Review

Nailfold capillaroscopy by dermatoscope in systemic sclerosis: a systematic review and meta-analysis

M. Radić[1,2], H. Đogaš[3], G. Maldonado[4], M. Snow[5], A. Gelemanović[6], J. Radić[2,7], T.M. Frech[8], M. Cutolo[9], V. Smith[10]

Affiliations: see page 7.

Mislav Radić, MD, PhD
Hana Đogaš, MD
Genessis Maldonado, MD, MCR
Marcus Snow, MD
Andrea Gelemanović, MD, PhD
Josipa Radić, MD, PhD
Tracy M. Frech, MD, MS
Maurizio Cutolo, MD
Vanessa Smith, MD, PhD

Please address correspondence to:
Mislav Radić
Department of Internal Medicine,
Division of Rheumatology,
University Hospital of Split,
Šoltanska 1,
21000 Split, Croatia.
E-mail: mislavradic@gmail.com

Received on February 1, 2026; accepted in revised form on April 13, 2026.

Clin Exp Rheumatol 2026; 44: 000-000.

© Copyright CLINICAL AND EXPERIMENTAL RHEUMATOLOGY 2026.

Key words: nailfold capillaroscopy; nailfold videocapillaroscopy; dermatoscope-used capillaroscopy; systemic sclerosis; Raynaud disease.

Competing interests: none declared.

ABSTRACT

Objective. *Nailfold capillaroscopy is pivotal for assessing microvascular abnormalities in systemic sclerosis (SSc), with nailfold videocapillaroscopy (NVC) as the gold standard. However, NVC availability and practicality are limited in routine clinical settings, prompting interest in dermatoscope-based nailfold capillaroscopy (DNC) as an accessible alternative. This review evaluates the diagnostic value of DNC for identifying the scleroderma pattern compared to standard high-magnification techniques.*

Methods. *Systematic literature search was conducted in PubMed, Scopus and Web of Science per PRISMA-DTA guidelines. Eligible studies assessed sensitivity and specificity of DNC versus NVC or stereomicroscopy in adults. Univariate and bivariate random-effects meta-analysis pooled sensitivity, specificity, diagnostic odds ratio, and area under the Summary Receiver Operating Characteristic (SROC) curve (AUC).*

Results. *Three studies, including 340 participants, met inclusion criteria. Pooled analysis demonstrated sensitivity of 56% (95% CI: 39–80%) and specificity of 95% (95% CI: 91–100%) for DNC in detecting scleroderma capillary patterns. Pooled diagnostic odds ratio was 31.83 (95% CI: 16.85–60.15), with an AUC of 0.895 indicating high diagnostic performance.*

Conclusion. *Limited data demonstrate DNC offers high specificity but moderate sensitivity for identifying scleroderma patterns in SSc, making it a valuable initial screening tool for resource-limited settings in patients with Raynaud's phenomenon. While DNC cannot replace NVC for detailed microvascular assessment, its ease of use, portability, and diagnostic performance support implementation for mainly triage of capillary abnormalities in SSc and connective tissue diseases in routine clinical practice.*

Introduction

Nailfold capillaroscopy (NFC) is a safe, non-invasive imaging technique used to assess the microcirculation at the nailfold, particularly valuable in diagnosing and monitoring systemic autoimmune diseases such as systemic sclerosis (SSc) and Raynaud's phenomenon (RP) (1). Microvascular changes, such as giant capillaries, microhaemorrhages, avascular areas, and disorganised morphology, constitute the typical "scleroderma pattern" observed in SSc and related conditions (2).

The current gold standard for NFC is nailfold videocapillaroscopy (NVC), which allows for high-resolution imaging (typically at 200 × magnification) and both qualitative (= classification as (non)-scleroderma pattern) and detailed quantitative analysis of capillary abnormalities (1). Its diagnostic and prognostic relevance has led to its inclusion in the 2013 ACR/EULAR classification criteria for SSc (2). Additionally, changes in capillary density and morphology detected via NVC have been linked to disease progression, organ involvement, and risk of digital ulcers (3).

However, NVC is not without limitations. The equipment is expensive, image acquisition can be time-consuming, and interpretation requires trained personnel and dedicated software, restricting its widespread availability mainly to specialised centres (4). In clinical surveys, while most rheumatologists acknowledged the value of NFC, only a minority had access to NVC, instead

relying on simpler tools such as dermatoscopes or ophthalmoscopes (3).

As a useful alternative, stereomicroscopy shows a strong correlation with NVC in assessing capillary density, enlarged and giant capillaries, microhaemorrhages, and avascular areas, with excellent intra- and inter-observer reliability in experienced hands (3). Although it lacks portability and may not capture high-quality images in patients with finger-flexion ankylosis, stereomicroscopy remains a cost-effective alternative to NVC in resource-limited settings and allows visualization of the entire nailfold microvasculature for prompt localisation of abnormalities (3, 5).

