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ORIGINAL ARTICLE

Antioxidant Status of Serum Bilirubin, Uric Acid and Albumin in Pemphigus Vulgaris

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ABSTRACT

Objective: To determine antioxidant status of serum bilirubin, uric acid and albumin in pemphigus vulgaris.
Study Design: Cross sectional study
Place of Study and Duration: This study was done at Department of Dermatology Mayo Hospital Lahore from July 11, 2019 to January 11, 2020.
Methodology: All 60 cases meeting inclusion criteria was enrolled after taking informed consent, from outdoor Department of Dermatology Mayo Hospital Lahore. A total of 200 cases meeting inclusion criteria was taken after getting approval from CPSP. A brief demographic information and contact detail was taken. Venous blood was collected from each subject for the evaluation of Serum Bilirubin, Uric Acid and Albumin. Total bilirubin, direct bilirubin, indirect bilirubin, UA and albumin levels was determined using an automatic biochemical analyzer (Model 7600-120; Hitachi High Technologies, Tokyo, Japan). All the values was recorded as per operational definition.
Results: The mean age of patients was 40.08±12.89 years with minimum and maximum age as 18 and 60 years. There were 22(36.7%) male and 38(63.3%) female cases with higher female to male ratio. The mean BMI was 29.08±2.70 with minimum and maximum BMI as 24 and 33.90. The mean serum bilirubin level was 8.51±1.64µmol/L with minimum and maximum serum bilirubin was 5.80µmol/L and 11µmol/L. The mean uric acid levels in this study was 234.37±33.46µmol/L with minimum and maximum value as 160.00µmol/L and 280.00µmol/L. The mean Albumin level in this study was 34.20 ±3.69g/l with minimum and maximum albumin level as 29.00g/l and 41g/l.
Conclusion: It is concluded that oxidative stress and antioxidant status are important in the pathogenic mechanism of PV. Hence by keeping these profile in mind that it can be of benefit to administer bilirubin, UA and albumin or their precursors as a replacement therapy to patients with PV who have low antioxidant status.
Key Words: Antioxidant status, serum bilirubin, uric acid, albumin, pemphigus vulgaris.

INTRODUCTION

Pemphigus vulgaris (PV), as an autoimmune disease including mucosa and the skin, is associated with several complications and comorbidities.[1,2] Pemphigus is a rare, chronic, potentially life-threatening, autoimmune blistering disease of the skin and mucous membranes. It has 2 major subtypes: PV and pemphigus foliaceus (PF). The aetiopathogenesis of pemphigus is characterized by acantholysis and intraepidermal blister formation, resulting from IgG autoantibodies directed against desmoglein (Dsg) 3 (PV) and/or Dsg 1 (PF), 2 transmembrane desmosomal glycoproteins.[3] Various environmental factors have been reported as triggering factors for PV and genetic association has been suggested to be the most important predisposing factor.[4]

Although there is no way to prevent autoimmune diseases, some factors may trigger pemphigus initiation in susceptible individuals or be exacerbated in affected patients. Recognition of these triggers, based on the latest studies and experiences is essential and should be updated every few years.[5] Increased reactive oxygen species (ROS) and lipid peroxidation are seen in many dermatologic disorders, for example, atopic dermatitis, psoriasis, vitiligo, acne vulgaris, PV, lichen planus, and alopecia areata.[6] ROS has an important role in the inflammation process. In PV, increased production of ROS leads to decline of antioxidants in plasma and red blood cells which results in oxidative stress.[6] Patients with PV have significantly higher antioxidant enzyme activities and lower total antioxidant capacity.[7] The mean total bilirubin level was 8.22±2.36µmol/L, the mean uric acid UA was 210.58±66.12µmol/L and mean albumin was 35.12±5.14 g/l.[8]

MATERIALS AND METHODS

This**c**ross sectional study was carried out in the Department of Dermatology at Mayo Hospital Lahore. All 60 cases meeting inclusion criteria was enrolled after taking informed consent, from Outdoor Department of Dermatology Mayo Hospital Lahore. A total of 200 cases meeting inclusion criteria was taken after getting approval from CPSP. A brief demographic information and contact detail was taken. Venous blood was collected from each subject for the evaluation of Serum Bilirubin, Uric Acid and Albumin. Total bilirubin, direct bilirubin, indirect bilirubin, UA and albumin levels was determined using an automatic biochemical analyzer (Model 7600-120; Hitachi High Technologies, Tokyo, Japan). All the values was recorded as per operational definition. SPSS version 22 was used for data entry and analysis. Mean ± S.D was used for quantitative data like age, BMI, serum bilirubin, uric acid and albumin. To address effect modifiers data was stratified for age, gender and BMI. Post stratification independent sample t-test was applied by taking $p \leq 0.05$ as significant.

