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# Serum Immune-Inflammation Index as an Indicator of Disease Activity in Egyptian Ulcerative Colitis Patients

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**Background.** Ulcerative colitis (UC) is a chronic inflammatory disease characterized by relapsing episodes that require accurate evaluation of disease activity to guide therapeutic decisions. Although endoscopy remains the gold standard for assessing mucosal inflammation, its invasive nature limits frequent use. The serum immune-inflammation index (SII), derived from routine blood counts, has emerged as a potential non-invasive biomarker of systemic inflammation.
**Aim:** to evaluate the role of SII in assessing disease activity and severity in UC patients.
**Materials and methods.** This cross-sectional study included 80 adult UC patients attending Ain Shams University Hospitals. Clinical evaluation, laboratory testing (C-reactive protein, fecal calprotectin, and complete blood count), and colonoscopic assessment using the Mayo Endoscopic Subscore were performed on the same day. SII was calculated as (platelet count × neutrophil count) / lymphocyte count.
**Results.** Of the 80 patients, 25 (31.25 %) were in remission and 55 (68.75 %) had active disease. SII values were significantly higher in patients with active UC compared to those in remission (1357.97 ± 831.17 vs. 582.86 ± 188.88; $p < 0.001$). SII positively correlated with C-reactive protein and fecal calprotectin, and negatively with lymphocyte count. At a cutoff of > 838.76, SII discriminated active disease from remission with 70.91 % sensitivity, 96.00 % specificity, and 86.1 % accuracy. A cutoff of > 1148.67 distinguished moderate-to-severe from mild disease with 78.00 % accuracy.
**Conclusion.** The SII is a simple, cost-effective, and reliable non-invasive marker for assessing disease activity and severity in UC. Its incorporation into routine monitoring may reduce dependence on frequent endoscopic evaluation.
**Keywords:** serum immune-inflammation index, ulcerative colitis, Mayo Endoscopic Sub-score, CRP, fecal calprotectin
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## Индекс системного иммунного воспаления сыворотки крови как показатель активности заболевания у египетских пациентов с язвенным колитом

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**Актуальность.** Язвенный колит (ЯК) — это хроническое воспалительное заболевание, характеризующееся чередованием периодов обострения и ремиссии, что требует точной оценки активности патологического процесса для определения тактики лечения. Хотя эндоскопическое исследование остается «золотым стандартом» оценки воспаления слизистой оболочки, его инвазивный характер ограничивает возможность частого применения. Индекс системного иммунного воспаления (SII), рассчитываемый на основе рутинного общего анализа крови, рассматривается как перспективный неинвазивный биомаркер системного воспаления.
**Цель:** оценить роль индекса SII в определении активности и тяжести течения заболевания у пациентов с ЯК.
**Материалы и методы.** В данное одномоментное (кросс-секционное) исследование были включены 80 взрослых пациентов с ЯК, проходивших лечение в больницах Университета Айн-Шамс. В один и тот же день всем пациентам проводились клиническое обследование, лабораторные тесты (определение уровня С-реактивного белка, фекального кальпротектина и общий анализ крови), а также колоноскопия с оценкой по эндоскопическому индексу Мейо (Mayo Endoscopic Subscore). Индекс SII рассчитывали по формуле: (число тромбоцитов × число нейтрофилов) / число лимфоцитов.

**Результаты.** Из 80 пациентов 25 (31,25 %) находились в стадии ремиссии, а 55 (68,75 %) имели активную форму заболевания. Значения SII были значимо выше у пациентов с активной формой ЯК по сравнению с лицами в стадии ремиссии (1357,97 ± 831,17 vs. 582,86 ± 188,88; $p < 0,001$). Выявлена прямая корреляция SII с уровнями С-реактивного белка и фекального кальпротектина и обратная — с числом лимфоцитов. При пороговом значении (cutoff) > 838,76 индекс SII позволял дифференцировать активную форму заболевания от ремиссии с чувствительностью 70,91 %, специфичностью 96,00 % и точностью 86,13 %. Пороговое значение > 1148,67 позволяло отличить среднетяжелое и тяжелое течение заболевания от легкой формы с точностью 78,00 %.
**Заключение.** Индекс SII является простым, экономически доступным и надежным неинвазивным маркером для оценки активности и тяжести течения язвенного колита. Его внедрение в практику рутинного мониторинга может снизить потребность в частом проведении эндоскопических исследований.
**Ключевые слова:** индекс системного иммунного воспаления сыворотки крови, язвенный колит, эндоскопический индекс Мейо, С-реактивный белок, фекальный кальпротектин
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## Introduction

