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Smoker Patients with COPD: Development of Joint Disorders and Dermatological Manifestations-A Retrospective Study

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ABSTRACT

Smokers often suffer from Chronic Obstructive Pulmonary Disease (COPD), which frequently results in serious respiratory problems and comorbidities. According to recent studies, there can be some association between COPD and the development of joint disorders and skin diseases. Understanding the basics of these associations is beneficial in managing patients and treatments. This observational, retrospective study analysed the data of 500 COPD patients who were smokers. Medical records were used to gather patient data, such as medical history, joint disorders and dermatological problems. Major parameters like incidence of joint issues and specific skin conditions were evaluated. According to the study, 19.2% of COPD patients with a smoking history also had dermatological symptoms,14.2% of cases experienced joint problems and 9.8% with both complaints. The most frequent joint problem was osteoarthritis (13.4%), followed by rheumatoid arthritis (4.2%) and gout (3.8%). 11.2% of patients had eczema, 4.8% had psoriasis and 2.6% had other skin conditions. Compared to individuals with moderate COPD (19.7%) and severe COPD (16.1%), 64.2% of mild COPD patients had no comorbidities. Similarly, comorbidities rise with the length of smoking history, as seen by 52.1% of patients with less than a decade of smoking history had no comorbidities, compared to 16.9% of patients with more than 20 years of smoking history. In addition, the study revealed higher inflammatory markers, including elevated CRP levels in 30.8% of patients, elevated IL-6 in 25.2% of patients and elevated TNF-a in 16.6% of patients. The study's findings indicate a correlation between smokers' COPD and the development of skin and joint disorders. It is observed that in patients with severe COPD, such complications were more common. Clinicians should consider these associations when providing comprehensive medical care to smokers with COPD.

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Key Words
COPD, smokers, joint disorders, dermatological manifestations, retrospective study, comorbidities

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD), an important medical condition primarily linked to smoking, results in decreased airflow and chronic respiratory symptoms. According to recent studies, COPD may also be linked to several extra-pulmonary symptoms[1]. Previous studies have indicated possible connections between COPD and metabolic syndrome, and cardiovascular illnesses, emphasizing the complicated relationships among these medical conditions[2]. However, its association with dermatological and joint conditions. like osteoarthritis, rheumatoid arthritis, gout, psoriasis and dermatitis are less studied which are focussed in our study. Comorbidities in a COPD patient will make the treatment and management regimens more difficult. Systemic effects like chronic inflammation, Protease-Antiprotease Imbalance and oxidative stress are the major factors for comorbidities[3,4]. Recent studies revealed that COPD patients exhibit chronic inflammation due to increased neutrophils and immune cells, producing inflammatory mediators which are responsible for the other comorbidities.5 These conditions may raise the morbidity and lower quality of life in chronic COPD patients[6]. Understanding these correlations is essential to create comprehensive treatment strategies.

It is still difficult to fully comprehend the extent of the relationships between COPD and its comorbidities, despite increasing evidence of these connections. There are limitations in understanding and clinical practice in these associations of chronic diseases due to insufficient research data. These gaps highlight the need for greater study in this field to provide patients with comprehensive medical attention[7].

This study aims to fill these gaps by carrying out an observational, retrospective analysis of 500 smokers who have COPD. We assessed the frequency and severity of joint diseases and dermatological conditions by looking through their medical records. Our work addresses an important area of research by offering insightful information on the frequency of these comorbidities and how they are linked to the severity of COPD.

Our goal is to emphasize the significance of taking extra-pulmonary symptoms into account while managing COPD by connecting our findings to the existing literature on COPD comorbidities. Our work highlights the need of comprehensive treatment approaches and provides opportunities for additional research into the underlying mechanisms and potential therapeutic options for the management of these concurrent conditions in COPD patients.

Aim of the Study: The aim of the study is to better understand the specific associations that exist between smokers with chronic obstructive pulmonary disease (COPD) and the frequency of joint and dermatological disorders.

Objectives:

- To determine the prevalence of joint disorders (such as gout, rheumatoid arthritis and osteoarthritis) and skin diseases (such as psoriasis, eczema and osteoarthritis) in smokers with COPD.
- To study the association between the frequency of joint and skin diseases and the severity of COPD.
- To assess the impact of smoking history, in relation to duration and intensity, on the development of skin and joint comorbidities in patients with COPD.
- To analyse the role of systemic inflammation in extra pulmonary comorbidities in COPD patients.

