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ORIGINAL RESEARCH

Telemedicine in Nail Psoriasis: Validation of a New Tool to Monitor (In-Person, In-Picture, and In-Video) Nail Psoriasis Severity in Patients with Concurrent Onychophagia and Onychotillomania

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ABSTRACT

Introduction: Since during the COVID-19 pandemic nail psoriasis was evaluated exclusively with teledermatology, dermatologists started to face the difficulty in rating it concurrent with other onycopathies (i.e., onychotillomania and onychophagy). Thus, we aimed to improve the existing severity scores and verify the value in different clinical settings (i.e., in person vs. teledermatology (video or picture)).

Methods: This multicenter prospective observational study evaluated patients with nail psoriasis and screened them for onychophagy or onychotillomania in telemedicine from May 2020 to January 2021. For therapeutic purposes patients with nail psoriasis were followed and rated with the Nijmegen-Nail psoriasis Activity Index tooL (N-NAIL) for 9 months; at the same time, N-NAIL and a new dedicated index that monitor also the changes in nail dimension (Galeazzi-(G) N-NAIL) were tested for accuracy. We assessed inter- and intraobserver agreement for the three different settings (in person, video, and pictures).

Results: In our cohort of 382 patients with nail psoriasis after a clinical and dermatoscopic

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assessment we found 20 (5.24%) patients with onychophagy and 17 (4.45%) patients with onychotillomania. Analysis of the impact of nail psoriasis on patients revealed that onycholysis and crumbing, followed by subungual hyperkeratosis, were the clinical signs that prevalently bothered patients. N-NAIL score displayed moderate intra- and interobserver agreement. Over the 9 months follow-up, N-NAIL vs. GN-NAIL displayed a solid correlation at all the examined time points, i.e., baseline and after 3, 6, and 9 months.

Conclusion: We created a new tool, the GN-NAIL capable of efficiently scoring nail psoriasis severity in complex cases, such as patients with onychotillomania and onychophagy, and monitor response to treatment during the COVID-19 pandemic.

Keywords: Nail psoriasis; N-NAIL; Severity evaluation indexes; Onychophagia; Onychotillomania; SARS-CoV-2; COVID pandemic; Teledermatology; Telemedicine; Image analysis

Key Summary Points
Onychotillomania and onychophagy alter all the severity scores for nail psoriasis.
The length of nail plate also significantly influences existing nail psoriasis severity scores.
Onychophagy and onychotillomania have a prevalence of 5.24% and 4.45%, respectively, in patients with nail psoriasis.
Galeazzi-(G) N-NAIL score is the only score that account for onychophagy and onychotillomania.
GN-NAIL is validated in person, in picture, and in video, so it is ideal for telemedicine.

INTRODUCTION

Psoriasis is a chronic, inflammatory, systemic disease that may also afflict nails with a wide range of clinical manifestations that differ according to the anatomic area involved—matrix, bed, or both [1]. As a result of its epidemiological (80–90% lifetime incidence and 10–82% prevalence) [2–4] and prognostic relevance [5], monitoring nail psoriasis remains important in clinical practice.

Interestingly, nail psoriasis severity is not directly correlated with both cutaneous and articular severity, so measuring nail severity is mandatory to orient nail psoriasis long-term treatment [1]. Scoring nail psoriasis is time consuming and controversial because of multiple scoring systems and parameters and global disagreement between different indexes [6]. Thus, our hypothesis is that actual nail scores underestimate nail severity in complex settings such as onychophagy and onychotillomania, since none of these indexes account for nail size and, at the same time, nail experts suggest to "cut the oncholytic part of the nail plate" to prevent the Koebner phenomenon [1]. Both onychophagy and onychotillomania impact nail psoriasis severity due to the continuous mechanic traumas that may trigger the Koebner phenomenon and influence nail severity score evaluation. Thus, the long-term clinical evaluation of patients with nail psoriasis and concurrent onychophagy and onychotillomania becomes even more challenging for clinicians.

