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A Comparative Study of Psoriasis and Psoriasiform Dermatoses on Basis of Ki-67 Immunohistochemical Expression

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ABSTRACT

Introduction: The prototypical psoriasiform tissue pattern is psoriasis, both clinically and histopathologically. However, it should be distinguished from other psoriasiform dermatoses.
Objective: This study aimed to determine the expression of Ki-67 immunohistochemically in psoriasis and psoriasiform dermatoses for diagnostic reasons. **Material and Methods:** Between January 2020 and January 2021, a cross-sectional study was conducted on the paraffin blocks of 22 psoriasis and 22 psoriasiform dermatoses patients. Four-micron sections were cut from formalin-fixed paraffin-embedded tissue from each biopsy specimen. Hematoxylin and eosin staining was used to colour the initial sections. Additionally, Ki-67 immunohistochemistry was performed.
Results: Mean value of KI-67 expression was highly significant in psoriasis (94.4 ± 11) versus (21.1 ± 5.7) than in psoriasiform dermatoses (P value < 0.001). **Conclusion:** Ki-67 expression was shown to be significantly elevated in psoriasis compared to the other types of dermatoses studied.
Keywords: Immunohistochemistry, Psoriasis, Dermatoses, Ki-67.

INTRODUCTION

Psoriasis is a chronic inflammatory disease mediated by the immune system. It affects 2-3% of the people all over the world, and the cause of psoriasis is still unknown. There is a complex interaction between genetic, immunological and environmental factors [(1)].

Psoriasis is clinically diagnosed with the presence of scaly, erythematous plaques on the skin surface with additional joint, and nail manifestations. Plaque psoriasis is the most common type, guttate, pustular, and erythrodermic are atypical forms [(2)].

The psoriasiform lesions have similar histological and clinical characteristics to those of psoriasis. Lichen simplex chronicus, pityriasis rosea, pityriasis rubra pilaris, atopic dermatitis, seborrheic dermatitis, and allergic contact dermatitis are examples of psoriasiform lesions. Therefore, clinical and histopathological similarities between psoriasis and psoriasiform lesions contribute to diagnostic difficulties in obtaining a final diagnosis [(3)]. Psoriasis and psoriasiform dermatoses can occasionally be differentiated using immunohistochemistry for diagnostic, prognostic, and therapeutic purposes. Psoriasis has a higher level of the cell proliferation marker Ki-67 in its lesions than does normal skin, and this higher level of Ki-67 expression is associated with the severity of the disease [(4)].

MATERIAL AND METHODS

This cross-sectional study was performed on a total of 44 paraffin blocks of skin tissue between January 2020 and January 2021. Data was gathered from the pathology department at Zagazig University. Twenty two blocks with psoriasis (14 males and 8 females) and twenty two blocks with psoriasiform dermatoses (12 males and 10 females) were enrolled in this study.

Ethical approval:

The study was conducted after taking approval of The Local Ethical Committee Institutional review board (IRB) with approval number of 6660.

Inclusion criteria: Psoriasis (active, healed, acute on top of chronic and chronic) and psoriasiform dermatoses (active, healed, acute on top of chronic and chronic).
Exclusion criteria: Co-existing dermatological diseases, pregnancy and breast-feeding.

Steps of performance and techniques that were used:
I- Clinical evaluation: The clinicopathological data of age, sex, and clinical presentation were retrieved from pathology reports available with the tissue specimens.
II- Histopathological evaluation: To double-check the diagnosis, routine Hematoxylin and Eosin stain (H & E) was used to segment paraffin blocks at a thickness of 3-4 microns.
Assessment of the disease activity (Histopathological changes of the epidermis) in both psoriasis and psoriasiform dermatoses for epidermal changes as (hyperkeratosis, parakeratosis, regular acanthosis, and elongated rete ridges)
A three -point scoring procedure was used: Zero for no changes, one for minimal changes, isolated changes in few microscopic fields, two for mild changes, few changes in several microscopic fields and three for moderate and focal changes in nearly all microscopic fields [(5)].
Assessment of grades of inflammation by counting of the inflammatory cells numbers per mm of section per ten high power fields in both psoriasis and psoriasiform

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dermatoses. Grade 0: No infiltrate when median count is < 10, grade 1: Mild infiltrate when median count is from 10- 30, grade 2: Moderate infiltrate when median count is from 31 -50 and grade 3: Marked infiltrate (severe inflammation) when median count is > 50 [(6)].

