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S-MAPA: bridging the gap in psoriasis severity assessment

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Consent for publication: informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

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Abstract

The Psoriasis Area and Severity Index (PASI) is widely used to evaluate psoriatic disease activity in clinical settings; however, its limitations hinder its practicality in routine use. The Simple-Measure for Assessing Psoriasis Severity (S-MAPA) has emerged as a promising tool addressing these limitations, providing a more feasible approach for assessing disease severity. This study aimed to evaluate the S-MAPA as a sensitive and practical alternative to existing instruments for measuring psoriasis severity.

Patients with psoriasis were assessed using body surface area (BSA), the Physician's Global Assessment (PGA), S-MAPA, PASI, and Dermatology Life Quality Index (DLQI). Plasma high-sensitivity C-reactive protein (hs-CRP) levels were also measured. Spearman's correlation analysis compared the relationships between these assessment tools and hs-CRP levels. In total, 100 assessments were conducted between January and July 2019. The S-MAPA score and PASI showed a strong positive correlation with disease severity ($r=0.9315$, $p<0.01$). Both the S-MAPA score and PASI exhibited comparable correlations with hs-CRP levels ($r=0.5299$ *vs.* 0.5316) and the DLQI ($r=0.2533$ *vs.* 0.2641). The S-MAPA score demonstrated stronger correlations with the PASI, DLQI, and hs-CRP level than with BSA or the PGA score. The area under the receiver operating characteristic curve for the S-MAPA was 0.9787, with an optimal cut-off value of 138 for predicting severe psoriasis (sensitivity, 92.59%; specificity, 95.89%).

Based on our findings, the S-MAPA is a reliable and practical alternative for assessing the severity of psoriasis in clinical practice, offering advantages over conventional measures.

Introduction

Psoriasis is a chronic, relapsing skin condition that significantly affects patients' quality of life, physical functioning, and work productivity. Accurate and consistent assessment of psoriasis severity is crucial for clinical management and research. Various tools have been developed to measure psoriasis severity. However, none have fully met the criteria for validity and practicality.[1,2]

The Psoriasis Area and Severity Index (PASI) has long been the gold standard for evaluating psoriasis severity. However, it is less suited for routine clinical practice because of its complex and time-intensive nature. The PASI requires a detailed assessment of body surface area (BSA), redness, thickness, and scaling across four distinct body regions, making it cumbersome for

everyday use. Additionally, the PASI has shown limitations in detecting subtle changes in patients with milder forms of psoriasis, reducing sensitivity.[3,4]

In contrast, the Simple Measure for Assessing Psoriasis Severity (S-MAPA) offers a streamlined alternative by calculating the product of the mean Physician's Global Assessment (PGA) score and the percentage of BSA involvement.[5] The use of the mean PGA score in this formula reflects an averaged clinical judgment of the overall severity of psoriatic lesions – typically considering erythema, scaling, and induration – across all affected areas. By integrating both the qualitative assessment of plaque characteristics (*via* PGA) and the quantitative extent of involvement (*via* BSA), the S-MAPA provides a simplified yet comprehensive measure of disease severity that is easier to apply in both clinical and research settings.

Although previous studies have demonstrated a strong correlation between S-MAPA and PASI, validating its potential utility as a surrogate marker,[6] remains a lack of objective evidence linking S-MAPA to systemic markers of inflammation. In this study, we aimed to investigate the association between S-MAPA scores and high-sensitivity C-reactive protein (hs-CRP), a well-established biomarker of systemic inflammation in psoriasis.[7] This analysis may offer further insights into the validity of S-MAPA as an alternative disease severity measure in both clinical practice and research.

Materials and Methods

This cross-sectional study enrolled 100 participants diagnosed with plaque psoriasis who visited the Ho Chi Minh City Hospital of Dermatology and Venereology between January 2019 and July 2019. The study population included 56 male and 44 female patients, aged 17 to 76 years (mean age: 47.12±15.19 years). Eligible participants were adults aged 16 years and older with a clinical diagnosis of psoriasis confirmed by dermatologists. Exclusion criteria included evidence of acute or chronic infections, autoimmune diseases, hepatic or renal failure, symptoms or signs of arthritis (including psoriatic arthritis), a history of active malignancy, recent surgery or bone fractures within the previous two months, and the use of anti-inflammatory medications.