On the other hand, dermatoscopy, particularly with polarised handheld devices, has emerged as a practical and affordable alternative for initial NFC screening. Though it offers lower magnification (typically around 10× to 20×), it has demonstrated reasonable accuracy in identifying key specific capillary abnormalities. Compared to NVC, dermatoscopy shows lower sensitivity (60.2% *vs*. 81.6%) but slightly higher specificity (92.5% *vs*. 84.6%), making it a useful tool to triage patients for further evaluation (3, 6). Dermatoscopy can effectively distinguish normal from abnormal NFC patterns and has shown potential to reflect systemic disease severity in SSc (7).

Recent studies affirm that dermatoscopic findings correlate with the severity of internal organ involvement in SSc and could support implementation of classification criteria even in outpatient settings (7). Thus, while dermatoscopy does not replace NVC in terms of detailed analysis and quality/magnification of the images, it offers a highly feasible, time-efficient, and low-cost method to expand access to initial capillaroscopic assessment in primary care assessing patients with RP (8). However, diagnostic interpretation requires standardised training, and caution must be exercised due to documented limitations in daily clinical practice (9).

Overall, consensus on definitive role of dermatoscope in routine nailfold capillaroscopy is still unclear. Therefore, the aim of this systematic review and meta-analysis is to analyse the diagnostic accuracy (sensitivity and specificity) of dermatoscope-used nailfold capillaroscopy (DNC) in SSc compared to widely used standard examinations.

Materials and methods

Search strategy

The present study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Diagnostic Test Accuracy Studies (PRISMA-DTA) (10). Present review methodology and protocol was also prospectively registered via INPLASY registry (registration number: INPLASY202580100). Using PICO components (population, intervention, comparison, outcome), two researchers (H.Đ. and M.R.) independently performed literature searches. A search of the databases PubMed, Scopus, and Web of Science was performed on 21st of June 2025 using the following search phrases: ("nailfold capillaroscopy" OR capillaroscopy) AND (dermatoscope OR dermatoscopy OR dermoscopy OR "nailfold dermoscopy") AND ("systemic sclerosis" OR scleroderma OR "Raynaud syndrome" OR Raynaud OR "Raynaud's disease"). Furthermore, a search of reference lists of relevant publications was made to identify additional publications.

Literature selection

The following inclusion criteria were used:

- Study design: clinical trials, randomised controlled trials, cohort studies, or observational studies;
- Studies assessing the presence of SSc-pattern of capillaries identified by nailfold capillaroscopy using a dermatoscope compared to standard (NVC or stereoscopic microscopy with higher magnification);
- Studies including human participants over 18 years of age;
- Studies available online;
- Studies with appropriate data availability.

Therefore, the exclusion criteria were:

- Study design: letters, editorials, comments, meeting abstracts, case reports, review, systematic review, or meta-analysis;
- Studies not assessing the presence of SSc-pattern of capillaries identified by nailfold capillaroscopy using a dermatoscope compared to standard (NVC or stereoscopic microscopy with higher magnification);
- Studies with no appropriate data availability;
- Studies not including human participants over 18 years of age;
- Studies unavailable online.

Data extraction

From studies fulfilling the mentioned inclusion criteria, the following data were extracted by two separate researchers (H.Đ and M.R.): author's surname and year of publication; country of origin; study design; sample size; mean age; gender; devices used; criteria used to define SSc capillary pattern; sensitivity and specificity of a dermatoscope in nailfold capillaroscopy compared to standard; number of true positives; number of true negatives; number of false positives; number of false negatives.

Outcome measures

The primary outcome of this evaluation was to assess the sensitivity and specificity of a capillaroscopy to detect SSc-pattern of capillaries using a dermatoscope *versus* a reference standard in SSc patients and therefore indicate in what measure and capacity dermatoscope-used nailfold capillaroscopy should be used.

Risk of bias

To assess the quality of the included studies, the Revised Tool for the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) was used (11). The QUADAS-2 evaluates both risk of bias and applicability concerns in studies by examining four key assessment domains: patient selection, index test, reference standard, and flow and timing. For each domain, the risk of bias is classified as low when all assessment questions receive affirmative responses and classified as high when any questions are answered negatively or remain unclear. Applicability concerns within each domain are categorised as low, high, or unclear. For the com-

prehensive risk-of-bias assessment, studies receive a low overall risk rating only when all domains demonstrate low risk, whereas studies with high or unclear risk in exactly one domain receive a moderate overall risk rating. When two or more domains show high or unclear risk, the study receives a high overall risk rating. For applicability assessment, the overall concern is classified as high when any domain demonstrates high applicability concerns, while studies with no high-concern domains are classified as having low overall applicability concerns.

Statistical analysis

The meta-analysis was performed in the free software environment for statistical computing, R version 4.0.0 (12), using the meta v6.0-0 (13) and mada v0.5.11 (14) packages. To assess the diagnostic accuracy of dermatoscope-assisted nailfold capillaroscopy, two methodological approaches were employed. Initially, a random-effects univariate meta-analysis model was implemented to derive mean specificity, sensitivity, and diagnostic odds ratio (DOR) values along with 95% confidence intervals (CI). Between-study heterogeneity was assessed using I2 statistics, with significant heterogeneity indicated by p-values below 0.05. Given the interconnected nature of specificity and sensitivity measures, a bivariate meta-analysis model was subsequently applied, with additional calculation of the summary receiver operating characteristic (SROC) curve area to assess overall diagnostic test performance (typically, area under the curve (AUC) values exceeding 0.8 indicate effective diagnostic tests). Forest plots were utilised to present univariate meta-analysis findings, while SROC curves were constructed to illustrate bivariate model results.

