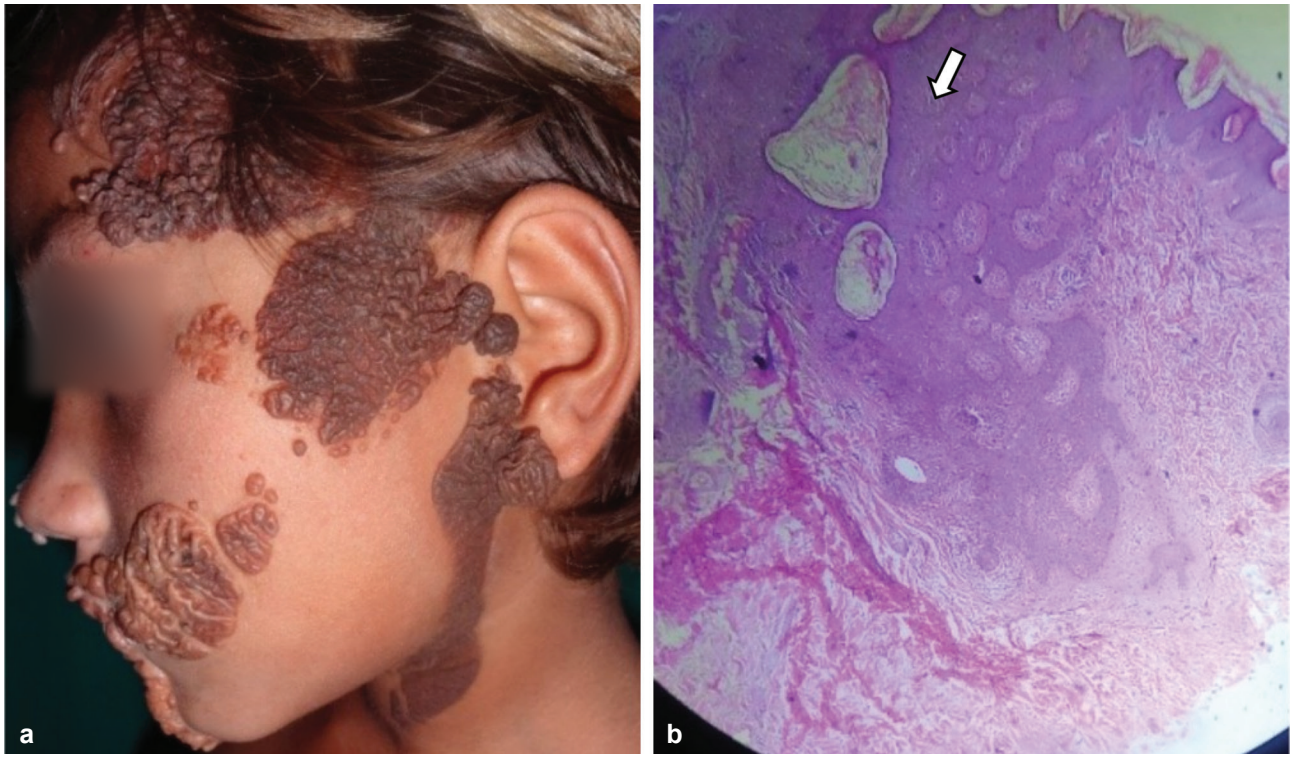

Figure 2. Linear verrucous epidermal nevus; (a) Clinical image showing verrucous hyperpigmented plaques along Blaschko's line over face and neck; (b) Psoriasiform acanthosis, orthokeratosis, parakeratosis, papillomatosis (white arrow), hypergranulosis and spongiosis. Dermis: increased collagen fibers (H&E staining; 100×).

