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A STUDY OF LIPID PROFILE IN PATIENTS SUFFERING FROM PSORIASISAS A MARKER OF CARDIOVASCULAR DISEASE RISK

DR. HASIT LAD[1*], DR. JIGNESH GORASIYA[2], MISS BHAVISHA RANA[3], DR. VILAS U. CHAVAN[4], DR. DILIP KAVA[5] AND DR. DVSS RAMAVATARAM[6]

1. Assistant Professor, Department of Biochemistry, Surat Municipal Institute of Medical Education and Research, Umarwada, Opp. Bombay market, Surat-395020, Gujarat, India.*
2. Assistant Professor, Department of Biochemistry, Pandit Deendayal Upadhyay Medical College, Rajkot, Gujarat, India
3. M. Sc. MLT student, 4. Associate Professor 5.Tutor 6. Professor & Head, Department of Biochemistry, Surat Municipal Institute of Medical Education and Research, Umarwada, Opp. Bombay market, Surat-395020, Gujarat, India.

ABSTRACT

Diabetes and obesity are associated with endothelial dysfunction and dyslipidaemia due to chronic inflammation. Both of them impart the risk to develop atherosclerotic cardiovascular disease. Psoriasis is a chronic inflammatory disease involving skin. The aim of this study is to find out the occurrence of dyslipidaemia in psoriatic individuals and there by risk assessment of developing cardiovascular disease amongst them. Objective:To measure fasting lipid profile in patients suffering from psoriasis. 50 diagnosedpatients of psoriasis were designated as cases and 50 normal, healthy individuals as controls. Anthropometric measurement (Body Mass Index) and biochemical estimations (fasting blood glucose and lipid profile) were carried out. Statistically significant difference was observed in levels of fasting blood glucose, total cholesterol, LDL, total cholesterol/HDL and LDL/HDL ratio in cases compared to controls. Psoriatic individuals tend to develop dyslipidaemia which can influence the process of atherosclerosis and impart cardiovascular risk.

KEYWORDS: ***Psoriasis, Chronic inflammation, Dyslipidaemia, Atherosclerosis, Cardiovascular disease.***

DR. HASIT LAD
Assistant Professor, Department of Biochemistry, Surat Municipal Institute of Medical Education and Research, Umarwada, Opp. Bombay market, Surat-395020, Gujarat, India.

***Corresponding author**

1. INTRODUCTION

Psoriasis is a chronic, disfiguring, systemic inflammatory disease primarily affecting skin, nail and occasionally joint. The prevalence of psoriasis varies between 0 to 12 % in different population. The most characteristic lesion consist of red, scaly, sharply demarcated, indurated plaques, present particularly over extensor surfaces and scalp. It is a non-contagious skin disorder and caused mainly by anomalies of protein expression in skin cells, which can be abnormal keratinocyte differentiation, hyper proliferation of the keratinocyte and infiltration of inflammatory elements.[1] The loss of scale from the surface observed in the course of psoriasis may be related to lipid disorders in epidermis and in serum. [2] Changes in the plasma lipid and lipoprotein composition in patients with psoriasis may be the reason for the increased risk of atherosclerosis in these individuals.[3,4] Psoriasis might be associated with endothelial dysfunction, both because of the abundance of pro-inflammatory cytokines as well as the metabolic abnormalities found in it.TH1/Th2 imbalances are involved in the pathogenesis of both atherosclerosis and psoriasis. The pro-inflammatory cytokines may favour the development of atherosclerosis and ultimately acute coronary syndrome as well as psoriasis.[2] Obesity, expressed in terms of Body Mass Index, is defined as an abnormal growth of adipose tissue due to enlargement of fat cell size (hypertrophic obesity) or increase in fat cell number (hyperplasic obesity) or combination of both. The main adverse consequences of obesity are cardiovascular diseases, type 2 Diabetes Mellitus, and several cancers. Increasing epidemiological evidence suggests that patients with psoriasis may be more obese compared with the general population. Although the exact mechanism underlying the epidemiological association between psoriasis and obesity is uncertain, researchers have theorized that adipocyte elaboration of pro-inflammatory cytokines may exacerbate psoriasis.[5] Hence, the very purpose of the study is to predict the cardiovascular disease risk by observing the pattern of lipid profile in psoriatic individuals compared to normal healthy individuals and to correlate the same with obesity, not complicated by dyslipidaemia in these groups of population.

