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A study of Clinico-histopathological study of psoriasis in correlation with lipid profile

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ABSTRACT

Background: Psoriasis was considered to be a chronic, recurrent skin disease, but it has been accepted as a chronic systemic inflammatory disease in recent years. Lipoprotein(a) (Lp(a)) is a lipoprotein that is synthesized in the liver and has a low-density lipoprotein (LDL)-like molecular structure consisting of phospholipids, cholesterol, and apolipoprotein. **Aim and objective:** To assess the lipid metabolism and its correlation with severity of disease and associated cardiovascular risk factors in psoriasis. **Methods:** The study comprises a total of 25 cases of psoriasis attending the dermatology department at SSIMS, Bhilai, Chhattisgarh, India, and 25 age-, gender-matched healthy controls. Subjects were enrolled in the study as per the inclusion criteria. The severity of the disease was assessed by the PASI score. All were evaluated for lipid profile. **Results:** The results indicated that serum total cholesterol, triglycerides, LDL-C, and VLDL-C were significantly increased in moderate to severe cases in comparison to controls, and the level of HDL-C significantly decreased in moderate psoriasis, and a highly significant decrease was observed in severe cases when compared to controls. Serum triglyceride (TG), total cholesterol, and low-density lipoprotein showed a significant positive correlation with the severity of psoriasis. The study concludes that lipid derangement correlates with the severity of disease and also acts as a good prognostic sign. **Conclusions:** The present study concludes that psoriatic patients should be evaluated and followed up for the risk of dyslipidemia and cardiovascular morbidity.

Key words: psoriasis, lipid profile, dyslipidemia

Introduction

Psoriasis is a common, chronic, disfiguring, recurrent-inflammatory, and proliferative condition of the skin that is transmitted genetically, with a population prevalence between 1.5 and 3%. The most characteristic lesions consist of red, scaly, sharply demarcated, indurate plaques, present particularly over extensor surfaces and the scalp. The disease is enormously variable in duration, periodicity of flares, and extent that may affect any part of the skin [1]. The distribution of skin lesions includes the elbows, the knees, scalp (especially the hairline), interlingual cleft, the glans, penis, palm, and soles. The patients may develop psoriatic arthropathy, which is the only non-cutaneous manifestation of the disease [2]. It affects about 2–3% of the world's population. About 135 million people all over the world suffer from this disease. Prevalence of the disease in India varies from 0.44% to 2.8% [3].

Patients with psoriasis appear to have an increased morbidity and mortality from cardiovascular events, especially those with a severe and long duration of psoriasis. There are several possible explanations for the increased prevalence of cardiovascular morbidity and mortality in patients with psoriasis. Multiple factors, including increased

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oxidative stress, decreased antioxidant capacity, and other established risk factors such as hypertension, obesity, and diabetes mellitus, have been associated with psoriasis. [4] However, the pathogenesis of atherothrombotic events in psoriatic patients is yet to be identified. Lipid metabolism may be playing a role in the pathogenesis of psoriasis. [5-6] Information is largely not available on lipid abnormalities in psoriatic patients. Lipid profile determines approximate risks for cardiovascular diseases.

Although a very wide range of biochemical and pathological abnormalities have been reported in psoriatic skin, the exact cause of psoriasis is not yet defined. While most studies suggest a primary role for the immune system in psoriasis pathogenesis, it has been argued that vascular change precedes the immune response, and some evidence suggests a genetic link. However, about five well-known mechanisms have contributed to the pathogenesis of this disease and involve epidermal proliferation, vascular changes, molecular genetics, immunology, and inflammation, and finally Koebner and reverse Koebner phenomena [1]. Abnormalities in lipid metabolism have been considered to play an important role in the pathogenesis of psoriasis, and patients with psoriasis may have an increased risk of arterial and venous occlusive disease (atherosclerosis). It is still a controversy whether changes in lipid composition are primary events or secondary to psoriasis, or perhaps due to medications such as retinoids [7-8]. Furthermore, it was found that atherosclerosis and psoriasis have a similar pathogenesis. Both diseases show similarity in the immunological processes involved, as both are T-helper 1 cell (Th-1) mediated diseases. Also, similarity is found in the inflammatory cytokine profiles and both local and systemic inflammatory markers. Both diseases have the same pattern of T-cell activation and expression of adhesion molecules. In addition, psoriasis and atherosclerosis share common histological features with involvement of T-cells, monocytes, macrophages, connective tissue cells, and extracellular matrix [9].

