

Nail Abnormalities in Scabies Patients: A Systematic Review

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Background: Nail abnormalities can be found in patients with scabies. It is commonly misdiagnosed as onychomycosis, traumatic nail disease, or nail psoriasis. Nail changes in patients with scabies are a result of the mites burrowing activity into the stratum corneum of the epidermis, which can extend to the subungual skin of the nail. There are limited studies that have been reported regarding the incidence of nail changes in patients with scabies.

Objective: To systematically review nail abnormalities in patients with scabies reported in the literature.

Methods: We searched all published articles in electronic databases until August 2024 reporting patients with scabies with detailed descriptions of malformed/diseased nails using specific terms and inclusion/exclusion criteria. This systematic review presents the data as a descriptive analysis.

Results: We included 32 articles reporting 33 individual patients with nail scabies. There was no significant difference in the number of scabies patients with nail abnormalities in the children (33.33%), adults (30.30%), and elderly groups (36.36%). The youngest age recorded was four months and the oldest of 92 years. Scabies were more frequent in males (60.61%). According to scabies type, 81.82% of cases of scabies with nail abnormality were crusted scabies. The most prevalent diagnosis approach was direct microscopy (84.84%), followed by histopathological examination (30.30%) and dermoscopy (12.12%). Subungual hyperkeratosis (60.60%), onychodystrophy (48.48%), discoloration (33.33%), and onycholysis (21.21%) constituted the majority of nail abnormalities. Fingernail involvement occurred in 33.33% of the patients, while combined fingernail and toenail involvement occurred in 30.30% of the patients.

Conclusion: Subungual hyperkeratosis, onychodystrophy, and discoloration are the most frequent nail abnormalities found in patients with scabies. In order to provide scabies patients with adequate treatment, regular nail examinations should be performed, and further prospective studies are required to completely understand the association between risk factors and abnormalities of the nail in scabies patients.

Keywords: classic scabies, crusted scabies, nail abnormalities, scabies

Introduction

Scabies is a contagious skin disease caused by *Sarcoptes scabiei var. hominis* (*S. scabiei*),¹ a human-specific ectoparasite.² It is estimated that more than 200 million people are still suffering from scabies worldwide,³ with the highest prevalence found in Indonesia.¹ Scabies may be readily recognized based on clinical presentation in the most obvious cases. However, the disease can manifest with a wide spectrum of clinical signs, making clinical diagnosis challenging. Following mite infestation, small, scattered papules, excoriation, and/or burrows develop rapidly (hours to days).² Those skin lesions favor interdigital webs, sides of fingers, volar aspects of the wrists, lateral palms, elbows, axillae, scrotum, penis, labia, and areolae mammae.⁴ Scabies can cause extensive or localized skin lesions, including those on the face, neck, scalp, eyelids, and nails.⁵

Nail is a skin appendage that can be utilized as a tool to pick up small items and as a protective covering.⁶ A nail abnormality may be a sign of systemic disease, cancer, or infection.⁷ The frequency of nail abnormalities in scabies patients is unclear. It is commonly misdiagnosed as onychomycosis, traumatic nail disease, and nail psoriasis.⁸ Crusted scabies is more likely to include the nails compared to cases of classic scabies. Clinical nail changes in scabies are a result of the mites burrowing activity into the stratum corneum of the epidermis,⁹ which can extend to the subungual skin of the nail.¹⁰ Clinically, nail abnormalities in scabies generally include subungual hyperkeratosis and onycholysis.¹¹ Furthermore, treatment failure in patients with scabies has been reported due to inappropriate treatment that related to nail scabies.¹²

In order to provide comprehensive treatment, it is important to recognize nail abnormalities in scabies. To our knowledge, there was no systematic review conducted yet about nail changes in patients with scabies.

Materials and Methods

We conducted a systematic review of the literature according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines in order to study nail involvement in patients with scabies.

Literature Search Strategies

Electronic Database

We searched for all relevant studies up until August 2024 in the following electronic databases: PubMed, Scopus, and Cochrane databases, without language or type of publication limitations. The following search criteria were used: [(Scabies) AND [(Nail) OR (Ungual)]].

Inclusion Criteria

We included all studies that described nail involvement in scabies patients and met the following criteria: (1) reported patients diagnosed with scabies; (2) by either dermoscopy, direct microscopy, and/or biopsy; and (3) with malformed or diseased nails who had at least one abnormality described.

Exclusion Criteria

Studies were excluded if the studies or abstracts were unavailable, duplicated, animal as subject, or published not in English.

Outcome Measure

The outcome of interest was the identification of at least one nail abnormality, as well as descriptions of the type and number of nails that were involved. The following data were extracted from the studies and collected in an electronic database: age, gender, scabies subtype, diagnostic method, location of affected nails, type of nail involvement (subungual hyperkeratosis, onychodystrophy, discoloration, onycholysis, onychomadesis, longitudinal nail splitting, anonychia, pitted nail, and others). Descriptive statistics were obtained using Microsoft Excel for Office Home and Students[®], 2021.

