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Efficacy of Topical Steroidal Treatment and Hand-Care Modification in Chronic Paronychia: A Retrospective Study

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ABSTRACT

Introduction: Chronic paronychia is a persistent inflammatory condition of the periungual tissue, often triggered by excessive hand exposure to irritants. Despite its high prevalence, treatment remains challenging, with conflicting evidence on the role of microbial colonization, particularly *Candida* spp., and the efficacy of antifungal and antibiotic therapies.

Objectives: To assess the efficacy of topical corticosteroids combined with hand-care modifications and antimicrobial treatments in managing chronic fingernail paronychia.

Methods: This retrospective study included 97 patients (mean age 54.3 ±10.6 years, 67% female) with chronic fingernail paronychia (mean disease duration 13.3 ±6.1 years). Patients initially received antifungal and/or antibacterial therapy, followed by corticosteroid-based treatment and strict hand-care modifications.

Results: Microbial cultures identified *Candida* spp. in 95.9% and bacteria in 36.1% of cases. First-line antifungal and/or antibiotic therapy was largely ineffective (76.3% nonresponders). In contrast, second-line corticosteroid-based therapy (mean duration 4.0 ±0.7 months) led to improvement in 90.7% of cases, with 38.1% achieving complete or near-complete resolution. Hand-care modifications

included minimizing prolonged contact with liquids, wearing non-powdered waterproof gloves for wet tasks, using mild fragrance-free cleansers, and applying moisturizer after handwashing. Treatment adherence, including these behavioral modifications ($P<0.01$) and regular topical application ($P<0.001$) as well as longer treatment duration ($P<0.05$), were significantly associated with improved outcome.

Conclusions: Chronic paronychia is primarily inflammatory, with limited response to antifungals or antibiotics. Prolonged corticosteroid-based therapy combined with hand-care modifications is highly effective, emphasizing the critical role of adherence to achieving clinical improvement.

Introduction

Chronic paronychia is a common inflammatory condition affecting the periungual tissue, often leading to persistent discomfort, functional impairment, and cosmetic concerns. It is more frequently reported in females [1]. The condition is characterized by erythema, swelling, and tenderness of the nail folds, which may be exacerbated by irritant exposure or secondary infections [2,3]. Chronic paronychia is considered a form of hand dermatitis, in which exposure to environmental irritants plays a major role [4]. Excessive hand exposure to liquids, such as frequent handwashing, prolonged immersion, or use of occlusive gloves, predisposes individuals to chronicity [1,2]. Whether microorganisms are part of the disease etiology or merely secondary colonizers remains uncertain. Fungal colonization, particularly by *Candida* spp., is frequently isolated [5]. Bacterial infection, often involving *Pseudomonas aeruginosa*, is also a common finding and may manifest as green nail discoloration. Despite its prevalence, effective management of chronic paronychia remains challenging, with only a few studies conducted to guide treatment approaches [1]. Management strategies for chronic paronychia typically involve a combination of pharmacological and strict environmental modifications [1,2]. Anti-inflammatory medications, including steroids, are considered the mainstay of the treatment, while surgical treatment is indicated in recalcitrant cases [6–9]. A randomized study demonstrated the superiority of topical steroid cream over systemic antifungal medications, supporting the primarily inflammatory rather than infectious pathogenesis of the disease [6]. An additional study among 45 patients, conducted by Rigopoulos et al. [7], found that 0.1% tacrolimus ointment was superior to 0.1% betamethasone 17-valerate ointment or placebo. The benefit of treating *Candida* remains controversial, with some studies suggesting it may be helpful [2]. Another study found that nearly half of 65 chronic paronychia patients tested positive for prick test with *Candida* allergen, supporting the rationale of eradicating *Candida* colonization [5]. However, a study among 33 patients with *Candida*-positive dystrophic fingernails and co-presence of paronychia found that 72.7% did not respond to oral anti-*Candida* treatment, suggesting *Candida* to be a commensal rather than a causative pathogen [10]. Patient adherence to behavioral modifications, including minimizing hand immersion in water, wearing protective gloves, and using gentle skincare products, is widely recommended [1]. However, the impact of these modifications on disease outcomes remains unclear.

