ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 17, Issue, 04, pp.32562-32568, April, 2025
DOI: https://doi.org/10.24941/ijcr.48683.04.2025

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

STUDY TO FIND-OUT THE CORRELATION OF C-REACTIVE PROTEIN WITH THE SEVERITY OF PSORIASIS IN A TERTIARY CARE HOSPITAL IN BANGLADESH

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Bangladesh

ARTICLE INFO

Article History:
Received 20th January, 2025
Received in revised form
19th February, 2025
Accepted 26th March, 2025
Published online 30th April, 2025

Key words:

C-reactive protein, Severity, Psoriasis.

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ABSTRACT

Background: Psoriasis is a common, chronic inflammatory skin disease. There is increasing awareness that psoriasis is more than 'skin deep' and that it has important systemic manifestations that are shared with other chronic inflammatory diseases, such as rheumatoid arthritis. Dermatologists have been looking for a reliable laboratory technique to evaluate the severity and progression of psoriasis for a very long time. The current clinical choice of method for determining the severity of the illness based on the surface area affected and the degree of redness, induration, and scaliness of the skin lesions is the Psoriasis Area and Severity Index (PASI). However, the method has limited applicability for diseases other than plaque types and is not just time-consuming but can be inaccurate due to its subjective quality. Inflammatory markers, particularly acute phase proteins, have been frequently studied to develop a qualified laboratory tool for severity evaluation and monitoring reasons since the significance of systemic pro-inflammatory cytokines in the etiology of psoriasis has been established. One of the most accurate indicators of inflammation is the C-reactive protein (CRP). Therefore, another area of interest in psoriasis research has been tracking the variations in CRP concentration over the course of the disease. Numerous studies have examined whether and to what extent psoriatic individuals have elevated CRP levels, as well as whether or not the measurement of the marker may be used to determine the severity of the condition. Monitoring CRP plasma levels is not yet thought of as a standard approach in the therapy of psoriatic patients due to some differences among the studies. We think that a thorough analysis of the evidence that already exists in this field may be a necessary first step towards hastening the conversion of research endeavors into clinical practice. The purpose of this study is to figure out the relationship between CRP values and disease severity. **Methods:** This cross-sectional study was conducted in the department of Dermatology & Venereology, Combined Military Hospital (CMH), Dhaka cantonment, Bangladesh from March 2022 to September 2022. Sample were taken purposively. All patients were given explanation of the study including the potential risks and obtainable benefits. All patients were included in the trial after taking their informed consent. Severely ill and pregnant were not taken in the study. Eighty-four patients with psoriasis, attending the department of Dermatology & Venereology during study period were enrolled in this study according to selection criteria. Data were collected, compiled and tabulated according to key variables. The analysis of different variable was done according to standard statistical analysis. The psoriasis area and severity index (PASI) is a quantitative rating score for measuring the severity of psoriatic lesions based on area coverage and plaque appearance. Score ranges from 0 (no disease) to 72 (maximal disease). In this study PASI score < 10 was considered mild and PASI score ≥ 10 was considered as severe disease. Data were processed and analyzed using software SPSS 25.0. For all analyses level of significance was set at 0.05 and p-value <0.05 was considered as significant. **Results:** The mean age of the patients was 44.1 ± 9.04 ranging from 22 to 70 years. Majority of the patients were found in the age group of 32–41 years (29.76%). Males (64.28%) were more prevalent than females (35.72%). The male-to-female ratio was 1.8:1. Among the study subjects, 53.57% were free from any co-morbidities. 27.38% had diabetes mellitus, 29.76% had hypertension and 34.53% had positive family history of psoriasis. In this study, the PASI score (The psoriasis area and severity index) ranged from 3 to 26, 60.71% had a PASI score of less than 10, while 39.29% had a score greater than or equal to 10. The mean CRP level was 5.71 ± 2.93 mg/L ranged from 2.3 to 14.5 mg/L, with a maximum of 85.71% of participants having a CRP level below 10 mg/L. PASI score had significant positive correlation with CRP (r=0.37; p= 0.001). **Conclusion:** C - reactive protein (CRP) had significant positive correlation with severity of psoriasis.