Result

Study Selection

The selection process is illustrated in the PRISMA flow chart (Figure 1). The initial database searches and reference list searches resulted in a total of 239 articles. A total of 65 articles were chosen for full-text reading following the elimination of duplicates and the screening of titles and abstracts. Studies were removed from the 65 total articles for the following reasons: the study subjects were not humans ($n = 1$), the articles were not in English ($n = 2$), the articles were irrelevant ($n = 18$), and the full text was not accessible ($n = 10$). Finally, this systematic review examined the 32 remaining articles (Table 1). In total, 33 relevant patient cases were included for data collection. The screening process resulted in a mixture of twenty case reports, two case series, five letters, and two correspondences.

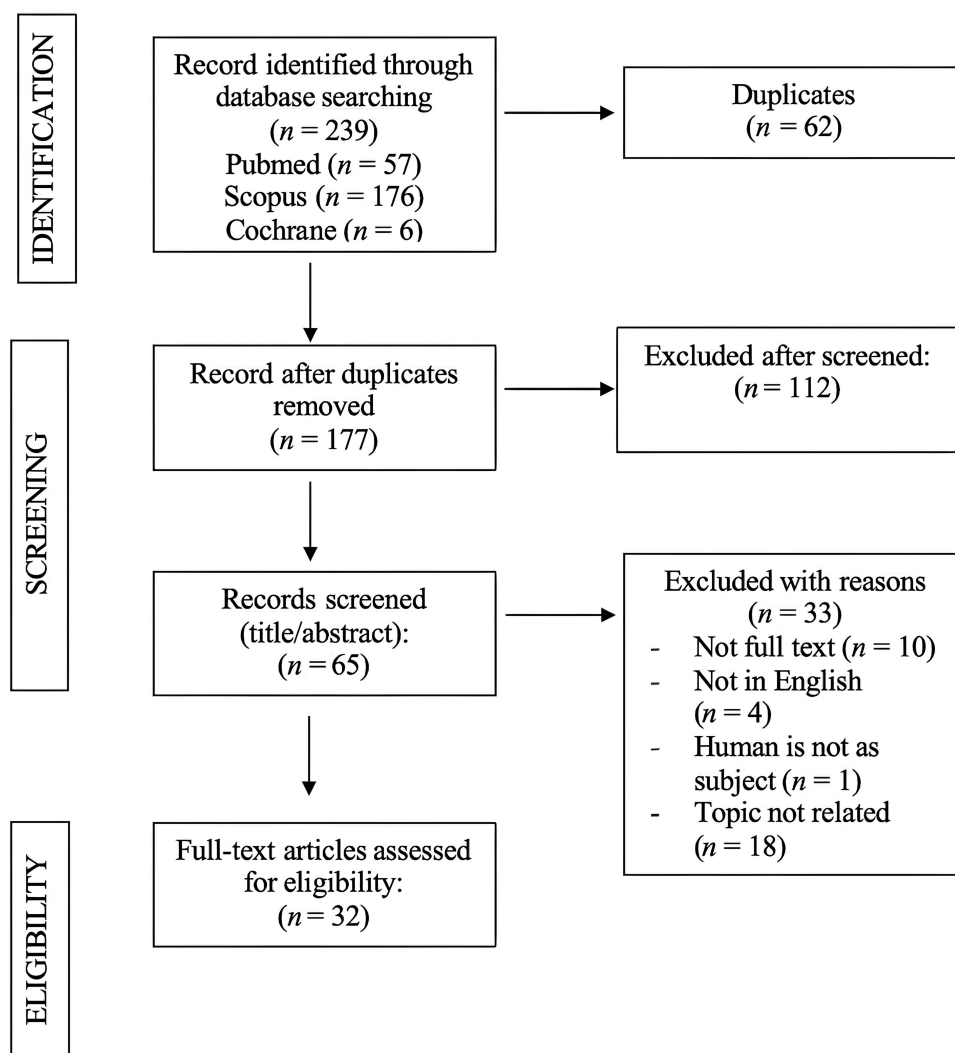


Figure 1 Flowchart of study selection process.

General Comparison Result

Regarding nail involvement, there was no statistically significant variation across all age categories of scabies patients: children (33.33%), adults (30.30%), and elderly (36.36%) (Figure 2). Four months was the youngest age ever reported, while 92 years was the oldest. Males had a higher incidence of scabies (60.60%) (Figure 3). Direct microscopy was used in 84.84% of diagnostic cases, with histological examination (30.30%) and dermoscopy (12.12%) following behind (Figure 4). According to scabies type, 81.82% of cases of scabies with nail abnormalities were crusted scabies (Figure 5). The majority of nail abnormalities were subungual hyperkeratosis (60.60%), onychodystrophy (48.48%), discolouration (30.30%), and onycholysis (21.21%) (Figure 6). Fingernail involvement occurred in 33.33% of the patients, while combined fingernail and toenail involvement occurred in 30.30% of the patients (Table 2).