III-Immunohistochemical staining using monoclonal antibody:

Ki-67, rabbit monoclonal antibody (IGg), dilution range (1:50 - 1:100) was used. It was done as prescribed by the manufacturer. Biomarker positive control samples included a small bowel specimen (strong nuclear positivity).

Immunostaining for Ki-67 (positive brown nuclear stained keratinocytes) [(7)] was graded semiquantitatively, and were counted per ten high power field and median was obtained and graded according to severity into: Grade 0: none, when median count is < 10, grade 1: weak, when median count is from 10- 30, grade 2: moderate, when median count is from 31-50 and grade 3: strong, when median count is > 50 [(8)].

Statistical analysis

Analysis of data was performed utilizing the software (SPSS version 21). Means and standard deviations were used to convey the results of a study for quantitive variables. Number and percentage for categorical variables. Chi-square test (X^2), t-test or when necessary, we utilised the Mann-Whitney test. P-value of 0.05 or lower was deemed statistially significant.

RESULTS

Regarding age and sex in cases of both psoriasis & psoriasiform dermatoses, there was no statistically significant difference (P= 0.73, 0.53 respectively) as shown in table (1).

Regarding moderate hyperkeratosis, parakeratosis, acanthosis & thickened rete ridges, they showed higher significant expression in psoriasis (31.8, 31.8, 36.4 and 31.8% versus 4.5, 0, 0 and 0 %) than in psoriasiform dermatoses respectively (P value <0 .5) as shown in table (2).

Regarding the count of inflammatory cells infiltration per 10 HPF, they were significantly higher in psoriasis (45 – 147) than in psoriasiform dermatoses (12 – 54) (Table 3). Regarding KI67 expression, mean value of Ki-67 expression was highly significant in psoriasis (94.4 ± 11 versus 21.1 ± 5.7) than in psoriasiform dermatoses. (P value < 0.001) (Table 4).

Table (1): Demographic characteristic in both psoriasis & psoriasiform dermatoses

Variable	Psoriasis (n=22)		Psoriasiform Dermatoses (n=22)		t-test	P value
Age (years):						
Mean ± SD	40.2 ± 15.8		41.9 ± 17.2		0.33	0.73
Range	17– 70		13 – 75			
	No	**%**	**No**	**%**	χ^2	**P value**
Gender:						
Male	14	63.6	12	54.5	0.38	0.53
Female	8	36.4	10	45.5		

Table (2): Histopathological changes in both psoriasis & psoriasiform dermatoses

	Psoriasis		Psoriasiform		χ^2	P value
	No	**%**	**No**	**%**		
Hyperkeratosis						
0 no	0	0	0	0.0		
1 minimal	7	31.8	7	31.8	6.14	*0.04
2 mild	8	36.4	14	63.6		
3 moderate	7	31.8	1	4.5		
Parakeratoses						
0 no	2	9.1	1	4.5		
1 minimal	6	27.3	10	45.5		
2 mild	7	31.8	11	50.0	9.22	*0.026
3 moderate	7	31.8	0	0.0		
Acanthosis						
0 no	0	0.0	0	0.0		
1 minimal	6	27.3	7	31.8	10.21	*0.006
2 mild	8	36.4	15	68.2		
3 moderate	8	36.4	0	0.0		
Ridges						
0 no	3	13.6	0	0.0		
1 minimal	5	22.5	10	45.5	12.98	*0.004
2 mild	7	31.8	12	54.5		
3 moderate	7	31.8	0	0.0		

Table (3): Comparison between the count of inflammatory cells per 10/HPF in both psoriasis & psoriasiform dermatoses in H & E stained slides

