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Original Research Article

Investigating the Association of Metabolic Syndrome in Psoriasis Patients

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Abstract:

Background: Metabolic syndrome is constellation of many different disorders. The common conditions associated with metabolic syndrome are obesity, hypertension, and dyslipidemia and insulin resistance. These conditions do play some role in developing cardiovascular disease beyond traditional risk. Metabolic syndrome have been commonly seen in patients of many skin diseases including psoriasis, lichen planus, acne inversa and even in skin malignancies. In chronic skin disorder and even in metabolic syndrome chronic inflammation has been shown to play some role in the pathogenesis of disease. The present study is designed with a view to know any association between skin diseases especially psoriasis and metabolic syndrome.

Materials and Methods: Present study was conducted on 100 clinically confirmed cases of Psoariasis & 100 age and sex matched healthy controls. Detailed history and clinical examination was conducted for both cases & controls. Blood pressure, waist circumference & body mass index were recorded. Blood fasting glucose levels and lipid profiles were also measured for both groups. Statistical analysis was done using descriptive statistics and Chi-square tests were used to assess the significance of the differences between the two groups. Data analysis was performed using SPSS and EPI info software.

Results: Among psoriasis patients 26/100 had metabolic syndrome. The incidence of metabolic syndrome with skin disease was high as compared to control population and it was also statistically significant.

Conclusion: It was concluded from this study that metabolic syndrome is an important co-morbidity with psoriasis which requires screening to avoid complications in later life.

Keywords: Psoriasis, Metabolic Syndrome.

Introduction

Psoriasis is a common chronic, inflammatory, immune mediated, genetically determined skin disorder, the course of which is affected by multiple environmental factors. In recent years, psoriasis is being recognized as a systemic disease associated with numerous multiorgan abnormalities and complications, posing a lifelong burden for those affected.[1,2] Prevalence of psoriasis varies in different parts of the globe, ranging from 0.5% to close to 2.5%. [5] Its prevalence in different populations varies from 0.1% to 11.8%.

In India, it varies from 0.4% to 2.8% in different studies. It is equally common in males and females. In Indians, higher prevalence in males has been noted. There is bimodal age of onset, the first peak at 15-20 years of age and a second one at 55-60 years of age. Indian studies have reported the higher incidence to be in the second decade or in reproductive age group.[3] The pathophysiology of psoriasis is governed mainly and predominantly by presentation, helper T-cell (Th)1 and Th17 cytokine production, T-cell expansion and angiogenesis.[7] It is a classical Th1 mediated disorder with Tumour Necrosis Factor – α (TNF-α) being the predominant cytokine.[8] Multiple HLA alleles are associated with psoriasis particularly HLA-B13, HLA-B37, HLA-B46, HLA-B57, HLA-Cw1, HLA-Cw6, HLA-DR7 and HLA-DQ9.[4]

The classic lesion of psoriasis is a well demarcated, raised, red plaque with a white silvery scaly surface. Lesions vary in size from a pinpoint papule to plaque that cover large areas of the body. The different clinical patterns are chronic stable plaque psoriasis (psoriasis vulgaris), guttate psoriasis, Small plaque psoriasis, Inverse psoriasis, Erythrodermic psoriasis, Pustular psoriasis. Many diseases particularly heart disease, hypertension and diabetes mellitus showed the positive association.[5] Similar studies done by Alexander E et al [6,7] in Indian population, the association of psoriasis with other diseases was established and with the highest frequency for diabetes mellitus. A study done by A Jucci et al indicate the existence of an endogenous insulin resistance in psoriasis. [8] The metabolic syndrome or the insulin resistance syndrome or the syndrome X are the terms used to describe a constellation of metabolic derangements that includes insulin resistance, hypertension, dyslipidemia, central or visceral obesity, type 2DM or IGT/IFG, and accelerated cardiovascular disease. TNF-α which plays a central role in the immunopathogenesis of psoriasis may be involved in the increased insulin resistance observed in patients with psoriasis. [9]

Lipoprotein A which is a genetically determined molecule whose role has been implied in cardiovascular pathology, and whose levels have been reported to be elevated in patients of psoriasis may be a factor contributing to an increased cardiovascular risk in patients of psoriasis. [10]

The link between psoriasis and hypertension may be related to the increased levels of angiotensin converting enzyme, Endothelin 1(ET-1) and renin in patients with psoriasis.[9]

Adipose tissue in psoriatic patients may serve as a major source of angiotensinogen, which is subsequently converted into Angiotensin II.[11] Angiotensin II not only promotes salt retention by the kidneys, but it also stimulates T Cell proliferation.[12] Angiotensin II also appears to promote inflammation and the development of atherosclerosis. [13]

The association between psoriasis and hypertension may also be attributed to the increased oxidative stress in psoriasis patients. Greater levels of reactive oxygen species can damage endothelium dependent vasodilation.

Increased associations between psoriasis and diseases such as diabetes mellitus, hypertension and lipid abnormalities are being recognized. Epidemiological studies have established these associations and they are determining the directionality of the associations and the role of psoriasis as an independent risk factor for these outcomes.

Psoriasis is associated with metabolic syndrome, and its components, such as obesity, diabetes, and hypertension independent of traditional risk factors for these disorders. These phenotypically diverse conditions share similar pathologic changes such as chronic inflammation, angiogenesis, oxidative stress, and selected susceptibility genes and loci.

Material and Method

The present study was a case control study, undertaken to study the association of psoriasis with metabolic syndrome and its components like-Obesity, Diabetes mellitus, Hypertension and Hyperlipidemia. A total of 100 cases of clinically diagnosed psoriasis patients and 100 age and sex matched controls attending Out Patient Department or admitted in ward of Dermatology, Venereology and Leprosy at Mahaveer Institute of Medical sciences & research, Bhopal Madhya Pradesh constituted the subject material for present study. Prior approval for the study and the protocol was obtained from the ethical committee. Informed written consent was taken from cases for the inclusion in the study. Detailed history and clinical examination findings of psoriatic cases was done. Selection of equal number of controls with age and sex matching was done. Detailed history and clinical examination of controls after taking informed Consent. All cases and controls were subjected to Blood Pressure measurement, Waist Circumference and Body Mass Index.