Results

Literature search

After an extensive literature search, 158 records were retrieved, among them 46 from PubMed, 54 from Web of Science, and 58 from Scopus. In addition, 79 duplicates were identified and therefore excluded. The remaining studies' titles and abstracts were examined, a total of 33 studies were discarded due to study design, while two studies were not available in English. Finally, after a careful, thorough, and independent examination of 44 reports by the two researchers (M.R. and H.Đ.) with all discrepancies resolved by discussion until a consensus was reached, a total of three studies were included in the present review, as shown in Figure 1.

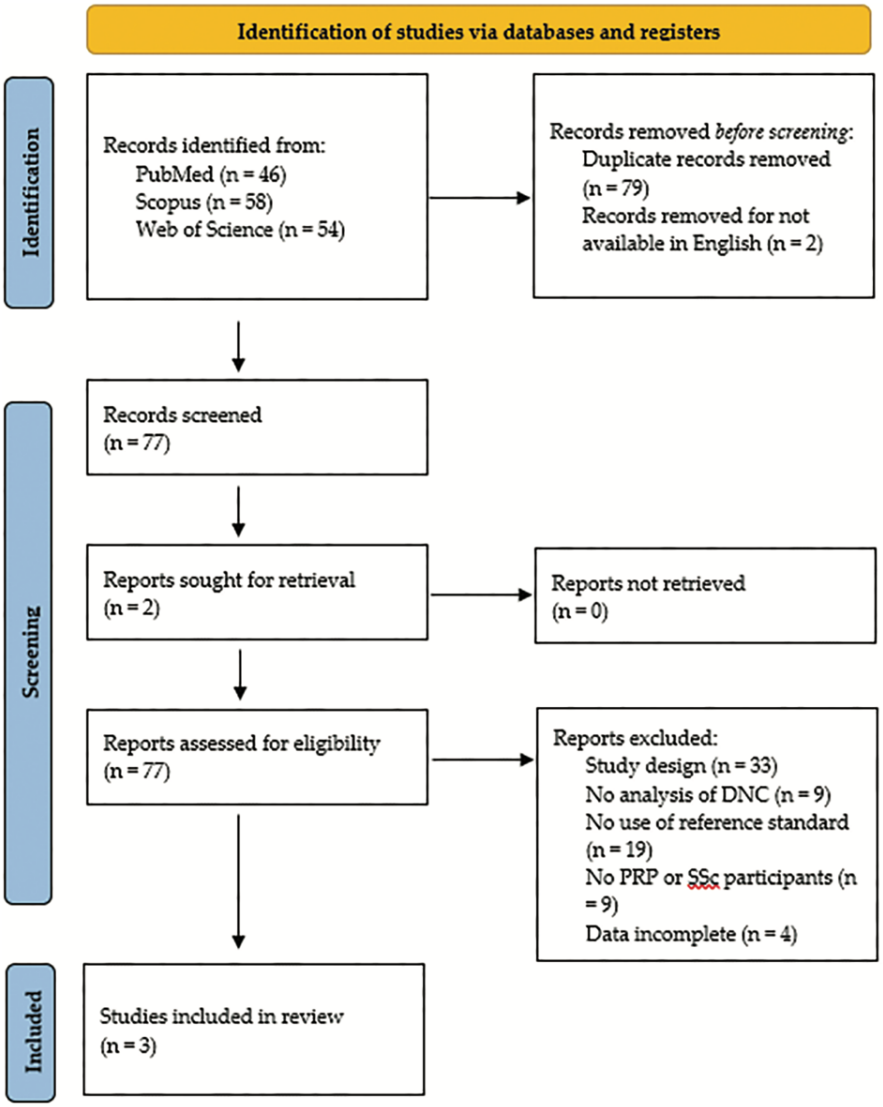


Fig. 1. Structural outline of the study selection process.

Characteristics of the included studies

In the three studies included in meta-analysis, participants were either diagnosed with SSc following the American College of Rheumatology/European League Against Rheumatism classification criteria (15) or referred for nailfold capillaroscopy examination due to primary Raynaud's phenomenon or other suspected connective tissue disease (CTD). All participants underwent standard capillaroscopy examination and dermatoscope-used nailfold capillaroscopy simultaneously or within 3 months' time apart. The summary of basic characteristics is listed in Table I. In all studies, DNC examinations were performed by a single or two experienced capillaroscopy providers, however certification of training was not documented. All studies used presence of avascular area and low capillary density, microhaemorrhages, and giant capillaries (old terminology megacapillaries) as a criterion for general definition of SSc-pattern. All extracted data from the included studies are summarised in Table II.

Table I. Basic characteristics of included studies.