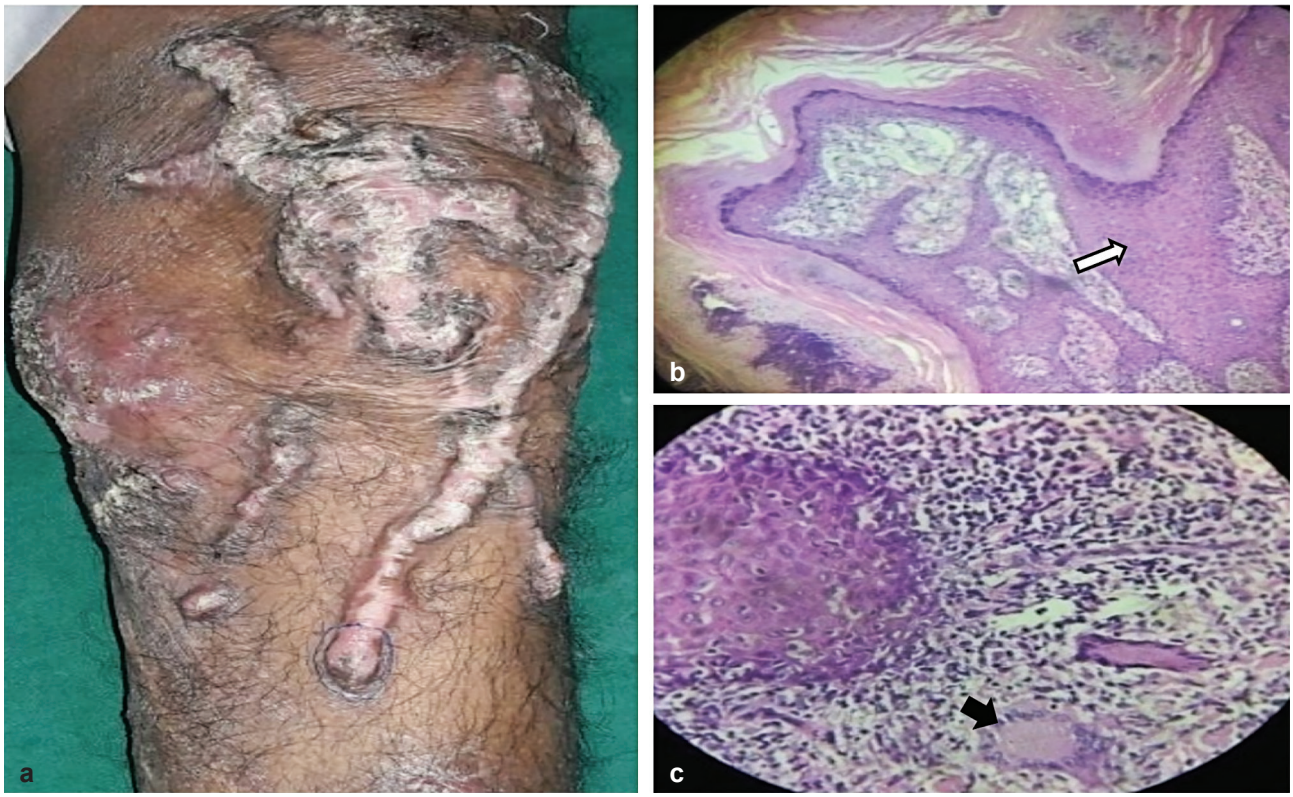

Figure 3. Tuberculosis verrucosa cutis; (a) Clinical image showing erythematous verrucous plaques and nodules over left knee, thigh, and leg; (b) Hyperkeratosis, irregular acanthosis (white arrow), parakeratosis with negative ZN staining (H&E staining; 40×); (c) Dense and diffuse collection of lymphocytes, plasma cells and few Langhans giant cells (black arrow) (H&E staining; 100×).

