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"STUDY OF SERUM URIC ACID IN PSORIASIS"

Biochemistry

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KEYWORDS

INTRODUCTION

Psoriasis is a chronic, painful, disfiguring and disabling noncommunicable disease for which there is no cure and is also associated with discrimination and stigmatization of those affected. It negatively impact on patients' quality of life (QoL). It can manifest at any age group, and is most common in the age group 50–69 years[1].

Psoriasis is derived from Greek word "psora" which means "itch". It is characterized by sharply marginated scaly, dry, erythematous plaques with a relatively symmetrical distribution. The most common sites affected are the scalp, elbow, knees, shins, tips of fingers and toes, palms, soles, umbilicus, gluteus, under the breasts and genitals and serum[2].It has a tendency to relapse.

While the exact etiology of psoriasis remains unclear, there is evidence for genetic predisposition and environmental factors plays one important role[3]. The environmental factors that leads to susceptibility towards psoriasis include streptococcal infections, chronic HIV infection, stress, sunburn, trauma, low humidity, drugs (beta-blockers, lithium, antimalarial agents, and interferon), smoking, and obesity[4]. Although there is a suggestion that psoriasis might be an autoimmune disease, autoantigen that could be responsible has been yet to be defined[1].

Globally, psoriasis affects approximately 125 million people[5] It is a serious global problem and the prevalence of psoriasis in different countries ranges between 0.09% and 11.4%[6,7]. In USA, the prevalence of psoriasis was around 4.6% while in Canada it was 4.7%. European countries show little variation with a range from 1.4% (Norway), 1.55% (Croatia) and 1.6% (UK). In East Africa, the figure was 0.7%[8]. Most of the Indian studies were hospital based. Okhandiar *et al*. published a comprehensive data from Dibrugarh, Calcutta, Patna, Darbhanga, Lucknow, New Delhi and Amritsar. They noted that the incidence of psoriasis among total skin patients ranged between 0.44 and 2.2%, with overall incidence of 1.02%. They observed that the incidence in Amritsar (2.2%) was higher as compared to other centers in Eastern India and concluded that it may be related to different environmental conditions (extremes of temperature), dietary habits, and genetic differences[9].Bedi etal in another study from North India, reported the prevalence of psoriasis to be 0.8% among the dermatology out patients[10].Another study by Kaur I etal from tertiary health care center from North India found psoriasis patients accounted for 2.3% of the total dermatology outpatients[11].

Psoriasis vulgaris (also called plaque psoriasis) is the commonest form of the disease, affecting 85%–90% of the patients in which papulosquamous plaques are well-delineated from surrounding normal skin and the plaques are red or salmon pink in colour, covered by white or silvery scales. They are rapidly progressing lesions and are most active at the edge may be annular, with normal skin in the centre[12].There are other types of psoriasis which include erythrodermic psoriasis, guttate psoriasis, and pustular psoriasis. Psoriasis patients could develop comorbidities like psoriatic arthritis (PsA), metabolic syndromes, cardiovascular diseases, impaired psychological health in addition to skin lesions[13].

Uric acid is an end-product of adenosine- and guanosine-based purine which is produced endogenously. The crystals of monosodium urate precipitating from hyperuricemic body fluids irritates the tissues in the joint which results in inflammation and phagocytosis leading psoriatic plaque formation. The accelerated production of cells which were yet to be mature and cornify normally could be partially the result of uptake of monosodium urate crystals. When they present in sufficient quantity, could disrupt the normal healing process[14].A number of studies showed strong correlation among high uric acid levels and psoriasis[15,16,17].

There are very few studies done in India to assess the serum uric acid level in psoriasis patients. In the present study, we aimed to determine serum uric acid levels in patients with psoriasis and compare these biochemical parameters with the control population.

AIMS AND OBJECTIVES

1. To study serum uric acid level in psoriasis
2. To compare above parameters in healthy controls and cases diagnosed with psoriasis.

MATERIALS AND METHODS

A total of 100 age and sex matched subjects (50 diagnosed psoriatic patients and 50 healthy controls) were selected after written inform consent and ethical clearance between January 2017 to July 2018 at department of biochemistry in a tertiary care medical institute from dermatology OPD of GMCH Nagpur. Each subject underwent detailed clinical history, physical examination and systemic examinations as per predesigned proforma after satisfying all inclusion and exclusion criterias. 3ml of fasting venous sample was collected from each subject in clean plain bulb for serum calcium and phosphorus estimation on the same day after sutaible aseptic precautions. Serum uric acid was estimated using enzymatic color test in Beckman Coulter AU 5800, Fully Automated Biochemistry Autoanalyzer in CRL, GMCH, Nagpur.

Serum uric acid[18]

Intended Use

Enzymatic colour test for the quantitative determination of uric acid in human serum, plasma and urine on Beckman Coulter analysers.

Test Principle

Uric acid is converted by uricase to allantoin and hydrogen peroxide. The Trinder reaction is utilized to measure H_2O_2. The formed H_2O_2 reacts with N,N-bis(4-sulfobutyl)-3,5-dimethylaniline, disodium salt (MADB) and 4aminophenazone in the presence of peroxidase to produce a chromophore, which is read photometrically at 660/800nm. The amount of dye formed is proportional to the uric acid concentration in the sample.

Reaction principle

$$\text{Uric acid} + O_2 + 2\,H_2O \xrightarrow{\text{Uricase}} \text{Allantoin} + CO_2 + H_2O_2$$

$$2\,H_2O_2 + MADB + 4\text{-Aminophenazone} \xrightarrow{\text{Peroxidase}} \text{Blue dye} + + OH^- + 3H_2O$$

Contents, Reagent Composition in the Test

Final concentration of active ingredients:

Phosphate Buffer (pH 7.5)	42 mmol/L
MADB	0.15 mmol/L
4-Aminophenazone	0.30 mmol/L
Peroxidase	≥ 5.9 kU/L (98 µkat/L)
Uricase	≥ 0.25 kU/L (4.15 µkat/L)
Ascorbate Oxidase	≥ 1.56 kU/L (26 µkat/L)
Preservative	

Reagent Preparation

The reagents are ready for use and can be placed directly on board the instrument.

