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The Relationship Between Neutrophil-to-Lymphocyte Ratio and Platelet-to-Lymphocyte Ratio in Psoriasis Curative Effect Treated with Apremilast: A Retrospective Analysis

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Abstract: In this study, the changes of neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) in patients with psoriasis were retrospectively analyzed based on the treatment of apremilast. By screening patients with psoriasis before and after treatment with apremilast, relevant blood routine indicators were collected, and NLR and PLR were calculated. The results showed that both NLR and PLR were significantly reduced after treatment with apremilast. This suggests that the inflammatory response is improved in patients with psoriasis and that apremilast may have an inhibitory effect on white blood cell platelet activation. These results suggest that NLR and PLR may be useful indicators to evaluate the condition of psoriasis and the therapeutic effect of apremilast. This provides a new reference index and treatment strategy for the clinic and has positive practical guiding significance for the prevention and treatment of psoriasis.

Keywords: Apremilast; Psoriasis; Neutrophil-to-lymphocyte ratio; Platelet-to-lymphocyte; Disease assessment

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1. Introduction

According to the World Health Organization, about 1–3% of the global population is affected by psoriasis. As a chronic non-infectious skin disease, psoriasis not only affects patients physically but also poses a serious threat to their mental health. Typical psoriasis features include redness, itching, and desquamation of the skin, and there is no definitive treatment that can completely cure the disease. In recent years, as a new drug for the treatment of psoriasis, apremilast has shown remarkable clinical efficacy, but its specific mechanism of action and influencing factors remain to be further studied. Based on the above background, we retrospectively analyzed the changes of neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) in the clinical data of patients with

psoriasis treated with apremilast. In recent years, NLR and PLR have been widely used to evaluate inflammatory response and immune status in a variety of diseases. We expect that this study will provide clinicians with a more accurate assessment of the disease and individualized treatment strategies to effectively improve treatment outcomes and quality of life for patients with psoriasis.

2. Overview of the treatment of psoriasis with apremilast

2.1. Pathophysiological mechanism of psoriasis

Psoriasis is a common skin disease characterized by chronic inflammation and complex pathogenesis involving multiple immune and inflammatory responses. The main characteristics are abnormal proliferation of keratinocytes and inhibition of death, accompanied by increased subdermal blood vessels and a large number of inflammatory cells. In this disease, the role of T cells is crucial, especially the increased activation of Th1 and Th17 cells, which leads to the overproduction of tumor necrosis factor-α (TNF-α), interleukin-17 (IL-17), and IL-23, which together drive the pathological process. This deviation from the normal immune response breaks down the skin barrier, causing abnormal skin hyperplasia and scale formation. Environmental factors, genetic predisposition, and psychological stress are the main factors that trigger psoriasis [1-3]. A deeper understanding of pathophysiological mechanisms provides the basis for the development of novel therapies, especially the application of immunomodulatory therapy in practice, which demonstrates its effective therapeutic potential [4].

2.2. The role of apremilast in the treatment of psoriasis

Apremilast is a selective phosphodiesterase 4 (PDE4) inhibitor that plays an important role in the treatment of psoriasis. It regulates immune and inflammatory responses by inhibiting PDE4 activity and increasing intracellular cyclic adenosine phosphate (cAMP) levels. Elevated levels of cAMP are linked in part to anti-inflammatory cytokines, including TNF-α, IL-17, and IL-23. These cytokines play a central role in the pathogenesis of psoriasis. Apremilast has been shown to significantly improve skin damage and symptoms in patients with psoriasis. Its oral administration makes it highly convenient, thereby enhancing patient compliance with treatment. However, it is not without side effects, including gastrointestinal discomfort and weight loss. Nevertheless, its overall safety profile remains acceptable. Therefore, apremilast offers a feasible and safe option for the treatment of psoriasis [5,6].

2.3. Pharmacological properties and mechanism of action of apremilast

The efficacy of apremilast is mainly due to its specific inhibition of PDE4. Its mechanism of action is to restrict the activity of PDE4, thus slowing down the degradation of cAMP, and inhibit the production of TNF-α, IL-17, and IL-23 that cause inflammation. This mechanism helps to regulate the body's immune response and concentrate the severity of inflammation, so as to improve the skin problems and actual conditions of psoriasis patients. Apremilast is highly valuable in bottom-facing applications due to its excellent oral bioavailability [7,8].

3. Neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios as indicators of inflammation

3.1. Neutrophil-to-lymphocyte ratio and inflammatory response

Neutrophil-to-lymphocyte ratio (NLR) has recently been widely recognized as a key indicator of inflammatory status. In the human immune response, neutrophils are an important component of the innate immune system,

and their increase in acute and chronic inflammation is observed. Changes in the value of platelets, which are the main players in stopping bleeding and promoting inflammation, can interpret the activity level of the inflammatory process. The rise in NLR is clearly associated with the activity of many inflammatory diseases, including autoimmune diseases, cardiovascular diseases, and various malignancies. For chronic inflammatory diseases such as psoriasis, an increase in NLR usually means an enhanced inflammatory response, which may indicate that the condition is worsening or in an active phase. The decrease in NLR associated with medication, such as apremilast, may indicate that an anti-inflammatory effect has occurred, which is a clear sign of improvement in the inflammatory state of the disease. NLR not only has the ability to serve as an effective biomarker of inflammatory response but also has the possibility of evaluating treatment effectiveness and prognosis [9,10].

