

Histological Changes Resulting from Parasitic Infestation (Scabies)

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Abstract

The present study was conducted to investigate the changes in tissues in patients with scabies. The biopsies from patients with scabies and from patients infected with cutaneous leishmaniasis (positive control) were collected from patients attended the Dermatology Unit at Baquba Teaching Hospital / Advisory Clinic during the period from March to May 2016. The ages of the studied groups ranged between 20-54 years. The results showed that there were histological changes in patients with scabies, including thickness of epidermis and filtration of inflammatory cells of dermis and hyperkeratosis in some chronic cases. In addition, some chronic cases showed edema, degeneration and necrosis of some epidermis cells. In contrast, the results of the present study showed that the histological changes associated with leishmaniasis included hyperkeratosis, epidermis and spongiosis, as well as the formation of rete ridges. In addition, there was infiltration of inflammatory cells in dermis as well as the presence of necrosis and degeneration in some infected skin cells.

Key words: Scabies, Histological changes, Inflammatory cells.

التغيرات النسيجية الناجمة عن الإصابة الطفيلية (الجرب)

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الخلاصة

اجريت الدراسة الحالية لمعرفة التغيرات النسيجية عند مرضى الجرب، اذ تم تشخيص 103 مريض مصاب بالجرب، جمعت الخرز النسيجية من مرضى الجرب ومرضى الليشمانيا (كسيطرة موجبة) من المراجعين لوحدة الامراض الجلدية في مستشفى بعقوبة التعليمي/ العيادة الاستشارية للمدة المحصورة بين اذار 2016 ولغاية ايار 2016. تراوحت اعمار المصابين بين 20-54 سنة، وقد استخدمت الطريقة النسيجية الروتينية في الدراسة الحالية لتحضير المقاطع النسيجية، اذ بينت الدراسة وجود التغيرات النسيجية المصاحبة لمرضى الجرب شملت تثخنت في طبقة البشرة Epidermis وارتشاح للخلايا الالتهابية Inflammatory cells في منطقة الادمة Dermis وحدث فرط تقرن Hyperkeratosis في بعض حالات الإصابة المزمنة، وقد شملت التغيرات النسيجية في بعض حالات الإصابة المزمنة تكون الوذمة Edema وحصول تنكس دهني Degeneration وتنخر Necrosis في بعض خلايا البشرة، كما تطرقت الدراسة الحالية الى التغيرات النسيجية عند مرضى الليشمانيا والتي تمثلت بفرط التقرن الجلدي، وتثخن البشرة ووذمة في منطقة البشرة، فضلاً عن تكون الحروف الشبكية فيها، ويتمثل التغير النسيجي في طبقة الادمة بارتشاح الخلايا الالتهابية فيها، فضلاً عن وجود الوذمة، وتنخر في بعض خلايا البشرة المصابة وتنكسها.

الكلمات المفتاحية: الجرب، التغيرات النسيجية، الخلايا الالتهابية.

Introduction

Scabies is a contagious skin disease caused by an ectoparasite called *Sarcoptes scabiei*. This disease is considered as one of the world's most neglected health problems. Although it is infecting over 300 million people worldwide every year, few studies were carried out about it, especially in the third world countries [1,2,3]. Mites cause disturbance and discomfort due to severe itching that causes skin scratching, allowing bacteria to invade the skin's crusty areas, and leading to secondary infection [4]. The disease spreads among members of the same family sharing the sheets and towels. The disease also can spread through skin contact and sexual intercourse [5]. Scabies is a disease infecting both sexes and all ages. It affects all ethnic groups

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Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

without exception, and does not distinguish between the social and economic levels of individuals. In addition, scabies is a significant problem for livestock and farm animal's breeders, resulting in heavy economic losses [6,7]. Different clinical forms of the disease are found depending on the number of parasites in the host body, the age of the host, the patient's immune and health status [8]. Diagnosis of scabies depends on the appearance of the clinical signs of the disease or by the presence of the mites and their eggs together with their residues in the skin. The appearance of channels and tunnels in the skin as well as the local inflammation of the infected areas, and severe itching are important symptoms of the disease in humans and other animals [9, 10]. Due to the importance of this zoonotic disease, this study was carried out in order to determine the histological changes in the skin of patients with scabies and comparing them with histological changes in the skin of patients infected with cutaneous leishmaniasis caused by *Leishmania tropica*.

