ORIGINAL RESEARCH

BIOCHEMICAL ASSESSMENT OF SERUM PARAOXONASEAND SERUM LIPID PROFILE AS PREDICTOR OF CARDIOVASCULAR DISEASES IN PATIENTS OF PSORIASIS

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ABSTRACT
Background: Psoriasis is the most prevalent chronic inflammatory disease, with an approximate worldwide prevalence of 2-3% [1]. The etiological factor is yet to be known but the genetic factor, trauma, skin infections, drugs, emotional stress like anxiety, alcohol, smoking etc greatly impact the clinical evolution of Psoriasis [2]. Oxidative stress which is induced by the excessive production of reactive oxygen species and inflammatory cytokines that play a significant role in the evolution of severe psoriatic plaques. Serum Paraoxonase is synthesized by the liver and is related with HDL particles.
Materials and Methods: Sample Collection– After 12 hours of fasting, a morning sample of 5 ml of venous blood has been collected from the antecubital vein from each subject under aseptic conditions. Parameters Serum Paraoxonase using paranitrophenol substrate by spectrophotometric method. Serum Lipidprofile Serum totalcholesterol by CHOD-PAP Enzymatic photometric method. Serumtriglycerides by GPO-POD method. Serum Hdl- cholesterol by Direct Enzymatic Cholesterol- DL estimation in the presence of detergent. Serum LDL-Cholesterol estimated by Friedewald formula. Serum VLDL- Cholesterol is estimated automatically by dividing triglyceride by5.
Results: The [mean ± SD] age of the cases was 43.67±11.069 and in the controls 42.8±11.679 years. Statistical analysis showed that there was no statistical difference in age between the two groups (as the P-value is > 0.005). The [mean±SD] basal PON activity in cases was 69.08±13.03 and in controls was 74.46±9.79. There is statistical significance in the basal PON activity between the two groups. The mean serum total

cholesterol is increased incases (p value is 0.630) when compared with controls, but it is not statistically significant. there is a high significance in the serum high densitylipo protein (HDL-C) between the two groups: 1. The mean increase in the levels of serum low densitylipo protein (LDL-C) cases are statistically significant when compared with controls. There was a high statistical significance in the serum triglycerides levels between the two groups.

Conclusion: This study was undertaken to study the levels of serum Paraoxonaseandserum lipid profile in 40 patients who are diagnosed with psoriasis to assess the irrole in causing cardiovascular diseases. 2. Inpsoriasis, the elevated levels of triglycerides, low densitylipo protein and very low-density lipoprotein are due to lowered levels of hepatic lipase at acute phase reaction, results in elevation of triglycerides in serum. Decreased levels of HDL-C levels are observed because the systemic Inflammation caused by cytokines. As PON is associated with HDL. The PON levels are affected by the decrease in HDL levels and results in lipidperoxidation along with formation of Oxidised LDL. This OX-LDL accumulates in the smooth muscle of artery and causes atherosclerosis.

Keywords: Cardiovascular disease, Psoriasis,Body mass index, Lipid profile, Cholesterol oxidase.

INTRODUCTION

Psoriasis is the most prevalent chronic inflammatory disease, with an approximate worldwide prevalence of 2-3%.[1] The etiological factor is yet to be known but the genetic factor, trauma, skin infections, drugs, emotional stress like anxiety, alcohol, smoking etc greatly impact the clinical evolution of Psoriasis.[2] It is distinguished markedly by hyper epidermal proliferation, atypical keratinocytes differentiation, T-Lymphocytes infiltration and exacerbated expression of cytokines which enormously results in the development of inflamed plaques.[3] Oxidative stress which is induced by the excessive production of reactive oxygen species and inflammatory cytokines that play a significant role in the evolution of sever epsoriatic plaques. Aggravated symptoms of psoriasis has been correlated with increased level of oxidative stress along with dyslipidemia, advocating the elevated risk for Cardiovascular disease (CVD) with in the patients of severe Psoriasis.[4,5] Serum Paraoxonase is synthesized by the liver and is related with HDL particles. It is generally known to regulate the antioxidant as well as anti-inflammatory role of HDL lipoprotein.[6] T Chronic Inflammation, which is the characteristic feature in psoriasisplaysa critical role in initiation along with progression and contributes towards dyslipidemia and cardio vascular diseases. Alteration in the lipid metabolism and lipoprotein composition like increased levels of total cholesterol, triglycerides, low density lipoprotein, very low densitylipo protein and decrease in the levels of high densitylipo protein assumes that the pathogenesis of psoriasis is closely related with changes in lipid metabolism. Thus, this study is undertaken to assess the cardiovascular risk in Psoriasis patients by estimating the serum Paraoxonase and lipid profile.

