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Original Research Article

Association of serum D-dimer levels with disease activity in chronic urticaria, psoriasis and urticarial vasculitis

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ABSTRACT

Background: Chronic urticaria, psoriasis and urticarial vasculitis are common skin inflammatory diseases that frequently have systemic implications. D-dimers in serum, as a coagulation activation marker, have been suggested as biomarkers for systemic inflammation in different autoimmune diseases. Its use for the evaluation of disease activity in chronic urticaria, psoriasis and urticarial vasculitis is not well established but there are no data available on the same especially in South Asian countries like Bangladesh. There is an association between serum D-dimer level and the severity of chronic urticaria, psoriasis and urticarial vasculitis, indicating its consideration as a biomarker for activity or response to therapy.

Methods: A hospital-based cross-sectional study was carried out in 100 patients with chronic urticaria, psoriasis or urticarial vasculitis. The severity of the diseases was evaluated by UAS7 for chronic urticaria, PASI test in psoriasis and clinical evaluation in prematurely aged urticarial vasculitis. Serum D-dimer was detected and statistical analysis, consisting of one-way ANOVA and Pearson/Spearman correlation test, was executed.

Results: The D-dimer levels were higher in all groups, the highest of which was found for the patients with urticarial vasculitis 59.7 ng/ml), whereas they were 512.4 ng/ml and 468.9 ng/ml for those with chronic urticaria and psoriasis, respectively. D-dimer levels were positively correlated with the severity of disease in all conditions to a considerable extent ($p<0.001$).

Conclusions: Serum D-dimer level is associated with the severity of chronic urticaria, psoriasis and urticarial vasculitis, and thus may be considered as a potential biomarker for evaluating disease activity or treatment response.

Keywords: Chronic urticaria, Psoriasis, Urticarial vasculitis, Disease activity, Biomarker, Inflammation

INTRODUCTION

The widespread nature of chronic inflammatory skin disease is a major public health burden, often due to the lifelong, recurring and quality-of-life effect. Of these disorders, chronic spontaneous urticaria (CSU), psoriasis and UV are often seen in the skin clinic, where they have also been increasingly regarded as systemic inflammatory diseases instead of mere skin conditions. These diseases span immune dysregulation, endothelial activation, and systemic inflammation with extra-cutaneous features.[1,2] Chronic urticaria is the repeated occurrence of wheals, angioedema, or both for longer than six weeks. It will also be interesting to see how it impacts the prevalence of chronic inducible urticaria, which has an estimated global prevalence of 0.5–1.0%, is thought to be driven by autoimmune mechanisms and mast cell activation (and release of proinflammatory mediators).[3] Psoriasis is a

chronic immune-mediated inflammatory disorder affecting worldwide 2–3% of the population, characterized by enhanced keratinocyte proliferation and systemic inflammation which itself is dominantly induced by IL-23/Th17 axis.[4] Urticarial vasculitis is uncommon but constitutes a separate clinical-pathological entity featured by hives persisting for more than 24 hours with evidence of leukocytoclastic vasculitis on histology and frequently also the presence of systemic symptoms.[5] New findings indicate that chronic inflammatory dermatoses are accompanied by activation of the coagulation and fibrinolytic systems. Inflammatory mediated endothelial injury favors formation of thrombin and fibrin, which in turn increases degradation products as D-dimer. D-dimer is used extensively as a biomarker for thrombotic disorders, but has also recently become recognized as a marker of continued coagulation activation in chronic inflammatory disease.[6] Increased D-dimer concentrations have also been demonstrated in a number of autoimmune and inflammatory disorders, implying that the interaction between inflammation and coagulation plays a pivotal role.[7] In chronic urticaria, some studies have shown an increase in the D-dimer level, particularly in patients with severe or resistant urticaria. Extrinsic coagulation activation has been demonstrated to augment vascular permeability and mast cell degranulation, leading ultimately to a high level of disease severity.[8] The same has also been described for psoriasis, which is related to a prothrombotic condition, as high levels of D-dimer, fibrinogen and other coagulation markers are associated with the severity of the disease and cardiovascular comorbidities.[9] The latter findings suggest that coagulation cascade may be activated in this type of vasculitis as complement activation triggers the endothelial damage and together ant membranous antibodies contribute to it. HUV has been considered some years ago to be an in situ immune complex–type disease involving mainly skin without any systemic involvement, such opinion is now a subject to debate.[10] Although international evidence is increasing, there is a scarcity of data from South Asia, especially Bangladesh where chronic inflammatory skin conditions are common and delayed diagnoses along with poor access to advanced investigations can make them even worse. Genetic determinants, environmental exposures, infectious triggers and variable care-seeking practices could affect presentation of disease course and systemic inflammation in this region.[11] Serum D-dimer as a biomarker of disease activity in chronic urticaria, psoriasis and urticarial vasculitis in the Bangladeshi patients has not been sufficiently addressed. The relationship between serum D-dimer levels and disease activity might have significant clinical implications. Individuals with confirmed COVID-19 have tested positive for the virus via real-time polymerase chain reaction PCR) from a nasopharyngeal or throat swab, yet sensitive and specific biomarkers of disease severity useful to augment non-proven therapies are seriously lacking. Considering the low cost and ready availability of D-dimer, whether it can be used in routine practice settings still requires further study. Accordingly, the aim of this study was to evaluate the potential correlation between serum D-dimer concentration and the activity of chronic urticaria (CU), psoriasis and urticarial vasculitis (UV) in patients attended by a tertiary care university hospital in Bangladesh. The results are intended to be a contribution to the literature and region-specific data that can inform clinical decision making and research.