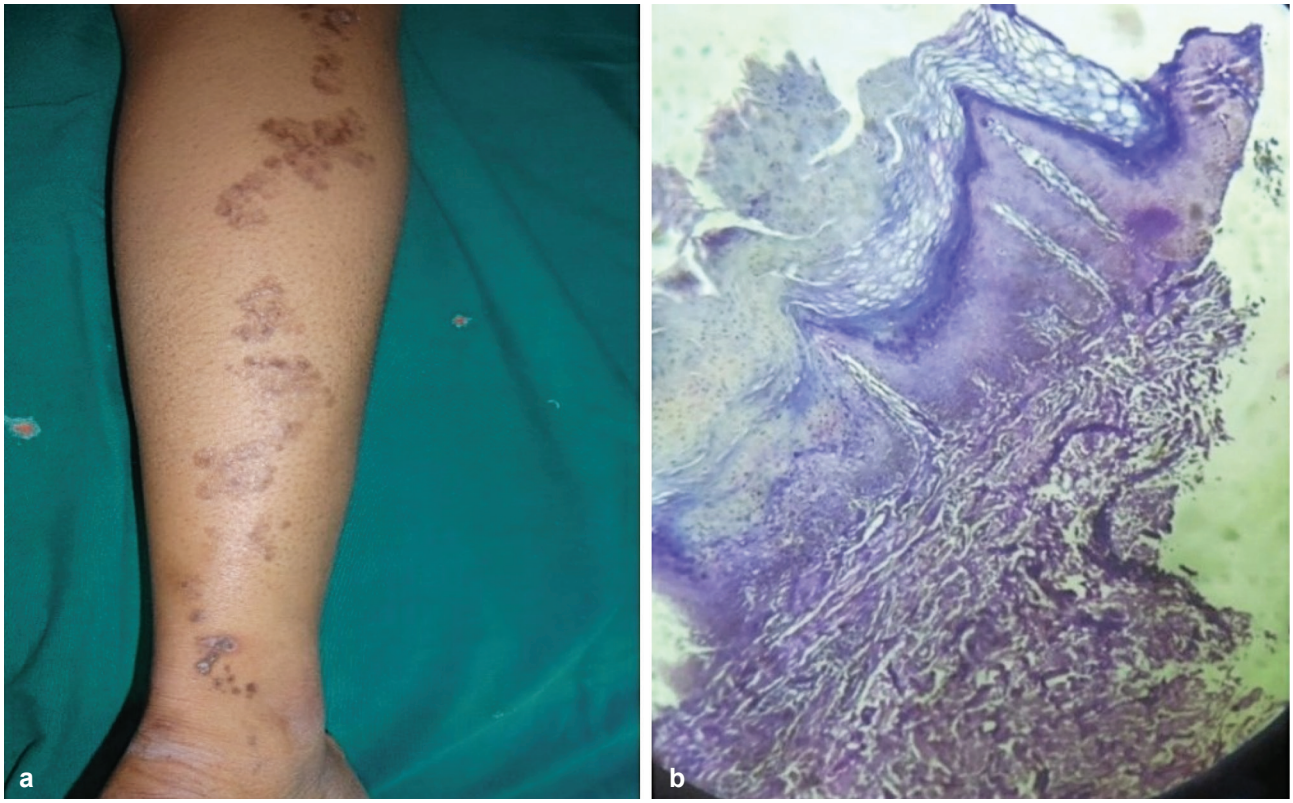

Figure 4. Porokeratosis; (a) Clinical image showing hyperpigmented plaques and macules over right thigh and leg; (b) Cornoid lamella with invagination of the epidermis at the site of the cornoid lamella with adjacent mild papillomatosis (H&E staining; 100×).