Hence, the present study is an attempt to assess the lipid abnormalities in the patients with psoriasis, which are independent risk factors for atherothrombotic events to occur. In the present study, we investigated the lipid profile in healthy control and in a group of psoriasis patients. In addition, we have evaluated the correlation between the lipid levels and severity of the psoriatic lesions by selecting the psoriasis group with mild psoriasis and moderate/severe psoriasis and comparing it with the normal control group to look for an increased risk of cardiovascular diseases.

Material and Method

The present case control study was undertaken in the department of dermatology, SSIMS, Bhilai, Chhattisgarh, India. 25 patients suffering from psoriasis attending the dermatology OPD in the period between December 2023 and July 2024, ages 18–50 years, not receiving any systemic treatment, were selected as the case group. Age and sex-matched 25 healthy volunteers were included in the study as control subjects.

Sample selection

All the patients were subjected to a detailed examination, including the general, physical, and mainly the skin examination. The diagnosis was made clinically, based on the presence of characteristic psoriatic lesions. For all the patients and at the initial screening visit, baseline characteristics had been made and the age, sex, BMI, onset and

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duration of the disease, previous treatment, medical history, and family history were recorded. An informed verbal consent was taken by all the participants, and the study protocol was approved by the local ethical and scientific committee.

Inclusion criteria

Mild to moderate and severe untreated psoriasis patients or patients only on topical therapies (emollients) between the age of 18-50 years were included in the study.

Exclusion criteria

Patients with diabetes, obesity, family history of hyperlipidemia, renal and liver failure, hypothyroidism, patients taking systemic drugs, especially lipid-lowering agents, smoking, and alcohol intake in order to eliminate deteriorating factors on the serum lipid level of the patients were excluded. Moreover, patients who received oral or topical antipsoriatic therapy within four weeks were not included in this study. The only allowed therapy was vaseline as an emollient.

Statistical Analysis

Data were maintained on an Excel spread sheet. Analysis was performed using SPSS-24 software. Descriptive data were expressed as mean, standard deviation, and range of all variables. Results were presented as mean±S.D. Means of data in patients and controls were compared using the independent student t-test. Differences were considered statistically significant at $p<0.05$ and highly significant at $p<0.001$.

Observation and Result

In our study, 15 patients were of moderate to severe psoriasis and 10 had mild psoriasis. Serum triglyceride (TG), total cholesterol, low density lipoprotein, and VLDL were significantly ($p<0.001$) higher in moderate to severe cases than in controls.

Table 1: Basic characteristics of study population.

Variable	Case (Mean ± SD)	Control (Mean ± SD)	P-value
Age (years)	35.16±8.65	37.92±7.1	0.211
SEX (M/F)	12:13	12:13	
BMI (kg/m2 sq.)	23.82±2.09	24.22±1.96	0.489

Table 2: Comparison of lipid profile between psoriasis patients and controls.

Variable	Case (Mean ± SD)	Control (Mean ± SD)	P-value
Total cholesterol	231.28±18.80	163.52±14.56	0.000
Triglycerides	160±11.74	129.04±22.79	0.000

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HDL-c	34.16±3.89	49.32±5.57	6.232
LDL-c	164.92±19.18	88.73±16.7	0.000
VLDL-c	32±2.34	25.92±4.61	3.819

Table 3: Comparison of lipid profile between mild psoriasis patients and controls.

Variable	**Mild Case** (Mean ± SD)	**Control** (Mean ± SD)	**P-value**
Total cholesterol	206.84±15.87	163.52±14.56	0.000
Triglycerides	130.76±11.58	129.04±22.79	0.738
HDL-c	36.64±5.29	49.32±5.57	6.12
LDL-c	143.64±18.05	88.73±16.7	5.995
VLDL-c	26.16±2.33	25.92±4.61	0.466

Table 4: Comparison of lipid profile between moderate/severe psoriasis patients and controls.

