sciendo

ORIGINAL ARTICLE Serbian Journal of Dermatology and Venereology 2020; 12 (2): 33-40

DOI: 10.2478/sjdv-2020-0006

Evaluation of IHC Ki-67 with Clinical Correlation in Psoriasis

Sandhya BORADE, Vasudha A. BELGAUMKAR, Ravindranath B. CHAVAN, Neelam BHATT, Nitika S. DESHMUKH

Department of Dermatology, B.J. Govt. Medical College and Sassoon General Hospital, Pune, India

Correspondence: Vasudha A. Belgaumkar, E-mail: oc_vasudha@yahoo.co.in

UDC 616.517-091.8:616-07

Abstract

Introduction. Psoriasis is a chronic inflammatory skin disease with hyperproliferation, abnormal differentiation and inflammatory infiltration in epidermis and dermis. Sometimes it is clinically and histopathologically challenging to distinguish psoriasis from other non-psoriatic psoriasiform dermatoses (NPPD) like eczema, pityriasis rosea, pityriasis rubra pilaris, and lichen simplex chronicus. Ki-67 is a non-histone nuclear protein complex that regulates the cell cycle and is the most widely used proliferation immunohistochemistry (IHC) marker. Its levels have been shown to be raised in psoriasis compared to normal skin. **Aim**. To elucidate and compare expression of IHC Ki-67 in psoriasis and NPPD, correlate these levels with clinical variants and disease severity in psoriasis and to observe change in levels with demographic and psoriasis -related variables. **Material and Methods**. Thirty patients, each with clinically diagnosed psoriasis (cases), and NPPD (controls) were enrolled. Biopsy was taken for histopathology and IHC Ki-67 immunohistochemistry. Statistical analysis was performed. **Results**. We found a significantly higher expression of IHC Ki-67 in psoriasis as compared to all types of NPPD. The higher level of Ki-67 in pustular and erythrodermic psoriasis compared to plaque-type emphasizes the greater severity and activity of these forms. The Ki-67 expression was found to increase with increasing body surface area involvement and disease severity (PASI) in chronic plaque type. Pityriasis rubra pilaris had the highest Ki67 expression among NPPD group. **Conclusion**. Ki-67 is a promising tool with diagnostic and prognostic utility in psoriasis, particularly when it comes to its differentiation from non-psoriasis psoriasiform disorders.

Key words: Psoriasis; Ki-67 Antigen; Cell Proliferation; Immunohistochemistry; Biopsy; Severity of Illness Index; Diagnosis; Prognosis

Introduction

Psoriasis is an immune-mediated genetically determined disorder affecting skin, nails and joints with various systemic associations (1). The worldwide prevalence ranges between 0.09% and 11.43% with India contributing 20% of the global burden (2, 3).

Non-psoriasis psoriasiform dermatoses (NPPD) are disorders which simulate psoriasis clinically and histopathologically. A few examples are seborrhoeic dermatitis, pityriasis rosea, pityriasis rubra pilaris (PRP) and lichen simplex chronicus (4). Although a specific diagnosis may be reached by means of characteristic and distinctive histopathological features such as Munro's microabscesses and tortuous, dilated capillaries *(psoriasis)*; alternating horizontal and vertical parakeratosis *(pityriasis rubra pilaris)*; mounds of parakeratosis with extravasation of erythrocytes *(pityriasis rosea)*; and dermal, thickened vertical collagen bundles with orthokeratosis *(lichen simplex)*, the dermatopathologist is often forced to report findings as "non-specific psoriasiform dermatitis", thereby emphasizing the need for more effective diagnostic tools to differentiate between psoriasis and NPPD. Ki-67 antigen is a labile, 345-395 kD non-histone nuclear protein complex. It regulates the cell cycle and is the most widely used proliferation immunohistochemistry (IHC) marker. Its expression has been shown to be increased in psoriatic lesions with respect to non-lesional skin (5). However, there are limited data regarding the comparative expression of this marker in different types of psoriasis vis-a-vis NPPD.