This systematic review identified several comorbidities potentially contributing to nail abnormalities in patients with scabies. These include chromosomal anomalies such as Down's syndrome, trisomy 21, chromosomal-8 anomalies, and osteolysis; diabetes mellitus; malignancies like non-Hodgkin's lymphoma, acute lymphocytic leukemia, myelodysplastic syndrome, and uterine carcinoma; and dementia. Additionally, other conditions associated with nail abnormalities in scabies patients were human immunodeficiency virus (HIV) infection, epidermolysis bullosa, paresis, hypertension, congestive heart failure, eczema, cellulitis, leprosy, vasculitis, respiratory failure, pneumonia, rheumatoid arthritis, pyelonephritis, and pregnancy (Figure 7).

Table 1 Studies of Nail Abnormalities in Scabies Patients

No.	Author, Year of Reporting	Title	Sex	Age	Types of Scabies	Part of Nail Involvement	Nail Unit Features	Associated Diseases	Diagnostic Method
1	Saruta, ¹³ 1978	Usual scabies with nail infestation	Female	51-years-old	Classic	Toenail	Subungual hyperkeratosis	Diabetes mellitus, hypertension, rheumatoid arthritis, pyelonephritis	Direct microscopy Histopathological examination
2	Neste, ¹⁴ 1985	Hyperkeratotic (Norwegian) scabies and onychomycosis in an immunosuppressed patient	Female	37-years-old	Crusted	Fingernail	Other	Vasculitis	Direct microscopy
3	DePaoli, ¹⁵ 1987	Crusted (Norwegian) scabies: Treatment of nail involvement	Male	24-years-old	Crusted	Fingernail Toenail	Subungual hyperkeratosis Onycholysis	Down's syndrome	Direct microscopy
4	Ramsay, ¹⁶ 1987	Keratotic (Norwegian) scabies	Male	52-years-old	Crusted	Fingernail	Subungual hyperkeratosis Onychodystrophy Pitting nail	Down's syndrome	Direct microscopy
5	Bezerra, ¹⁷ 1993	Crusted scabies: An unusual clinical manifestation	Female	40-years-old	Crusted	Fingernail	Subungual hyperkeratosis Onychodystrophy	Uterine carcinoma	Direct microscopy Histopathological examination
6	Judge, ¹⁸ 1995	Crusted scabies in pregnancy	Female	19-years-old	Crusted	Fingernail	Subungual hyperkeratosis Onycholysis	Pregnant	Direct microscopy
7	Isogai, ¹⁹ 2002	Nail scabies as an initial lesion of ordinary scabies	Male	87-years-old	Classic	Toenail	Subungual hyperkeratosis Discoloration	Pneumonia	Direct microscopy
8	Ohtaki, ²⁰ 2003	Oral ivermectin treatment in two cases of scabies: Effective in crusted scabies induced by corticosteroid but ineffective in nail scabies	Male	72-years-old	Crusted	Toenail	Subungual hyperkeratosis Discoloration	Dementia	Direct microscopy
9	Weatherhead, ²¹ 2004	Crusted scabies as a cause of longitudinal nail splitting	Female	55-years-old	Crusted	Fingernail Toenail	Subungual hyperkeratosis Onychodystrophy Longitudinal nail splitting	Diabetes mellitus	Direct microscopy
10	Nakamura, ²² 2006	A case of crusted scabies with a bullous pemphigoid-like eruption and nail involvement	Male	71-years-old	Crusted	Toenail	Subungual hyperkeratosis Discoloration	Diabetes mellitus	Direct microscopy
11	Fuchs, ²³ 2007	Diagnostic dilemma: Crusted scabies superimposed on psoriatic erythroderma in a patient with acquired immunodeficiency syndrome.	Male	45-years-old	Crusted	Not mentioned	Onychodystrophy	Human immunodeficiency virus infection	Direct microscopy Histopathological examination