Author and Year	Country	Participants	Sample Size (Total/Sample/Control)	Age (Years)	QUADAS-2 (Risk of Bias)
Parker *et al*., 2017 [16]	Australia	SSc *vs*. PRP/suspected CTD	65/23/42	53 ± 13 **	Moderate
Dinsdale *et al*., 2018 [6]	UK	SSc *vs*. HC	170/99/71	50.8 ± 11.9 **	Low
Monfort *et al*., 2024 [17]	France	SSc *vs*. PRP	105/34/71	46.46 ± 15.33 **	Low

* Median (IQR), ** Mean ± SD.
QUADAS-2: Revised Tool for the Quality Assessment of Diagnostic Accuracy Studies; SSc: systemic sclerosis; PRP: primary Raynaud's phenomenon; CTD: connective tissue disease; UK: United Kingdom; HC: healthy control.

Table II. Data for performing standard examination and DNC examinations.

Author and Year	Device used	Standard examination	Classification	Sensitivity	Specificity
Parker *et al*., 2017 [16]	Smartphone-dermatoscope	Stereomicroscope (x65)	Normal, non-specifically abnormal or the SSc pattern (21)	74%	95%
Dinsdale *et al*., 2018 [6]	Dermatoscope	NVC (x300)	Normal, early, active, late or non-specific (22)	60%	93%
Monfort *et al*., 2024 [17]	Dermatoscope	NVC (x300)	Presence of all analysed was regarded as SSc pattern (haemorrhages, megacapillaries, disorganization, avascular areas, low density)	38%	100%

SSc: systemic sclerosis; NVC: nailfold capillaroscopy.

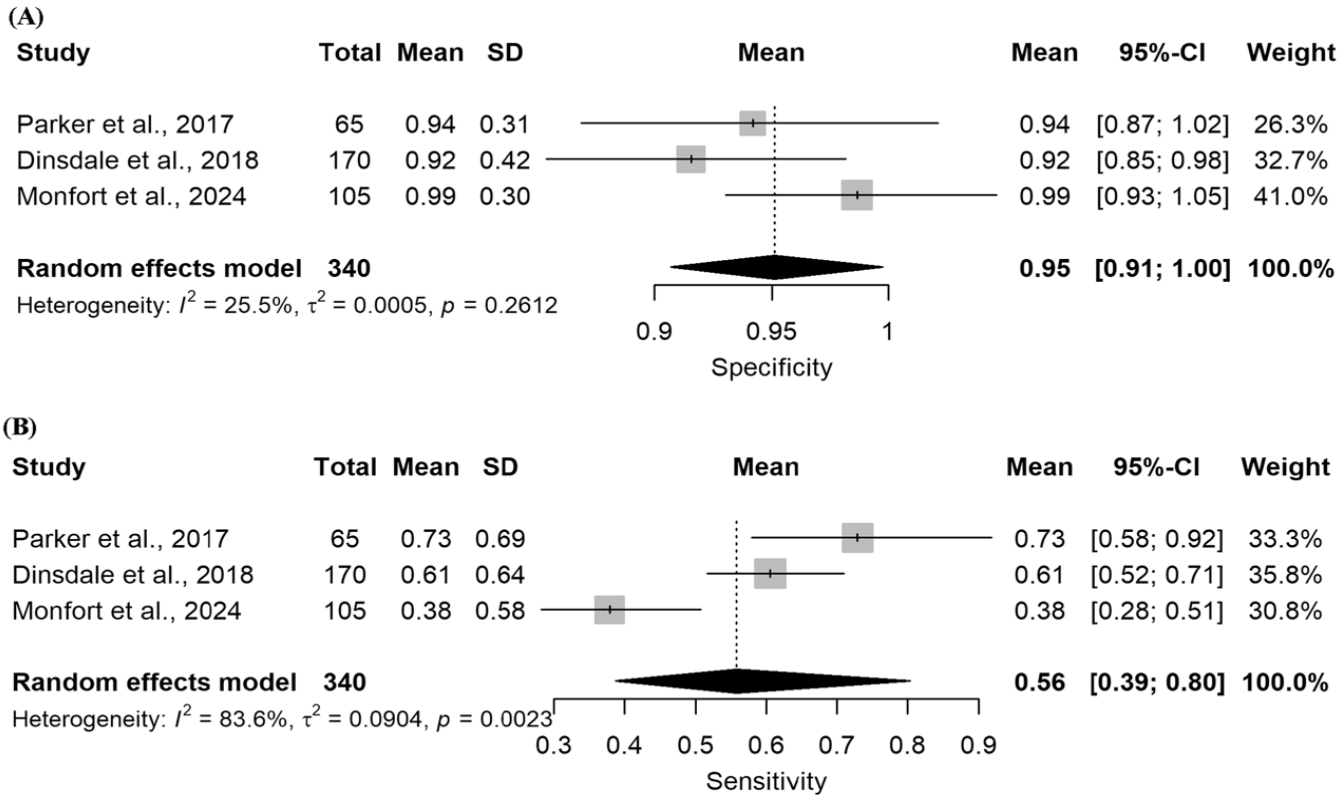


Fig. 2. Forest plots for univariate random-effects meta-analyses showing (**A**) specificity and (**B**) sensitivity of DNC, based on three studies.

Risk-of-bias and quality assessment
Regarding the risk-of-bias assessment, according to the QUADAS-2 evaluation, all studies had low to moderate risk of bias. More specifically, two studies showed low risk of bias, while one study showed moderate risk of bias, as shown in Table I. When applicability was assessed, all studies had low concerns.