Aim:

To study Serum Paraoxonase and Serum lipid profile (total cholesterol (TC), triglycerides (TG), low density lipids (LDL-C), high density lipids (HDL-C) and very low-density lipids (VLDL-C)) in patients of psoriasis in the dermatology Department at King George Hospital, Visakhapatnam.

Objectives:
1. To estimate the levels of serum lipid profile-total cholesterol, triglycerides, low density lipids, high density lipids and very low-density lipids in identifying the risk of cardio vascular disease in patients with psoriasis.
2. To estimate the levels of serum paraoxonase to assess the atherogenicpotentiall of psoriasis.

MATERIALS & METHODS
Cross-sectional study was carried out in the Department of Biochemistry, Andhra Medical College, Visakhapatnam, with approval from the institutional Scientific and Ethics Committee.

Study subject and size:
A total of eighty patients with the age group 20 to 60 years, both male and female patients were selected from King George Hospital which is attached to Andhra Medical College, Visakhapatnam. Patients who are diagnosed with Psoriasis and attending the outpatient and inpatient Department of Dermatology were considered. Subjects weredivided into two groups, after fulfilling the inclusion and exclusion criteria.

Study period:
This study was conducted from February 2021 to November 2021 in the Department of Biochemistry, King George Hospital, Visakhapatnam.
Sample size: Cases 40 and Controls 40 Total Comes to 80

Inclusioncriteria:
1. Patients who are diagnosed with Psoriasis.
2. Patients who provided informed consent.
3. Patients of age group 20 to 60 years were considered.
4. The healthy people of the same age group were taken as controls.

Exclusion criteria:
1. Patients with Cardiovascular diseases.
2. Patients suffering with renal failure
3. Psoriatic patients on Lipid lowering drugs.
4. Diabetes Mellitus.
5. Hepatic Diseases.
6. Patients who are not willing to give consent.
7. Pregnant women.
8. Patients who are less than 20 years and greater than 60 years of age.

The Following steps were taken during the study:

1. The Ethical Committee of Andhra Medical College, Visakhapatnam, has approved the study protocol.
2. Before recruiting each participant in this study, informed consent was taken. The purpose of this study was explained to every patient in their local language.
3. A detailed history was taken about the duration of psoriasis, treatment taken for Psoriasis, family history of Psoriasis, any pre-existing diseases like diabetes, hypertension and cardiac diseases, personal history like smoking and alcohol intake.
4. A thorough physical examination and cutaneous examination was carried out.
5. Height and weight of the participant's is recorded and Body mass index was measured.
6. All the changes involving the nails, scalp, genitalia were
7. The cases are selected according to the PASI scoring based on the distribution of lesions.
8. Patients with PASI score more than 10 were selected.

PASI Score:

It is a most widely used tool both for severity and for monitoring the outcome of psoriasis to any therapeutic treatment. The severity can be assessed by the characteristic lesions of psoriasis like redness, thickness and scariness. The four sites which are affected in psoriasis are head (h), upper limbs (u), trunk (t) and lower limbs (l) are scored separately. Morphologic scoring of plaquesinpsoriasisisd one by evaluating three parameters- erythema, in duration and desquamation. Each parameter is graded on a severity scale from 0 to 4, where 0 is equal to nil, 1 is equal to mild, 2 is equal to moderate, 3 is equal to severe and 4 is equal to very severe

Sample Collection:

After 12 hours of fasting, a morning sample of 5 ml of venous blood has been collected from the antecubital vein from each subject under aseptic conditions.

