A Proposal for a New Severity Index for the Evaluation of Chronic Paronychia

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Keywords

Paronychia · Nail · Severity index

Abstract

Introduction: Chronic paronychia (CP) is an inflammatory disease of the nail folds. Staging of CP is important for clinicians. We developed an objective scale that evaluates each finding of CP separately in addition to evaluating the treatment process and follow-up. **Methods:** A new “chronic paronychia severity index scale” was developed to enable dermatologists to examine all features of CP. A previous categorical severity scale and this new scale were used for the evaluation of CP by 6 different dermatologists. The dermatologists evaluated the nails with both scales again 20 days later using randomly ordered photographs. **Results:** Using the previous scale, the intra-observer intraclass correlation coefficient (ICC) values between the first and second evaluations were 0.767, 0.860, 0.734, 0.609, 0.900, and 0.840 for the 6 dermatologists. Using the new proposed scale, the intra-observer ICC values between the first and second evaluations were 0.930, 0.931, 0.942, 0.934, 0.938, and 0.920 for the 6 dermatologists. All intra-observer ICC values were higher for the results of the proposed scale than for those of the previous

scale. The inter-observer ICC values were also higher for the proposed scale than for the previous scale for the 6 dermatologists. **Conclusion:** The new scale is a standardized, more suitable, objective, and valuable method to use in clinical practice and studies on CP.

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Introduction

Chronic paronychia (CP) is an inflammatory disease of the nail folds that is often observed in adult women on the second and third fingers of the dominant hand. The disease is facilitated by having a job which requires contact with food (especially foods rich in carbohydrates), humid environments, maceration, acrocyanosis, etc. Contact allergies, food hypersensitivity, candida hypersensitivity, irritant reactions, candida infection, bacterial infection, and foreign bodies are major etiological risk factors [1].

The study was conducted at Department of Dermatology, Haydarpaşa Numune Training and Research Hospital, University of Health Sciences, Istanbul, Turkey.

Table 1. New chronic paronychia severity index

Nail fold involvement	Involvement of 1 nail fold (proximal or lateral)	1
	Involvement of 2 nail folds (proximal or/ and lateral)	2
	Bilateral lateral nail fold involvement and proximal nail fold involvement	3
Edema	Absent	0
	Mild	1
	Moderate	2
	Severe	3
Erythema	Absent	0
	Mild	1
	Moderate	2
	Severe	3
Nail plate changes	Absent	0
	Mild	1
	Moderate	2
	Severe	3
Cuticle	Normal	0
	Damaged	1
	Absent	2

Daniel et al. [2] developed a CP severity scale that evaluates the disease in 5 stages. However, CP severity could be more clearly demonstrated if erythema, edema, and cuticle changes were evaluated separately to distinguish the cases that are categorized as having the same stage despite having different disease severities. In the previous scale, the stage may not change even if treatment has achieved CP improvement. Furthermore, the previous scale allows CP severity to be evaluated differently by different dermatologists. Therefore, we aimed to develop an objective scale that separately evaluates each CP finding, as well as the treatment process and follow-up.

Materials and Methods

A new “chronic paronychia severity index scale” (Table 1) has been developed. On the scale, a dermatologist evaluates the proximal and lateral nail folds (involvement of 1 nail fold = 1; involvement of 2 nail folds [proximal or/and lateral] = 2; bilateral lateral nail fold involvement and proximal nail fold involvement = 3), edema (absent = 0; mild = 1; moderate = 2; severe = 3), erythema (absent = 0; mild = 1; moderate = 2; severe = 3), nail plate changes (absent = 0; mild = 1; moderate = 2; severe = 3), and cuticle involvement (normal = 0; damaged = 1; absent = 2), producing a combined total score (between 0 [min.] and 14 [max.]).

All patients were followed with standardized forms which included patients’ age, gender, family history, and medical history. Thirty-two patients and 135 nails with CP were identified. The photographs of 45 nails were not clear enough for evaluation; therefore, 90 nails with CP were enrolled in the study. The photographs of the cases were ordered randomly and evaluated by 6 dermatologists who determined the severity of the CP using the scale created by Daniel et al. [2] and the proposed scale. The same 6 dermatologists evaluated the nails with the 2 scales again 20 days later using randomly ordered photographs. Approval from a local ethics committee was obtained.

