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Psoriasis and chronic obstructive pulmonary disease association

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Abstract:

BACKGROUND: The inflammation that occurs with psoriasis can affect both lungs and raise the risk for chronic obstructive airway disease, and hence, pulmonary function should be studied in patients with psoriasis.

AIM OF THE WORK: The study aimed to detect the relationship between psoriasis and chronic obstructive pulmonary disease (COPD).

SUBJECTS AND METHODS: A case–control study was conducted at El-Hussein University Hospital, Al-Azhar University. Sixty patients with psoriasis and sixty control patients were involved in this study. Spirometry was performed in all the study patients.

RESULTS: The present study included 60 psoriasis patients and age- and gender-matched 60 controls fulfilling inclusion criteria. No statistically significant differences were found between two groups as regards age, gender, and residence. However, patients with psoriasis were significantly more frequently smokers, overweight, obese, and diabetic. In addition, obstructive pulmonary functions were significantly higher among psoriasis patients. Overall, COPD was diagnosed in 10.0% of psoriasis patients compared with 5.0% of controls but with no statistically significant difference. The mean forced expiratory volume in 1 s/forced vital capacity ratio and forced expiratory flow at 25%–75% were significantly lower in the psoriasis patients than in the controls (80.4 ± 5.6 vs. 93.1 ± 5.4 , $P < 0.001$ and 85.6 ± 9.1 vs. 95.5 ± 5.8 , $P < 0.001$, respectively). Overweight, obese, and diabetic psoriasis patients were at increased risk of COPD than controls (odds ratio = 2.0, 2.5, and 1.7; 95% confidence interval, 0.89–4.45, 0.86–7.31, and 0.92–3.32), respectively.

CONCLUSIONS: Psoriasis patients were likely to develop COPD.

RECOMMENDATION: COPD should be screened by spirometry among psoriasis patients and advise them to stop smoking and control weight and diabetes to reduce COPD development.

Keywords:

Chronic obstructive pulmonary disease, psoriasis, spirometry

Introduction

Psoriasis is a chronic inflammatory disease of the skin that may be present in several forms, including guttate, pustular, scaly and erythematous patches, papules, and plaques that can be pruritic.^[1] Psoriasis considered as autoimmune diseases

results from dysregulation of multiple inflammatory cytokines.^[2] Chronic obstructive pulmonary disease (COPD) is characterized by progressive airflow limitation not fully reversible but usually preventable. Multiple factors increase the risk of development such as immune defects, genetic predisposition, infection, and environmental factors.^[3] Smoking is the most important risk factor associated with COPD, followed by lung inflammation,

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which is responsible for small airways thickening, alveolar destruction, and airway remodeling.^[4]

In both psoriasis and COPD, T-cell-mediated immunity is elevated, tumor necrosis factor-alpha (TNF- α) and other pro-inflammatory cytokines that play roles in the pathogenesis of both diseases, including interleukin-1 (IL-1), IL-6, and IL-8 are secreted to trigger neutrophil activation and migration of cells to the lung. T-cell cytokines, including interferon- γ , IL-13, and IL-17, may induce expression of TNF- α , IL-1, and IL-8, and also, IL-23, chemokines, receptors, adhesion molecules, and proteases.^[5]

Both psoriasis and COPD are chronic inflammatory conditions suggesting the inflammatory process to be the link between COPD and psoriasis.^[6] Despite the nature of immune system dysfunction in COPD remaining largely unknown, the crosstalk between innate and adaptive immunity has been shown previously lead to increased severity.^[7]

Aim

The study aimed to detect the relationship between psoriasis and COPD.

Subjects and Methods

A hospital-based case-control study was conducted at El-Hussein University Hospital, Al-Azhar University, Egypt. The study involved 120 patients (60 patients with psoriasis followed up at the dermatology clinic and 60 healthy controls) during the period from December 2017 to June 2019.

