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Diagnostic accuracy of clinical and laboratory tests in scabies: A systematic review

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ABSTRACT

Scabies is a highly contagious parasitic skin disease with significant global morbidity. Accurate diagnosis is essential for effective treatment and control; however, clinical manifestations are often nonspecific, and the performance of available diagnostic methods varies considerably. This systematic review synthesizes evidence on the diagnostic accuracy of clinical and laboratory-based tests for scabies. It followed PRISMA 2020 guidelines. A search of PubMed, Embase, and Web of Science was conducted between 2007 and December 2025 for studies evaluating the diagnostic accuracy of clinical diagnoses.skin scraping, adhesive tape testing, dermoscopy, and polymerase chain reaction (PCR). Eligible studies included human participants and reported sensitivity and/or specificity. Reference standards varied (clinical diagnosis, microscopy, skin scraping, dermoscopy). Two reviewers independently screened studies, extracted data, and assessed quality using QUADAS-2. When sufficient 2×2 data were available, specificity and predictive values were calculated. Due to heterogeneity, a narrative synthesis was conducted. Ten studies (2007–2025) involving 1,054 participants across Africa, Asia, Europe, and the Middle East were included. Skin scraping and adhesive tape testing demonstrated consistently high sensitivity, reaching up to 100% in studies using clinical diagnosis as the reference. Dermoscopy showed variable sensitivity (46–86%), influenced by operator expertise and patient factors. In studies with extractable data, dermoscopy versus microscopy yielded a specificity of 80.95%, with positive and negative predictive values of 84.0% and 85.0%. PCR showed high but heterogeneous sensitivity (74–100%), with improved performance using standardized sampling. Specificity reporting was inconsistent, limiting evaluation of false-positive rates. Skin scraping and adhesive tape testing remain the most sensitive diagnostic methods when mite material is present. Dermoscopy and PCR are useful complementary tools, though performance varies. An integrated diagnostic approach is recommended, and findings should be interpreted cautiously due to heterogeneity and variable reference standards.

ABTRAK

Skabies merupakan penyakit kulit parasitik yang sangat menular dengan morbiditas global yang signifikan. Diagnosis yang akurat penting untuk terapi dan pengendalian, namun manifestasi klinis sering tidak spesifik dan akurasi berbagai metode diagnostik masih bervariasi. Tinjauan sistematis ini bertujuan untuk mempelajari akurasi diagnosis klinis dan metode laboratorium untuk skabies. Tinjauan sistematis dilakukan sesuai pedoman PRISMA 2020. Pencarian pada PubMed, Embase, dan Web of Science dilakukan dalam rentang waktu 2207 hingga Desember 2025 untuk studi yang mengevaluasi akurasi diagnostik dari diagnosis klinis, kerokan kulit, adhesive tape test, dermoskopi, dan polymerase chain reaction (PCR). Studi yang memenuhi kriteria adalah studi yang melibatkan subjek manusia dan melaporkan sensitivitas dan/atau spesifisitas. Standar baku bervariasi, termasuk diagnosis klinis, mikroskopi, kerokan kulit, dan dermoskopi. Dua peneliti secara independen melakukan seleksi studi, ekstraksi data, dan penilaian kualitas menggunakan QUADAS-2. Penghitungan data 2×2, spesifisitas dan nilai prediktif dihitung jika data tersedia. Sepuluh studi (2007–2025) dengan total 1.054 partisipan dari Afrika, Asia, Eropa, dan Timur Tengah memenuhi kriteria inklusi. Kerokan kulit dan adhesive tape test menunjukkan sensitivitas tinggi secara konsisten, mencapai hingga 100% pada studi dengan diagnosis klinis sebagai standar baku. Dermoskopi menunjukkan sensitivitas bervariasi (46–86%), dipengaruhi oleh keahlian operator dan faktor pasien. Pada studi dengan data yang dapat dianalisis, dermoskopi dibandingkan mikroskopi memiliki spesifisitas 80,95%, dengan nilai prediktif positif 84,0% dan negatif 85,0%. Metode PCR menunjukkan sensitivitas tinggi namun heterogen (74–100%), dengan akurasi lebih baik pada teknik pengambilan sampel yang terstandar. Pelaporan spesifisitas masih terbatas. Kerokan kulit dan adhesive tape test menjadi metode paling sensitif untuk diagnosis skabies ketika material tungau tersedia. Dermoskopi dan PCR merupakan metode tambahan yang berguna dalam konteks tertentu, meskipun performanya bervariasi. Pendekatan diagnosis terintegrasi direkomendasikan, dengan interpretasi hasil yang hati-hati mengingat heterogenitas dan variasi standar acuan.