Routine investigations, Blood Fasting glucose level, Lipid profile was sent for all cases and controls. Conclusion was established on the grounds of all findings. The working proforma has been devised according to which, the patient will be subjected to detailed history, thorough clinical examination and the clinical diagnosis would be made. This would be co-related with the laboratory findings to conclude the percentage co-relation between the two. Statistical analysis was done by the statistician with the help of the software. Descriptive statistical analysis has been carried out in the present study. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Analysis was done by using SPSS and EPI info software and necessary test of significance (chi square test) was applied.

Observations & Results

This study was carried out in Department of Dermatology, Venereology and Leprology, Mahaveer Institute of Medical Sciences & Research Centre, Bhopal. Hundred patients of Psoriasis and hundred age and sex matched controls who presented in our hospital as outdoor and indoor were included in our study.

Table 1: Distribution of Cases & Controls According To Ag

Age(years)	Cases	Controls
1-20	11	11
21-40	33	35
41-60	23	22
61-80	33	32
>80	00	00
Total	100	100

A total of 100 psoriasis cases and 100 controls (non psoriatic) were studied. The ageof psoriasis cases ranged from 1 to 80 yrs. [Mean age 42.5]. Majority of psoriasis cases were in the age group of 21-40years(33%) and 61-80 years(33%) each, representing the bimodal age of onset, followed by 41-60 years (23%) and 1-20yrs(11%) and>80yrs(0%). The controls in all age groups were nearly matched.

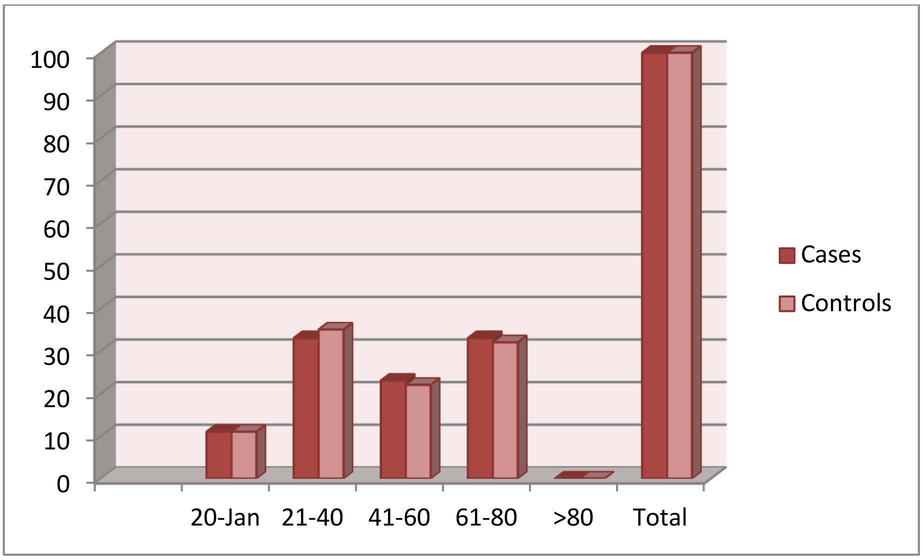

Figure 1:

Table 2: Distribution of Cases & Controls According To Sex.

Sex	Cases	Controls
Male	**80**	**80**
Female	**20**	**20**
Total	**100**	**100**

Out of total 100 cases and 100 controls (n=100), 80 were males and 20 were females.[Sex matched controls]. Male: female ratio was 4:1 in both case and control groups.

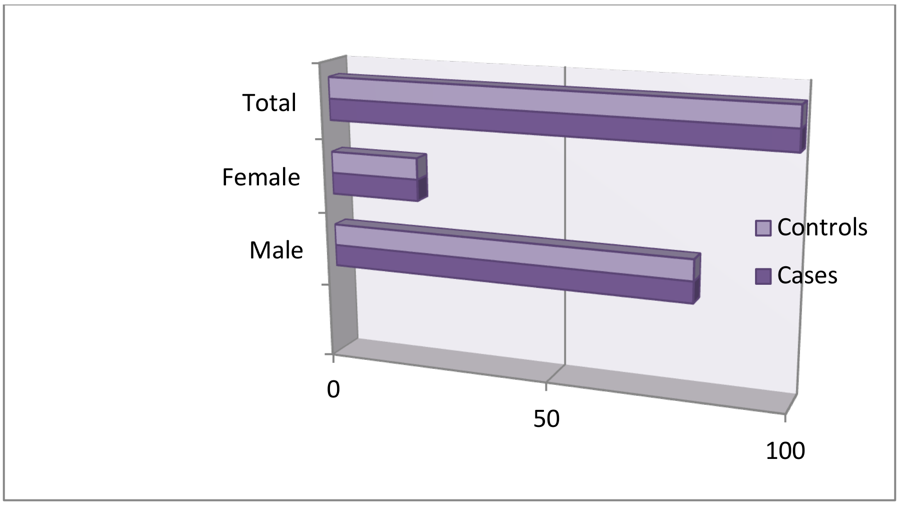

Figure 2:

Table 3: Distribution of Number of Cases According To Family History

Types of psoriasis	Family history of psoriasis	Percentage %
Chronic plaque psoriasis	9	9
Palmo-plantar psoriasis	1	1
Scalp psoriasis	0	0
Guttate psoriasis	0	0
Pustular/Erythrodermic	0	0
Total	**10**	**10**

There was 10 patients in which family history was positive for psoriasis 9 in chronic plaque psoriasis and 1 in Palmo-plantar psoriasis

