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Steroid-Induced Leukocytosis: Could it be a New Prognostic Indicator in Bell's Palsy?

Steroid Kaynaklı Lökositoz: Bell Palsi'nde Yeni Bir Prognostik Gösterge Olabilir Mi?

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ABSTRACT Objective: To investigate the use of steroid-induced leukocytosis (SIL) in Bell's palsy to predict recovery and guide personalized treatment options for patients for the first time in the literature. **Material and Methods:** In this prospective, observational study, 86 Bell's palsy patients who received prednisone within 72 hours of symptom onset were observed at a single tertiary referral center between 2017-2022. Leukocyte counts and facial function were assessed during the first 5 days of treatment. **Results:** The study involved 86 patients, with a mean age of 46.32±11.8 years for the recovery group (n=71) and 48.65±12.07 years for the nonrecovery group (n=16).The results showed a significant effect of time on leukocyte counts ($p<0.001$), a significant effect of recovery status on leukocyte counts ($p=0.044$), and a significant interaction between time and recovery status ($p=0.014$). Subgroup analyses of leukocyte levels indicated that there were significant differences between the nonrecovery and recovery groups on 4 of the predictor variables; peak day ($p=0.042$), 5-day average ($p<0.001$), initial increase ($p<0.001$), and peak-pre level ($p<0.049$). Binary logistic regression analysis identified 2 predictor variables, the 5-day average [$p=0.007$, odds ratio (OR): 5.89, Confidence Interval (CI): 1.63-21.24], and the initial increase ($p=0.006$, OR: 2.29, CI: 1.27-4.13), as statistically significant for the outcome variable. The sensitivity and specificity of the initial increase were 81.7% and 66.2% at a cut-off value of 5.23, respectively. **Conclusion:** The results of this study provide valuable insights into the usefulness of SIL as a predictor of treatment success in patients with Bell's' palsy.

Keywords: Bell palsy; leukocytosis; prognosis

ÖZET Amaç: Bu çalışmanın amacı, Bell paralizisi hastalarında steroid kaynaklı lökositoz (SKL) kullanarak iyileşmeyi öngörmek ve kişiselleştirilmiş tedavi seçeneklerini ilk kez literatürde araştırmaktır. **Gereç ve Yöntemler:** Prospektif, gözlemsel bu çalışmada, 2017-2022 yılları arasında semptomların başlangıcından itibaren 72 saat içinde prednizon tedavisi alan 86 Bell paralizisi hastası üçüncü basamak bir hastanede izlenmiştir. Tedavinin ilk 5 günü boyunca lökosit sayıları ve fasiyal fonksiyonları değerlendirilmiştir. **Bulgular:** Çalışmaya 86 hasta dâhil edilmiştir; iyileşen grubun (n=71) ortalama yaşı 46,32±11,8 yıl, iyileşmeyen grubun (n=16) ortalama yaşı ise 48,65±12,07 yıldır. Sonuçlar, lökosit sayıları üzerinde zamanın ($p<0,001$) ve iyileşme durumunun ($p=0,044$) anlamlı etkilerini ve zaman ile iyileşme durumu arasında anlamlı bir etkileşimi ($p=0,014$) göstermiştir. Lökosit seviyelerinin alt grup analizleri, iyileşmeyen ve iyileşen gruplar arasında 4 prediktör değişkeninde anlamlı farklar olduğunu göstermiştir; zirve gün ($p=0,042$), 5 günlük ortalama ($p<0,001$), ilk artış ($p<0,001$) ve zirve-öncesi seviye ($p<0,049$). İkili lojistik regresyon analizi, 5 günlük ortalama [$p=0,007$, odds oranı (OR):5,89, güven aralığı (confidence interval (CI):1,63-21,24] ve ilk artış ($p=0,006$, OR:2,29, CI:1,27-4,13) olmak üzere 2 prediktör değişkenini sonuç değişkeni için istatistiksel olarak anlamlı bulmuştur. İlk artışın kesilme değeri 5,23'te duyarlılık ve özgüllük sırasıyla %81,7 ve %66,2 olarak bulunmuştur. **Sonuç:** Bu çalışmanın sonuçları, Bell paralizisi hastalarında tedavi başarısının bir prediktörü olarak SKL'nin faydalı olduğu konusunda değerli bilgiler sunmaktadır.