All participants were informed of the study's objectives, and written informed consent was obtained prior to enrollment. Detailed demographic and clinical information was collected, including age, sex, occupation, disease duration, and time of disease onset.

A thorough physical examination was performed to assess psoriasis severity through multiple validated tools. Disease extent was evaluated using BSA involvement, while lesion severity was assessed using the PGA scale. The PGA utilized in this study was a 5-point scale, ranging from 0 (clear) to 4 (severe), based on the overall assessment of erythema, induration, and scaling of psoriatic plaques.[8,9] The S-MAPA was then calculated by multiplying the mean PGA score by the percentage of BSA involvement. In addition, psoriasis severity was measured using PASI for comparison purposes.[10] The impact of psoriasis on patients' quality of life was evaluated using the Dermatology Life Quality Index (DLQI).[11,12] Following clinical assessment and interviews, venous blood samples were collected from each participant to measure hs-CRP levels, a biomarker of systemic inflammation.[13]

The study protocol was reviewed and approved by the Human Research Ethics Committee of Ho Chi Minh City University of Medicine and Pharmacy (approval number 295/ĐHYD-HĐĐĐ).

Statistical analysis

Data analysis was performed using STATA software (version 13.1, StataCorp LLC, TX 77845 USA). Data were summarized as means (± standard deviation) and medians (interquartile range) for those with normal and non-normal distributions, respectively. The relationships between all assessment instruments were evaluated using Spearman's correlation. Statistical significance was set at $p<0.05$. Spearman correlation coefficients were interpreted as follows: 0.1-0.3, 0.3-0.5, 0.5-0.7, 0.7-0.9, and ≥0.9 indicated very low, low, moderate, high, and very high correlation, respectively.[14] A receiver operating characteristic (ROC) curve was constructed to evaluate the ability of the S-MAPA score to discriminate patients with severe psoriasis, using PASI ≥20 as the reference standard. The area under the curve (AUC) was calculated to assess the overall diagnostic performance. The optimal cut-off point for the S-MAPA was determined by maximizing Youden's index, which identifies the threshold that optimizes the trade-off between sensitivity and specificity.

Results

Data from 100 patients diagnosed with plaque psoriasis were analyzed. Of these, 56% were male. The mean age at study entry was 47.1±15.19 years, ranging from 17 to 76 years. The median disease duration was 10 years (interquartile range: 5-18 years). The median S-MAPA score, BSA,

PGA score, PASI, and DLQI are summarized in Table 1. Spearman rank correlation analysis demonstrated a significant and very strong association between the S-MAPA score and PASI ($r=0.93$, $p<0.01$). Notably, the S-MAPA score showed a stronger correlation with the PASI than with either BSA or the PGA score alone (S-MAPA score, $r=0.9315$; PGA score, $r=0.449$; BSA, $r=0.836$). The scatter plots in Figure 1 illustrate the relationship between the S-MAPA score with PASI, BSA, and PGA scores. However, the S-MAPA score, PASI, PGA score, and BSA were weakly correlated with the DLQI ($r=0.2533$, 0.2641, 0.2391, and 0.1505, respectively; Table 2). In terms of biomarker associations, both the S-MAPA score and PASI were moderately correlated with hs-CRP levels, whereas the PGA score and BSA exhibited weaker correlations with hs-CRP levels (Table 2).

The ability of S-MAPA to detect severe psoriasis, as defined by PASI ≥ 20, was evaluated using a ROC curve (Figure 2). The ROC analysis demonstrated that the S-MAPA score was a strong predictor of severe psoriasis, with an AUC of 0.9787 (95% confidence interval (CI): 0.96-1.00), indicating excellent discriminative ability. Using Youden's index to determine the optimal cut-off point, a S-MAPA value of 138 was found to be optimal for predicting severe psoriasis. At this threshold, the sensitivity was 92.59% (95% CI: 75.7%-99.1%), and the specificity was 95.89% (95% CI: 88.5%-99.1%).

