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Abnormal Serum Lipid Profile and Smoking are Associated with Plaque-type Psoriasi: A Case Control Study

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Psoriasis is a very commonly seen inflammatory condition in skin clinics. It has been suggested that this disease is associated with metabolic disease, particularly abnormalities in serum lipid profile. This study sought to examine possible association between plaque-type psoriasis and some individual variables of metabolic syndrome. After being approved by an ethical committee, 53 patients with plaque-type psoriasis were recruited along with 55 age and sex-matched healthy individuals as controls. The status of smoking, alcohol consumption and lipid profile including abnormally increases serum total cholesterol, Low Density Lipoprotein (LDL) and triglyceride, hypertension, diabetes mellitus and overweight/obesity were compared between the two groups. The case group was consisted of 27 males and 26 females with a mean age of 47.89±8.09 years. The controls were 35 males and 20 females with a mean age of 48.38±7.46 years. Smoking (43.4 vs. 20%, p = 0.01), increased serum total cholesterol (43.4 vs. 14.5%, p = 0.001), increased serum LDL (34 vs. 12.7%, p = 0.01) and hypertriglyceridemia (43.4 vs. 12.7%, p<0.001) were significantly higher in patients than in controls. These differences remained significant after logistic regression analysis. The two groups were comparable in terms of age (p = 0.74), sex (p = 0.18), alcohol consumption (p = 0.56), overweight/obesity (p = 0.74), hypertension (p = 0.33) and diabetes mellitus (p = 0.60). In conclusion, this study showed a significant association between smoking and abnormal lipid profile with psoriasis. Screening/preventive programs are recommended in this regard.

Key words: Psoriasis, smoking, lipid profile

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INTRODUCTION

Psoriasis is a common skin disease all over the world, with an estimated prevalence of 1-3% among general population (Langley *et al*., 2005; Amirnia *et al*., 2012; El-Gayyar *et al*., 2012).

This disorder is generally believed to be an inflammatory disease, in which Th1/Th17 cells and pro-inflammatory cytokines are thought to play a pivotal role (Ghoreschi *et al*., 2007; Dhama *et al*., 2013; Sabeti *et al*., 2013).

Metabolic syndrome, on the other hand, is a very common condition comprising a cluster of interrelated entities such as overweight and obesity, insulin resistance and glucose intolerance, abnormal serum lipid profile, increased blood pressure, etc (Moller and Kaufman, 2005; Mahajan *et al*., 2010; Navali *et al*., 2011; Mori *et al*., 2013).

Although, a possible association between psoriasis and metabolic syndrome is not a new concept, this connection is still a matter of hot debate in current literature (Sommer *et al*., 2006; Gisondi *et al*., 2007; Al-Mutairi *et al*., 2010; Choi *et al*., 2010; Nisa and Qazi, 2010; Love *et al*., 2011; Mebazaa *et al*., 2011; Langan *et al*., 2012; Madanagobalane and Anandan, 2012; Zindanci *et al*., 2012).

Those who believe a significant connection between the two entities explain it by the chronic inflammation that is prevalently found in psoriatic patients, because many major individual components of metabolic syndrome such as insulin resistance and abnormal lipid profile are supposed to be mediated through inflammatory cytokines namely IL-1, IL-6 and tumor necrosis factor-α (Azfar and Gelfand, 2008).

Despite abundant, albeit conflicting reports regarding a possible association between psoriasis and metabolic syndrome, the role of individual components of the latter condition in association with psoriasis has been less investigated (Damevska *et al*., 2013). This study aimed to examine possible interrelation between some of these individual components, particularly lipid profile and psoriasis in a well-designed case-control setting.

MATERIALS AND METHODS

After being approved by the ethics committee of a local university, a total of 53 patients with definite diagnosis of plaque-type psoriasis and 55 age and sex-matched normal subjects from the same geographic region, were enrolled in this prospective, case-control study from February 2013 through to May 2014 in a referral clinic.

Cases with previous coronary, liver or renal disease, hypothyroidism or familial dyslipidemia or other autoimmune disease rather than psoriasis and those with a recent history (for at least 1 month before enrolment) of taking medications effective against serum lipids or immunosuppressive agents were not included. Written informed consents were obtained from participants.