- The blood was collected in aclotactivator vacutainer (red topped tubes).
- The blood in the tube is allowed to clot spontaneously for30minutes.
- Then the tube is centrifuged for10 minutes at 3000 rpm.
- The analysis was done immediately whenever possible.
- When there was any delay, the samples were stored at -70 degrees Celsius for further analysis. Care was taken to avoid hemolysis of the sample.
- All the findings were recorded, tabulated and statistically analysed using the r-test and the unpaired t-test on a excel sheet and expressed in terms of mean and standard deviation.
- A p-value of less than 0.05 (<0.05) is more significant.

Parameters

1. Serum PARAOXONASE using paranitrophenol substrate by spectro photometric method.
2. Serum LIPID PROFILE
3. Serum total cholesterol by CHOD-PAP Enzymatic photometric method.

Table 1: Referencerange Total Cholesterol

Total cholesterol levels	Risk classification
<200mg/dl	Desirable
200-239 mg/dl	Border line high
≥240mg/dl	High

Table 2: Serum triglycerides by GPO-POD method reference levels

Triglycerides Level	Risk Classification
<150 mg/dl	Normal
150-199mg/dl	Border line high
200-499mg/dl	High
≥500mg/dl	Very high

Serum HDL-cholesterol by Direct Enzymatic Cholesterol-HDL estimation in the presence of detergent.

Reference Values: 23-92mg/dl.NCEP increased the high risk medical decision point to >40mg/dl. There fore the guidelines for CAD are:

1. <40mg/dlisamaj or risk factor for CAD
2. >60 mg/dlisa negative risk factor for CAD.
3. Serum LDL-Cholesterol estimated by Friedewald formula.
4. VLDL-C=Triglyceride/5LDL=TC-(HDL-C+VLDL-C)

Reference Range for LDL-CAbove 100mg/dl good control130mg/dlto159mg/dl moderately elevated above 160mg/dl high levelSerum VLDL-Cholesterol is estimated automatically by dividing triglyceride by

RESULTS
Age wise Distribution:
The age distribution pattern of cases and controls are shown in the [Table 3].

Table 3: Age distribution of cases and controls

Age in years	Cases		Controls	
	No	%	No	%
21-30	5	12.5	8	20.0
31-40	13	32.5	9	22.5
41-50	10	25.0	11	27.5
51-60	12	30.0	12	30.0
Total	40	100.0	40	100.0
Mean±SD	43.67±11.069		42.8±11.679	
Chi-Square Value = 1.467				
P Value = 0.69				

The [mean ± SD] age of the cases was 43.67±11.069 and in the controls 42.8±11.679 years. Statistical analysis showed that there was no statistical difference in age between the two groups (as the P-value is > 0.005).

Gender Wise Distribution:
The gender wise distribution pattern of cases and controls are shown in the [Table4].

Table 4: Gender wise distribution of cases and controls

Gender	Cases		Controls	
	No	%	No	%
Male	29	72.5	23	57.5
Female	11	100.0	17	42.5
Total	40	100.0	40	100.0
Chi-Square Value = 1.978				
P Value = 0.241				

Samples are gender matched with 72.5% of males and 27.5% of females incases and 57.5% males and 42.5% females in controls. There was no statistical difference in gender distribution between the two groups.

Basalpon Activity:
[Table 5] shows the pattern of basal PON activity in cases and controls.

Table 5: Basal PON activity in cases and controls

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Basal PON activity	69.08±13.03	74.46±9.79	2.086	0.04	Significant

The [mean±SD] basal PON activity in cases was 69.08±13.03 and in controls was 74.46±9.79.There is statistical significance in the basal PON activity between the two groups.

SaltstimulatedPonactivity:
[Table 6] shows the pattern of salt stimulated PON activity between cases and controls.