Meta-analysis of DNC assessment

Three studies had available information on sensitivity and specificity data needed for formal analysis totalling 340 participants. Due to partially significant heterogeneity (I^2=25.5%, p=0.261 and 83.6%, p=0.002, respectively), firstly a univariate random-effects meta-analysis was conducted with overall specificity being 0.95 (95% CI 0.91–1), and overall sensitivity being 0.56 (95% CI 0.39–0.80), respectively. Forest plots depicting aforementioned analysis are presented in Figure 2.

The diagnostic odds ratio (DOR) of the univariate analysis of the three studies was 31.83 (95% CI 16.85–60.15), meaning that DNC is 31 times more likely to identify true positives compared to false positives.

Taking into account that the specificity and sensitivity of a diagnostic test are mutually dependent, we additionally performed a bivariate meta-analysis, and the SROC curve is depicted in Figure 3. The AUC value of the SROC curve was 0.895 which indicates moderate sensitivity and a low false-positive rate for the majority of the included studies.

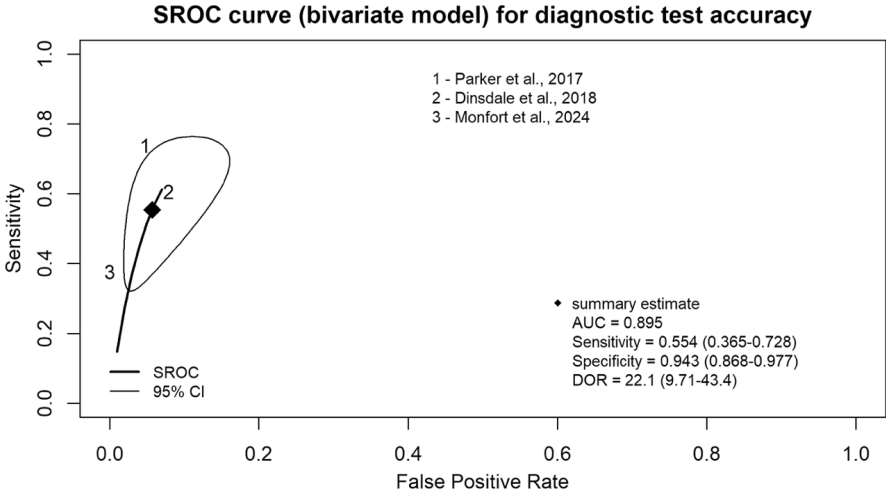


Fig. 3. SROC curve for diagnostic test accuracy obtained from the bivariate meta-analysis model.

Discussion

This meta-analysis showed that dermatoscopy achieves a sensitivity of approximately 56%, specificity of 95%, and an AUC of 0.895 for general detection of the SSc pattern compared to standard examination with NVC, indicating a significant level of diagnostic accuracy, particularly in confirming disease when specific abnormalities are present. Dermatoscopy has increasingly been recognised as a valuable initial alternative to NVC for the identification of a general scleroderma pattern in patients with Raynaud's phenomenon and suspected SSc.

Although NVC remains the gold standard due to its high magnification and capacity for detailed capillary quantification, it is limited by higher cost in resource-limited settings and can have limited portability due to the need for the vision, storing and analysis of the images on personal computers. These practical constraints have restricted its widespread adoption in routine clinical practice, especially in initial screening in primary care and outpatient rheumatology settings, despite its recognised diagnostic and prognostic value in SSc classification and monitoring (18, 19).

Dermatoscopy, by contrast, is a widely available, affordable, and easy-to-use tool that has demonstrated diagnostic performance for detecting key microvascular changes characteristic of the scleroderma pattern, such as giant capillaries, avascular areas (less capable of quantifying loss of capillaries), microhaemorrhages, and abnormal shapes (angiogenesis). In a multicentre study by Monfort *et al*. (the VASCULR trial), dermatoscopy showed a 100% positive predictive value for excluding a scleroderma pattern when none of the three hallmark features, angiogenesis, giant capillaries, low density, or avascular areas, were present, highlighting its reliability as an initial alternative triage tool (17).

Several studies have corroborated the diagnostic potential of dermatoscopy. Mazzotti *et al*. reported high sensitivity (over 91%) and good concordance (kappa values around 0.6–0.7) with NVC in detecting SSc patterns using both polarised and non-polarised dermatoscopy (20). Moreau *et al*. found that dermatoscopy identified abnormal capillary patterns with 87% sensitivity and that dermatoscopic abnormalities were significantly correlated with those observed via NVC, supporting its clinical utility even in the absence of advanced equipment (18). Furthermore, Parker *et al*. demonstrated that even novice non-specialists using smartphone-dermatoscope combinations could achieve diagnostic sensitivity of 70% and specificity of 90%, suggesting that dermatoscopy can be implemented broadly with minimal training and infrastructure for screening purposes (16).