Variable	psoriasis (n=22)	Psoriasiform Dermatoses (n=22)	t-test	P value
Count of inflammatory cells per 10HPF				
Mean ± SD	103.7 ± 26.9	25.4 ± 12.6	12.3	** 0.001<
Range	45– 147	12 – 54		

Table (4): Comparison between Ki-67 expression in both psoriasis & psoriasiform dermatoses

Variable	psoriasis (n=22)	Psoriasiform Dermatoses (n=22)	t-test	P value
Ki-67				
Mean ± SD	94.4 ± 11	21.1 ± 5.7	27.7	** 0.001<
Range	75– 121	10 – 28		

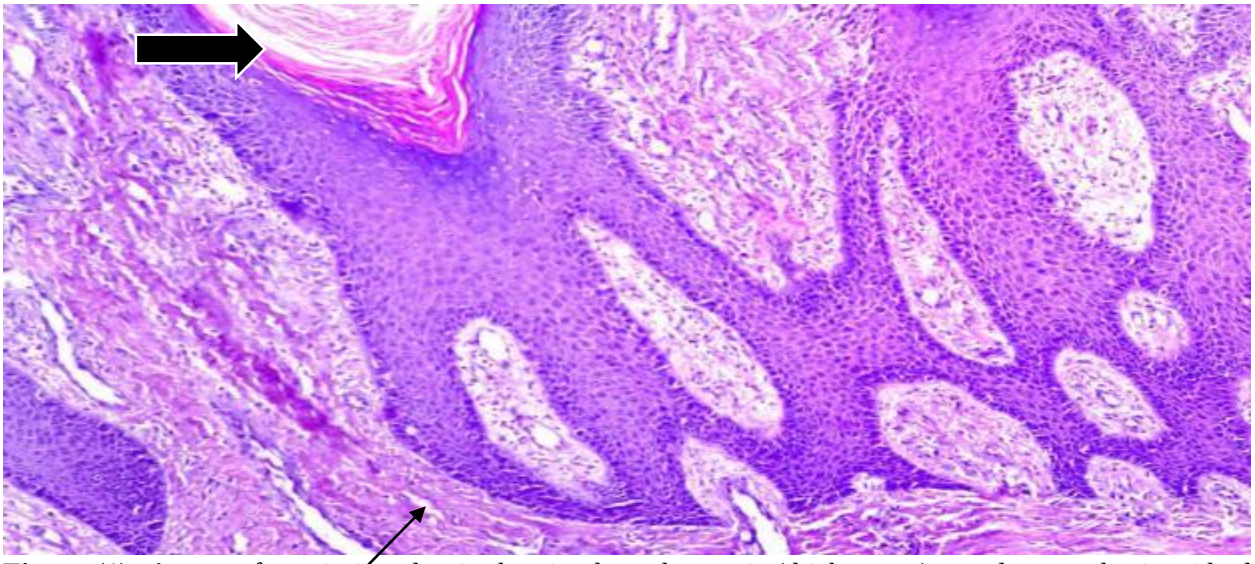

Figure (1): A case of psoriasis vulgaris showing hyperkeratosis (thick arrow), regular acanthosis with elongated rete ridges (thin arrow). **(X400, H&E).**