Remarkably, psoriasis has a relevant psychiatric burden [6] but the prevalence of onychophagy and onychotillomania remains unknown in patients with nail psoriasis. These conditions are currently classified by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) in the "Other specified obsessive-compulsive and related disorders" category and poorly reported and pictured in clinical practice [7].

The COVID-19 pandemic is challenging healthcare systems [8–10] and at the same time is also forcing dermatologists into the digital era of teledermatology in which patients are assessed in person, in picture, and in video [11].

Regrettably, during the pandemic, patients with nail psoriasis had a low dermatological priority, so teledermatological evaluations were privileged to optimize the resources and minimize the risk of nosocomial COVID-19. Actually, poor evidence is present for teledermatological assessment of patients with nail psoriasis, so we aimed to evaluate different teledermatological strategies to monitor and characterize nail psoriasis in difficult subsets, such as patients with concurrent onychophagy and/or onychotillomania.

METHODS

Ethical Approval

The study protocol is in line with the principles of Helsinki declaration of 1975 (https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/), revised in 2013. The present study received the approval by the Institutional Review Board of San Raphael Hospital (protocol code 178/INT/2021, date of approval 10 November 2021).

Study Design

This multicenter prospective observational study that involved three primary referral centers in Italy (IRCCS Istituto Ortopedico Galeazzi in Milan, Italy, Policlinico of Messina in Messina, Italy and IRCCS San Gallicano in Rome, Italy) and two European Nail Society members (M.P. and M.I).

All adult (> 18 years old) patients with a diagnosis of psoriasis with nail psoriasis, under systemic treatment and more than 1 year without additional specific treatment for nail psoriasis, that were evaluated in telemedicine from May 2020 to January 2021 were screened for onychophagy and onychotillomania (Fig. 1).

Patients with onychophagy and onychotillomania were identified by evaluating clinical signs and further confirmed with a detailed phone interview. Patients with onychophagy and onychotillomania were then interviewed using the bothering-visual analogue scale (VAS) to rate the patients' perception of the most relevant nail psoriasis manifestations (onycholysis, oil-drop discoloration, pitting, crumbling, Beau lines, and subungual hyperkeratosis).

For therapeutic purposes patients with nail psoriasis underwent a severity rating assessment with the Nijmegen-Nail psoriasis Activity Index tooL (N-NAIL) [12] ant then we assessed the tool's reliability by quantifying the intra- and interobserver agreement in person, in picture, and in video. Ten patients (five with onychophagy and five with onychotillomania) were selected and all 10 fingernails were rated in person, in picture, and in video consecutively by three independent board-certified dermatologists. Every reported measure was the mean of three consecutive ratings performed by the same rater (intraobserver agreement). For each assessing modality (in-person, in-picture, and in-video) we quantified the interobserver agreement among the three raters (R1, R2, and R3) and then we compared the same rater in the three modalities (i.e., R1 in person, R1 in picture, R1 in video). Then, all patients with nail psoriasis, onychophagy, and onychotillomania were evaluated with N-NAIL at T0 (baseline), T1 (after 3 months), T2 (after 6 months), and T3 (after 9 months) with in-person, in-picture, and in-video methodologies depending on both patients' preference and hospital emergency policies due to the COVID-19 outbreak.

The study followed the ethical principles for medical research involving human subjects contained in the Declaration of Helsinki and received approval from the local ethical committee. Each patient signed an informed consent form before the screening.

Camera and Video Requirements for the Study

To increase the generalizability of results and account for the wide range of mobile phone camera requirements, we used a camera with at least 12 megapixels and ×10 digital zoom with the possibility to record HD videos (1080p) at 60 fps.