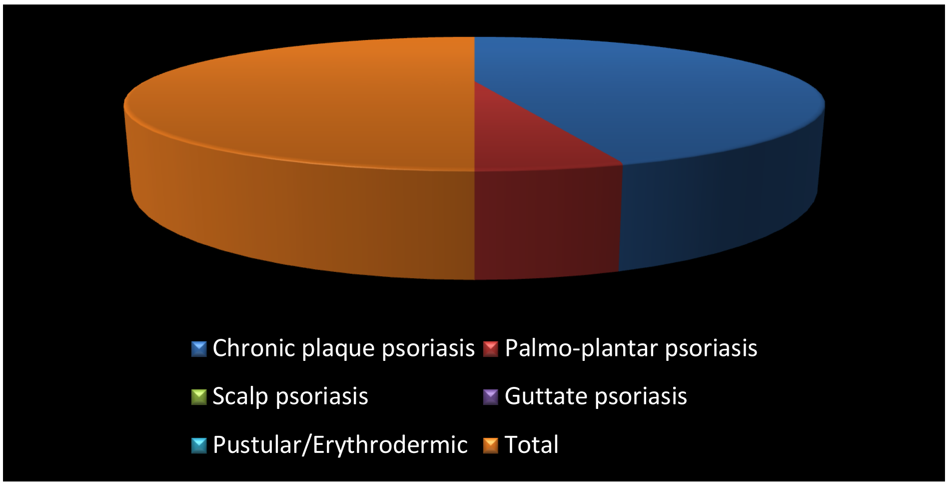

Figure 3:

Table 4: (a) Distribution of Number of Cases and Controls According To Smoking Habit.

Smoking	Group		p-value	χ^2
	Cases	Control		
Yes	55	41	0.048	3.926
No	45	59		
Total	**100**	**100**		

Odds ratio (OR)-0.569, Degree of freedom (df)-1

History of smoking was present in 55 (55%) cases of psoriasis and 41(41%) controls which was statistically significant in our study. Out of 55 smokers majority of smokers were of chronic plaque type of psoriasis i.e. 47.

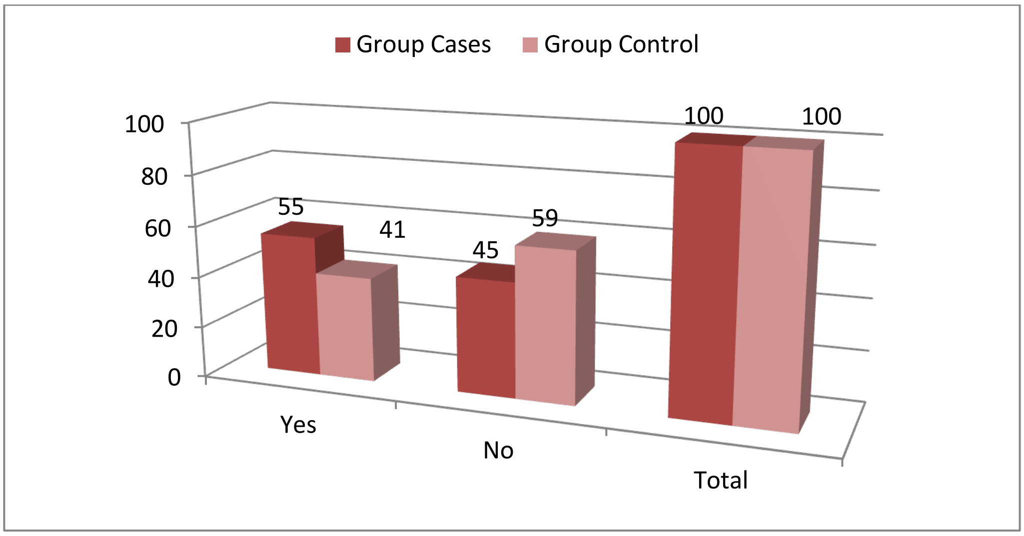

Figure 4:

Table 4(b):

Type of psoriasis	**Number of psoriasis patient, n=100**	**Smoking habit (% among types of psoriasis)**	**Percentage among smokers %**
Chronic plaque	88	47(53.4)	85.5
Palmo- plantar	8	05(62.5)	9.1
Scalp	1	00(0.0)	0.0
Guttate	1	01(100)	1.8
Pustular/Erythrodermic	1	01(100)	1.8
Scrotal	1	01(100)	1.8
Total	**100**	**55**	**100**

Table 5 (a): Distribution of Number of Cases According To Alcohol Consumption

Alcohol	**Group**		**p-value**	**χ^2**
	Cases	**Control**		
Yes	22	25	0.617	0.250
No	78	75		
Total	100	100		

Odds ratio (OR)-1.182, Degree of freedom (df)-1

History of alcohol was present in 22 (22%) cases of psoriasis and 25 (25%) controls which was not statistically significant in our study. Out of 22 alcoholic majority of alcoholics were of chronic plaque type of psoriasis i.e. 19.

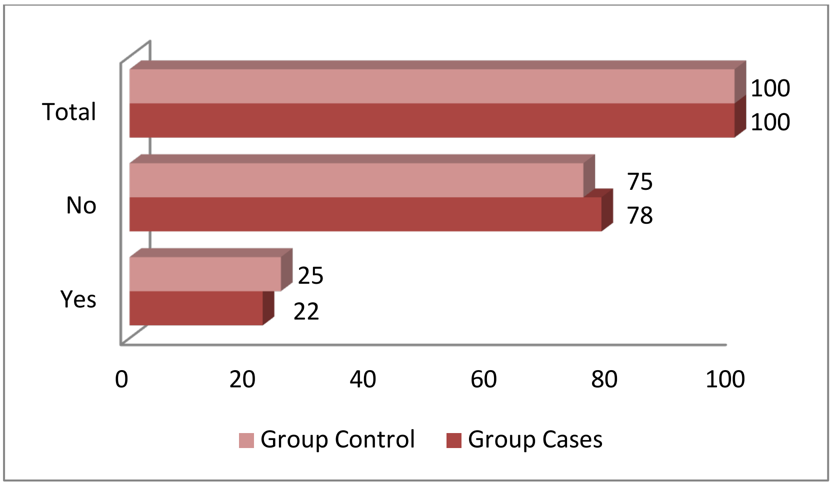

Figure 5:

Table 5 (b):

Type of psoriasis	**Number of psoriasis patient, n=100**	**Alcohol habit (% among types of psoriasis)**	**Percentage among alcoholics %**
Chronic plaque	88	19(21.6)	86.4
Palmo-plantar	08	02(25)	9.1
Scalp	01	00(0.0)	00
Guttate	01	00(0.0)	00
Pustular/Erythrodermic	01	01(100)	4.5
Scrotal	01	00(0.0)	00
Total	**100**	**22(22)**	**100**

Table 6: Distribution of Number of Cases & Controls According To Waist Circumference

Waist circumference(cm)	**Cases**	**Controls**	**p-value**	**χ^2**
<90 (males)	46	69	0.001	11.314
<80(females)	12	11		
>90(males)	34	11		
>80(females)	08	09		
Total	**100**	**100**		

Odds ratio (OR)-2.897 Degree of freedom (df)-1

In the present study there were more number of 34 (34%) males and 08 (08%) females in psoriatic group with increased waist circumference than normal cut-off value in comparison to non-psoriatic group 11 (11%) and 09 (09%) respectively. Data was statistically significant with p-value of 0.001.

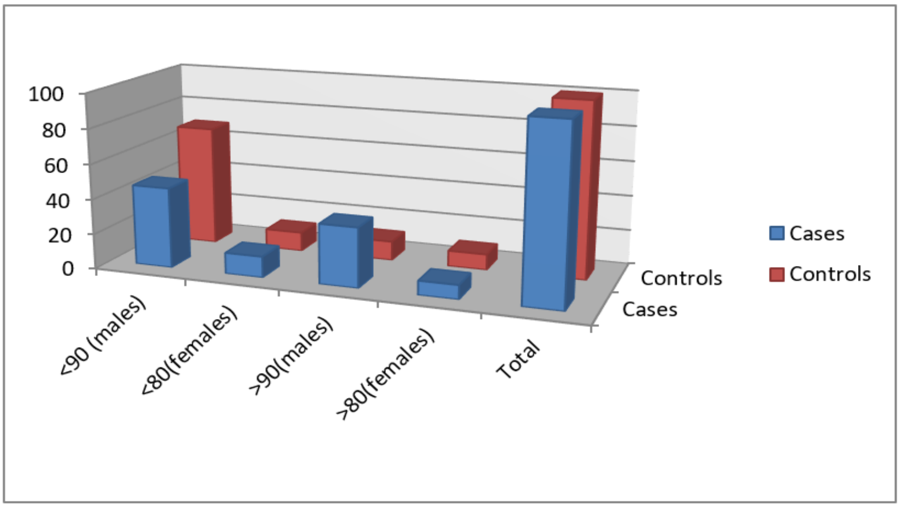

Figure 6:

Table 7: Distribution of Number of Cases & Controls According To BMI

BMI	Cases	Controls	p-value	χ^2
>30	36	16	0.001	10.395
<30	64	84		
Total	**100**	**100**		

Odds ratio (OR)-2.953 Degree of freedom (df)-1

In the present study BMI >30 was present in 36 (36%) patients of psoriasis in comparison to 16 (16%) of non-psoriatic controls.

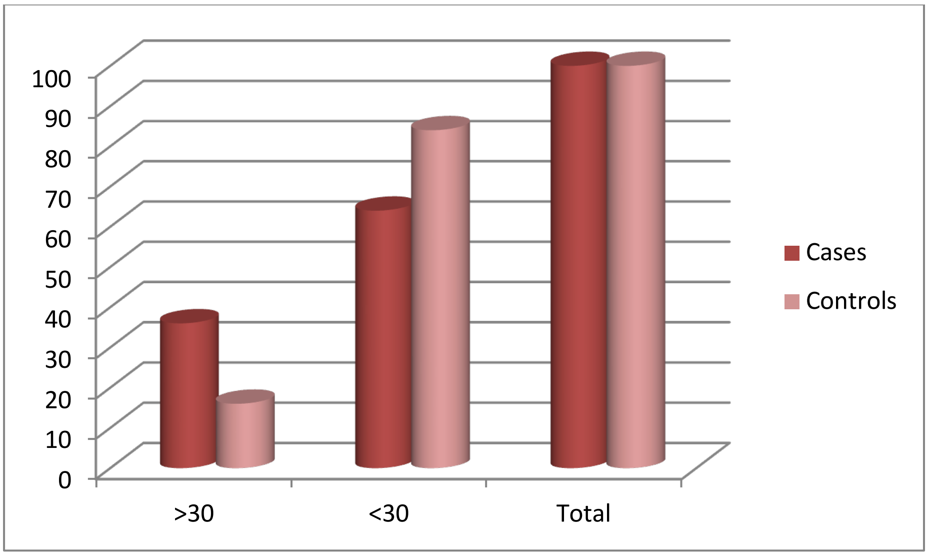

Figure 7:

Table 8: Distribution of Number of Cases & Controls According To Blood Pressure

Hypertension (mmHg)	Cases	Controls	p-value	χ^2
>130/85	38	24	0.032	4.582
<130/85	62	76		
Total	**100**	**100**		

Odds ratio (OR)-1.941 Degree of freedom (df) – 1

In our study, hypertension (>130/85 mmHg) was significantly high in 38(38%) psoriatic cases in comparison to 24(24%) control group. Data was statistically significant with p value=0.032.