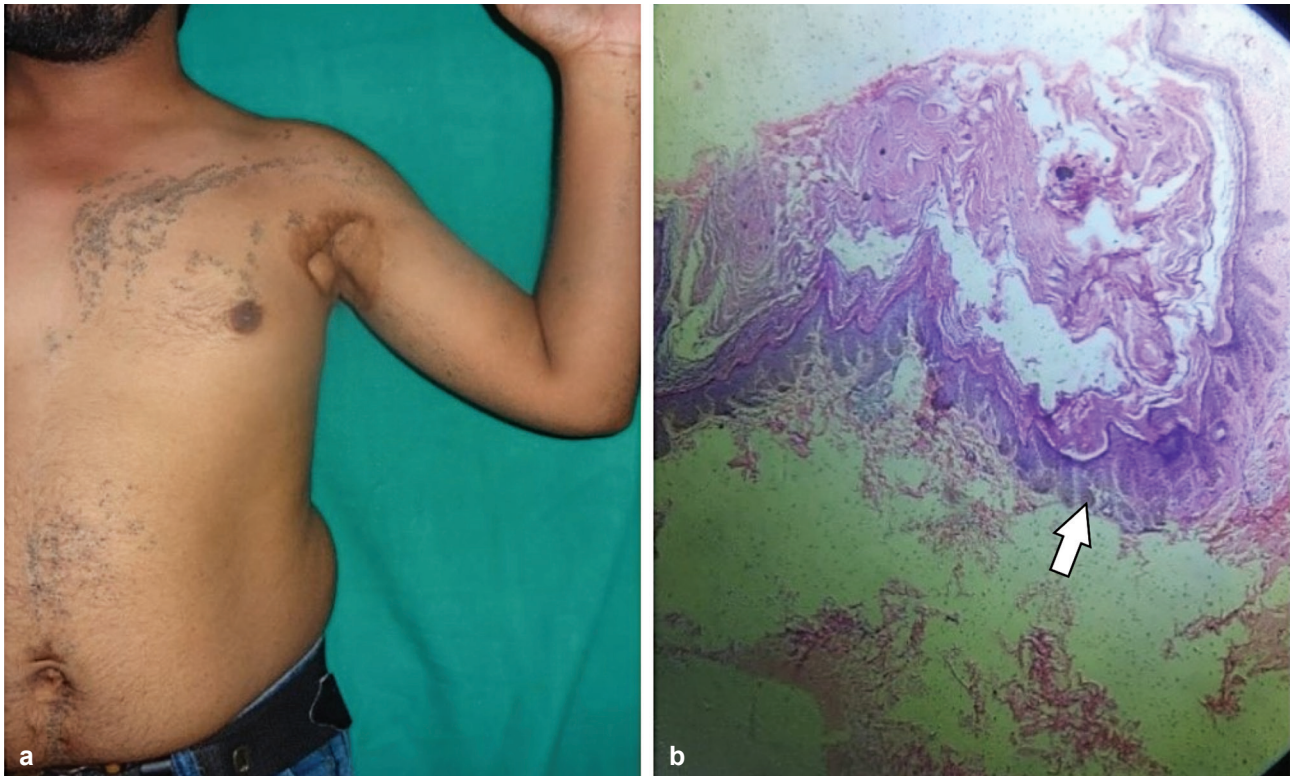

Figure 5. Nevus comedonicus; (a) Clinical image showing asymmetrical grouped papules with central keratin plug along Blashcko's lines over left half of abdomen, chest, arm, and forearm; (b) Hyperkeratosis, irregular acanthosis, wide and deep invagination of epidermis filled with keratin (white arrow) (H&E staining; 40×).

linear psoriasiform verrucous epidermal nevus, post Mantoux erythema multiforme, nevus depigmentosus, palmoplantar keratoderma, post herpes zoster atrophic scars and hyperpigmentation, striae gravidarum, steroid induced atrophy, and lichen amyloidosis.

DISCUSSION

Skin lesions with linear configuration are common and striking in appearance but can be confusing owing to a wide variety of differential diagnoses. Linear lesions resemble a straight line, often implying that contact dermatitis or the Koebner phenomenon has occurred in response to scratching. They may occur as a single lesion (e.g., a scabies burrow, poison ivy dermatitis, or bleomycin pigmentation) or may be arranged as multiple lesions (e.g., lichen nitidus or lichen planus) [5].