After overnight fasting, venous samples were obtained and laboratory tests including the measurement of serum glucose, total cholesterol, Low Density Lipoprotein (LDL) and triglyceride were performed using standard photometric quantitative methods.

An increased serum level of cholesterol was defined when it was over 200 mg dL^{-1}, an increased serum level of LDL was defined when it was over 160 mg dL^{-1} and an increased serum level of triglyceride was defined when it was over 150 mg dL^{-1} (Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, 2001).

Overweigh/obesity was defined as having a Body Mass Index (BMI) = 25 (Damevska *et al*., 2013).

Study variables including demographic data (age and sex), history of smoking and alcohol consumption, overweight/obesity, history of hypertension, history of diabetes mellitus and the status of lipid profile were documented and compared between the case and control groups.

Statistical analysis: The SPSS software version 19.0 (IBM Corporation, New York, USA) was used for statistical analysis. Normal distribution of numerical data was ensured using Kolmogorov-Smirnov test and QQ plots. Independent samples t test or chi-square test were used for comparisons, where appropriate. Logistic regression analysis was used for determining independency of variables (Fattahi *et al*., 2011). A significance level of $p \leq 0.05$ was used.

RESULTS

A total of 53 patients with plaque-type psoriasis were included. The mean duration of the disease was 7.04±3.74 years (range: 1-19). The patients were 27 males (50.9%) and 26 females (49.1%) with a mean age of 47.89±8.09 years (range: 34-67) at the time of recruitment. Their normal counterparts (controls) were 55 subjects including 35 males (63.6%) and 20 females (36.4%) with a mean age of 48.38±7.46 years (range: 35-67).

Study variables are compared between the two groups in Table 1. Accordingly, the two groups were comparable in terms of demographics ($p = 0.74$ for age and

Table 1: Study variables in patients with psoriasis and controls

Variable	Patients (n = 53)	Controls (n = 55)	p-value	OR	CI 95%
Age (y)	47.89±8.09	48.38±7.46	0.74	-	-
Sex (male)	27 (50.9)	35 (63.6)	0.18	0.59	0.28-1.28
Smoking	23 (43.4)	11 (20)	0.01*	3.03	1.30-7.14
Alcohol	11 (20.8)	9 (16.4)	0.56	0.75	0.28-1.98
Overweight/obesity	14 (26.4)	13 (23.6)	0.74	0.86	0.36-2.06
Hypertension	17 (32.1)	13 (23.6)	0.33	0.66	0.28-1.53
Diabetes mellitus	9 (17)	6 (10.9)	0.36	0.60	0.20-1.82
Increased serum cholesterol	23 (43.4)	8 (14.5)	0.001*	4.55	1.79-11.1
Increased serum LDL	18 (34)	7 (12.7)	0.01*	3.57	1.33-9.10
Increased serum triglyceride	23 (43.4)	7 (12.7)	<0.001*	5.26	2.00-14.29

CI: Confidence interval, LDL: Low density lipoprotein, OR: Odds ratio, Data is shown as Mean±SD (for age) or number (%), *p<0.05 is significant

0.18 for sex), alcohol consumption (p = 0.56), overweight/obesity (p = 0.74), hypertension (p = 0.33) and diabetes mellitus (p = 0.36).

In contrast, smoking was significantly more frequent among patients (43.4 vs. 20%; p = 0.01). Regarding serum lipid profile, increased serum cholesterol (43.4 vs. 14.5%; p = 0.001), increased serum LDL (34 vs. 12.7%; p = 0.01) and increase serum triglyceride (43.4 vs. 12.7%; p<0.001) were all significantly more common in the group of patients.

Based on the result of logistic regression analysis, smoking (p = 0.03), increased serum cholesterol (p = 0.01), increased serum LDL (p = 0.02) and increased serum triglyceride (p=0.02) were all independently higher in patients than in controls.

DISCUSSION

Among the studied variables in the present study, only smoking and abnormalities in serum lipid profile were associated with psoriasis. This association was independent of other variables such as age, sex, hypertension, diabetes mellitus, alcohol use or overweight/obesity, as well as medication profile used by the patients.