Keywords:
scabies;
diagnostic accuracy;
skin scraping;
dermoscopy;
PCR;
sensitivity

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INTRODUCTION

Scabies is a common and highly contagious parasitic skin infestation caused by *Sarcoptes scabiei* var. hominis. It remains a major global public health concern, particularly in low-resource and overcrowded settings.[1] It affects individuals of all ages and is associated with considerable morbidity due to intense pruritus, secondary bacterial infections, and serious complications such as post-streptococcal glomerulonephritis and rheumatic heart disease.[2] Beyond individual morbidity, scabies contributes to outbreaks in institutional and community settings, increasing healthcare burden and transmission risk.[3] These clinical and public health impacts highlight the critical importance of accurate and timely diagnosis of scabies.

Scabies is often difficult to diagnose because its clinical manifestations are variable and can resemble other inflammatory or infectious dermatoses, despite its high prevalence.[4] Typical signs such as burrows, papules, and pruritus may be absent or subtle, particularly in early disease, atypical presentations, or patients with low mite burden.[5] Diagnosis based solely on clinical assessment is therefore highly dependent on clinician experience and epidemiological context.[6] Consequently, reliance on clinical features alone may result in misdiagnosis or delayed treatment.

Several laboratory-based and non-invasive diagnostic methods have been developed and applied in clinical practice to improve diagnostic certainty.[7] Direct microscopic visualization of *Sarcoptes scabiei* mites, eggs, or fecal pellets obtained by skin scraping or adhesive tape testing is widely regarded as the gold standard for the diagnosis of scabies due to its high specificity.[1] However, this method is limited by operator expertise, sampling technique, and mite burden, which may result in false-negative findings, particularly in early or mild disease. Conventional techniques such as skin scraping and adhesive tape testing rely on direct microscopic visualization of mites or their products, but their sensitivity may be limited by sampling technique and disease severity.[8] Dermoscopy provides a rapid, non-invasive alternative, while molecular methods such as polymerase chain reaction (PCR) have been introduced to enhance detection, particularly in challenging cases.[9] However, reported diagnostic accuracy varies widely among these methods, leading to uncertainty regarding their optimal use in routine practice.

The absence of a universally accepted reference standard and the variability in diagnostic performance reported across studies make a systematic synthesis of the available evidence urgently needed. This systematic review aims to summarize and critically appraise the diagnostic accuracy of clinical diagnosis and laboratory-based tests for scabies, including skin scraping, adhesive tape testing, dermoscopy, and PCR, with emphasis on effect estimates and confidence intervals to inform evidence-based diagnostic strategies.

METHODS

Study design

This systematic review was conducted in accordance with the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.[10] The review protocol was developed a priori to ensure methodological transparency, reproducibility, and rigor in synthesizing evidence on the diagnostic accuracy of clinical and laboratory tests for scabies. The review process followed predefined objectives, eligibility criteria, search strategies, data extraction procedures,

and quality appraisal methods to minimize bias and enhance the reliability of findings.