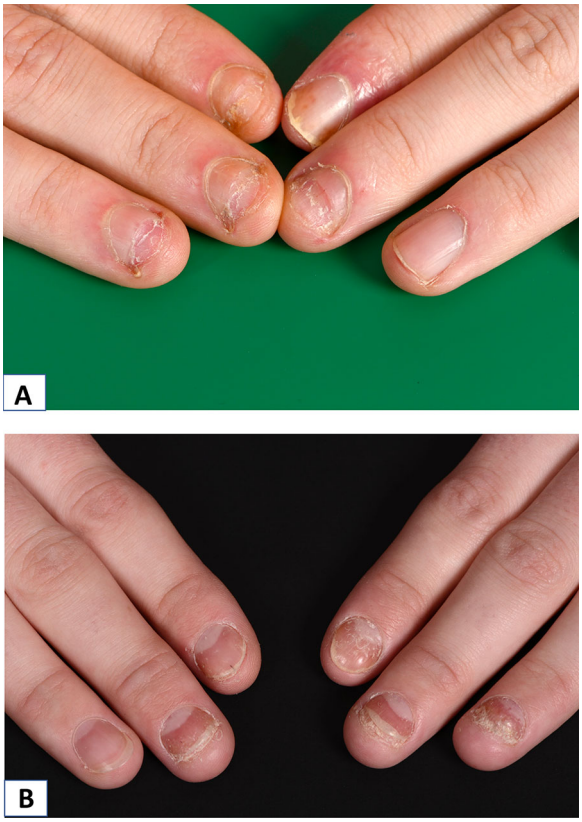

Fig. 1 **a** Patient with nail psoriasis and concurrent onychotillomania. **b** Patient with nail psoriasis and concurrent onychophagia

Clinical Assessment

Cutaneous severity was evaluated with Psoriasis Area Severity Index (PASI) [13], whilst the presence of psoriatic arthritis was preliminarily checked with the Psoriasis Epidemiology Screening Tool (PEST) [14] and eventually diagnosed with Classification Criteria for Psoriatic Arthritis (CASPAR) and quantified with the Disease Activity Index for Psoriatic Arthritis (DAPSA) [15].

We scored nail psoriasis severity with N-NAIL because it is accurate [4], practical in daily visits, and less time-consuming than Nail Psoriasis Severity Index (NAPSI) [16]. Furthermore, N-NAIL correlates with NAPSI and better reflects the clinical severity than NAPSI does [12].

All scores were independently recorded in patients in person or by teledermatology by three independent, experienced (> 5 years of experience) board-certified dermatologists.

In line with the DSM-5, we considered both onychophagy and onychotillomania as falling in the "Other specified obsessive-compulsive and related disorders" category.

We defined onychotillomania or nail picking as the continuous manipulation of the different components of the nail unit or even compulsively cutting the nails short, whilst onychophagy was identified as a chronic nail behavior that introduces the nails and/or fingers into the mouth and biting them with teeth [17, 18]. In this study we also included onychotemnomania, onychoteiromania, and onychodaknomania in the definition of onychotillomania (OT).

During the follow-up we collected nail dimension change percentages approximated to nearest whole number (i.e., 0%, 25%, 50%, 75%, 100%) at every time points and we compared N-NAIL with a composite index that account also for the dimension Galeazzi (G)-N-NAIL or modified-N-NAIL that is calculated as N-NAIL × [1 + (T1 fingernail dimension − T0 fingernail dimension approximated in percent)].

Statistics

Discrete variables were expressed as counts (percentage) and continuous variables as means ± standard deviation (SD) or median (25th–75th percentiles) as appropriate. The Kolmogorov–Smirnov test was used and histograms and normal quartile plots were examined to verify the normality of distribution of continuous variables. The agreement between the three techniques and the three raters was evaluated using Cohen's kappa or Fleiss kappa coefficient (≤ 0 no agreement, 0.01–0.20 slight, 0.21–0.40 fair, 0.41–0.60 moderate, 0.61–0.80 substantial, 0.81–1.00 as almost perfect agreement), as appropriate. Correlations were tested using Pearson or Spearman test, as appropriate.

All tests were two-tailed and a $p < 0.05$ was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics 25.0 for Macintosh (Armonk, NY, USA).