Table 6: Salt simulated PON activity in cases and controls

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Salt stimulated PON activity	73.95±14.07	88.26±10.55	5.144	0.000	Highly Significant

The [mean ± SD] Salt stimulated PON activity in cases was 73.95±14.07 and in controls was 88.26±10.5. Statistical analysis showed that there is a high significance in the salt stimulated PON activity between the two groups.

Graph4:Salt stimulated PON activity between cases and controls

Lipid Profile: Serumtotalcholesterol(TC):
[Table 7] shows the mean value of total cholesterol between cases and controls.

Table 7: Mean value of serum total cholesterol in cases and controls

Parameter	Cases(Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Total Cholesterol (TC)	194.8±36.82	191.4±26.67	0.483	0.630	Not Significant

The [mean ± SD] serum total cholesterol in cases was 194.8±36.82 and in controls was 191.4±26.67. The mean serum total cholesterol is increased incases (p value is 0.630), when compared with controls, but it is not statistically significant.

Serum Triglycerides (TG):
[Table8] shows the mean value of serum triglycerides between cases and controls.

Table 8: serum triglycerides between cases and controls.

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Serum triglycerides (TG)	141.37±29.65	122.67±22.65	3.169	0.002	Highly Significant

The [mean ± SD] serum triglycerides in cases where 141.37±29.65 and in controls was 122.67±22.6. There was a high statistical significance in the serum triglycerides levels between the two groups.

Serum High Density Lipoprotein (HDL-C):
[Table 9] shows the mean value of serum high density lipoprotein between cases and controls.

Table 9: serum high density lipoprotein between cases and controls.

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Serum high density lipoprotein (HDL-C)	30.07±7.46	48.02±5.77	12.02	0.000	Highly Significant

The [mean ± SD] serum HDL-C in cases was 30.07±7.46 and in controls was48.02±5.77. Statistical analysis showed that there is a high significance in the serum high density lipoprotein (HDL-C) between the two groups.

Serum Lowdensitylipoprotein (LDL-C):
[Table 10] shows the mean value of serum low density lipoprotein (LDL-C) between cases and controls.

Table 10: serum low density lipoprotein between cases and controls.

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Serum low density lipoprotein (LDL-C)	135.65±37.76	118.29±24.18	2.447	0.017	Significant

The [mean ± SD] serum LDL-C in cases was 135.65±37.76 and in controls was 118.29±24.18. The mean increase in the levels of serum low density lipoprotein (LDL-C) cases are statistically significant when compared with controls.

Serum very low density lipoprotein (VLDL-C):

[Table 11] shows the mean value of serum very low density lipoprotein (VLDL-C) between cases and controls.

Table 11: serum very low density lipoprotein in cases and controls.

Parameter	Cases (Mean±SD)	Controls (Mean±SD)	't' value	'p' value	Significance
Serum very low-density lipoprotein (VLDL-C)	28.40±5.80	24.72±4.93	3.049	0.003	Highly Significant

The [mean±SD] serum VLDL-C in cases was 28.40±5.80 and in controls was 24.72±4.93. Statistical analysis showed that there is a high significance in the serum high density lipoprotein (HDL-C) between the two groups.

Correlationof HDLandponactivity:

The correlation between HDL-C and PON activity is shown in the [Table 12].

Table 12: Correlation of HDL-C and PON activity in cases and controls

Correlation	Healthy		Cases	
	R value	P value	R value	P value
HDL-C vs Basal PON Activity	0.271	0.356	0.861	0.000
HDL-C vs Salt Stimulated PON activity	0.299	0.206	0.644	0.000

Cases

Scatter plot incases for the correlation of serum HDL with serum Paraoxonase activity (both Basal and Salt stimulated activity)

DISCUSSION

The present study was conducted to evaluate the levels of serum Paraoxonase and abnormalities in lipid profile in clinically and his to pathologically diagnosed cases of psoriasis attending department of dermatology. The same parameters were studied in healthy

subjects, selection is based on inclusion and exclusion criteria. The results of both the groups were analysed statistically and the results were compared.