3.2. Platelet-to-lymphocyte ratio and inflammatory response

Platelet-to-lymphocyte ratio (PLR), as a biomarker reflecting the inflammatory state of the organism, has been widely used in many diseases in recent years. Fluctuations in the PLR may indicate an interaction between the immune system and the clotting system. During the inflammatory experience, the number of lymphocytes often decreases, while platelets may increase in response to their participation in the inflammatory response, which may lead to a increase in PLR, and this difference can be a marker of inflammatory activity. In patients with psoriasis, inflammation is often chronic or systemic, and changes in PLR at this time may reflect the severity of the disease and the degree of inflammatory activity. Fluctuations in PLR have potential value in evaluating the response of psoriasis patients to treatment and can help clinicians develop individualized treatment plans. A detailed analysis of PLR will support a further understanding of the mechanisms of inflammation in psoriasis [11].

3.3. Significance of NLR and PLR in the assessment of psoriasis

NLR and PLR, as important indicators of inflammation, have the special ability to reveal the dynamics of psoriasis. In patients with psoriasis, these changes are a powerful indicator of the severity of the inflammatory response and the response to treatment. After treatment with apremilast, a significant decrease in these values was seen, indicating an improvement in the inflammatory response. The role of NLR and PLR in the evaluation of psoriasis is particularly important, contributing extremely valuable reference points, giving physicians a better guidance in developing improved treatment strategies adapted for each patient, and improving the accuracy of the evaluation of treatment effects [12].

4. Patient screening and data collection methods

4.1. Screening criteria and methods for psoriasis patients

In the process of screening patients, it is necessary to set clear criteria for intervention and exclusion, in order to ensure the homogeneity of the samples in the study and the authenticity of the study effect. The criteria for admission were patients diagnosed with psoriasis who had been treated with apremilast for at least three months. Patients with a complete record of routine blood tests were included, which can be used to calculate NLR and PLR. Exclusion criteria included co-existing conditions that affect the results of routine blood tests, such as infectious conditions, diseases of the blood system, and patients receiving other immunomodulatory treatments. In order to avoid bias in the sample data, pregnant women and minors were not accepted. Furthermore, an electronic medical record system was used to retrieve and screen the data, which was reviewed by medical professionals to ensure the accuracy of the screening and the integrity of the data. This screening scheme helps to find representative

researchers, which provides a solid basis for subsequent data analysis [13].

4.2. Collection and processing of blood routine indexes

During the collection and processing of blood routine indicators, standardized blood samples were taken from all patients with psoriasis enrolled in the study. The sampling time was arranged at specific time points before and after treatment with apremilast to ensure comparability and scientific data. Blood samples were tested using a fully automated blood analyzer to obtain neutrophils, lymphocytes, and platelets. To ensure the accuracy and consistency of the data, the testing process followed strict laboratory operating standards. In order to further analyze the NLR and PLR of the patient, the calculation was carried out according to the predetermined calculation formula based on the obtained test results of each item. The whole process emphasized data quality control, and the abnormal data were screened and processed to ensure the reliability and validity of the research results [14].

4.3. Calculation and comparison of NLR and PLR

In the study, neutrophil, lymphocyte, and platelet counts were obtained from the blood routine data of patients. NLR is calculated by dividing the absolute number of neutrophils by the absolute number of lymphocytes, and PLR is calculated by dividing the absolute number of platelets by the absolute number of lymphocytes. The purpose of the calculation was to determine the changes in the inflammatory response of patients before and after treatment with apremilast to compare the treatment effect. On the basis of the calculated results, statistical methods were used to analyze whether the changes of NLR and PLR were significant, so as to provide a reference for evaluating the condition and treatment of psoriasis [15].

5. Analysis of the influence of apremilast on NLR and PLR

5.1. Changes in NLR and LPR before and after treatment with apremilast

Both NLR and PLR showed significant changes before and after treatment with apremilast. Compared with the blood routine indexes before treatment, NLR and PLR were significantly reduced after treatment, which reflected the improvement of the inflammatory state in patients. The decrease of NLR may be related to neutropenia or the increase of lymphocytopenia, while the decrease of PLR is mainly due to the increase of lymphocytes or the decrease of platelets. This observation suggests that apremilast may reduce the burden of inflammation in patients with psoriasis by regulating the activation of white blood cells and platelets. These changes not only illustrate the therapeutic effect of apremilast but also provide a new indicator for the clinical evaluation of inflammation. By comparing NLR and PLR before and after treatment, the anti-inflammatory effects of apremilast in patients with psoriasis can be more comprehensively evaluated, providing an important experimental basis and direction for follow-up studies.