2. MATERIALS AND METHODS

The study was conducted on patients attending outpatient department of dermatology clinic at SMIMER hospital, Surat, Gujarat, India. The study was conducted after taking the required ethical clearance from ethical review committee and all patients who signed the informed consent took part in study. Study population was divided in cases and controls of 20-60 years of age. Controls comprised of 50 normal, healthy controls without having psoriasis whereas cases comprised of 50 individuals diagnosed to be suffering from any form of psoriasis. Inclusion criteria: Individuals diagnosed to be suffering from any form of psoriasis. Exclusion criteria were as follows: 1) Personal or family history of dyslipidaemia, consumption of drugs known to affect lipid metabolism. 2) History of hypertension, diabetes, hypothyroidism, liver or renal failure. 3) Personal history of smoking, alcohol consumption regnant patients were also excluded from the study. Blood samples after 10-12 hours of overnight fasting were collected for estimation of fasting blood glucose and lipid profile. Blood glucose was assayed by hexokinase kit (Siemens Healthcare Diagnostics Ltd., Frimely, Camberley, UK cat. No. DF40) method,[6] serum total cholesterol by enzymatic kit (Siemens Healthcare Diagnostics Ltd., Frimely, Camberley, UK cat. No. DF27), [7]serum triglyceride byenzymatic kit (Siemens Healthcare Diagnostics Ltd. Frimely, Camberley, UK cat. No. DC 6A) method[8] and serum HDL by accelerator selective detergent kit(Siemens Healthcare Diagnostics Ltd., Frimely, Camberley, UK cat. No. 48B) method.[9] Serum LDL was calculated from estimated values of cholesterol, triglyceride and HDL using the equation of Freidwald et al.[10] Calculated values also included the Total cholesterol: HDL ratio and LDL: VLDL ratio. Anthropometric index i.e. Body Mass Index (BMI) (body weight in kg/ height in m^2) was recorded in both the groups. Cut off points for obese subjects were BMI ≥ 23 kg/m^2 as per WHO standards. [11]

3. RESULTS

Statistical analysis was performed using t-test and Pearson's correlation in SPSS 12.0 for windows programme. Results are shown in tables 1-6.

Table 1
Comparison of biochemical parameters between study groups

Parameters	Controls	Cases	p Value
FBS	86.9 ± 7.99	100.39 ± 16.24	<0.05*
Triglyceride	81.36 ±24.48	164.8 ± 87.83	0.381
Total Cholesterol	154.87 ± 29.37	191.25 ± 29.37	< 0.05*
HDL Cholesterol	51.66 ± 11.64	50.33 ± 7.33	0.4157
LDL Cholesterol	109.59 ± 51.98	133.24 ± 57.37	<0.05*
TC/HDL	3.15 ± 0.89	3.78 ± 1.197	<0.05*
LDL/HDL	2.24 ± 1.167	2.66 ± 1.22	0.076

****p < 0.001(Highly significant); *p < 0.05 (Moderately significant)**

Table 2
Comparison of biochemical parameters according to type of psoriasis in cases

Parameters	Cases		p Value
	Localized psoriasis	Non- localized psoriasis	
FBS	116.65 ± 13.09	96.72 ± 15.59	0.8286
Triglyceride	186.50 ± 116.84	157.17 ± 75.62	0.305
Total Cholesterol	164.73 ± 37.90	200.568 ± 51.62	< 0.05*
HDL Cholesterol	45.04 ± 7.501	51.44 ± 12.85	0.098
LDL Cholesterol	144.56 ± 48.57	129.22 ± 60.24	0.4094
TC/HDL	3.72 ± 1.029	3.80 ± 1.26	0.1943
LDL/HDL	3.051 ± 1.45	2.53 ± 1.12	< 0.05*

*****p < 0.001; *p < 0.05***

Table 3
Comparison of biochemical parameters based on BMI in cases.