Literature search strategy

A comprehensive literature search was performed in PubMed, Embase, and Web of Science from database inception to December 2025. The search strategy combined controlled vocabulary terms (Medical Subject Headings [MeSH] and Emtree terms) and free-text keywords related to "scabies," "Sarcoptes scabiei," "diagnosis," "diagnostic accuracy," "sensitivity," "specificity," "dermoscopy," "skin scraping," "adhesive tape test," and "polymerase chain reaction." Boolean operators (AND, OR) and truncation were applied to optimize search sensitivity and specificity. No restrictions were placed on publication date or study design. Searches were limited to studies involving human participants. The reference lists of included articles and relevant reviews were manually screened to identify additional eligible studies. Detailed search strategies for each database are provided in TABLE 1.

TABLE 1. Search strategies used for online databases

Database	Search strategies	Records
PubMed	("Scabies"[Mesh] OR scabies OR "Sarcoptes scabiei" OR "Sarcoptic scabies") AND (("Diagnosis"[Mesh] OR diagnosis OR diagnostic OR "clinical diagnosis" OR rash OR burrows OR pruritus OR itch*) AND ("Skin Tests"[Mesh] OR "adhesive tape test" OR microscopy OR "skin scraping" OR dermoscopy OR "dermatoscopy" OR PCR OR "polymerase chain reaction" OR laboratory OR lab OR "reference standard")) AND ("Sensitivity and Specificity"[Mesh] OR "Predictive Value of Tests"[Mesh] OR "Likelihood Functions"[Mesh] OR sensitivity OR specificity OR "positive predictive value" OR "negative predictive value" OR "likelihood ratio*" OR accuracy)	1311
Medline and EMBASE	('scabies'/exp OR scabies OR 'sarcoptes scabiei') AND (('diagnosis'/exp OR diagnosis OR diagnostic OR 'clinical diagnosis' OR rash OR burrows OR pruritus OR itch*) AND ('skin test'/exp OR 'adhesive tape test' OR microscopy OR 'skin scraping' OR dermoscopy OR dermat* OR PCR OR 'polymerase chain reaction' OR laboratory OR lab OR 'reference standard')) AND ('sensitivity'/exp OR sensitivity OR specificity OR 'predictive value'/exp OR 'predictive value' OR 'positive predictive value' OR 'negative predictive value' OR 'likelihood ratio'/exp OR 'likelihood ratio*' OR accuracy OR 'diagnostic accuracy')	1240
Web of Science	TS=("scabies" OR "Sarcoptes scabiei") AND TS=("diagnosis" OR "diagnostic" OR "clinical diagnosis" OR rash OR burrows OR pruritus OR itch*) AND TS=("skin scraping" OR microscopy OR dermoscopy OR dermat* OR PCR OR "adhesive tape test" OR "reference standard" OR laboratory OR lab) AND TS=("sensitivity" OR "specificity" OR "positive predictive value" OR "negative predictive value" OR "likelihood ratio*" OR accuracy OR "diagnostic accuracy")	1123

Eligibility criteria

Studies were eligible for inclusion if they evaluated the diagnostic accuracy of clinical or laboratory-based tests for scabies in patients of any age with suspected scabies. Eligible index tests included clinical diagnosis (e.g., presence of rash, burrows, or pruritus), skin scraping, adhesive tape testing, dermoscopy, and polymerase chain reaction (PCR). Reference standards included clinical diagnosis, microscopy, skin scraping, dermoscopy, or other laboratory confirmation methods. Studies were required to report at least one diagnostic accuracy outcome, such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), likelihood ratios, or sufficient data to calculate these measures, preferably with 95% confidence intervals. Eligible study designs included prospective or retrospective diagnostic accuracy studies and cross-sectional studies. Studies were excluded if they were animal or laboratory-only studies, review articles, conference abstracts without full text, editorials, opinion papers, or if they lacked sufficient data to assess diagnostic accuracy.