Anahtar Kelimeler: Bell palsi; lökositoz; prognoz

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Bell's palsy is a neurological disorder characterized by the abrupt onset of paralysis or muscular weakness affecting the facial musculature. Treatment often involves the use of steroids to reduce inflammation and promote nerve regeneration. Glucocorticoids are potent antiinflammatory agents widely used for treating inflammatory and autoimmune diseases. However, these drugs can cause reactive leukocytosis, characterized by an increase in the peripheral white blood cell count, particularly neutrophils, in the absence of infection or inflammation. Steroid-induced leukocytosis develops through several mechanisms, including increased release of neutrophils from the bone marrow, demargination of neutrophils from the vascular endothelium, and inhibition of neutrophil apoptosis.[1,2] However, the effectiveness of steroid treatment can vary among patients, possibly due to differences in the number and sensitivity of steroid receptors present on the facial nerve. Research has demonstrated that both genetic and environmental determinants can significantly impact the expression and functionality of steroid receptors, thereby potentially resulting in individual differences in receptor concentrations and sensitivity.[3,4] These variations could affect the ability of steroids to bind to and activate receptors on the facial nerve, ultimately affecting the treatment response in patients with Bell's palsy. Therefore, it may be necessary to consider individual differences in steroid receptor expression and function when developing treatment strategies for patients with Bell's palsy. By considering such variations, it may be possible to optimize treatment strategies for each patient, potentially improving treatment outcomes and minimizing adverse effects.

Steroid-induced leukocytosis (SIL) is typically not a cause for concern, but monitoring leukocyte counts can be a valuable tool for clinicians to assess the response to steroid treatment and detect potential complications. If it is discovered that steroid-induced leukocytosis has a significant impact on predicting recovery from Bell's palsy, it could potentially lead to the suggestion of individualized treatment options instead of relying on a standardized treatment approach. For this purpose, we aimed to explore whether monitoring SIL levels can provide additional information for healthcare providers to predict recovery and potentially guide individualized treatment options for patients with Bell's palsy.

MATERIAL AND METHODS

PARTICIPANT

This prospective, observational study enrolled 86 patients with a diagnosis of Bell's palsies who were receiving steroid treatment. Data on patient characteristics, such as sex, age, body mass index, duration from initial paresis/paralysis to hospitalization, presence of comorbid conditions (hypertension, diabetes mellitus), degree of initial facial nerve paralysis, and degree of final recovery, were gathered by reviewing each patient's medical records.

STUDY DESIGN

Inclusion criteria for the study were age 18 or older, confirmed diagnosis of Bell's palsy, and initiation of steroid treatment within 72 hours of symptom onset. The exclusion criteria for this study included pre-existing leukocytosis counts, a history of immune-mediated or autoimmune disorders, previous treatment with steroids for Bell's palsy, active infections, pregnancy or breastfeeding, comorbidities such as diabetes mellitus and hypertension, and smokers. Facial functions during the follow-up were measured using the House-Brackmann (H-B) grading system. In the analysis, the data of patients who recovered from Bell's palsy were compared to the data of patients who did not recover from the condition. In accordance with a widely accepted standard, recovery was deemed unsatisfactory when the individual's H-B score was within the range of 3-6 or equivalent. The group that experienced the range of 1-2 was considered the "recovered" group, while those who demonstrated an unsatisfactory response were placed in the "unrecovered" group. This comparison was done to identify any potential differences or patterns that might be relevant to the prognosis. The minimum follow-up time was determined as 6 months.

MEDICATION

Prednisone (Gensenta Pharmaceuticals, Istanbul, Türkiye) was used as the steroid treatment. The dosage of prednisone was determined on the basis of the patient's weight with a taper regimen (1 mg/kg

for 5 days intravenously, then taper in 5 days orally). To prevent gastrointestinal problems associated with steroid use, a proton pump inhibitor pantoprazole (Acino Pharma AG, Liesberg, Switzerland) was administered prior to the steroid treatment. None of the patients received an antiviral agent.

LABORATORY TESTS

Leukocyte counts were measured at baseline (prior to starting treatment) and each day during the first 5 days of treatment. Blood samples were collected and analyzed using standard laboratory methods.