METHODS

A hospital-based cross-sectional study was conducted to assess the relationship of serum D-dimer levels and disease activity in patients with certain chronic inflammatory dermatoses. The research was conducted for six months, from March 2025 to August 2025. One hundred patients were included. The research was done in the Department of Dermatology and Venereology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The patients who attended Dermatology OPD and IPD and were clinically diagnosed as chronic urticarial, psoriasis or urticarial vasculitis were included in the study.

Inclusion criteria

Patients of at least 18 years old. Clinical diagnosis of chronic urticaria, psoriasis or urticarial vasculitis performed by a dermatologist. Chronic urticaria and psoriasis must already have been diagnosed for at least six weeks. Cases of urticarial vasculitis with biopsy-proven support, where clinically justified.

Exclusion criteria

Patients with previous venous or arterial thromboembolic events. Patients on anticoagulant/antiplatelet therapy at the time of inclusion. Prior major surgery or trauma within 3 months. Patients with known malignancy. Patients with chronic hepatic or renal insufficiency.

Data collection procedure

Following informed consent, pre-tested structured data was collected. Sociodemographic information, clinical feature, duration of illness, comorbidity and medication were documented. A thorough clinical assessment was accomplished by each participant in order to evaluate the disease activity. Aseptic laboratory sampling of venous blood samples was obtained.

Statistical analysis

The data was entered and analyzed using statistical package for the social sciences (SPSS) version 26.0. Continuous variables were described by means and standard deviations, and categorical variables were described with the use of frequencies and percentages. A one-way analysis of variance (ANOVA) was used to compare the mean serum d-dimer level between disease classification groups. Pearson or spearman correlation tests were used to evaluate the association between serum D-dimer levels and disease activity score. A p value <0.05 was considered significant.

RESULTS

Participants were stratified into four age groups. The dominant age category was 31–45 years (34%). The 46–60 years age-group formed the second most frequent group (28%). There were more respondents 18–30 years old (22%), and the least number of participants (16%) over 60 years. Of the 100 subjects, 58% were male with a male-to-female ratio of more than 1 indicating over-representation of males in the study population. Participants from urban areas constituted 61% and those from rural areas constituted 39%. This implies that the research had an (apparently) urban sample (Table 1).

Table 1: Sociodemographic characteristics of the study participants (n=100).

Variable	Frequency (N)	Percentage (%)
Age group (years)		
18–30	22	22.0
31–45	34	34.0
46–60	28	28.0
>60	16	16.0
Sex		
Male	58	58.0
Female	42	42.0
Residence		
Urban	61	61.0
Rural	39	39.0

Chronic urticaria was the most prevalent disease in our study population 42%. It is the idiopathic form of chronic urticaria and angioedema. Thirteen people in the study had psoriasis, an autoimmune skin condition that causes red, scaly patches, or 38 percent of patients. The less frequent was urticarial vasculitis (20%) of subjects. It concerns hives that last longer than 24 hours and are associated with inflammation of blood vessels (Table 2).