Inflammatory bowel disease encompasses chronic, relapsing inflammatory conditions of the gastrointestinal tract, primarily represented by ulcerative colitis (UC) and Crohn's disease. Both conditions result from complex interactions among genetic susceptibility, environmental triggers, dysbiosis of the gut microbiota, and aberrant immune responses that lead to chronic intestinal inflammation [1]. UC is characterized by continuous mucosal inflammation confined to the colon and rectum, with histological hallmarks including crypt architectural distortion, goblet cell depletion, and infiltration of inflammatory cells into the lamina propria [2].

Diagnosis and monitoring of UC rely on a multifaceted approach, including clinical assessment, laboratory testing, endoscopic evaluation, and histopathological confirmation. Endoscopy with biopsy remains the gold standard for establishing diagnosis, determining disease extent, and grading disease activity, as it provides direct visualization of mucosal inflammation. However, its invasive nature, cost, and patient discomfort limit its frequent use, particularly for disease monitoring [3]. Consequently, there has been growing interest in identifying non-invasive, rapid, and reliable biomarkers that can accurately reflect disease activity and guide clinical decision-making [2].

Several laboratory-based biomarkers have been investigated for their ability to indicate inflammatory activity in UC. Elevated C-reactive protein (CRP) correlates with disease activity; however, its specificity for UC is limited since it can rise in numerous infectious and inflammatory conditions [4]. Fecal calprotectin (FC) correlates well with endoscopic and histologic activity. However, its measurement is subject to variability related to bowel movement patterns, sample handling, and timing, which may result in inconsistent results [3]. Therefore, the search for a simple, reproducible, and cost-effective biomarker that can reliably assess UC activity remains an active area of investigation.

In recent years, various hematologic indices derived from routine complete blood counts have gained attention as potential inflammatory markers. Ratios such as the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) have been explored in numerous inflammatory and autoimmune conditions, providing insight into the balance between pro-inflammatory and regulatory immune components [5]. Building on this concept, the systemic immune-inflammation index (SII) has been proposed as a more comprehensive indicator that integrates platelet, neutrophil, and lymphocyte counts into a single parameter. The SII is calculated as (platelet count × neutrophil count) / lymphocyte count, thereby reflecting both immune and inflammatory responses within the systemic circulation [6].

Numerous studies have explored the potential of the SII as a biomarker in various malignancies and inflammatory disorders [7]. More recently, attention has turned to its application in UC, where several investigations have demonstrated that higher SII corresponds to increased disease activity. These findings suggest that the SII may serve as a surrogate marker for mucosal inflammation and clinical severity [8]. Furthermore, it may help identify impending disease flare-ups before the onset of overt clinical symptoms, allowing earlier therapeutic intervention [9].

**This study aimed** to explore whether the SII can be adopted as a routine tool for monitoring disease activity and severity in UC patients.

## Materials and methods

This observational cross-sectional study was conducted on 80 UC patients who attended gastroenterology clinics, IBD multidisciplinary team meetings, and colonoscopy units at Ain Shams University Hospitals between August 2024 and February 2025.

Eligible participants were adults aged 18 years or older with a confirmed diagnosis of UC established by clinical, endoscopic, and histopathological criteria. Exclusion criteria included a history of intestinal surgery, active infection, hepatic or renal failure, hematological disorders, or malignancy. Patients with chronic systemic diseases such as rheumatoid arthritis, systemic lupus erythematosus, or other conditions involving chronic inflammation, as well as pregnant or lactating women, were also excluded.

All participants provided written informed consent prior to inclusion. The study protocol was approved by the Ethics Committee of Scientific Research, Faculty of Medicine, Ain Shams University (Approval No. FMASU MS587/2024). All procedures conformed to the ethical standards of the Declaration of Helsinki.

Each patient underwent a detailed medical history taking, a comprehensive general and physical examination, and laboratory and endoscopic evaluations performed on the same day.