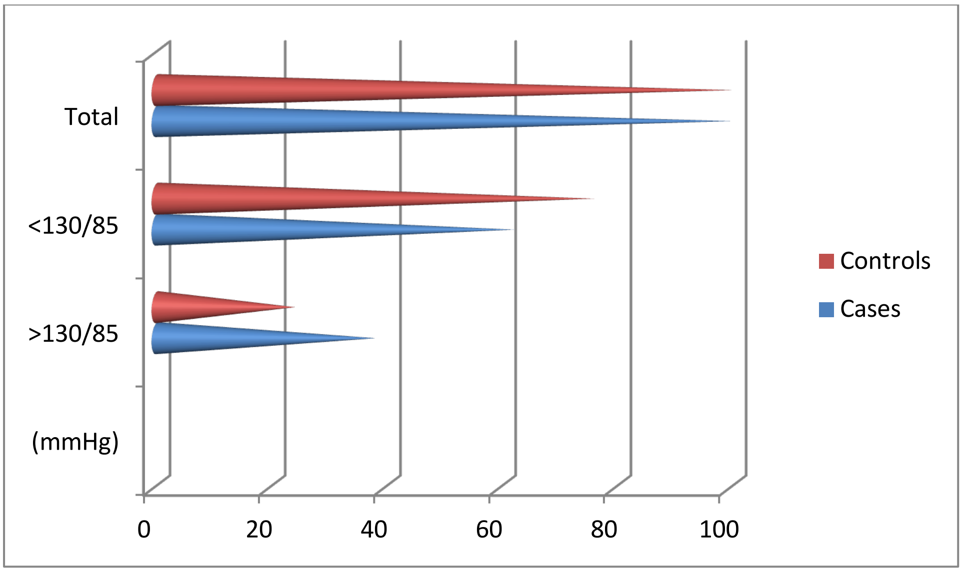

Figure 8:

Table 9: Distribution of Number of Cases & Controls According To FBS

FBS (mg/dl)	Cases	Controls	p-value	χ^2
>100	28	15	0.025	5.007
<100	72	85		
Total	**100**	**100**		

Odds ratio (OR)-2.204, Degree of freedom (df)-1

In the present study, FBS (>100 mg/dl) was significantly high in 28(28%) psoriatic cases in comparison to 15(15%) control group. Data was statistically significant with p value=0.025.

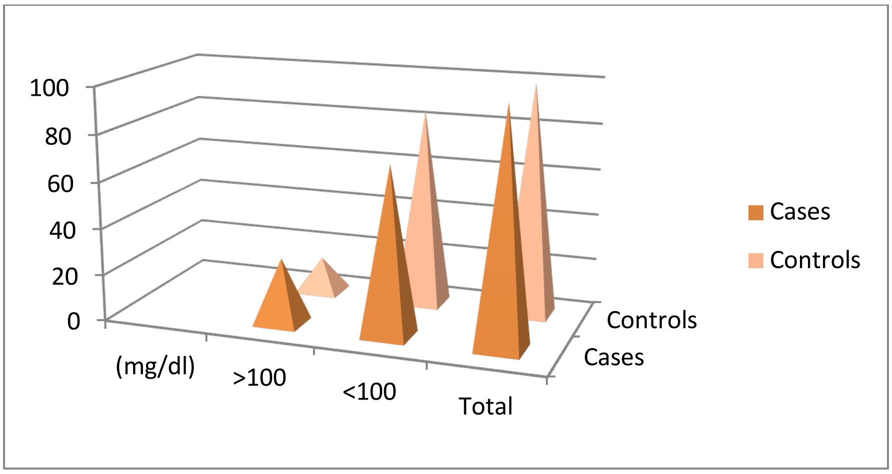

Figure 9:

Table 10: Distribution of Number of Cases & Controls According To HDL

HDL (mg/dl)	Cases	Controls	p-value	χ^2
>40(males)	33	59	0.00	15.705
>50(females)	05	07		
<40(males)	47	21		
<50(females)	15	13		
Total	**100**	**100**		

Odds ratio (OR)-0.316 Degree of freedom (df)-1

In the present study, HDL (<40 in males and < 50 mg/dl in females) was significantly high in 62(62%) psoriatic cases in comparison to 34(34%) control group. Data was statistically significant with p value=0.00.

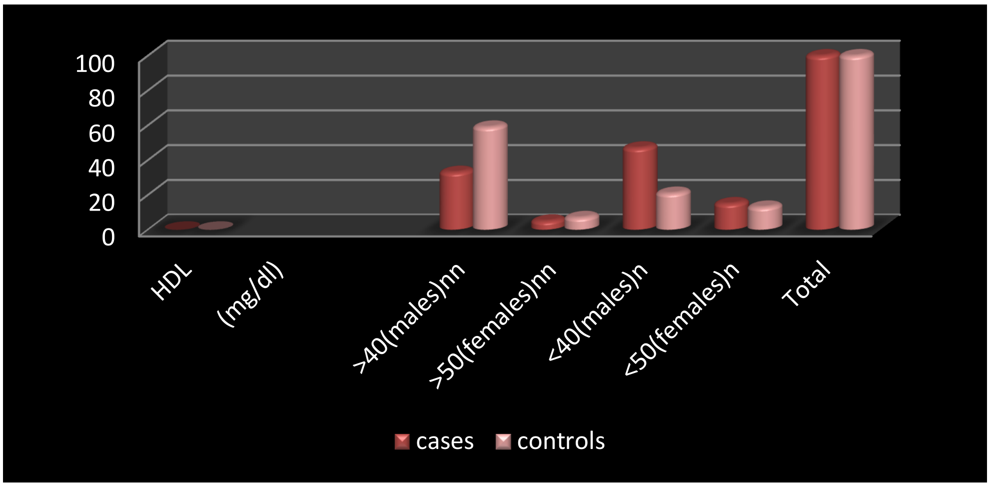

Figure 10:

Table 11: Distribution of Number of Cases & Controls According To Triglycerides.