The data were analyzed with MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; <http://www.medcalc.org>; 2013). Inter-observer intraclass correlation coefficient (ICC) values were used to measure the degree of agreement between different dermatologists. Intra-observer ICC values were used to measure the consistency between 2 different assessments of the same set of patients by each dermatologist. ICC values were accepted as follows: ≤ 0.20 = poor; $0.21\text{--}0.40$ = fair; $0.41\text{--}0.60$ = moderate; $0.61\text{--}0.80$ = good; and $0.81\text{--}1.0$ = very good.

Results

Using the previous scale, the intra-observer ICC values between the first and second evaluations were 0.767, 0.860, 0.734, 0.609, 0.900, and 0.840 for the 6 dermatologists (Table 2). Using the proposed scale, the intra-observer ICC values between the first and second evaluations were 0.919, 0.924, 0.929, 0.920, 0.921, and 0.899 for the 6 dermatologists (Table 3). All intra-observer ICC values were higher for the results of the proposed scale than for those of the previous scale. The intra-observer ICC values were higher than 0.80 for the proposed scale; therefore, the values were interpreted as “very good.” The inter-observer ICC values were also higher for the proposed scale than for the previous scale for the 6 dermatologists (Table 4). All inter-observer ICC values for the proposed scale were higher than 0.80; therefore, the values were interpreted as “very good.”

Discussion

CP is a common disorder that affects 1 or more nail folds for more than 6 weeks. Tenderness/pain, erythema, edema, cuticle seal, fluid under the nail folds, and nail plate changes can be observed in CP. The absence of sealing of the cuticle allows infective organisms and irritants to spread into the proximal nail folds. CP is common among those who are exposed to moist environments and contact irritants, such as custodians, maids, food handlers, cooks, dishwashers, chefs, nurses, and swimmers.

Table 2. Intra-observer ICC values for the previous scale for 6 dermatologists

	First evaluation (grade), mean (min.–max.)	Second evaluation (grade), mean (min.–max.)	ICC (95% CI)
D1	2.84 (1–5)	3.27 (1–5)	0.767 (0.64–0.84)
D2	3.66 (1–5)	3.80 (1–5)	0.860 (0.78–0.90)
D3	2.93 (1–5)	3.10 (1–5)	0.734 (0.59–0.82)
D4	3.02 (0–5)	2.63 (0–4)	0.609 (0.37–0.75)
D5	2.64 (1–5)	2.81 (1–5)	0.900 (0.84–0.93)
D6	3.20 (1–5)	3.28 (1–5)	0.840 (0.75–0.89)

ICC, intraclass correlation coefficient; D, dermatologist; CI, confidence interval.

Table 3. Intra-observer ICC values for the proposed scale for 6 dermatologists

	First evaluation (grade), mean (min.–max.)	Second evaluation (grade), mean (min.–max.)	ICC (95% CI)
D1	8.91 (2–14)	8.75 (2–14)	0.919 (0.88–0.95)
D2	8.51 (1–14)	8.86 (2–14)	0.924 (0.89–0.95)
D3	8.97 (3–14)	9.09 (3–14)	0.929 (0.90–0.96)
D4	7.48 (1–13)	7.04 (0–13)	0.920 (0.89–0.95)
D5	8.79 (3–14)	8.16 (1–14)	0.921 (0.90–0.95)
D6	7.34 (2–13)	6.52 (2–13)	0.899 (0.85–0.94)

ICC, intraclass correlation coefficient; D, dermatologist; CI, confidence interval.

Table 4. Inter-observer ICC values for the 2 scales

	D2	D3	D4	D5	D6
D1 ICC					
Previous scale	0.765	0.766	0.816	0.782	0.656
New scale	0.906	0.836	0.874	0.897	0.858
D2 ICC					
Previous scale		0.748	0.786	0.634	0.850
New scale		0.882	0.887	0.824	0.892
D3 ICC					
Previous scale			0.867	0.803	0.744
New scale			0.861	0.779	0.900
D4 ICC					
Previous scale				0.776	0.806
New scale				0.871	0.901
D5 ICC					
Previous scale					0.488
New scale					0.850

ICC, intraclass correlation coefficient; D, dermatologist.