Table 2: Distribution of study participants by disease type (n=100).

Disease category	Frequency (N)	Percentage (%)
Chronic urticaria	42	42.0
Psoriasis	38	38.0
Urticarial vasculitis	20	20.0

In those with chronic urticaria, severity of the condition was graded in line with the urticaria activity score (UAS7). 28.6% of subjects had mild (UAS7 ≤ 15), 40.5% moderate (UAS7 16–27) and 31% severe disease (UAS7 ≥28). Psoriasis severity was measured by the psoriasis area and severity index (PASI). In total, there were 36.8% of patients with mild disease (PASI 20) occurred in a percentage of 23.7%. With urticarial vasculitis, 30% had mild disease, 40 % moderate disease and 30% severe disease. Disease activity for this disease was not calculated with a specific score, but determined by clinical symptoms (Table 3).

Table 3: Disease activity categories among study participants.

Disease	Activity category	Percentage (%)
Chronic urticaria (n=42)		
Mild (UAS7 ≤15)	12	28.6
Moderate (UAS7 16–27)	17	40.5
Severe (UAS7 ≥28)	13	31.0
Psoriasis (n=38)		
Mild (PASI <10)	14	36.8
Moderate (PASI 10–20)	15	39.5
Severe (PASI >20)	9	23.7
Urticarial vasculitis (n=20)		
Mild	6	30.0
Moderate	8	40.0
Severe	6	30.0

The mean serum D-dimer level was different between the diseases. Mean level of chronic urticaria was 512.4 ng/ml and demonstrated a moderate procoagulant activity. However, for psoriasis the mean was slightly lower (468.9 ng/ml), but showed the tendency for increased coagulation. The mean for circulating B2GP1 was highest in urticarial vasculitis at 598.7 ng/ml, indicating the highest coagulation activity. The average D-dimer level of all patients was 512.8 ng/ml, with a moderate dispersion and coagulation function of the patients in this study (Table 4).

Table 4: Mean serum D-dimer levels by disease type.

Disease category	Mean D-dimer (ng/ml)	SD
Chronic urticaria	512.4	138.6
Psoriasis	468.9	121.3
Urticarial vasculitis	598.7	162.1
Overall	512.8	145.2

The average D-dimer for those with mild disease was 392.6 ng/ml and for moderate activity the level rose to 521.3 ng/ml. The mean D-dimer level was highest among those with severe disease activity at 684.9 ng/ml. This increase of D-dimer is significantly related with severity of the disease, and the p value <0.001 confirms that this association is statistically significant (Table 5).

Table 5: Association between disease activity and serum D-dimer levels.

Disease activity	Mean D-dimer (ng/ml)	SD	P value
Mild	392.6	104.8	<0.001
Moderate	521.3	126.5	
Severe	684.9	158.2	

The relationship between serum D-dimer levels and disease activity was positive in all diseases. In chronic urticaria, the correlation coefficient was 0.62 ($p<0.001$), indicating that higher levels of D-dimer were found in more severe disease case groups. The coefficient for the relationship with severity was 0.58 ($p=0.001$) of psoriasis, indicating a moderate correlation between the two. Urticarial vasculitis was most significantly associated at 0.66 ($p<0.001$), indicating that severity is strongly associated with D-dimer levels (Table 6).

Table 6: Correlation between serum D-dimer levels and disease activity scores.

Disease	Correlation coefficient (r)	P value
Chronic urticaria (UAS7)	0.62	<0.001
Psoriasis (PASI)	0.58	0.001
Urticarial vasculitis	0.66	<0.001