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Citation: Shobnom S., Mou, I., Islam, M.N., Alam, S., Progga, T.T., Ahmed, S., Khatoon, S., Islam, M.J., Islam, M.T. and Samdani, A., 2025. *"Study to find-out the correlation of c-reactive protein with the severity of psoriasis in a tertiary care hospital in Bangladesh". International Journal of Current Research, 17, (04), 32562-32568.*

INTRODUCTION

Psoriasis is a common, chronic, and recurrent inflammatory disease of the skin characterized by circumscribed, erythematous, dry, scaling plaques of various sizes, usually covered by silvery white lamellar scales. The lesions are usually symmetrically distributed and have a predilection for the scalp, nails, extensor surfaces of the limbs, umbilical region, and sacrum. It usually develops slowly but may be exanthematous, with the sudden onset of numerous guttate (drop like) lesions. Subjective symptoms, such as itching or burning, may be present and may cause extreme discomfort[1]. Psoriasis is a comorbid disease that can affect any organ of the body, not just the skin. Psoriasis patients are at a higher risk of developing arthritis, cardiovascular disease, hypertension, obesity, diabetes, and autoimmune diseases[2]. Psoriasis is found worldwide, affecting approximately 1% to 3% of the population. Men and women are equally affected. Psoriasis exhibits a bimodal distribution with a peak between 15 and 20 years of age and another peak between 55 and 60 years[3-4]. On the basis of the bimodal distribution of the age at onset and inheritance, two types of psoriasis have been discussed. Type I psoriasis (approximately 65% of the psoriasis population) is associated with onset below the age of 40, a positive family history of psoriasis, a preceding streptococcal sore throat, and guttate lesions. Type II psoriasis (35% of psoriasis patients) appears to be associated with a population with onset after the age of 40 years and with no family history of psoriasis. Type II is not linked to a preceding infectious trigger. The dominate clinical picture is chronic plaques and an association with nail and joint involvement has been described[5]. A total of 15,000 individuals were enrolled from 500 randomly selected households from six sub-districts (upazila) of Bangladesh. A psoriasis screening tool was used for initial diagnosis and confirmed by consultant dermatologists and then point prevalence of psoriasis was calculated. The point prevalence of all types of psoriasis was 0.7% where plaque type was common variant (81%)[6]. Worldwide the prevalence of psoriasis is widely variable ranging from 0.09% and 11.4%[7-8]. Highest prevalence of psoriasis was found among Nordic population[9]. In USA prevalence among black population is 1.3% and white population is 2.5%[10]. The prevalence of psoriasis is low in certain ethnic groups in Asia[11-12]. It may be absent in aboriginal Australians, Indians from South America[13-14].

The exact cause and mechanism of the disease are unknown, but there is strong evidence of genetic, autoimmune, and environmental causes[15-16]. In terms of prevalence, disease onset, clinical presentation, severity, complication, and therapeutic response, it is a diverse disease[17-18]. Psoriasis affects people of all ages and genders, regardless of ethnic or geographical origin[19]. In one population-based study from the United States, analyzing the incidence of adult onset psoriasis between 1970 and 2000, the overall incidence of psoriasis in men was higher than in women (85.5 per 100,000 person-years in men vs 73.2 in women)[20]. Chronic plaque psoriasis, guttate psoriasis, inverse psoriasis, pustular psoriasis, and erythrodermic psoriasis are the five primary varieties. Pustular and erythrodermic versions of these types are the ones that usually flare up, necessitating rapid medical attention and hospitalization due to the possibility of life-threatening sickness[21`].Severe psoriasis has also been shown to be an independent risk factor for chronic renal disease and end-stage renal failure in adult patients[22]. Furthermore, patients on chronic hemodialysis with end-stage renal disease are more likely to develop psoriasis[23]. CRP is an acute-phase inflammatory protein that is synthesized by hepatic cells and increases in the following interleukin-6 (IL-6) secretion. CRP signals the complement system to destroy other cells of the body[24]. CRP is the best component of the inflammatory syndrome response and the most common index used to identify inflammatory conditions such as infection, inflammatory diseases, and malignancies. The increased CRP level is associated with various chronic inflammatory processes such as some rheumatologic conditions, cancer, and cardiovascular disease[25]. The CRP level is less than 3 mg/l in normal individuals and more than 3 mg/l in abnormal individuals. However, a CRP level of more than 10 mg/l is indicative of an underlying inflammatory disease[25]. Studies on patients with psoriasis have shown that the high CRP level in these patients exacerbates the symptoms of psoriasis[26-27]. A study showed that, measurement of the CRP level is one of the prerequisites of psoriasis treatment. The CRP level was very high in psoriasis patients, and the higher the CRP level is, the more severe the skin lesions would be in these patients[28]. They also reported that the high CRP level was associated with systemic inflammation among these patients.