Colonoscopy was performed to evaluate disease activity using the Mayo Endoscopic Subscore (MES), which grades mucosal appearance as follows [10]:

- 0: Normal or inactive mucosa;
- 1: Mild disease (erythema, reduced vascular pattern, and mild friability);
- 2: Moderate disease (marked erythema, obliteration of vascular pattern, friability, or erosions);
- 3: Severe disease (spontaneous bleeding or ulceration).

The MES was then incorporated into the Mayo score, which is a 0–12-point scale that assesses UC severity using four factors [10]:

- Rectal bleeding: scored from 0 (none) to 3 (blood alone);
- Stool frequency: scored from 0 (normal) to 3 (5 or more extra stools per day);
- Endoscopic appearance (MES): scored from 0 (normal) to 3 (spontaneous bleeding and ulceration);
- Physician's global assessment: scored from 0 (normal) to 3 (severe).

Interpretation:

- remission: 0–2 points (provided that each individual subscore is not greater than 1);
- mild disease: 3–5 points;
- moderate disease: 6–10 points;
- severe disease: 11–12 points.

Based on clinical and endoscopic findings, patients were categorized as having active disease or being in remission. The extent of colonic involvement was also recorded and classified as proctitis, left-sided colitis, or extensive colitis according to the Montreal classification [11].

Venous blood samples were obtained on the same day as the colonoscopy for the measurement of CRP and CBC. FC was also measured in all study participants. The SII was calculated according to B. Hu et al. [12] using the formula:

$$SII = Neutrophil\ count\ (\times 10^9/L) \times Platelet\ count\ (\times 10^9/L) / Lymphocyte\ count\ (\times 10^9/L)$$

***Statistical analysis***

Collected data were tabulated, coded, and then analyzed using SPSS version 25 (IBM Corp., Armonk, NY, USA). Quantitative variables were expressed as mean ± standard deviation (SD), and the Pearson correlation coefficient ($r$) was used to evaluate linear relationships between them. Categorical variables were presented as frequencies and percentages, and were compared using the chi-square ($\chi^2$) test. Comparisons between two independent groups were performed using the unpaired Student's $t$-test, while one-way analysis of variance (ANOVA) was applied for comparisons among more than two groups. The Tukey post-hoc test was used after ANOVA to identify which specific group means differed significantly from each other. A $p$-value $\leq 0.05$ was considered statistically significant, while $p > 0.05$ was regarded as non-significant. Lastly, the diagnostic performance of the SII was assessed using a receiver operating characteristic (ROC) curve analysis.

## Results

Our study comprised 80 UC patients, of whom 25 (31.25 %) were in remission and 55 (68.75 %) had active disease. Table 1 outlines the socio-clinical characteristics of our study cohort. Regarding the laboratory parameters highlighted in Table 2, significantly higher values of CRP, FC, PLR, and the SII were observed in patients with active UC in contrast to those in remission, while a significantly lower lymphocyte count was recorded in patients with active colitis as compared to those in remission. Of note, these findings were more statistically significant among moderate and severe cases in contrast to mild cases, as demonstrated in Table 3. In addition, there was a statistically significant association between the extent of colonic involvement and CRP, PLR, and the SII in patients in remission, as shown in Table 4. All three parameters were highest in patients with left-sided colitis as compared to those with proctitis in particular ($p$-values of 0.009, 0.011, and 0.006, respectively) and, to a lesser extent, those with extensive colitis ($p$-values of 0.062, 0.110, and 0.084, respectively). Notably, no statistically significant difference in laboratory values, including the SII, in relation to disease extent was observed in patients with active disease.

Table 5 outlines the changes observed in the SII in relation to various socio-demographic, clinical, laboratory, and endoscopic findings in patients with active colitis. Remarkably, the SII did not exhibit a statistically significant variation with respect to the