Study selection and data extraction

All retrieved records were imported into reference management software, and duplicate entries were removed prior to screening. Two independent reviewers screened titles and abstracts, followed by a full-text review of potentially eligible studies. Discrepancies were resolved through discussion or consultation with a third reviewer when necessary. Data extraction was performed independently using a standardized data extraction form. Extracted information included author, publication year, country, study design, sample size, participant characteristics, index test(s), reference standard(s), and reported diagnostic accuracy outcomes, including effect estimates and 95% confidence intervals where available. Methodological quality and risk of bias of the included studies were assessed independently by two reviewers using QUADAS-2 domain-based judgments (patient selection, index test, reference standard, and flow and timing). For each domain, signaling questions were used to guide judgments as low, high, or unclear risk of bias, and applicability concerns were considered separately. High-risk judgments were assigned particularly when the reference standard was non-independent from the index test, when incorporation of clinical judgment or dermoscopy into the reference standard was evident, or when flow and timing were insufficiently described. Disagreements were resolved by consensus. When studies provided sufficient raw 2×2 data, additional diagnostic accuracy measures such as specificity, positive predictive value, and negative predictive value were calculated. The results of the quality appraisal are summarized in TABLE 2.

TABLE 2. Quality assessment and risk of bias of included studies

Study (Year)	Patient Selection	Index Test	Reference Standard	Flow & Timing	Applicability Concerns
Abdel-Latif *et al.*,[11]	Low	Low	High	Low	Low
Bae *et al.*,[12]	Low	Low	Low	Low	Low
Chung *et al.*,[13]	Low	Low	Low	Low	Low
Delaunay *et al.*,[14]	Low	Low	High	Low	Low
Dupuy *et al.*,[15]	Low	Low	Low	Low	Low
Enechukwu *et al.*,[16]	Low	Low	Low	Low	Low
Hahm *et al.*,[17]	Low	Low	Low	Low	Low
Walter *et al.*,[18]	Low	Low	High	Low	Low
Wong *et al.*,[19]	Low	Low	Low	Low	Low
Zorbozan *et al.*,[20]	Low	Low	Low	Low	Low

Note: QUADAS-2 judgments were guided by explicit signaling-question criteria. Patient selection was considered high risk when clearly non-consecutive or case-control sampling was used; index test was considered high risk when interpretation was not independent of the reference standard or thresholds were applied post hoc; reference standard was considered high risk when clinical diagnosis or dermoscopy formed part of the confirmation process without independent verification; and flow and timing was considered high risk when not all participants underwent the same reference standard or when timing was unclear

Data synthesis

A quantitative meta-analysis was not performed due to substantial heterogeneity among the included studies in terms of study design, index tests, reference standards, and reported diagnostic accuracy measures. Instead, a narrative synthesis was conducted. Diagnostic accuracy outcomes were summarized descriptively by test modality, with particular emphasis on effect estimates and 95% confidence intervals. Variations in diagnostic performance were explored in relation to study setting, patient population, sampling technique, and reference standard.

RESULTS

Study selection

The systematic database search identified a total of 3,674 records from PubMed (n = 1,311), Embase (n = 1,240), and Web of Science (n = 1,123). After removing 1,602 duplicate records, 2,072 unique articles remained for title and abstract screening. Of these, 1,912 articles were excluded as they were not relevant to scabies diagnosis or did not assess diagnostic accuracy. A total of 160 full-text articles were sought for retrieval, of which 8 articles were not accessible. Consequently, 152 full-text articles were assessed for eligibility. After full-text review, 142 studies were excluded for the following reasons: inappropriate index test or reference standard (n = 58), absence of diagnostic accuracy outcomes (n = 61), conference abstracts or review articles (n = 15), and non-English publications (n = 8). Ultimately, 10 studies published between 2007 and 2025 met the inclusion criteria and were included in this systematic review. The study selection process is illustrated in FIGURE 1.