Objective

Our objective was to retrospectively evaluate the efficacy of topical steroid application combined with hand-care modification and antimicrobial treatments in the management of chronic fingernail paronychia.

Methods

This retrospective study included patients diagnosed with chronic fingernail paronychia (duration >6 weeks) who were evaluated between 2017 and 2024. Patients were referred to a specialist dermatology outpatient nail clinic for a second opinion. Demographic information (age and sex) and clinical characteristics of the chronic paronychia were retrieved from the patients' medical files. Patients with drug-induced paronychia were excluded. Disease severity at baseline was assessed using the previously defined staging system by Daniel et al. [11] (Figure 1), ranging from 1 (mild) to 5 (severe), and the duration of the condition was also recorded. Patients were also questioned about excessive hand exposure to liquids, defined as immersing their hands in liquids for >2 hours per day, wearing occlusive gloves for an equivalent duration, or washing their hands >20 times per day.

Fungal cultures from the affected nails were obtained in all cases, while bacterial cultures were performed in the majority of patients. Before referral, initial treatment by the referring dermatologist included oral and/or topical antifungals and/or antibacterial therapy but without specific recommendations on irritant avoidance. Antifungal agents with anti-*Candida* activity were prescribed, with oral antifungal treatment consisting of either pulse therapy (400 mg/day for one week per month) or weekly administration of fluconazole (>150 mg/week). Topical antifungal treatments

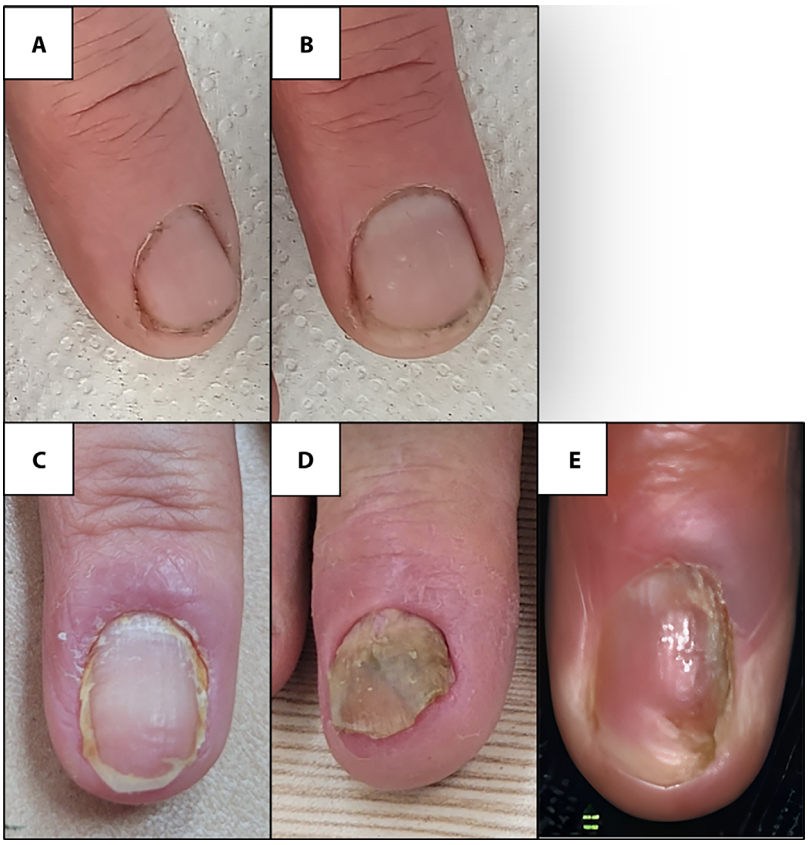

Figure 1. Clinical stages of chronic paronychia according to the Daniel et al. grading system. (A) *Stage I*: mild erythema, swelling, and cuticle disruption. (B) *Stage II*: pronounced erythema and swelling with cuticle disruption. (C) *Stage III*: erythema and swelling of the proximal nail fold, absent cuticle, mild discomfort, and initial nail plate changes. (D) *Stage IV*: erythema and swelling of the proximal nail fold, absent cuticle, tenderness/pain, and extensive nail plate changes. (E) *Stage V*: same as stage *IV* with an acute exacerbation (acute paronychia) superimposed on chronic paronychia.