12	Goyal, ²⁴ 2008	Psoriasis or crusted scabies	Female	67-years-old	Crusted	Fingernail	Subungual hyperkeratosis Onycholysis	No underlying disease	Direct microscopy
13	Apap, ²⁵ 2012	Crusted (Norwegian) scabies treated with oral ivermectin: A case report and overview	Female	92-years-old	Crusted	Fingernail	Subungual hyperkeratosis Discoloration	Dementia Paresis	Not mentioned
14	Jayananda, ²⁶ 2013	Norwegian or Crusted Scabies in a Patient With Down Syndrome	Male	67-years-old	Crusted	Fingernail Toenail	Onychodystrophy	Down's Syndrome	Direct microscopy Histopathological examination
15	Fonseca, ²⁷ 2014	Crusted scabies misdiagnosed as erythrodermic psoriasis in a 3-year-old girl with Down syndrome.	Female	3-years-old	Crusted	Fingernail Toenail	Onychodystrophy Onycholysis	Down's syndrome	Direct microscopy
16	Fujimoto, ²⁸ 2014	Treatment for crusted scabies: Limitations and side effects of treatment with ivermectin	Male	90-years-old	Crusted	Toenail	Subungual hyperkeratosis	Diabetes mellitus	Direct microscopy
17	Oh, ²⁹ 2014	Scabies of the nail unit	Male	66-years-old	Crusted	Toenail	Subungual hyperkeratosis Onychodystrophy Discoloration	Diabetes mellitus	Histopathological examination
18	Lima, ³⁰ 2015	Crusted scabies due to indiscriminate use of glucocorticoid therapy in infants	Male	4 months	Crusted	n/a	Onychodystrophy	No underlying disease	Histopathological examination Dermoscopy
19	Assaf, ³¹ 2016	Severe scaly pruritic rash in an 8-year-old girl with trisomy 21	Female	8-years-old	Crusted	Fingernail	Onychodystrophy	Trisomy 21	Direct microscopy
20	Pedra e Cal, ³² 2016	Crusted scabies in a patient with lepromatous leprosy	Male	56-years-old	Crusted	Fingernail Toenail	Onychodystrophy	Lepromatous leprosy	Direct microscopy
21	Taniguchi, ³³ 2017	Topical phenothrin treatment in a case of crusted scabies with nail involvement	Male	78-years-old	Crusted	Fingernail	Subungual hyperkeratosis	No underlying disease	Direct microscopy Dermoscopy
22	Tempark, ⁸ 2017	Nail scabies: An unusual presentation often overlooked and mistreated	Male	4 months	Classic	Toenail	Onycholysis	Cellulitis	Direct microscopy
23	Aghazadeh, ³⁴ 2018	Thick nails and itchy rash	Female	16-years-old	Classic	Fingernail Toenail	Subungual hyperkeratosis Onychodystrophy Onycholysis	No underlying disease	Histopathological examination
24	Last, ³⁵ 2018	Subungual and unguinal scabies: Avoiding severe presentation in high-risk patients	Female	79-years-old	Crusted	Fingernail	Subungual hyperkeratosis Onychodystrophy Discoloration	Myelodysplastic syndrome, congestive heart failure	Direct microscopy Histopathological examination

(Continued)

Table 1 (Continued).

No.	Author, Year of Reporting	Title	Sex	Age	Types of Scabies	Part of Nail Involvement	Nail Unit Features	Associated Diseases	Diagnostic Method
25	Zou, ³⁶ 2018	Nail infestation: An atypical presentation of typical scabies	Male	55-years-old	Classic	Fingernail Toenail	Onychodystrophy Discoloration	Non-Hodgkins lymphoma	Direct microscopy
26	Visser, ³⁷ 2019	To diagnose from scratch: Crusted scabies mimicking a T-cell lymphoma	Male	68-years-old	Crusted	n/a	Subungual hyperkeratosis Onychodystrophy Discoloration	Respiratory failure	Direct microscopy
27	Mahajan, ³⁸ 2021	Unusual presentation of crusted scabies with osteolysis in immunocompetent	Female	16-years-old	Crusted	Fingernail Toenail	Onychodystrophy	Osteolysis	Direct microscopy Histopathological examination
28	Lin et al, ³⁹ 2022	Autosomal dominant epidermolysis bullosa simplex exacerbated by hyperkeratotic scabies	Male	6-years-old	Crusted	Fingernail	Onychodystrophy	Epidermolysis bullosa	Direct microscopy
29	Jiang, ⁴⁰ 2022	Serial dermoscopic monitoring of subungual scabies mites in an infant with crusted scabies	Male	6 months	Crusted	Toenail	Subungual hyperkeratosis Onycholysis	No underlying disease	Direct microscopy Dermoscopy
30	Suhail, ⁴¹ 2023	Crusted scabies in an elderly, healthy male: A case report	Male	70-years-old	Crusted	Fingernail Toenail	Subungual hyperkeratosis	Eczema	Direct microscopy
31	Gaurav, ⁴² 2024	Ungual scabies: A case report and review of literature	Male	14-years-old	Crusted	Fingernail	Onychomadesis Anonychia	Acute lymphocytic leukemia	Direct microscopy Dermoscopy
32	Yuan, ⁴³ 2024	Infantile scabies misdiagnosed and treated as Langerhans cells histiocytosis: A case report	Female	9-years-old	Classic	Toenail	Discoloration	Chromosome 8 anomaly	Direct microscopy
			Male	6 months	Crusted	Fingernail Toenail	Subungual hyperkeratosis Discoloration	No underlying disease	Histopathological examination

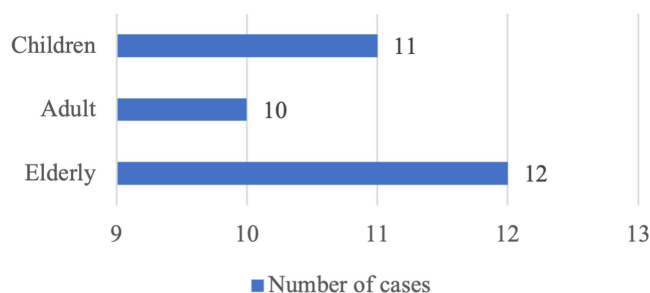


Figure 2 Age distribution.

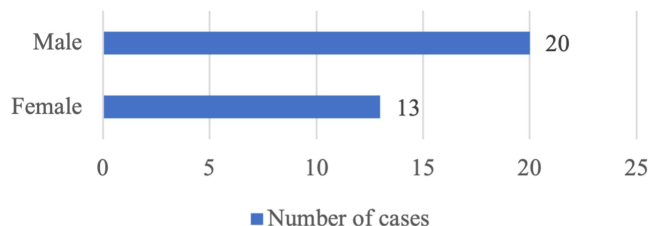


Figure 3 Gender distribution.