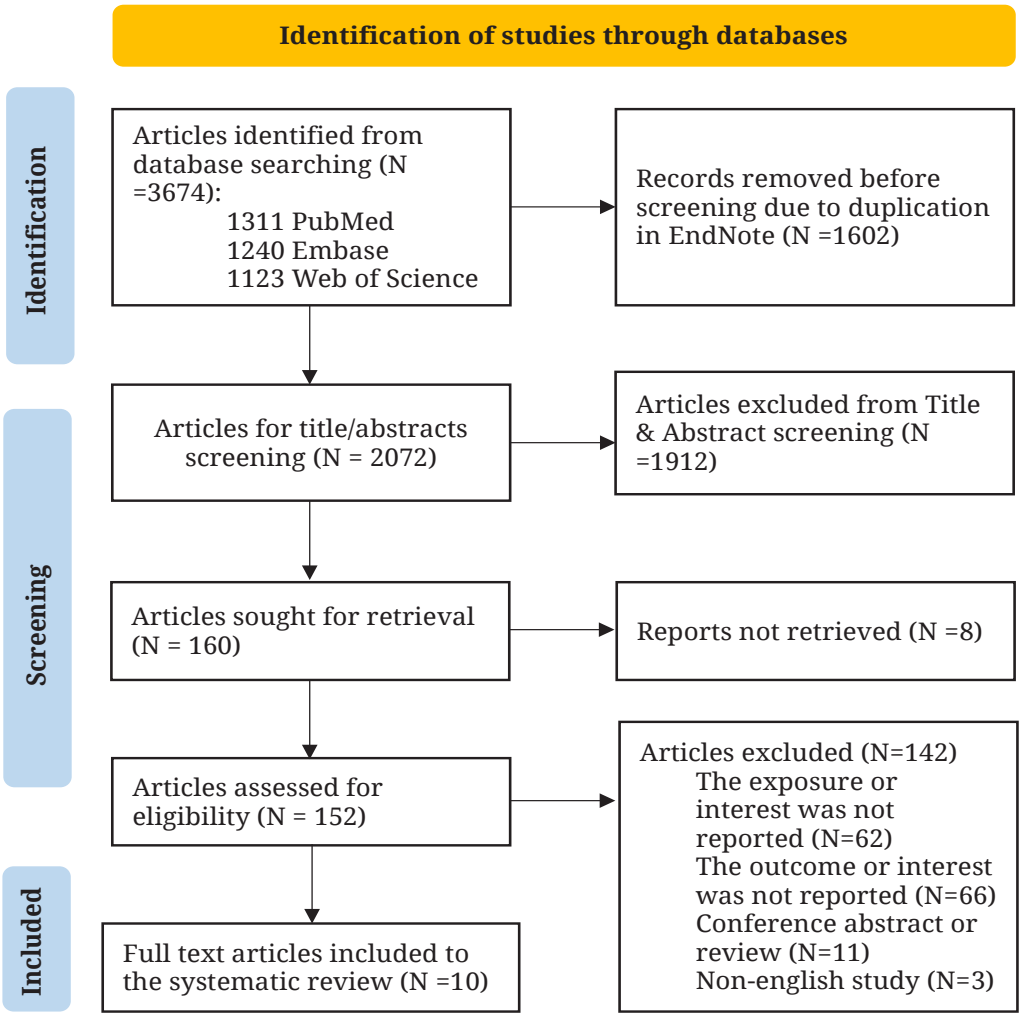

FIGURE 1

Study characteristics

The 10 included studies were conducted across Africa (n = 2), Asia (n = 4), Europe (n = 3), and the Middle East (n = 1), demonstrating broad geographical representation. All studies included patients of all ages with suspected scabies, recruited from dermatology clinics, hospitals, or community-based settings. Sample sizes ranged from 42 to 245 participants, with a total pooled sample of 1,054 individuals. The evaluated diagnostic modalities included skin scraping (n = 3 studies), adhesive tape test (n = 2), dermoscopy (n = 4), and polymerase chain reaction (PCR) (n = 5). Several studies assessed more than one diagnostic test. Reference standards varied across studies and included clinical diagnosis, microscopy, skin scraping, and dermoscopy. Diagnostic accuracy outcomes were primarily reported as sensitivity, with fewer studies reporting specificity or predictive values. Regarding risk of bias, patient selection and index test domains were generally judged as low risk, whereas three studies were judged as high risk in the reference standard domain because the reference standard incorporated clinical diagnosis or dermoscopy without clear independent confirmation. A detailed summary of study characteristics is provided in TABLE 3.