included azole-based or ciclopirox-based formulations. Antibiotic therapy, administered orally or topically for 7–10 days, was tailored based on suspected or confirmed bacterial pathogens: anti-*Pseudomonas* antibiotics were prescribed for cases with green nail discoloration or positive cultures, while anti-*Staphylococcal* medication was given otherwise. Treatment response was evaluated using a four-point Global Improvement Scale (GIS): 0=deteriorated or unchanged; 1=mild to moderate improvement (<50%); 2=marked improvement (50–90%); and 3=complete or almost complete cure (>90%). The treating physician, unblinded to the treatment regimen, assessed treatment response. Complete response was defined as the proportion of patients achieving GIS 3 (>90% improvement), while partial response was defined as the proportion of patients achieving GIS 2 (50–90% improvement). Patients who did not achieve GIS 3 upon evaluation within 1–4 weeks after initial treatment termination were switched to a second-line regimen. Patients were instructed to minimize hand immersion in liquids, to wear non-powdered waterproof gloves for wet tasks, apply fragrance-free moisturizer after hand washing, and use mild, fragrance-free soaps and cleansers (Table 1). A topical combination therapy consisting of a high-potency corticosteroid (0.05% betamethasone dipropionate), an azole antifungal (1% clotrimazole), and an antibiotic (0.1% gentamicin) was prescribed. The cream was applied under occlusion twice daily for one month, followed by non-occluded application for an additional two to four months. To assess adherence with liquid avoidance and topical therapy, patients completed a self-reported structured questionnaire (Table 1). The study was conducted in accordance with the ethical guidelines outlined by the journal. Ethical approval was granted by the Research Ethics Committee of Laniado Hospital (Approval No. LND-0104-09). Data supporting the study findings are available upon request from the corresponding author but are not publicly accessible due to privacy and ethical restrictions.

Statistical Analysis

Descriptive statistics are presented as mean (± standard deviation) for continuous variables and as number (percentage) for categorical variables. Categorical variables were compared

Table 1. Hand care and cream application adherence scale.

Adherence Statement	Score (1 to 4)
1. **Liquid avoidance measures**	
I wash my hands quickly (under 30 seconds) and use fragrance-free soap	
I always pat my hands dry and apply fragrance-free moisturizer after washing or using alcohol-based hand sanitizer	
I consistently wear non-powdered waterproof gloves for wet tasks	
I avoid prolonged soaking of my hands in water (e.g., swimming)	
I shower not more than once daily for less than 10 minutes	
I use gentle cleaning products and avoid harsh chemicals	
Cumulative score (sum of above)	**Up to 24 points**
Adherence level	
Excellent adherence	20 to 24
Good adherence	15 to 19
Moderate adherence	10 to 14
Poor adherence	Below 10
2. **cream application**	**Score (1 to 3)**
I applied the cream twice daily almost every day (> 80% of applications completed)	1 (Excellent)
I applied the cream mostly once a day or skipped some days (50–80% of applications completed)	2 (Moderate)
I frequently forgot or rarely applied the cream (< 50% of applications completed)	3 (Poor)

using the chi-square test, while continuous variables were analyzed using the independent samples t-test. All statistical tests were two-sided, with P-values < 0.05 considered statistically significant. Statistical analysis was performed using SPSS software (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.).