Parameters	Cases		p Value
	BMI < 23 Kg/m^2	BMI > 23 Kg/m^2	
FBS	105.52 ± 14.703	100.05 ± 16.42	0.577
Triglyceride	161.00 ± 36.71	165.04 ± 90.32	0.9394
Total Cholesterol	169.18 ± 59.75	192.66 ± 50.40	0.4417
HDL Cholesterol	47.24 ± 12.187	49.909 ± 12.046	0.7118
LDL Cholesterol	118.65 ± 52.92	134.16 ± 58.04	0.6543
TC/HDL	3.62 ± 1.28	3.79 ± 1.207	0.8109
LDL/HDL	1.79 ± 1.45	2.72 ± 1.207	0.2035

*****p < 0.001; *p < 0.05***

Table 4
Correlation of BMI levels with biochemical parameters in study groups.

Parameters	Controls		Cases	
	r-value	p-value	r-value	p-value
BMI vs. FBS	-0.1606	0.000*	0.0127	0.000*
BMI vs. Total cholesterol	0.1900	0.000*	-0.042	0.000*
BMI vs. Triglyceride	0.0295	0.0001	-0.056	0.035
BMI vs. HDL Cholesterol	-0.1696	0.000*	0.233	0.000*
BMI vs. LDL cholesterol	0.0017	0.000*	0.2615	0.000*
BMI vs. TC/HDL	0.2633	0.000*	0.1055	0.000*
BMI vs. LDL/HDL	0.0989	0.000*	0.355	0.000*

*****p < 0.001; *p < 0.05***

As per results shown in Table no 1, in our study it was found that Total cholesterol was high in moderately significant manner ($p<0.05^*$) in cases (191.2 ± 29.37 mg/dl) compared to controls (154.87 ± 29.62 mg/dl). Serum LDL values were high in moderately significant manner ($p<0.05^*$) in cases (133.24 ± 57.37 mg/dl) compared to controls (109.59 ± 51.98 mg/dl) along with moderately significant increased ($p<0.05$) TC/HDL ratio (3.78± 1.19) in cases. Also was observed a moderately significant difference ($p<0.05^*$) in fasting blood glucose levels between cases (100.39 ± 16.29) compared to controls (86.9 ± 7.99). There was no statistically significant difference between both groups especially with regard to HDL cholesterol and triglycerides.Though all the biochemical parameters were found within the normal range for both the groups, there was significant difference in the above mentioned parameters of lipid profile and blood glucose when the comparison was carried out.In an attempt to find out whether or not lipid profile and blood glucose levels are affected by the type of psoriasis acquired, cases were further subdivided into Localized and Non –Localized psoriasis and the comparison of biochemical parameters was carried out. As shown in Table 2, there were 13 patients of Localized type and 37 patients of Non- Localized type amongst the study groups and on comparison, total cholesterol was high in moderately significant manner ($p<0.05^*$) in patients of Non-localized psoriasis (200.56 ± 51.62 mg/dl) compared to Localized type (164.73 ± 37.90mg/dl).HDL was significantly decreased in localized psoriasis along with increased in LDL/HDL ratio was observed in the same. No significant difference was observed for the rest of the parameters between two sub groups.As shown in table 3, whether or not the obesity, expressed in terms of Body Mass Index, affects the psoriatic individual's biochemical profile, cases again were subdivided into obese and non-obese groups and were compared, wherein BMI cut off for obesity was considered as 23 Kg/m^2as per WHO standards for Asian population. The results showed that, amongst cases, 19 patients had normal ranged BMI (<23kg/m^2) and 31 patients had increased BMI (>23 kg/m^2). We found no statistically significant difference in the biochemical profile between the two groups. Table 4 shows the correlation of BMI levels with biochemical parameters between two parent groups. Trivial positive correlation was observed between BMI and LDL cholesterol (0.2615) as well as BMI and TC/HDL ratio (0.1055) whereas moderate positive correlation was observed between BMI and LDL/HDL ratio (0.355) in cases. However, there was no negative correlation observed between BMI and HDL in cases. In control group, negative correlation between BMI and HDL was observed and small positive correlation was observed of BMI with Total cholesterol and TC/HDL ratio.