***Table 1.*** Characteristics of the study population according to socio-demographic and clinical data

| **Age** | Range | 24–67 | |
|---|---|---|---|
| | Mean ± SD | 44.350 ± 12.208 | |
| | | ***n*** | **%** |
| Gender | Male | 45 | 56.25 |
| | Female | 35 | 43.75 |
| Comorbidities | None | 71 | 88.75 |
| | Hypertension | 5 | 6.25 |
| | Diabetes mellitus and hypertension | 4 | 5.00 |
| Extra-intestinal manifestations | None | 78 | 97.50 |
| | Peripheral arthralgia | 2 | 2.50 |
| Site | E1 | 17 | 21.25 |
| | E2 | 27 | 33.75 |
| | E3 | 36 | 45.00 |
| Mayo Clinic Score | Remission | 25 | 31.25 |
| | Mild | 26 | 32.50 |
| | Moderate | 16 | 20.00 |
| | Severe | 13 | 16.25 |
| Mayo Endoscopic Score | Remission | 25 | 31.25 |
| | Mild | 21 | 26.25 |
| | Moderate | 26 | 32.50 |
| | Severe | 8 | 10.00 |
| Treatment | Conventional (Steroids/Immunomodulators) | 49 | 61.25 |
| | Ustekinumab | 12 | 15.00 |
| | Adalimumab | 8 | 10.00 |
| | Infliximab | 7 | 8.75 |
| | Tofacitinib | 2 | 2.50 |
| | Golimumab | 2 | 2.50 |

***Table 2.*** Differences in laboratory parameters between patients in remission and those with active disease according to the Mayo score

| | | **Classification** | | | | ***t*-test** | |
|---|---|---|---|---|---|---|---|
| | | **Remission** | | **Active disease** | | ***t*-value** | ***p*-value** |
| C-reactive protein | Range | 0.00–6.30 | | 0.00–45.30 | | –4.723 | <0.001 |
| | Mean ± SD | 1.44 ± 1.64 | | 14.49 ± 13.72 | | | |
| Fecal calprotectin | Range | 24–111 | | 28–272 | | –5.637 | <0.001 |
| | Mean ± SD | 65.40 ± 26.57 | | 137.20 ± 60.95 | | | |
| Platelets | Range | 149–322 | | 155–331 | | –0.569 | 0.571 |
| | Mean ± SD | 231.16 ± 44.66 | | 237.60 ± 47.92 | | | |
| Neutrophils | Range | 0.7 –16.1 | | 0.1–17.4 | | 1.241 | 0.218 |
| | Mean ± SD | 5.95 ± 4.92 | | 4.78 ± 3.41 | | | |
| Lymphocytes | Range | 1.1–3.4 | | 0.6–2.7 | | 4.876 | <0.001 |
| | Mean ± SD | 1.98 ± 0.54 | | 1.39 ± 0.49 | | | |
| NLR | Range | 0.4–8.3 | | 0.2–7.7 | | –0.960 | 0.340 |
| | Mean ± SD | 3.02 ± 2.51 | | 3.57 ± 2.33 | | | |
| PLR | Range | 82.4–168.5 | | 100.1–280.9 | | –6.098 | <0.001 |
| | Mean ± SD | 121.22 ± 25.02 | | 183.64 ± 48.20 | | | |
| SII | Range | 169.27–980.01 | | 211.84–3633.91 | | –4.594 | <0.001 |
| | Mean ± SD | 582.86 ± 188.88 | | 1357.97 ± 831.17 | | | |
| **Chi-square** | | ***n*** | **%** | ***n*** | **%** | **$\chi^2$** | ***p*-value** |
| CRP group | Normal | 24 | 96.00 | 20 | 36.36 | 24.698 | <0.001 |
| | Elevated | 1 | 4.00 | 35 | 63.64 | | |
| Fecal calprotectin group | <150 | 25 | 100.00 | 33 | 60.00 | 13.793 | <0.001 |
| | >150 | 0 | 0.00 | 22 | 40.00 | | |

***Note:*** *NLR — neutrophil-to-lymphocyte ratio; PLR — platelet-to-lymphocyte ratio; SD — standard deviation; SII — serum immune-inflammation index.*

***Table 3.*** Differences in laboratory values in patients with active disease according to severity as assessed by the Mayo score

