To Assess the Levels of Lipid Profile, Uric Acid, Albumin / Globulin Ratio and Trace Elements in the Serum of Psoriasis Patients

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ABSTRACT

Introduction: Psoriasis is a chronic, autoimmune disease that appears when the immune system sends out faulty signals which leads to speeding up the growth cycle of skin cells. Study was done to access the biochemical analytes like lipid profile, uric acid, A/G Ratio, serum electrolytes in psoriatic patients.

Material and Methods: Study was done from November 2016 to October 2017 in RVM Medical College and the subjects were taken from the department of Dermatology. Patients with plaque psoriasis of age group 20 years – 60 years without any history of topical or systemic drug therapy and without any coexisting disease were selected for the study. The subjects for control group were taken from healthy paramedical staff, volunteers and patients attending skin outpatient department.

Results: The mean±SD of serum total cholesterol, triglycerides, VLDL, LDL, serum uric acid in the study group showed a significant increase when compared to that of the controls. But the mean±SD of serum HDL was lower in the study group when compared to the controls. The mean ratio of Na^+/ K^+ and Total Cholesterol/ HDL in the study group showed a significant increase compared to the control population. The mean ratio of Ca^{2+}/Mg^{2+} and HDL/LDL in the study group showed a significant decrease compared to the control population.

Conclusion: Psoriasis is a chronic, auto-immune disease which should be treated with ultimate care to reduce the exacerbations especially in winter season. Regular follow-ups along with estimation of routine and special biochemical parameters will reduce the risk of cardiovascular complications.

Keywords: Psoriasis, Lipid Profile, Cardiovascular Risks, Serum Electrolytes

INTRODUCTION

Psoriasis is not contagious.[1] It causes red scaly patches on the skin (psoriatic plaques), nails (psoriatic nail dystrophy) and joints (psoriatic arthritis).[2] Psoriasis affects both sexes equally and occurs at any age, although it most commonly appears between the ages of 15 and 25 years. Psychological distress can lead to significant depression and social isolation.[3]

The 'Psoriasis Area Severity Index' (PASI) is the most widely used measurement tool. PASI combines the assessment of the severity of lesions and the area affected into a single score in the range 0 (no disease) to 72 (maximal disease).[3]

Aim of the study was to assess the biochemical analytes like lipid profile, uric acid, A/G Ratio, serum electrolytes with variations in calcium and magnesium in psoriatic patients to incur finding for severity of disease progression to complications using basic ratios of Na^+/K^+, Ca^{2+}/Mg^{2+}, Total cholesterol/HDL and HDL/LDL.

MATERIAL AND METHODS

Study Population: Subjects for this present study were selected from outpatient department of dermatology, RVM Institute of Medical Sciences. This study was conducted from November 2016 to October 2017. The subjects for control group were taken from healthy paramedical staff, volunteers and patients attending skin outpatient department for other cosmetic problems.

Inclusion criteria: Ages in between 20-60, No history of any topical or systemic drug therapy for at least 3 months, No other co-existing disease, patients with plaque psoriasis.

Exclusion criteria: Long history of alcohol intake, smoking, hypertension, diabetes, BMI > 30kg/m², personal or family history of metabolic disease, patients who are on medication that affects lipid or carbohydrate metabolism (beta blockers, thiazides, corticosteroids, cyclosporine, retinoids and lipid lowering drugs), pregnant ladies, females who are on oral contraceptives and women in menopausal age group.

Sample collection: After a fast for 12-14 hours, 5 ml of venous blood was drawn in a sterile syringe (from both study group and controls) and analyzed for biochemical parameters.

For estimation of serum total cholesterol "CHOD-PAP" enzymatic photometric test[4] was used. The calorimetric indicator is quinoneimine which is generated from Trinder's reaction.[5] The test showed a measuring range from 3 - 750 mg/dl (0.08 – 19.4 mmol/L). The desirable value was <=200mg/dl, 200 – 240 was borderline high risk and >240 was considered as high risk.

HDL-C Immuno FS is a homogeneous method for HDL-cholesterol measurement without centrifugation steps. Antibodies against human lipoproteins are used

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to form antigen-antibody complexes with LDL, VLDL and chylomicrons in a way that only HDL-cholesterol is selectively determined by an enzymatic cholesterol measurement.[6] The test has been developed to determine HDL-C concentrations within a measuring range from 1 - 180 mg/dL (0.03–4.7 mmol/L). Reference range: ≥ 35 mg/dL (0.9 mmol/L).[7]

To determine serum triglycerides colorimetric enzymatic test using glycerol-3-phosphate-oxidase (GPO)[4] was used. The principle is enzymatic splitting with lipoprotein lipase and the indicator is quinoneimine.[8] The test showed a measuring range of 1 - 1000 mg/dL (0.01 - 11.3 mmol/L). The reference range taken was desirable, borderline high and elevated with the values 50-200 mg/dL (fasting) (2.3 mmol/L), 200 - 400 mg/dL (2.3 - 4.5 mmol/L) and > 400 mg/dL (4.5 mmol/L) respectively.