Ponactivity: Basalponactivity

The [mean ± SD] basal PON activity in cases was 69.08±13.03 and in controls was 74.46±9.79. There is statistical significance in the basal PON activity between the two groups. There sults in the present study are in accordance with the findings of Houshanget al.[7]

Table 13: Comparison between Mean of Basal PON activity

Authors	Cases	Controls	P-value
Houshang et al,[7]	119.6±35.7	152.8±28.8	<0.001 (highly significant)
AAEAhmed et al,[8]	24.5±47.5	42.2±60.0	<0.001 (highly significant
A. Toker et al,[10]	37.13±16.6	27.61±11.8	>0.05 (not significant)
Prathibak et al,[9]	63.24±13.9	72.57±9.58	<0.001 (highly significant
Present study	69.08±13.03	74.46±9.79	<0.05 (significant)

Salts Stimulated Activity

The [mean±SD] Salt stimulated PON activity in cases was 73.95±14.07 and in controls was 88.26±10.5. Statistical analysis showed that there is a high significance in the salt stimulated PON activity between the two groups. There sults in the present study are in accordance with the findings of Prathibaket al.[9]

Table 14: Comparison between Mean of Salt stimulated PON activity

Authors	Cases	Controls	P-value
Prathibak et al,[9]	72.57±15.17	82.72±8.87	<0.001 (highlysignificant)
A. Toker et al,[10]	97.30±60.2	63.87±41.9	>0.05 (notsignificant)
Present study	73.9±14.07	88.26±10.55	<0.001 (highlySignificant)

Lipid profile
Total cholesterol:

The [mean ± SD] serum total cholesterol in cases was 194.8±36.82 and in controls was 191.4±26.67.the mean serum total cholesterol is increased incases (pvalueis0.630), when compared with controls, but it is not statistically significant. The results in the present study are in accordance with the findings of Prathibak et al,[9]and A. Toker et al.[10]

TRIGLYCERIDES

The [mean ± SD] serum triglycerides in cases were 141.37±29.65 and in controls was 122.67±22.6. There was a high statistical significance in the serum triglycerides levels between the two groups. The results in the present study are inaccordance with the findings of Prathibak et al,[9] Gupta S et al.[11]

Highdensity Lipoprotein

The [mean ± SD] serum HDL-C in cases was 30.07±7.46 and in controls was 48.02±5.77. Statistical analysis showed that there is a high significance in the serum high density lipoprotein (HDL-C) between the two groups. The results in the present study are in accordance with the findings of Manisha Arora et al.[13]

Low Density Lipoprotein

The [mean ±SD] serum LDL-C in cases was 135.65±37.76 and in controls was 118.29±24.18. The mean increase in the levels of serum low density lipoprotein (LDL-C) cases are statistically significant when compared with controls. The results in the present study are in accordance with the findings of Prathiba k et al.[9]

VERYLOWDENSITYLIPOPROTEIN

The [mean±SD] serum VLDL-C incases was 28.40±5.80 and in controls was24.72±4.93. Statistical analysis showed that there is a high significance in the serum high density lipoprotein (HDL-C) between the two groups. There sults in the present study are in accordance with the findings of Prathiba k et al,[9] Gupta S et al.[11]

CONCLUSION

1. Psoriasis is a chronic inflammatory disorder of skin, which is triggered by both genetic and environmental factors.
2. It is associated increased frequency of cardiovascular diseases and increased risk of mortality. Chronic inflammation, systemic medications for psoriasis and lifestyle factors elevates the risk for cardiovascular diseases in psoriatic patients.
3. This study was undertaken to study the levels of serum Paraoxonase and serum lipid profile in 40 patients who are diagnosed with psoriasis to assess their role in causing cardiovascular diseases.
4. In psoriasis, the elevated levels of triglycerides, low density lipoprotein and very low density lipoprotein are due to lowered levels of hepatic lipase at acute phase reaction, results in elevation of triglycerides in serum. Decreased levels of HDL-C levels are observed be cause the systemic Inflammation caused by cytokines.

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