Variable	**Moderate Case (Mean ± SD)**	**Control (Mean ± SD)**	**P-value**
Total cholesterol	240.64±13.19	163.52±14.56	0.000
Triglycerides	177.34±15.96	129.04±22.79	2.108
HDL-c	32.96±2.71	49.32±5.57	1344
LDL-c	171.96±14.80	88.73±16.7	0.000
VLDL-c	35.71±3.81	25.92±4.61	1.16

Patients with mild psoriasis had elevated levels but not significant as compared to controls ($p>0.05$). HDL-C showed significantly ($p<0.02$) lower value than controls in mild cases, and the difference was highly significant ($p<0.001$) in moderate to severe psoriasis. TC/HDL ratio were found to be significantly ($p<0.01$) higher in cases than control group. Total cholesterol, LDL-cholesterol, and TG showed a significant $P<0.001$ positive correlation with severity of the psoriasis.

Discussion

Atherosclerotic cardiovascular diseases are more frequently seen in psoriatic patients [10]. McDonald et al. [11] have shown that patients with psoriasis are predisposed to atherosclerotic cardiovascular diseases and thromboembolic events. This condition may be associated with disorders in lipid metabolism, and its possible relationship with oxidative stress in the chronic disease process have been suggested in some studies [4]. In addition, hypertension, where activation of the renin-angiotensin system plays a prominent role, atherosclerosis have been more frequently observed in patients with psoriasis [12]. Although there have been extensive studies in lipid metabolism in psoriasis, their importance in the etiology or in the enhancement of the disease remains conflicting. It is still controversial whether changes in lipid composition are primary

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events or secondary to psoriasis or perhaps due to medications, such as cyclosporine and retinoids. [13]

Many studies have evaluated the serum lipid profile in psoriatic patients. According to these studies, controversial results have been reported. The high serum levels of TCH, TG, VLDL, LDL, and low serum level HDL have been reported [14]. Another study showed normal serum levels of TCH, TG, LDL, and HDL [15]. Furthermore, a study by Javidi et al. showed that serum levels of TCH, TG, and LDL were found to be significantly higher in psoriatic patients than in the normal control group, and no significant statistical difference was observed between HDL levels of the two groups. Data of high serum levels of TCH and LDL were reported by Suleyman et al. in a study of one hundred psoriatic patients. In the present study, the serum levels of TCH and LDL in psoriatic patients were significantly higher than those of healthy subjects, and there were no significant differences in the serum levels of TG, HDL, and VLDL.

The association between psoriasis and dyslipidemia is somewhat controversial. We found a strong association as psoriatic patients had altered lipid levels, compared to the study of Cohen AD et al as dyslipidemia was present in 50.9% patients. While in the study of Dreiher J et al. dyslipidemia was found in 57.1% psoriatic patients. But in contrast, studies done by Neimann AL et al and Farshchian M et al failed to find a consistent association.[16-19] Among many case-control studies on serum lipid levels in psoriasis, conflicting results have been reported regarding serum cholesterol, LDL-C, serum triglyceride and HDL-C levels. Total cholesterol and LDL-C levels in psoriatic patients were found to be either significantly higher or similar to controls.[20] Triglyceride levels were reported to be significantly higher in psoriatic patients in some studies, but not in other studies. [21] Finally, HDL-C levels had been found to be significantly lower, similar or even higher to controls.[21] We found significantly raised levels of cholesterol, triglycerides and LDL-c in cases than in control group. Dyslipidemia was found more frequently in the patients with severe psoriasis. It was observed that in the patients with mild psoriasis i.e. PASI<10, 3 (12%) had dyslipidemia as compared to the patients with severe psoriasis. Thus, frequency of dyslipidemia increased proportionately with the severity of disease. Javidi Z et al found that total cholesterol levels significantly increased with disease severity. [22] LDL-C levels also increased but not significantly, while serum triglyceride and HDL had no relation with disease severity. Contrary to this, Mallbris L et al did not observe any significant association between disease severity and lipid profile.[20]

Similar to our study, Pietrzak et al. [23] found significantly higher Lp(a) levels in patients with psoriasis than in the control group; however, they detected significantly lower HDL levels in the lipid profile of patients with psoriasis relative to the control group, contrary to our study. Nevertheless, in contrast to the other studies in which Lp(a) was examined, in our study, serum Lp(a) levels in patients with psoriasis were significantly higher than those in the control group. Contrary to other studies related to the subject, there was no statistically significant difference between the other lipid parameters except for Lp(a). Several mechanisms for the increased lipid levels in psoriasis have been suggested. Psoriasis is now considered a systemic inflammatory disease, with Th-1 cells, Th-17 cells, and inflammatory cytokines contributing to its pathogenesis. [24-25] Furthermore, in agreement with previous findings suggesting that abnormal lipoprotein metabolism may be related to the high incidence of atherosclerosis in psoriasis.