Discussion

In psoriasis, the initiation of therapy and monitoring of treatment effectiveness rely heavily on accurate assessment of disease severity. Therefore, evaluation of psoriasis severity is essential in both clinical practice and research. Between 1997 and 2000, 171 randomized clinical trials of psoriasis employed 44 different scoring systems to measure severity.[15] Among these, the PASI, PGA, and BSA were the most commonly used tools. In 2013, Walsh *et al.* introduced the S-MAPA – a metric that combines the PGA and BSA – as a more practical and efficient alternative capable of capturing both the extent and characteristics of psoriasis plaques.[5]

This study aimed to evaluate the efficacy of the S-MAPA as an alternative to the PASI and other instruments for measuring psoriasis severity. Our findings align with and build upon previous research validating the S-MAPA as a reliable severity assessment tool.[5,16,17] In our analysis, the S-MAPA and PASI demonstrated a very strong correlation ($r=0.93$, $p<0.01$). Consistent with the results reported by Walsh *et al*.,[5] our data suggest that the S-MAPA performs similarly to the PASI

in estimating psoriasis severity. Furthermore, the S-MAPA was more sensitive than the PASI in patients with low BSA. For example, Walsh *et al.* highlighted a case involving two patients: one with erythema, induration, and desquamation scores of 3 each and a BSA involvement of 1%, and another with similar lesions but a BSA involvement of 9%. Although both patients had a PASI of 9 because their percentage of BSA involvement was <10%, their S-MAPA scores were 3 and 27, respectively. This discrepancy underscores the insensitivity of the PASI to minor changes in the percentage of BSA involvement, particularly in patients with mild disease, whereas the S-MAPA effectively accounts for these differences. Consequently, the S-MAPA may enable clinicians to assess and monitor treatment responses with greater precision and ease.

The role of C-reactive protein (CRP) as a biomarker of psoriasis has been supported by numerous studies. Vanior *et al.* reported that patients with psoriasis exhibit significantly elevated baseline CRP levels, compared with healthy controls.[18] Similarly, Malbris *et al.* demonstrated that CRP levels in patients with psoriasis were higher than those in controls and positively correlated with serum cholesterol levels.[19] Asha *et al.* found that 52% of patients with psoriasis had CRP levels >5 mg/L, compared with only 14% of controls ($p<0.05$).[20] Kimbell *et al.* further observed that mean CRP levels in patients with severe psoriasis were significantly higher than those in patients with mild disease (1.16±0.07 mg/dL *vs.* 0.63±0.03 mg/dL, $p<0.001$).[21] Asha *et al*. also noted a correlation between disease severity and CRP levels, with 44% of patients with a PASI >10 having elevated CRP levels, compared with 25% of those with a PASI <10 ($p=0.003$).[20] A positive correlation between CRP levels and the PASI has been reported.(22-24) CRP, therefore, serves as a valuable biomarker for assessing disease severity and monitoring treatment response. In our study, both the S-MAPA score and PASI exhibited moderate correlations with hs-CRP levels, providing further evidence that the S-MAPA is an effective tool for assessing psoriasis severity. However, the weak correlations among the S-MAPA score, PASI, and DLQI highlight the limitations of the corresponding tools in capturing factors beyond the physical manifestations of psoriasis, such as itching, stinging, and psychological distress, which significantly affect patients' quality of life.

Although the PGA and BSA are straightforward and widely used in clinical practice, our data demonstrate that the S-MAPA score correlates more strongly with the PASI, DLQI, and hs-CRP levels than with the PGA or BSA alone. This can be attributed to the PGA and BSA failing to provide a comprehensive evaluation of both the intensity of lesions and the extent of BSA

involvement when used separately. By combining these measures, the S-MAPA addresses the limitations of each tool and offers a holistic assessment of disease severity.

A key finding of our study was the high AUC for the S-MAPA (0.97), which underscores its utility in assessing psoriasis severity. Based on the ROC curve, the optimal S-MAPA threshold for predicting severe psoriasis was 138, with sensitivity and specificity values of 92.59% and 95.89%, respectively. Although the cut-off values for the S-MAPA score have not been established in the literature, this study provides valuable insights into its potential clinical application and highlights the potential of the S-MAPA as a reliable severity assessment tool.

Limitations of the study

The sample size of the study was limited to 100 patients, which may have restricted the generalizability of the findings to a broader population of patients with psoriasis. Furthermore, the study did not evaluate the intra- and interrater reliabilities of the S-MAPA, questioning its consistency and reproducibility across different measurements and evaluators. These highlight the need for further research to address the limitations of this study.

Conclusions

Our findings highlight the S-MAPA as a compelling alternative to the PASI for assessing psoriasis severity. With its ability to quantify disease severity and simplicity of calculation, the S-MAPA is a practical and reliable tool. We recommend the S-MAPA as an effective instrument for measuring psoriasis severity, suitable for use not only in clinical trials but also in routine clinical practice.