Sample size estimation

Sample size of this study was calculated based on the following criteria:

in Al-Mutairi *et al's* study, in 2010, the expected prevalence of COPD among psoriasis patients was nearly 6% and margin of error 10%. Hence, after application of the sample size equation, the minimum sample size required was 21. To avoid bias, the sample size was tripled to 60. $n = Z^2 P (1 - P) / d^2$ where n = sample size, Z = Z statistic for a level of confidence is 1.96, P = expected prevalence (if 6%, $P = 0.06$), and d = precision (if 10%, $d = 0.10$).

Procedures

All patients were subjected to measurement by spirometry.

Spirometric lung functions

Spirometric studies were carried out using (SCHILLER Spirovit At10, Germany) for healthy controls. Forced expiratory volume in 1 s (FEV1) and forced vital capacity (FVC), FEV1/FVC were measured.

Diagnosis of chronic obstructive pulmonary disease

Risk factors and symptoms suggest COPD, general and local examination confirming the diagnosis, and spirometry report revealing the diagnosis of COPD. The FEV₁/FVC ratio is a very important spirometric indicator used for airway disease assessment. The cutoff point used for COPD diagnosis is 0.70.

Inclusion criteria

Patients with psoriasis not complaining previously from chronic chest diseases were included in this study.

Exclusion criteria

Previously diagnosed COPD patients, other chronic lung diseases (bronchiectasis), contraindications to perform spirometry (hemoptysis, tuberculosis, a history of syncope associated with forced exhalation), patients with a history of pneumothorax, surgery to the head, chest, stomach or eye regions, unstable angina, hypertension, and recent myocardial infarction were excluded from the study.

Ethical consideration

Ethical approval was obtained from the Local Ethical Committees at El-Hussein University Hospital. Spirometric studies were performed after obtaining signed written informed consent from the participants. Privacy and confidentiality were maintained throughout the study process using a unique code number.

Statistical analysis

Statistical analysis was carried out using the SPSS computer package version 25.0 (IBM SPSS Statistics for Windows, version 25.0. Armonk, NY: IBM Corp., USA). For descriptive statistics: the mean \pm standard deviation, minimum and maximum was used for quantitative variables, whereas the number and percentage were used for qualitative variables. For analytical statistics: the Chi-square test and Fisher's exact test were used to assess the differences in frequency of qualitative variables, whereas independent samples *t*-test was applied to assess the differences in means of quantitative variables between both groups and Kruskal-Wallis test was used for nonparametric statistics. The statistical methods were verified, assuming a statistically significant level of $P < 0.05$ and a highly significant level of $P < 0.001$.

Results

The study included 60 psoriasis patients fulfilling the inclusion criteria, with a mean age 54.5 ± 10.0 years that ranged from 26 to 77 years, and age- and gender-matched 60 controls with a mean age 51.7 ± 11.3 years that ranged from 30 to 70 years. No statistically significant differences were found between two groups as regard age, gender,

and residence. However, psoriasis was significantly more among smokers [Table 1]. Patients with psoriasis have poor lifestyle conditions favoring COPD such as diabetes, overweight, and obesity than controls. In addition, obstructive pulmonary functions were significantly common among patients with psoriasis [Table 2]. Overall, COPD was prevalent in six psoriasis patients (10.0%) compared to three controls (5.0%) but with no significant difference [Figure 1]. Spirometric indices among psoriasis patients showed a significant increase of FVC% and a significant decrease of both FEV₁/FVC % and FEF₂₅₋₇₅% were significantly lower in psoriasis patients, compared to controls [Table 3].