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Hypertriglyceridemia secondary to VLDL is associated with both procoagulant and prothrombotic factors in the blood. VLDL-mediated platelet adhesion may play an important role in atherosclerosis. These VLDL remnants are susceptible to retention within the arterial intima, thereby promoting atherosclerotic plaque growth. In this regard, antibodies recognizing oxidized LDL are reported to correlate with disease severity. [26] Interestingly, macrophages activated by engulfing LDL immune complexes release large quantities of tumor necrosis factor (TNF-α) and IL-1β. [27] Cytokine driven inflammation and tissue destruction is a common theme of chronic inflammatory disease. That is why, in psoriasis, the association between lipid and immunologic abnormalities was observed, so the disease could be described as an immunometabolic syndrome.[28-29] Psoriasis is a chronic inflammation characterized by increased Th- 1 and Th-17 T cell activity. The significant role of cytokines, such as TNF-α, IL-6, IL-8, IFN-gamma, IL-1, and IL-17 in the generation of proatheromatous abnormalities (dyslipidemia, insulin resistance, endothelial dysfunction, clotting system activation and pro-oxidative stress) was reported.[30] The clinical manifestations of both the diseases include inflammation that seems to be driven by certain T- cell cytokines including chemokines, local and systemic expression of adhesion molecules and endothelins which are characteristic for the T-helper 1 cell response.[31] In light of these findings, the lipid abnormalities seen in psoriasis patients, while promoting atherosclerosis might in parallel facilitate and maintain the inflammatory reaction in the skin.

Strength and limitation of the study

The present study has some potential limitations among them the small sample size because of our high standard strict exclusion criteria. Future studies with larger sample size having both sexes along with quantification of body fat content are needed to understand the role of lipids in pathogenesis of psoriasis.

Conclusion

Patients with psoriasis must be considered a group at high risk for cardiovascular diseases. Lipid derangements correlate with the severity of disease and also act as a good prognostic sign. We suggest early screening with a serum lipid profile assay in psoriatic patients at the time of presentation and follow-up for evaluating the risk and treatment of hyperlipidemia to modify and prevent the risk of cardiovascular diseases.

References

1. Burns, S. Breathnach, N. Cox, Ch. Griffiths (2010): Rook's Textbook of Dermatology, 8th ed., Wiley-Blackwell Publishing Ltd, vol. I: 20.1-20.60.
2. Fitzpatrick TB, Freedberg IM, Eisen AZ, Wol FK, Austen KF, Goldsmith LA, Katz SI (1999): Dermatology in General Medicine, 5th ed., McGraw-Hill Co., vol. (I): 495.
3. Gelfand JM, Stern RS, Nijsten T, Feldman SR, Thomas J, Kist J, et al. The prevalence of psoriasis in African Americans: results from a population-based study. J Am Acad Dermatol. 2005;52:23-6.
4. Pietrzak A, Lecewicz-Tourn B. Activity of serum lipase and the diversity of serum lipid profile in psoriasis. Med Sci Monit. 2002;8:CR9-13.
5. Krueger JG, Bowcock A. Psoriasis pathophysiology: current concepts of pathogenesis. Ann Rheum Dis 2005;64(2):ii30-6.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 10, 2024