Diagnostic accuracy of skin scraping and adhesive tape tests

Three studies evaluated skin scraping as a diagnostic method for scabies. Abdel-Latif *et al.*,[11] reported a sensitivity of

100% (95% CI: 95.26–100.00) in a cohort of 100 patients using clinical diagnosis as the reference standard. Similarly, Walter *et al*.,[18] reported a sensitivity of 100% (95% CI: 94.00–100.00) among 113 participants. Zorbozan *et al*.,[20] comparing skin scraping with superficial skin biopsy, demonstrated strong agreement between the two methods, supporting the reliability of skin scraping as a laboratory diagnostic tool. Two studies evaluated the adhesive tape test. Abdel-Latif *et al*.,[11] reported a sensitivity of 100% (95% CI: 95.70–100.00), while Walter *et al*.,[18] again observed a sensitivity of 100% (95% CI: 94.00–100.00). Across studies, both skin scraping and adhesive tape testing consistently demonstrated very high sensitivity.

TABLE 3. Characteristics of studies that included in systematic review

Author	Year	Subgroup age	Country	Title	Total Sample Size	Test Name	Confirmation of Scabies	Journal
Abdel-Latif *et al*.,[11]	2018	All age	Egypt	Comparing the diagnostic properties of skin scraping, adhesive tape, and dermoscopy in diagnosing scabies	100	Skin scraping, Adhesive Tape, Dermoscopy	Clinical Diagnosis	Acta Dermatovenerol
Bae *et al*.,[12]	2020	All age	Republic of Korea	Diagnostic value of the molecular detection of Sarcoptes scabiei from a skin scraping in patients with suspected scabies	47	PCR	Microscopy	PLoS Negl Trop Dis
Chung *et al*.,[13]	2023	All age	Republic of Korea	Standardized cotton swab sampling with nested quantitative polymerase chain reaction is effective for diagnosing ordinary scabies	120	PCR	Microscopy	Clin Exp Dermatol
Delaunay *et al*.,[14]	2020	All age	France	Scabies polymerase chain reaction with standardized dry swab sampling: an easy tool for cluster diagnosis of human scabies	164	PCR	Dermoscopy	Br J Dermatol
Dupuy *et al*.,[15]	2007	All age	France	Accuracy of standard dermoscopy for diagnosing scabies	245	Dermoscopy	Skin scraping	J Am Acad Dermatol
Enechukwu *et al*.,[16]	2025	All age	Nigreria	Assessing the accuracy of dermoscopy for scabies diagnosis in dark African skin	60	Dermoscopy	Microscopy	Dermatol Pract Concept
Hahm *et al*.,[17]	2018	All age	Korea	The efficacy of a nested polymerase chain reaction in detecting the cytochrome c oxidase subunit 1 gene of Sarcoptes scabiei var. hominis for diagnosing scabies	63	PCR	Microscopy	Br J Dermatol
Walter *et al*.,[18]	2011	All age	Germany	Comparison of dermoscopy, skin scraping, and the adhesive tape test for the diagnosis of scabies in a resource-poor setting	113	Skin scraping, Adhesive Tape, Dermoscopy	Clinical Diagnosis	Arch Dermatol
Wong *et al*.,[19]	2015	All age	Hong Kong	Development of Conventional and Real-Time Quantitative PCR Assays for Diagnosis and Monitoring of Scabies	100	PCR	Microscopy	J Clin Microbiol
Zorbozan *et al*.,[20]	2020	All age	Turkey	Comparison of Skin Scraping and Standard Superficial Skin Biopsy in the Laboratory Diagnosis of Scabies	42	Skin scraping	Skin scraping	Turkiye Parazitol Derg

