

Serum prolactin concentration in psoriatic patients and its relationship with disease activity

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Abstract

Background Psoriasis is a dermatological disease of T lymphocyte origin and has multiple etiological backgrounds. Recent lines of researches suggest that prolactin as a neurohormone may have a role in the disease activity of psoriasis.

Objective To identify the correlations of serum prolactin concentration with disease activity of psoriatic patients.

Methods In the department of Dermatology & Venereology at Bangabandhu Sheikh Mujib Medical University, this cross sectional study was conducted. Time period was from September 2016 to December 2017. Fifty individuals diagnosed as psoriasis were included. Subjects were enrolled according to some specific criteria. Consecutive sampling method was applied to choose the samples. For measurement of disease activity of each subject, Psoriasis Area and Severity Index (PASI) was implemented.

Results In this study, 39.64 ± 15.51 years was got as mean age of the subjects and mean BMI was 22.43 ± 1.16 kg/m² within the range of 19.9–25.39. Study showed that serum prolactin gradually increased according to the increment of PASI score and serum prolactin had positive correlation with PASI score ($r=0.821$; $p \leq 0.001$) which was accepted as significant statistically. Patients with joint involvement had significantly higher serum prolactin level.

Conclusion A positive correlation between psoriatic disease activity with concentration of patient's serum prolactin was observed in this study. So, serum prolactin may be esteemed as a marker of psoriatic disease activity.

Key words

Serum Prolactin, Psoriasis, Psoriasis Area and Severity Index (PASI).

Introduction

Psoriasis is an inflammatory disease of chronicity which is not curable but can be controlled. 3% of the world population is affected by this non contagious dermatosis.^{1,2}

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Psoriatic patients are embarrassed about their skin appearance and suffer from high degree of morbidity. It has lessened employment opportunity and decreased quality of life.^{3,4} Healthcare system and socioeconomic condition of the society is hugely impacted by this disabling illness, due to increased social burden and therapeutic cost.⁵

Psoriasis is an immune mediated disease where dendritic cells, T cell, macrophages, neutrophil

and keratinocytes play combined role for initiation of skin lesions.^{6,7} Sub population of Th1 and Th17 were found in psoriatic skin lesions. Pathogenesis of psoriasis includes genetic factors, T cell mediated immunity and other factors like injury, infection, stress, drugs.⁸

In addition, it has been reported that some hormones, due to their effects on keratinocyte proliferation may also be an etiologic factor for psoriasis.^{9,10} Prolactin is a peptide hormone secreted from the anterior pituitary gland, via specific receptors, has proliferative effects on human keratinocytes which is a dominant feature of psoriasis.^{11,12} Prolactin may have an effect on skin immune system and that it may get involved in the pathological process of psoriasis which is suggested by some reports.¹³⁻¹⁵ It is type I cytokine in nature and exerts a number of immune-regulatory effects specially proliferation of lymphocytes and induce T cell mediated inflammation.¹⁶ T cells or NK (Natural killer) produce IFN γ by influential effect of prolactin. This hormone can potentiate a chemokine that is CXC production in keratinocytes. CXC chemokine is responsible for copious amount of type I T cell infiltration.^{15,17} Increased major histocompatibility complex (MHC) class II expression is induced along with co-stimulatory molecules like CD40, B7-1, or B7-2, and through these effects it can stimulate antigen presenting cells.¹⁶ Together with granulocyte-macrophage colony stimulating factor (GM-CSF) it has action upon peripheral blood monocytes into dendritic cells (DCs) differentiation. Effective antigen presentation by dendritic cells is also induced by prolactin. Obviously, prolactin is closely connected in complex pathogenic pathway of psoriasis at a number of ways.¹⁸ Report was published that patients with prolactinoma had severe psoriatic lesions and being treated with bromocriptin, psoriasis also improved.¹⁹ So, serum prolactin has a

conspicuous role in psoriasis and can be a cost effective target for treatment purpose. There is paucity of data regarding prolactin with psoriatic disease activity. This analysis was focused to observe the association between serum prolactin concentration and disease activity of psoriasis.

Methods

A study was coordinated in the department of Dermatology & Venereology at Bangabandhu Sheikh Mujib Medical University, regarding relationship between serum prolactin and psoriatic disease activity. Study was cross sectional in nature. Time frame was from September 2016 to December 2017. Psoriasis was diagnosed either by obvious clinical feature by or by histopathological report of lesional biopsy sample. Consecutive type of sampling method was applied to collect the sample. All patients age >18 years and of both male and female of reproductive ages in premenstrual phase were included in the study. Patients having acute illness (fever, acute abdominal complaints), history of MI or angina, malignancy; patients who were smoker; patients taking any systemic therapy for psoriasis; patients having chronic renal failure and hepatic failure; patients having endocrinopathies (prolactinoma, hypo or hyperthyroidism, acromegaly); patients having psychiatric disease; patients having seizure and CNS tumor; use of drugs that affect level of PRL including dopaminergic receptor blockers and dopamine synthesis inhibitor, calcium channel blockers, methyldopa, opioids, cimetidine, ranitidine, thyroxin, systemic steroids, and estrogens or contraceptives.; pregnant and nursing females and having menstrual irregularity or in menopause and lastly who did not give consent were also not included in the study.