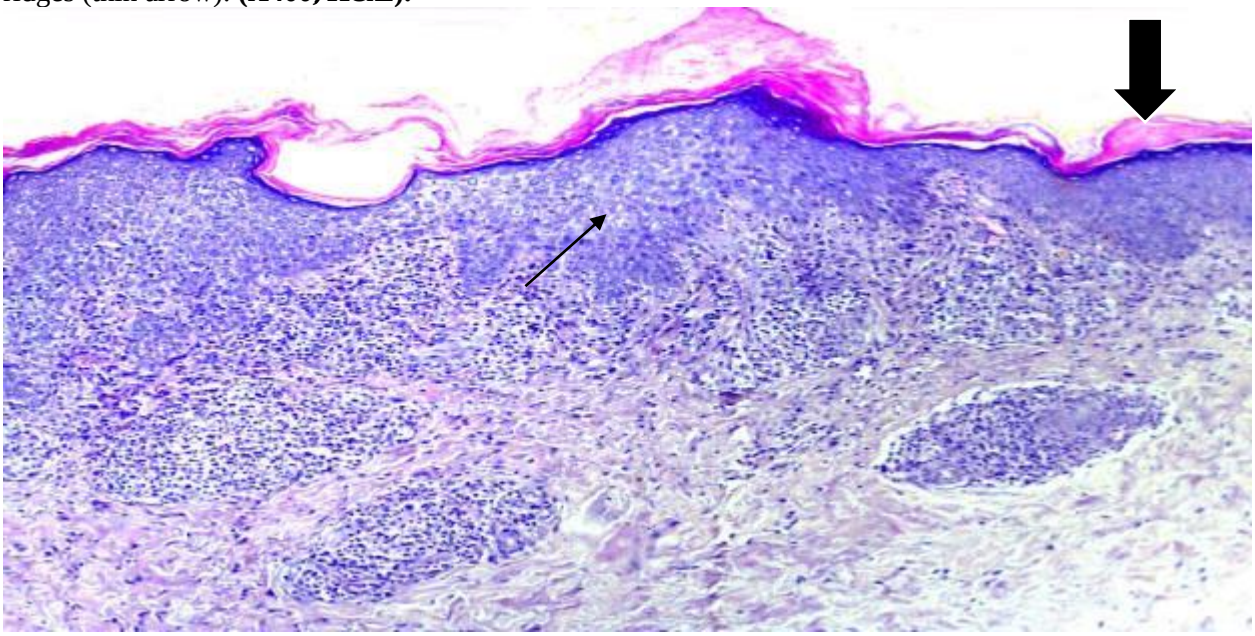

Figure (2): A case of chronic nonspecific dermatitis showing hyperkeratosis (thick arrow), acanthosis and irregular thickened rete ridges (thin arrow) **(X100, H&E).**