This study attempts to elucidate the difference in IHC Ki-67 expression between psoriasis and non-psoriasis psoriasiform derma-

Table 1. Distribution of patients with psoriasis and non-psoriasis psoriasiform dermatoses (NPPD) according to clinical diagnosis

Clinical diagnosis (Psoriasis)	Number n (%)	Clinical diagnosis (NPPD)	Number n (%)
Plaque psoriasis	10 (33.33)	Pityriasis rosea	10 (33.33)
		Eczema	12 (40.0)
Generalised pustular psoriasis	10 (33.33)	Seborrhoeic	6
		Discoid	3
		Lichen simplex chronicus	3
Erythrodermic psoriasis	10 (33.33)	Pityriasis lichenoides chronica	4 (13.33)
		Pityriasis rubra pilaris	3 (10.0)
		Parapsoriasis (small plaque)	1 (3.33)
Total	30 (100)		30 (100)

toses (NPPD) and to identify any correlation with demographic and disease - related variables in psoriasis.

Material and Methods

A cross-sectional observational hospital-based study was conducted on 30 clinically diagnosed cases with psoriasis and 30 age and gender-matched controls with non-psoriasis psoriasiform dermatoses. After the permission and written informed consent had been obtained from the Institutional Ethics Committee and the patients, respectively, a detailed history was elicited from each patient followed by dermatological and systemic examination. Pregnant and lactating females and patients with doubtful diagnosis or on topical or systemic treatment within two months of enrolment were excluded. Data were recorded in Microsoft Excel Software.

Skin biopsy was taken from the most clinically representative lesion for histopathological examination and immunohistochemistry (using two-step polymer method and mouse monoclonal antibodies against Ki-67)

IHC Interpretation: Expression of Ki 67 was indicated by the presence of yellow to brown granules in the nucleus. Ki 67 positivity index was calculated as the percentage of Ki 67 positive cells.

$$\text{Ki-67 percentage} = \frac{\text{Suprabasal Ki-67 positive cells}}{\textit{Total epidermal Ki-67 positive cells}} \times 100$$

Statistical Analysis

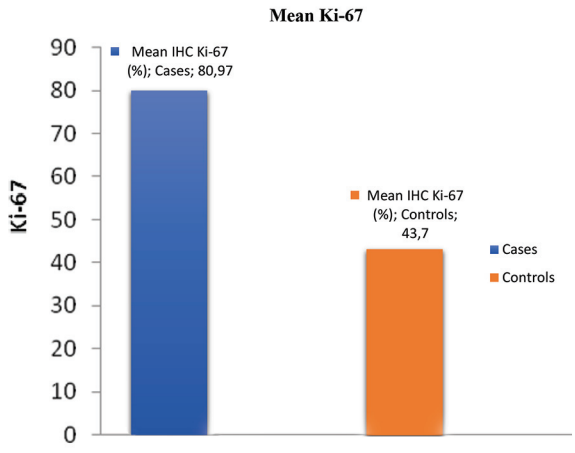
Data analysis was performed using SPSS (Statistical package for social sciences) version 20:0. Qualitative data variables were expressed as frequency and percentage. Chi-square test/Fisher's exact test/Kruskal Wallis test/Mann–Whitney U test/ANOVA test were used to find the association of Ki-67 percentage with various parameters such as the difference between psoriasis and NPPD, correlation with the type and duration of psoriasis, age, gender, treatment history, nail and joint involvement and disease severity (assessed by PASI score and body surface area involvement). p-value <0.05 was considered as significant.

