ANNALS OF MEDICAL AND SURGICAL DERMATOLOGY
Apr-Jun 2025, VOL. 3, ISSUE 2, pp. 1-4
https://doi.org/10.61577/amsd.2025.100006

RESEAPRO JOURNALS

CASE STUDY

OPEN ACCESS

Utilizing dermoscopy combined with AI in the diagnosis of skin cancers: A prospective diagnostic accuracy study in Syria

Sajeda Alnabelsi, Hussein Abdallah and Kinda Alshawa

Faculty of Medicine, Hospital of Dermatology and Venereology, Damascus University, Syria

ABSTRACT

Background: Skin cancers, including basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma, represent a growing global health challenge. Early and accurate diagnosis is crucial to improving clinical outcomes and reducing treatment costs. Dermoscopy is increasingly recognized as a valuable imaging tool that enhances the visualization of subsurface lesion features beyond the naked eye. The integration of artificial intelligence (AI) with dermoscopy has the potential to revolutionize diagnostic precision and efficiency, especially in resource-limited settings such as Syria.

Methods: This prospective diagnostic accuracy study evaluated the performance of an AI-assisted dermoscopy system compared to dermatologists and histopathology as the gold standard.

Results: A total of 115 lesions from 108 patients were analyzed. The AI demonstrated a 92% overall accuracy, surpassing dermatologist sensitivity and specificity. These findings underscore the transformative role of AI-augmented dermoscopy in dermatological diagnostics in developing countries.

Limitations: Several limitations warrant mention. The relatively small sample size, especially for SCC and melanoma cases, restricts broader generalization. Additional multicentric studies with diverse ethnic populations and lesion types are necessary to validate these results. Ethical considerations, including patient data privacy and AI decision transparency, must be addressed before clinical deployment.

Objective: To highlight and evaluate the crucial role of combining dermoscopy with artificial intelligence (AI), specifically using the FotoFinder system in enhancing the diagnostic accuracy of skin cancers (including basal cell carcinoma, squamous cell carcinoma, and melanoma) in a Syrian clinical population. The study aims to demonstrate how integrating dermoscopy and AI can improve the sensitivity and specificity of skin cancer diagnosis compared to standard clinical evaluation, thus enabling earlier and more precise detection and treatment, with a focus on real-world application in dermatological practice.

KEY WORDS

Artificial intelligence (AI); Dermoscopy; Skin cancer diagnosis; Basal cell carcinoma; Squamous cell carcinoma; Melanoma

ARTICLE HISTORY

Received 16 April 2025; Revised 07 May 2025; Accepted 14 May 2025

Introduction

Skin cancer incidence continues to rise globally, posing a significant burden on healthcare systems, particularly in countries with limited dermatological resources [1,2]. According to the World Health Organization (WHO), non-melanoma skin cancers (basal cell carcinoma and squamous cell carcinoma) are among the most common cancers worldwide, with melanoma contributing disproportionately to skin cancer mortality despite its lower incidence [3]. In the Middle East and Syria specifically, epidemiological data are scarcer; nonetheless, increasing ultraviolet (UV) exposure and demographic shifts suggest a rising trend [4]. Dermoscopy is an important guide in enhancing the diagnostic accuracy of skin cancer by providing a detailed visualization of skin lesions through a non-invasive imaging modality. Empirical studies indicate that dermoscopy improves the sensitivity for detecting skin cancers, thereby reducing the incidence of unnecessary biopsies and enhancing patient care [5,6]. Given the evolution of nonsurgical techniques within the field of dermatology, it is imperative to integrate dermoscopy into routine preventative health assessments to enable timely and precise diagnoses and treatment options [7,8]. Recent advancements in artificial intelligence (AI), particularly machine learning and deep learning algorithms, have shown promising results in identifying malignant skin lesions with diagnostic accuracies comparable to, or exceeding, those of dermatologists [9]. These AI systems, trained on large, annotated image datasets, can evaluate dermoscopic images rapidly and consistently, potentially alleviating diagnostic workload and aiding clinical decision-making. Integration of AI with dermoscopy may particularly benefit healthcare settings facing shortages in trained dermatologists, such as in Syria.

This study aims to assess the diagnostic accuracy of AI-assisted dermoscopic evaluations in a cohort of Syrian patients presenting at the outpatient dermatology clinics in Damascus, comparing the results against expert dermatologists and histopathologic findings.

Materials and Methods

Objectives

This study was a prospective diagnostic accuracy study between the dermatologist and the clinical examination with a non-invasive imaging technique (FotoFinder) in patients from Syria treated at the Hospital of Dermatology and Venereology in Damascus, Syria.

Methods

108 patients were selected from the outpatient dermatology clinics in the Hospital of Dermatology and Venereology in Damascus. Lesions were imaged, evaluated. Skin specimens were assessed by a blinded pathologist, giving the gold standard criteria for comparison.