Material and Methods

The Data Collection

The current study was conducted on patients with scabies and patients infected with cutaneous leishmaniasis who attended the Dermatology Unit at Baqubah Teaching Hospital/ Advisory Clinic. The data were collected from patients with scabies, after the diagnosis was confirmed by specialist dermatologists. A questionnaire was used to record the required information on whether or not the patients and their families were having any diseases, the number of infected members of the family, the first appearance of infection, the type and dose of treatment, the source of infection and its location. The patients who suffer from chronic or acute diseases and those who currently take treatment, as well as the people with allergies were excluded from the present study.

Collection of samples

The biopsies were collected during the period between March and May 2016. This study included 110 patients with scabies, (55 males and 55 females), aged 20 to 54 years. The diagnosis was done by a specialist dermatologist.

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Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

Collection of Histological Samples

Skin biopsies were taken with 4mm punch and 2% xylocaine was used as an anesthetic. The biopsies were fixed in 10% formalin, routinely processed and embedded in paraffin sections which were stained with hematoxylin and eosin and examined under the microscope.

Results and Discussion

According to duration of infection, the patients with scabies were divided into four groups: early lesions (one week), early acute lesions (8 weeks), and late lesions (12 weeks) and chronic lesions (16 weeks and longer). Figure (1) represents a section from a biopsy from patient with scabies (duration one week) which shows, an epidermis thickness, and a slight accumulation and infiltration of inflammatory cells in the dermis layer.

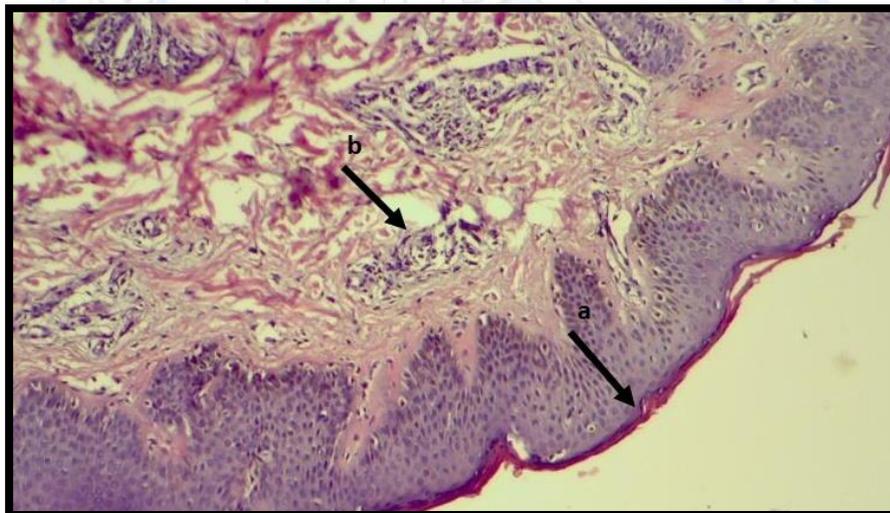


Figure 1: Epidermis of a patient with scabies showing a slight accumulation (a) and infiltration of inflammatory cells in the upper dermis (b) (H&E,10x).

Figure (2) shows a clear accumulation of corneal skin layer, increasing inflammatory as well as keratosis and an increased in the numbers of hypermelanosis cells.