Diabetic patients and HIV-positive patients also have increased risk factors for CP. Avoiding irritants and moist environments and preventing injury are important factors in treatment. Topical/systemic antifungal agents, topical corticosteroids, topical/systemic antibiotics, tacrolimus ointment, and surgery can be used to treat CP. A response to therapy may take several weeks or months because clinical improvements develop slowly [3]. Following up to assess improvements achieved through the treatments and staging the CP are important in clinical practice and especially in clinical studies.

In the literature, the severity of CP has been evaluated using different methods, mostly categorical classifications. In one study, Tosti et al. [4] compared the effects of topical steroids and systemic antifungal agents in the treatment of CP. Cuticle absence, swelling, and erythema of the proximal nail fold were used as the diagnostic criteria for CP. Furthermore, nail plate changes and disease duration were recorded in the study. The nails were photographed before and after treatment. At the end of treatment, each nail was individually rated as “cured,” “improved,” “stable,” or “worsened” [4].

Fig. 1. Previous-scale stages for nails “grade 1.” **a** Proposed scale score: 3 (nail fold involvement: 1; edema: 0; erythema: 0; nail plate changes: 0; cuticle: 1). **b** Proposed scale score: 4 (nail fold involvement: 1; edema: 1; erythema: 0; nail plate changes: 1; cuticle: 1). **c** Proposed scale score: 6 (nail fold involvement: 2; edema: 0; erythema: 1; nail plate changes: 1; cuticle: 2).

Fig. 2. Previous-scale stages for nails “grade 2.” **a** Proposed scale score: 8 (nail fold involvement: 3; edema: 1; erythema: 2; nail plate changes: 1; cuticle: 1). **b** Proposed scale score: 6 (nail fold involvement: 1; edema: 1; erythema: 1; nail plate changes: 2; cuticle: 1). **c** Proposed scale score: 5 (nail fold involvement: 1; edema: 1; erythema: 2; nail plate changes: 0; cuticle: 1).

Rigopoulos et al. [5] compared the efficacy of tacrolimus ointment 0.1% and betamethasone 17-valerate 0.1% cream and a placebo in the treatment of CP. They evaluated responses to treatment with the same categorical method for severity assessment as Tosti et al. [4].

In another study, the efficiencies of ciclopirox 0.77% topical solution and of avoiding irritants were researched, and the results were summarized as clearing the condition in 100% of CP patients; however, the study did not provide pre- and post-treatment clinical conditions and disease severity [6].

Fig. 3. Previous-scale stages for nails “grade 3.” **a** Proposed scale score: 8 (nail fold involvement: 3; edema: 1; erythema: 1; nail plate changes: 1; cuticle: 2). **b** Proposed scale score: 8 (nail fold involvement: 2; edema: 2; erythema: 1; nail plate changes: 1; cuticle: 2). **c** Proposed scale score: 8 (nail fold involvement: 3; edema: 1; erythema: 1; nail plate changes: 1; cuticle: 2).

Fig. 4. Previous-scale stages for nails “grade 4.” **a** Proposed scale score: 13 (nail fold involvement: 3; edema: 3; erythema: 2; nail plate changes: 3; cuticle: 2). **b** Proposed scale score: 6 (nail fold involvement: 2; edema: 1; erythema: 1; nail plate changes: 1; cuticle: 1). **c** Proposed scale score: 11 (nail fold involvement: 3; edema: 2; erythema: 1; nail plate changes: 3; cuticle: 2).

El-Komy and Samir [7] aimed to assess the role of a neodymium-doped yttrium aluminium garnet (Nd-YAG) laser in the treatment of CP in their study. They evaluated the response to Nd-YAG laser using a scale of mild improvement (<20% decrease in the size of the swelling and/or intensity of the erythema of the proximal nail fold), moderate improvement (20–50% decrease

in the findings and symptoms), marked improvement (>50% decrease in the findings and symptoms), and no change. Photographs of nails were taken before and after treatment [7]. Grover et al. [8] used en bloc excision of the proximal nail fold for treatment of CP. Postoperative results were evaluated using a 4-point scale: cure (absence of swelling, tenderness, erythema: normal cuticle and nail

plate) was defined as 3+, >50% improvement was defined as 2+, 30–50% improvement was defined as 1+, and 0–30% improvement was defined as 0.

