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Role of Adenosine Deaminase in Assessing the Severity of Psoriasis

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Abstract

Introduction: Psoriasis is an immune mediated inflammatory skin disease affecting approximately 2%-3% of the world's population. The severity of psoriasis ranges clinically from mild, moderate and severe. Psoriasis area and severity index (PASI) is a commonly used tool to assess severity of psoriasis. There is no specific biomarker to assess the psoriasis severity.

Objective: The objective of this study is to see the role of ADA level with PASI score in patients with psoriasis.

Methods: This cross-sectional study was conducted in the Department of Laboratory Medicine and Department of Dermatology and Venereology, BSMMU. Duration of the study was from March 2019 to February 2020. Diagnosed patient with psoriasis who fulfills the inclusion and exclusion criteria was selected as study population. After taking informed written consent, proper history and clinical examination was done and severity of psoriasis was assessed by PASI. 2.0 ml blood was collected for estimation of ADA level in the Department of Laboratory Medicine.

Result: The mean age was 35.15±13.63 years. Female were more common than male. Mean age of onset of disease was 32.15±12.28. Mean duration of disease was 2.65±2.76. Regarding severity of psoriasis according to PASI score, 45 (56.3%) patients had mild psoriasis (PASI≤10) and 35 (43.8%) had moderate to severe psoriasis (PASI>10). Mean serum ADA level was 20.76±4.89 U/L. Mean±SD level of serum ADA was measured in different categories of severity of psoriasis. Highest value of serum ADA was found in moderate to severe psoriasis (mean±SD:24.84±4.63, range 18.3-36.0 U/L). ADA found higher in the patients with moderate to severe psoriasis in relation to the patients with psoriasis of low severity and it was found statistically significant ($p<0.001$). Pearson's correlation coefficient (r) test revealed significant positive correlation ($r=+.777$, $p<0.001$) between serum ADA level with PASI score of psoriasis patients.

Conclusion: In the current study, we observed serum ADA level significantly correlated with the severity of psoriasis (PASI score). The findings of the present study suggest that, estimation of serum ADA and MPV level can be used as markers to predict the severity of psoriasis.

Keyword: Psoriasis; Severity; PASI score; ADA

Abbreviations: PASI: Psoriasis Area and Severity Index; WHO: World Health Organization; ADA: Adenosine Deaminase

Introduction

World Health Organization (WHO) considered psoriasis as a global health problem Michalek, Loring & John [1]. Psoriasis is a clinical diagnosis Jain, Krishna & Rathore [2]. There are no biomarkers to diagnose the disease and assess its severity. For this, clinical assessment tools are used to measure the disease severity. In research, Psoriasis Area and Severity Index (PASI) is most commonly used clinical scoring system Bozek & Reich [3]. PASI is recommended as the current gold standard for assessing the severity of psoriasis and for clinical trials Walsh et al. [4], Jain, Krishna & Rathore [2]. Adenosine deaminase (ADA) is an enzyme that is distributed in most of the tissue having highest activity in lymphoid tissue. ADA activity is considered as a marker of non-specific T cell activation Erbagci et al. [5]. Adenosine deaminase

is the main enzyme for purine degradation. Adenosine is another endogenous purine nucleoside involve in the pathogenesis of psoriasis Nicolae et al. [6]. ADA catalyses the irreversible hydrolytic deamination of adenosine to inosine. Increased in purine catabolism of the hyper proliferating epidermis of psoriasis causes increase in ADA activity Murari, Ray & Lodha [7]. So, serum ADA may be significant to determine the immunological factor in the pathogenesis of psoriasis Erbagci et al. [5]. In the formation and extension of skin lesions activated T lymphocyte and their cytokine seems to have important roles. ADA acts as a marker T lymphocyte activation. Limited studies have done on the association of ADA with PASI. In our country no such study is conducted to correlate with PASI. This parameter will act as a co-predictor of PASI index as PASI is solely depends on clinical features. The aim of this study is to see the role of ADA in assessing the severity of psoriasis.

Materials and Methods

This cross-sectional study was conducted in Department of Laboratory Medicine and Department of Dermatology and venereology in Bangabandhu Sheikh Mujib Medical University (BSMMU) from March 2019 to February 2020. 80 Clinically diagnosed patients of psoriasis were included in this study. Inclusion criteria for patient's selection were 18 years and above, patients with both sexes and clinically diagnosed cases of psoriasis. Exclusion criteria were Gout, psoriatic arthritis, renal disorder and diabetes mellites. Here clinical variable was PASI score and investigational variable was Adenosine deaminase. Diagnosed patients of psoriasis from the indoor and outpatient's department of Dermatology, BSMMU, were included in this study. Severity assessment of psoriasis was done by PASI score. With proper aseptic precaution, 2.0ml of whole blood was drawn in plastic red screw-capped plain tube for serum ADA level. Measurement of serum ADA level was done in dimension ExL with LM biochemistry auto analyzer.