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Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

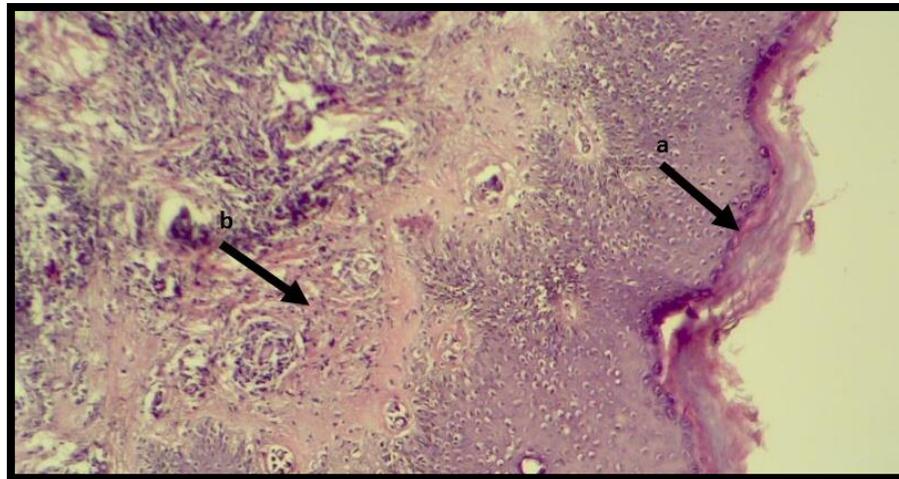


Figure 2: A clear accumulation of the keratinized skin layer, (a) inflammatory cells in the dermis layer (b). (H&E, 10x).

These results were consistent with the result of previous studies that showed thickness and keratinization of epidermis with inflammatory cell infiltration [12-16]. The parasite stimulates the cellular immune mononuclear cells and their infiltration in the site of infection. In the infected skin, female's parasites burrow tunnels to lay eggs and consequently damage the tissues. The female secretes materials to facilitate the penetration of the skin during the burrowing process. These materials are acting as antigen molecules that stimulate the infiltration of inflammatory cells to the sites of infection, so there are intensively inflammatory and immune cells in infected areas. Figure (3), (8th week of infection) showed, that the thickness of epidermis increased and became very clear. The Figure showed the burrowed channel at epidermis surface and the infiltration of inflammatory cells in the dermis.

Histological Changes Resulting from Parasitic Infestation (Scabies)

Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

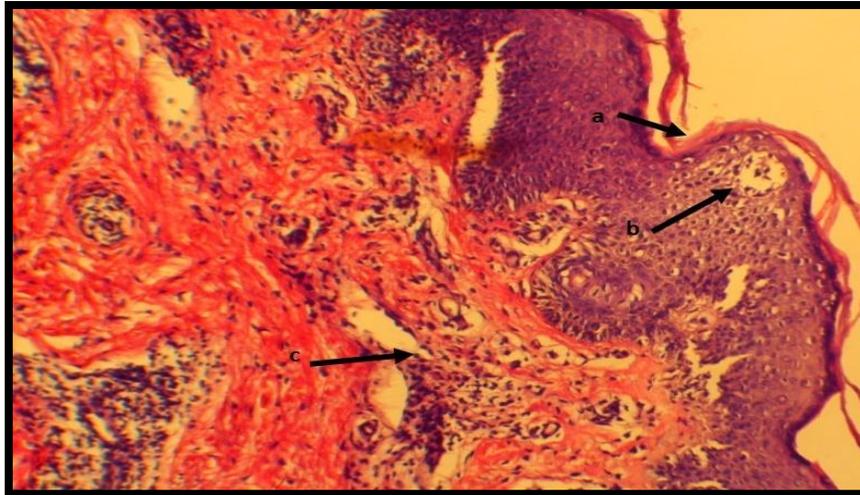


Figure 3: Showed the thickening of epidermis (a), the appearance of the parasite channel on its surface (b) the infiltration of inflammatory cells in dermis layer (c). (H&E,10x).

The persistent infection resulting in exacerbated of pathological effects due to causative agent existence and continued its secretions as well as immune response reaction [18]. Figure (4a) showed the changes at the 12th week of infection, and epidermis in addition to presence of the parasite in this layer and there are intensively inflammatory cells in the upper layer of the dermis.