6. University of California, Davis, Department of Dermatology. Psoriasis retrieved 2013. http://www.ucdmc.ucdavis.edu/dermatology/medical/psoriasis.html.
7. Seishima M, Mori S, Noma A (1994). Serum lipid and lipoprotein levels in patients with psoriasis. Br J Dermatol; 130:738-42.
8. Lotus Mallbris, Fredrik Granath, Hamsten, Mona Stahle (2006). Psoriasis is associated with lipid abnormalities at the onset of skin disease. JAAD; 54, 4:614-21.
9. Spah F. (2008). Inflammation in atherosclerosis and psoriasis: common pathogenic mechanisms and the potential for an integrated treatment approach. British Journal of Dermatology; 159 (Supp. 2):10-17.
10. Gottlieb AB, Chao C, Dann F. Psoriasis comorbidities. J Dermatolog Treat 2008;19:5-21.
11. McDonald CJ, Calabresi P. Psoriasis and occlusive vascular disease Br J Dermatol 1978;99:469–75.
12. Ena P, Madeddu P, Glorioso N, Cerimele D, Rappelli A. High prevalence of cardiovascular diseases and enhanced activity of the renin-angiotensin system in psoriatic patients. ActaCardiol 1985;40:199–205.
13. Seckin D, Tokgozoglu L, Akkaya S. Are lipoprotein profile and lipoprotein(a) level altered in men with psoriasis? J Am Acad Dermatol. 1994;31:445-9.
14. Madhur Gupta, Suresh Chari, Milind Borkar, and Manju Chandankhede (2011). Dyslipidemia and oxidative stress in patients with psoriasis. Biomedical Research; 22(2): 221-4.
15. Utas S, Pasaoglu H, Muhtaroglu S, Unver U, Utas C, Kelestimur F. Serum lipid profile in patients with psoriasis. T Klin J Dermatol 1995;5:18-29.
16. Cohen AD, Gilutz H, Henkin Y, Zahger D, Shapiro J, Bonneh DY, et al. Psoriasis and the metabolic syndrome. Acta Derm Venereol. 2007;87:506-9.
17. Dreiher J, Weitzman D, Davidovici B, Shapiro J, Cohen AD. Psoriasis and dyslipidemia: A population-based study. Acta Derm Venereol. 2008; 88:561-5. .
18. Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB, Gelfand JM. The prevalence of cardiovascular risk factors in patients with psoriasis. J Am Acad Dermatol. 2006;55:829-35.
19. Farshchian M, Zamanian A, Farshchian M, Monsef AR, Mahjub H. Serum lipid level in Iranian patients with psoriasis. J Eur Acad Dermatol Venereol. 2007;21:802-5.
20. Mallbris L, Granath F, Hamsten A, Stahl M. Psoriasis is associated with lipid abnormalities at the onset of skin disease. J Am Acad Dermatol. 2006;54:614-21.
21. Tekin NS, Tekin IO, Barut F, Sipahi EY. Accumulation of oxidized low-density lipoprotein in psoriatic skin and changes of plasma lipid levels in psoriatic patients. Mediators Inflamm. 2007;78454.
22. Javidi Z, Meibodi NT, Nahidi Y. Serum lipid abnormalities and psoriasis. Indian J Dermatol. 2007;52:89-92.
23. Pietrzak A, Kadzielewski J, Janowski K, Roliński J, Krasowska D, Chodorowska G, et al. Lipoprotein (a) in patients with psoriasis: associations with lipid profiles and disease severity. Int J Dermatol 2009;48:379–87.
24. Rapp SR, Feldman SR, Exum ML, Fleischer AB Jr., Reboussin DM. Psoriasis causes as much disability as other major medical diseases. J Am Acad Dermatol. 1999;41:401-07.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 10, 2024

25. Terui T, Ozawa M, Tagami H. Role of neutrophils in induction of acute inflammation in T-cell-mediated immune dermatosis, psoriasis: a neutrophil-associated inflammation-boosting loop. Exp Dermatol. 2000;9:1-10.
26. Orem A, Cimsit G, Deger O, Vanizor B. The significance of autoantibodies against oxidatively modified LDL in patients with psoriasis. Clin Chim Acta. 1999;284:81-8.
27. Takeda H, Okuho M, Hoga M, and Aizawa K. Lipid analysis of peripheral blood monocytes in psoriatic patients using Fourier transform infrared microspectroscopy. J Dermatol. 2001;28:303-11.
28. Dreiher J, Weitzman D, Shapiro J, Davidovici B, and Cohen AD. "Psoriasis and chronic obstructive pulmonary disease: a case-control study." British Journal of Dermatology. 2008;159(4):956-60.
29. Wysocki J, Nski SS, ozik AS, Hochuł B, Zyguła M. "Metabolic or immunometabolic syndrome?" Wiadomosci Lekarskie. 2005;58(1-2):124-7.
30. Gisondi P, Fantin F, Del Giglio M, Valbusa F, Marino F, Zamboni M, et al. "Chronic plaque psoriasis is associated with increased arterial stiffness," Dermatology. 2009;218(2):110-3.
31. Schlaak JF, Buslau M, Jochum W, Hermann E, Girndt M, Gallati H, et al. T cells involved in psoriasis vulgaris belong to the Th1 subset. J Invest Dermatol. 1994;102:145-9.