Results

Baseline Characteristics

A total of 97 patients with chronic paronychia were included in this retrospective cohort. The average baseline severity grade was 3.1 (±0.8). Disease severity was categorized as mild (grades 1–2) in 19.6%, moderate (grade 3) in 50.5%, and severe (grades 4–5) in 29.9% of patients (Figure 1). The mean age was 54.3 (±10.6) years, with 67% female patients. The average disease duration was 13.3 (±6.1) years. Excessive hand exposure to liquids was reported in 89% of cases. *Candida spp.* was isolated in 95.9% of the cohort. *C. albicans* was the most common isolate (64.5%). Bacterial cultures were performed in 62.9% of cases and were positive in only 36.1% of the patients. The most commonly identified bacteria were *Staphylococcus aureus* and *Pseudomonas aeruginosa* (13.1% each), followed by other Gram-positive bacteria (9.8%).

First-Line of Treatment Efficacy

The first-line treatment consisted of anti-*Candida* and/or antibacterial medications. Antifungal medication was administered to 93.8% of patients, with oral antifungal therapy prescribed to 80.4% for an average duration of 2.9 (±0.6) months. Antibiotics were given in 22.7% of cases. These treatment regimens were mostly ineffective, achieving a mean GIS score of 0.3 (±0.5). The nonresponse rate was 76.3%, while mild (GIS 1) and moderate (GIS 2) improvement were observed in 20.6% and 3.1% of cases, respectively. Table 1 compares the characteristics of nonresponders and partial responders, with no significant difference observed between groups. Given the poor response, all patients were transitioned to second-line treatment, consisting of topical therapy combined with liquid avoidance measures.

Second-Line Treatment Efficacy

With second-line treatment, after a mean duration of 4.0 (±0.7) months, 90.7% of patients experienced improvement, with a mean GIS score of 2.0 (±1.0). A complete or near-complete response (GIS 3, >90% improvement) was achieved in 38.1% of cases, while moderate (GIS 2) and mild (GIS 1) improvement were observed in 34.0% and 18.6%, respectively (Figure 2). Table 2 shows comparative analysis of GIS 3 group versus GIS 0 to 2. Treatment duration and adherence were significantly associated with achieving GIS 3. The mean treatment duration was longer in the GIS 3 group compared to the GIS 0–2 group (4.2 [±0.7] vs. 3.9 [±0.7] months, respectively; $P<0.02$). Treatment adherence, including hand-care modifications ($P<0.01$) and daily cream application ($P<0.001$), was also a significant factor. No side

Figure 2. Pre- and posttreatment images showing almost-complete clinical improvement of the nail folds with normal proximal nail plate regrowth following corticosteroid-based therapy and hand-care modification: (A) before treatment; (B) after four months of therapy.

effect was observed, and no deviation from the treatment regimen was recorded.

Discussion

The present study retrospectively evaluated a two-step treatment approach: initial antifungal and/or antibacterial therapy followed by topical corticosteroid-based combination therapy with strict hand-care modifications. Our findings highlight the limited efficacy of antifungal and antibiotic treatments and underscore the superior outcomes achieved with corticosteroid therapy combined with environmental modifications.

Although *Candida* spp. was isolated in almost all patients, the first-line treatment, consisting of antifungal and/or antibiotic therapy, yielded poor clinical responses, with 76.3% of patients classified as nonresponders and only 3.1% achieving moderate improvement. These results align with previous studies suggesting that while fungal colonization, particularly *Candida spp.*, is frequently observed in chronic paronychia, it may represent mere colonization [5]. These findings support the hypothesis that chronic paronychia is primarily an inflammatory rather than an infectious condition, reinforcing previous reports demonstrating the superiority of anti-inflammatory agents over antifungal therapy in its management [2,6,7].

Although most cases can be successfully managed with topical corticosteroids combined with hand-care modifications, additional therapeutic options have been described for refractory cases [8,9]. Infiltrative approaches, such as intralesional corticosteroid injections, may be considered when topical therapy fails. Surgical interventions, including en bloc excision of the proximal nail fold, eponychial marsupialization, the square flap technique, and the Swiss roll technique, have also been reported to achieve favorable outcomes in resistant cases.