SUBGROUP ANALYSES

In this study, subgroup analyses were created based on leukocyte level measurements. The groups were defined as follows: the *initial increase* group, which was calculated by subtracting the leukocyte level at post-treatment day 1 from the pretreatment level; the *5-day average* group, which was defined as the mean leukocyte level over the 5-day period; the *peak day* group, which describes the day on which the highest leukocyte level was observed over the 5-day period; the *peak level* group, which describes the mean value of the highest leukocyte level observed over the 5-day period; and the *peak-pre level* group, which was defined as the difference between the peak leukocyte level and the pretreatment level.

STATISTICAL ANALYSIS

The Shapiro-Wilk test was used to assess the dataset's normality. For every variable in the study, descriptive statistics such as the mean and standard deviation were calculated. The impact of time, recovery state, and their interaction on leukocyte counts was examined using a repeated measures analysis of variance (ANOVA). The factors associated with effective treatment outcomes were determined using binary logistic regression analysis. The diagnostic accuracy of the predictor factors was evaluated using Receiver Operating Characteristic (ROC) curve analysis. The best cut-off criterion for the predictor variables was established by calculating the sensitivity and specificity. Statistical significance was defined as a p value of less than 0.05. All statistical calculations were performed using the SPSS statistical program (version 28.0, Chicago, IL, USA) for MacOS.

This research was sanctioned by the Bilkent City Hospital Clinical Research Ethics Committee in alignment with the ethical standards set forth in the Declaration of Helsinki (date: November 11, 2020, no: 95). Informed consent was procured from the participants involved in the study.

RESULTS

In our study, 86 patients with Bell's palsy were treated with steroids and divided into 2 groups based on their level of recovery: recovered and nonrecovered. The value of SIL as a predictor of treatment success was evaluated by comparing the 2 groups. Table 1 provides a summary of the study population's clinical characteristics. At the time of presentation, no statistically significant differences across the cohorts were found ($p>0.05$). A total of 86 individuals with a mean leukocytosis of 8.03±1.8 (x109/L) were included. The mean pre-treatment H-B grade was slightly higher in the nonrecovery group (4.31±0.91) than in the recovery group (4.18±0.85), although the difference was not statistically significant. The leukocyte count mean and standard deviation for the recovery and nonrecovery groups at each time point are displayed in Table 2A.

TABLE 1: Clinical findings of the recovery and non-recovery groups

	Nonrecovery (n=16)				Recovery (n=71)			
	Range		Average		Range		Average	
	Minimum	Maximum	$\bar{X}$	SD	Minimum	Maximum	$\bar{X}$	SD
Age, years	31	65	48.65	12.07	27	66	46.32	11.8
BMI, kg/m^2	18.12	28.3	23.09	2.98	18.04	28.98	23.56	3.47
H-B grade (pre-tax)	3	6	4.31	0.91	3	6	4.18	0.85

SD: Standard deviation; BMI: Body mass index; H-B: House-Brackmann

TABLE 2A: Descriptive statistics of pre-treatment and daily leukocyte counts in the recovery and nonrecovery groups

		$\bar{X}$	SD	n
Recovery group	Pre-treatment, ($x10^9$/L)	7.94	1.92	71
	Day 1, ($x10^9$/L)	15.59	1.7	71
	Day 2, ($x10^9$/L)	15.06	2.17	71
	Day 3, ($x10^9$/L)	14.62	1.74	71
	Day 4, ($x10^9$/L)	14.11	1.89	71
	Day 5, ($x10^9$/L)	13.3	1.82	71
Nonrecovery group	Pre-treatment, ($x10^9$/L)	8.45	1.05	16
	Day 1, ($x10^9$/L)	13.86	1.68	16
	Day 2, ($x10^9$/L)	14.57	2.56	16
	Day 3, ($x10^9$/L)	14.15	2.59	16
	Day 4, ($x10^9$/L)	13.03	2.01	16
	Day 5, ($x10^9$/L)	13.45	1.87	16