Study design

A comprehensive clinical history typically encompasses demographic information, including sex, date of birth, and ethnicity, skin phototype, alongside lesion-specific details such as duration and any observed changes. Additionally, it assesses risk factors pertinent to any skin cancer, which include family history, personal history, and prior occurrences of sunburns, particularly blistering sunburns. A clinical assessment of the

***Correspondence:** Dr. Sajeda Alnabelsi, Faculty of Medicine, Hospital of Dermatology and Venereology, Damascus University, Syria
e-mail: mp79.sajeda@gmail.com

target lesion was performed, documenting its dimensions (measured in the two largest radial directions), color, and utilizing side lighting as necessary.

Imaging and dermoscopic assessment

Macroscopic and dermoscopic images of the lesions were collected using a Fotofinder imaging system. Then, the diagnosis was established by a seasoned dermatologist employing the fundamental skin cancer algorithm, which includes the options to excise, refrain from excision, or monitor the lesion through in-person evaluation. The lesion was subsequently evaluated using the FotoFinder imaging system. The results were classified according to the FotoFinder assigned a probability score from 0 to 1, where 0 denoted no suspicion for malignancy, and 1 indicated a high level of suspicion. Following excision, the skin samples underwent processing for standard light microscopy examination. A dermatopathologist provided the final determination in instances of diagnostic disagreement.

AI modelling

The AI model utilized for this study was developed on Google's TensorFlow platform. It employed a convolutional neural network architecture, trained on over 100,000 annotated dermoscopic images from diverse populations to differentiate between benign and malignant lesions, including BCC, SCC, and melanoma subtypes [9]. Inference was run on the captured images to generate diagnostic predictions.

Statical Analysis

We utilized descriptive statistics to evaluate patient data, with histopathological examination serving as the reference point. The metrics analyzed comprised sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy of the in-person diagnosis performed using FotoFinder. Subsequently, these results were contrasted with the gold-standard pathological diagnosis.

Results

A total of 115 lesions were examined from 108 patients. Among these, 24 lesions were diagnosed as basal cell carcinoma, six as squamous cell carcinoma, one as melanoma, and 84 as benign based on histopathology. The demographic information of the patients and the details of the lesion diagnoses are outlined in (Table 1). All patients had Fitzpatrick skin phototypes ranging from I to IV. The average age of patients with BCC was 62 years (range 32 to 85), whereas the average age of patients without SCC was 65 years (range 49 to 83). The study included 19 men and 12 women with skin cancer diagnoses, along with 50 men and 27 women with benign lesions.

Table 1. Demographic data.

		BCC NO. (%)	SCC NO. (%)
Mean age		62	65
Sex	Men	15 (62.5%)	4(66.6%)
	Women	9 (37.5%)	2 (33.3%)
Fitzpatrick skin phototypes			
	I	1 (4.1%)	1 (16.6%)
	II	4 (16.6%)	0 (0%)
	III	8 (33.2%)	3 (50%)
	IV	11 (45.8%)	2(33.3%)

In the context of basic skin cancer triage for determining the necessity of excising suspicious lesions, local dermatologists demonstrated a sensitivity of 89% and a specificity of 69.2% (Table 2).

Table 2. Sensitivity and specificity between dermatologists and the Fotofinder system.

	Sensitivity	Specificity
Fotofinder system	97%	86.3%
Dermatologist	89%	69.2%

FotoFinder showed a sensitivity of 97% and a specificity of 86.3%.

Detailed clinical, dermoscopic and histologic images of representative SCC, BCC cases are illustrated in Figures 1 and 2, demonstrating characteristic vascular and keratin features.

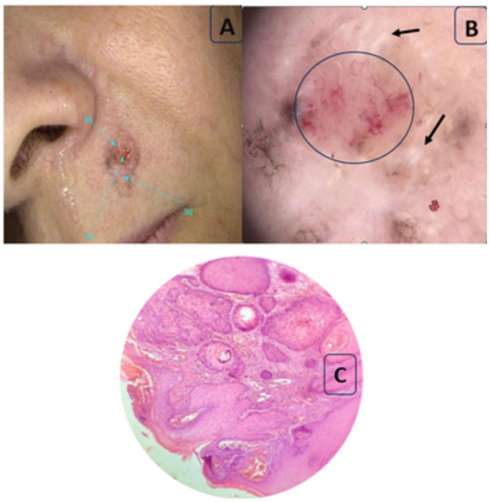

Figure 1. Patient 1, Squamous cell carcinoma [A: clinical picture, B: dermoscopic picture demonstrates polymorphous blood vessels (black circle) and shiny white structures (black arrows), C: histologic picture].