According to the index by Daniel et al. [2] for grading CP, redness and swelling of the nail folds that spread to the cuticle are observed in stage 1. In stage 2, the findings are pronounced and cuticle seal disruption is observed. Redness, swelling of the proximal nail fold, cuticle absence, and some nail changes are seen in stage 3. In addition to the stage 3 skin findings, tenderness/pain and extensive nail changes are observed in stage 4. And along with the stage 4 findings, an exacerbation of CP is observed in stage 5 [2].

Among the aforementioned categorical methods, the severity index by Daniel et al. [2] is the most detailed scale to assess the clinical characteristics of CP. When we compared the results of our severity index with those of Daniel et al.'s index, the patients who were in the same group on Daniel et al.'s scale could be scored differently. Some case examples are presented in Figures 1–3. For example, a nail with CP staged as stage 4 scored 13 on our scale (nail fold involvement: 3; edema: 3; erythema: 2; nail plate changes: 3; cuticle absent: 2) (Fig. 4a). Another nail staged as stage 4 using the previous scale scored 6 on our scale (involvement of 2 nail folds: 2; edema: 1; erythema: 1; nail plate changes: 1; cuticle damaged: 1) on the proposed scale (Fig. 4b). A third nail staged as stage 4 using the previous scale scored 11 using the proposed scale (bilateral lateral nail fold involvement and proximal nail fold involvement: 3; edema: 2; erythema: 1; nail plate changes: 3; cuticle absent: 2) (Fig. 4c). In addition, intra-observer and inter-observer ICC values were higher for our new scale than for the previous scale.

Our study has some limitations. First, the study is retrospective in nature. In the future, it would be better to

use both scales for treatment follow-up in a prospective study. This may provide a deeper understanding of the value of the new scale. Also, a negative control group was not included in the study. Second, the evaluation of the nails was done according to findings on the photographs.

Conclusion

In conclusion, the scale developed in this study showed increasing intra-observer and inter-observer ICC values in the evaluation of the severity index of CP. Additionally, the scale provided a mean for assessing each feature of CP. For these reasons, the new scale is a standardized, more suitable, objective, and valuable method to use in clinical practice and studies on CP.

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Statement of Ethics

Approval from a local ethics committee was obtained.

Disclosure Statement

The authors have no conflicts of interest to declare.

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References

- 1 Roderick J, Baran R: Fungal (onychomycosis) and other infections involving the nail apparatus; in Baran R, Dawber RPR, de Berker DAR, Haneke E, Tosti A (eds): Baran and Dawber's Diseases of the Nails and Their Management, ed 3. Oxford, Blackwell Science Ltd, 2001, pp 172–192.
- 2 Daniel CR, Iorizzo M, Piraccini BM, Tosti A: Grading simple chronic paronychia and onycholysis. *Int J Dermatol* 2006;45:1447–1448.
- 3 Relhan V, Goel K, Bansal S, Gark VK: Management of chronic paronychia. *Indian J Dermatol* 2014;59:15–20.
- 4 Tosti A, Piraccini BM, Ghetti E, Colomb MD: Topical steroids versus systemic antifungals in the treatment of chronic paronychia: an open, randomized double blind and double dummy study. *J Am Acad Dermatol* 2002;47:73–76.
- 5 Rigopoulos D, Gregoriou S, Belyayeva E, Larios G, Kontochristopoulos G, Katsambas A: Efficacy and safety of tacrolimus ointment 0.1% vs. betamethasone 17-valerate 0.1% in the treatment of chronic paronychia: an unblinded randomized study. *Br J Dermatol* 2005;153:136–144.
- 6 Daniel CR, Daniel MP, Daniel J, Sullivan S, Bell FE: Managing simple chronic paronychia and onycholysis with ciclopirox 0.77% and an irritant avoidance regimen. *Cutis* 2004;73:81–85.
- 7 El-Komy MH, Samir N: 1064 Nd:YAG laser for the treatment of chronic paronychia: a pilot study. *Lasers Med Sci* 2015;30:1623–1626.
- 8 Grover C, Bansal S, Nanda S, Reddy BS, Kumar V: En bloc excision of proximal nail fold for treatment of chronic paronychia. *Dermatol Surg* 2006;32:393–399.