Storage and Stability

The reagents are stable, unopened, up to the stated expiry date when stored at 2-8°C. Once open, reagents stored on board the instrument are stable for 30 days.

Specimen

Serum and EDTA or heparinised plasma.
Stable in serum and plasma for 7 days when stored at 2-8°C and 3 days when stored at 15-25°C.

Test Procedure

Refer to the appropriate User's Guide and Setting Sheet for analyserspecific assay instructions for the sample type as listed in the Intended Use statement.

Calculation

The Beckman Coulter analysers automatically compute the uric acid concentration of each sample.

Reference Intervals

Serum Male 208.3 – 428.4 µmol/L (3.5 – 7.2 mg/dL)
Female 154.7 – 357.0 µmol/L (2.6 – 6.0 mg/dL)

Standardization and Quality control
Standardization and Quality control were done properly for all the parameters before run.

Statistical analysis :

The collected data was entered in Microsoft Excel 2007 and then transferred to the SPSS (version 20). The qualitative data was represented with frequency and percentage and quantitative data with mean and standard deviation. Association between two qualitative data was calculated using chisquare test and difference between two mean was calculated using unpaired t test. P value less than 0.05 was considered as statistically significant.

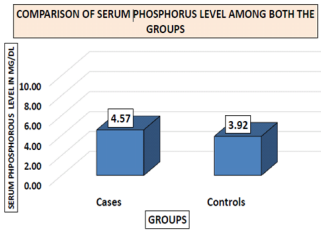
OBSERVATIONS AND RESULTS

The present study was conducted in Department of Biochemistry of a tertiary care hospital. Study period was from January 2017 to July 2018.

Table 1: Comparison of serum uric acid level among cases and controls

Serum Uric Acid	Group	N	Mean	Std. Deviation	P value
	Cases	50	5.85	1.78	0.0001
	Controls	50	4.71	1.01	

The mean serum uric acid level among cases was 5.85 ± 1.78 mg/dl while among controls it was lower (4.71 ± 1.01 mg/dl) than cases. The difference between the two means was statistically significant.



Graph 1: Comparison of serum uric acid level among cases and controls

DISCUSSIONS

The present study, aimed to "study the serum uric acid in psoriasis" was conducted in a Tertiary Care Medical institute, from Jan 2017 to July 2018. We estimated the serum serum uric acid in psoriatic patients and compared with age and gender matched control groups to draw results.

Comparison of age

In the present study,the mean age of cases were 41.78 ± 12.45 years while mean age of controls were 40.90 ± 12.95 years. The difference between the two mean was not statistically significant

Similar study was done by Gisondi P et al where the mean age among cases was 54.1 ± 12 years and among controls it was 54.3 ± 8 years and the difference was not statistically significant[19].

Another similar study conducted by Yilmaz E al where, mean age among cases was 44.73 ± 13.31 years and among controls it was 42.24 ± 15.18 years and the difference was not statistically significant[20].

Gender wise distribution

In the present study, 42% were females and 58% were males while among controls 34% were females and 66% were males. The difference between two proportions was not statistically significant Similar study was conducted by Gisondi P et al, where 35% cases were females in both cases and control group[19].

Study conducted by Yilmaz E al where females (55.7%) were more as compared to males (44.3%) in both the groups and the difference was not significant[20].

In the present study, the major presenting complaint was multiple reddish raised lesions (74%) followed by itchy lesions (22%), scaly lesions (12%) etc.

Past history

In the present study, majority of the cases had past history of Diabetes Mellitus (20%) followed by hypertension (16%), bronchial asthma (6%), hypothyroidism (4%) and TB (2%) while among controls majority among them had hypertension (10%) followed by Diabetes mellitus (2%) and bronchial asthma (2%). Diabetes Mellitus was found to be significantly more among psoriatic cases as compared to controls.

Study conducted by Gisondi P et al observed similar findings where type 2 Diabetes mellitus cases were significantly more in psoriatic patients (17.6%) as compared to control groups (4.2%). Even hypertension was significantly higher among cases (51.3%) as compared to controls (37.8%)[19].

Personal history

In the present study, 20% of the cases were smokers and 40% were alcoholics while among controls 30% were smokers and 46% were alcoholics. The difference between the two proportions were not statistically significant.

Gisondi P et al observed smokers were more in psoriatic patients (16.8%) as compared to control group (15.1%). This is in contrary to our study and can be explained by the fact that, since we have chosen hospital controls, the control might came to hospital for some other diseases which might be affected by their smoking history[19].

Serum Uric acid level

In the present study, the mean serum uric acid level among cases was 5.85 ± 1.78 mg/dl while among controls it was lower (4.71 ± 1.01 mg/dl) than cases. The difference between the two means was statistically significant. Similar results were observed by Gisondi P et al where serum uric acid level was significantly higher among psoriatic cases (5.61 ± 1.6 mg/dl) as compared to controls (4.87 ± 1.4 mg/dl)[19].

Another study by Gui XY et al observed consistent finding with our result showing psoriatic patients had higher serum uric acid level (6.25 ± 1.62 mg/dl) as compared to matched controls (5.71 ± 1.35 mg/dl)[21]. This result was also consistent with the findings observed by Jain IVK et al[22].

Increased purine catabolism due to increased epidermal cell turnover could be an important cause of raised serum uric acid levels among psoriatic patients.

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