The evaluation of illness severity is done using a PASI score, although this process is time-consuming and subjective The Psoriasis Area and Severity Index (PASI) is a widely used tool for the measurement of the severity of psoriasis[29]. The PASI combines the assessment of the severity of lesions and the area affected, into a single score within the range of 0 to 72. The body is divided into four sections: head (10% of the body area), arms (20%), trunk (30%) and legs (40%). Each of these areas is scored separately, and the four scores are then combined. For each section, the percentage of the area of skin involved is estimated and then transformed into a grade from 0 to 6. The PASI is the most validated objective method to measure the severity of psoriasis[30]and has a high intra-rater reliability and a good interobserver correlation when used by trained assessors[31]. PASI < 10 was considered mild and PASI > 10 was considered severe disease[32]. The PASI system is sensitive to changes and reflects disease improvement or deterioration, although the sensitivity to change for small areas of involvement is poor[34-35]. PASI 75 is a widely used concept, meaning the percentage of patients achieving a 75% improvement in PASI from baseline to the primary endpoint, usually 12 to 16 weeks of treatment. Achieving a 75% improvement in the PASI is considered to be successful treatment. PASI 50 (50% improvement) and PASI 90 (90% improvement) are sometimes also used.

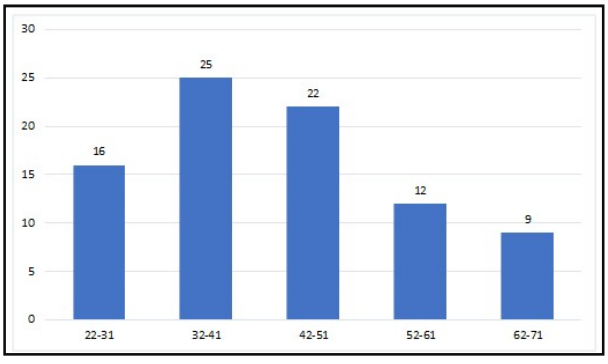

Figure 4.1. Bar diagram showing distribution of psoriasis patients according to age group (n=84)

The psoriasis area and severity index (PASI) is a quantitative rating score for measuring the severity of psoriatic lesions based on area coverage and plaque appearance

Plaque characteristic	Lesion score	Head	Upper limbs	Trunk	Lower limbs
Erythema	0= None				
Induration/ Thickness	1= Slight				
Scaling	2= Moderate 3= Severe 4= Very Severe				
Add together each of the 3 scores for each body region to give 4 separate sums (A)					
Lesion Score Sum (A)					
Percentage area affected	**Area score**	**Head**	**Upper limbs**	**Trunk**	**Lower limbs**
Area score (B) Degree of involvement as a percentage for each body region affected (score each region with score between (0-6)	0 = 0% 1 = 1-9% 2 = 10-29% 3 = 30-49% 4 = 50-69% 5 = 70-89% 6 = 90-100%				
Multiple Lesion Score Sum (A) by Area Score (B), for each body region, to give 4 individual subtotals (C)					
Subtotals (C)					
Multiply each of the Subtotals (C) by amount of body surface area represented by that region, 1.e x 0.1 for head, x0.2 for upper body, x0.3 for trunk and x0.4 for lower limbs					
Body Surface Area		**X0.1**	**X0.2**	**X0.3**	**X0.4**
Totals (D)					
Add together each of the scores for each body region to give the final PASI Score.					