Determination of Very Low Density Lipoprotein (VLDL) is done by Friedewald-Levy-Fredrickson formula[8]

VLDL = Triglycerides / 5 (Normal range of VLDL: <32 mg/dl)

Determination of Low Density Lipoprotein: LDL = Total cholesterol - (VLDL + HDL)
(Normal range of LDL: 130-160mg/dl)

To estimate uric acid in serum enzymatic photometric test using TBHBA (2,4,6-tribromo-3-hydroxybenzoic acid) is used. The test showed a measuring range from 0.07 – 20 mg/dL (4.2 – 1190 μmol/L). Reference range in serum is 2.6 – 6.0mg/dl for females and 3.5 – 7.2mg/dl for males.[9]

To estimate albumin in serum photometric test using bromocresol green[11] is used. The test has been developed to determine albumin concentrations within a measuring range from 0.2 – 6 g/dL. The reference range in adults is 3.5 – 5.2 g/dL.[11]

Determination of Globulin: Globulin = Total Protein – Albumin

To estimate serum electrolytes iso selective electrode is used. The potential gradient is measured against a stable reference electrode of constant potential. The strength of this charge is directly proportional to the concentration of the selected ion.[12-14] Normal values Na+: 135 - 145 mmol/L, K+: 3.5 - 5 mmol/L and Cl-: 97 - 112 mmol/L.

To estimate calcium levels in serum photometric endpoint determination with Phosphonazo III[15] is used. The test has been developed to determine calcium concentrations within a measuring range from 0.2 - 25 mg/dL (0.05 – 6.24 mmol/L). Reference Range in Serum: 8.6 – 10.3 mg/dL (2.15 – 2.57 mmol/L).[15]

Magnesium levels in serum is estimated by photometric test using xylidyl blue. The test showed a measuring range from 0.05 - 5 mg/dL (0.02 – 2.05 mmol/L). Reference range in serum is 1.9 – 2.5 mg/dL (0.77 – 1.03 mmol/L) and 1.8 – 2.6 mg/dl (0.73 – 1.06 mmol/L)[16] for females and males respectively.

STATISTICAL ANALYSIS

Statistical data of the results were analyzed using SPSS software version 11.0. All the results are presented in tables and graphs.

RESULTS

A total of 25 patients with plaque psoriasis (16 male and 9 female) were enrolled. Similar number of age and sex matched non-psoriatic patients were included as controls. All patients and controls are in the age group of 20-58 years with various grades of severity of the disease.

Mean, standard deviation and p value of biochemical analytes in control and study group of psoriatic patients are given in table 1. The mean±SD of serum total cholesterol, triglycerides, VLDL, LDL, serum uric acid in the study group showed a significant increase when compared to that of the controls. But the mean±SD of serum HDL was lower in the study group when compared to the controls.

Ratios of certain biochemical parameters pof study and control groups are mentioned in table 2.

The mean ratio of Na+/ K+ and Total Cholesterol/ HDL in the study group showed a significant increase compared to the control population. The mean ratio of Ca2+/Mg2+ and HDL/LDL in the study group showed a significant decrease

Parameters	Controls Mean ± S.D.	Psoriatic patients Mean ± S.D.	P value
Total cholesterol	157.88 ± 12.84	243.52 ± 19.87	0.000120
HDL	39.28 ± 2.75	30.28 ± 2.65	0.001205
Triglycerides	138.00 ± 20.59	208.92 ± 17.29	0.000204
LDL	91.04 ± 11.41	171.46 ± 17.13	0.000045
VLDL	27.56 ± 4.18	41.78 ± 3.46	0.000198
Na+	139.40 ± 2.50	152.56 ± 3.95	0.001389
K+	4.38 ± 0.35	3.18 ± 0.22	0.000005
Cl-	107.40 ± 2.36	105.44 ± 3.19	0.272332
Ca2+	9.23 ± 0.49	8.23 ± 0.45	0.019153
Mg2+	2.45 ± 0.16	2.88 ± 0.23	0.039038
Uric acid	3.04 ± 0.32	5.89 ± 1.13	0.009345
Total Protein	7.91 ± 0.41	7.25 ± 0.38	0.047996
Albumin	4.54 ± 0.27	3.44 ± 0.29	0.000402
Globulin	3.37 ± 0.22	3.81 ± 0.30	0.078931
A/G Ratio	1.35 ± 0.10	0.91 ± 0.11	0.000341

Table-1: Mean, standard deviation and p value of biochemical analytes in controls and study group (psoriatic patients)

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Parameters	Controls	Study group
Na^+ / K^+	31.80	47.91
Ca^{2+} / Mg^{2+}	3.77	2.86
Total Cholesterol / HDL	4.02	8.04
HDL / LDL	0.43	0.18

Table-2: Ratios of certain biochemical parameters in controls and study group

compared to the control population.