The lines of Blaschko represent a classic pattern of cutaneous mosaicism (two or more genetically different populations of cells existing side by side) assumed by many different nevoid and acquired skin diseases on the human skin and mucosae [2]. They differ from dermatomes and appear as single or multiple lines, whorls (swirls), or wave-like shapes in the skin. The present study included lesions along Blaschko's lines as lichen striatus, linear verrucous epidermal nevus, linear lichen planus, linear morphea, hypomelanosis of Ito, linear epidermal nevus, nevus comedonicus, segmental vitiligo, linear and whorled nevoid hypermelonosis, nevus depigmentosus, and inflammatory linear verrucous epidermal nevus. The Koebner phenomenon is the development of isomorphic pathologic lesions in the traumatized uninvolved skin of patients who have cutaneous diseases, signifying activity of the disease [3]. A similar pseudo-Koebner phenomenon is seen in infectious diseases, occurring due to auto-inoculation. In our study, four patients had the Koebner phenomenon, including two plaque psoriasis cases, one case of lichen planus, and one case of lichen nitidus. We had one case of pseudo-Koebnerization due to verruca plana.

In our study, linear lesions were classified into two groups. The major group was acquired dermatoses, followed by nevoid/congenital conditions. As we were unable to find any similar study documenting such a clinico-etiological analysis for comparison, we herein describe our observations according to individual etiological categories and attempt an interpretation wherever possible.

Lichen striatus. Lichen striatus is an acquired condition presenting as small, pink, lichenoid papules that rapidly coalesce to extend over a week or more to form a dull-red, slightly scaly linear band, usually 2 mm to 2 cm in width, along Blaschko's lines. The lesions are erythematous, papular, vesicular, and eczematous [6]. The etiology is unknown. Several theories have been proposed including environmental agents, cutaneous injury, viral infection, hypersensitivity, and genetic predisposition [7].

In the present study, the predominant age group for lichen striatus was up to 20 years. This age predilection is similar to previous studies. In the study by Hauber *et al.* [8], 10 out of 12 patients were children aged six months to 12 years. Das *et al.* [9] conducted an observational study for 12 months and reported the maximum number of cases among patients between 0 to 4 years of age; the youngest was a one-year-old patient. The present study recorded a slight male predominance with a male to female ratio of 1.1:1 in lichen striatus. Hauber *et al.* [8] reported a much more considerable male predominance, with a male to female ratio of 3:1. However, Patrizi *et al.* [10] reported a female predominance, with a male to female ratio of 0.5:1.

On histopathological examination, lichen striatus shows hyperkeratosis, irregular acanthosis, mild spongiosis, and basal layer vacuolar degeneration with tagging of lymphocytes. Also, the superficial dermis shows moderate lymphocytic infiltration with pigment incontinence.

Herpes zoster. A dermatome is a linear area of skin supplied by a single spinal nerve [1]. Herpes zoster is caused by the varicella-zoster virus, which reactivates from its dormant state (in about 25% of cases) to travel along the sensory nerve fibers. It presents with multiple painful grouped vesicles on an erythematous base along a particular dermatome, usually unilateral. It is more common in people with diminished cell-mediated immunity [11]. Lesions are accompanied by severe pain, which, in some people, does not subside after healing and persists for months or years. Post-herpetic neuralgia is defined as pain persisting for more than four months after the vesicular lesions have healed, representing the most common complication [12].

The present study showed that the predominant age group for herpes zoster was above 11 years. Although there is no single age group for the occurrence of herpes zoster, old age is recognized as a strong risk factor. Amongst all cases, 9 were males and 4 were females. Our finding of male preponderance contrasts with the report that female sex is a risk factor for the development of herpes zoster [13]. In the present study, the most frequent site of reactivation was the thoracic dermatomes. We have found 2 HIV seropositive patients among 13 cases of herpes zoster.