MATERIALS AND METHODS

Study Setting: The study was carried out at RVM Institute of Medical Sciences, located in Laxmakkapalli Village, Siddipet District. This tertiary care hospital offers comprehensive healthcare services to a wide range of patients.

Study Design: This research is an observational retrospective study to analyse the joint and dermatological comorbidities in smokers with COPD.

Study Population: 500 patients with a history of smoking and a diagnosis of chronic obstructive pulmonary disease (COPD) were included in the study.

Study Period: Data was collected for the period of January 2022 to December 2023, allowing an extensive review of suspected cases during the allotted two years.

Inclusion Criteria: COPD patients who have been diagnosed using the GOLD criteria. Patients with smoking history that is documented. Complete medical records with information on joint and skin issues are available.

Exclusion Criteria: Patients whose medical records are not complete. Patients who do not smoke or who have never smoked before. Patients who have serious chronic conditions such as cancer or severe renal disease, which may bias the results.

Data Collection: In order to gather pertinent information, patient records were examined. This included, details on the demographics (age, gender, etc.), severity of COPD according to spirometry data (FEV1, FVC), Smoking history (length and intensity), joint conditions with medical documentation (e.g., osteoarthritis, rheumatoid arthritis, gout)., dermatological conditions with documentation (e.g.,

eczema, psoriasis), indicators of inflammation (TNF-a, IL-6 and CRP), hospital stays as well as flare-ups and prescription drugs and treatment plans. The existence and severity of dermatological and joint disorders were recorded, covering diagnosis based on relevant investigations and the clinical examination. Classification of severity according to accepted clinical standards for every condition.

Statistical Analysis: Descriptive Statistics used to summarize the patient demographics, prevalence of joint and dermatological conditions and levels of inflammatory markers. By using the comparative Analysis, differences in inflammatory markers between patients with and without joint and dermatological conditions were analysed. Correlation Analysis is used to examine the relationship between COPD severity, smoking history and the prevalence of comorbidities.

Ethical Considerations: Institutional Ethics Committee of RVM Institute of Medical Sciences evaluated and approved the study protocol. To maintain confidentiality, all patient data were anonymised.

RESULTS AND DISCUSSIONS

In this study, we thoroughly analysed the impact and prevalence of dermatological and joint diseases in smokers with COPD. We investigated the association between these comorbidities and the severity of COPD, the impact of smoking history and the role of systemic inflammation using a large sample size of 500 cases at the RVM Institute of Medical Sciences. The results of our study are summarized in Tables 1 through 6.

Table 1: Prevalence of Joint and Dermatological Conditions in COPD Patients (N=500).

Condition	Number of Patients	Percentage (%)
No Joint or Dermatological Symptoms	284	56.80%
Only Joint Disorders	96	19.20%
Only Dermatological Issues	71	14.20%
Both Joint and Dermatological Issues	49	9.80%

Table 2: Correlation of Comorbidities with COPD Severity

Severity of COPD	No Disorders	Only Joint Disorders	Only Dermatological Issues	Both Disorders
Mild	192 (64.2%)	29 (30.2%)	20 (28.2%)	18 (36.7%)
Moderate	56 (19.7%)	42 (43.7%)	34 (47.9%)	18 (36.7%)
Severe	51 (16.1%)	25 (26.1%)	17 (23.9%)	13 (26.6%)

Table 3: Smoking History and Prevalence of Comorbidities

Smoking History	No Disorders	Only Joint Disorders	Only Dermatological Issues	Both Disorders
< 10 years	148 (52.1%)	32 (33.3%)	23 (32.4%)	13 (26.5%)
10-20 years	88 (31.0%)	49 (51.0%)	34 (47.9%)	18 (36.7%)
> 20 years	48 (16.9%)	15 (15.7%)	14 (19.7%)	18 (36.7%)

Table 4: Comparison of COPD Patients with and Without Comorbidities

Category	Number of Patients	Percentage (%)
Without Comorbidities	284	56.80%
With Comorbidities	216	43.20%

Table 5: Prevalence of Specific Joint and Dermatological Disorders in COPD Patients (N=500)

Disorder	Number of Patients	Percentage (%)
No Joint or Dermatological Symptoms	284	56.80%
Osteoarthritis	67	13.40%
Rheumatoid Arthritis	21	4.20%
Gout	19	3.80%
Eczema	56	11.20%
Psoriasis	24	4.80%
Other Skin Conditions	13	2.60%