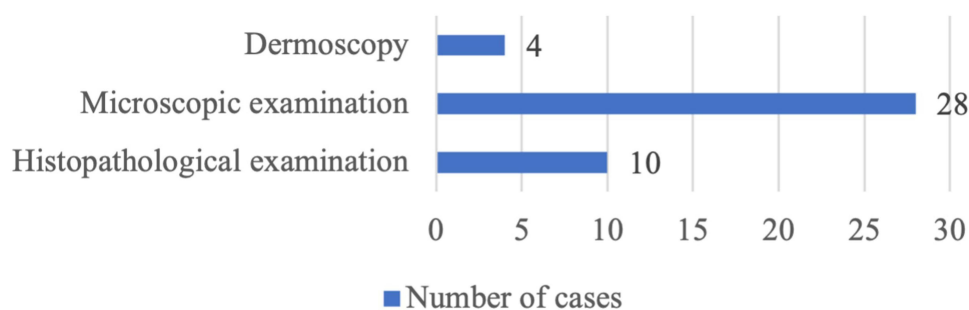


Figure 4 Diagnostic method.

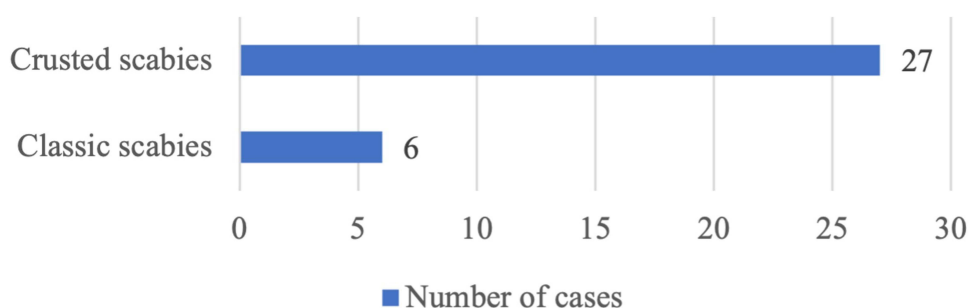


Figure 5 Types of scabies.

Discussion

Age and Gender

Nail abnormalities were seen in 11 children (33.33%), 10 adults (30.30%), and 12 elderly patients (36.36%) with scabies. Based on World Health Organization (WHO), the prevalence of scabies among children may vary from 5–50%.³ Gaurav et al⁴² found that nail abnormalities in scabies occurs 10% in children, while it may occur in 40% of adults. Nails grow

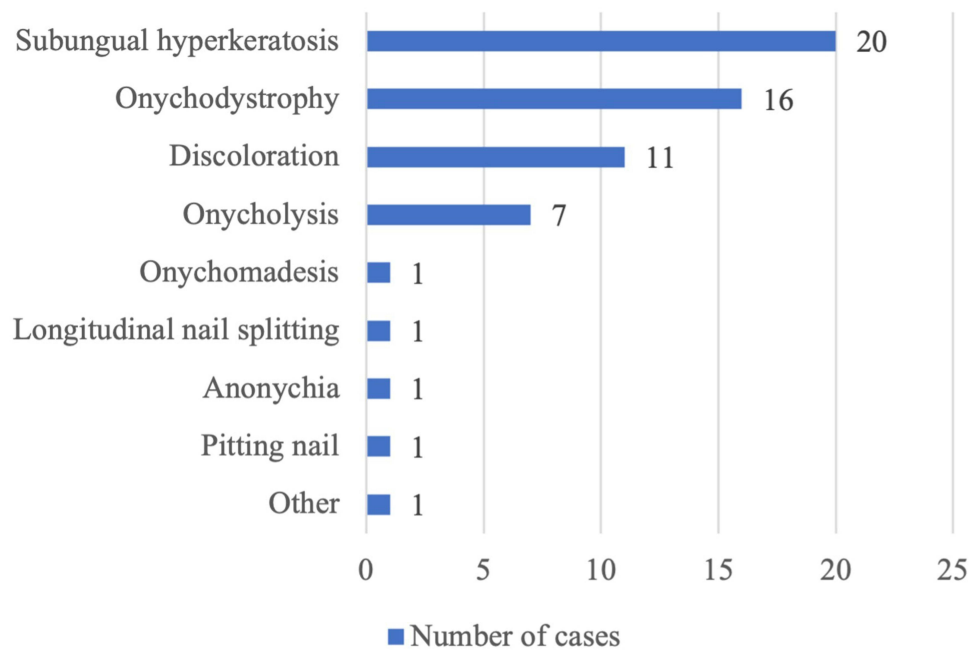


Figure 6 Nail feature of scabies.

faster in children compared to adults.⁴⁴ In Japanese hospitals and nursing homes, scabies has been more prevalent among the elderly and their caregivers in recent years.²²

About 20 patients (60.61%) affected by scabies were males, as compared to 13 female patients (39.39%) found in this study. This finding was consistent with Kouotou et al⁴⁵ that male sex was a risk factor for scabies infestation. Boys were found to have slept more with others, have a more history of pruritus, use less soap when taking a shower, and were rarer to cut their nails short.⁴⁵ In contrast to this, the overall prevalence of scabies in the UK was 2.81 per 1000 females and 2.27 per 1,000 males.⁴⁶ Both findings differ from Hegab et al’s report in Egypt, where there was no difference between males and females.⁴⁷ Hengge et al⁴⁸ also conclude that scabies affects both males and females similarly.