RESULTS

The mean age of patients was 40.08±12.89 years (Table 1). There were 27(45%) cases who were 18-39 years old and 33(55%) cases were 40-60 years old. There were 22(36.7%) male and 38(63.3%) female cases with higher female to male ratio. The mean BMI was 29.08±2.70 with minimum and maximum BMI as 24 and 33.90 (Table 2). There were 16(26.7%) obese and 44(73.3%) non-obese cases. The mean serum bilirubin level was 8.51±1.64µmol/L with minimum and maximum serum bilirubin was 5.80µmol/L and 11µmol/L (Table 3). The mean uric acid levels in this study was 234.37±33.46µmol/L with minimum and maximum value as 160.00µmol/L and 280.00µmol/L (Table 4). The mean Albumin level in this study was 34.20±3.69g/l with minimum and maximum albumin level as 29.00 g/l and 41g/l (Table 5). The mean serum bilirubin level was statistically same in 18-39 years old cases (8.36±1.66µmol/L) and 40-60 years old cases (8.63±1.65µmol/L), p >0.05. The mean uric acid level was statistically same in 18-39 years old cases (231.52±32.15µmol/L) and 40-60 years old cases (236.70±34.82µmol/L), p >0.05. The mean Albumin level was statistically same in 18-39 years old

cases (34.07±3.68µmol/L) and 40-60 years old cases (34.30±3.75µmol/L), p >0.05 (Table 6).

The mean serum bilirubin level was statistically same in male (8.16±1.54µmol/L) and female cases (8.71±1.69µmol/L), p >0.05. The mean uric acid level was statistically same in male (239.23±31.90µmol/L) and female cases (231.55±34.43µmol/L), p>0.05. The mean Albumin level was statistically same in male cases (34.18±3.65µmol/L) and female cases (34.21±3.76µmol/L), p >0.05 (Table 7). The mean serum bilirubin level was statistically same in obese (8.95±1.78g/l) and non-obese cases (8.35±1.58 g/l), p>0.05. The mean uric acid level was statistically higher in obese cases (257.62±21.23g/l) as compared to non-obese cases (225.91±33.24g/l), p <0.05. The mean Albumin level was statistically same in obese cases (34.38±3.69g/l) and non-obese cases (34.14±3.72g/l), p >0.05 (Table 8).

Table 1: Descriptive statistics of age (years) (n=60)

Age (years)	
Mean	40.08
S.D	12.89
Range	42.00
Minimum	18.00
Maximum	60.00

Table 2: Descriptive statistics of BMI

Body mass index	
Mean	29.08
S.D	2.70
Range	9.90
Minimum	24.00
Maximum	33.90

Table 3: Descriptive statistics of serum bilirubin

Serum bilirubin	
Mean	8.51
S.D	1.64
Range	5.20
Minimum	5.80
Maximum	11.00

Table 4: Descriptive statistics of uric acid

Uric acid	
Mean	234.37
S.D	33.46
Range	120.00
Minimum	160.00
Maximum	280.00

Table 5: Descriptive statistics of Albumin

Albumin	
Mean	34.20
S.D	3.69
Range	12.00
Minimum	29.00
Maximum	41.00

Table 6: Mean comparison of age groups (years) in serum bilirubin, uric acid and albumin

	Age (years)	Mean	S.D	P value
Serum bilirubin	18-39	8.36	1.66	0.525
	40-60	8.63	1.65	
Uric acid	18-39	231.52	32.15	0.555
	40-60	236.70	34.82	
Albumin	18-39	34.07	3.68	0.813
	40-60	34.30	3.75	

Table 7: Mean comparison of gender in serum bilirubin, uric acid and albumin

	Gender	Mean	S.D	P value
Serum bilirubin	Male	8.16	1.54	0.211
	Female	8.71	1.69	
Uric acid	Male	239.23	31.90	0.397
	Female	231.55	34.43	
Albumin	Male	34.18	3.65	0.977
	Female	34.21	3.76	

Table 8: Mean Comparison of BMI in serum bilirubin, uric acid and albumin

	BMI	Mean	S.D	P value
Serum bilirubin	Obese	8.95	1.78	0.214
	Non-obese	8.35	1.58	
Uric acid	Obese	257.62	21.23	0.001*
	Non-obese	225.91	33.24	
Albumin	Obese	34.38	3.69	0.827
	Non-obese	34.14	3.73	