TG (mg/dl)	Cases	Controls	p-value	χ^2
>150	36	10	0.00	19.085
<150	64	90		
Total	**100**	**100**		

Odds ratio (OR)-5.062 Degree of freedom (df)-1

Our study showed 36 (36 %) psoriatic cases had high LDL >100 mg/dl in comparison to 10 (10 %) of non-psoriatic controls which came out to be statistically significant.

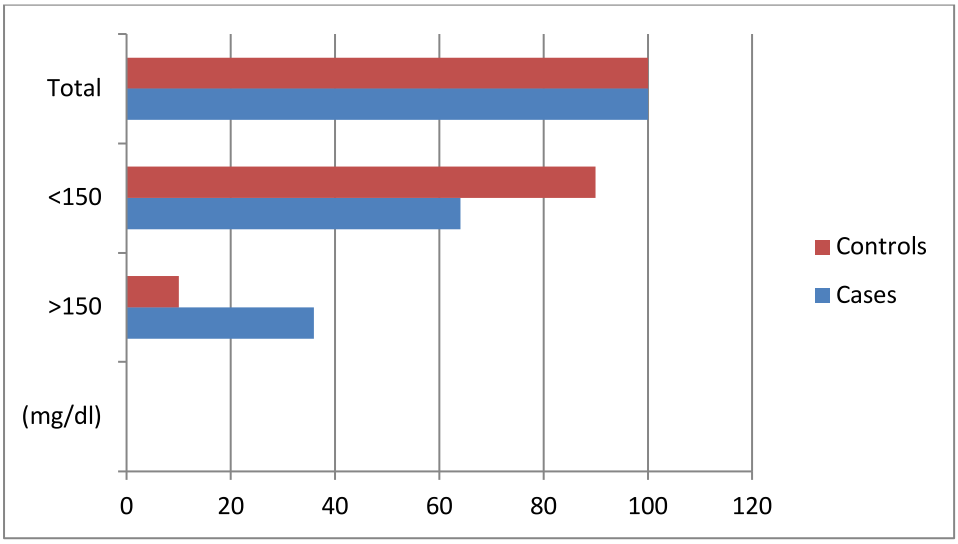

Figure 11:

Table 12: Distribution of Number of Cases & Controls According To Total Cholesterol

T.CH (mg/dl)	Cases	Controls	p-value	χ^2
>200	35	19	0.011	6.494
<200	65	81		
Total	**100**	**100**		

Odds ratio (OR)-2.296 Degree of freedom (df)-1

Our study showed 35 (35 %) psoriatic cases had high LDL >100 mg/dl in comparison to 19 (19 %) of non-psoriatic controls which came out to be statistically significant.

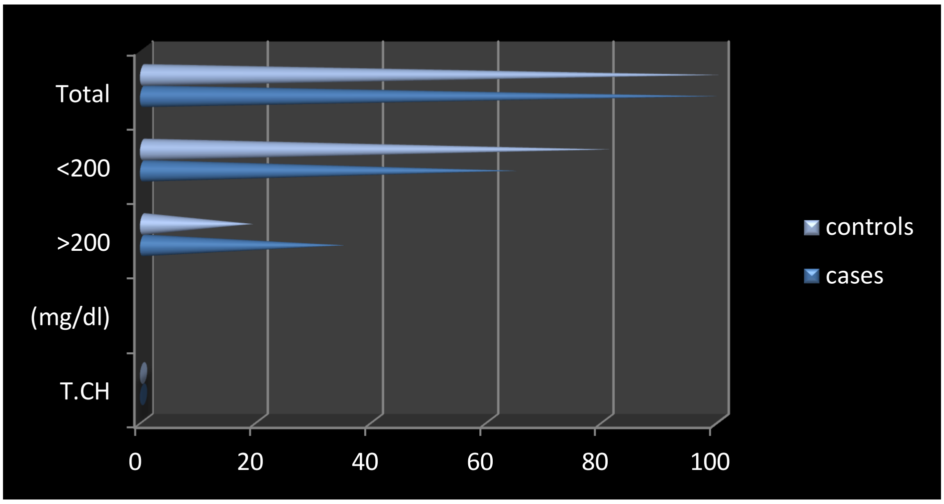

Figure 12:

Table 13: Distribution of Number of Cases & Controls According To LDL

LDL (mg/dl)	Cases	Controls	p-value	χ^2
>100	51	32	0.006	7.435
<100	49	68		
Total	100	100		

Odds ratio (OR)-2.212, Degree of freedom (df)-1

Our study showed 51 (51%) psoriatic cases had high LDL >100 mg/dl in comparison to 32 (32%) of non-psoriatic controls which came out to be statistically significant.

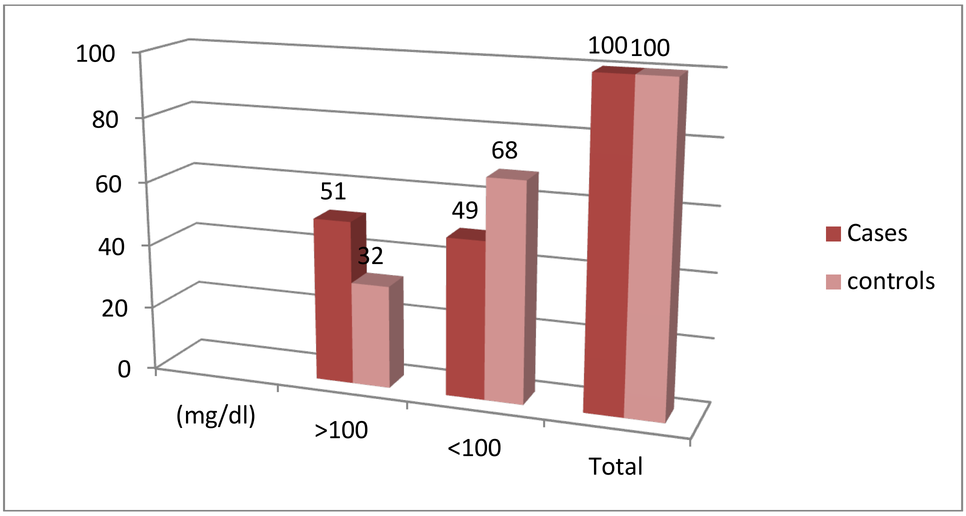

Figure 13:

Table 14: Distribution of Number of Cases & Controls According To VLDL.