DISCUSSION

Amina Hamed Ahmad studied lipid profile in psoriatic patients and found that total cholesterol, triglycerides, VLDL and LDL were significantly higher than those of healthy subjects. HDL was significantly lower in psoriatic patients compared to controls.[17] The present study in psoriatic patients correlated with the above study. Vanizor kural et al[18]., Doulat Rai Bajaj et al.[19], Akhyani et al.[20], Iyer et al[21] and many studies studied lipid profile in psoriatic patients and found that total cholesterol, triglycerides and LDL-C levels in patients with psoriasis were significantly higher.

Radziwillowska et al. studied lipid profile in psoriatic patients where they found HDL-cholesterol concentration was significantly decreased; triglycerides and VLDL-cholesterol levels were significantly increased when compared to controls.[16]

The lipid abnormalities (increased levels of total cholesterol, triacylglycerols, VLDL and LDL along with decreased HDL levels) seen in the psoriatic patients might facilitate the inflammatory reaction in the skin. The individuals of the study group are more likely prone to cardiovascular risk i.e. atherosclerotic changes.

The present study showed the serum uric acid levels were in the upper normal limit values in psoriatic patients when compared with controls and it correlated with the study of Maryam Ghiasi[23] et al.

As psoriasis is a disease with rapid epidermal cell turnover, hyperuricemia results from increased purine catabolism. Association of hyperuricemia as a frequent accompaniment of psoriasis and psoriatic arthritis was first noted by Herrmann et al. KC Verma et al. in 1979; Goldman in 1981; Eroglu et al. in 2009; Isha et al. in 2011 also reported similar findings.[23-26] Prevalence of hyperuricemia varied from 21 to 50% for them.

Bhatnagar et al. studied total protein, albumin and globulin levels in psoriatic patients, and noted a significant decrease in albumin and an increase in globulins (α_2, β, γ).[27] Shruty mohanthy et al. studied total protein, albumin and globulin levels in psoriatic patients, and noted a significant decrease in total protein due to decrease in albumin and an increase in globulins (α_2, β, γ).[28]

The present study on A/G Ratio in psoriatic patients correlated with the study of Bhatnagar et al.[27] and Shruty mohanthy et al.[28] Herizchi et al. studied albumin levels in psoriatic patients and found them to be lower when compared with controls.[30] Increased globulin levels are observed in auto-immune diseases such as psoriasis. Altered A/G Ratio due to

increased globulin levels and decreased albumin levels may be the result of auto-immunity.

Basavaraj et al. studied levels of trace elements in psoriatic patients. According to their study, sodium and magnesium levels were increased in psoriatic patients when compared to controls.[29]

KC Verma studied calcium and magnesium levels in psoriatic patients and noted significant increase in the levels of magnesium along with decrease in levels of calcium when compared with controls.[23] Herizchi et al. studied calcium levels in psoriatic patients and found that 65% of them are with low serum calcium levels when compared with controls.[30]

The present study on sodium in psoriatic patients correlated with the study of Basavaraj et al.[27] The present study on magnesium in psoriatic patients correlated with the study of Basavaraj et al.[27] and KC Verma et al.[23] The present study on calcium in psoriatic patients correlated with the study of KC Verma et al. and Herizchi et al.[30] The present study on potassium in psoriatic patients has not correlated with the study of Basavaraj et al.[27] The present study on chloride in psoriatic patients showed no change in the values and is least significant.

CONCLUSION

Psoriasis is a chronic, auto-immune disease which should be treated with ultimate care to reduce the exacerbations especially in winter season. Regular follow-ups along with estimation of routine and special biochemical parameters will reduce the risk of cardiovascular complications.