In contrast, the second-line treatment, administered for an average of four months, combined topical corticosteroids, antifungal, and antibiotic therapy with strict hand-care modifications, led to significant clinical improvement in 90.7% of cases, including 38.1% achieving cure or near complete response. The superior efficacy of corticosteroid-based therapy is consistent with a prior study, which demonstrated the effectiveness of high-potency topical steroids over systemic antifungal therapy [6]. Our findings further suggest that treatment success is highly dependent on patient adherence to hand-care modifications and regular application of corticosteroid-based topical therapy. Strict adherence to hand care-modifications ($P<0.01$), daily application of the prescribed cream ($P<0.001$), and longer treatment duration ($P<0.05$) were significantly associated with achieving complete resolution (GIS 3). Given that 89% of our cohort reported excessive hand exposure to liquids, these findings highlight the importance of patient education in preventing chronicity and recurrence. Our results reinforce the expert-based recommendations that patients should minimize prolonged contact with water, wear non-powdered waterproof gloves for wet tasks, and use mild, fragrance-free skin care products [1,2].

The long disease duration observed in our cohort (mean 13.3 years) suggests that chronic paronychia remains an undertreated condition. A paradigm shift towards early corticosteroid-based intervention, combined with behavioral modifications, may improve patient outcomes and reduce disease chronicity.

This study has several limitations. First, its retrospective design introduces potential biases, including assessment bias due to unblinded evaluation of treatment response, selection bias related to the referral-based clinic population, and recall bias, resulting from patients' self-reported adherence to treatment and hand-care measures.

Another limitation is the absence of a concurrent control group, which limits the ability to attribute clinical improvement to specific components of the second-line treatment or to exclude the possibility of spontaneous self-improvement.

Table 2. Baseline characteristics and treatment response to first-line therapy (antifungal and/or antibiotic).

	Partial response (N=23)[a]	No response (N=74)	*p-value*
Age (years), mean (SD)	52.4 (±10.0)	54.9 (±10.8)	0.32
Sex, N (%)			
Female	73.9%	67.6%	0.75
Male	26.1%	32.4%	
Paronychia severity, mean (SD)	3.0 (±0.90)	3.2 (±0.7)	0.42
Paronychia duration (years), mean (SD)	12.1 (±5.4)	13.6 (±6.2)	0.28
Excessive liquid exposure, N (%)	95.7%	90.5%	0.73
Yeast culture, N (%)			
Candida albicans	16 (69.6%)	44 (59.5%)	0.44
C. krusei	1 (4.4%)	5 (6.8%)	
C. parapsilosis	1 (4.4%)	6 (8.1%)	
C. tropicalis	1 (4.4%)	5 (6.8%)	
Other spp.	4 (17.4%)	10 (13.5%)	
Missing	0 (0%)	4 (5.4%)	
Bacterial culture, N (%)			
Staphylococcus aureus	1 (4.4%)	7 (9.5%)	0.44
Other gram-positive spp.	1 (4.4%)	5 (6.8%)	
Pseudomonas aeruginosa	2 (8.7%)	6 (8.1%)	
Negative	11 (47.8%)	28 (37.8%)	
Missing	8 (34.8%)	28 (37.8%)	
Treatment, N (%)			0.67
Antibiotic			
Oral only	4 (5.4%)	0 (0%)	
Oral and topical	2 (2.7%)	0 (0%)	
Antifungal			
Oral and topical	15 (65.2%)	47 (63.5%)	
Oral only	3 (13.0%)	10 (13.5%)	
Combined oral Ab, topical Ab and topical antifungal	5 (21.7%)	11 (14.9%)	

Abbreviations: Ab, antibiotic; [a] Partial response included 20 patients with <50% improvement and three patients with 50–90% improvement.

However, internal comparisons between complete and partial/nonresponders showed that longer treatment duration and better adherence to hand-care modifications and topical therapy were significantly associated with improved outcomes, supporting the clinical relevance of the intervention despite the retrospective design.