VLDL (mg/dl)	Cases	Controls	P-value	χ^2
>30	37	23	0.031	4.667
<30	63	77		
Total	**100**	**100**		

Odds ratio (OR)-1.966, Degree of freedom (df) – 1

Our study showed 37 (37%) psoriatic cases had high VLDL >30 mg/dl in comparison to 23 (23%) of non-psoriatic controls which came out to be statistically significant.

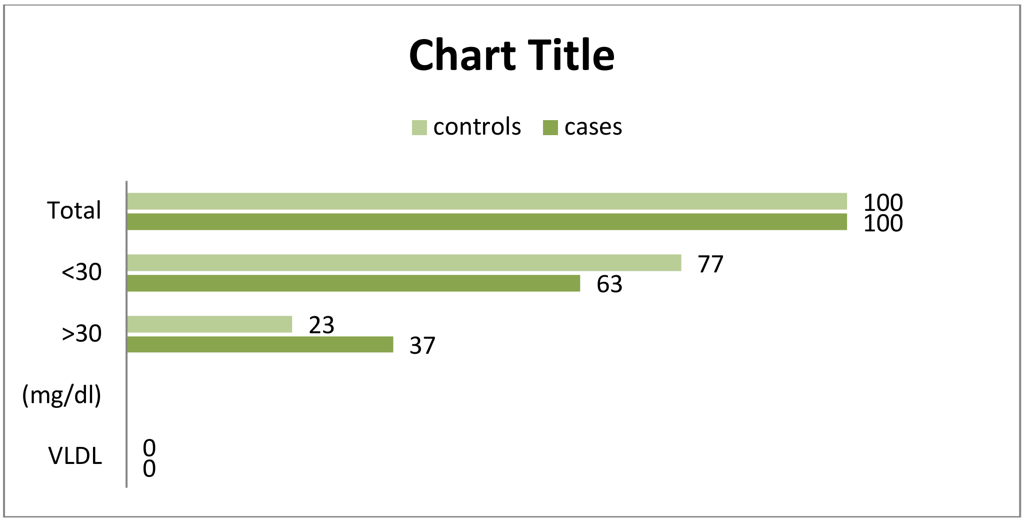

Figure 14:

Table 15: Distribution of Number of Cases &Controls according to Metabolic Syndrome.

Metabolic syndrome	Cases	Controls	p – value	χ^2
Yes	26	10	0.003	8.672
No	74	90		
Total	**100**	**100**		

Odds ratio (OR)-3.162 Degree of freedom (df)-1

In our present study Metabolic Syndrome was present in 26(26%) of psoriatic cases in comparison to 10 (10%) non psoriatic cases which came out to be statistically significant.

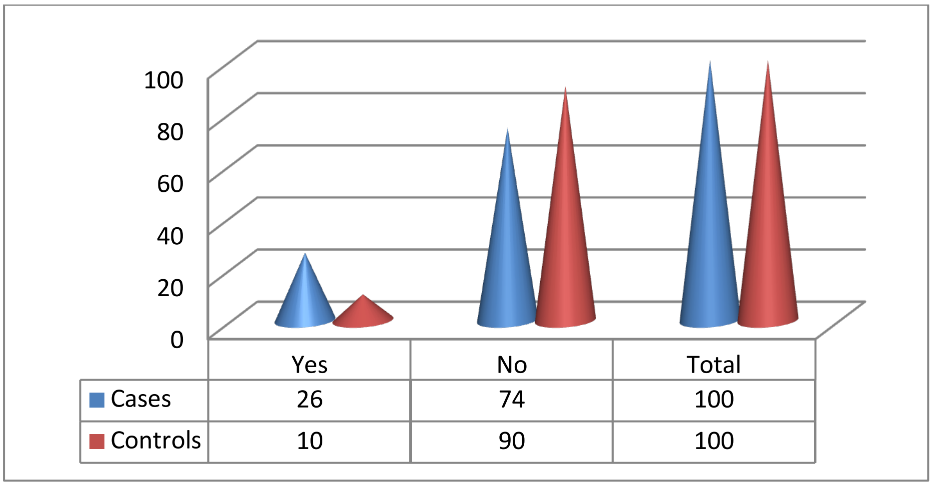

Figure 15:

Discussion

Psoriasis is a common complex inflammatory disease that shares many immunological features with other common complex disorders, such as cardiovascular disease, obesity, diabetes, depression and inflammatory arthritis. The diseases that occur concurrently are often thought to be related to common pathogenetic mechanisms. Comorbidities are most likely related to underlying disease pathogenesis and exclude factors such as lifestyle, access to healthcare and patients' associated economic status. Comorbidities tend to increase with age. Nearly half of psoriasis patients aged over 65years have at least three comorbidities and two thirds have two or more comorbidities. Comorbidities also have significant impact by increasing the patient's physical limitations.