Table 6: Prevalence of Elevated Inflammatory Markers in COPD Patients (N=500)

Inflammatory Marker	Number of Patients	Percentage (%)
CRP	154	30.80%
IL-6	126	25.20%
TNF-a	83	16.60%
No Significant Elevation	137	27.40%

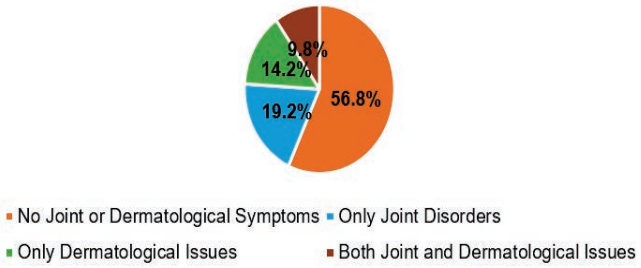

Fig. 1: Prevalence of Joint and Dermatological Conditions in COPD Patients

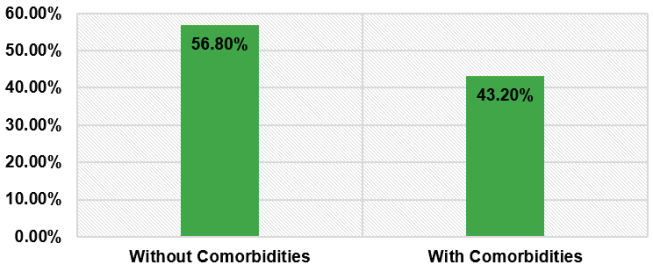

Fig. 2: Comparison of COPD Patients With and Without Comorbidities

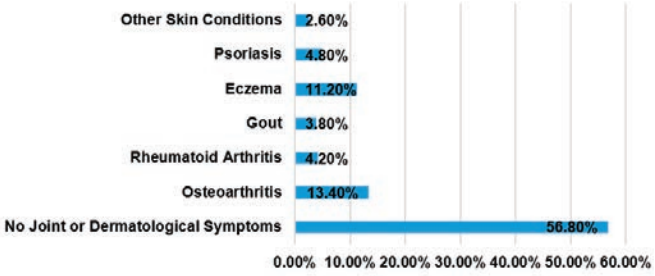

Fig. 3: Prevalence of Specific Joint and Dermatological Disorders in COPD Patients

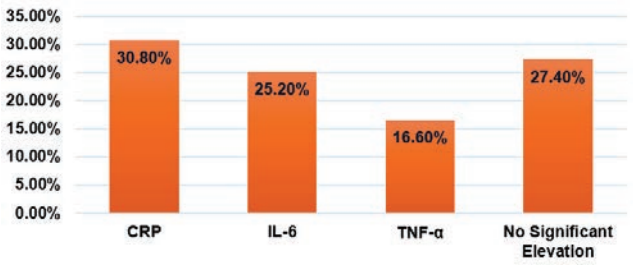

Fig. 4: Prevalence of Elevated Inflammatory Markers in COPD Patients

The prevalence of joint and dermatological disorders in patients with COPD is shown in Table 1. There were significant proportions of patients without comorbidities (56.8%) showing no joint or dermatological symptoms. In 19.2% of cases, only joint disorders were found and in 14.2% of cases, only dermatological problems were found. A lesser portion, 9.8%, had issues with their joints as well as their skin. These results indicated a significant association between comorbid conditions and COPD($p<0.01$).

Table 2 indicates the correlation between the severity of COPD and the occurrence of comorbidities. Compared to patients with mild or moderate COPD, those with severe COPD have a higher prevalence of joint and dermatological concerns. The tables shows that percentage of people affected with no comorbidities decrease from mild (67.6%) and moderate (19.7%) to severe cases (12.3%). These values. These numbers show a significant correlation ($p<0.01$) between the severity of COPD and comorbidities.

The association between comorbidity prevalence and smoking history in COPD patients is shown in Table 3. The study reveals that 52.1% of patients with less than 10 years of smoking history showed no comorbidities while 10-20 years history and more than 20years history are 31.0% and 16.9% respectively. By the values from this table, Pearson Correlation ($r=0.28$, $p<0.05$) suggests that there is significant correlation between smoking history and comorbidities.