Lichen planus. Lichen planus is characterized by linear lesions that follow the lines of Blaschko, denominated linear lichen planus and representing less than 0.2% of all cases [14]. In our study, the major age group of linear lichen planus was up to 30 years. Although linear lichen planus is more common in children than adults, its occurrence in children is extremely rare, comprising only 2-3% of all affected patients [15]. We encountered only a single child (8 years) with linear lichen planus. Out of 11 patients, 5 were males and 6 were females. We were unable to find any studies suggesting a predilection for either gender in lichen planus.

Linear verrucous epidermal nevi. Epidermal nevi are defined as congenital malformations or hamartomas derived from embryonic ectoderm [16]. Lesions are usually noted at birth or infancy but are typically non-familial. Linear verrucous epidermal nevi clinically appear as verrucous papules and plaques distributed along Blaschko's lines. The prevalence of linear verrucous epidermal nevus is estimated at 1:1000 live births. In addition, they are associated with central nervous system (CNS) and skeletal abnormalities. Skeletal abnormalities are common in 50–66% of patients [17]. CNS involvement in epidermal nevus syndrome is estimated to occur in 50–70% of patients [18]. None of our cases had systemic associations.

Inflammatory linear verrucous epidermal nevus (ILVEN) is a rare variant of epidermal verrucous nevus that commonly affects females, characterized by recurrent inflammatory phenomena, with chronic eczematous or psoriasiform aspects in linear distribution following Blaschko's lines and severe pruritus, refractory to therapy [17]. ILVEN is a variant of verrucous epidermal nevus and was originally described by Unna in 1896 [19]. ILVEN is caused by somatic mutations that result in genetic mosaicism, although its physiopathology is still unclear.

In our study, the major age group associated with linear verrucous epidermal nevi was up to 30 years with a female to male ratio of 1.5:1. A literature review suggested that children are more commonly affected, and it predominates in females in a ratio of 4:1 [17]. Linear verrucous epidermal nevus shows psoriasiform acanthosis, orthokeratosis, parakeratosis, papillomatosis, hypergranulosis, and spongiosis with increased dermal collagen fibers on histopathology.

Linear morphea. Morphea (localized scleroderma) is a rare fibrosing disorder of the skin that may also involve the underlying muscles, connective tissues, bones, and brain. Morphea typically goes through two stages: an active (inflammatory) stage and a 'burnt out' stage [20].

The present study's predominant age group for linear morphea was 31-40 years with a female predilection (female to male ratio of 5:1). Linear morphea generally predominates in children. The mean age at onset in adults is in the mid-forties, while in children the mean age at disease onset is 7.3-8.3 years [21]. Most studies suggest that morphea is more common in women, with female to male ratios of between 7:1 and 2.6:1, which is more marked in children (2.4:1-3:1) [21]. Our study findings approximate the above observation.

Tuberculosis verrucosa cutis (TVC). A 54-year-old male farmer presented with asymptomatic, gradually progressing, multiple erythematous verrucous indurated plaques and nodules with adherent crusts and few lesions showing keloid-like morphology along the left lower limb. The onset was 15 years beforehand. Clinical differentials of TVC and deep fungal infection were kept. Investigations such as sputum acid-fast bacillus (AFB), Mantoux test, tissue culture for AFB, and fungus were negative. Skin biopsy with AFB stain was done. Histopathological examination showed hyperkeratosis, irregular acanthosis, and parakeratosis. Dense and diffuse collection of lymphocytes, plasma cells, and few Langhans giant cells in the dermis were noted with negative Ziehl Neelsen staining. This led to the diagnosis of TVC. TVC presenting as linear lesions, to the best of our knowledge, has not been reported so far.