Table 2 Clinical Characteristics Scabies Patients with Nail Abnormality

Variable	n (%)
Age	
<18	11 (33.33)
18–60	10 (30.30)
>60	12 (36.36)
Gender distribution	
Male sex	20 (60.61)
Female sex	13 (39.39)
Diagnostic method	
Dermoscopy	4 (12.12)
Direct microscopy	28 (84.85)
Histopathology	10 (30.30)
Scabies type	
Crusted	27 (81.82)
Classic	6 (18.18)

(Continued)

Table 2 (Continued).

Variable	n (%)
Location of nail affected	
Fingernail	11 (33.33)
Toenail	9 (27.27)
Both	10 (30.30)
Unknown	3 (9.09)
Type of nail involvement	
Subungual hyperkeratosis	20 (60.60)
Onychodystrophy	16 (48.48)
Discoloration	11 (33.33)
Onycholysis	7 (21.21)
Onychomadesis	1 (3.03)
Longitudinal nail splitting	1 (3.03)
Anonychia	1 (3.03)
Pitted nail	1 (3.03)
Other	1 (3.03)

Diagnostic Methods

Dermoscopic Examination

The method of diagnosis used to identify scabies in this study involved dermoscopic examination in four patients (12.12%). Scabies can be diagnosed quickly, easily, and non-invasively with a dermoscopic examination.^{40,49} Dermoscopic examination in scabies has a sensitivity of 91% and a specificity of 86%.⁴⁹ According to the case report by Jiang et al,⁴⁰ mites that had been in the proximal nail bed at first were discovered by serial dermoscopic examination to have crawled out of the tunnel and into the distal nail bed and lateral nail fold. This examination can also help detect scabies mites in normal-looking nails, as in the case reported by Chinazzo et al.⁵⁰ On skin dermoscopic examination, a circular pattern (like the French letter “ø”) was seen, reflecting the head and two pairs of forelimbs of the mite.⁴⁹ There was also triangular structure (delta-shaped) and structure like millipedes.³⁰

Microscopic Examination

Direct microscopic examination was the diagnostic procedure carried out of the 28 scabies patients (84.84%) in this systematic review. Direct examination with a 20% potassium hydroxide solution of subungual debris can help detect *S. scabiei* in the form of adult mites,^{16,18,32,36} eggs,^{19,20} and scibala.^{8,12,15,27,51} Based on the research of Goldberg et al, examination of subungual scrapings in classic scabies had a sensitivity of 16.1% and a specificity of 100%. This may be because classic scabies patients have fewer mites or because daily activities that involve scratching cause material to come loose from the subungual cleft.⁵¹

Histopathological Examination

In this study, 10 cases (30.30%) of the scabies diagnostic procedures were performed using the histopathological examination method. A nail biopsy is done on scabies patients who have unclear nail abnormalities or those without mites detected.^{29,34} The histological examination of the nails is expected to show psoriasiform acanthosis,³⁰ psoriasiform hyperplasia, compact orthokeratosis, focal parakeratosis, hypergranulosis, and scattered neutrophil collections.⁴² Within the nail plate, mites^{29,34,35,42} and pink pigtail-like structures³⁴ can be observed. Histopathological features of skin abnormalities in scabies show pink pigtail-like structures,³⁴ superficial burrows,³⁴ mite-filled nodules,⁴² and psoriasiform acanthosis with tunnels.³⁰

Nail Features of Scabies

Crusted scabies was found in 27 patients (81.82%), while the remaining six patients (18.18%) had classic scabies. Nail involvement has been reported in both crusted and classical scabies.⁴² Involvement of the nails in noncrusted scabies is rare, with few reports in the literature.^{8,13,19,34,36} Nail scabies has primarily been reported in the setting of crusted scabies.^{8,13}