COPD in both study groups was examined in relation to different study variables and showed a significant decrease of both FEV₁/FVC% and FEV₂₅₋₇₅% among psoriasis patients with COPD compared to controls with COPD. Overweight, obese, and diabetic psoriasis patients were at a 2.0-, 2.5-, and 1.7-folds increased risk of COPD than controls (95% confidence interval [CI], 0.89–4.45; 0.86–7.31 and 0.92–3.32), respectively [Table 4]. Different study variables were also examined in patients with psoriasis according to the presence or absence of COPD. Psoriasis patients with COPD showed a significant decrease of both FEV₁/FVC% and FEV₂₅₋₇₅% and were significantly more smokers, overweight, and with obstructive pulmonary functions [Table 5].

Discussion

Before the 2015 study, there had been conflicting reports regarding COPD and psoriasis, and if there is, in fact, a correlation between the two conditions. However, the new research revealed psoriasis patients are more likely to develop COPD, especially if their psoriasis is severe.^[8] In psoriasis, white blood cells become overactive and produce chemicals that trigger inflammation in the skin. This inflammation can also affect other parts of the body, including the lungs.^[9] The study included 60 psoriasis

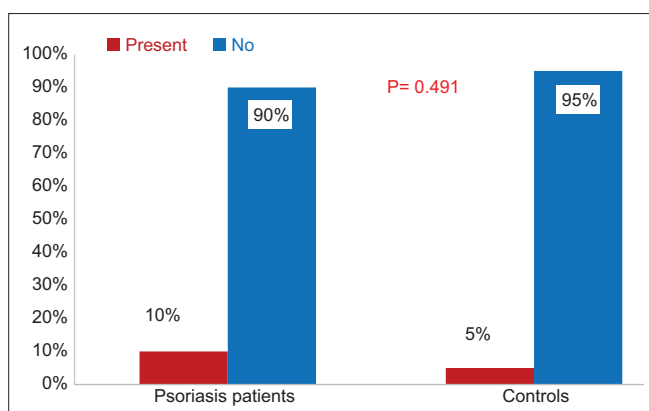


Figure 1: Distribution of chronic obstructive pulmonary disease among the studied groups

patients fulfilling the inclusion criteria with a mean age 54.47 ± 10.0 years that ranged from 26 to 77 years, and age- and gender-matched 60 controls with a mean age 51.7 ± 11.03 years that ranged from 30 to 70 years. In this study, psoriasis affects mostly male and urban residents; there were no statistically significant differences were found between both groups as regards to age, gender, and residence. However, patients with psoriasis were significantly more in smokers. In a study done by Dreier *et al.* revealed that 12,502 psoriasis cases and

Table 1: General characteristics of the studied groups

Variables	Psoriasis patients (n=60), n (%)	Controls (n=60), n (%)	P
Age (year)			
Mean±SD	54.5±10.0	51.7±11.3	0.161
Minimum-maximum	26.0-77.0	30.0-70.0	
Gender			
Male	37 (61.7)	28 (46.7)	0.142
Female	23 (38.3)	32 (53.3)	
Residence			
Urban	32 (53.3)	35 (58.3)	0.357
Rural	28 (46.7)	25 (41.7)	
Smoking habit			
Smoker	36 (60.0)	20 (33.3)	0.006*
Nonsmoker	24 (40.0)	40 (66.7)	

*Significant. Values are present as mean±SD were analyzed by independent samples t-test. Values are present as number and percent were analyzed by the Fisher's exact test. SD: Standard deviation

Table 2: Clinical data of the studied groups

Variables	Psoriasis patients (n=60), n (%)	Controls (n=60), n (%)	P
BMI			
Normal	16 (26.7)	32 (53.3)	<0.001*
Underweight	7 (11.7)	18 (30.0)	
Overweight	16 (26.7)	6 (10.0)	
Obese	21 (35.0)	4 (6.7)	
Comorbidity			
HTN	12 (20.0)	11 (18.3)	1.000
DM	16 (26.7)	5 (8.3)	0.015*
Pulmonary function			
Normal	36 (60.0)	54 (90.0)	0.002*
Obstructive	22 (36.7)	6 (10.0)	
Restrictive	1 (1.7)	0 (0.0)	
Mixed	1 (1.7)	0 (0.0)	