Porokeratosis. A 14-year-old female presented with multiple, asymptomatic, gradually progressing,

non-scaly, non-indurated, hyperpigmented papules with atrophic centers over the right lower limb since six years back. Clinical differentials of linear porokeratosis and linear lichen planus were kept. Histopathological examination showed the typical cornoid lamella and invagination of the epidermis at the site of the cornoid lamella with adjacent mild papillomatosis. Diminution of the granular layer with basal vacuolar change and vacuolated cells in the spinous layer were seen beneath the cornoid lamella. This typical histopathology confirmed the diagnosis of linear porokeratosis [22]. Linear porokeratosis is listed as a rare disease by the Office of Rare Diseases of the National Institutes of Health affecting fewer than 20000 people in the US [22]. Very few cases of linear porokeratosis have been reported in India [23].

Blaschkitis. A 62-year-old male presented with asymptomatic, gradually progressing, asymmetrical, non-indurated, erythematous, and violaceous plaques along Blaschko's lines over the left flank commencing ten months beforehand. Blaschkitis is an acquired inflammatory dermatitis that some consider an adult variant of lichen striatus. It manifests as multiple lines typically located on the trunk with a rapid course and spontaneous resolution within two months. On histopathology, Blaschkitis features spongiotic dermatitis [24]. After clinicopathologic correlation, the final diagnosis of Blaschkitis/Blaschko linear acquired inflammatory skin eruptions (BLAISE) was reached. This condition has rarely been described in the literature [25].

Lymphangioma circumscriptum (LC). A 14-year-old female presented with asymptomatic, gradually progressing, multiple grouped clear fluid-filled vesicles on erythematous macules over the lateral aspect of the right thigh and knee since three months beforehand. She had painless diffuse swelling over the right side of the lower limb since childhood, which had progressed gradually from the perineal region to the right leg. Radiological investigations revealed multiple dilated subcutaneous vascular channels involving the medial aspect of the bilateral gluteal region and the medial aspect of the right thigh and knee, suggestive of venous malformation. Histopathological and radiological investigations led to the diagnosis of LC associated with Klippel Trenaunay syndrome (KTS). LC is not a tumor but rather a congenital malformation of the superficial lymphatics. KTS is relatively rare as a congenital vascular anomaly. It is classically defined as the triad of vascular (port-wine) stain, venous varicosities, and soft tissue or bony hypertrophy. Liu *et al.* [26] reported a Chinese woman with vulvar LC coexisting with KTS on the same body side.

Linear and whorled nevoid hypermelanosis (LWNH). A 20-year-old female presented with multiple asymptomatic, gradually progressing, non-scaly, swirling streaks of hyperpigmented macules along Blaschko's lines over the trunk and dorsum of right hand and forearms since birth. Typical histopathology led to the diagnosis of linear and whorled nevoid hypermelanosis [27]. LWNH is characterized by hyperpigmented macules in a streaky configuration along Blaschko's lines without preceding inflammation or atrophy, mainly on the trunk and extremities, sparing the palms, soles, and mucosae. Similarly, our case also had sparing of the palms, soles, and mucosa. There are very few case reports from India and elsewhere [27].

Leiomyoma. A 27-year-old male presented with gradually progressing, asymmetrical, skin-colored to erythematous, well-circumscribed, firm nodules and papules along Blaschko's line over the left upper limb since ten years beforehand and episodic pain in the lesions during winter. Typical histopathology confirmed the diagnosis of pilar leiomyoma. Cutaneous leiomyomas are rare lesions and form an important clinical differential diagnosis of painful papulonodules. These lesions must be biopsied in order to differentiate them from other spindle cell tumors. Clinicopathologic data on cutaneous leiomyomas, with special reference to pilar leiomyomas in the linear configuration, are scant in literature [28].

Collagen nevus. A nine-year-old boy presented with multiple, asymptomatic, gradually progressing, non-scaly, asymmetrical, skin-colored, rubbery plaques with a hypopigmented rim along the lines of Blaschko over the right side of the abdomen extending to the back since three months earlier. Final diagnosis of zosteriform collagen nevus was reached based on clinicopathological data. Zosteriform connective tissue nevi (CTN) are slow-growing, painless, flesh-colored or pink nodules/plaques most commonly found in the lumbosacral area. To date, very few cases of zosteriform CTN have been reported [29].