Results

Table 1 depicts the distribution of the 30 psoriasis cases and 30 non-psoriasis psoriasiform dermatoses (NPPD, controls) based on clinical diagnosis (confirmed by clinicopathological correlation). The psoriasis group comprised of 10 plaque, generalized pustular and erythrodermic types each. Maximum number of patients in both psoriasis (22, 73.33%) and NPPD (23, 76.66%) groups was below 50 years of age, their mean age being 35 years (SD 18.66) and 37.17 years (SD 17.43), respectively, without any statistically significant difference. There were three pediatric cases in both plaque and pustular group (mean age 10.16 years). Both psoriasis (57%) and NPPD (70%) groups showed male predominance. Disease duration since its onset ranged between 15 days to 30 years for psoriasis while 90% of the NPPD had duration less than 6 months. Out of 30 psoriatic patients, 16 had previous history of treatment.

Table 2. Mean IHC Ki-67 percentage in psoriasis and non-psoriasis psoriasiform dermatoses (NPPD)

Clinical diagnosis (Psoriasis)	Number n, (%)	Mean Ki-67 value (%)	Clinical diagnosis (NPPD)	Number n,(%)	Mean Ki-67 value (%)
Plaque psoriasis	10 (33.33)	78.50	Pityriasis rosea	10 (33.33)	45.30
Generalised pustular psoriasis	10 (33.33)	82.0	Eczema	12 (40.0)	41.00
Erythrodermic psoriasis	10 (33.33)	82.40	Pityriasis lichenoides chronica	4 (13.33)	47.50
			Pityriasis rubra pilaris	3 (20.0)	51.00
			Parapsoriasis	1 (3.33)	23.00
Total	30 (100)			30 (100)	



Graph 1. Comparison of Mean IHC Ki-67 between Psoriasis (cases) & NPPD (controls)

Nail changes were noted in 22 (73.3%) psoriatic patients while in NPPD only 3 (10%) patients with chronic eczema had pitting and longitudinal ridges. Two psoriatic patients (one each with generalized pustular psoriasis and erythroderma) had joint pain while none from the NPPD group had this complaint.

Mean Ki-67 percentage for psoriasis (80.97 $\pm$ 5.58, range 70 – 90%) was significantly higher than for NPPD (43.7 $\pm$ 10.10, range 20% to 59%) (p value < 0.001) **(Table 2 and Graph 1)**. Among different variants of psoriasis, erythrodermic type had the highest levels followed by generalized pustular and plaque **(Graph 2a).** However, this difference was not statistically significant (p value 0.199). Children (< 12 years) with plaque-type had significantly higher Ki-67 expression than their adult counterparts (84.66% vs. 75.85%) while adults with pustular type had insignificantly higher levels as compared to children (83% vs 79.6%). PRP had the highest Ki-67 levels (51%) in NPPD group followed by pityriasis lichenoides chronica, pityriasis rosea and small plaque parapsoriasis **(Graph 2b)**. **Figure 1 (A, B and C)** shows immunohistochemistry staining (IHC Ki-67) observed in the three sub-types of psoriasis. Of all variables analyzed, body surface area (for entire

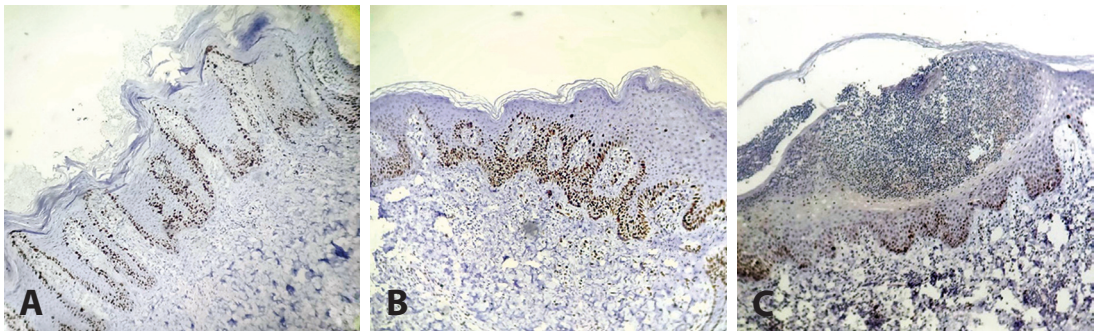


Figure 1. Immunohistochemical staining (IHC Ki-67) in psoriasis: A) Plaque Psoriasis, B) Erythroderma, C) Pustular Psoriasis