The distribution of COPD patients according to the presence or absence of comorbidities is shown in Table 4. It shows that 56.8% of patients do not have any comorbid conditions, but 43.2% of patients have one or more comorbidities. It gives an overview of how comorbidities are distributed among COPD patients.

Table 5 shows the frequency of specific joint and dermatological disorders in people with COPD. With 13.4% of people suffering from osteoarthritis, it is the most frequent condition, followed by eczema with 11.2%. Rheumatoid arthritis (4.2%), gout (3.8%), psoriasis (4.8%) and other skin disorders (2.6%) are among the other comorbidities. Significant associations were found between specific disorders like osteoarthritis and eczema ($p<0.01$).

Table 6 shows the incidence of elevated inflammatory markers in COPD patients. In 30.8% of patients, elevated CRP levels, IL-6 in 25.2% and TNF-a in 16.6% of patients are detected. Furthermore, none of these markers are significantly elevated in 27.4% of patients. These results reveal a significant association between increased CRP and IL-6 levels with COPD ($p<0.01$).

The findings of our study highlight the complex relationship between joint and dermatological comorbidities with COPD, highlighting the challenging nature of management of COPD especially in smokers[9]. Our study analysed multiple parameters that are related to the associated comorbidities of COPD like, history of smoking, severity of COPD and inflammatory markers. Our study results also revealed the frequency of comorbidities and notified the specific joint and dermatological disorders which are prevalent in smokers with COPD.

Prevalence of Joint and Dermatological Disorders: According to our study, smokers with COPD had a significant frequency of joint and skin disorders. Osteoarthritis and eczema were found in a considerable number of individuals, indicating that these conditions are common among these patients. These results are consistent with an extensive cross-sectional study, which similarly found that individuals with COPD had a high frequency of comorbidities, such as inflammatory arthritis and skin conditions[9].

Association of Comorbidities with COPD Severity: According to the study, there is a significant correlation between the prevalence of joint and dermatological disorders and the severity of COPD. Patients who have severe COPD are more likely to have these comorbidities compared to the patients with mild to moderate COPD. These results are inconsistent with a German study which suggested that the prevalence of comorbidities did not always correlate with the degree of severity, indicating the need for comprehensive management strategies at every stage of the disease[10].

History of Smoking and Comorbidity Prevalence: Longer smoking durations were clearly associated with a higher prevalence of comorbid conditions. This is supported by earlier studies showing that smoking increases systemic inflammation in COPD patients which triggers other comorbidities[11].

Comparison of Patients with COPD and Those Without Comorbidities: Our study indicates that a significant proportion of individuals with COPD also had one or more comorbid illnesses. According to earlier studies, those with COPD had a markedly greater possibility of having other chronic diseases than people without COPD which is in line with our results[12].

Frequency of Specific Joint and Dermatological Conditions: In our study, the most prevalent specific conditions found in COPD patients were osteoarthritis and eczema. A prior meta-analysis found a statistically significant correlation between COPD and psoriasis, with more severe psoriasis associated with a higher chance of getting COPD[13]. A recent systemic review confirmed the association of osteoarthritis and COPD which is consistent with our study results[14].

Association of Elevated Inflammatory Markers: The significance of systemic inflammation in the development of concurrent diseases has been demonstrated by the prevalence of increased inflammatory markers, including IL-6 and CRP, in COPD patients. Our results correlate with an increasing amount of literature indicating that chronic inflammation in COPD has a role in the emergence of several comorbidities[15,16,17].

Limitations and Future Directions: Despite significant sample size, the study was limited to a single medical institution, which could restrict the implications of the findings to other populations. For a better understanding of the associations between COPD severity, smoking history, systemic inflammation and comorbidities, longitudinal studies are required as the cross-sectional design limits our capacity to establish causal relationships. Therefore, Future research should focus on multicentred longitudinal studies in diverse populations.

CONCLUSION

Our study's findings highlight the significant prevalence of joint and skin comorbidities in COPD patients, especially in smokers. The results show a strong correlation between the incidence of these comorbidities and the severity of COPD, emphasizing the need for comprehensive management of COPD. The significance of smoking cessation programs is further highlighted by proving the association between the incidence of comorbidities and smoking history. Increased inflammatory markers in COPD patients suggest possible treatment targets and indicate that systemic inflammation is a major factor in the development of comorbidities. In conclusion, our study highlights the significance of systemic inflammation in COPD comorbidities, stressing the need of comprehensive care to improve patient outcomes.

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