ORIGINAL ARTICLE

Correlation of inflammatory serum markers with disease severity in patients with hidradenitis suppurativa (HS)

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Background: Data regarding the association of routinely obtained serum markers of inflammation, namely C-reactive protein (CRP), white blood cell count, and neutrophil count, with disease severity of hidradenitis suppurativa (HS) according to a scoring system have not been reported to our knowledge.

Objective: We sought to evaluate these inflammatory serum markers for assessing disease severity of HS.

Methods: Medical files of 275 patients who were referred to the outpatient HS center of the Department of Dermatology, Venereology, and Allergology, Ruhr-University Bochum, in 2013 were evaluated retrospectively.

Results: CRP levels and neutrophil count significantly differed among Hurley stages I, II and III ($P < .0001$, $P = .0002$, respectively). There were significant positive correlations among CRP levels ($r = 0.496$, $P < .0001$) and neutrophil count ($r = 0.330$, $P = .0009$) with modified Hidradenitis Suppurativa Score. CRP was a significant independent predictor for Hurley stage III (odds ratio 1.077, 95% confidence interval 1.013-1.145, $P = .016$). CRP and body mass index were significant independent predictors for severe disease according to modified Hidradenitis Suppurativa Score (odds ratio 1.065, 95% confidence interval 1.015-1.117, $P = .009$; and odds ratio 1.12, 95% confidence interval 1.009-1.243, $P = .032$, respectively).

Limitations: Files were analyzed retrospectively.

Conclusion: These inflammatory markers, especially CRP, are effective for assessing the extent of disease severity and the grade of inflammation in patients with HS. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2015.08.052.)

Key words: biomarkers; C-reactive protein; hidradenitis suppurativa; inflammation; inflammatory skin disease; serum markers for inflammation.

Hidradenitis suppurativa (HS) is a chronic inflammatory skin disease characterized by the formation of multiple abscesses, nodules, and scars in the apocrine gland-bearing areas.[1,2] The most frequently affected anatomic sites are the inguinofemoral, axillary, perianal, gluteal, and submammary regions. The prevalence of HS is estimated to be 1% to 4%.[3,4] Follicular occlusion as a result of hyperkeratosis appears to play a major role in the pathogenesis of HS and can lead to occlusion

Abbreviations used:

BMI:	body mass index
CI:	confidence interval
CRP:	C-reactive protein
HS:	hidradenitis suppurativa
IL:	interleukin
IQR:	interquartile range
mHSS:	modified Hidradenitis Suppurativa Score
OR:	odds ratio
WBC:	white blood cell count

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of apocrine glands with subsequent follicular rupture and inflammation.[5] Genetic predisposition, obesity, and cigarette smoking are considered to be risk factors.[6]

One of the available clinical measures for assessing HS disease severity is the Hurley classification system, which defines 3 stages of severity.[7] Stage I is characterized by single or multiple abscesses without sinus tracts, stage II is described as recurrent abscesses with tract formation and cicatrization separated by normal-appearing skin, and stage III is defined as multiple interconnected sinus tracts without normal-appearing skin in between. A more precise HS severity score is the modified Hidradenitis Suppurativa Score (mHSS), which considers the extent of disease and inflammation by counting the number of individual nodules and fistulas.[6]

CAPSULE SUMMARY

- No data are available to our knowledge regarding the association of routinely obtained serum markers of inflammation with disease severity of hidradenitis suppurativa according to a scoring system.
- C-reactive protein and neutrophil count are effective parameters for assessing disease severity and grade of inflammation.
- These markers should be considered as a valuable extension to currently available clinical scoring systems.

Assessments of disease severity are currently based only on the grading of skin symptoms. Because of the simplicity of the Hurley staging system, it is routinely used in clinical evaluations. Although it is a useful tool, choosing between conservative and surgical treatment options, it is static, nonquantitative, and not suitable for assessing the extent of inflammation. In contrast, the more complex and dynamic mHSS is better suited to assess disease severity and grade of inflammation. However, its routine clinical use is time-consuming and usually reserved for clinical trials. Thus, an accurate disease quantification system and objective biomarkers for HS are needed. Recently, biomarkers for HS have been proposed, such as soluble interleukin (IL)-2 receptor,[8] S100A8/A9,[9] and chitinase-3-like protein 1 (YKL-40).[10] In contrast, serum markers for inflammation, namely C-reactive protein (CRP), white blood cell count (WBC), and neutrophil count, have already been established for evaluating the grade of inflammation in the clinic. Data regarding the association of routinely obtained serum markers of inflammation with disease severity of HS according to a scoring system have not been reported. Hence, we evaluated these inflammatory serum markers for assessing disease severity according to the Hurley staging system and the mHSS.

METHODS

Retrospectively, medical files of 275 patients referred to the outpatient HS/AI Center of the Department of Dermatology, Venereology, and Allergology, Ruhr-University Bochum, in 2013 were evaluated. Patients were included if diagnosis of HS was confirmed, which required the presence of the well-established criteria[11] and if mHSS and laboratory data at the time of consultation were available. Exclusion criteria were patients younger than 18 years, receiving ongoing antibiotic or immunosuppressive therapy, with a history of surgery within 4 weeks before consultation, with a suspected infectious disease or if antibiotic or immunosuppressive agents had been administered within 4 weeks before consultation. Disease severity was assessed via mHSS and Hurley stage of the most severely affected region. The study was approved by the local ethics committee and was performed according to the declaration of Helsinki.

Measurement of laboratory parameters

WBC and differential counts were determined using a fluorescent flow cytometry Sysmex XE-5000 analyzer (Sysmex, Kobe, Japan). A turbidimetric assay on Cobas 8000 (Roche Diagnostics, Mannheim, Germany) was used to measure CRP serum levels. A CRP level greater than 5 mg/L, WBC greater than $9.5 \times 10^3/\mu L$, and neutrophil count greater than $7.2 \times 10^3/\mu L$ were regarded as abnormal values.

Statistical analysis

Continuous data are presented as the mean (SD) or median (interquartile range [IQR]) and were compared using the Student t test or the nonparametric Mann-Whitney U test. Categorical data are presented as numbers (percentages) and were compared using the χ^2 or Fisher exact test.

Correlations between variables were determined via the Spearman coefficient of rank correlation. Post hoc power calculations for correlation coefficient revealed that the number of patients included in our study allowed detection of an effect size of 0.271 with 80% power and an alpha risk of 5%. Thus, the