Table 3. Correlation of mean value of IHC Ki-67 with body surface area involvement in psoriasis

BSA	Number of patients	IHC (%)		p-value
		Mean	SD	
≤ 30%	3	73.67	3.21	
31% - 50%	1	75.0		0.024
> 50%	26	82.04	5.25	

Table 4. Correlation of mean value of IHC Ki-67 with PASI score in plaque psoriasis

PASI score	Number n, (%)	Mean value of IHC Ki-67 (%)	SD	p- value
< 10	3	75.33	0.57	
>10	7	80.17	6.55	0. 03

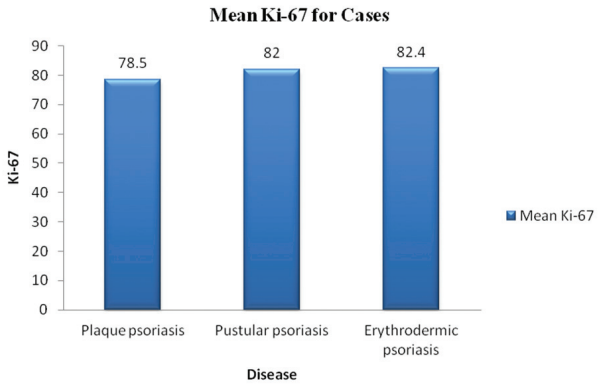
psoriasis group) and PASI score (for plaque-type psoriasis) demonstrated a statistically significant correlation with Ki-67 levels **(Tables 3 and 4)**. The patients with > 50% body surface area involvement (p=0.024) and PASI score > 10 (p = 0.03) had highest Ki-67 levels. Male patients with generalized pustular psoriasis had significantly higher mean Ki-67 levels as compared to female ones (p = 0.021). There was no statistically significant association between Ki-67 levels and other parameters such as treatment history, duration of disease, nail or joint involvement.

Discussion

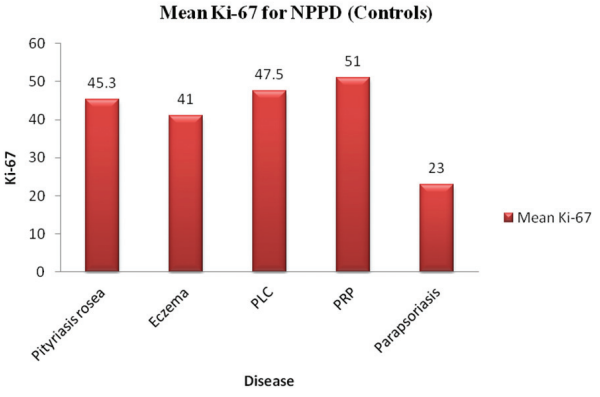
Various dermatoses, either at the onset or during the course of their progression/resolution, manifest lesions that mimic psoriasis leading to delayed or missed diagnosis with implications for management and prognosis.

Histopathologically, psoriasiform reaction pattern is defined as the presence of epidermal hyperplasia with elongation of rete ridges in a regular manner. This encompasses a heterogeneous group of dermatological conditions (6). Psoriasis, the prototype of the psoriasiform dermatoses, is considered to be a disease of dysregulated inflammation, driven and maintained by multiple components of the immune system. The pathologic collaboration between innate and acquired immunity results in the production of cytokines, chemokines and growth factors that contribute to the hyperproliferation and inflammatory infiltrate (4). The common clinical variants of psoriasis are pustular, erythrodermic and plaque type.