| Activity | | Mayo score | | | ANOVA | | Tukey's test | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mild | Moderate | Severe | *F*-value | *p*-value | MI vs. MO | MI vs. S | MO vs. S |
| CRP | Range | 0.0–6.9 | 2.9–45.3 | 2.5–44.4 | 40.459 | <0.001 | <0.001 | <0.001 | 0.394 |
| | Mean ± SD | 3.41 ± 2.55 | 22.49 ± 11.07 | 26.79 ± 12.82 | | | | | |
| Fecal calprotectin | Range | 28–147 | 82–256 | 101–272 | 19.304 | <0.001 | <0.001 | <0.001 | 0.848 |
| | Mean ± SD | 95.73 ± 42.02 | 170.06 ± 44.19 | 179.69 ± 58.93 | | | | | |
| Platelets | Range | 171–324 | 156–331 | 155–311 | 0.439 | 0.647 | | | |
| | Mean ± SD | 239.77 ± 45.19 | 242.81 ± 57.80 | 226.85 ± 41.62 | | | | | |
| Neutrophils | Range | 1.1–17.4 | 0.1–11.3 | 0.2–10.6 | 0.437 | 0.648 | | | |
| | Mean ± SD | 5.11 ± 3.65 | 4.11 ± 3.23 | 4.93 ± 3.25 | | | | | |
| Lymphocytes | Range | 1–2.7 | 0.6–1.8 | 0.7–1.6 | 12.241 | <0.001 | <0.001 | 0.001 | 0.981 |
| | Mean ± SD | 1.67 ± 0.50 | 1.14 ± 0.30 | 1.12 ± 0.28 | | | | | |
| NLR | Range | 0.6–7.6 | 0.2–6.9 | 0.2–7.7 | 0.688 | 0.507 | | | |
| | Mean ± SD | 3.34 ± 2.41 | 3.40 ± 2.20 | 4.23 ± 2.36 | | | | | |
| PLR | Range | 100.1–194.6 | 128.2–272.7 | 131.4–280.9 | 21.209 | <0.001 | <0.001 | <0.001 | 0.883 |
| | Mean ± SD | 149.93 ± 30.84 | 216.78 ± 40.85 | 210.29 ± 41.10 | | | | | |
| SII | Range | 211.84–1148.67 | 775.64–3633.91 | 716.35–3534.32 | 24.116 | <0.001 | <0.001 | <0.001 | 0.396 |
| | Mean ± SD | 765.45 ± 251.38 | 1755.32 ± 761.97 | 2053.95 ± 869.16 | | | | | |
| **Chi-square** | | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** | $\chi^2$ | ***p*-value** | **MI vs. MO** | **MI vs. S** | **MO vs. S** |
| CRP group | Normal | 17 | 65.38 | 2 | 12.50 | 1 | 7.69 | 18.019 | <0.001 | | | |
| | Elevated | 9 | 34.62 | 14 | 87.50 | 12 | 92.31 | | | | | |
| Fecal calprotectin group | <150 | 26 | 100.00 | 4 | 25.00 | 3 | 23.08 | 32.885 | <0.001 | | | |
| | >150 | 0 | 0.00 | 12 | 75.00 | 10 | 76.92 | | | | | |

***Note:*** *MI — mild; MO — moderate; S — severe; NLR — neutrophil-to-lymphocyte ratio; PLR — platelet-to-lymphocyte ratio; SD — standard deviation; SII — serum immune-inflammation index.*

extent of colitis during active disease. Yet, significantly higher values of the SII were noted in patients with left-sided colitis (754.35 ± 76.49) as compared to those with proctitis (447.30 ± 158.98) and extensive colitis (576.20 ± 183.32) during remission (*p*-value of 0.008). A statistically significant positive correlation was observed between the SII and CRP, FC, and PLR during both remission and active disease phases. Conversely, a significant negative correlation was noted between the SII and lymphocyte count during both phases, as demonstrated in Table 6.

Last but not least, a receiver operating characteristic (ROC) curve analysis was conducted to assess the discriminatory performance of the SII between remission and active disease states. The AUC was 0.86, with an optimal cut-off value of > 838.76, yielding an accuracy of 86.10 %, a sensitivity of 70.91 %, and a specificity of 96.00 % (Fig. 1). At a cut-off value of >1148.67 with an AUC of 0.78, the SII was able to differentiate between moderate-to-severe and mild cases (as specified by the MES), with an accuracy of 78.00 %, a sensitivity of 70.59 %, and a specificity of 90.48 % (Fig. 2).

## Discussion

Inflammatory ratios and composite hematologic scores, including the NLR, PLR, and the SII, have recently gained attention as potentially valuable tools in assessing systemic inflammation [5, 6]. As these blood counts are routinely obtained in clinical practice, they have the advantage of accessibility, low cost, and suitability for repeated measurements.