RESULTS

Prevalence and Clinical Characteristics of Onychophagy and Onychotillomania in Patients with Nail Psoriasis

We enrolled 382 patients (282 (73.8%) male) with nail psoriasis with an average age of 47.3 ± 17.7 years and a disease duration of 16.4 ± 14.2 years. After a clinical and dermatoscopic assessment we found 20 (5.24%) patients with onychophagy and 17 (4.45%) patients with onychotillomania. Onychophagy and onychotillomania were more prevalent in men (22 vs. 15 in women); these patients had a median age of 40 [31–49] years and a median psoriasis duration of 8 [5–14] years.

Patients displayed a median PASI of 13 [10–16] with a median N-NAIL of 51 [39–61] and interestingly 16 had also psoriatic arthritis with a median DAPSA score of 21 [19–27].

In terms of academic education, 19 (51.4%) had high school diploma, 16 (43.2%) had bachelor degree, and 2 (5.4%) had a PhD. In terms of socio-economic status according to Equivalent Economic Situation Indicator (ISEE), 13 (35.1%) patients were in Class 2 (€23,121–27,000), 17 (45.9%) in Class 3 (€27,001–31,000), 5 (13.5%) in Class 4 (€31,001–40,000), one (2.7%) in Class 5 (€40,001–51,000), and one (2.7%) in Class 7 (€63,001–75,000). Focusing on the marital status, 8 (21.6%) were single, 22 (59.5%) married or in a stable couple (> 5 years), 6 (16.2%) divorced, and 1 (2.7%) was a widow.

Interestingly, in patients with psoriasis, onychophagy was prevalent in healthy nails compared with nails affected by psoriasis (78.4% vs. 43.1%, $p < 0.001$).

Demographics of the nail psoriasis cohort are summarized in Table 1.

Perception of Nail Psoriasis Signs Among Patients with Onychophagy and Onychotillomania

With the visual analogue scale we evaluated the perceived discomfort triggered by oil-drop discoloration, pitting, crumbling, Beau lines, and subungual hyperkeratosis. Remarkably, onycholysis and crumbing afforded the highest scores (8 [8, 9] and 8 [7, 8]), followed by subungual hyperkeratosis (7 [7, 8]), oil-drop discoloration (6 [6, 7]), Beau lines (6 [5, 6]) and, finally, pitting (5 [5, 6]).

Intra- and Interobserver Agreement Between In-person and Teledermatological N-NAIL Evaluations

In-person interobserver agreement was statistically significant ($p < 0.01$) for all the nail psoriasis analyzed signs (onycholysis/oil-drop discoloration, pitting, crumbling, Beau lines, and subungual hyperkeratosis). In particular, Beau lines ($k = 1.00$, $p < 0.01$), onycholysis/oil-drop discoloration ($k = 0.95$, $p < 0.01$), and pitting ($k = 0.86$, $p < 0.01$) afforded the highest interobserver agreement. The N-NAIL rating agreement was clinically and statistically significant ($p < 0.01$).

In-picture N-NAIL rating interobserver agreement was statistically significant for all the analyzed nail psoriasis signs ($p < 0.01$) with the highest agreement reconfirmed for onycholysis/oil-drop discoloration ($k = 0.91$, $p < 0.01$), pitting ($k = 0.91$, $p < 0.01$), and Beau lines ($k = 0.91$, $p < 0.01$). The N-NAIL rating agreement displayed moderate-high agreement ($k = 0.57$, $p < 0.01$).

In-video N-NAIL rating interobserver agreement was statistically significant for all the analyzed nail psoriasis signs ($p < 0.01$) with the highest agreement recorded for crumbling ($k = 0.95$, $p < 0.01$), onycholysis/oil-drop discoloration ($k = 0.86$, $p < 0.01$), and pitting ($k = 0.86$, $p < 0.01$). The N-NAIL rating agreement displayed moderate-high agreement ($k = 0.59$, $p < 0.01$). Details are reported in Table 2.