Ki-67 is an important marker of active cycling cells (S, G2 and M phases). We found that lesions of psoriasis had higher mean values of IHC Ki-67 than NPPD, confirming a greater degree of epidermal hyperprolifera-



Graph 2a. Mean value of IHC Ki-67 in different types of psoriasis



Graph 2b. Mean value of IHC Ki-67 in different types of NPPD

tion. Our method of IHC Ki-67 staining was similar to Engin Sezer et al. (7) Jun-min et al. stated that the over-expression of Ki-67 in psoriatic lesions suggests an abnormality of cell cycle regulation related to the hyper-proliferation and abnormal differentiation of psoriatic keratinocytes, implying that it may be involved in the pathogenesis of psoriasis (8). In our study, higher levels noted in unstable variants like erythrodermic and generalised pustular are attributable to their greater severity with profound epidermal proliferation as compared to the more stable plaque-type. Our findings are consistent with previous studies that reported higher number of Ki-67 positive keratinocytes in pustular psoriasis as compared with psoriasis vulgaris (9). In the plaque psoriasis group, the highest IHC Ki-67 percentage was seen in a single patient with guttate lesions, suggesting that guttate psoriasis might be associated with increased epidermal proliferation as against the chronic plaque type.

Since the initial documentation of rapid epidermal turnover in psoriasis by Weinstein (10), a large body of evidence has indicated that the cell cycle time in psoriasis is normal and only increased recruitment of epidermal cells may be responsible for the development of psoriatic lesions (5). Our finding of Ki-67 positive inflammatory cells in the epidermis with Ki-67 negative dermal cells is in concordance with the above mentioned hypothesis. In corroboration, Nickoloff and Griffiths proposed that dermal T-cells are in a resting or non-cycling (G0) state and the entry of the T-cells into the epidermis is apparently associated with an important activation event, which involves interaction with the keratinocytes (11). In our study, mean Ki-67 of the three children with plaque-type psoriasis was higher than the adults with the same type. This might indicate higher activity and severity of plaque psoriasis with greater propensity for instability in children. Interestingly, we noted the opposite trend in pustular psoriasis wherein adults had higher mean Ki-67 values. Prakashiny S et al. (12) demonstrated the Ki-67 index of suprabasal epidermal cells as 10-30% in adult psoriasis (6% in normal skin) and 12-28% in childhood psoriasis (8% in normal skin). However, these authors used suprabasal epidermal cell count for calculation, hence the level of expression could not be compared with our study which calculated suprabasal-to-total epidermal cell ratio.

We found significantly higher Ki-67 expression in male patients with erythrodermic and pustular psoriasis in comparison with their female counterparts. Although psoriasis affects adult women and men equally with only slight male predilection, studies assessing the use of systemic and biological treatment in cohorts of patients with severe disease consistently report that men are twice as likely to receive systemic therapy as women, suggesting that they are likely to have more severe disease. Abdou AG et al. (13) have shown nucleolar pattern of Ki-67 expression to be significantly associated with male gender. On the other hand, females with plaque type had higher mean IHC Ki-67 than males, probably due to larger body surface involvement in the small number of females recruited in our study. Psoriasis is an extremely dynamic disorder with multiple fluctuations and the three forms are often inter-convertible. Hence co-relation of proliferation markers with duration is difficult to interpret and explain. We were unable to find any previous studies analyzing this parameter to compare our findings.

Patients with past history of treatment had statistically insignificant lower levels of Ki-67 than treatment-naive patients. According to the standard protocol for psoriasis management followed in our institute, patients are initially prescribed topical corticosteroids, Vitamin D analogs and emollients, while those requiring systemic therapy are prescribed methotrexate or cyclosporine (subject to patient co-morbidity profile and affordability). Miracco et al. (14) and Tursen B et al. (15) have demonstrated that Ki-67 expressions decreased after cyclosporin and etanercept treatment respectively while Van der Velden et al. (16) observed that the number of Ki-67+ cells reduced after topical calcipotriol/betamethasone dipropionate treatment. These reports suggest that Ki-67 expression can be utilized as a prognostic marker to evaluate response to treatment with various topical and systemic modalities.