5.2. Changes in the activation status of leukocytes and platelets in psoriasis patients treated with apremilast

The use of apremilast in patients with psoriasis showed a significant change in the activation status of white blood cells and platelets. Significant reductions in NLR and PLR were observed after treatment, suggesting a reduction in levels of inflammatory mediators in the patient. White blood cells and platelets are caught in the task of inflammatory counterattack and immune vigilance, and the activation of apremilast envoys drops to a low point. In fact, because of the clever interference of apremilast, the signal transmission pathway is blocked, the

release of pro-inflammatory cytokines is reduced, and the vitality of white blood cells and platelets is impaired. Phosphodiesterase 4 is a key enzyme in regulating inflammation and immune response, and the influence of apremilast on its activity is evident. Apremilast can not only deal with the symptoms of skin psoriasis but also stabilize the vitality of white blood cells and platelets and alleviate the systemic inflammatory response.

5.3. Effects of apremilast on the assessment of psoriasis

Studies have shown a significant reduction in NLR and PLR in patients with psoriasis after treatment with apremilast, suggesting it is effective in improving the inflammatory response. This reduction may reflect the modulating effect of apremilast on the immune system, which relieves the symptoms and condition of psoriasis. In clinical practice, the changes of NLR and PLR can be used as an important reference index to evaluate the efficacy of apremilast, which can help clinicians more accurately judge the changes of the disease, optimize the treatment plan, and improve the individualization and precision of treatment. This provides a critical scientific basis for the management of psoriasis.

6. Research conclusion and prospects

6.1. Research results and conclusion

The results showed that the NLR and PLR were significantly reduced in patients with psoriasis after treatment with apremilast. The decrease in NLR and PLR hinted at an improvement in the inflammatory response, which revealed a quantifiable biomarker change that showed the exact therapeutic effect of apremilast on psoriasis. The study further revealed that apremilast may alleviate inflammation by inhibiting the activation of white blood cells and platelets, which not only helps to reduce the clinical symptoms of psoriasis but also provides a new perspective on its pharmacological mechanism of action. NLR and PLR are considered to be potential indicators for evaluating the change of the disease and the treatment effect in patients with psoriasis. This study lays a foundation for further exploration of the therapeutic strategy and application of apremilast in inflammatory diseases and provides a new reference for clinical treatment.

6.2. Application of NLR and PLR in the evaluation of psoriasis and the therapeutic effect of apremilast

NLR and PLR have great potential for evaluating the effects of apremilast on psoriasis. Studies have shown that NLR and PLR are significantly reduced in patients with psoriasis after treatment with apremilast, suggesting that these ratios are closely related to the inflammatory response. In general medical operations, NLR and PLR can be used as sensitive response elements to help the medical staff to control the inflammation of the patient and study the steps of treatment. Periodic speculations and attempts to analyze NLR and PLR can more quickly detect changes in the disease, which can help to study efficacy and improve the treatment plan for individuals. This can improve the scientific nature of diagnosis and treatment and provide patients with the most accurate treatment strategy, so that the personalized management of psoriasis is more effective. Analysis of NLR and PLR can enhance the overall evaluation of psoriasis, promote the adjustment and improvement of treatment plans, and enhance the integrated outcome of patients.

6.3. New strategies and future research directions for the treatment of psoriasis with apremilast

The new treatment strategy for psoriasis with apremilast can focus on the development of a personalized treatment

regimen that combines the patient's genetic background and immune status and optimizes dosage and duration of administration to improve efficacy and reduce adverse effects. Future research directions include exploring the specific mechanisms of action of the drug on different subtypes of psoriasis, as well as its effects on other inflammatory markers. Combined with biomarkers such as NLR and PLR, large-scale clinical trials verifying their usefulness in disease monitoring and treatment adjustment will provide strong support for precision medicine for psoriasis.

7. Conclusion

In this study, we retrospectively analyzed the changes of NLR and PLR in psoriasis patients treated with apremilast. The study found that the NLR and PLR values of patients were significantly reduced after treatment with apremilast, which proved that the drug inhibited the activation of white blood cells and platelets, the inflammatory response was improved, and the physical health of patients was enhanced. This provides a new reference index and treatment strategy for the clinic and has positive practical guiding significance for the prevention and treatment of psoriasis. However, it is worth noting that although apremilast has obvious therapeutic effect on psoriasis, its mechanism of action is not completely clear, so in future studies, we need to closely observe the changes of NLR and PLR values in psoriasis patients during the treatment of apremilast on a regular basis to better evaluate its efficacy and safety. In general, NLR and PLR have potential as indicators for the assessment of psoriasis and the evaluation of the therapeutic effect of apremilast and are worthy of further clinical research and practice.

Disclosure statement

The authors declare no conflict of interest.

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