*Significant. Values are present as number and percent were analyzed by the Chi-square or Fisher's exact tests. BMI: Body mass index, HTN: Hypertension, DM: Diabetes mellitus

Table 3: Spirometric indices for studied patients

Variables	Psoriasis patients (n=60)	Controls (n=60)	P
FEV ₁	90.9±5.0	90.7±5.6	0.906
FVC %	95.7±7.1	92.7±4.9	0.008*
FEV ₁ /FVC %	80.4±5.6	93.1±5.4	<0.001*
FEF ₂₅₋₇₅ %	85.6±9.1	95.5±5.8	<0.001*

*Significant. Values are present as mean±SD were analyzed by the independent samples t-test. FEV₁: Forced expiratory volume in the 1 s, FVC %: Forced vital capacity, FEV₁/FVC: FEV₁/FVC ratio, FEF₂₅₋₇₅%: Forced expiratory flow at 25%-75% of FVC, SD: Standard deviation

Table 4: Comparison of all studied variables between chronic obstructive pulmonary disease patients among both studied groups

Variables	COPD		P
	Psoriasis (n=6), n (%)	Controls (n=3), n (%)	
Age (year), mean±SD	55.2±10.4	59.2±3.8	0.369
FEV _{1%} , mean±SD	91.2±5.9	91.0±2.2	0.930
FVC %, mean±SD	94.5±8.0	91.5±1.6	0.368
FEV ₁ /FVC %, mean±SD	76.4±2.3	93.6±0.6	<0.001*
FEV _{25%-75%} , mean±SD	81.3±9.0	101.5±1.6	<0.001*
Gender			
Male	4 (66.7)	2 (66.7)	1.000
Female	2 (33.3)	1 (33.3)	
Residence			
Urban	2 (33.3)	0 (0.0)	0.500
Rural	4 (66.7)	3 (100.0)	
Smoking habit			
Smoker	6 (100.0)	2 (66.7)	0.333
Nonsmoker	0 (0.0)	1 (33.3)	
BMI			
Over weight	3 (50.0)	0 (0.0)	0.464
OR (95% CI)		2.0 (0.89-4.45)	
Obese	4 (66.7)	0 (0.0)	0.167
OR (95% CI)		2.5 (0.86-7.31)	
Comorbidity			
HTN	4 (66.7)	1 (33.3)	0.524
DM	2 (33.3)	0 (0.0)	0.500
OR (95% CI)		1.7 (0.92-3.32)	
Pulmonary function			
Obstructive	6 (100.0)	3 (100.0)	-

*Significant. Values are present as mean±SD were analyzed by the independent samples t-test. Values present as number and percent were analyzed by Fisher's exact test. OR: Odd ratio, CI: Confidence interval. FEV_{1%}: Forced expiratory volume in the 1 s, FVC %: Forced vital capacity, FEV_{25%-75%}: Forced expiratory flow at 25%-75% of FVC, SD: Standard deviation, BMI: Body mass index, HTN: Hypertension, DM: Diabetes mellitus, COPD: Chronic obstructive pulmonary disease

24,287 age and gender-matched controls. Psoriasis was slightly older and more likely to be male.^[8] Jankovic *et al.* in their study provide evidence that psoriasis affects mostly urban residents, smokers, alcohol consumption, and family history of psoriasis.^[10] Patients with psoriasis were associated with COPD, especially in smokers, diabetes, and obese. In this study, psoriasis was found to be associated with a higher prevalence of COPD (10%). The FEV₁/FVC ratio is the most important indicators for airway disease. The cutoff value used for COPD diagnosis is 0.70.^[11] FEV₁/FVC ratios compatible with COPD were observed in 6 (10%) of our psoriasis patients, which reflect a tendency toward COPD development in such patients. The different study result was reported by Dreier *et al.*, as the prevalence of COPD in patients with psoriasis and control was approximately the same (5.7% vs. 3.7%).^[8]