The intraobserver agreement of both nail psoriasis signs and N-NAIL evaluated in the three modalities (i.e., in-person, in-picture, in-video) was moderate and statistically significant ($p < 0.01$). Details are summarized in Table 3.

Table 1 Characteristics and perceptions of patients with nail psoriasis and concurrent onychophagia or onychotillomania

Parameters	Overall ($N = 37$)
Age, median [IQR], years	40 [31–49]
Male, *n* (%)	22 (59)
Onychophagia, *n* (%)	20 (54)
Onychotillomania, *n* (%)	17 (46)
Onycholysis bothering—VAS, median [IQR]	8 [8, 9]
Oil-drop discoloration bothering—VAS, median [IQR]	6 [6, 7]
Pitting bothering—VAS, median [IQR]	5 [5, 6]
Crumbling bothering—VAS, median [IQR]	8 [7, 8]
Beau lines bothering—VAS, median [IQR]	6 [5, 6]
Subungual hyperkeratosis bothering—VAS, median [IQR]	7 [7, 8]
PsA, *n* (%)	16 (43)
DAPSA, median [IQR]	21 [19–27]
PASI, median [IQR]	13 [10–16]
N-NAIL, median [IQR]	51 [39–61]
Disease duration, median [IQR], years	8 [5–14]

IQR interquartile range, *N-NAIL* Nijmegen-Nail psoriasis Activity Index tooL, *PASI* Psoriasis Area Severity Index, *PsA* psoriatic arthritis, *PsO* psoriasis, *VAS* visual analogue scale

Nine-Month Follow-up of Nail Dimension in Patients with Onychophagy and Onychotillomania and the Modified Score

In order to evaluate the influence of nail dimension on N-NAIL we followed for 9 months all patients with nail PsO and onychophagy and onychotillomania diagnosis and we evaluated all 10 fingernails.

Interestingly, after 3 months, 21 (56.76%, 5 increased and 16 decreased) patients had modified their nail area from the baseline; after 6 months, 25 patients (67.57%, 8 increased and 17 decreased) modified it from T1; and finally after 9 months, 22 patients (59.46%, 8 increased and 14 decreased) modified it from T2. Remarkably, during the 3 months follow-up we suggested to the patients to avoid any non-prescribed nail therapy.

At the baseline we assumed both scores identical (10 [8–12]), at T1 the correlation was 0.69 ($p < 0.01$; N-NAIL vs. GN-NAIL, 9 [6–10] vs. 9 [8–11]), at T2 it was 0.81 ($p < 0.01$; N-NAIL vs. GN-NAIL, 8 [5–9] vs. 8 [5–9]), and at T3 it was 0.76 ($p < 0.01$; N-NAIL vs. GN-NAIL, 6 [5–8] vs. 7 [5–8]).

DISCUSSION

Nail psoriasis represents a risk factor for developing psoriatic arthritis and should be properly evaluated and monitored in patients with psoriasis with severity tools capable of also detecting concurrent onychopathies. In line with literature [19], 306 (80.1%) patients also manifested joint involvement that was diagnosed after the appearance of nail psoriasis in 247 (64.66%) [4]. Despite nail psoriasis representing a clinically orientating sign, its monitoring remained confined only to clinical trials and to dermatologic departments with ambulatories dedicated to onychopathies as a result of the difficulty and time-consuming available tools (i.e., N-NAIL and NAPSI). Furthermore, concurrent onychopathies (i.e., onychophagy and onychotillomania) that modify nail dimension may alter nail psoriasis monitoring, too. Interestingly, in our cohort onychophagy prevalence was 3.7 times lower (5.24% vs. 19.2%) in patients with nail psoriasis, conversely onychotillomania prevalence was five times higher (4.45% vs. 0.9%) than in the general population [20].

