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Original article

The Validity of Dermoscopic Findings in Diagnosis of Scabies

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ABSTRACT

Background: Scabies is a common parasitic infestation of the skin. Signs and symptoms of scabies are the result of a hypersensitivity reaction to proteins released by the mites. Diagnosing scabies is problematic and confirmed by direct tests showing the presence of mites or their eggs. Dermoscopy is viewed as a sensitive and valuable tool in diagnosing scabies in vivo.

Aim of the work: To assess the validity of dermoscopic findings in diagnosis of scabies.

Patients and methods: This study included 40 patients complaining of generalized itching or multiple localized itching. All the patients were subjected to full history taking and clinical examination including general examination, dermatological examination and photography of any lesions in the suspected sites. These lesions were examined by the dermoscope.

Results: The results of the study revealed that dermoscope had 87.5 % sensitivity and 100% specificity in the diagnosis of scabies as compared to clinical examination. The overall accuracy of dermoscope in diagnosis of clinically suspected cases was 90%.

Conclusion: Scabies is a common skin disease that affects both genders mainly in the middle age group. Dermoscope has been shown to be as an effective and non-invasive technique in diagnosis of scabies

Keywords: Scabies; Dermoscope; Validity; Parasitic Infestation; Skin.

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INTRODUCTION

Scabies is a parasitic infestation of the skin caused by the mite *Sarcoptes scabiei* var. *hominis*. Globally, more than 200 million people are affected, with a particularly high prevalence in resource poor tropical regions^[1].

Signs and symptoms of scabies are the result of a hypersensitivity reaction to proteins released by the mites and usually manifest with severe itch and characteristic skin lesions consisting of burrows and erythematous papules that are often excoriated. Distribution varies with age and often includes involvement of the webs of the fingers, flexor aspect of the wrist, feet and torso^[2]. However, infestations with scabies can present with unusual morphologies lacking typical lesions or clinical clues to the underlying parasite. There are numerous clinical variants of scabies, including bullous, crusted, hidden, incognito, nodular and scalp^[3, 4].

The diagnosis of scabies can be challenging due to it mimics many conditions mimic dermatitis herpetiformis, ecchymosis, Langerhans cell histiocytosis, systemic lupus erythematosus, urticaria, and urticaria pigmentosa. A recent study found that 45% of the patients presenting to the dermatology office with scabies had been misdiagnosed by another provider. The mis-diagnosed patients underwent unnecessary costs for the tests and treatment^[4].

The reference standard for diagnosis is a demonstration of the scabies mite, eggs or fecal material through microscopic examination of skin scrapings. Visualization of burrows in the skin using dermoscopy can be a useful aid for clinical examination^[5].

Dermoscopy is a non-invasive diagnostic procedure that allows a rapid *in vivo* evaluation of morphologic structures of the epidermis, the dermo-epidermal junction, and the papillary dermis, not visible to the naked eye^[6]. Dermoscopy has been shown to be an effective adjunct to clinical examination in diagnosis of scabies, but has not been widely adopted^[7].

AIM OF THE WORK

The aim of the present work is to assess the validity of dermoscopic findings in diagnosis of scabies.

PATIENTS AND METHODS

This study is an observational cross-sectional one; the patients included in this study were selected from the out-patient clinic of Dermatology in the period between January 2018 and February 2019. This study aims to assess the validity of dermoscopic findings in diagnosis of scabies. This study included 40 patients complaining of generalized itching or multiple localized itching. A written informed consent will be obtained from all patients before inclusion in the study.

All cases were subjected to complete history taking, through full general and dermatological examination. Clinical dermatological examination and photography of any lesions in the following sites [interdigital spaces, flexion sites of the wrists, extension sites of the elbows, axillae, mamillae, peri-umbilical area, penis, scrotum, or buttocks]. Criteria for diagnosis of scabies in suspected lesions include excoriated, irritated papules, nodules, burrows and eczematous skin lesions are seen on near inspection with naked eye.

The lesions were examined by the dermoscope in the [interdigital spaces, flexion sites of the wrists, extension sites of the elbows, axillae, mamillae, peri-umbilical area, penis, scrotum, or buttocks]. The dermoscope used: DermLite II Pro [3Gen, USA] is palm-sized, offers high light output, a large 25mm lens with 10xmagnification power, camera adaptability, as well as an integrated rechargeable lithium-ion battery. The dermoscope combines the advantages of polarized and immersion fluid dermoscopy.

Statistical analysis

Data was analyzed by using SPSS software, version 20 [Chicago, IL]. Quantitative data were expressed as means with standard deviation or medians with ranges according to data distribution. Categorical data were presented as number and percentages. Validity of dermoscope was expressed in terms of sensitivity, specificity, NPV and PPV. P values <0.05 are considered significant.