SD: Standard deviation

THE EFFECTS OF TIME AND GROUPS AND THEIR INTERACTION

Figure 1 shows the mean leukocyte counts for both groups over time. As can be seen, both groups experienced an initial increase in leukocyte counts, which peaked on day 1 for the recovery group and day 2 for the nonrecovery group. A two-way repeated measures ANOVA was conducted to ascertain the influence of the recovery status over the temporal intervals on the concentration of leukocytosis. Analyzing the studentized residuals revealed that there were no outliers, as shown by no studentized residuals surpassing ±3 standard deviations, and that the assumption of normalcy was upheld, as established by the Shapiro-Wilk test of normalcy. Mauchly's test of sphericity was used to evaluate the interaction term, and sphericity was verified ($p>0.05$). According to the results of the two-way repeated measures ANOVA, time had a statistically significant impact on leukocyte counts [$F(5,96)=89.03$, $p<0.001$, partial eta squared=0.512]. Additionally, a significant relationship between recovery status and leukocyte counts was discovered [$F(5,96)=2.3$, $p=0.044$, partial eta squared=0.026]. A significant interaction effect between the recovery state and time was also found [$F(1,96)=6.25$, $p=0.014$, partial eta squared=0.069] (Table 2B).

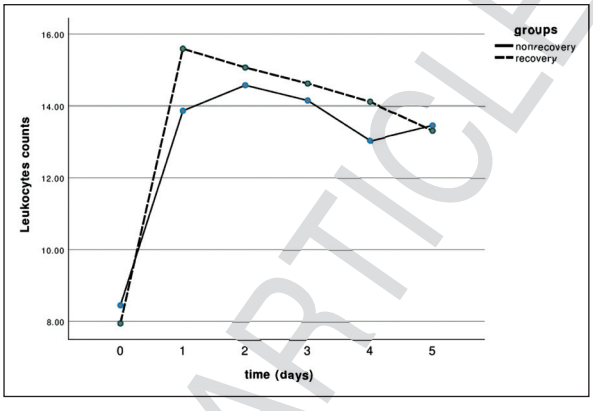

FIGURE 1: The daily mean values of the recovery and nonrecovery groups over a period of 5-days

SUBGROUP ANALYSES OF LEUKOCYTE LEVELS

The results indicate that there were significant differences between the nonrecovery and recovery groups on 4 of the predictor variables. Specifically, the recovery group had a significantly lower mean for *peak day* compared with the nonrecovery group ($p=0.042$). Additionally, the recovery group had significantly higher means for *5-day average* and *initial increase* compared with the nonrecovery group ($p<0.001$, $p<0.001$, respectively). Furthermore, the recovery group had a significantly higher mean for *the peak-pre level* compared to the nonrecovery group. In contrast, there was no significant difference in the mean peak *level* between the recovery and nonrecovery groups ($p=0.098$) (Table 3).

TABLE 2B: Results of two-way repeated measure ANOVA for leukocyte counts taken every day of treatment in each group

	Sum of squares	df	$\bar{X}$ square	F	p value	Partial Eta squared
Time (days)	1,648.65	5	329.73	89.03	<0.001	0.512
Groups	42.69	5	8.53	2.3	0.044	0.026
Time x groups	3.53	1	3.53	6.25	0.014	0.069

df: Degree of freedom, F:F-statistic (Mean Square Between Groups / Mean Square Within Groups)

TABLE 3: Subgroup analyses of leukocyte levels between the recovery and non-recovery groups

	Nonrecovery (n=16)				Recovery (n=71)				
	Range		Average		Range		Average		
	Minimum	Maximum	$\bar{X}$	SD	Minimum	Maximum	$\bar{X}$	SD	p value
Peak level, (x10^9/L)	14.15	19.73	16.3	1.45	13.85	20.09	16.97	1.46	0.098
Peak day	1	5	2.87	1.02	1	5	2.23	1.12	0.042
5-day average, (x10^9/L)	12.65	14.89	13.81	0.85	12.89	16.06	14.54	0.78	<0.001
Initial increase, (x10^9/L)	3.24	9.24	5.41	1.66	1.36	14.65	7.64	2.45	<0.001
Peak-pre level, (x10^9/L)	5.02	9.84	7.99	1.42	4.33	14.65	9.06	2.44	0.049

