Original Research Article

Alterations in plasma lipid profile and cardiovascular risk indicators in clinically sub-grouped psoriasis

S. Srinivas[1], S. Nagendra[2]*, Prashanthkumar Goudappala[3], R. T. Kashinath[4]

[1]Department of Dermatology, [2]Department of Medicine, [3]Department of Biochemistry, [4]Research and Development Department, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka, India

*Correspondence:
Dr. S. Nagendra,
E-mail: rsearch.smc@gmail.com

ABSTRACT

Background: Psoriasis, a chronic skin complication been considered in the recent years by dermatologists as a systemic disease with multi organ abnormalities. Dyslipidemia commonly observed in psoriasis patients may result in cardiovascular complications hence a prompt routine cardiovascular risk evaluation is essential in these patients. A study was designed to assess plasma lipid profile as well as cardiovascular risk markers in psoriasis patients to find out the relationship between cardiovascular risk indicators and psoriasis disease severity.

Methods: Study consists of 200 subjects including 100 psoriatics. These psoriatics were sub-grouped based on their increasing PASI score into four groups.

Results: The results indicate a significant elevation in lipid parameters and in cadiac risk ratio, atherogenic index of plasma as well as atherogenic coefficient in psoriatics as compared to normal controls. Further a parallel raise has seen in these lipid parameters and risk indicators based on their increasing PASI score.

Conclusions: It can be stated from the study results that psoriatics are more affected group for cardiovascular complications and a proper evaluation of cardiovascular risk indicators in these patients is essential in preventing development of cardiovascular risk. Further the risk indicators atherogenic index of plasma and atherogenic coefficient are more promising in evaluating cardiovascular risk in psoriases patients.

Keywords: Psoriasis, PASI score, Lipid parameters, Atherogenic index of plasma, Cadiac risk ratio, Atherogenic coefficient

INTRODUCTION

Psoriasis, a common chronic skin disorder affecting 2-3% of world population and its occurrence is affected by environmental, psychological, immunological, biochemical and genetic factors. Across the Globe about 150 million people are affected by this skin complication.[1] In recent years the psoriasis has been recognised by many dermatologists as systemic disease with multi organ involvements and complications.[2] The predominant co-abnormality observed in psoriatics is dyslipidemia and in this skin disorder lipid metabolism and lipid turnover seems to be generally altered which may be attributed to cardiovascular involvement as well as due to underlying psychological stress. Many earlier researchers have observed plasma lipid profile alterations in psoriasis patients.[3-18] Psoriatic dyslipidemia is mainly characterised by consistent alterations in plasma total cholesterol levels as well as in plasma triacylglycerol levels.[9,13-15,17] As both triacylglycerols and total cholesterol are mainly related to cardiovascular complications and these two lipid parameters are elevated

in psoriatics making these patients more prone to cardiovascular diseases which is primarily due to their derangement. There are no reports available regarding the plasma lipid profile relationship to cardiovascular complications in psoriasis patients as well as to the psoriasis disease severity.

Hence a study was undertaken to evaluate the plasma lipid profile in psoriatic sub groups based on their PASI scores with an emphasis on the clinical utility of these lipid profile in assessing the cardiovascular risk in these patients.

METHODS

The psoriasis patients of both sexes (20-60 years) attending Subbaiah Medical College Hospital, Shivamogga and other affiliated hospitals, were randomly selected. The normal controls of both sexes (20-60 years) were taken from the employees of Subbaiah Medical College and its affiliated hospitals. This study was carried out during the period November 2017 to July 2018. A complete history regarding the present illness, its duration and the therapy taken were collected. The selected psoriasis patients were sub grouped depending on their PASI (psoriasis area and severity index) scores into 4 subgroups (Table 1).

PASI score is a psoriasis severity score to assess the psoriasis severity depending on the presence and distribution of psoriatic lesions on (a) head (h), (b) upper limbs (u), (c) trunk (t) and (d) lower limbs (l). The sites of affection like head, upper limbs, trunk and lower limbs are individually scored.

The psoriasis plaques were scored by evaluating morphologic parameters like erythema (E), indurations (I) and desquamation (D) and these parameters were graded separately on a severity scale. As the four body regions (head, upper limbs, trunk and lower limbs) represent approximately 10%, 20%, 30% and 40% of body surface area respectively. Hence the area severity was assessed by multiplying scores with 0.1, 0.2, 0.3 and 0.4 respectively.