4. DISCUSSION

Psoriasis is a chronic inflammatory disorder of skin that is associated with an increased cardiovascular risk profile.[12]The excess risk is influenced by the psoriasis severity indicating an inflammation dependent effect.[13] Genetic studies demonstrate that psoriasis and cardiovascular diseases share common pathogenic features for example inflammatory cytokines like TNF-α and IL-1 play an important role. The chronic inflammation in psoriasis has an unfavourable effect on the cardiovascular risk profile. Multiple CVD factors like, the blood pressure, oxidative stress, dyslipidaemia, endothelial dysfunction and blood platelet adhesion seem to be influenced. These factors are associated more strongly with severe psoriasis than mild psoriasis.[14] These proatherogenic changes of lipoproteins during inflammation may be the potential mechanisms that account for the epidemiologic observation linking inflammatory conditions and atherosclerosis. Also, there are several studies investigating the oxidant/antioxidant status in psoriasis and it has been suggested that increased reactive oxygen species (ROS) and deficient antioxidant system is responsible for pathogenesis of psoriasis.[15] Increased oxidative stress in psoriasis also increases the risk of atherosclerosis leading to cardiovascular events.[16] In our study, Total cholesterol and LDL-Cholesterol were found to be high in moderately significant manner which is observed in table no 1. Mallbris et al investigated individuals with newly diagnosed psoriasis and their lipid profile was compared to healthy controls where significantly higher

total cholesterol and serum LDL levels were observed in psoriatic patients which correlates with our study.[3] Also Pereira et al in their study showed that, in moderate to severe psoriasis, a significantly deteriorated lipid profile was observed compared to healthy controls with higher values of Total cholesterol and LDL-cholesterol.[14] Piskin et al in his study showed serum total cholesterol and LDL-cholesterol was significantly higher in psoriasis group than the control group.[17] Hypertriglyceridemia associated with inflammation has been attributed to both decreased lipoprotein clearance and increased lipoprotein production. Serum triglycerides levels were found to be low compared to healthy controls but the results were not significant. But conflicting results were observed in the study by Rocha-Pereira etal and Banerjee and More.[14, 18] The activation of inflammatory cascade will induce a decrease in HDL cholesterol levels with impairment in reverse cholesterol transport and parallel changes in Apo lipoprotein, enzyme, anti-oxidant capacity and ATP binding cassette 1(ABCA-1) dependent efflux.[18] In our study, no significant difference was observed in HDL levels between study groups and healthy controls. However various studies related to HDL cholesterol show conflicting results. Rocha-Pereira et al reported low HDL level in study group when compared with normal healthy individuals.[14] Dr. K.P. Latha et al while carrying out the study, also found low level of serum HDL between study group and healthy controls.[5] The cases were further sub-divided according to the type of psoriasis they acquired. Moderately significant rise in total cholesterol was observed in non-localized psoriasis patients and significantly decrease in the HDL cholesterol and increase in LDL/HDL ratios was observed in localized psoriasis patients as shown in table 2. The combination of obesity and psoriasis is an important health care concern. Persons with BMI >23 kg/m^2 and >25kg/m^2 classified as overweight and obese, respectively.[11]Both conditions are related with chronic inflammation, which may aggravate the cardiovascular disease pathogenic course such as atherosclerosis , correlation proposed initially by Henseler and Christophers.[19]Obesity is an important component of the metabolic syndrome along with impaired glucose regulation, hypertriglyceridemia, reduced high-density lipoprotein and hypertension.[20] We did not find statistically significant difference in the biochemical profile in our study as per table 3. Singh G. et al showed that higher BMI was detected in patients with severe psoriasis and that is directly associated with the risk of cardiovascular mortality.[21] As per table no 4, correlation of Body Mass Index (BMI) levels with biochemical parameters in study population was carried out and trivial positive correlation (0.2615) was observed between the BMI and LDL-cholesterol, TC/HDL ratios (0.1055) and no negative correlation was observed between BMI and HDL-cholesterol. Psoriasis is related to diabetes; independent of factors such as obesity, hypertension and hyperlipidaemia. Diabetes is more common in patients with severe psoriasis than in those with mild disease.[22]Insulin resistance, which is common to psoriasis and the metabolic syndrome, may be mediated in part through inflammatory cytokines such as TNF.[23, 24, 25] Furthermore, chronic inflammation in psoriasis leads to increased insulin-like growth factor-II (IGF-II) in the skin and blood of psoriasis patient. IGF-II promotes epidermal proliferation and is also implicated in promoting atherosclerosis, in modulating body fat mass and lipid metabolism in mice, and is linked to diabetes and hyperlipidaemia in human module.[26,27] We found statistically significant difference ($p<0.05$*) in fasting glucose in our study between the study groups and controls. The risk for diabetes mellitus rises substantially in patients with psoriasis, with a 62% increase in risk noted in patients with severe psoriasis when compared with control subjects. Shapiro J. et al. demonstrated that the risk of incident DM was increased for psoriatic patients when compared with a psoriasis-free group in their study. [22] All lipid profile parameters and blood glucose levels in cases were well within normal reference range but an increasing trend of the same was observed in statistically significant manner when compared to normal healthy controls.