SD: Standard deviation

IDENTIFYING THE SIGNIFICANT PREDICTOR VARIABLES

A binary logistic regression analysis was performed to ascertain the significant predictor variables associated with the outcome variable (Table 4). The predictor variables included in the analysis were *peak level*, *peak day*, *5-day average*, *initial increase*, and *peak-pre level*. The results showed that two predictor variables, *the 5-day average* and *the initial increase*, had statistically significant effects on the outcome variable. The coefficient for *the 5-day average* was 1.77 Standard Error (SE=0.65, z=2.71, p=0.007), indicating that a one-unit increase in *the 5-day average* was associated with a 5.89 times increase in the odds of the outcome variable. The coefficient for *the initial increase* was 0.83 (SE=0.30, z =2.76, p=0.006), indicating that a one-unit increase in *the initial increase* was associated with a 2.29 times increase in the odds of the outcome variable. In contrast, the other predictor variables, *peak level*, *peak day*, and *peak-pre level*, did not have statistically significant effects on the outcome variable (p>0.05).

SENSITIVITY AND SPECIFICITY

The ROC curve was used to evaluate the diagnostic performance of the *initial increase* and *5-day average* in predicting the occurrence of the disease. The area under the curve (AUC) for the initial increase was 0.782, indicating good diagnostic accuracy. The AUC for the *5-day average* was 0.708, indicating a moderate diagnostic accuracy. The sensitivity and specificity of the *initial increase* were 81.7-66.2%, respectively, at a cut-off value of 5.23. The sensitivity and specificity of the *5-day average* were 71.8% and 66.2%, respectively, at a cut-off value of 14.13. These results suggest that the *initial increase* is a better predictor of disease occurrence compared with the

TABLE 4: Identifying significant predictor variables by using binary logistic regression analysis

	Coefficient B	Std. error	z value	p value	Odds ratio	95% CI
Peak level, (x10^9/L)	-0.21	0.4	0.54	0.59	0.81	0.37-1.76
Peak day	-0.36	0.33	1.1	0.273	0.7	0.36-1.33
5-day average, (x10^9/L)	1.77	0.65	2.71	0.007	5.89	1.63-21.24
Initial increase, (x10^9/L)	0.83	0.3	2.76	0.006	2.29	1.27-4.13
Peak-pre level, (x10^9/L)	-0.46	0.31	1.48	0.138	0.63	0.34-1.16

CI: Confidence interval; Std: Standard

TABLE 5: Area under curve of initial increase and 5-day average

	AUC	Std. Error	p value	Cut off value, (x10^9/L)	Sensitivity, %	Specificity, %
Initial increase	0.782	0.059	0.001	5.23	81.7	66.2
5-day average	0.708	0.075	0.010	14.13	71.8	66.2

AUC: Area under curve; Std: Standard

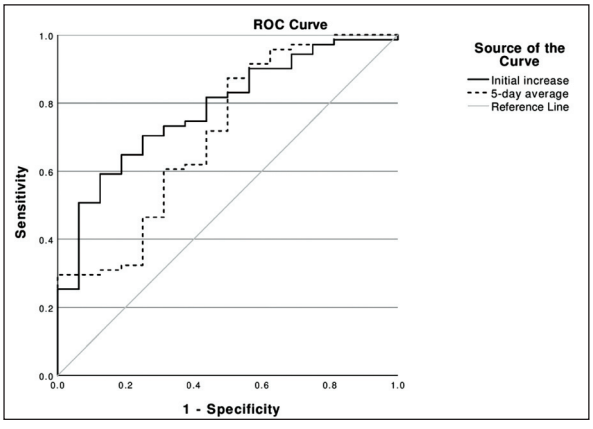

FIGURE 2: Area under curve for initial increase and 5-day average
ROC: Receiver operating characteristic

5-day average. (Table 5, Figure 2).

DISCUSSION

DEFINITION AND PURPOSES

Bell's palsy is a pathological condition that affects the facial nerve, resulting in the abrupt onset of paralysis or muscular weakness within the facial musculature. Treatment often involves the use of steroids, but the effectiveness of such treatment can vary among individuals due to differences in the number and sensitivity of steroid receptors present on the facial nerve. Genetic and environmental factors can impact the expression and function of these receptors, which may affect the ability of steroids to bind and activate them, ultimately affecting the treatment response. Therefore, it may be necessary to consider individual differences in steroid receptor expression and function to optimize treatment strategies, improve outcomes, and minimize adverse effects. Monitoring steroid-induced leukocytosis levels can also be valuable in predicting recovery and guiding individualized treatment options. By exploring the potential of SIL as a predictor of recovery, healthcare providers can use this information to make more informed decisions about treatment options for patients with Bell's palsy.