We found that mean IHC Ki-67 increased with increasing body surface area in both overall psoriasis group (with maximum expression in erythroderma followed by generalized pustular psoriasis with > 50% BSA) as well as the plaque-type (maximum in BSA > 50%). PASI score is a universally accepted clinical indica-

tor of disease severity in plaque type psoriasis. We studied plaque patients with PASI score ranging from 5.2 to 44.2 (mean 18.32) and found significantly higher Ki-67 expression in patients with PASI more than 10 as compared to those with PASI under 10, which is consistent with the findings of authors who have noted a positive correlation between clinical psoriatic activity (PASI) and epidermal proliferative activity (17, 18). According to the European S3 Guidelines on the systemic treatment of psoriasis vulgaris, moderate to severe disease is defined as a PASI score >10 and is an indication for systemic treatment (19). Amany et al. (20) concluded that Ki-67 was the most significant variable contributing to clinical severity and claimed that one unit change in Ki-67% can explain 1.2 unit changes in PASI score (with 97% sensitivity, 40% specificity and 25% cut-off value). Contradicting this school of thought, Yazici et al. (21) did not observe any correlation between PASI index and Ki-67, PCNA and ICAM-3 expression in patients treated with methotrexate. They have propounded that the PASI index is a static method of evaluation of the intensity of psoriasis which does not adequately reflect the real activity of the disease process. In the absence of any consensus criteria for severity assessment of generalized pustular and erythrodermic psoriasis, the correlation of Ki-67 with this parameter could not be studied in these variants. Among NPPD, the highest mean value seen in pityriasis rubra pilaris is concordant with its propensity for progression to erythroderma. The epidermal cell kinetic study conducted by Ralfs et al. (22) also demonstrated elevated proliferative indices among PRP patients while Jeng-Feng Chen et al. (23) documented upregulated Ki-67 expression in PRP lesional epidermis compared to the adjacent non-affected skin, supporting the view that PRP results from hyperproliferation of the epidermal keratinocytes.

Strengths – This is probably a novel study of its kind because, despite thorough search through available literature (using search engines: Google, Google Scholar, Pubmed), we were unable to find any other study analyzing the co-relation of Ki-67 with such a comprehensive number of demographic and psoriasis-related parameters.

Limitations – A small sample size of different sub-types of psoriasis could be enrolled due to constraints of feasibility and availability of immunohistochemistry kits. Therefore, although various parameters demonstrated an association with Ki-67 expression, this did not reach statistical significance and hence definitive conclusions could not be drawn. Multivariate-regression analysis would be required to identify and quantify the exact correlation between Ki-67 and study variables. Elicitation of post-treatment Ki-67 expression was not part of the cross-sectional study design.

Conclusion

This preliminary study demonstrates the potential utility of Ki-67 as a diagnostic and prognostic marker in psoriasis, particularly to differentiate it from non-psoriasis psoriasiform disorders. More studies with larger sample size for individual sub-types of psoriasis will further elucidate its role in the pathogenesis and management of this challenging disorder.

Abbreviations

NPPD – non-psoriatic psoriasiform dermatoses
IHC – immunohistochemistry
PRP – pityriasis rubra pilaris
SPSS – Statistical package for social sciences

Acknowledgement

Dr. Vasudha Belgaumkar is supported by the Fogarty International Centre of the US National Institutes of Health (grant#D43TW 00957). The content is solely the responsibility of the authors and does not represent the official views of the National Institutes of Health.

The authors would like to thank Dr. Sharada R. Rane and Dr. Rupali K Bangar (Department of Pathology, B.J. Government Medical College and Sassoon General Hospital, Pune, India) for their valuable support.

References

1. Dogra S, Yadav S. Psoriasis in India: prevalence and pattern. Indian J Dermatol Venereol Leprol. 2010;76(6): 595-601.
2. Danielsen K, Olsen AO, Wilsgaard T, Furberg AS. Is the prevalence of psoriasis increasing? A 30–year follow-up of a population–based cohort. Br J Dermatol. 2013;168(6):1303-10.

