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Original Research Article

Assessment of glycemic status of COPD patients on long term corticosteroid therapy

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Among the pharmacological therapy, inhaled beta-agonist and anticholinergics are the mainstay therapy of COPD along with corticosteroid. Steroid therapy is associated with various potential adverse effects like steroid induced deranged glycemic status. So, we sought to examine the association between long term corticosteroid therapy and glycemic status in COPD patients.
Methods: A cross sectional study was done to assess the glycemic status in COPD patients on long term corticosteroid therapy in a rural tertiary care centre on patients satisfying inclusion and exclusion criteria. Inclusion criteria includes COPD patients on steroid based therapy (inhaled/systemic or both) for at least 6 months. Known case of type 2 diabetes mellitus, bronchial asthma, interstitial lung disease, coronary artery disease, cardiomyopathies, connective tissue disorders, recipients of organ transplant or immunosuppressive therapy, patients having co morbidities like renal failure, liver failure, heart failure and patients on other drugs known to cause hyperglycemia were excluded. Random blood sugar, HbA1C etc, was done and data was analyzed by SPSS version 22.0.
Results: Total 46 patients were included in study. Mean age was 63.22 years with minimum age 47 years and maximum age 80 years. 35 patients (76.09%) were male and 11 patients (23.91%) were female. Sex ratio was 3.18:1. 26 patients (56.52%) were taking both inhaled and systemic corticosteroids, 12 patients (26.09%) were taking only inhaled corticosteroids and 8 patients (17.39%) were taking systemic corticosteroid therapy. 14 patients (30.43%) were found to have impaired glucose tolerance, 7 patients (15.22%) were diagnosed as a case of diabetes mellitus and 25 patients (54.35%) were found to be euglycemic.
Conclusions: We conclude that incidence of deranged glycemic status is more common among COPD patients receiving only systemic corticosteroid therapy or both systemic and inhaled corticosteroid therapy. Further, inhaled corticosteroids are better in terms of glycemic control among COPD patients on corticosteroid therapy. Hence, we recommend routine screening of glycemic status in COPD patients on corticosteroid therapy.

Keywords: COPD, Glycemic status, Inhaled corticosteroid, Systemic corticosteroid

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and co morbidities attribute to overall severity in individual patient.[1,2] In COPD, there is chronic and progressive inflammation occur in the airways of the lungs.[1-3] This chronic inflammation is sometimes aggravating due to some acute inflammation (usually from infections) and called as acute exacerbation of COPD (AECOPD).[4] Cigarette smoking is the best studied but not the only risk factor responsible for COPD development.[5]

Prevalence of COPD in India is about 3.7% and the estimated burden of COPD in India is about 15 million cases.[5,6] According to national institute of health COPD is the third leading cause of death in United State. There are no medications that can reverse the natural history of COPD and therapy is generally aimed at alleviating symptoms, improving function, reducing exacerbations and hospitalization.[3,7,8] Both pharmacological and non-pharmacological therapy are included in the management of COPD.

Among the pharmacological therapy inhaled beta- agonist and anticholinergics are the mainstay therapy of COPD along with corticosteroid.[9] Initially, use of oral steroid was common in practice but now only 5-10% are considered truly oral steroid dependent.[10,11] Due to more systemic effect, inhaled corticosteroid is preferred over oral steroid to improve symptoms and reduce exacerbations (approx. in 65% of COPD population in some studies).[12-15]

Various studies support the use of short course of systemic steroid during acute exacerbations of COPD to shorten the duration and improve the outcome. But there are number of potential adverse effects from both short term and long-term use of steroid therapy in COPD.[9,16] Several studies have been done to support the adverse effect of steroid therapy on adrenal axis, peptic ulcer disease, infections, skin, bone mineral density, fractures.[17-24]

Glucose control is more difficult with steroid based therapy in COPD.[25-27] One study shows 15% of COPD patient requires additional treatment for hyperglycemia as compared to 4% of control group.[28-30] In addition to this some case reports describe loss of glucose control in patient receiving ICS based therapy.[13,31,32] On the other hand, lung health study-2 did not demonstrate an increased risk for a new diagnosis of diabetes mellitus in individual receiving ICS based therapy.[33,34] But it was associated with individual on prolonged oral steroid.[35] So, in order to find out the association between steroid therapy and glycemic state in COPD population, we conducted a study at our rural tertiary centre.