The present study evaluated the role of the SII as a non-invasive indicator of disease activity in UC. The results demonstrated a strong and statistically significant positive correlation between the SII and established inflammatory markers, including

***Table 4.*** Association between disease extent and laboratory data in patients in remission ($n$ = 25)

| Remission | | Site | | | | | | ANOVA | | Tukey's test | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E1 | | E2 | | E3 | | *F*-value | *p*-value | 1 vs. 2 | 1 vs. 3 | 2 vs. 3 |
| CRP | Range | 0.0–1.4 | | 1.9–4.2 | | 0.0–6.3 | | 5.524 | 0.011 | 0.009 | 0.407 | 0.062 |
| | Mean ± SD | 0.41 ± 0.59 | | 2.97 ± 0.83 | | 1.28 ± 1.85 | | | | | | |
| Fecal calprotectin | Range | 41–103 | | 66–106 | | 24–111 | | 2.919 | 0.075 | | | |
| | Mean ± SD | 60.57 ± 23.57 | | 86.50 ± 18.10 | | 57.67 ± 27.66 | | | | | | |
| Platelets | Range | 186–279 | | 213–286 | | 149–322 | | 0.383 | 0.686 | | | |
| | Mean ± SD | 238.00 ± 34.86 | | 239.83 ± 35.83 | | 222.83 ± 54.40 | | | | | | |
| Neutrophils | Range | 1.6–16.1 | | 1.3–11.4 | | 0.7–14.2 | | 0.440 | 0.650 | | | |
| | Mean ± SD | 6.99 ± 5.50 | | 4.40 ± 3.73 | | 6.13 ± 5.28 | | | | | | |
| Lymphocytes | Range | 1.6–3.2 | | 1.5–1.9 | | 1.1–3.4 | | 3.058 | 0.067 | | | |
| | Mean ± SD | 2.34 ± 0.57 | | 1.68 ± 0.15 | | 1.91 ± 0.55 | | | | | | |
| NLR | Range | 1–7 | | 0.8–6.7 | | 0.4–8.3 | | 0.127 | 0.882 | | | |
| | Mean ± SD | 2.97 ± 2.37 | | 2.60 ± 2.18 | | 3.25 ± 2.88 | | | | | | |
| PLR | Range | 83.5–126.7 | | 127.4–157.7 | | 82.4–168.5 | | 5.177 | 0.014 | 0.011 | 0.296 | 0.110 |
| | Mean ± SD | 104.46 ± 16.80 | | 142.93 ± 11.83 | | 120.15 ± 26.67 | | | | | | |
| SII | Range | 169.27–618.42 | | 649.80–838.76 | | 272.78–980.01 | | 6.106 | 0.008 | 0.006 | 0.223 | 0.084 |
| | Mean ± SD | 447.30 ± 158.98 | | 754.35 ± 76.50 | | 576.20 ± 183.32 | | | | | | |
| **Chi-square** | | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** | $\chi^2$ | ***p*-value** | | | |
| CRP group | Normal | 7 | 100.00 | 6 | 100.00 | 11 | 91.67 | 1.128 | 0.569 | | | |
| | Elevated | 0 | 0.00 | 0 | 0.00 | 1 | 8.33 | | | | | |
| Fecal calprotectin group | < 150 | 7 | 100.00 | 6 | 100.00 | 12 | 100.00 | – | – | | | |

***Note:*** *NLR — neutrophil-to-lymphocyte ratio; PLR — platelet-to-lymphocyte ratio; SD — standard deviation; SII — serum immune-inflammation index.*

CRP and FC, in both active and remission phases. A significant negative correlation with lymphocyte count was also observed, consistent with the known immune dysregulation in active UC. The ability of the SII to discriminate between active disease and remission was reflected in its diagnostic performance: using a cutoff value of 838.76, the SII showed a sensitivity of 70.91 %, a specificity of 96.00 %, a positive predictive value of 97.50 %, and an overall accuracy of 86.10 %. The SII also demonstrated value in stratifying disease severity. At a cutoff value of 1148.67, it differentiated moderate-to-severe UC from mild disease with high sensitivity and specificity based on the MES, further supporting its capacity to reflect mucosal inflammation. These findings are in agreement with numerous studies indicating that the SII is elevated in active UC and correlates with disease severity [2, 3, 6, 8, 13].