DISCUSSION

Chronic urticaria, psoriasis and urticarial vasculitis are three common inflammatory skin conditions though sometimes coexist with systemic inflammation. To assess the utility of serum D-dimer level as a biomarker for disease activity in these diseases among Bangladeshi population this study was done. The results reveal marked correlations of serum D-dimer levels with disease severity of the three disorders and further highlight the relationship between clotting and inflammation in cutaneous diseases. The sociodemographic characteristics of the participants showed that most of them were middle-aged adults and people aged between 31–45 years accounted for the largest group (34%) in this study. This profile matches the acknowledgment that middle-aged subjects are common when it comes to relatively moderate and severe levels of psoriasis or chronic urticaria in everyday practice types as well global prevalence numbers of such individuals harboring these inflammatory conditions. Plus, beware of over-the-counter products. The sample was also more male- than female-predominant (58% versus 42%), in keeping with other studies that have described a higher male preponderance for diseases such as psoriasis.[2] Study population (61% were urban) had an 'urban bias', typical of healthcare access in Bangladesh where higher proportion of urban dwellers seek healthcare and are willing to participate in clinical studies.[11] The most frequent diagnosis was chronic urticaria (42% of patients), followed by psoriasis (38%) and urticarial vasculitis (20%). This distribution correlates with an increased frequency of chronic urticaria in clinical dermatology practice.[3] Being a well-studied autoimmune disease, psoriasis is also an non-dermatological disorder, and urticarial vasculitis that occurs less frequently was kindly included in order to assess its unique pathophysiology with endothelial activation and immune complex formation.[5] Due to the characteristics of the disease we assessed disease activity by means of UAS in chronic urticaria, PASI in psoriasis and clinical observation for urticarial vasculitis. Regarding chronic urticaria, the majority of CSU patients (40.5%) presented with moderate disease which is consistent with what one would expect for individuals living this on a daily basis: chronically fluctuating severity. In the case of psoriasis, the majority (39.5%) was in moderate course, also being consistent with a higher proportion of patients suffering from mild or moderate rather than severe disease activity as reported in large cohort studies for patients affected by psoriasis.[9] In contrast, distribution across the severity scale in patients with urticarial vasculitis was somewhat more even, with 40% with moderate disease. Serum D-dimer levels were higher among urticarial vasculitis cases (598.7 ng/ml) when compared to chronic urticaria (512.4 ng/ ml) and psoriasis (468.9 ng/ml). This trend indicates the even greater activation of the coagulation system in urticarial vasculitis, possibly because of more intense endothelial injury and vascular inflammation resulting from immune complex deposition.[10] Chronic urticaria and psoriasis showed also increased D-dimer levels; similarly, in agreement to previous findings this reflects a hypercoagulable state occurring in such inflammatory diseases.[8,12] The high mean D-dimer level observed in the patients with all diseases (512.8 ng/ml for the group as a whole) reinforces the idea that activation of coagulation may be a common phenomenon in these disorders. There was a significant positive relationship between the severity of disease and serum D-dimer levels in all conditions. For instance, the mean level of D-dimer was found to be the highest in those with severe chronic urticaria (684.9 ng/ml), followed by moderate (521.3 ng/ml) and mild cases (392.6 ng/ml). This pattern was similar in psoriasis and urticarial vasculitis. The marked variation of D-dimer concentrations in different categories of disease severity ($p<0.001$) suggest that serum D-dimer may be a valid marker for the evaluation of disease activity and treatment response.[13] The correlation coefficients between the D-dimer levels and disease activity scores were moderately strong in CU ($r=0.62$; $p<0.001$), PSO ($r=0.58$; $p=0.001$) and strongest in UV ($r=0.66$; $p<0.001$). These findings indicate that high D-dimer is strongly related to disease severity in all three diseases. The higher association of urticarial vasculitis is probably related to the more direct implication of coagulation and endothelial malfunction in such patients with diseases.[5] Several analogies can be drawn by comparing the findings of the study with literature review. For instance, higher D-dimer has been shown frequently in psoriasis and chronic urticaria, reinforcing the systemic inflammation with concurrent procoagulant activation concept for both diseases.[12,13] The findings in urticarial vasculitis, also with the highest D-dimer levels here, further support current theory on path mechanisms of this disease, where vascular injury and immune complex formation may lead to both inflammation and activation of coagulation cascade.[10,14] Although this study provides important insights in the Bangladeshi setting, it points at literature gaps including limited studies on D-dimer among South Asian populations. Results emphasize the need for more

mechanistic studies to identify region-specific biomarkers that may be used in the diagnosis and treatment of chronic inflammatory skin diseases.[11,15]

CONCLUSION

This study emphasizes the potential role of serum D-dimer as a marker of disease activity in chronic urticaria, psoriasis, and urticarial vasculitis. The positive correlation between elevated D-dimer levels and disease severity across these conditions suggests that D-dimer testing could be a valuable tool for monitoring disease progression and treatment response. Further research, particularly involving larger and more diverse populations, is needed to refine the clinical utility of D-dimer as a biomarker in dermatology.

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