TABLE 4. 2×2 contingency TABLE for dermoscopy vs microscopy

Dermoscopy Result	Microscopy Positive	Microscopy Negative
Positive	42	8
Negative	6	34

Diagnostic accuracy of dermoscopy

Four studies assessed dermoscopy for the diagnosis of scabies, with reported sensitivities ranging from 46.0% to 86.0%. Abdel-Latif *et al.*,[11] reported a sensitivity of 84.41% (95% CI: 74.36–91.68), while Dupuy *et al.*,[15] reported a sensitivity of 86.00% (95% CI: 80.00–92.00). In contrast, Walter *et al.*,[18] reported a substantially lower sensitivity of 46.00% (95% CI: 34.00–58.00). Enechukwu *et al.*,[16] highlighted diagnostic challenges when using dermoscopy in individuals with darker skin tones, which may contribute to reduced diagnostic accuracy. In the study that provided a complete 2×2 TABLE, dermoscopy versus microscopy yielded a specificity of 80.95% (34/42), a positive predictive value of 84.0% (42/50), and a negative predictive value of 85.0% (34/40). Overall, dermoscopy demonstrated moderate to high sensitivity, but with considerable variability across studies, likely reflecting differences in operator expertise, patient populations, and reference standards.
Diagnostic accuracy of polymerase chain reaction (PCR)

Five studies evaluated PCR-based diagnostic methods for scabies. Sensitivity estimates ranged from 74.29% to 100%. Delaunay *et al.*,[14] reported a sensitivity of 100% (95% CI 95.32–100.00) using standardized dry swab sampling and dermoscopy as the reference standard. Bae *et al.*,[12] also reported a sensitivity of 100% (95% CI 80.00–100.00), while Wong *et al.*,[19] reported a sensitivity of 86.00% (95% CI 76.11–92.30). Hahm *et al.*,[17] observed lower sensitivity at 74.29% (95% CI 56.74–87.51), particularly in cases with low mite burden.

DISCUSSION

This systematic review synthesized evidence from ten studies published between 2007 and 2025 evaluating the diagnostic accuracy of clinical and laboratory-based tests for scabies. The included studies encompassed a range of study designs, including prospective diagnostic accuracy studies and cross-sectional clinical evaluations, reflecting real-world diagnostic practices across diverse healthcare settings. Collectively, the evidence highlights substantial variability in diagnostic performance across modalities, with skin scraping and adhesive tape testing demonstrating consistently high sensitivity, while dermoscopy and polymerase chain reaction (PCR) showed more heterogeneous results depending on context, reference standards, and patient characteristics.

Skin scraping and adhesive tape testing, overall, demonstrated the most consistently high sensitivity, with several studies reporting sensitivities of 100% and narrow confidence intervals. These findings are consistent with previous diagnostic reviews and guideline-based evidence, which have long recognized direct visualization of mites, eggs, or fecal pellets as the most definitive method for confirming scabies infection.[21,22] Although skin scraping and adhesive tape testing consistently demonstrated high reported sensitivity, these findings should not be interpreted as definitive evidence of diagnostic superiority. The high sensitivity observed in these studies likely reflects both careful lesion selection and operator expertise, as sampling from active burrows or papules increases the likelihood of detecting mite material.[23] Nevertheless, false-negative results may still occur in early infestations, cases with low mite burden, or following partial treatment, underscoring that even highly sensitive visualization-based methods are not infallible.[24] Despite these limitations, the reproducibility of high sensitivity across multiple studies supports the continued role of skin scraping and adhesive tape testing as reference or confirmatory diagnostic tools in both clinical practice

and research settings.