RESULTS

Table 4.1 shows distribution of psoriasis patients according to the age group. Mean age was 44.1±9.04 ranging from 22 to 70 years. Most of the patients were found in the age group of 32–41 years (29.76%), followed by 42–51 years (26.19%), 22–31 years (19.05%), and 52–61 years (14.29%).

Table 4.1. Distribution of psoriasis patients according to age group (n=84)

Age (years)	Frequency (n)	Percentage (%)
22-31	16	19.05
32-41	25	29.76
42-51	22	26.19
52-61	12	14.29
62-71	09	10.71
Total	84	100%
Mean ± SD (Age)	44.1±9.04	

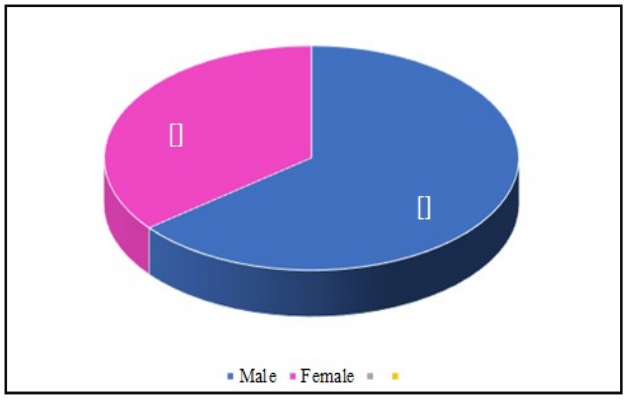

Figure 4.2. Pie chart for Distribution of psoriasis patients according to gender (n = 84)

Table 4.3 shows mean age onset of psoriasis was 33.11 ± 9.58 years and duration of psoriasis was 13.30 ± 8.98.

Table 4.4 shows family history of psoriasis patients. 29 patients had positive family history compared to 55 patients who had negative family history.

Table 4.3. Age of onset of psoriasis and duration of psoriasis (n = 84)

	Mean ± SD
Age of onset	33.11±9.58
Duration of psoriasis	13.30 ± 8.98

Table 4.4. Family history of psoriasis patients (n=84)

Family history	Frequency (n)	Percentage (%)
Positive	29	34.53
Negative	55	65.47

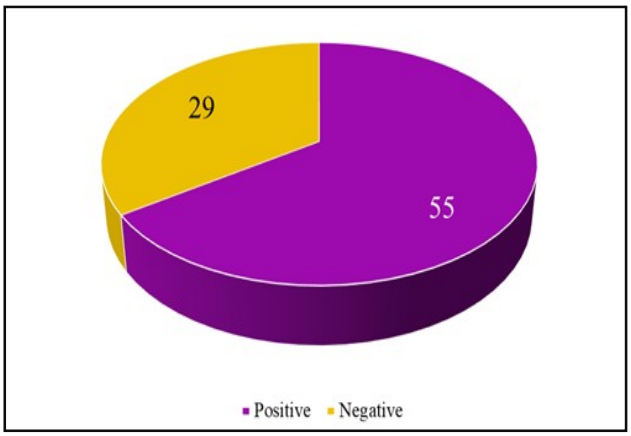

Figure 4.3. Pie chart for family history of psoriasis patients (n = 84)

Table 4.5 shows co-morbidities of psoriasis patients. 53.57% of the study subjects were free from any co-morbidities. 46.43% had different co-morbidities.

Table 4.5. Co-morbidities of psoriasis patients (n=84)

Co- morbid conditions	Frequency (n)	Percentage (%)
Diabetes mellitus	23	27.38
Hypertension	25	29.76
CKD	2	2.38
CHD	0	0.00
None	45	53.57

Table 4.6 shows among the 39 patients of psoriasis with co-morbidities, 11 of them had co-morbidities before the onset of psoriasis. 28 developed different co-morbidities following the onset of psoriasis.

Table 4.6. Presence of co-morbid conditions (n = 39) before or after psoriasis

	Frequency (n)	Percentage (%)
Before psoriasis	11	13.75
After psoriasis	28	33.33

Table 4.7 shows 51 patients with psoriasis had a PASI score of less than 10, while 33 had a score greater than or equal to 10.