3. Asokan N, Prathap P, Ajithkumar K, Betsy A, Binesh VG. Pattern of psoriasis in a tertiary care teaching hospital in South India. Indian J Dermatol. 2011;56(1):118-9.
4. Sehgal VN, Dogra S, Srivastava G, Aggarwal AK. Psoriasiform dermatoses. Indian J Dermatol Venereol Leprol. 2008;74(2):94-9.
5. Amin MM, Azim ZA. Immunohistochemical study of osteopontin, Ki-67, and CD34 of psoriasis in Mansoura, Egypt. Indian J Pathol Microbiol. 2012;55(1):56-60.
6. Pinkus H. Psoriasiform tissue reactions. Aust J Dermatol. 1965;8(1):31-5.
7. Sezer E, Böer-Auer A, Cetin E, Tokat F, Durmaz E, Sahin S, et al. Diagnostic utility of Ki-67 and Cyclin D1 immunostaining in differentiation of psoriasis vs. other psoriasiform dermatitis. Dermatol Pract Concept. 2015;5(3):7-13.
8. Jun-min Z, Geng-shi H, Chun-hong Z. Expression of P57 (kip2), PCNA and Ki67 in psoriatic lesion. China Tropical Medicine. 2009;9:453-4.
9. Chang SL, Hu S, Hung SI, Huang YL, Hsiao WC, Chung WH. A comparison of Ki-67 antigen presentation in acute generalized exanthematous pustulosis and pustular psoriasis. Arch Dermatol Res. 2010;302 (7)**:**525-9.
10. Weinstein GD, McCullough JL, Ross PA. Cell kinetic basis for pathophysiology of psoriasis. J Invest Dermatol. 1985;85(6):579-83.
11. Nickoloff BJ, Griffiths CE. Lymphocyte trafficking in psoriasis: a new perspective emphasizing the dermal dendrocyte with active dermal recruitment mediated via endothelial cells followed by intra-epidermal T-cell activation. J Invest Dermatol. 1990;95(5 Suppl):35S-7.
12. Prakashiny S, Srivastava V. Clinicohistological correlation of psoriasis and immunohistochemical expression of Ki 67. IP Journal of Diagnostic Pathology and Oncology. 2017;2(2):26-31.
13. Abdou AG, Maraee AH, Eltahmoudy M, El-Aziz RA. Immunohistochemical expression of GLUT-1 and Ki-67 in chronic plaque psoriasis. Am J Dermatopathol. 2013; 35(7):731-7.
14. Miracco C, Pellegrino M, Flori ML, Vatti R, Materno M, Andreassi L. Cyclin D1, B and A expression and cell turnover in psoriatic skin lesions before and after cyclosporin treatment. Br J Dermatol. 2000;143(5):950-6.
15. Tursen B, Kara T, Tursen U, Apa DD, Gubur O, Kaya TI. The changes in expression of Ki-67, and CD31 in psoriatic lesions before and after etanercept treatment. Hong Kong Journal of Dermatology and Venereology. 2013;21(1):5-13.
16. van der Velden HM, Pasch MC, van Erp PE, van Lingen RG, Otero ME, de Boer-van Huizen RT, et al. Treatment of plaque psoriasis with the two-compound product calcipotriol/betamethasone dipropionate versus both monotherapies: an immunohistochemical study. J Dermatolog Treat. 2010;21(1):13-22.
17. Jesionek-Kupnicka D, Chomiczewska-Skóra D, Rotsztejn H. Influence of phototherapy in psoriasis on ki-67 antigen expression: a preliminary study. Pol J Pathol. 2013;64(2):96-103.
18. Chen GS, Wu TM, Yang SA, Yu HS. Quantitative assessments of physiological and biological parameters in psoriatic lesions and its correlations to the clinical severity of psoriasis. Kaohsiung J Med Sci. 2001;17(8):408-18.
19. Nast A, Gisondi P, Ormerod AD, Saiag P, Smith C, Spuls PI, et al. European S3-Guidelines on the systemic treatment of psoriasis vulgaris - update 2015 - short version - EDF in cooperation with EADV and IPC. J Eur Acad Dermatol Venereol. 2015;29(12):2277-94.
20. Bary AA, Bary AA. Study of keratinocyte proliferation, apoptosis, and dermal inflammation in psoriatic skin lesions before and after methotrexate therapy: which change is contributing more to the clinical severity of the disease? American Journal of Research in Medical Sciences. 2018;2(1):34-43.
21. Yazici AC, Tursen U, Apa DD, Ikizoglu G, Api H, Baz K, et al. The changes in expression of ICAM-3, Ki-67, PCNA, and CD31 in psoriatic lesions before and after methotrexate treatment. Arch Dermatol Res. 2005;297 (6):249-55.
22. Ralfs IG, Dawber RP, Ryan TJ, Wright NA. Pityriasis rubra pilaris: epidermal cell kinetics. Br J Dermatol. 1981;104(3):249-52.
23. Chen JF, Gao HW, Wang WM. Juvenile pityriasis rubra pilaris: a case report with immunohistochemical and electromicroscopic studies. Dermatologica Sinica. 2010;28(1):46-50.