5. CONCLUSION

Psoriasis is a chronic inflammatory disorder, along with on-going endothelial dysfunction,

might affect blood lipid levels, more with non-localized psoriasis. This might well contribute to the process of atherosclerosis development and hence the cardiovascular disease risk. Therefore it will be well in the interest of patients suffering from psoriasis to get screened for lipid profile.

Limitations

1) The marker to suggest the on-going endothelial dysfunction was not estimated for the study.
2) Obesity can play a role as a confounding factor but none of the overweight or obese patients were dyslipidaemic.

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CONFLICT OF INTERESTS

Conflict of interests declared none.

7. REFERENCES

1. Griffiths CEM, Barker JN . Psoriasis. In: TBurns, S. Breathnach, N. Cox and C. Griffiths , Ed. Rook's Textbook of dermatology, 7th edition, Blackwell publishers : Oxford ,3501-3510, (2004)
2. Pietrzak A, Michalak-Stoma A, Chodorowska G, Szepietowski JC. Lipid disturbances in psoriasis: an update. Mediators Inflamm. 2010: 535612,(2010)
3. Mallbris L, Granath F, Hamsten A, Ståhle M. Psoriasis is associated with lipid abnormalities at the onset of skin disease. J Am Acad Dermatol. 54(4):614–621,(2006)
4. Akhyani M, Ehsani AH, Robati RM, Robati AM. The lipid profile in psoriasis: a controlled study. J Eur Acad Dermatol Venereol. 21(10):1330–1332,(2007)
5. Dr. K.P. Latha, Dr. Anil Kumar A.S. Serum lipids and lipoprotein(a) levels in psoriasis. International journal of scientific research. 3(9):283-84,(2014)
6. Stadtman,T.C. Methods in enzymology, Colowick, SP, and Caplan, NO (Eds.), Vol III, Academy Press: New York,392-394,678-691.(1957)
7. Nader Rifai, G. Russell Warnick, Alan T. Remaley. Lipids, Lipoproteins, Apolipoproteins, and other Cardiovascular Risk Factors.In:Burtis CA, Ashwood ER, Burns DE, Ed. Teitz fundamentals of clinical chemistry, 6th edition, Saunders (An imprint of Elsevier), Philadelphia, 422-423, (2008)
8. Warnick GR, Wood PD. National Cholesterol Education Programme recommendation for measurement of high density lipoprotein Cholesterol. Clinical Chemistry, 41(10):1427-1433,(1995)
9. Friedwald, W.T., Levy, R.I., Fredrickson, D.S.. Estimation of the concentration of low density lipoprotein cholesterol in plasma, without use of preparative ultracentrifuge. Clinical Chemistry, 18(6): 499-502, (1972).
10. WHO expert Consultation. Appropriate Body Mass Index for Asian populations and its implication for policy and intervention strategies. Lancet, 363: 157-163,(2007)
11. M.Wakkeea, H.B.Thioa, E.P.Prensa, E.J.G. Sijbrandsb, H.A.M. Neumanna. Unfavorable cardiovascular risk profiles in untreated and treated psoriasis patients. Atherosclerosis, 190(1):1-9,(2007)
12. Nehal N. Mehta, Rahat S. Azfar, Daniel B. Shin, Andrea L. Neimann, Andrea B. Troxel, and Joel M. Gelfand et al. Patients with severe psoriasis are at increased risk of cardiovascular mortality: Cohort study using the general practice research database. European Heart Journal, 31(8):1000–1006,(2010)
13. Rocha-Pereira,Santos-Silva,Rebelo,Figueiredo,Quintanilha,Teixeira et al. The inflammatory response in mild and in severe psoriasis. Br. J. Dermatol150(5),917-928,(2004)
14. Kiymet Baz, Burak Cimen MY, Aysin Kokturak, Ayca CordanY, Gulcin