Major factors that may contribute to this increased cardiovascular risk include cigarette smoking, dyslipidaemia, obesity, physical inactivity, hyperhomocysteinaemia and psychological stress, all of which have a higher occurrence among patients with psoriasis. A direct correlation between severity of psoriasis and the prevalence of obesity, dyslipidaemia and hyperhomocysteinaemia has been reported in psoriatic patients suggesting that skin changes (inflammation) caused by psoriasis have a direct role in determining these risk factors. The concomitant occurrence of dyslipidaemia, glucose intolerance, insulin resistance, obesity and hypertension constitutes the metabolic syndrome, which has been similarly defined by the World Health Organization, the National Cholesterol Education Program's ATP III and the European Group on Insulin Resistance. Metabolic syndrome is a strong predictor of cardiovascular diseases, diabetes and stroke and significantly increases the risk of cardiovascular mortality compared with the individual factors. A very consistent finding among different studies is that prevalence of metabolic syndrome is strictly age dependent, increasing sharply after the age of 60.[14]

Age Of Onset: In this study, majority of the psoriasis cases belonged to the age group of 21-40 years [33%], followed by 60-80 years [33%] and 41-60 years [23%] and 1-20 years [11%]. The mean age of the psoriasis cases in this study was 42.5years. The incidence was low below the age of 20 years and above the age of 80 years. Indian studies have reported the highest incidence to be in the second decade or in the reproductive age group.[15,16]

Sex Ratio: In our study, case group comprises of 80 males (80%) and 20 females (20%) likewise in the control group, there were 80 males (80%) and 20 females (20%). There was much preponderance in males which is consistent with most of the Indian studies (Sharma T et al, Lal S, Verma KC et al, Mehta TK et al).[15-18]

Diabetes: In the present study there are 28 (28%) cases who had FBS >100 in comparison to 15 (15%) controls which is statistically significant. {P=0.025, OR=2.204}.This findings corroborates with other studies.

Henseler and Christophers analysed data from more than 40,000 patients and calculated expected and observed incidence rates of associated disorders. Many diseases particularly diabetes mellitus, hypertension and heart disease showed the positive association.

Alexander E et al (2001) and A Sundharam et al (1980) included 61 and 20 Indian patients respectively showed the association of psoriasis with other diseases and with the highest frequency for diabetes mellitus. [19,20] A Jucci et al and others indicate the existence of an endogenous insulin resistance in psoriasis. [21]

Dyslipidemia: In our study we found statistically significant findings in relation to

T.CH {P=0.011, OR=2.296}, TG {P=0.00, OR=5.062}, HDL {P=0.00, OR=0.316} and VLDL {P= 0.031, OR=1.996} supporting most of the studies done previously. But we did not find any significant association as far as LDL is concerned {P=0.006, OR=2.212}. Yet Seishima (1994) observed normal values for total cholesterol and HDL values in 38 npsoriatic patients, but serum apoB, apoC2 and C3 were significantly increased compared to control group.[22]

Rocha-Preira (2001) reported rise in TC, TG, LDL, VLDL and a reduction in HDL in psoriatic patients. They also found that the worsening of psoriasis was associated with the enhancement of oxidative stress and of the lipid risk changes. [23]

Hypertension

In the present study there were 38 (38%) psoriatic patients who had Blood Pressure >130/85 in comparison to 24 (24%) non psoriatic group, which was found to be statistically significant {P=0.032, OR=1.941}S. Armestoet al (2012) The prevalence of hypertension was significantly higher in psoriasis patients than controls (30.3%, 21.3%, respectively, P < 0.001). In a multivariate analysis, hypertension was associated with psoriasis after controlling for age, gender, diabetes, obesity and smoking (OR = 1.44, 95% confidence interval: 1.07–1.94). The results of this study support the association between psoriasis and hypertension.

Obesity

In our study, Waist Circumference (>90 males &>80 females) ,an indicator of central obesity was found to be higher in psoriatic patient i.e. 42 (42%) than in control group 20 (20%).Male psoriatic cases were outnumbered female cases(M=34,F=08). Like other previous studies this variable was also statistically significant in our study. {P=0.001, OR= 2.897}

In the present study BMI >30 was present in 36 (36%) patients of psoriasis in comparison to 16 (16%) of non-psoriatic controls {P= 0.001, OR=2.953} which was found to be statistically significant and correlates with findings of other previously done studies.

A W Armstrong et al (2012) Using random-effects meta-analysis, the pooled odds ratio (OR) for obesity among patients with psoriasis was 1.66 (95% confidence interval (CI) 1.46–1.89) compared with those without psoriasis. Overall, compared with the general population, psoriasis patients have higher prevalence and incidence of obesity.[24]

Metabolic Syndrome

In our present study Metabolic Syndrome was present in 26(26%) of psoriatic cases in comparison to 10 (10%) non psoriatic cases. {P=0.003, OR=3.162. D. Cohen et al (2007) Diabetes mellitus was present in 27.9% of the patients with psoriasis, compared with 19.5% of the controls (p <0.001). Hypertension was present in 44.4% of the patients with psoriasis, compared with 37.2% of the controls (p=0.007). Obesity was present in 29.4% of the patients with psoriasis, compared with 23.5% of the controls (p=0.012). Dyslipidaemia was present in 50.9% of the patients with psoriasis, compared with 44.2% of the controls (p=0.015) which demonstrated a possible association between psoriasis and the metabolic syndrome. [25] Waist circumference (p = 0.001) was identified as the key factor which contributed for development of MS. There was an overall association of psoriasis with MS. Among the individual components of MS, increased waist circumference was significantly associated. Patients with greater duration or severity of psoriasis were more likely to have an association with MS. [26]

Conclusion

This study found that Psoriasis has an association with metabolic syndrome and a positive correlation of metabolic syndrome was seen with .This correlation was found to be statistically significant. The chronicity of the disease does play some role in the development of metabolic syndrome as majority of the patient had skin disease for more than a year. It can be concluded from this study that metabolic syndrome is important comorbidity with skin disease especially psoriasis and requires screening of patients with Psoriasis especially those with longer duration of disease for metabolic syndrome. Hence psoriasis patients should be evaluated for metabolic syndrome to assess the risk of cardiovascular diseases so that the preventive steps could be taken. Larger study with bigger sample size is required to further strengthen our findings.

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