RESULTS

The patients were, 28 males [76%] and 12 females [24%]. Their age ranged from 2 months -88 years with a mean \pm SD of [39.54 \pm 11.63]. There were 23 patients [57.5%] with positive family history of scabies and 28 patients had previous history of

pruritus with nocturnal exacerbation [70%]. These data are illustrated in table [1].

The cases presented with different types and forms of lesions. The most common lesion was the papules and excoriations and each of them were found in 25 cases [62.5%]. Macules were present in 8 cases [20%], nodules in 7 cases [17.5%] and both crusted papules and burrows were present in 5 cases [12.5%]. The least common types of lesions were the crusted plaques were found in only 1 case [2.5 %].

The lesions were distributed over many areas within the body in the different cases. One or more site/s could be affected in the same case. The interdigital spaces were the most affected sites with scabies lesions. The extension sites of the elbows and buttocks were the second and third most affected areas and were found in 17 and 14 cases respectively. The palm of the hand, area behind the ear and the back were the least affected sites with lesions and were found in only 1 case each. The Morphology and sites of scabies lesions are shown in table [2].

On naked eye examination, 25 cases [62.5%] were diagnosed to have scabies. On dermoscopic examination [87.5%] were confirmed to have scabies.

The different clinical types of scabies detected in the cases that were found to be positive by dermoscope are shown in the following table. The classical or typical scabies was present in 26 patients [74.2%], nodular scabies was present in 7 cases [20%] while the Norwegian scabies [crusted] and scabies incognito were present in one case each. These data is shown in table [3].

As shown in table [4], by comparing the diagnostic abilities of clinical suspicion plus naked eye examination and clinical suspicion plus dermoscopic by using one-sided Z-test, there was high level of significance between the two procedures.

By using the dermoscopic examination, the clinical suspicion of scabies was confirmed in 35 of total 40 cases. The evaluation of the dermoscopic examination against the naked eye examination in clinically suspected cases of scabies is shown in the following table. The dermoscope showed 87.5 % sensitivity as compared to clinical examination while the specificity was 100%. The overall accuracy of dermoscope in diagnosis of clinically suspected cases was 90%. These data are shown in the next table. The data are shown in table [5].

Table [1]: Demographic data and symptoms of cases included in study

Age	Mean ± SD	39.54 ± 11.63	
	Median [Min-Max]	35 [2-88]	
		Frequency	Percentage
Gender	Male	28	76 %
	Female	12	24 %
Positive Family history		23	57.5 %
pruritus with nocturnal exacerbation		28	70 %

Table [2]: Morphology and sites of scabies lesions in cases included in study

The types of lesions	Frequency [Percent]
Papules	25 [62.5%]
Crusted papules	5 [12.5%]
Macules	8 [20%]
Crusted plaques	1 [2.5%]
Excoriations	25 [62.5%]
Burrows	5 [12.5%]
Nodules	7 [17.5%]
Site of the detected lesions	
Interdigital spaces	23 [57.5%]
Flexion sites of the wrist	12 [30%]

The types of lesions	Frequency [Percent]
Extension sites of the elbow	17 [42.5%]
Axilla	5 [12.5%]
Mamillae	9 [22.5%]
perimammilar area	3 [7.5%]
Periumbilical area	8 [20%]
Penis and scrotum	7 [17.5%]
Buttocks	14 [35%]
Palm of hands	1 [2.5%]
Behind ear	1 [2.5%]
Back	1 [2.5%]

Table [3]: Detection of scabies in the cases included in the study

Clinically suspected cases of scabies		N= 40 [100%]
Naked eye examination	Positive	25 [62.5%]
	Negative	15 [37.5%]
Dermoscope	Positive	35 [87.5%]
	Negative	5 [12.5%]
Clinical types of scabies		N= 35 [confirmed by dermoscope]
Typical scabies		26 [74.2%]
Nodular scabies		7 [20%]
Norwegian scabies		1 [2.9%]
Scabies incognito		1 [2.9%]

Table [4]: One sided z-test for comparing the positive cases detected by naked eye and dermoscope in the cases in the study

	Naked eye examination	Dermoscopic examination	P value
Total number of cases positive for scabies	25	35	< 0.001

Table [5]: Sensitivity and specificity of dermoscope against clinical diagnosis in scabetic patients

Diagnostic property	Dermoscope
Sensitivity [TP/TP+FN]	87.5%
Specificity [TN/TN+FP]	100%
PPV [TP/TP+FP]	100%
NPV [TN/TN+FN]	33.3%
Accuracy [TN+TP/TN+TP+FN+FP]	90%

DISCUSSION

Scabies is one of the most common skin disorders affecting more than 300 million cases are diagnosed annually worldwide [8]. The diagnosis of

scabies infection is problematic because of many factors such as the diversity of symptoms, failed microscopic examination of skin scrapings and the possible confusion with other skin diseases [9].