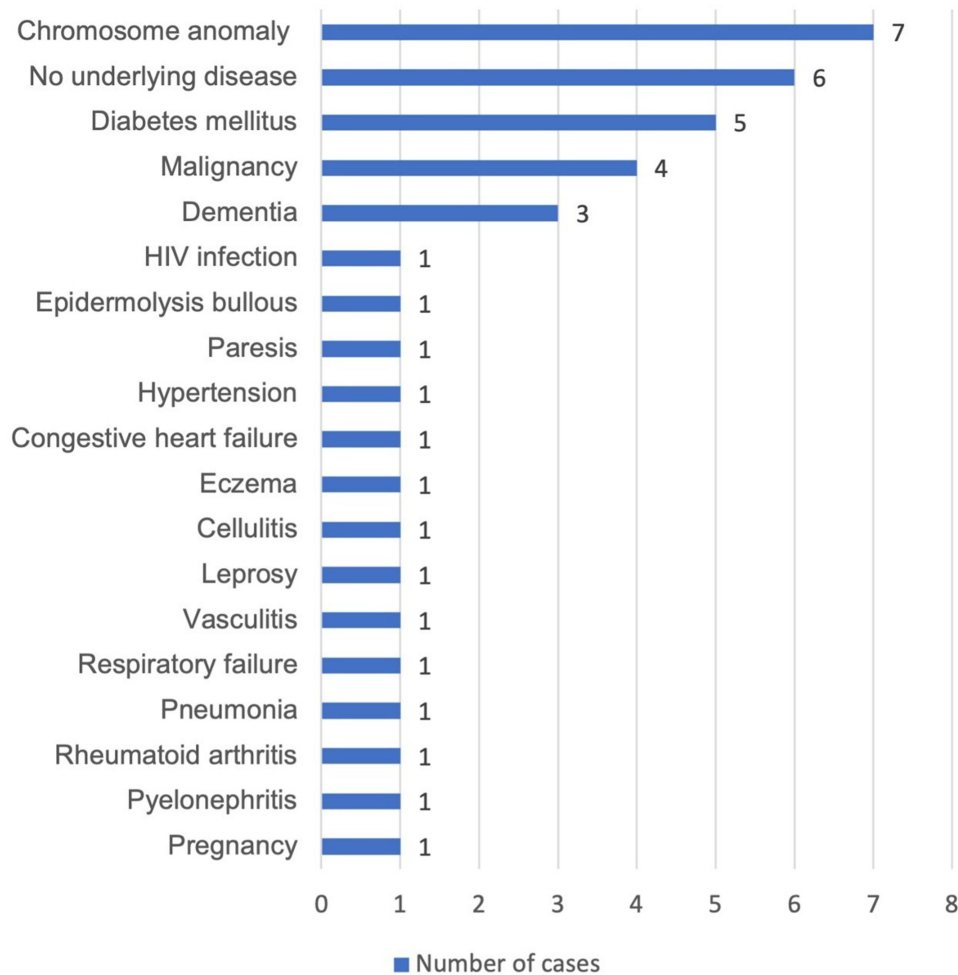


Figure 7 Number of cases based on underlying diseases.

According to this systematic review, 11 patients (33.33%) were affected only on their fingernails, nine patients (27.27%) on their toenails only, and 10 patients (30.30%) on both. It is believed that scratching reduces the number of mites in typical scabies patients. Therefore, any illness that causes decreased scratching, such as dementia, immunosuppression, or lack of feeling, can lead to the development of crusted scabies.²¹ Subungual scrapings of nondominant fingers will have a higher mite population.⁵¹

Since nail scabies is more likely to show abnormalities in older adults or immunocompromised people, it can mimic other disorders such as onychomycosis or nail psoriasis.³⁶ Nail scabies features subungual hyperkeratosis, onycholysis, longitudinal nail splitting, and subungual debris.²⁴

Subungual Hyperkeratosis

Twenty patients (60.60%) had nail abnormalities as subungual hyperkeratosis, according to this systematic review. It is a form of nail abnormality that is often found in patients with scabies.⁴² The nail plate may appear thickened due to the accumulation of scales in the subungual of the distal nail. Subungual hyperkeratosis arises due to excessive proliferation of keratinocytes in the hyponychium.⁵² In patients with scabies, especially crusted scabies, the nail plate may be hypertrophy, and many mites are found.^{49,53} Subungual hyperkeratosis and onycholysis are not only found in scabies but can also occur in onychomycosis, inflammatory diseases (such as psoriasis), or trauma.^{29,50}

Onychodystrophy

Onychodystrophy was the nail abnormality found in 16 patients (48.48%) in this systematic review. Onychodystrophy is described as a total or partial nail morphological abnormality, which can be caused by various factors, including nail plate attachment disorders or nail surface changes.⁵⁴ In crusted scabies, nail plate destruction is common.^{16,22,31,32} It was usually accompanied by debris accumulation under the thickened nail (subungual hyperkeratosis)¹⁷ and nail discoloration.^{36,37} Oh S et al²⁹ reported a case of onychodystrophy throughout the toenails of a patient with crusted scabies with yellowish discoloration of the nails.