EFFECTS OF STEROID

Corticosteroids, such as prednisone, can have side effects like high blood pressure, elevated blood sugar levels, gastrointestinal issues, and avascular necrosis of femur.[5] Although these side effects are possible, the use of steroids may be justified in the treatment of Bell's palsy due to the potential physical and psychological impact of facial paralysis on a patient. Additionally, the administration of steroids can cause an increase in neutrophil white blood cells in the bloodstream, peaking within 4-6 hours.[6] This increase is thought to be caused by the release of more neutrophils from the bone marrow, a decrease in the migration of neutrophils into inflamed tissue, and a delay in the programmed cell death of circulating neutrophils.[2]

MONITORING THE STEROID RESPONSE

Close monitoring of blood pressure and blood glucose levels is necessary in individuals with preexisting conditions such as hypertension, diabetes mellitus, and coronary artery disease during steroid therapy to reduce the risk of adverse effects.[2] There are several methods that can be used to monitor the response to steroid treatment in terms of blood parameters. Some common methods that may be used include:

- **White Blood Cell Count:** As steroid-induced leukocytosis is a result of a steroid-induced inflammatory response, knowing the course of this condition can be helpful in assessing the presence and severity of a steroid-induced side effect.

- **Red Blood Cell Count:** Erythrocytes are responsible for carrying oxygen to the body's tissues. A decrease in the red blood cell count or anemia can be a side effect of steroid treatment.

- **Hemoglobin and Hematocrit:** Erythrocytes are characterized by the protein hemoglobin, which facilitates the conveyance of oxygen to the body tissues. The proportion of erythrocytes within the bloodstream is quantified by the hematocrit measurement. Pharmacological intervention with steroids may influence both hemoglobin levels and hematocrit values.

- Blood glucose and blood pressure

PREDICTOR STATUS OF SIL IN DISEASE PROGNOSIS

This study investigated the value of SIL as a predictor of treatment success in patients with Bell's palsy

who received steroid treatment. Our findings indicate that the leukocyte counts of both the recovery and nonrecovery groups showed an initial increase after steroid treatment, with a peak at day 1 for the recovery group and day 2 for the nonrecovery group. Moreover, the leukocyte counts were significantly different between the recovery and nonrecovery groups at different time points, with the recovery group having a lower peak day and higher 5-day average and initial increase compared with the nonrecovery group.[7]

The influence of temporal factors and recovery conditions on leukocyte quantities was assessed through a two-way repeated measures ANOVA. The findings revealed a substantial impact of both time and recovery conditions on leukocyte quantities, in addition to a notable interaction effect between time and recovery conditions. As shown in Table 2.2, the effect of time was the strongest predictor of leukocyte counts, explaining 51.2% of the total variance in the data. The effect of the recovery status was also statistically significant, but it explained a smaller proportion of the variance (2.6%). Furthermore, the interaction between time and group membership was significant, indicating that the effect of time on leukocyte counts varied across the groups. These results suggest that both time and recovery status are important factors to consider when examining leukocyte counts.

Subgroup analyses of leukocyte levels indicated that the recovery group had a significantly lower mean for Peak day and a significantly higher mean for 5-day average, initial increase, and Peak-pre level compared with the nonrecovery group. A binary logistic regression analysis was performed to ascertain the notable predictor variables influencing the outcome variable. The results showed that two predictor variables, the 5-day average and the initial increase, had statistically significant effects on the outcome variable. Finally, the diagnostic performance of the initial increase and 5-day average in predicting the occurrence of the disease was evaluated using the ROC curve. The results suggested that the initial increase is a better predictor of disease occurrence compared with the 5-day average.