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Table 1. Demographics and disease characteristics of study participants.

Characteristics	**Result (n=100)**
Age, years, mean (±SD)	47.12±15.19
Male, n (%)	56 (56%)
Duration of psoriasis, years, median (IQR)	10 (5-18)
Onset time, years old, mean (±SD)	34.68±15.66
PASI, median (IQR)	14.4 (8.75-20.8)
Affected BSA, %, median (IQR)	32.75 (12-61.5)
PGA, median (IQR)	2.33 (1.67-2.69)
S-MAPA, median (IQR)	72.83 (31.58-144.17)
DLQI, median (IQR)	11 (4-14.5)
Hs-CRP, mg/L, median (IQR)	2.62 (0.91-9.59)

BSA, body surface area; DLQI, Dermatology Life Quality Index; hs-CRP, high-sensitivity C-reactive protein; IQR, interquartile range; PGA, Physician's Global Assessment; S-MAPA, Simplified Modified Psoriasis Area and Severity Index; SD, standard deviation.

Table 2. Spearman correlation coefficients between S-MAPA, PASI, BSA, PGA with DLQI and hs-CRP.

Correlation (bootstrap 95% CI)	**S-MAPA**	**PASI**	**BSA**	**PGA**
DLQI	0.2533 (0.06-0.45)	0.2641 (0.07-0.46)	0.2391 (0.04-0.44)	0.1505 (-0.04-0.34)
Hs-CRP	0.5299 (0.36-0.70)	0.5316 (0.37-0.69)	0.4748 (0.30-0.65)	0.2520 (0.75-0.43)

The correlations between S-MAPA, PASI, and DLQI were weak, with r=0.25 and 0.26, respectively. In contrast, stronger correlations were observed with Hs-CRP, showing r=0.53 and 0.5316, respectively.

BSA, body surface area; CI, confidence interval; DLQI, Dermatology Life Quality Index; Hs-CRP, high-sensitivity C-reactive protein; PASI, Psoriasis Area and Severity Index; PGA, Physician's Global Assessment; S-MAPA, Simplified Modified Psoriasis Area and Severity Index.

Figure 1. The correlation between PASI and S-MAPA, BSA, and PGA scores.

The PASI is correlated with the S-MAPA score (r=0.9315; p<0.0001) (**a**); BSA (r=0.8364, p<0.0001) (**b**); and PGA score (r=0.4490, p<0.0001) (**c**).

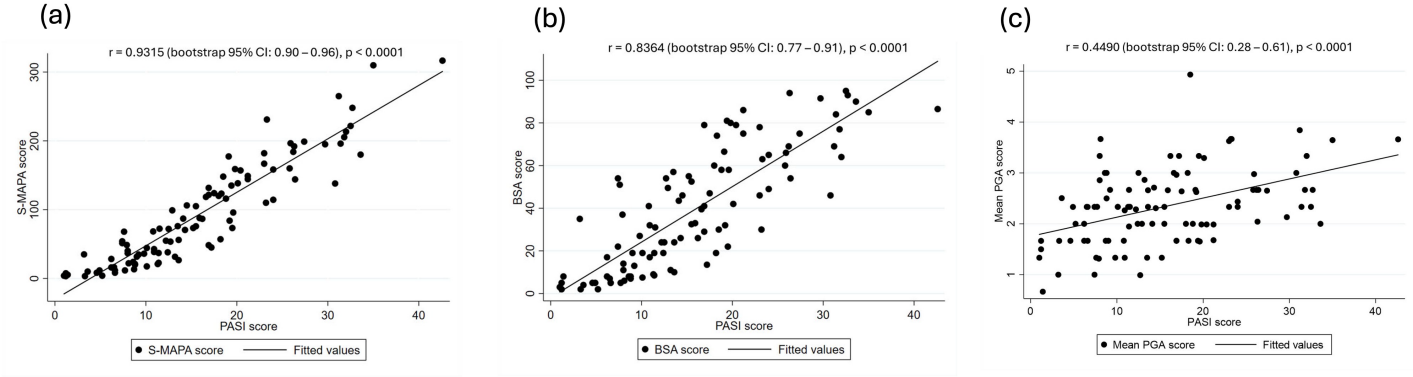

Figure 2. Receiver operating characteristic curve to determine cut-off value of the S-MAPA score for predicting severe psoriasis (PASI ≥20).