Nevus comedonicus (NC). A 27-year-old male presented with recurrent, asymptomatic,

gradually progressing, asymmetrical, multiple grouped papules with central keratin plugs along Blashcko's lines over the left half of the abdomen, chest, arm, and forearm since 20 years back without any other extracutaneous developmental anomalies. Histopathological examination showed hyperkeratosis, irregular acanthosis, and wide, deep invagination of the epidermis filled with keratin, leading to the diagnosis of NC.

Nevus comedonicus with linear psoriasiform verrucous epidermal nevus. A 41-year-old male presented with multiple discrete open comedones over his left arm and forearm in a Blaschkoid pattern, commencing when he was 30 years of age. On further examination, erythematous scaly plaques over the left elbow and dorsal aspect of the left thumb and index finger were noted. Shortening of both thumbs (brachydactyly) and brachyonychia were confirmed on radiography. The patient also had delayed developmental milestones with stammering speech since childhood, the cause of which could not be related to any specific history. Evaluation of ophthalmic, otorhinolaryngeal, dental, skeletal, and endocrinological systems was unremarkable. Intelligence quotient (IQ) assessment revealed mild mental retardation (score 62). After histopathological examination, the final diagnosis of Nevus Comedonicus Syndrome (NCS) with psoriasiform verrucous epidermal nevus was made. To the best of our knowledge, the coexistence of two types of epidermal nevi had not been reported so far. Single cases of delayed development of NC and NCS at a later age have been reported [30].

Post Mantoux erythema multiforme. Ten days after Mantoux testing, a 13-year-old female presented with tender erythematous annular crusted plaques at the site of the Mantoux test and two well-defined annular erythematous indurated plaques with central crusting in a linear distribution along the lymphatics over the left forearm. The patient also had tubercular cervical lymphadenitis and was on anti-Kochs treatment (AKT4). According to Haholu *et al.* [31], the histopathological feature of the tuberculin skin test site is not uniform. It may be related to the status of tuberculosis. The histological pattern of inflammatory reaction seen in the test site is classified into three types: (a) perivascular (PV), (b) basal spongiotic dermatitis (BSD), and (c) erythema multiforme (EM). The EM type inflammation is documented to be more common in the active tuberculosis group. Histopathological examination in our case was inconclusive. As our case had active tuberculosis and morphology was suggestive of EM, the final diagnosis of post Mantoux EM was reached on the basis of clinicopathological correlation.

We encountered some disorders that are infrequently reported to occur in the linear pattern. They constituted irritant contact dermatitis due to intraoperative betadine scrub, prurigo simplex (multiple lichenified hyperpigmented papules in linear configuration over left arm), and palmoplantar keratoderma (thick verrucous linear plaques over the lateral aspect of left sole and radial aspect of right palm).

The strength of our study lies in its probable novelty. Despite a thorough search through the available literature, we were unable to find such a comprehensive clinico-etiological compilation of linear skin eruptions analyzing a large number of clinical variables and risk factors. The study was limited by the cross-sectional design. Further studies involving larger sample sizes would be more robust and productive. Histopathological examination was confirmatory in most patients, though a clinicopathological correlation was often required to reach the final diagnosis.

CONCLUSION

This study identified some uncommon dermatoses (leiomyoma, linear TVC, linear porokeratosis, zosteriform collagen nevus, and post Mantoux erythema multiforme) that rarely present with linear configuration. Additionally, we encountered two rare instances of coexistence of two dermatoses (LC with KTS and NCS with linear psoriasiform verrucous epidermal nevus). Therefore, these disorders should be considered in the differential diagnoses of linear skin eruptions in the appropriate clinical settings.

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