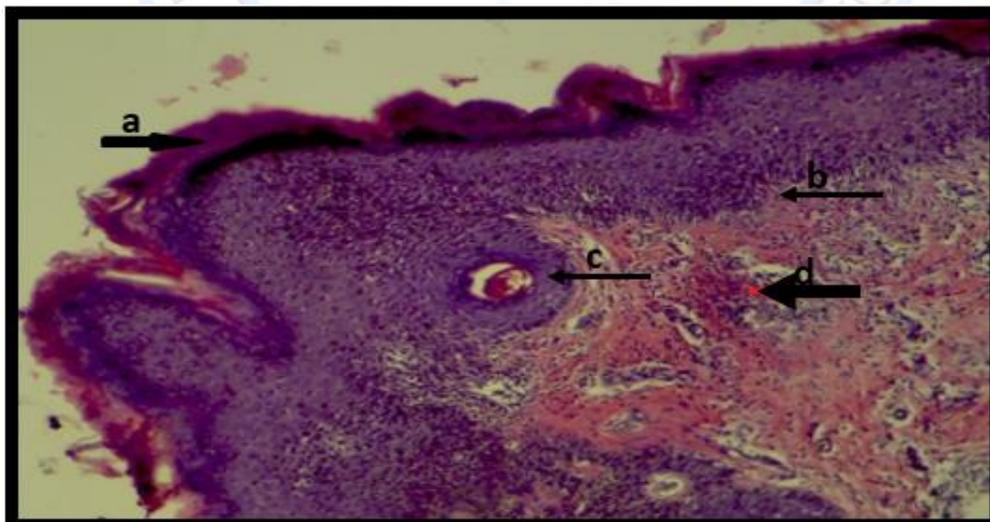


Figure 4 (a): Thickening of stratum corneum(a), and epidermis(b) the presence of the parasite(c), and intensively infiltration of the inflammatory cells in the upper layer of the dermis(d) (H&E,10x).

Histological Changes Resulting from Parasitic Infestation (Scabies)

Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

It was noted in the same individual, the formation of edema, spongiosis and greasy degeneration in some cells and necrosis in others, infiltration of inflammatory cells, and showed a degeneration of basal layer. (Figure 4b). This result agreed with the findings of Sharquie et al. [15], and Liu et al. [19], who reported that there was infiltration of many types of cells, including immune cells lymphocytes, eosinophils and histocytes to location of infection. The presence of abundance immune cells may be a result of interaction between antigen and immune response reaction of the host which led to inflammatory response and accumulation of these cells in the lesions.

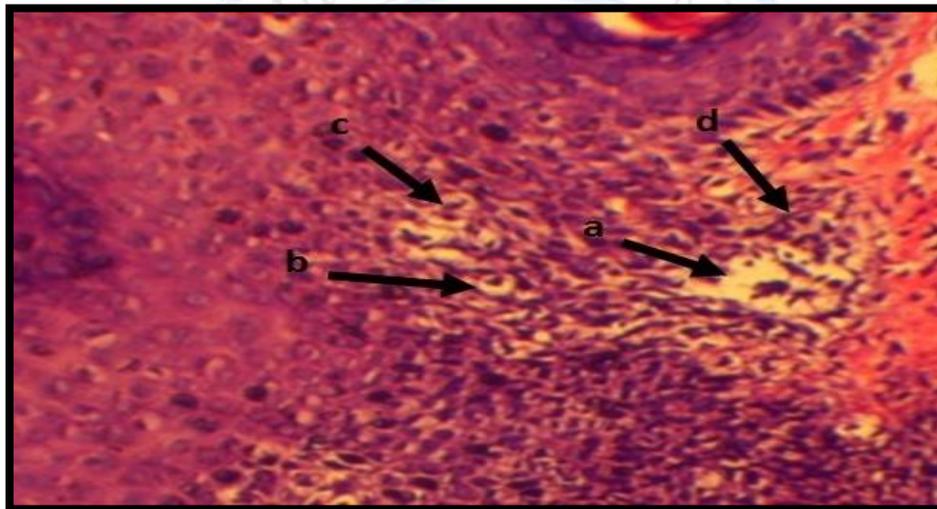


Figure 4 (b): Spongiosis in the skin layer (a), degeneration of cells (b) necrosis of some cells (c), and inflammatory cells (H&E,40x).

At the 16th week of infection, the epidermis was intensively thickened, infiltration of inflammatory cells, hemorrhage and degeneration of the basal layer of the epidermis.