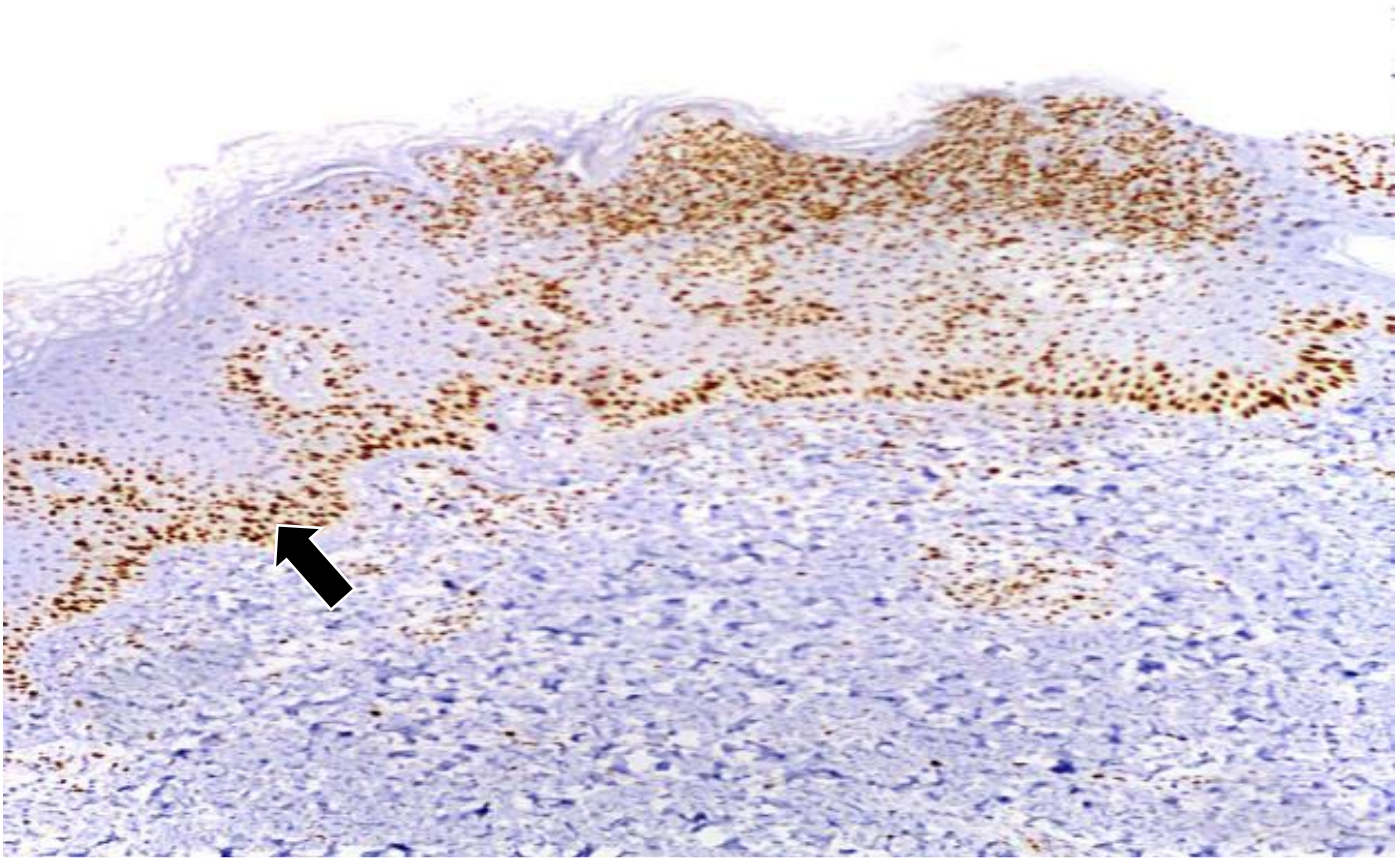

Figure (3): A case of pustular psoriasis showing strong positive expression of Ki-67 IHC marker (arrow) **(X100, IHC).**