Study Procedure: This study comprised of 50 psoriatic patients who were diagnosed clinically

and/ or histopathologically in the Dermatology and Venereology department, BSMMU. Specific inclusion or exclusion criteria were executed to gather the subjects. After proper understanding of whole process preliminarily, written informed consent was taken from them. Relevant history was taken regarding present illness, co-morbidities, psychiatric illness, past medical illness, drug history, in case of female menstrual and obstetric history. Then complete dermatological examination was done to determine the extent and severity of psoriasis. Psoriasis Area and Severity Index (PASI) technique was implemented to measure the disease activity in each patient. Information was recorded in semi-structured questionnaire. 5ml blood was collected from antecubital vein in a test tube maintaining aseptic precaution in morning between 8:00 to 10:00 AM in regard to circadian variation of prolactin secretion from each subjects. Separation of serum was done by centrifugation at 3200 rpm for 10 minutes, and preserved under -20°C until assay for prolactin done in Department of Microbiology and Immunology, BSMMU.

Analytic Methods: Serum prolactin of the study subjects were measured by ADVIA Centaur Prolactin assay method. Prolactin was assayed chemiluminescently. This is a two-site sandwich immunoassay. A polyclonal goat and mouse prolactin antibody were used. Firstly specific amount (25 μL) serum was taken in a cuvette and then mixed with both reagent step by step and incubated at 37°C . Then chemiluminiscent reaction was initiated by acidic and basic reagent dispersion. Results were given according to system operating instructions or by online help system.

Normal reference value was Male: 2.50-17.00ng/ml and Female: 1.90 – 25.00 ng/ml

Data processing and analysis: All the data were

analysed and processed by Statistical Package for the Social Sciences (SPSS) software version 23.0. Mean \pm SD demonstrated continuous data and percentages (%) showed categorical data. Subgroups that made on the basis of clinical and biochemical findings were compared by student t-test, ANOVA or Chi-square test as applicable. Pearson's correlation was done to correlate among mean serum prolactin concentration with mean PASI, disease duration, age and BMI. Probability value (p value) less than 0.05 was treated as significant.

Ethical consideration: A research protocol was approved by Institutional Review Board of BSMMU before the study was initiated. The aims, objectives, study procedure, risks and benefits of this study was explained to the patients in easily understandable local language. An informed written consent form was filled up by from each patient before enrollment. This consent form contained the objectives, procedures, risk and benefit of this research. Clear and easy language was tried to use as far as possible. Also confidentiality of all information was well maintained and used only for research purpose.

Results

Table 1 shows distribution of patients according to age. Mean age of the patients was 39.64 ± 15.51 years within the range of 18–72. Male was predominant with a ratio with female

Table 1 Demographic profile of the subjects (n=50)

	Frequency (n)	Percentage
<i>Age (years)</i>		
Mean \pm SD	39.64 \pm 15.51	
Range (min-max)	18 – 72	
<i>Gender</i>		
Male [n (%)]	36	72.0%
Female [n (%)]	14	28.0%
<i>BMI (kg/m²)</i>		
Mean \pm SD	22.43 \pm 1.16	
Range (min-max)	19.90 – 25.39	

Table 2 Association of serum prolactin level with severity of psoriasis (PASI score) (n=50).

PASI score	Serum prolactin (ng/ml)	
	Mean ± SD	Range (min-max)
<7	4.25 ± 1.43	1.76 - 6.67
7-12	7.83 ± 1.65	4.74 - 12.12
>12	13.74 ± 4.30	7.82 - 21.02
P value	<0.001	

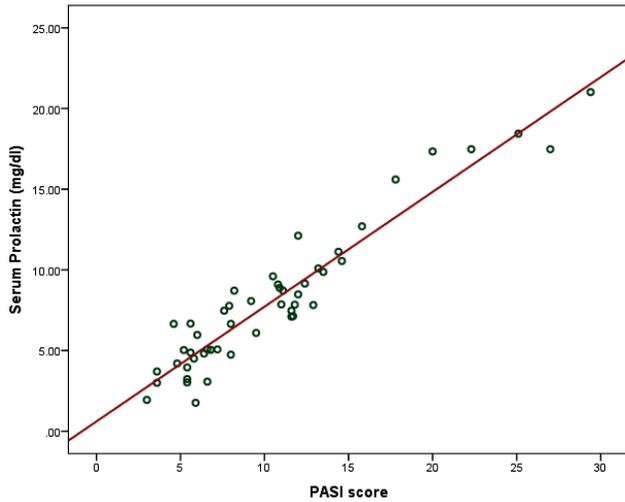


Figure 1 Correlation of PASI score with serum prolactin.

Table 3 Correlation of mean serum prolactin with PASI score, disease duration, age and BMI (n=50).