In patients in the remission phase, the SII remained significantly associated with CRP, PLR, and the disease extent, indicating its usefulness in detecting subclinical inflammation. Given UC's relapsing–remitting course, early identification of inflammatory reactivation is essential to prevent exacerbations and maintain long-term disease control. The lack of a significant correlation between the SII and treatment regimen in patients in the active phase suggests that the SII reflects underlying inflammatory activity regardless of whether patients were receiving conventional therapies or biologic agents. This is advantageous in clinical settings where patients may be on diverse therapeutic regimens, as the SII may serve as a consistent indicator of inflammatory status.

Although extensive colitis is generally associated with greater inflammatory burden, patients with left-sided colitis in remission demonstrated higher SII values in our cohort. This finding may reflect variations in systemic immune recovery and treatment intensity among different disease phenotypes. Patients with extensive colitis are more likely to receive prolonged or aggressive immunosuppressive therapy, which may effectively normalize systemic inflammatory markers. In contrast, residual low-grade inflammation or slower resolution of platelet activation in left-sided

***Table 5.*** Association between the SII and various socio-demographic, clinical, laboratory, and endoscopic parameters in patients with active disease ($n$ = 55)

| Active cases ($n$ = 55) | | SII | | $t$-test | |
|---|---|---|---|---|---|
| | | $n$ | Mean ± SD | $t$-value | $p$-value |
| Gender | Male | 34 | 1472.42 ± 812.02 | 1.308 | 0.197 |
| | Female | 21 | 1172.67 ± 847.92 | | |
| CRP group | Normal | 20 | 654.88 ± 196.20 | –6.150 | <0.001 |
| | Elevated | 35 | 1759.73 ± 786.62 | | |
| Fecal calprotectin group | <150 | 33 | 818.00 ± 262.86 | –9.808 | <0.001 |
| | >150 | 22 | 2167.92 ± 725.07 | | |
| Treatment | Non-biological | 31 | 1476.06 ± 846.86 | 1.202 | 0.235 |
| | Biological | 24 | 1205.43 ± 802.16 | | |
| Extraintestinal manifestations | Negative | 53 | 1320.85 ± 789.99 | –1.736 | 0.088 |
| | Arthralgia | 2 | 2341.50 ± 1686.91 | | |
| **ANOVA** | | | | ***F*-value** | ***p*-value** |
| Chronic disease | None | 50 | 1363.27 ± 829.69 | 0.107 | 0.899 |
| | HTN | 2 | 1102.25 ± 1259.22 | | |
| | DM and HTN | 3 | 1440.09 ± 958.27 | | |
| Site | E1 | 10 | 1040.16 ± 493.80 | 1.309 | 0.279 |
| | E2 | 21 | 1310.00 ± 855.38 | | |
| | E3 | 24 | 1532.36 ± 901.42 | | |
| Mayo score | Mild | 26 | 765.45 ± 251.38 | 24.116 | <0.001 |
| | Moderate | 16 | 1755.33 ± 761.97 | | |
| | Severe | 13 | 2053.95 ± 869.16 | | |
| Mayo Endoscopic Subscore | Mild | 21 | 934.65 ± 675.93 | 5.940 | 0.005 |
| | Moderate | 26 | 1531.69 ± 829.25 | | |
| | Severe | 8 | 1904.56 ± 759.55 | | |

***Note:*** *DM — diabetes mellitus; HTN — hypertension; n — number; SD — standard deviation.*

***Table 6.*** Correlations between the SII and laboratory parameters in the study cohort

| Correlations | | | | |
|---|---|---|---|---|
| | Serum immune-inflammation index | | | |
| | Remission | | Active disease | |
| | $r$ | $p$-value | $r$ | $p$-value |
| Age | 0.268 | 0.194 | 0.023 | 0.868 |
| C-reactive protein | 0.903 | <0.001 | 0.972 | <0.001 |
| Fecal calprotectin | 0.760 | <0.001 | 0.724 | <0.001 |
| Platelets | –0.015 | 0.941 | 0.028 | 0.837 |
| Neutrophils | –0.211 | 0.312 | 0.010 | 0.943 |
| Lymphocytes | –0.556 | 0.004 | –0.589 | <0.001 |
| Neutrophil-to-lymphocyte ratio | –0.035 | 0.869 | 0.293 | 0.030 |
| Platelet-to-lymphocyte ratio | 0.754 | < 0.001 | 0.797 | <0.001 |

colitis could contribute to a persistently elevated SII during remission. Additionally, the relatively small number of patients in each subgroup may have amplified these differences. However, during active disease phases, the disease site was not significantly associated with the SII, likely reflecting the dominance of systemic inflammation during active flares. These findings suggest that the SII may be particularly useful for tailored monitoring strategies in remission, where disease extent may influence relapse risk and follow-up intensity.