Table 4.7. PASI score of the psoriasis patients (n=84)

PASI score	Frequency (n)	Percentage (%)
<10	51	60.71
≥10	33	39.29

Table 4.8 shows 72 patients with psoriasis had a CRP level of less than 10 mg/L, while 12 had a score greater than or equal to 10 mg/L.

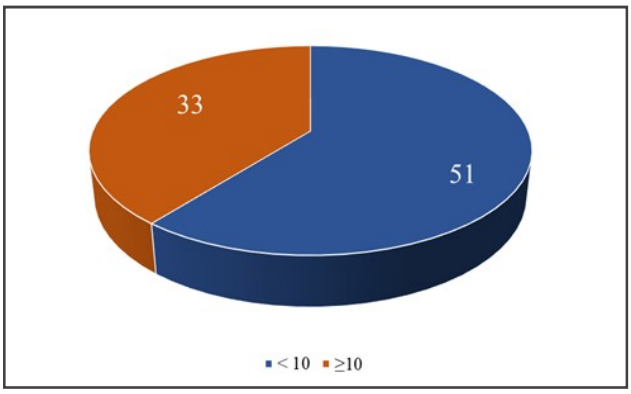

Figure 4.4. Distribution of the psoriasis patients according to the PASI score (n=84)

Table 4.8. CRP level of the psoriasis patients (n=84)

CRP level (mg/L)	Frequency (n)	Percentage (%)
<10	72	85.71
≥10	12	14.29

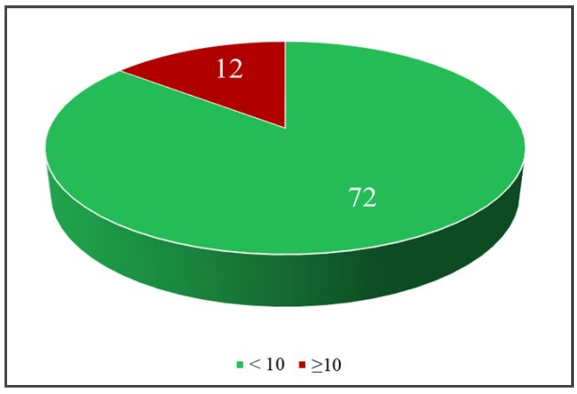

Figure 4.5. Distribution of the psoriasis patients according to the CRP level (mg/L) (n=84)

Table 4.9. Association of CRP level with PASI score (n = 84)

CRP level	PASI score		p-value
	<10	≥10	
<10	49	23	<0.001
≥10	02	10	

Table 4.9 shows, 49 out of 51 psoriasis patients who had PASI score <10, had a CRP level of <10. 10 out of 33 patients who had PASI score ≥10 had a CRP level of ≥10. Unpaired t test was done.

Table 4.10. Correlation of PASI score with CRP (n = 84)

		r value	p value
PASI	CRP	0.37	0.001

Table 4.10 shows significant positive correlation of PASI score with CRP level.

DISCUSSION

This cross-sectional study was carried out to see the relation of CRP with the severity of psoriasis in the Department of Dermatology & Venereologyat Armed Forces Medical Institute, Dhaka Cantonment, Dhaka. A total number of 84 patients with psoriasis were enrolled in this study. The mean age of the patients presented with psoriasis was 44.1 ± 9.04, and their age ranged from 22 to 70 years. Majority of these patients were found in the age group of 32–41 years (29.76%), followed by age group 42–51 years (26.19%), 22–31 years (19.05%), and 52–61 years (14.29%). In a population-based study conducted in Bangladesh, the mean age of the psoriasis patients was 37±2.7 years and age range was from 2 to 71 years[6]. In another study the ages of the patients ranged from 21 to 67 years, with a mean age of 41.08±14.60 years[28]. Another study found the mean age was 44.71 ± 10.84 (mean ± SD) and maximum number of patients was in the range of 41–50 years age group[32]. One more study revealed the mean age to be 46.1±13.8 years, with a range of 18 to 75 years[35].