Nail Discoloration

Nail discoloration can occur in patients with scabies.^{8,20,22,35,42} Eleven patients (30.30%) in this systematic review had nail discoloration. A noticeable shift in color of the nail plate is known as nail discoloration. Staining of the nail plate, nail matrix, or nail bed that is visible through the nail plate may cause the nail to become discolored.⁵⁵ Nail discoloration can occur in all components of the nail or only in some nail units, such as the lunula or nail plate.⁵⁶ Leuconichia is the most common discoloration of the nail caused by scabies. This is due to impaired keratinization of the nail plate, which is characterized by the presence of parakeratotic cells in the nail epithelium in histopathological images.⁵⁵ Yellow or greenish discoloration may occur in thickened nails or in onycholysis.⁵⁵ Tempark et al⁸ reported a case of scabies with yellow-green nail abnormalities, irregular transverse ridges in the nail plate, and mild inflammation in the nail fold of the left big toe. Nail discoloration can also be found in diseases other than scabies, including onychomycosis and nail disorders caused by *Pseudomonas*.⁸

Onycholysis

Among the scabies patients in this systematic review, seven patients (21.21%) had onycholysis. Onycholysis is a nail disorder that involves detachment of the nail plate from the nail bed distally and/or laterally.⁵⁵ In onycholysis, the nail may be white, yellow, or brown,⁵⁷ due to the presence of air in the subungual space. Onycholysis is a nail bed disorder, which usually begins with subungual hyperkeratosis.^{52,55} Tempark et al⁸ reported a case of onycholysis in the thumb and second finger of the right foot in a four-month-old infant with scabies. Onycholysis can be an individual anatomical variation⁵⁰ or occur due to drug-induced. In drug-induced onycholysis, it usually involves multiple nails with subungual haemorrhage.⁵² Fonseca et al²⁷ reported a case of crusted scabies with 20 nail onycholysis and persistent onychodystrophy.

Onychomadesis and Anonychia

Onychomadesis in a patient with scabies was reported by Gaurav et al, along with anonychia and nail discoloration.⁴² Onychomadesis is a nail disorder in the form of fissures or onycholysis at the proximal nail plate due to prolonged cessation of nail matrix proliferation.⁵⁵ The faster the nail grows, the more obvious the lesion. Therefore, onychomadesis is more common in fingernails than toenails. In scabies, proximal nail plate involvement is also rarely reported.⁴² Onychomadesis can lead to anonychia.^{42,55} Anonychia, which can be acquired or inherited, is the absence of nails. Anonychia may indicate alopecia areata, eczema, or psoriasis.⁵⁸ It is difficult to tell the difference between scabies and medicine effects on the nail. Even though the exact mechanism is yet unknown, we cannot completely rule out the infection's role because onychomadesis was primarily observed in the infected digits, in contrast to chemotherapy-induced onychomadesis, which often presents in all nails.⁴²

Longitudinal Nail Splitting

There was a case report regarding the presence of longitudinal nail splitting in a scabies patient. Longitudinal nail splitting is a nail disorder characterized by a gap extending from proximal to distal involving the entire thickness of the nail plate. Some of the causes of this disorder include a defect in the keratinization process associated with inflammation or malignancy. This causes direct damage to the nail plate or nail matrix, compromising the integrity of the nail matrix.⁵⁵ Weatherhead et al²¹ reported the first case of longitudinal nail splitting in a 55-year-old woman with crusted scabies who had been suspected of having psoriasis for the previous two years. After treatment for scabies, the patient's nails grew back to normal, thus corroborating the suspicion that the patient's nail deformities were caused by *S. scabiei* infestation.

Longitudinal nail splitting may occur in other conditions such as lichen planus, Darier's disease, patellar nail syndrome, pterygium, and Raynaud's disease.²¹

Pitted Nail

A case was reported in a patient with scabies who had a pitted nail, along with subungual hyperkeratosis and onychodystrophy.¹⁶ Pitted nails are superficial depressions within the nail plate that indicate a defect in the uppermost layer of the nail plate, which arises from the proximal nail matrix.⁵⁹ Pitted is usually associated with psoriasis, affecting 10–50% of patients with that disorder. Pitted also may be caused by a variety of systemic diseases, including Reiter's syndrome, sarcoidosis, pemphigus, alopecia areata, and incontinentia pigmenti.⁶⁰ Pitted and irregularity of the nail plate were visible on the less severely affected nails on both hands in the patient with scabies.¹⁶

Underlying Diseases

Nail abnormalities in patients with scabies are a risk for those with immunocompromised, developmental disabilities²⁷ or cognitive impairment, impaired sensation, inability to scratch, or prolonged corticosteroid use.²⁶ In this systematic review, associated comorbidities possibly contributing to nail abnormalities in scabies patients included chromosomal anomalies (Down's syndrome, trisomy 21, anomaly chromosome-8, and osteolysis), diabetes mellitus, malignancy (non-Hodgkin's lymphoma, acute lymphocytic leukemia, myelodysplastic syndrome, and uterine carcinoma), and dementia. Other diseases that were also associated with the occurrence of nail abnormalities in patients with scabies included HIV infection, epidermolysis bullous, paresis, hypertension, congestive heart failure, eczema, cellulitis, leprosy, vasculitis, respiratory failure, pneumonia, rheumatoid arthritis, pyelonephritis, and pregnancy.

Conclusion

Scabies patients may present with a variety of nail abnormalities, the most common being subungual hyperkeratosis, onychodystrophy, and discoloration. Therefore, in order to treat scabies patients appropriately, nails should be examined and evaluated at both the initial and routine follow-up visits. Additional prospective studies are needed to completely understand the associations between various risk factors and nail abnormalities in patients with scabies.

Abbreviations

PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; HIV, Human Immunodeficiency Virus; WHO, World Health Organization.

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