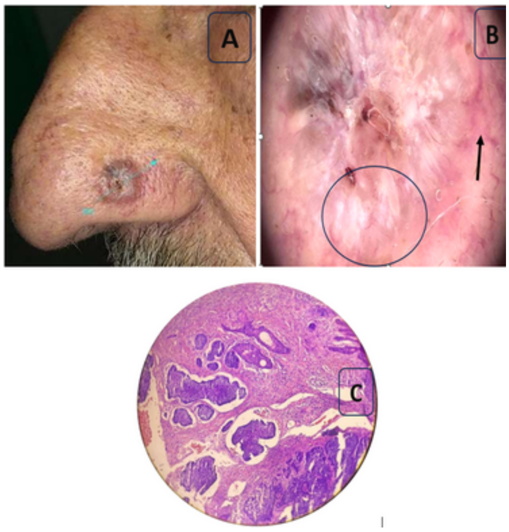

Figure 2. Patient 2, basal cell carcinoma [A: clinical picture, B: dermoscopic picture demonstrates keratinizing pearls (black circle) and arborizing vessels (black arrows), C: histologic picture].

https://doi.org/10.61577/amsd.2025.100006

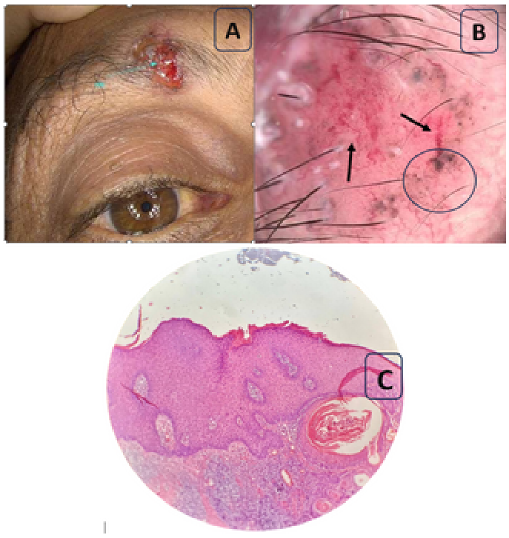

Figure 3. Patient 3, Squamous cell carcinoma [A: clinical picture, B: dermoscopic picture demonstrates brown-grey aggregated dots (black circle) and polymorphous vessels (black arrows), C: histologic picture].

Discussions

Keratinocyte skin cancer and melanoma represent the most prevalent forms of cancer, characterized by the uncontrolled proliferation of abnormal skin cells, often instigated by the sun or artificial tanning devices that contain UV. The condition typically manifests in three main types: basal cell carcinoma (BCC), squamous cell carcinoma (SCC), which is categorized as a nonmelanoma skin cancer and generally poses a lower risk, and melanoma, which has a higher propensity for metastasis. Preventive strategies and early detection are crucial, emphasizing the importance of minimizing UV exposure and conducting regular skin examinations [5,6,10].

Dermoscopy, a noninvasive imaging modality, has demonstrated significant accuracy in the diagnosis of various skin cancers. This technique allows clinicians to visualize colors and subsurface structures within lesions that are not discernible to the naked eye, thereby assisting in the differentiation between malignant and benign conditions. Prompt diagnosis facilitated by dermoscopy contributes to improved patient outcomes and prognoses while also alleviating the economic burden on healthcare systems [10,11].

We conducted an independent, peer-reviewed, cross-sectional study focused on diagnostic concordance in the identification of keratinocyte skin cancers and melanoma. This study utilized clinical assessments, dermatoscopic evaluations, noninvasive imaging technologies, and a fundamental skin cancer algorithm to provide reassurance to patients, facilitate lesion reassessment, or determine the necessity for biopsy.

Our research corroborates earlier findings that certain noninvasive devices exhibit a high sensitivity in the detection of different types of skin cancer. Nevertheless, the observed low specificity and diagnostic accuracy suggest that these devices cannot supplant the clinical expertise of dermatologists in the selective excision of lesions. Furthermore, there are several practical challenges associated with the implementation of these devices in clinical practice, including considerations of size, anatomical location, and Fitzpatrick skin phototype.MelaFind received approval from the Food and Drug Administration in 2011, following the work of Monheit et al., who reported its impressive sensitivity of 98.4%, a low biopsy ratio of 10.8:1, and a specificity of 10.5%, which is notably higher than the 3.7% achieved by non-specialist clinicians [12]. reviewed seven studies utilizing digital skin lesion analysis (MelaFind, STRATA Skin Sciences Inc., Horsham, PA) for melanoma diagnosis. The clinical diagnosis sensitivity and the necessity for surgery improved from 70% to 88% with the incorporation of multispectral digital skin lesion analysis, while specificity increased from 52% to 58% [13]. The special side of our study compared to the previous ones is that it included keratinocyte skin cancer (BCC, SCC). As a result, applying dermoscopy with AI has enhanced the sensitivity for skin cancer diagnosis from 89% to 97% and specificity from 69.2% to 86.3%.