Onychophagy prevalence in patients with autoimmune disorders was rarely evaluated, except for Crohn disease (49%) [21] and fibromyalgia (7%) [22], but no data are currently available for both psoriasis and psoriatic

Table 2 N-NAIL interobserver agreement between in-person vs. in-picture vs. in-video modalities

	R1 vs. R2	R2 vs. R3	R1 vs. R3	R1 vs. R2 vs. R3
In-person N-NAIL rating				
Onycholysis/oil-drop discoloration	$k = 0.93$	$k = 0.93$	$k = 1.00$	$k = 0.95$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.86$	$k = 0.79$	$k = 0.93$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Crumbling	$k = 0.64$	$k = 0.65$	$k = 0.72$	$k = 0.67$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Beau lines	$k = 1.00$	$k = 1.00$	$k = 1.00$	$k = 1.00$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 0.65$	$k = 0.66$	$k = 0.86$	$k = 0.72$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.76$	$k = 0.59$	$k = 0.71$	$k = 0.69$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
In-picture N-NAIL rating				
Onycholysis/oil-drop discoloration	$k = 0.86$	$k = 0.93$	$k = 0.93$	$k = 0.91$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.86$	$k = 0.93$	$k = 0.93$	$k = 0.91$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Crumbling	$k = 0.86$	$k = 0.79$	$k = 0.79$	$k = 0.81$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Beau lines	$k = 1.00$	$k = 0.87$	$k = 0.87$	$k = 0.91$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 1.00$	$k = 0.72$	$k = 0.72$	$k = 0.82$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.62$	$k = 0.57$	$k = 0.51$	$k = 0.57$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
In-video N-NAIL rating				
Onycholysis/oil-drop discoloration	$k = 0.86$	$k = 0.79$	$k = 0.93$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.87$	$k = 0.80$	$k = 0.93$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Crumbling	$k = 0.92$	$k = 0.92$	$k = 1.00$	$k = 0.95$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$

Table 2 continued

	R1 vs. R2	R2 vs. R3	R1 vs. R3	R1 vs. R2 vs. R3
Beau lines	$k = 0.76$	$k = 0.76$	$k = 1.00$	$k = 0.83$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 0.93$	$k = 0.65$	$k = 0.72$	$k = 0.77$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.53$	$k = 0.53$	$k = 0.71$	$k = 0.59$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$

N-NAIL Nijmegen-Nail psoriasis Activity Index tooL

arthritis. Onychotillomania, described in 1934 by Alkiewicz [23], was never associated with rheumatic or dermatological disorders, and a few epidemiological data are limited to the general population [18].

Patients with psoriasis display frequently onycholysis, subungual hyperkeratosis, and crumbling that hinder refined manual movements and decrease the quality of life [24]. Thus, physicians' advice to reduce onycholysis by cutting [4, 24] may trigger onychotillomania and onychotemnomania, an onychotillomania subtype in which the patient compulsively cuts nails short. Interestingly, onychophagy was drastically lower than previously reported in the general population and the motivation could be the social shame that nail psoriasis triggers, repulsing the patient to bite their affected nails, and also that biting psoriatic fingernails is painful and limits the drive to start chewing.

Remarkably, nails affected by onychophagy and/or onychotillomania display several clinical and dermatoscopic signs that often can mimic a plethora of other nail disorders, such as lichen simplex [17, 18]. Thus, the concurrent presence of onychophagy/onychotillomania and nail psoriasis makes diagnosis, monitoring, and research challenging, thus giving a rationale for the absence of reports in literature.

In this complex scenario, nail evaluation remains a crucial step and may be influenced by the chosen assessment modality (in-person, in-picture, in-video). Consequently, a detailed comparison of these modalities was performed which found that the global interobserver agreement was almost substantial in all modalities. Therefore, the use of the combined rating approaches in teledermatology during the COVID-19 pandemic appears to be safe and efficient [11]. Interestingly, the average intraobserver agreement with the same modality was almost perfect; likewise, the intraobserver agreement with different modalities rating the same nail was moderate. As a result of the complexity (onychotillomania + nail psoriasis or onychophagy + nail psoriasis) of the evaluated nails, the interobserver agreement in-person was lower than previously reported [12, 25].