### *Limitations and future directions*

Although the sample consisted of 80 patients, which is sufficient for preliminary evaluation, it may not fully reflect the broad clinical and demographic variability seen in the wider UC population. Larger, multicenter studies would be beneficial to verify the generalizability of the SII across patient populations. Also, incorporating longitudinal follow-up and serial SII measurements would help assess whether changes in the SII correspond with subsequent alterations in disease activity.

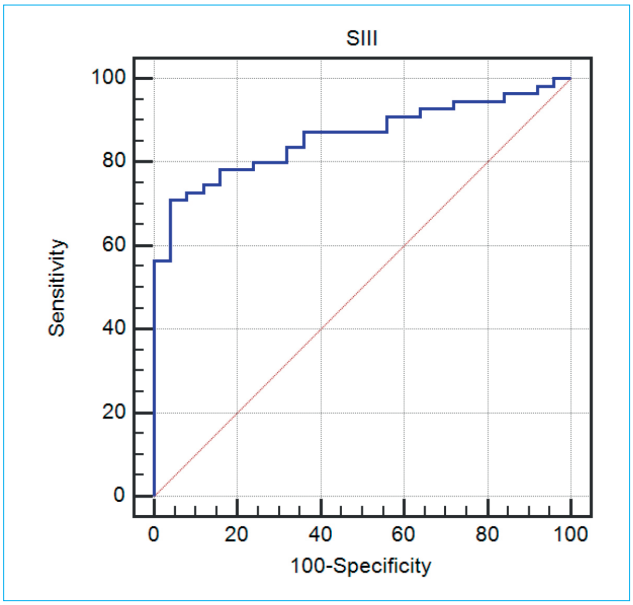


***Figure 1.*** ROC curve analysis of the SII for discriminating between active disease and remission

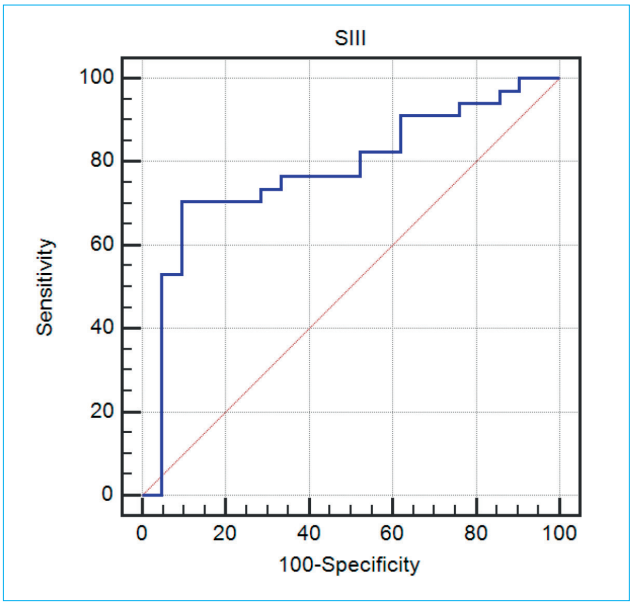


***Figure 2.*** ROC curve analysis of the SII for discriminating between moderate-to-severe and mild cases according to the Mayo Endoscopic Subscore (MES)

## Conclusion

The findings of this study indicate that the SII represents a useful, non-invasive marker for evaluating disease activity in UC. The SII demonstrated strong associations with established inflammatory indicators, including CRP, FC, and the Mayo score. Its high specificity, notable predictive value, and straightforward calculation from routine blood tests suggest that the SII may reduce dependence on invasive procedures such as colonoscopy, while contributing to more individualized patient monitoring and treatment decisions. Further longitudinal evaluation may help determine its role in predicting flare occurrence and long-term outcomes.

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