REFERENCES

1. http://www.psoriasis.org/netcommunity/about_psoriasis
2. http://www.ema.europa.eu/pdfs/human/ewp/245402en.pdf
3. http://www.parade.com/health/healthyskin/copying-with-psoriasis.html
4. Guder WG, Zawta B et al. The Quality of Diagnostic Samples. 1st ed. Darmstadt: GIT Verlag; 2001.
5. Rifai N, Bachorik PS, Albers JJ. Lipids, lipoproteins and apolipoproteins. In: Burtis CA, Ashwood ER, editors. Tietz Textbook of Clinical Chemistry. 3rd ed.Philadelphia: W.B Saunders Company; 1999.
6. Wiebe DA, Warnick GR. Measurement of high-density lipoprotein cholesterol. In: Rifai N,Warnick GR, Dominiczak MH, eds. Handbook of lipoprotein testing. Washington: AACC Press, 1997.
7. Schaefer EJ, McNamara J. Overview of the diagnosis and treatment of lipid disorders. In: Rifai N, Warnick GR, Dominiczak MH, eds. Handbook of lipoprotein testing. Washington: AACC press, -1997.
8. Cole TG, Klotzsch SG, McNamara J. Measurement of triglyceride concentration. Handbook of lipoprotein testing. Washington: AACC Press, 1997.
9. Newman DJ, Price CP. Renal function and nitrogen metabolites. In: Burtis CA, Ashwood ER, editors. Tietz Textbook of Clinical Chemistry. 3rd ed. Philadelphia: W.B Saunders Company; 1999.

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10. Johnson Am, Rohlfs EM, Silverman LM. Proteins. In: Burtis CA, Ashwood ER, editors. Tietz Textbook of Clinical Chemistry. 3rd ed. Philadelphia: W.B Saunders Company; 1999.

11. Dati F, Schumann G, Thomas L, Aguzzi F, Baudner S, Bienvenu J et al. Consensus of a group of professional societies and diagnostic companies on guidelines for interim reference ranges for 14 proteins in serum based on the standardization against the IFCC/BCR/CAP reference material (CRM 470). Eur J Clin Chem Clin Biochem 1996.

12. Covington, AK. "Introduction: Basic Electrode Types, Classifications, and Selectivity Considerations." In. Covington, AK (ed.), Ion Selective Electrode Methodology. Volume 1. CRC Press. Boca Raton. 1-20.

13. Frant, MS. History of the Early Commercialization of Ion-Selective Electrodes. Analyst 1994;199:2293-2301.

14. Meyerhoff, ME and WN Opdycke. 1986. Ion Selective Electrodes. Advances in Clinical Chemistry 1986;25:1-47.

15. Endres DB, Rude RK. Mineral and bone metabolism. In: Burtis CA, Ashwood ER, editors. Tietz Textbook of Clinical Chemistry. 3rd ed. Philadelphia: W.B Saunders Company; 1999.

16. Radziwillowska et al. - Medical University of Lublin, POLOGNE. Journal of molecular catalysis 2006;40:144-154.

17. Amina Hamed Ahmad Alobaidi, Biochemical Changes in Psoriasis: Lipid Profile, Oxidant and Antioxidant Markers. - Journal Edition, Volume 3, Issue 1.

18. Vanizor Kural B et al. Evaluation of the atherogenic tendency of lipids and lipoprotein content and their relationships with oxidant-antioxidant system in patients with psoriasis. Clin Chim Acta. 2003;328:71-82., Karadeniz Technical University, Trabzon, Turkey.

19. Doulat Rai Bajaj et al. - Liaquat University of Medical and Health Sciences, Jamshoro, Hyderabad - Lipid profile in patients with psoriasis. JPMA 2009;59:512.

20. Akhyani et al. - The lipid profile in psoriasis.Journal of the European Academy of Dermatology and Venereology, 20007;21:1330–1332.

21. Iyer et al. - PSORIASIS: A link with hyperlipidemia. South Square, Boston, Lincolnshire, UK.

22. Maryam Ghiasi et al. – Serum uric acid levels in patients with psoriasis. Tehran University Medical Journal 2012; 70: 58-63.

23. KC Verma, NC Bhargava; Psoriasis - a Clinical and Biochemical Investigative Study.Indian journalof dermatology,venereology and leprology- 1979;45:95—99.

24. Eroglu et al. Serum levels of C-reactive protein and uric acid in patients with cardiac syndrome X. Acta Cardiol. 2009; 64: 207–11.

25. Isha, V. K. Jain et al. C - reactive protein and Uric Acid Levels in Patients with Psoriasis. Ind J Clin Biochem 2011;26:309–311.

26. M Goldman- Uric acid in the etiology of psoriasis. The American Journal of dermatopathology. 1981;3:397-404.

27. M Bhatnagar et al – Serum proteins, trace metals in psoriasis. Indian J Dermatol Venerol Leprol 1994; 60:18-21.

28. Shruty mohanthy et al. - Atherogenic index and protein fractions in psoriasis. Kamineni institute of medical sciences, Nalgonda, AP. Int. J. med. Public Health, 2011;1: 25-32.

29. K H Basvaraj et al – Study on the levels of trace elements in psoriasis. Clinica Chimica Acta 2009;405:66-70, Mysore.

30. Herizchi et al. - Role of Serum Calcium in Exacerbation of Psoriasis. Medical Journal of Tabriz University of Medical Sciences, Vol. 29, No. 3.