Our research indicates that incorporating computer-assisted analysis of dermoscopic images, specifically utilizing FotoFinder, has enhanced the accuracy of clinical diagnoses by decreasing the incidence of overlooked skin cancers. The application of FotoFinder as a supplementary tool in clinical assessments successfully identified all skin cancers that had been previously missed by local dermatologists.

Conclusions

In summary, this study provides a significant investigation into the capabilities and effectiveness of artificial intelligence in the field of dermoscopy, particularly regarding its proficiency in differentiating benign from malignant skin lesions. The AI model, carefully crafted through collaborative efforts leveraging the sophisticated infrastructure of Google's platform, stands as a symbol of technological advancement in the healthcare sector. With an outstanding performance that yields a 92% accuracy rate across various essential metrics, the model emphasizes its skill and dependability in the intricate process of distinguishing between different skin lesion types. This not only establishes the model as an essential asset in dermatological diagnostics but also illustrates the transformative role of AI in enhancing precision and efficiency in medical decision-making.

Disclosure Statement

The authors declare that they have no competing interests.

References

1. Hw R. Incidence estimate of nonmelanoma skin cancer in the United States, 2006. Arch Dermatol. 2010;146:283-287. https://doi.org/10.1001/archdermatol.2010.19
2. Esteva A, Kuprel B, Novoa RA, Ko J, Swetter SM, Blau HM, et al. Dermatologist-level classification of skin cancer with deep neural networks. Nature. 2017;542(7639):115-118. https://doi.org/10.1038/nature21056
3. Karimkhani C, Green AC, Nijsten T, Weinstock MA, Dellavalle RP, Naghavi M, et al. The global burden of melanoma: results from the Global Burden of Disease Study 2015. Br J Dermatol. 2017;177(1):134-140. https://doi.org/10.1111/bjd.15510
4. World Health Organization. Skin cancers. WHO Factsheet. 2022. Available at: https://www.iarc.who.int/cancer-type/skin-cancer/
5. Dinnes J, Deeks JJ, Chuchu N, Matin RN, Wong KY, Aldridge RB, et al. Visual inspection and dermoscopy, alone or in combination, for diagnosing keratinocyte skin cancers in adults. Cochrane Database Syst Rev. 2018(12). https://doi.org/10.1002%2F14651858.CD011901.pub2

https://doi.org/10.61577/amsd.2025.100006

6. Harrison K. The accuracy of skin cancer detection rates with the implementation of dermoscopy among dermatology clinicians: a scoping review. J Clin Aesthet Dermatol. 2024;17(9-10 Suppl 1):S18. Available at: https://pubmed.ncbi.nlm.nih.gov/39386002/

7. Sonthalia S, Yumeen S, Kaliyadan F. Dermoscopy overview and extradiagnostic applications. InStatPearls. StatPearls Publishing. 2023. Available at: https://www.ncbi.nlm.nih.gov/books/NBK537131/

8. Mihulecea CR, Iancu GM, Leventer M, Rotaru M. The many roles of dermoscopy in melanoma detection. Life. 2023;13(2):477. https://doi.org/10.3390/life13020477

9. Vestergaard ME, Macaskill PH, Holt PE, Menzies SW. Dermoscopy compared with naked eye examination for the diagnosis of primary melanoma: a meta-analysis of studies performed in a clinical setting. Br J Dermatol. 2008;159(3):669-676. https://doi.org/10.1111/j.1365-2133.2008.08713.x

10. Bhat YJ, Dar UK, Zeerak S. Clinico-dermoscopic Diagnosis of Skin Cancers in Skin of Color: An Update. Indian J Dermatopathol Diagn Dermatol. 2021;8(2):29-37. https://doi.org/10.4103/ijdpdd.ijdpdd_8_21

11. Kittler H, Pehamberger H, Wolff K, Binder MJ. Diagnostic accuracy of dermoscopy. Lancet Oncol. 2002;3(3):159-165. https://doi.org/10.1016/S1470-2045(02)00679-4

12. Monheit G, Cognetta AB, Ferris L, Rabinovitz H, Gross K, Martini M, et al. The performance of MelaFind: a prospective multicenter study. Arch Dermatol. 2011;147(2):188. https://doi.org/10.1001/archdermatol.2010.302

13. Farberg AS, Winkelmann RR, Tucker N, White R, Rigel DS. The impact of quantitative data provided by a multi-spectral digital skin lesion analysis device on dermatologists' decisions to biopsy pigmented lesions. J Clin Aesthet Dermatol. 2017;10(9):24. Available at: https://pubmed.ncbi.nlm.nih.gov/29344323/

https://doi.org/10.61577/amsd.2025.100006