The second-line regimen combined a topical corticosteroid, antifungal, and antibiotic therapy along with hand-care modifications. While this approach limits our ability to isolate the specific contribution of each component, the poor clinical response observed during first-line antimicrobial therapy, administered without corticosteroids or behavioral change, suggests that the antifungal and antibiotic agents alone are unlikely to account for the subsequent improvement. Additionally, long-term outcomes following treatment cessation were not assessed. Future prospective randomized controlled trials are warranted to validate our findings, clarify the individual contribution of treatment components, and further investigate the long-term efficacy of corticosteroid-based therapy combined with hand-care modifications in chronic paronychia.

Conclusion

Our study highlights the limited efficacy of antifungal and antibiotic therapy in chronic paronychia and demonstrates the superior outcomes achieved with a prolonged course of

Table 3. Comparative analysis of complete responders vs. partial or nonresponders to second-line treatment (topical corticosteroid therapy with hand-care modifications).

	Complete Response [a] (N=37)	Partial or no response [a] (N=60)	*p-value*
Response to 1st treatment regime, N (%)			0.26
Improved	6 (16.2%)	17 (28.3%)	
Not improved	31 (83.4%)	43 (71.7%)	
Age (years), mean (SD)	55.7 (10.3)	53.4 (10.8)	0.30
Female, n (%)	27 (73.0%)	40 (66.7%)	0.67
Paronychia severity, mean (SD)	3.0 (0.6)	3.2 (0.8)	0.19
Paronychia duration (years), mean (SD)	13.1 (6.1)	13.4 (6.2)	0.82
Excessive liquid exposure, N (%)	35 (94.6%)	54 (90.0%)	0.68
Candida albicans	18 (48.6%)	42 (70.0%)	0.28
C. krusei	4 (10.8%)	2 (3.3%)	
C. parapsilosis	4 (10.8%)	3 (5.0%)	
C. tropicalis	3 (8.1%)	2 (3.3%)	
Other spp.	6 (16.2%)	9 (15.0%)	
None	2 (5.4%)	2 (3.3%)	
Bacterial culture, N (%)			0.03
Staphylococcus aureus	4 (10.8%)	4 (6.7%)	
Other gram-positive spp.	6 (16.2%)	0 (0%)	
Pseudomonas aeruginosa	3 (8.1%)	5 (8.3%)	
Negative	9 (24.3%)	30 (50.0%)	
Missing	15 (40.5%)	21 (35.0%)	
Treatment duration (years), mean (SD)	4.2 (0.7)	3.9 (0.7)	0.02
Hand care modifications, N (%)			0.009
Excellent adherence	25 (67.6%)	16 (26.7%)	
Good adherence	4 (10.8%)	20 (33.3%)	
Moderate adherence	0 (0%)	9 (15.0%)	
Poor adherence	4 (10.8%)	8 (13.3%)	
Missing	4 (10.8%)	7 (11.7%)	
Cream application, N (%)			<0.0001
Excellent adherence	25 (67.6%)	15 (25.0%)	
Moderate adherence	10 (27.0%)	34 (56.7%)	
Poor adherence	2 (5.4%)	11 (18.3%)	

Abbreviations: Ab, antibiotic; GIS, global improvement scale. GIS: 0 = deteriorated or unchanged; 1=mild-to-moderate improvement (<50%); 2=marked improvement (50–90%); and 3=complete response (>90%). [a] Partial or no response includes patients with GIS 0–2, while complete response is defined as GIS 3 (>90% improvement).

topical corticosteroids combined with strict hand-care modifications. These findings reinforce the inflammatory nature of the disease and emphasize the critical role of patient adherence to behavioral modifications in achieving treatment success.

Patient Consent: The Ethics Committee of Laniado Hospital waived the requirement for written informed consent for the collection, analysis, and publication of retrospectively obtained and anonymized data in this non-interventional study.

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