The final formula to calculate PASI score was:

PASI = $0.1 \times (Eh + Ih + Dh) A + 0.2 \times (Eu + Iu + Du) A + 0.3 \times (Et + It + Dt) A + 0.4 \times (El + Il + Dl) A.$[19]

A fasting blood sample (5-6 ml) was collected with heparin as an anticoagulant from the selected psoriasis patients and from normal controls after obtaining an informed consent. The collected samples were centrifuged for ten minutes at 3500 rpm. The plasma separated was used for estimation of total cholesterol (TC), triacylglycerols (TAG) and HDL cholesterol (HDLC).[20-22] VLDL cholesterol (VLDLC), LDL cholesterol (LDLC), cardiac risk rate (CRR), atherogenic index of plasma (AIP) and atherogenic coefficient (AC) were calculated by using the following formulae.[23-26]

- VLDLC= (TAG/5)
- LDLC= (TC- HDLC–VLDLC)
- CRR= (TC/HDLC)
- AIP= log (TAG/HDLC)
- AC= (TC-HDLC/HDLC)

Statistical analysis

The results obtained were expressed as their Mean±SD and were statistically evaluated using Graph Pad Instat 3.05. P<0.05 was considered as significant.

RESULTS

The present study included a total number of 200 subjects consisting 100 normal controls and 100 psoriatics. Depending on their PASI score the psoriatics were categorised in to 4 groups group-1 (21 patients), group-2 (26 patients), group-3 (28 patients) and group-4 (25 patients) (Table 1).

Table 1: Patient distribution based on their PASI score.

Groups	PASI score
Group 1 (21)	<3
Group 2 (26)	3-6
Group 3 (28)	6.1-10
Group 4 (25)	>10.1

The results obtained are narrated in Table 2-5. The plasma levels of TC, TAG, HDLC, VLDLC and LDLC in normal controls and in psoriatics are given in Table 2. It is clear from the table that TC, TAG, VLDLC and LDLC are significantly raised in psoriatics as compared to normal controls, whereas HDLC levels are significantly lowered.

Table 2: Plasma lipid parameters.

Groups	TC (mg/dl)	TAG (mg/dl)	HDLC (mg/dl)	VLDLC (mg/dl)	LDLC (mg/dl)
Normal subjects (100)	161.86±31.82	114.64±32.21	58.27±8.68	28.35±9.08	104.86±20.28
Psoriasis patients (100)	214.85[***]±28.12	247.78[***]±22.16	45.52***±9.38	50.70***±11.12	125.85[***]±17.18

Data expressed as their Mean±SD. * p>0.05, **p>0.01 and ***p>0.001.

Table 3: Cardiovascular risk indicators.

Groups	CRR	AIP	AC
Normal subjects (100)	2.78±0.13	1.97±0.21	1.78±0.32
Psoriasis patients (100)	4.72***±0.42	5.44***±0.72	3.72***±0.40

Data expressed as their Mean±SD. * p>0.05, **p>0.01 and ***p>0.001.

Table 4: Plasma lipid parameters in psoriatic sub groups.

Groups	TC (mg/dl)	TAG (mg/dl)	HDLC (mg/dl)	VLDLC (mg/dl)	LDLC (mg/dl)
Group-1 (21)	122.80±14.48	107.86±8.82	50.60±12.80	21.50±3.10	47.75±2.10
Group-2 (26)	154.28***±6.82	149.64***±9.90	55.60±9.86	28.82***±2.80	81.20***±6.90
Group-3 (28)	189.90***±9.90	178.80***±11.20	45.30**±10.82	36.60***±2.10	100.90***±1.10
Group-4 (25)	222.28***±7.80	238.60***±10.50	48.60±10.90	52.20***±3.90	129.60***±9.90

Data expressed as their Mean±SD. * p>0.05, **p>0.01 and ***p>0.001.

Table 5: Cardiovascular risk indicators in psoriatic sub groups.

Groups	CRR	AIP	AC
Group-1 (21)	2.20±0.30	1.86±0.94	1.20±0.31
Group-2 (26)	3.90***±1.10	3.30***±0.60	2.48*±0.62
Group-3 (28)	3.70±0.95	4.10*±0.40	2.51±0.80
Group-4 (25)	4.88***±1.20	6.10***±1.50	4.20***±2.88

Data expressed as their Mean±SD. * p>0.05, **p>0.01 and ***p>0.001.

Table 3 gives the plasma levels of CRR, AIP and AC in normal controls and in psoriatics. It is evident from the table that CRR, AIP and AC are significantly increased in psoriatics as compared to normal controls.