Since no score at the moment accounts for changes in nail size [12], we developed the GN-NAIL. It correlates with the N-NAIL, but, differently from N-NAIL, it captures modifications of nail sizes without underrating nail severity. In fact, nail clipping of distal onycholysis or even distal onychophagy may cause nail psoriasis underrating with the N-NAIL but not with GN-NAIL. These data encourage the use of GN-NAIL to measure both statically and dynamically the nail psoriasis severity in complex cases, such as patients with onychophagy/onychotillomania.

This study represents the first step to assessing systematically onychophagy and onychotillomania, but the main limitation is that no onychophagy and onychotillomania severity algorithms are validated or even available.

Table 3 N-NAIL intraobserver agreement with different rating modalities (video, picture, in-person)

	Video vs. picture	Video vs. in-person	Picture vs. in-person	Video vs. picture vs. in-person
R1				
Onycholysis/oil-drop discoloration	$k = 0.93$	$k = 1.00$	$k = 0.93$	$k = 0.95$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.80$	$k = 1.00$	$k = 0.80$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Crumbling	$k = 0.86$	$k = 0.56$	$k = 0.72$	$k = 0.71$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Beau lines	$k = 1.00$	$k = 1.00$	$k = 1.00$	$k = 1.00$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 0.67$	$k = 0.79$	$k = 0.44$	$k = 0.63$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.46$	$k = 0.76$	$k = 0.28$	$k = 0.51$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
R2				
Onycholysis/oil-drop discoloration	$k = 0.79$	$k = 0.79$	$k = 1.00$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.79$	$k = 0.87$	$k = 0.79$	$k = 0.82$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Crumbling	$k = 0.78$	$k = 0.70$	$k = 0.79$	$k = 0.76$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Beau lines	$k = 0.76$	$k = 0.76$	$k = 1.00$	$k = 0.83$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 0.59$	$k = 0.79$	$k = 0.66$	$k = 0.68$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.33$	$k = 0.53$	$k = 0.52$	$k = 0.46$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
R1				
Onycholysis/oil-drop discoloration	$k = 0.93$	$k = 0.93$	$k = 1.00$	$k = 0.95$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Pitting	$k = 0.93$	$k = 0.86$	$k = 0.79$	$k = 0.86$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$

Table 3 continued

	Video vs. picture	Video vs. in-person	Picture vs. in-person	Video vs. picture vs. in-person
Crumbling	$k = 0.78$	$k = 0.57$	$k = 0.65$	$k = 0.67$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Beau lines	$k = 0.87$	$k = 1.00$	$k = 0.87$	$k = 0.91$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
Subungual hyperkeratosis	$k = 0.52$	$k = 0.79$	$k = 0.58$	$k = 0.63$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$
N-NAIL	$k = 0.46$	$k = 0.47$	$k = 0.47$	$k = 0.47$
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$

N-NAIL Nijmegen-Nail psoriasis Activity Index tooL

CONCLUSIONS

Onychophagy and onychotillomania are relatively frequent in patients with nail psoriasis and are currently underdiagnosed possibly because these onychopathies constitute a well-known nail psoriasis trigger; thus their evaluation may further implement the already consistent psychiatric burden of patients with psoriasis. Obviously, the onychophagy and onychotillomania prevalence needs to be further investigated in different age groups to better orient therapeutic efforts and multidisciplinary strategies. Although onychophagy and onychotillomania are psychiatric disorders, their implications are multiple and may influence both quality of life and psoriasis severity [17, 18], so patients with onychophagy and onychotillomania should be strictly monitored with dedicated tools, such as GN-NAIL, and pictured every visit. Furthermore, live, photographic, or video assessments can be reliably used in this patient group and even patient-made pictures and video appear to be reliable for nail evaluations.

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Declarations

Conflict of Interest. Authors reported no conflict of interests.

Ethical Approval. The study protocol is in line with the principles of Helsinki declaration of 1975 (https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/), revised in 2013. The present study received the approval by the Institutional Review Board of San Raphael Hospital (protocol code 178/INT/2021, date of approval 10 November 2021).

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