Serum Prolactin	r value	p value
PASI score	0.821	<0.001
Disease duration	0.195	0.175
Age	-0.106	0.465
BMI	0.019	0.898

2.6:1. Mean BMI of the subjects was 22.43±1.16 kg/m² within the range of 19.9–25.39.

Table 2 shows that serum prolactin gradually increased according to the increment of PASI score. Statistically significant result was found from ANOVA test.

Figure 1 show strong positive relationship of PASI score with serum Prolactin (r=0.821; p<0.001).

Table 3 shows correlation of serum Prolactin with mean PASI score, disease duration, age and BMI. Serum Prolactin had significant positive

Table 4 Comparison of prolactin level in subjects with and without joint involvement.

Joint involvement	Number (%)	Serum prolactin (ng/ml)	p value
		Mean ±SD	
Present	15 (30.0)	11.59 ± 4.82	<0.001
Absent	35 (70.0)	6.57 ± 3.41	

correlation with PASI score. Level of significance was measured by Pearson’s correlation test.

Table 4 Prolactin level in subjects with and without joint involvement was compared. Patients with joint involvement had significantly higher serum prolactin level. The level of significance was obtained by unpaired t test.

Discussion

This cross sectional study was aimed to find out any relationship between serum prolactin concentration with disease severity in psoriatic patients. As mean age, the figure 39.64±15.51 years was obtained. Male predominance was observed in this study where 72% of enrolled cases were male. A study done by Sikder et al.²⁰ on psoriatic patients in Bangabandhu Sheikh Mujib Medical University, Dhaka in 2017, included 30 psoriatic patients, with a mean of 35.8±16.9 years. Male:female ratio in that study was 2:1. These findings are in agreement with current study. A similar study was done by Keen and Hassan²¹ that included a total of 60 patients of psoriasis. In that study, 33±13.02 years were figured as age mean and male: female ratio 2.3:1 was calculated.

In this study, psoriasis disease severity was determined by PASI score and the study result revealed existence of correlation between serum prolactin level and PASI score which is statistically significant. Gupta et al.²²

accomplished a study where 50 psoriatic subjects of different severity were included and their serum prolactin level were measured. They showed that level of serum prolactin correlated significantly with disease activity ($r= 0.932$, $p<0.001$). This inference is quite similar to present study. Another study which was performed by Dilme-Carreras et al.¹⁴ where 20 psoriatic patients and 20 healthy controls were included, and serum prolactin concentration of both group were measured. Then disease severity of psoriatic group was assessed by PASI. Serum PRL levels was raised significantly in the diseased samples compared with the control group ($p < 0.001$). There was a positive correlation between serum PRL levels and PASI ($r = 0.33$; $P = 0.02$). Present study is supported by this inference. In a study which was done in Egypt by Al-Mohammady et al.²³ showed a same result between PRL levels and PASI score (p value < 0.05), and also between duration of the disease and serum PRL level. (p value < 0.05). Azizzadeh et al.¹³ investigated serum prolactin concentration in 30 psoriatic patients. There is statistical correlation between prolactin concentration and disease severity. Positive correlation between severity of psoriasis and PRL level ($r=0.521$, $p=0.003$) was tested by Pearson regression test.

Handjaniet al.²⁴ performed a case control study where they selected 90 individuals and divided them into 3 groups: psoriatic, atopic, and control. But none of the study subject had raised prolactin level and no significant relationship was established. They ruled out role of prolactin in skin pathology and concluded that growth hormone or growth factors can attribute to keratinocytes proliferation. Gorpelioglu et al.²⁵ included 39 patient in a study and estimated the serum prolactin level and PASI score but could not establish any significant relationship. These inferences are not supported by present study. They concluded that intracutaneous prolactin

may contribute to the pathogenesis of psoriasis. Moreover, they recommended further study with larger sample to investigate about involvement of circulating prolactin in pathogenesis of psoriasis. Patients aged 18-72 year (mean 39.64 ± 15.1) were taken in this study. Patients' serum level of prolactin is negatively correlated with age (p value 0.465). This is supported by Al-Mohammady et al.²³ where p value was 0.091.

Patients with psoriatic arthritis have significantly increased level of prolactin. About 15 (30%) subjects had joint involvement and had significantly raised prolactin (11.59 ± 4.82 ng/ml) than subjects without joint involvement (6.67 ± 3.41 ng/ml). $p < 0.001$. Husakova et al.²⁶ also showed serum prolactin as a marker of inflammatory arthritis in psoriasis vulgaris. They enrolled 40 and 70 psoriasis cases with or without joint involvement respectively. Serum prolactin was increased statistically in arthritic patient compared to patient without arthritis. Serum prolactin level in psoriatic arthritis patients obtained (299.2 ± 28.29 mIU/L) compared to psoriasis only patients (201.42 ± 11.72 mIU/L) where p value was 0.0003.

Conclusion

Existence of statistically positive correlation was found between PASI and serum prolactin level in this study. Considering the significance value, prolactin concentration can be taken into account as a disease activity marker in psoriatic patients.

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