Table 4 shows TC, TAG, HDLC, VLDLC and LDLC in group-1, group-2, group-3, and in group-4 psoriatics. It is seen from the table that the TC, TAG, VLDLC and LDLC are proportionately elevated in group-1 to group-4.
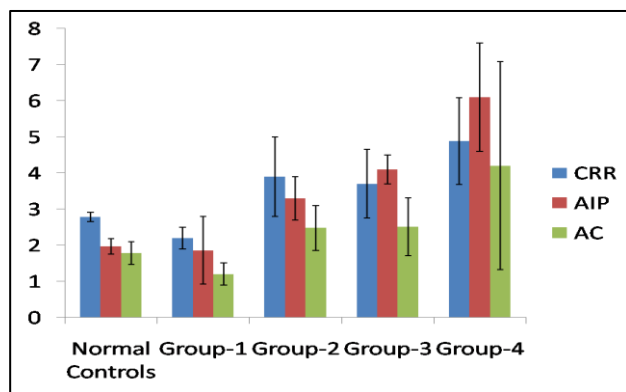
Table 5 narrates CRR, AIP as well as AC in group-1, group-2, group-3, and in group-4 psoriatics. It evident from the table that the CRR, AIP and AC are parallel raised in group-1 to group-4 indicating cardiovascular risk is related to psoriasis disease severity.

Figure 1: Comparison of cardiovascular risk indicators.

Figure 1 narrates the cardiovascular risk indicators CRR, AIP and AC in group-1, group-2, group-3, as well as in group-4 psoriatics. The Figure 1 proves that the risk factors are proportionately elevated parallel to increase in PASI score.

DISCUSSION

One of the significant feature of psoriatic dyslipidemia is elevated plasma lipid levels particularly cholesterol, TAG and related lipoprotein fractions.[27-28] The results of the present study shows a significant elevation in plasma TAG and in plasma TC levels in psoriatics as compare to normal controls indicating the psoriasis induced dyslipidemia is principally due to elevations in TAG and TC or it may be due to elevations in related lipoprotein fractions which are involved in their transport. This elevations is in agreement with many earlier reports.[6,8,9,29] The parallel increase in the lipid parameters in relation to severity of the psoriasis disease as per increase in their PASI score observed in the present study is in agreement with the reports of Amer et al suggesting the dyslipidemia is related to psoriasis disease severity (Table 4).[29]

Psoriasis is primarily an inflammatory disease and inflammatory conditions normally trigger the release of cell signalling compounds like cytokines, interlukins, tissue necrotic factors and others causing alterations in systemic lipid metabolism and lipid turnover through stimulating SREBP target genes as well as by up-regulation HMG CoA reductase gene.[30-37] This leads to an increase in the systemic synthesis of lipids including

cholesterol which is need of inflammatory state for the extra lipid requirement.

The elevation observed in cardiovascular risk indicators in psoriatics as observed in the present study (Table 3) indicates these patients are more vulnerable group for the development of cardiovascular complications. Though the significance of decreased HDLC in predicting the cardiovascular risk the importance raised plasma TAG levels as cardiovascular risk marker cannot be ignored.

The development of cardiovascular complications, including atherosclerosis, in a multi factorial process and the raised plasma lipid levels as well as dyslipidemia are the major key factors.[38] The two principle lipid constituents that make up the lipo proteins which are salient lipid transporting particles in human system. The very low density lipo proteins (VLDL) mainly transport endogenous or liver synthesized TAG whereas the cholesterol is being transported by low density lipo proteins (LDL) and High density lipo proteins (HDL). The development of cardiovascular disease is generally predicted by cardiovascular risk indicators and the principally employed risk indicators are cardiac risk ratio (CRR), atherogenic index of plasma (AIP) and atherogenic coefficient. The result obtained in the present study in psoriasis patients (Table 3 and 5) that risk indicators CRR, AIP and AC are significantly elevated in psoriatics proving that these patients are more susceptible for cardiovascular complications and specific remedial steps are necessary in considering their treatment.

Further the raise in this risk indicators are proportional to severity of the disease (Table 5) and Figure 1 indicating psoriasis disease severity is related to cardiovascular risk. It seen from the Figure 1 that CVD risk indicators-AIP and AC are more reliable in assessing CVD risk in psoriasis patients as compared to risk indicator, CRR.

CONCLUSION

It can be concluded from the present study that psoriasis patients are more vulnerable group for cardiovascular complications and a proper evaluation of cardiovascular risk indicators in these patients is essential in preventing development of CVD risk. Further the risk indicators AIP and AC are more promising in evaluating CVD risk in psoriases patients.

ACKNOWLEDGEMENTS

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