However, regarding these pooled estimates, they remain highly sensitive to individual studies. As previously reported, specificity analysis remains relatively high while sensitivity analysis varies significantly throughout different studies (I^2=83.6%, p=0.002) (6, 16, 17). There are multiple possible reasons. Firstly, level and number of assessor experience can be a factor in under- or over-diagnosing SSc pattern. Generally, of three studies included, two reported to include experienced assessors [Dinsdale *et al*. (6) and Parker *et al*. (16)] while the third study did not report experience of assessor, only main specialty of the assessors (17), and only one study included 10 evaluators [Dinsdale *et al*. (6)] while others used one to two evaluators. As analysed by Parker *et al*., the level of experience can significantly affect the accuracy of performed test; differences in level of experience (expert, intermediate, and novice) showed increase in kappa values as experience deteriorated (0.736, 0.703, and 0.670, respectively) which reflected in sensitivity and specificity analysis which were lower in novice assessor (74% *vs*. 70% for sensitivity, and 95% *vs*. 90% for

specificity) (16). However, to alleviate a possibility of discrepancies, all studies conducted standardised education before assessment and calculated inter-rater and intra-rater variability which reported very good agreement in all studies (6, 16, 17).

Another reason for this significant heterogeneity could be found in slight criteria differences. Although all studies have the same general characteristics analysed as reported in Table II, all three express different classifications (21, 22) with Monfort *et al*. being the most rigorous one with requiring all pathological findings to be present as stated to confirm the disease (17). Importantly, the VASCUL-R trial revealed an important refinement regarding diagnostic criteria: when microhaemorrhages were included as a diagnostic criterion, sensitivity was substantially lower at 38%; however, when microhaemorrhages were excluded, sensitivity increased to 73% (17). Overall, haemorrhages were least predictive of having an NVC SSc pattern (17), and as a standalone criterion may be highly non-specific for screening purposes as it may create false negatives. Furthermore, reproducibility of criteria used is highly important if intended as a triage tool. As reported by Mazzotti *et al*., greatest reproducibility was found for avascular areas, megacapillaries, bizarre morphology, and haemorrhages with kappa values of 0.826-1 (20). This highlights the need to systematically evaluate the sensitivity, specificity, and reproducibility of each individual criterion used to identify the SSc pattern with dermatoscopy. Consequently, there is a stronger case for validating and standardizing the diagnostic criteria used in screening to ensure accuracy and consistency across different observers and settings.

The ease of use, speed and portability of dermatoscopy make it ideal for outpatient clinic screenings and in resource-limited environments. Unlike NVC and other stereoscopic microscopy techniques, which may require 20–30 minutes and technical expertise to perform and interpret, dermatoscopy can be performed as initial screening in presence of Raynaud's in a matter of minutes during a standard clinical consultation. Dogan *et al*. found no statistically significant diagnostic difference between dermatoscopy and NVC in identifying distinct nailfold capillary patterns in patients with SSc, despite NVC's superior imaging detail (23). However, the EULAR consensus-based study by Radić *et al*. demonstrated that while dermatoscopy reliably distinguishes overt scleroderma patterns from normal capillary morphology, a substantial proportion of assessments yield non-specific findings that cannot be definitively classified and therefore require follow-up with NVC for diagnostic clarification (9). Recently, in a study by Maldonado *et al*. evaluating overall image quality on different skin types, dermatoscopy had a high rate of uninterpretable examinations, particularly in African American Veterans and Fitzpatrick skin types IV–VI which furthermore highlighted device choice matters for equitable care as pigment-related limitations may reduce the usefulness of dermatoscopy in diverse populations. However, due to a small sample size further larger studies are needed (24).

In terms of this meta-analysis, although AUC value indicated a good practical test, sensitivity measures were slightly lower indicating that DNC would be a good triage tool for further evaluation. This underscores that dermatoscopy functions best as a preliminary screening tool within a sequential diagnostic pathway rather than as a standalone diagnostic test.

In SSc patients, NVC screening should be performed at least twice yearly for those with persistent Raynaud phenomenon, focusing on detection of giant capillaries (≥50μm diameter) which occur in 73% of SSc patients, and progressive capillary loss with scleroderma patterns (early, active, late) present in 88% of cases (25, 26). The key abnormalities to screen for include homogeneously dilated giant capillaries, and the combination of severe capillary density reduction (<3 capillaries/linear mm) and abnormal shapes indicative of neoangiogenesis, as formulated in the Fast track algorithm as these specific findings differentiate secondary from primary Raynaud's phenomenon and predict future organ involvement including digital ulcers and interstitial lung disease (25). International multi-centre studies reveal that while experts can achieve perfect agreement ($\varkappa$=1.0), the Fast Track algorithm training enables novices to reach excellent reliability (mean Cohen's $\varkappa$ 0.96-0.98) within just 45 minutes of instruction, highlighting solving the challenge of standardization across different experience levels and the potential for rapid skill acquisition with proper educational tools (27).