In this study, Males (64.28%) were found to be more prevalent than females (35.72%) and male-to-female ratio was 1.8:1. Similarly, male predominance was observed in various other studies as well[6,28,35]. Mean age of onset of psoriasis was found to be 33.11 ± 9.58 years and duration of psoriasis was 13.30 ± 8.98 in this study. 34.53% of the patients had a family history of psoriasis. In another study conducted in Bangladesh which was 30.0%[36]. In this study, 46.43% psoriasis patients were found to have different co-morbidities, among which, 27.38% psoriasis patients had diabetes, 29.76% had hypertension, 2.38% had CKD. In a study conducted in Bangladesh, it was found that diabetes mellitus affected 43.3% and hypertension affected 38.3% of the randomly assigned psoriasis patients[36]. In a population-based cohort study, it was revealed that 4.1% diabetes mellitus and 14.1% hypertension among psoriasis patients[37]. In another population-based study in Israel, 10.6% psoriasis patient had renal diseases[38]. In a study on self-reported psoriasis nurses, 3.3% had DM and 21.3% had HTN[39]. Several other studies have shown an increased incidence of nephropathy in psoriatic patients[37,40,41]. In a study based in Turkey, patients with psoriasis had an increased prevalence of pathologic albuminuria (30 mg/24 h) compared with controls[40]. In another study based in Taiwan, patients with psoriasis had an increased risk of developing glomerulonephritis and CKD. High severity, psoriatic arthritis,

and concomitant NSAIDs use further increased the risk of CKD in psoriasis patients[42]. Another study revealed, 13.46% psoriasis patients were having CKD[43]. Patients with psoriasis were more likely to have diabetes, hypertension, cardiovascular disease, and higher BMI than people without psoriasis[16,44]. In this study, the PASI score of the study subjects ranged from 3 to 26 and 60.71% patients had a PASI score of less than 10, while 39.29% had a score greater than or equal to 10. PASI score in psoriasis patients varied from 9.10 to 53.1 in another study[28]. The range of PASI score was 2 to 54 in another study[32]. In this study, the mean CRP level was 5.71 ± 2.93 mg/L ranged from 2.3 to 14.5 mg/L, with a maximum of 85.71% of participants having a CRP level below 10 mg/L. It was noted in few other studies that, patients with psoriasis had higher levels of CRP compared with controls[45-46]. And 52% of psoriatic patients, CRP was elevated (> 5 mg/L) in another study[32]. In one more study CRP level ranged from 2.1 to 18.58 mg/l with a mean of 5.79±3.62 mg/L[28]. Another study found the mean CRP level in psoriasis patients was 4.82±2.0[35].

In this study, 49 out of 51 psoriasis patients who had PASI score <10, had a CRP level of <10. 10 out of 33 patients who had PASI score ≥10 had a CRP level of ≥10. CRP level was found significantly higher among the psoriasis patients with PASI ≥10 than those with PASI <10 (p-value <0.001). Another study revealed that, psoriasis patients with severe disease (PASI >10) had significantly higher levels of CRP than those with mild disease (PASI <10) (p-value = 0.003)[32]. It was found in this study that, PASI score had significant positive correlation with CRP (r= 0.37; p= 0.001) which was consistent with another study, where PASI score had significant positive correlation with CRP (r= 0.492; p= 0.006)[37]. Few other studies also revealed that, CRP level correlated with the severity of disease[32,47]. Similarly, it was observed in another study that, other inflammatory parameters including CRP level were significantly related to the clinical demonstrations of psoriasis (p<0.005) and they also identified a relationship between disease severity and the increased levels of inflammatory reactions[48]. In another study on 175 male psoriasis patients, the clinical activity of psoriasis was calculated based on the PASI score, which reflected the increase in CRP level during the acute phase (p<0.001)[49]. In a cross-sectional study conducted on 73 psoriasis patients, it was noted that serum CRP level was related to PASI score[50]. All these findings were consistent with this study. So, from above all discussions, it can be suggested that serum CRP level can be considered as a useful marker for detecting psoriasis severity, monitoring disease activity and the disease's response to treatment.

CONCLUSION

Reactive Protein (CRP) had significant positive correlation with severity of psoriasis.

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