Table 1 shows that the maximum number of patients 38 (47.5%) were in the age group of 18-30 years followed by 18 (22.5%) in the age group 31-40 years. The mean age of the study group was 35.15 ±13.63 years, minimum age 18 and maximum 70 years. Figure 1 shows the distribution of the study patients by sex. Maximum patients were female 43 (53.8%) and rest 37 (46.2%) were male out of 80 psoriasis. Male and female ratio was 1:1.2. Table 2 shows the distribution of the study patients by severity of psoriasis according to PASI score. Maximum 45 (56.3%) patients had mild psoriasis (PASI ≤10) and 35 (43.8%) had moderate to severe psoriasis (PASI>10). Mean ± SD value of PASI score in mild psoriasis was 5.99 ±1.71 and in moderate to severe psoriasis was12.61±2.74. Table 3 shows the association of serum ADA with severity of psoriasis. Mean ± SD level of serum ADA were measured in different categories of severity of psoriasis. Maximum mean ± SD value of serum ADA was found in moderate to severe psoriasis (PASI>10; mean ± SD value: 24.84±4.63; range: 18.3-36.0 U/L) and rest mean ± SD value of serum ADA was found in mild psoriasis (PASI ≤10; mean± SD value: 17.59±1.70; range: 15.7-22.0 U/L).The significance test was done by unpaired student t-test and which was found statistically significant (p value<0.001). In psoriasis patients, it was observed that PASI, most commonly used clinical assessment tool for disease severity, significant weak positive correlation with age (r=0.236, p=0.035), age of onset (r=0.251, p=0.025). Significant strong positive correlation with serum ADA (r=0.777, p<0.001). However, PASI showed weak positive correlation with duration of disease (r=+.157, p=0.206) (Table 4).

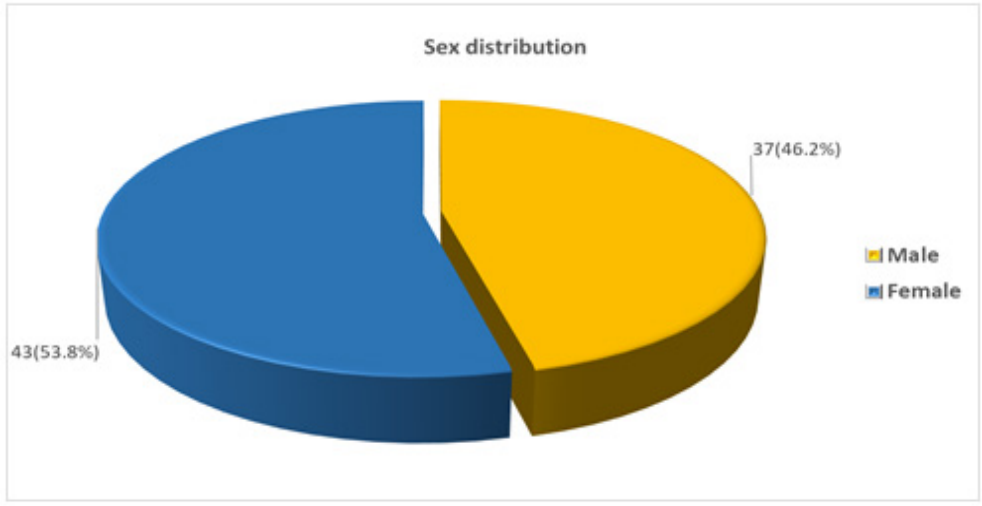

Figure 1: Shows the distribution of the study patients by sex. Maximum patients were female 43 (53.8%) and rest 37 (46.2%) were male out of 80 psoriasis. Male and female ratio was 1:1.2.

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Table 1: Age distribution of the study patients (n=80).

Age Group (Years)	Frequency	Percentage	Mean ± SD
18-30	38	47.5	
31-40	18	22.5	
			35.15±13.63
41-50	16	20.0	
51-60	5	6.3	
61-70	3	3.8	
Total	80	100.0	

Table 2: Distribution of the study patients by severity of psoriasis (n=80).