METHODS

This study was conducted on patients of COPD attending outdoor and indoor of medicine department of UPUMS Saifai, Etawah, Uttar Pradesh, India, from September 2016 to June 2017. Prior approval of institutional ethical committee was taken to conduct the above study.

Inclusion criteria

COPD patients on steroid based therapy (inhaled/systemic or both) for at least 6 months.

Exclusion criteria

- Known case of type 2 diabetes mellitus
- Known case of bronchial asthma, interstitial lung disease, coronary artery disease, cardiomyopathies, connective tissue disorders, recipients of organ transplant or immunosuppressive therapy
- Patients having co morbidities like renal failure, liver failure, heart failure
- Patient on other drugs known to cause hyperglycemia.

All patients satisfying inclusion and exclusion criteria were included in study. This was a cross sectional study. All patients were subjected to a detailed history and thorough clinical examination after obtaining his/her informed consent. Random blood sugar, HbA1C, serum creatinine, blood urea, haemoglobin, total and differential counts, HIV and spirometry. Statistical analysis was done by SPSS version 22.0.

RESULTS

Total 46 patients were included in the study who satisfied the inclusion and exclusion criteria. In this study, mean age was 63.22 years with minimum age 47 years and maximum age 80 years (Figure 1).

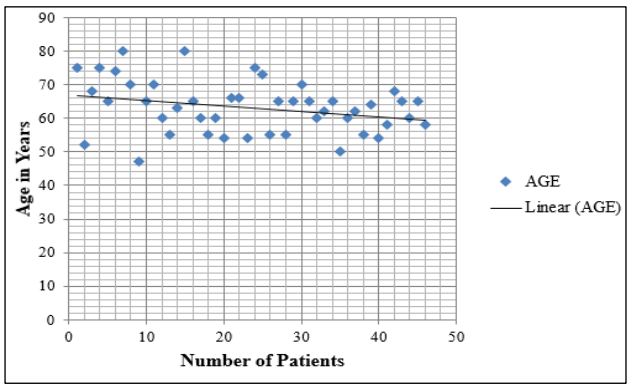


Figure 1: Age distribution.

Out of total 46 patients, 35 patients (76.09%) were male and 11 patients (23.91%) were female. Sex ratio was 3.18:1 (Figure 2 and Table 1).

Table 1: Glycemic status and mode of steroid therapy in different sex groups.

Sex	Total no. of patients	Glycemic status	Mode of corticosteroid therapy					
			Inhaled		Systemic		Both inhaled and systemic	
			No. of Pt.	Total	No. of Pt.	Total	No. of Pt.	Total
Male	35	Euglycemic	04	06	03	07	13	22
		IGT	01		03		05	
		Diabetes	01		01		04	
Female	11	Euglycemic	04	06	00	01	01	04
		IGT	01		00		00	
		Diabetes	01		01		03	
Total	46	Total	12		08		26	

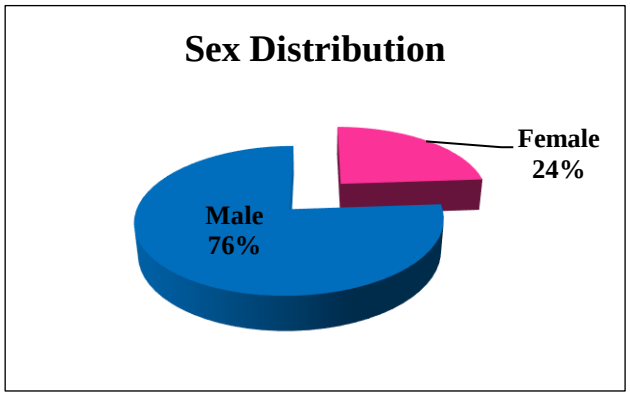


Figure 2: Sex distribution.

In this study 34 patients (73.91%) had history of smoking, 8 patients (17.39%) had prolonged exposure to passive smoking and 4 patients (8.70%) were nonsmoker (Figure 3).