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Nora D. Al-Musawi, Nagham Y. Al-Bayati and Munther Hussain Al-Kadhemi

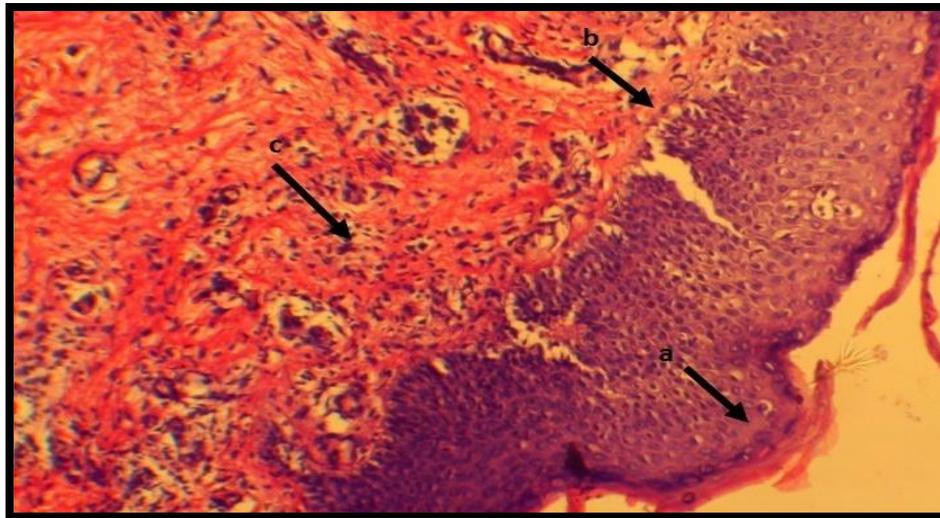


Figure 5: Thickness of epidermis (a) degeneration of basal layer(b) and clear infiltration of cells in the dermis layer(c). (H&E,10x).

These results agreed with the results of previous studies [15,18]. The authors of these studies reported that, chronic infection leads to several changes in different layers of the skin in addition to occurrence of crusted papules due to several reasons such as, mechanical damage of the parasite and its presence for a long time with continuing burrowing for laying eggs and its secretions, which generates allergic reactions as well as delayed hypersensitivity due to the large numbers of parasites, eggs and larva under the skin [20,21]. When comparing the skin changes caused by cutaneous leishmaniasis with the changes caused by scabies, patients infected with leishmaniasis showed hyperkeratosis, thickness of epidermis, spongiosis, as well as the appearance reteridges in epidermis as shown in Figure (6a).

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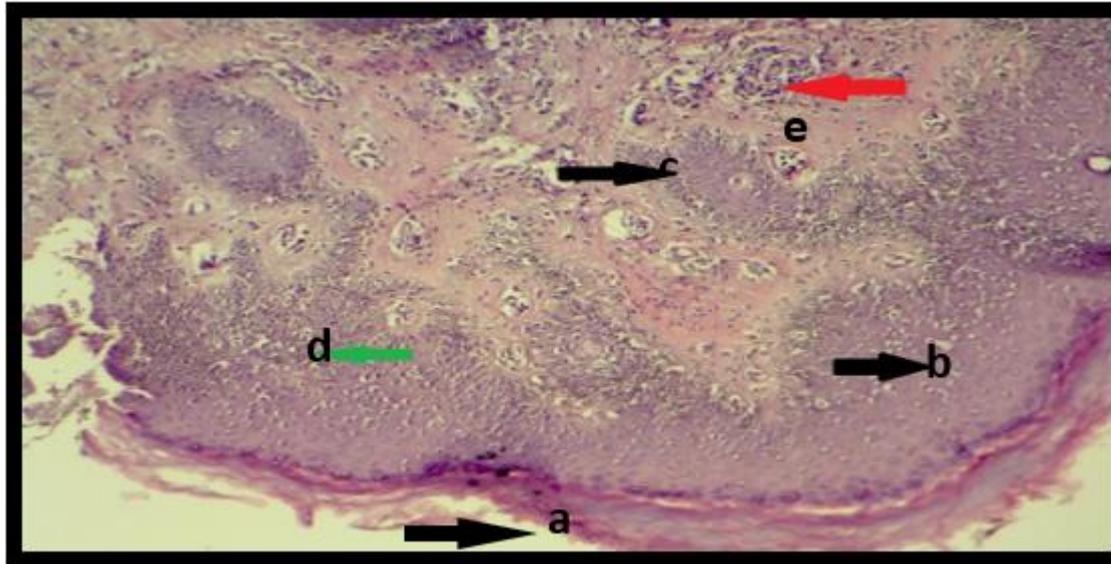