Clinical identification of scabies is the main diagnostic tool. A definitive diagnosis can only be made through identification of mites, eggs, or mite pellets using *ex vivo* microscopic examination [10].

Dermoscopy was initially used for the diagnosis of skin tumors. Nowadays, it has gained popularity in the use of infectious and inflammatory skin disorders [11]. It is also useful for diagnosing scabies. It is less time consuming and is more acceptable to patients than skin scrapings. It can be used to replace skin scrapings as it allows a quick screening of a large number of sites. Apart from that, it can also be used in therapeutic trials to select the site in patients where skin scrapings can be done [12]. Studies revealed that dermoscopy as an accurate, non-invasive, painless, non-expensive and simple technique is important and useful tool for the diagnosis of scabies either as a diagnostic test or to guide the traditional diagnostic test [13].

In our study, 76% of the cases were males and 24% of the cases were females and their age ranged from 2 months to 88 years with a mean age of 39.54 years. In another study only children between 1 to 15 years were included from them 60 % were males and 40 % were females [12]. Nassef and his colleagues included 49 cases in their study who were distributed as 22 males and 27 females [14]. Also Walter et al. reported that 38.9% of the cases included in their study were males and 61.1% were females. The ages of the cases in this study ranged between 2 to 72 years [9].

In our study, 57.7 % of the cases had positive family history of scabies while 70% of cases had pruritus with nocturnal exacerbation of symptoms. This came in accordance with the study performed by Srinivas et al. where 55% of the cases had positive family history of scabies and 66% of them showed nocturnal exacerbation of symptoms [12]. Park et al. reported similar results as 51% of the cases included in the study had previous family history and 65% of the cases had pruritus with nocturnal exacerbation of symptoms [15]. Also this agreed with the results reported by Dupuy et al. who showed that 74% of the cases included in their study suffered from exacerbation of itching during night [16].

In our study, the most common lesion was the papules which were found in 30 cases [75%] followed by excoriations which were found in 25 cases [62.5%]. Macules were present in 8 cases [20%], nodules in 7 cases [17.5%] and burrows were present in 5 cases [12.5%]. The least common types of lesions were the crusted plaques which were found in only 1 case [2.5 %]. Similar results were reported by Walter et al. where papules were the most common form of lesions and were present in 98.2% of cases followed by excoriations that were found in 54% of cases. Nodules, vesicles and crusted papules were present in 11.5%, 4.4% and 3.5% of the cases respectively [9]. This came in contrast with the results reported by Dupuy et al. [16] where the most common lesions in the scabetic cases were burrows in 38% of cases followed by nodules in 33% of cases.

Results of the present work agreed with the findings reported by Abdel-Latif et al. who revealed Excoriations were the most common dermoscopic findings because they were found in 90 cases [90.0%]. The triangle sign was found in 16 cases [16.0%] and a burrow was found in only nine cases [9.0%] [17].

Also in current study, by comparing the diagnostic abilities of clinical suspicion plus naked eye examination and clinical suspicion plus dermoscopic by using one-sided Z-test, there was high level of significance between the two procedures. This came in accordance with the results reported by Srinivas et al. where the comparison of the distribution of the positive cases of scabies by clinical examination and dermoscopic findings revealed statistically significant difference between the two modalities [$p = 0.03$] [12].

In our study, the dermoscope showed 87.5% sensitivity as compared to clinical examination while the specificity was 100%. The overall accuracy of dermoscope in diagnosis of clinically suspected cases was 90%. The PPV was 100% while the NPV was much lower by 33.3%. In one study, the sensitivity of dermoscope in detecting scabies lesion was 92%, NPV = 89%, whereas their number of false-positive results led to lower specificity 80% and PPV 85% [16]. In another study lower sensitivity

was reported [83%]. Specificity, NPV and PPV were 46%, 85%, 47% respectively [9]

The sensitivity of dermoscope was much lower in a study performed by Abdel-Latif et al. [17] and it was 43%. Specificity, NPV and PPV were 84.3%, 83.4%, 44.45% respectively.

In conclusion, the current study revealed high sensitivity and specificity of dermoscope in diagnosis of different scabetic lesion as compared to clinical examination. This could provide simple, non-invasive and available method for diagnosis of scabies in places where no other techniques are available.

Conflict of Interest

Authors declare that, there was no conflicts of interest.

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