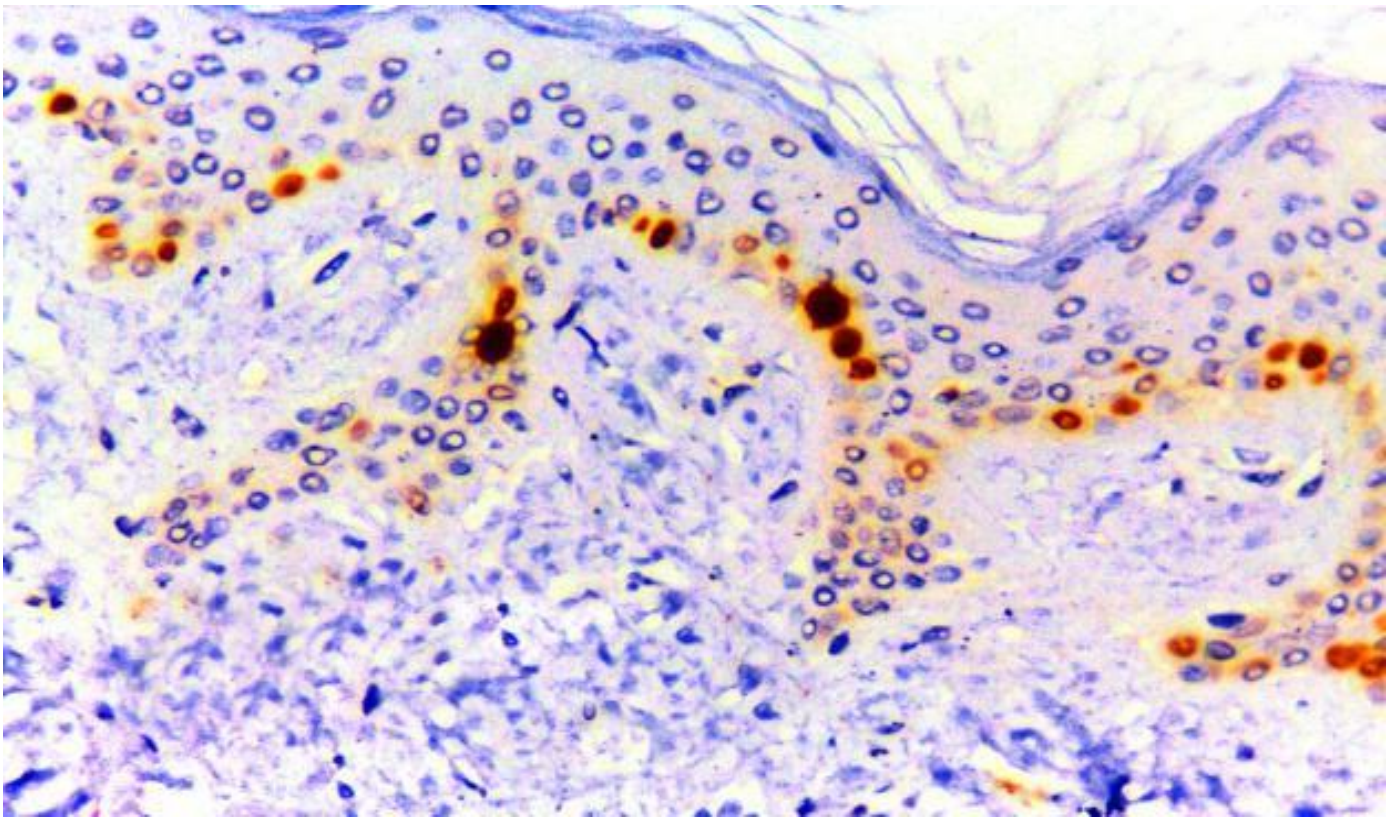

Figure (4): A case of chronic non-specific dermatitis showing weak positive expression of Ki-67 IHC marker **(X400, IHC).**

DISCUSSION

Demographic characteristics of this study were in agreement with the study performed by **Jayalakshmy *et al.* [9]** a look at gender patterns found that psoriasis was more prevalent in women than in men, (65%), were males as compared to females (35%), while in psoriasis (75%) were males as compared to females (25%).

Our findings were more in line with those of **Gyanchandani and colleagues results[3]** who stated that regular acanthosis, was highly significant for psoriasis, thickening rete ridges was highly significant in cases of psoriasiform dermatoses, hyperkeratosis and parakeratosis was found significant in psoriasis.

The count of inflammatory cells infiltration in our study were concordant with **Rana *et al.* [10]** who observed that the difference in percentage of cells was statistically significant (p=0.002), on comparing the infiltration of inflammatory cells between psoriasis and psoriasiform lesions.

The results of the present study were consistent with **Sezer *et al.* [11]** who studied expression of Ki-67 in psoriasis histopathology (n = 35) and in psoriatic dermatoses histopathology (n = 36). The psoriasis group had significantly higher levels of Ki-67 than the control group (462.2 ± 188.2 cells/mm^2) compared with the psoriasiform dermatoses group (345.6 ± 193.7 cells/mm^2) (p = 0.012), Ki-67 immunostaining, was higher in all psoriasis cases (range, 77.1% - 92.4%) and lower in all psoriasiform dermatoses cases (range, 21.0% - 73.3%).

In contrast with our results, **Ramezani *et al.* [4],** found that mean value of Ki-67 expression was higher in psoriasiform dermatoses (29 ±11.6) versus (21.6 ±10) in psoriasis. (P value = 0.002).

CONCLUSIONS

The present study showed a high expression of Ki-67 biomarker in psoriasis compared to psoriasiform dermatoses.

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Authorship and Contribution: This manuscript was co-authored by all of the authors in terms of study conception, data collection, analysis and interpretation, and manuscript preparation and revision. Their approval of the book in its current form is complete.

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