Severity of Psoriasis	Frequency	Percentage	PASI Mean ± SD
Mild disease	45	56.3	5.99±1.71
Moderate to severe disease	35	43.8	12.61±2.74
Total	80	100.0	

Table 3: Comparison of serum ADA with severity of psoriasis (n=80).

Variables	Severity of Psoriasis		Total (n=35) Mean ± SD	p-value
	Mild Disease (n=45) Mean ± SD	Moderate to Severe Disease (n=35) Mean ± SD		
Serum ADA (U/L)	17.59 ±1.70	24.84±4.63	20.76±4.89	
				<0.001*
Range (min - max)	(15.7 – 22.0)	(18.3 – 36.0)	(15.7-36.0)	
Normal range		(0-15 U/L)		

Table 4: Correlation coefficients of severity of psoriasis (PASI) with age, onset of disease, duration of disease, serum ADA and mean platelet volume.

Variables	Correlation Coefficient (r)	p-value
Age (yrs)	+.236	0.035*
Age of onset	+.251	0.025*
Duration of disease	+.157	0.206
Serum ADA	+.777	<0.001*

*Significant.

Discussion

In our study, the mean ± SD age was found 35.15±13.63 years with the range of 18-70 years. Kilic et al. [8] reported that mean ± SD age of psoriasis patients was 37.66±14.63, which is nearly consistent with our study. In a study of Arican et al. [9] reported mean ± SD age of patients was 35±15.5 which is consistent with our study. In this study, it was found that, out of 80 patients, 43 (53.8%) patients were female and 37 (46.2%) patients were male with male and female ratio of 1:1.2. According to PASI score in this study, maximum 45 (56.3%) patients were found in mild psoriasis and 35 (43.8%) had moderate to severe psoriasis. In a study of Kim et al. they found 70.45% mild psoriasis and 29.55% had moderate to severe psoriasis patients among 176 psoriasis patients which was some extent nearly higher than our study. In the present study, mean ± SD of serum ADA level were measured in different categories of severity of psoriasis. The mean ± SD level of ADA in psoriasis was 20.76±4.89. The level of ADA in mild psoriasis (PASI≤10) was 17.59±1.70 with the range of 15.7-22.0U/L. In moderate to severe psoriasis (PASI>10) the level was 24.84±4.63 with the range of 18.3-36.0U/L.

This result shows that ADA level varies with the severity of psoriasis and lower value was 15.7 U/L and higher value was 36.0U/L. The difference in value of ADA level in mild and moderate to severe psoriasis group were statistically significant (p<0.001). In accordance to the research work of Murari, Ray & Lodha [7], Khan et al. [10], Nadeem et al. [11] found that ADA level was elevated in psoriasis patients and it's severity was increased according to severity of psoriasis which was statistically significant (p<0.001), (p<0.001), (p<0.001) and these findings were consistent with our study. In the study of Hashemi et al. [12] mean ± SD serum ADA

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level was significantly higher (23±9.06U/L) in psoriasis patients which was nearly consistent to our study (p<0.001). Similar result was found in study of Moustofa et al. [13] serum ADA was higher in psoriasis group with median value 22.5(3.5-69.1) which was statistically significant (p< 0.001).Pearson's correlation coefficient (r) test was done in order to assess the correlation of variables with severity of psoriasis. In the present study showed a significant strong positive correlation between serum ADA and severity of psoriasis (r=.777, p<0.001). Similar findings observed in study of Khan et al. [10], they found a significant association of serum ADA with disease severity (p=0.001). Murary, Ray & Lodha [7] found that serum ADA level was significantly increase with disease severity (p<0.001). Nicolae [6] found a positive correlation of ADA with PASI more than 12 which was considered as severe psoriasis (r=.498 and p=0.004). In the current study, we observed serum ADA level significantly correlated with the severity of psoriasis. The findings of the present study suggest that, estimation of serum ADA level can be used as markers to predict the severity of psoriasis.

Conclusion

Psoriasis is a serious non-communicable disease considered as a global problem now a day. The severity of psoriasis is measured by PASI which is done by clinical feature and vary from physician to physician. Therefore, subsequent evaluation by same physician is necessary. In the present study serum ADA levels were higher in moderate to severe psoriasis in relation to the psoriasis of mild severity. There was significant positive correlation found between serum ADA level with the severity of psoriasis. Both markers are rapidly determined by the method used in the present study. So, serum ADA level in this regard can be used as important tools to predict severity of psoriasis. Therefore, it will be greatly beneficial for assessing severity of psoriasis uniformly to minimize inter physician variability. As a result, treatment can be start earlier.

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