DOSE-SELECTION CRITERION

Bell's palsy patients frequently heal on their own, with 70% demonstrating full recovery without medical intervention. Numerous double-blind, randomized, placebo-controlled clinical investigations have shown that a significant percentage (%90) of patients with Bell's palsy fully' recover after receiving corticosteroid treatment.[8,9] The recommended dosage of prednisone for the treatment of Bell's palsy varies depending on the severity of the condition and the specific treatment protocol being followed. According to the American Academy of Otolaryngology-Head and Neck Surgery, the recommended dosage of prednisone for the treatment of Bell's palsy is 60-80 mg per day for the first 3-5 days, followed by a tapering of the dosage over the next several days. This regimen is usually administered orally although intravenous administration may be used in more severe cases.[10] However, there are clinical studies with better results with higher-dose steroid therapy, which makes the initial treatment dose controversial.[11,12] According to our research, SIL might be a helpful criterion for choosing the right dosage for Bell's palsy treatment. The usefulness of SIL as a dose-selection criterion requires more research, especially in light of the possible advantages of administering high doses of corticosteroids at the outset for patients whose low white blood cell counts indicate a bad prognosis.

PREVIOUS STUDIES ON SIL

To the best of our knowledge, this is the first study that represents a significant contribution to the literature on the relationship between steroid-induced leukocytosis and the prognosis of facial paralysis or paresis. Despite extensive research into hematological parameters such as the neutrophil-to-lymphocyte ratio, systemic immune-inflammation index, Yanagihara score, Palsy Prognosis Prediction score, thiol/disulfide ratio, and others in patients diagnosed with Bell's palsy, no study to date has investigated the effect of steroid-induced leukocytosis.[13-17] Previous research has primarily focused on the potential for steroid-induced leukocytosis to suggest underlying infection or inflammation, which may require further evaluation.[18,19] A study suggests that patients with dexamethasone-induced leukocytosis may be at

a higher risk of poor outcome and that alternative edema-reducing substances should be considered for newly diagnosed glioblastoma.[20]

LIMITATIONS

There are 3 main limitations of this study. First, SIL may be considered a useless monitoring analyze for steroid response, as the effect of steroids on cells is not solely determined by receptors. Several other factors can also influence it, such as the way steroids enter and exit cells, intracellular enzyme activity, steroid metabolism, and elimination. Second, the study did not evaluate how oral therapy-induced SIL affects the prognosis of Bell's palsy or how this predictive effect progresses over time. Further research is needed to evaluate whether the antiinflammatory impact of steroids is related to the level of leukocytosis and to explore the potential use of leukocytosis as a predictor of treatment outcomes in Bell's palsy through both hematological and pharmacological studies. Third, this study did not include a comparison of the leukocyte response to steroids in healthy individuals or in patients with conditions other than Bell's palsy. This limitation limits the generalizability of the findings. Future studies involving control groups exposed to steroid treatment could help address this limitation and provide a broader understanding of SIL dynamics.

CONCLUSION

To the extent of our understanding, this represents the inaugural investigation into the correlation between SIL and individuals diagnosed with Bell's palsy. The study suggests that SIL is a useful predictor of treatment success in patients with Bell's palsy. These findings may have important clinical implications, as identifying patients who are likely to benefit from steroid treatment can improve treatment outcomes and reduce healthcare costs. Nonetheless, additional investigations are essential to validate these findings and to ascertain the ideal threshold for SIL as an indicator of therapeutic efficacy. In summary, this research offers significant contributions to the understanding of SIL's function in forecasting treatment results for individuals suffering from Bell's palsy.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Fatih Gül;* ***Design:*** *Fatih Gül, Aslıhan Ensari;* ***Control/Supervision:*** *Aslıhan Ensari, Kadir Şinasi Bulut;* ***Data Collection and/or Processing:*** *Fatih Gül, Aslıhan Ensari, Kadir Şinasi Bulut;* ***Analysis and/or Interpretation:*** *Fatih Gül, Kadir Şinasi Bulut;* ***Literature Review:*** *Aslıhan Ensari, Kadir Şinasi Bulut;* ***Writing the Article:*** *Fatih Gül, Aslıhan Ensari, Kadir Şinasi Bulut;* ***Critical Review:*** *Fatih Gül;* ***References and Fundings:*** *Aslıhan Ensari, Kadir Şinasi Bulut.*

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