This study, although it highlights the potential advantages of dermatoscope usage in performing a screening nailfold capillaroscopy, has certain limitations. Firstly, a small number of studies included indicates a need for further studies evaluating dermatoscope use. Secondly, while two studies used NVC as a reference standard, one included study used stereomicroscopy. Further studies should focus primarily on comparing dermatoscope use against current gold standard, NVC, although stereomicroscope is a valid tool still used in nailfold capillaroscopy (1). Although dermatoscopy has limitations, most notably its lower sensitivity compared to NVC and a relatively higher rate of non-interpretable images (ranging from 20% up to 30%), its high specificity, ease of use, and broad availability make it a valuable initial screening tool. It is especially effective for identifying patients who need further diagnostic evaluation with NVC, thus optimising resource allocation and reducing unnecessary referrals. With growing interest in telemedicine, the use of smartphone-connected dermatoscopy further expands the feasibility of remote assessments and longitudinal monitoring, offering a scalable solution for early disease detection and triage in patients with PRP and suspected SSc. However, caution is advised in general evaluation due to variable sensitivity estimations.

Acknowledgements

V. Smith is senior clinical investigator of the Research Foundation-Flanders (Belgium) (FWO) [1802925N]. The FWO was not involved in study de-

sign, collection, analysis and interpretation of data, writing of the report, nor in the decision to submit the article for publication.

Affiliations

[1]Department of Internal Medicine, Division of Rheumatology, Allergology, and Clinical Immunology, University Hospital of Split, Croatia; [2]Internal Medicine Department, University of Split School of Medicine, Split, Croatia; [3]Department of Neurology, University Hospital of Split, Croatia; [4]Rheumatology Department, Vanderbilt University Medical Center, Nashville, TN, USA; [5]Department of Internal Medicine, Division of Rheumatology, University of Nebraska Medical Center, Omaha, NE, USA; [6]Mediterranean Institute for Life Sciences (MedILS), University of Split, Croatia; [7]Department of Internal Medicine, Division of Nephrology, Dialysis and Arterial Hypertension, University Hospital of Split, Croatia; [8]Internal Medicine, Vanderbilt University Medical Center and Tennessee Valley Healthcare System Nashville, TN, USA; [9]Laboratory of Experimental Rheumatology and Academic Division of Clinical Rheumatology, Department of Internal Medicine, University of Genova; IRCCS San Martino Polyclinic, Genova, Italy; [10]Department of Internal Medicine, Ghent University, Ghent; Department of Rheumatology, Ghent University Hospital, Ghent; Unit for Molecular Immunology and Inflammation, VIB Inflammation Research Center (IRC), Ghent, Belgium.