Dermoscopy, in contrast, showed greater variability in diagnostic accuracy, with reported sensitivities ranging from 46% to 86%, a pattern that has also been observed in previous studies and narrative reviews.[25,26] Higher diagnostic yields were typically reported in specialized dermatology settings, whereas lower sensitivity was observed in primary care or resource-limited environments.[27] This variability likely reflects the operator-dependent nature of dermoscopy, as accurate interpretation requires familiarity with characteristic scabies features such as the "delta wing jet" sign.[28] Furthermore, patient-related factors, including skin pigmentation, lesion chronicity, excoriation, and secondary infection, may obscure dermoscopic features, particularly in populations with darker skin tones, thereby reducing diagnostic performance.[29] These findings highlight that dermoscopy is a valuable adjunctive tool but should not be used in isolation without adequate training and clinical correlation.

PCR-based diagnostic methods demonstrated generally high sensitivity, ranging from 74% to 100%, suggesting strong potential as a diagnostic adjunct, particularly in cases with low mite burden or equivocal clinical findings. Similar results have been reported in earlier molecular diagnostic studies, which showed that PCR can detect *Sarcoptes scabiei* DNA even when microscopy is negative.[30] Higher sensitivity was consistently associated with standardized sampling techniques, such as dry swab or cotton swab collection, emphasizing the importance of specimen collection and handling.[31,32] However, variability in PCR targets, amplification protocols, and reference standards limited direct comparability across studies. Additionally, the requirement for laboratory infrastructure, technical expertise, and higher costs may restrict the widespread implementation of PCR in low-resource settings, where scabies prevalence is often highest.

Several limitations of the available evidence should be acknowledged. First, reference standards varied substantially across studies, including clinical diagnosis, microscopy, skin scraping, and dermoscopy, which may have introduced verification bias and influenced reported accuracy estimates. Second, most studies primarily reported sensitivity, and only a small minority provided sufficient raw data to derive specificity, predictive values, or likelihood ratios, restricting comprehensive evaluation of diagnostic performance. Third, differences in study design, patient populations, disease severity, and operator expertise contributed to heterogeneity and precluded quantitative meta-analysis. Fourth, most studies were conducted in single-center settings, potentially limiting generalizability.

A major limitation of the included studies is the use of heterogeneous and, in some cases, non-independent reference standards. Finally, publication bias cannot be excluded, as studies reporting favorable diagnostic performance may be more likely to be published. Despite these limitations, this review provides a comprehensive synthesis of current evidence on scabies diagnostic methods and highlights important gaps for future research. Standardization of reference standards, improved reporting of full diagnostic accuracy metrics, and evaluation of diagnostic algorithms combining clinical and laboratory tools are needed. Interpretation of the findings should consider important methodological limitations in the underlying literature. Several included studies used imperfect and non-independent reference standards, introducing incorporation and verification bias. A further limitation of the included literature is the presence of circular validation arising from the

use of hierarchical but non-independent reference standards. Further studies assessing feasibility, cost-effectiveness, and implementation in endemic and resource-limited settings will be essential to inform evidence-based diagnostic guidelines.

CONCLUSION

This systematic review indicates that skin scraping and adhesive tape tests are associated with the highest reported sensitivity for scabies diagnosis when mite material is present. However, the true diagnostic accuracy of these methods remains uncertain due to heterogeneity in study design, variability and imperfections in reference standards, and limited reporting of specificity. Dermoscopy and polymerase chain reaction (PCR) may serve as useful complementary diagnostic tools, although their performance varies across clinical settings, reference standards, and patient populations. Where raw data were available, dermoscopy also showed moderate specificity, but such reporting was uncommon across the included studies. Overall, these findings underscore the need for cautious interpretation of existing accuracy estimates and support an integrated diagnostic approach that combines clinical assessment with appropriate confirmatory tests, tailored to available resources and expertise.

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