Figure 6 (a): Histopathological changes in the epidermis include hyperemia of skin (a), hyperplasia (b) the reteridges (c) and edema (d) and infiltration of the inflammatory cells in the dermis region (e) in patients infected with cutaneous leishmaniasis (H&E,10x).

In dermis there was infiltration of inflammatory cells as shown in Fig.6b, as well as the presence of edema, necrosis, and degeneration in some infected skin cells. This finding agrees with the results of the previous studies [22-24]. All these studies showed that the histological changes of the dermal skin lesions were characterized by hyperemia, ulceration, hyperplasia, necrosis and degeneration, as well as excessive infiltration of inflammatory cells. These changes are caused by the presence of the parasite inside macrophages and its proliferation which leads to cell burst and increase in the amount of metabolic products of parasite in infected tissues, which generate immune responses as well as hyperplasia as a reaction.

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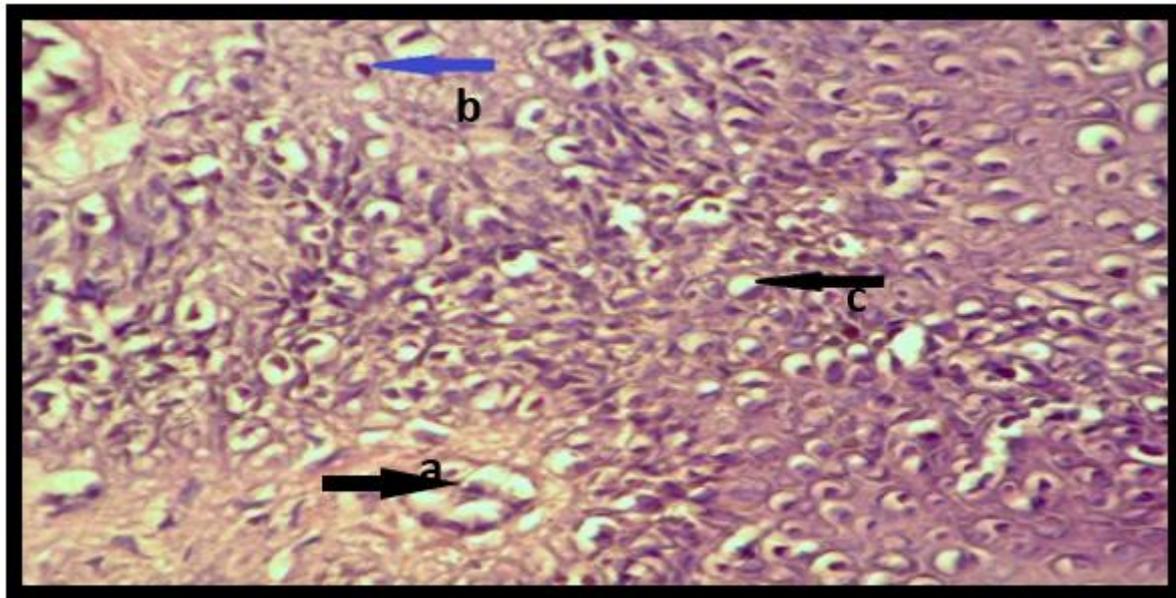


Figure 6 (b): hydropic degeneration of the skin (a), cellular necrosis (b) and degeneration in some patients infected with cutaneous leishmaniasis (c). (H&E,10x).

In conclusion, the results of the current study showed that the scabies is still considered as a neglected public health problem and many people suffering from this disease which causes many histological changes and damage to the human skin.

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