References

1. SMITH V, ICKINGER C, HYSA E *et al*.: Nailfold capillaroscopy. *Best Pract Res Clin Rheumatol* 2023; 37(1): 101849. https://doi.org/10.1016/j.berh.2023.101849
2. SMITH V, HERRICK AL, INGEGNOLI F *et al*.: Standardisation of nailfold capillaroscopy for the assessment of patients with Raynaud's phenomenon and systemic sclerosis. *Autoimmun Rev* 2020; 19(3): 102458. https://doi.org/10.1016/j.autrev.2020.102458
3. MA Z, MULDER DJ, GNIADECKI R, COHEN TERVAERT JW, OSMAN M: Methods of Assessing Nailfold Capillaroscopy Compared to Video Capillaroscopy in Patients with Systemic Sclerosis—A Critical Review of the Literature. *Diagnostics* 2023; 13(13): 2204. https://doi.org/10.3390/diagnostics13132204
4. HERRICK AL, BERKS M, TAYLOR CJ: Quantitative nailfold capillaroscopy - Update and possible next steps. *Rheumatology* (Oxford) 2021; 60(5): 2054-65. https://doi.org/10.1093/rheumatology/keab006
5. SEKIYAMA JY, CAMARGO CZ, ANDRADE LEC, KAYSER C: Reliability of widefield nailfold capillaroscopy and videocapillaroscopy in the assessment of patients with raynaud's phenomenon. *Arthritis Care Res* (Hoboken) 2013; 65(11): 1853-61. https://doi.org/10.1002/acr.22054
6. DINSDALE G, PEYTRIGNET S, MOORE T *et al*.: The assessment of nailfold capillaries: Comparison of dermoscopy and nailfold videocapillaroscopy. *Rheumatology* (Oxford) 2018; 57(6): 1115-6. https://doi.org/10.1093/rheumatology/key018
7. ARANA-RUIZ JC, SILVEIRA LH, CASTILLO-MARTÍNEZ D, AMEZCUA-GUERRA LM: Assessment of nailfold capillaries with a handheld dermatoscope may discriminate the extent of organ involvement in patients with systemic sclerosis. *Clin Rheumatol* 2016; 35(2): 479-82. https://doi.org/10.1007/s10067-015-3112-x
8. BERGMAN R, SHARONY L, SCHAPIRA D, NAHIR MA, BALBIR-GURMAN A: The handheld dermatoscope as a nail-fold capillaroscopic instrument. *Arch Dermatol* 2003; 139(8): 1027-30. https://doi.org/10.1001/archderm.139.8.1027
9. RADIĆ M, SNOW M, FRECH T, SAKETKOO LESLEY, CUTOLO M, SMITH V: Consensus-based evaluation of dermatoscopy versus nailfold videocapillaroscopy in Raynaud's phenomenon linking USA and Europe: a European League against Rheumatism study group on microcirculation in rheumatic diseases project. *Clin Exp Rheumatol* 2020; 38 (Suppl. 125): S132-6.
10. MCINNES MDF, MOHER D, THOMBS BD *et al*.: Preferred Reporting Items for a Systematic Review and Meta-analysis of Diagnostic Test Accuracy Studies The PRISMA-DTA Statement. *JAMA* 2018; 319(4): 388-96. https://doi.org/10.1001/jama.2017.19163
11. WHITING PF, RUTJES AWS, WESTWOOD ME *et al*.: Quadas-2: A revised tool for the quality assessment of diagnostic accuracy studies. *Ann Intern Med* 2011; 155(8): 529-36. https://doi.org/10.7326/0003-4819-155-8-201110180-00009
12. R CORE TEAM. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing; Vienna, Austria. https://www.r-ProjectOrg/2020 (Accessed on 10 January 2023).
13. BALDUZZI S, RÜCKER G, SCHWARZER G: How to perform a meta-analysis with R: A practical tutorial. *Evid Based Ment Health* 2019; 22: 153-160. n.d.
14. PHILIPP DOEBLER WITH CONTRIBUTIONS FROM BERNARDO SOUSA-PINTO. MADA: Meta-Analysis of Diagnostic Accuracy. https://CRANR-ProjectOrg/Package=mada (Accessed on 10 January 2023).
15. VAN DEN HOOGEN F, KHANNA D, FRANSEN J *et al*.: 2013 classification criteria for systemic sclerosis: An American College of Rheumatology/European League against Rheumatism collaborative initiative. *Arthritis Rheum* 2013; 65(11): 2737-2747. https://doi.org/10.1002/art.38098.
16. PARKER MJS, OLIFFE MT, MCGILL NW: An evaluation of two novel capillaroscopy techniques in suspected scleroderma-spectrum disorders: A single-centre cross-sectional study. *Mod Rheumatol* 2018; 28(4): 676-80. https://doi.org/10.1080/14397595.2017.1404179
17. MONFORT JB, KLEJTMAN T, LAZARETH I *et al*.: Nailfold dermoscopy predicts the absence of a capillaroscopy sclerodermic pattern: The multicentre, prospective VASCULR trial. *J Eur Acad Dermatol Venereol* 2024; 38(10): 1982-7. https://doi.org/10.1111/jdv.19803
18. MOREAU J, DUPOND AS, DAN N, UNTEREINER T, VIDAL C, AUBIN F: Évaluation comparative de la dermatoscopie et de la capillaroscopie dans le phénomène de Raynaud. *Ann Dermatol Venereol* 2017; 144(5): 333-40. https://doi.org/10.1016/j.annder.2017.02.004
19. HUGHES M, MOORE T, O'LEARY N *et al*.: A study comparing videocapillaroscopy and dermoscopy in the assessment of nailfold capillaries in patients with systemic sclerosis-spectrum disorders. *Rheumatology* (Oxford) 2015; 54(8): 1435-42. https://doi.org/10.1093/rheumatology/keu533
20. MAZZOTTI NG, BREDEMEIER M, BRENOL CV, XAVIER RM, CESTARI TF: Assessment of nailfold capillaroscopy in systemic sclerosis by different optical magnification methods. *Clin Exp Dermatol* 2014; 39(2): 135-41. https://doi.org/10.1111/ced.12254
21. MARICQ HR: Comparison of quantitative and semiquantitative estimates of nailfold capillary abnormalities in scleroderma spectrum disorders. *Microvasc Res* 1986; 32(2): 271-6. https://doi.org/10.1016/0026-2862(86)90062-2
22. CUTOLO M, SULLI A, PIZZORNI C, ACCARDO S: Nailfold videocapillaroscopy assessment of microvascular damage in systemic sclerosis. *J Rheumatol* 2000; 27(1): 155-60.
23. DOGAN S, AKDOGAN A, ATAKAN N: Nailfold capillaroscopy in systemic sclerosis: Is there any difference between videocapillaroscopy and dermatoscopy? *Skin Res Technol* 2013; 19(4): 446-9. https://doi.org/10.1111/srt.12067
24. MALDONADO G, CUTOLO M, FRECH T, RADIĆ M, SNOW M, SMITH V: Dermatoscopy limitation and the critical role of capillaroscopy in the evaluation of systemic sclerosis and Raynaud's phenomenon among African American Veterans. *Semin Arthritis Rheum* 2026. https://doi.org/10.1016/j.semarthrit.2026.152961
25. CUTOLO M, SMITH V: Detection of microvascular changes in systemic sclerosis and other rheumatic diseases. *Nat Rev Rheumatol* 2021; 17(11): 665-77. https://doi.org/10.1038/s41584-021-00685-0
26. HYSA E, PIZZORNI C, SAMMORÌ S *et al*.: Microvascular damage in autoimmune connective tissue diseases: a capillaroscopic analysis from 20 years of experience in a EULAR training and research referral centre for imaging. *RMD Open* 2023; 9(3): e003071. https://doi.org/10.1136/rmdopen-2023-003071
27. SMITH V, VANHAECKE A, HERRICK AL *et al*.: Fast track algorithm: How to differentiate a "scleroderma pattern" from a "non-scleroderma pattern". *Autoimmun Rev* 2019; 18(11): 102394. https://doi.org/10.1016/j.autrev.2019.102394