DISCUSSION

Skin is one of the major targets of oxidative injury due to reactive oxygen species (ROS) that originate in the environment and skin during various physiological and pathological processes. Normally a complex of antioxidant defence system in our body scavenges ROS, maintaining a balance. Imbalance in the oxidant antioxidant systems due to increased reactive oxygen species production and/or deficient function of the antioxidant system, leads to oxidative stress, which may be involved in the pathogenesis of many dermatological diseases such as, systemic sclerosis, psoriasis, skin cancers, vitiligo, chronic urticaria, Behcet's disease, lichen planus, atopic dermatitis, to mention a few, as well as their association with non-dermatological diseases such as cardiovascular disorders, diabetes mellitus, rheumatoid arthritis, all of which are associated with oxidative stress. However there are very few studies regarding the role of antioxidants and oxidative stress in pemphigus vulgaris.[9]

Oxidative stress is a pathological state due to generation of excessive amounts of reactive oxygen species to levels greater than the capacity of the body's antioxidant processes, which can lead to cell apoptosis and accumulation of apoptotic remnants, promote the formation of autoantibodies, and trigger an autoimmune cascade reaction.[10] Currently, it is believed that the occurrence and development of autoimmune diseases is a multifactorial and multistep process, and that oxidative stress is a triggering factor that plays a role not only in the pathogenesis of autoimmune disease, but also in the deterioration of such disease.[11] To maintain an appropriate cellular redox balance, enzymatic and nonenzymatic antioxidant defence systems should control the production of excess ROS by scavenging or decreasing ROS levels. Bilirubin has long been regarded as a cytotoxic metabolite of iron porphyrin, but in recent years, it has been found to have a variety of biological actions, such as anti-inflammatory, antioxidant, immunomodulatory, cytoprotective and neuroprotective activities.[12]

Furthermore, the antioxidative capacity of bilirubin is stronger than that of a-tocopherol (vitamin E), catalase and superoxide dismutase. Uric acid (UA), the end product of the common pathway of purine metabolism, is a natural antioxidant with metal-chelating properties and reacts with nitrogen radicals and superoxide. Moreover, some studies have confirmed that serum albumin is a major antioxidant in extracellular fluids and possesses antioxidant properties.[13] Consequently, not only can serum bilirubin, UA and albumin reduce global oxidative stress, but they may also reflect the antioxidant status in the body. There is overwhelming evidence that oxidative stress is intimately involved in the development and progression of autoimmune skin disease,

such as systemic lupus erythematosus (SLE), psoriasis and Behcet disease (BD).[14] In current study the mean age of patients was 40.08±12.89 years with minimum and maximum age as 18 and 60 years. There were 22(36.7%) male and 38(63.3%) female cases with higher female to male ratio. A recent study reported similar demographic profile of patients with PV that was conducted on 30 subjects, 22 women (72.33%) and 8 men (26.67%). The mean ages of patients was 40.83±12.74 years.[15] Yet there have been few studies discussing the relationship between PV and antioxidants status of serum bilirubin, uric acid and albumin.[16,17] Although the pathophysiology of PV is nearly understood and the interaction between desmoglein as autoantigens and autoantibodies is in the prior line of the hypothesis, the role of antioxidants decline and redox state sequencing further oxidative damage in the formation of PV lesions is unknown.[15] Uric acid is found to be a protective antioxidant defense in patients with ischemic heart disease and other fields of surveillance but its role in PV patients is not yet investigated.Uric acid with antioxidant characteristics was measured for the first time in our study and the meaningful decline in serum levels of uric acid was found in the patients which can verify the antioxidant effect of this factor.[15]

A study reported that the mean total bilirubin level was 8.22±2.36µmol/L, the mean uric acid UA was 210.58±66.12µmol/L and mean albumin was 35.12±5.14g/l.[8] In current study we also found some similar statistics of these parameters i.e. the mean serum bilirubin level was 8.51±1.64µmol/L with minimum and maximum serum bilirubin was 5.80µmol/L and 11µmol/L. The mean uric acid levels in this study was 234.37±33.46µmol/L with minimum and maximum value as 160.00µmol/L and 280.00µmol/L. The mean Albumin level in this study was 34.20±3.69g/l with minimum and maximum albumin level as 29.00g/l and 41g/l.

CONCLUSION

It is concluded that oxidative stress and antioxidant status are important in the pathogenic mechanism of PV. Hence by keeping these profile in mind that it can be of benefit to administer bilirubin, UA and albumin or their precursors as a replacement therapy to patients with PV who have low antioxidant status.

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