Evaluacija IHC Ki-67 sa kliničkom korelacijom u psorijazi

Sažetak

Uvod. Psorijaza je hronično inflamatorno oboljenje kože se hiperproliferacijom, abnormalnom diferencijacijom i inflamatornom infiltracijom u epidermu i dermu. Ponekad je klinički i histopatološki izazovno razlikovati psorijazu od drugih nepsorijaznih psorijazoformnih oboljenja (NPPO): ekcem, *pityriasis rosea*, *pityriasis rubra pilaris* i hronični *lichen simplex*. Ki-67 je nuklerno proteinski kompleks koji reguliše ćelijski ciklus i najviše korišćeni proliferacijski imunohistohemijski (IHC) marker. Dokazano je da su njegovi nivoi povišeni kod psorijaze u odnosu na normalnu kožu. **Ciljevi**. Da se uporedi ekspresija IHV Ki-67 u psorijazi i NPPO, koreliraju ti nivoi sa kliničkim varijantama i težinom bolesti kod psorijaze i da se posmatra promena u nivoima u odnosu na varijabile povezane sa demografskim podacima i psorijazom. **Materijal i metode.** Uzorak se sastojao od 30 pacijenata sa klinički dijagnostikovanom psorijazom (slučajevi) i NPPO (kontrole). Biopsija je urađena za histopatološki pregled i IHC Ki-67 imunohistohemiju. Urađena je statistička analiza. **Rezultati.** Ustanovili smo

značajno višu ekpresiju IHC Ki-67 u prisustvu psorijaze u poređenju sa svim tipovima NPPO. Viši nivo Ki-67 u pustularnoj i eritrodermalnoj psorijazi u odnosu na pločasti tip naglašava veću težinu i aktivnost tih formi. Ustanovljeno je da se Ki-67 ekspresija povećava sa većom zahvaćenom površinom tela i težinom oboljenja (PASI) u hroničnom pločastom tipu. *Pityriasis rubra pilaris* imala je najvišu Ki-67 ekspresiju u grupi NPPO. **Zaključak.** Ki-67 je potencijalni instrument sa dijagnostičkom i prognostičkom primenom kod psorijaze, pogotovo da je razlikuje od nepsorijaznih psorijazoformnih poremećaja.

Ključne reči: Psorijaza; Ki-67 antigeni; Ćelijska proliferacija; Imunohistohemija; Biopsija; Indeks težine bolesti; Dijagnoza; Prognoza

Received 7.06.2020.
Accepted 26.08.2020.