In a very recent study, a significant association was found between hypertriglyceridemia and psoriasis (Ali *et al*., 2014).

Similar significant association was also reported in an older study by Seishima *et al*. (1994).

In line with this reports, there was a significant and independent association between increased level of serum triglyceride and psoriasis in the present study. This association was the strongest one among other parameters (odds ratio = 5.26).

Beside serum triglyceride, we also found significant and independent associations between abnormal serum total cholesterol and LDL levels with psoriasis (odds ratios = 4.55 and 3.57, respectively).

This is in conformity with the results of a very recent study by Sarvtin *et al*. (2014) who studied 50 plaque-type psoriasis patients and 50 controls and reported higher levels of serum total cholesterol and LDL in patients. The association between serum increase cholesterol and psoriasis has been suggested by other investigators, too (Pietrzak *et al*., 2000).

It has been shown that the concentration of cholesterol in psoriatic crusts is higher than that in crusts normal skin shed. As a result, due to high loss of cholesterol during active phase of the disease a compensatory increase in cholesterol synthesis occurs and the level of serum cholesterol elevates (Lea *et al*., 1958).

It should be born in mind that there are also reports in the literature that have denied any connection between lipid abnormalities and psoriasis (Chen *et al*., 2008; Wakkee *et al*., 2010; Kim *et al*., 2012; Jensen *et al*., 2013). Apart from mythological errors and selection bias exist in many such studies (Damevska *et al*., 2013), some factors may justify this heterogeneity. Overall, three major parameters have been implicated in unfavorable cardiovascular role of psoriasis in affected patients: inflammation, lifestyle and medications (Wakkee *et al*., 2007). Difference in dietary habits among various nations is one of these justifications. In addition, it has been suggested that drugs routinely used in psoriasis such as methotrexate, cyclosporine and acitretin may inversely affect lipid profile (Naldi and Griffiths, 2005; Baharivand *et al*., 2013).

To eliminate this possible effect in the present study, all such systemic drugs were disconnected at least for one month prior to enrollment. In addition to an abnormal serum lipid profile, smoking was found to be another independent parameter in association with psoriasis in the present study.

It has been suggested that smoking might be a risk factor for psoriasis. It is believed that the number of cigarettes per day is a more important determiner in this regard than the duration of smoking itself. In addition to a causative role, some investigators have shown that smoking is against amelioration and response to treatment in psoriatic patients (Herron *et al*., 2005).

Although, the exact mechanism(s) underlying the etiologic/exacerbating role of smoking in psoriasis is unknown, it has been suggested the nicotine may augment inflammation, exists in such cases (Gelfand *et al*., 2006; Jensen *et al*., 2013).

The authors did not find a significant association of overweight/obesity, hypertension and diabetes mellitus with psoriasis. These findings are in line with some previous reports. For example, Ali *et al*. (2014) not only found a connection between psoriasis and diabetes mellitus in their case-control setting but also reported a protective effect for diabetes mellitus against the disease. This finding was confirmed by another study, too (Kim *et al*., 2012).

Likewise, some authors have concluded that body mass index is not a significant predictor of psoriasis in their study Herron *et al*. (2005), Griffiths and Barker (2007) and Kim *et al*. (2012) a finding that was also confirmed in the present study.

In this study, the two case and control groups were matched for age and sex. So, to evaluate the effect of demographic parameters further unmatched studies should be performed in future (Babaeinejad *et al*., 2011; Khodaeiani *et al*., 2012, 2013; Babaeinejad and Fouladi, 2013).

In conclusion, this study showed that lipid profile is abnormal among psoriatic patients. Since the increased serum levels of cholesterol and triglyceride is well-known risk factors for cardiovascular disease (Shakeri *et al*., 2011a, b; Tarzamni *et al*., 2012), it merits recommending that all patients with psoriasis need regular follow-ups and appropriate treatments if needed. In addition, smoking may play an independent role in the pathogenesis of psoriasis and thus the patients need to be encouraged to cease smoking.

CONCLUSION

Both smoking and abnormal lipid profile are associated with plaque-type psoriasis.

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