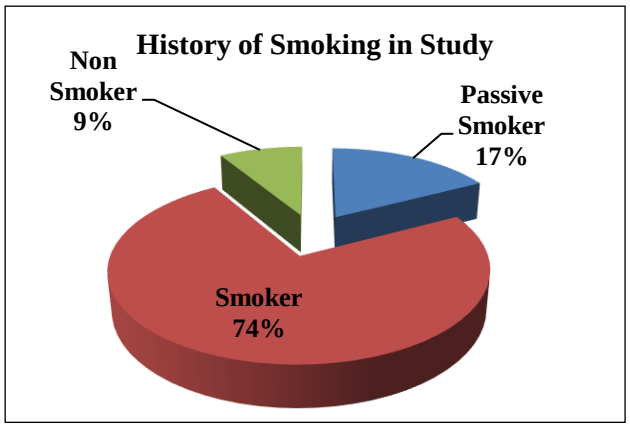


Figure 3: History of smoking in study population.

In current study 26 patients (56.52%) were taking both inhaled and systemic corticosteroids, 12 patients (26.09%) were taking only inhaled corticosteroids and 8 patients (17.39%) were taking systemic corticosteroid therapy (Figure 4).

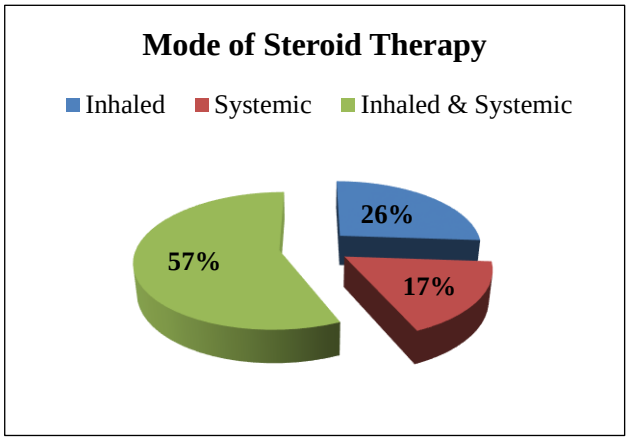


Figure 4: Mode of steroid therapy.

Among 12 patients (100%) on inhaled corticosteroid therapy only, 8 patients (66.67%) were euglycemic, 3 patients (25%) had impaired glucose tolerance and 1 patient (8.33%) had diabetes mellitus.

Among 8 patients (100%) taking systemic corticosteroid therapy only, 3 patients (37.5%%) were euglycemic, 3 patients (37.5%) had impaired glucose tolerance and 2 patients (25%) had diabetes mellitus.

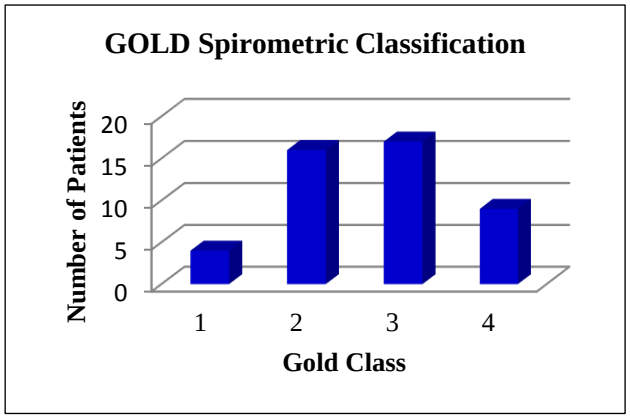
Among 26 patients (100%) on inhaled and systemic corticosteroid therapy, 14 patients (53.85%) were euglycemic, 8 patients (30.77%) had impaired glucose tolerance and 4 patients (15.38%) had diabetes mellitus (Table 2).

Minimum duration of corticosteroid therapy was 6 month and maximum duration was 5 years with mean duration of corticosteroid therapy was 1.90 years.

Table 2: Mode of corticosteroid therapy and HbA1C.

Mode of corticosteroid therapy	Number of patients	Glycemic status		
		Euglycemic	IGT	Diabetes
Inhaled	12	8	3	1
Systemic	8	3	3	2
Inhaled and systemic	26	14	8	4
Total	46	25	14	7

Most of the patients included in study belong to GOLD Spirometric Class 2 and 3 (Figure 5).