Eskandari, Guliz Ikizoglu et al. Oxidant/Antioxidant status in patients with psoriasis. Yonsei Med J; 44(6):987-90, 2003.

15. Tripti sexena, Agarwal BK, Pawan Kare. Serum paraoxonase activity and oxidative stress in acute myocardial infraction patients. Biomedical research;22(2):215-9, 2011.
16. Suleyman Piskin, FigenGurkok, GalipEkuklu. Serum Lipids levels in Psoriasis. Yonsei Medical Journal, 44(1):24-26, (2003)
17. Dr.Susmita Banerjee, Dr.Umesh More, Dr. Mrs. Mona A Tilak, Dr. Anita Deshmukh, Dr. Lalna Takale. Lipid alterations in psoriasis Indian Journal of Basic and Applied Medical Research, 3(2):350-357,(2014)
18. Henseler T, Christophers E: Disease concomitance in psoriasis. J Am AcadDermatol, 32(6):982-986,(1995)
19. Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB, Gelfand JM et al. Prevalence of cardiovascular risk factors in patients with psoriasis. J AmAcadDermatol,55(5):829–835,(2006)
20. Singh G, Aneja SP. Cardiovascular comorbiditiy in psoriasis. Indian J Dermatol, 56(5):553-556,(2011)
21. Shapiro J, Cohen AD, David M, Hodak E, Chodik G, Viner A et al. The association between psoriasis, diabetes mellitus and atherosclerosis in Israel: A case control study. J Am AcadDermatol, 56(4):629–34,(2007)
22. Schon MP, Boehncke WH. Psoriasis. N Engl J Med, 352(18):1899–912,(2005)
23. Rifai N, Bachorik PS, Albers JJ. Lipids, Lipoproteins, and apolipoproteins. In: Burtis CA, Ashwood ER. Ed. Tietz textbook of Clinical Chemistry. 3rd edition,W.B.Saunders;Philadelphia, 806-861,(1999)
24. Rader DJ, Hobbs. H. Disorders of Lipoprotein Metabolism.In: Fauci, Braunwald, Kasper. Ed. Harrison's Principle of Internal Medicine. 17th Edition, MC Graw Hill, New York, 2:2060- 2080,(2008)
25. Griffiths CEM, Barker JN. Pathogenesis and clinical features of psoriasis. Lancet, 370 (9583):263-271,(2007)
26. O'Malley T, Ludlam CA, Riemermsa RA, Fox KA. Early increase in levels of soluble inter-cellular adhesion molecule-1 (sICAM-1). Potential risk factor for the acute coronary syndromes. Eur Heart Journal; 22 (14):1226-1234,(2001).