The same results were obtained in the study done by Chiang and Lin, men and patients with psoriasis

Table 5: Comparison of all studied variables among psoriasis patients regarding chronic obstructive pulmonary disease

Variables	Psoriasis patients		P
	COPD (n=6), n (%)	No COPD (n=54), n (%)	
Age (year), mean±SD	55.2±10.4	54.1±9.8	0.789
FEV _{1%} , mean±SD	91.2±5.9	90.7±4.5	0.969
FVC %, mean±SD	94.5±8.0	96.2±6.6	0.525
FEV ₁ /FVC %, mean±SD	76.4±2.3	81.5±5.3	0.024*
FEV _{25%-75%} , mean±SD	81.3±9.0	87.7±8.4	0.005*
Gender			
Male	4 (66.7)	32 (59.3)	1.000
Female	2 (33.3)	22 (40.7)	
Residence			
Urban	2 (33.3)	26 (48.1)	0.675
Rural	4 (66.7)	28 (51.9)	
Smoking habit			
Smoker	6 (100.0)	25 (46.3)	0.024*
Nonsmoker	0 (0.0)	29 (53.7)	
BMI			
Over weight	3 (50.0)	6 (11.1)	0.038*
Obese	4 (66.7)	18 (33.3)	0.179
Comorbidity			
HTN	4 (66.7)	14 (25.9)	0.060
DM	2 (33.3)	15 (27.8)	1.000
Pulmonary function			
Obstructive	6 (100.0)	9 (16.7)	<0.001*

*Significant. Values are present as mean±SD were analyzed by the Kruskal-Wallis test. Values are present as number and percent were analyzed by Fisher's exact test. COPD: Chronic obstructive pulmonary disease, FEV_{1%}: Forced expiratory volume in the 1 s, FVC %: Forced vital capacity, FEV_{25%-75%}: Forced expiratory flow at 25%-75% of FVC, SD: Standard deviation, BMI: Body mass index, HTN: Hypertension, DM: Diabetes mellitus

over 50 years of age (HR = 2.19) were more likely to contract COPD.^[12] Pearce *et al.* describe a higher incidence of COPD (5.0%) (1.7%, i.e., a prevalence ratio of 3.0).^[13] Li *et al.* in their study revealed that psoriasis patients are at a greater risk of developing COPD.^[14] Ungprasert *et al.* in their study demonstrated the increased risk of COPD at a 1.45-fold in psoriasis patients.^[15]

While the study done by Li *et al.* showed that most psoriasis patients were developed COPD (odds ratio [OR] = 1.90).^[14] In a large study of 2096 psoriasis cases and 8384 controls found that the risk of developing COPD by patients with psoriasis was 2.35 times higher than in controls.^[12] In a study done in the USA (National Health and Wellness Survey), found a higher prevalence of COPD in patients suffering from psoriasis (OR 1.68; CI 1.03–2.78).^[16] Al-Mutai *et al.* in their study observed that the prevalence of COPD in patients with psoriasis was high without statistically significant with controls.^[17] In patients with psoriatic arthritis, COPD was the fifth comorbidities plus hypertension, obesity, diabetes, and kidney disease.^[18] Psoriasis-related comorbidities, including smoking, diabetes mellitus, hypertension, and metabolic syndrome may contribute to COPD

development.^[13] Wu *et al.* study psoriasis and their comorbidities found that higher prevalence to develop COPD and hypertension.^[19]

Nadeem *et al.* found that psoriasis triggers and is triggered by airway inflammation.^[20] Psoriasis and COPD associated with the same risk factors such as obesity, smoking, physical inactivity, and metabolic syndrome.^[12]

Conclusions

Psoriasis patients were likely to develop COPD.

Recommendation

COPD should be screened by spirometry among psoriasis patients and advise them to stop smoking and control weight and diabetes to reduce COPD development.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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