Out of total 46 patients, 14 patients (30.43%) were found to have impaired glucose tolerance, 7 patients (15.22%) were diagnosed as a case of diabetes mellitus and 25 patients (54.35%) were found to be euglycemic.

Out of 25 patients (100%) having euglycemic status, 8 patients (32%) were taking inhaled corticosteroids only, 3 patients (12%) were taking systemic corticosteroid therapy and 14 patients (56%) were taking both inhaled and systemic corticosteroid therapy.

Out of 14 patients (100%) having impaired glucose tolerance, 3 patients (21.43%) were taking inhaled corticosteroids, 3 patients (21.43%) were taking systemic corticosteroid therapy and 8 patients (57.14%) were taking both inhaled and systemic corticosteroid therapy.

Out of 7 patients (100%) having diabetes mellitus, 1 patients (14.29%) were taking inhaled corticosteroids, 2 patients (28.57%) were taking systemic corticosteroid therapy and 4 patients (57.14%) were taking both inhaled and systemic corticosteroid therapy (Table 3).

Table 3: Glycemic status and HbA1C in study population.

Glycemic status	HbA1C	Type of steroid therapy			
		Inhaled	Systemic	Both inhaled and systemic	Total
Normal	Below 5.7	08	03	14	25
IGT	5.7-6.4	03	03	08	14
Diabetes	6.5 and above	01	02	04	07

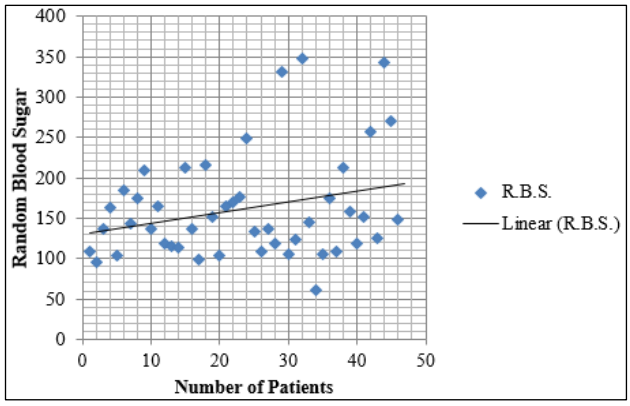


Figure 6: Random blood sugar in study population.

In current study average, random blood sugar was found to 161.41 mg/dl, with minimum of 61 mg/dl and maximum of 348 mg/dl (Figure 6).

DISCUSSION

In current study 17.39% patients were taking systemic corticosteroid therapy and 56.52% patients were taking both inhaled and systemic corticosteroids i.e. 73.91% patients were on systemic corticosteroid therapy which is higher in comparison to current trends in developed countries as shown in previous studies by Miravitlles M et al and Jackevicius C at al.[10,11] In this study only 26.09% patients were taking inhaled corticosteroids and which is quite lower than studies conducted in developed

countries by Donohue JF et al McEvoy CE et al Spencer S et al and Calverley PM et al.[12-15] In current study 15.22% patients had diabetes mellitus which is comparable to studies conducted by Slatore CG et al, Faul JL et al, Suissa S et al and Gartlehner G et al.[27-30]

Impaired glucose tolerance was found in 30.43% patients. Smyllie HC et al and Slatore CG et al concluded that glucose control is more difficult with steroid based therapy in COPD.[25,27] Impaired glucose tolerance and diabetes mellitus is less common in patients taking inhaled corticosteroid therapy which is comparable to previous studies conducted by Spencer S et al and Calverley PM et al.[14,15]

CONCLUSION

Based on current study we conclude that incidence of deranged glycemic status is more common among COPD patients receiving only systemic corticosteroid therapy or both systemic and inhaled corticosteroid therapy. Further, Inhaled corticosteroids are better in terms of glycemic control among COPD patients on corticosteroid therapy. Hence, we recommend routine screening of glycemic status in COPD patients on corticosteroid therapy. Due to small data, demographic and socioeconomic variation among different regions of world, more research is needed to test this hypothesis.

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