



A STUDY OF ASSOCIATION BETWEEN SERUM MAGNESIUM LEVEL AND ACUTE EXACERBATION OF COPD PATIENTS AT A TERTIARY CARE HOSPITAL.

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ABSTRACT **Background:** The course of COPD is associated with exacerbations. There are many factors responsible for exacerbations. A decrease in serum Mg²⁺ is associated with airway hyper-reactivity and impaired pulmonary function. The purpose of this study was to determine if decreased serum Mg²⁺ levels in patients with chronic obstructive pulmonary disease (COPD) are associated with acute exacerbations.

Aims and Objectives: To study the association of serum Magnesium level with acute exacerbation and also to know the relationship between Serum Magnesium levels and frequency of exacerbations.

Materials and Methods: The study was conducted among 286 COPD patients admitted in Govt. Medical College and hospital Jammu from January 2018 to December 2018. A detailed history was elicited, clinical examination and all required investigations were done in all cases. Patients with age above 40 years only included and patients associated with other conditions producing hypo or hypermagnesemia were excluded from this study.

Statistical methods: The data was analysed with the help of software such as SPSS16, Microsoft Excel 2018.

Results: Magnesium was at low level in patients who presented with acute exacerbation, normal in stable COPD patients (P value – 0.002). And number of admissions also more in COPD patients with exacerbations.

Conclusion: Hypomagnesemia is seen in COPD patients with exacerbations. And also there was more frequent exacerbations found in patients with Hypomagnesemia. So Magnesium is one of the independent and modifiable risk factor for COPD exacerbation.

KEYWORDS : COPD, Exacerbation, Magnesium, Smokers

Introduction

COPD is a leading cause of morbidity and mortality, so it is a major public health concern. Magnesium plays a role in airway smooth muscle relaxation and bronchodilation, stabilization of mast cells, Neuro humoral mediator release and mucociliary clearance. Hypomagnesemia is associated with increased airway hyperreactivity and decreased muscle strength. Hypomagnesemia is one of the correctable risk factor (1, 2, 3). This study is to confirm the correlation between Hypomagnesemia and COPD exacerbation.

Although the precise mechanism of this action is unknown, it has been suggested that Mg²⁺ plays a role in the maintenance of airway patency via relaxation of bronchial smooth muscle [4]. Chronic obstructive pulmonary disease (COPD) represents an overlap of chronic bronchitis and emphysema, and patients with COPD have an element of asthmatic bronchitis [5]. Bronchospasm is a contributing factor in their inability to clear secretions. This may result in reduced pulmonary gas exchange with consequences such as decreased quality of life and repeated hospitalization [6]. Thus, Mg²⁺ may have a role in maintaining disease stability in COPD patients.

Aims and Objectives

The purpose of this study is to determine the association of serum Magnesium level with acute exacerbation of COPD and also to know the relationship between Serum Magnesium levels and frequency of exacerbations.

Materials and Methods

The study was conducted among 286 COPD patients in Govt. Medical College and Hospital GMC Jammu from January 2018 to December 2018.

Inclusion Criteria:

- 1) COPD patients with and without exacerbation,
- 2) Age > 40 years

Exclusion Criteria:

- 1) Patients with other respiratory diseases
- 2) Renal failure
- 3) Congestive heart failure
- 4) Ca lung
- 5) COPD patients admitted for other reasons
- 6) DM, Hypertension, CAD, CVA.
- 7) Drugs – H2 blockers, Antacids, PPIs, Diuretics, Digoxin.

8) Previous GI surgery.

Methods

Patients who presented with exacerbation of COPD based on the criterion of Anthonisen's & stable COPD patients who came for follow up were included in the study. After obtaining informed consent, detailed history, examination, baseline investigations (CBC, RFT, and Serum Electrolytes, ECG, and Chest X ray), LFT & serum Mg²⁺ were sent. Retrospective analysis regarding frequency of exacerbation based on history and medical records will be noted. Later both groups were compared. The data was analysed with the help of software such as SPSS14, Microsoft Excel 2018.

Case definition:

COPD acute exacerbation patients are selected based on ANTHONISEN'S CRITERIA 3.

Cardinal symptoms:

- Increased dyspnea,
- Increased sputum production,
- Increased sputum purulence

Supporting symptoms or signs:

- Upper Respiratory tract infection in past 5 days,
- Wheezing, Cough, Fever without an obvious source,
- A 20% increase in Respiratory Rate or Heart Rate above baseline.

Discussion

The study was conducted in Govt: Medical College and hospital Jammu between January 2018 to December 2018. Aziz Gumus et al studied about 89 cases of COPD exacerbation. Patients were followed up at 3 monthly

Intervals for 1 year. There were significant positive correlation between serum Magnesium and COPD exacerbation (7). Suryprakash et al published an article which contained 100 COPD patients (8). A cross sectional

Study was conducted in 50 COPD patients at Kashmir by J.P. Singh et al (9). Hany S. Aziz et al conducted retrospective study in 100 COPD patients (10). All the above studies confirmed the association between low serum

Magnesium levels and exacerbations of COPD. Serum Magnesium levels in Stable COPD & COPD with exacerbations. Table 1 below show sex distribution of patients with stable and acute exacerbation of

COPD.

Table 1 Shows Sex Distribution

SEX	STABLE COPD	COPD WITH AE	TOTAL
MALE	126	120	246
FEMALE	17	23	40
	143	143	286

Table 2 below shows Average serum Magnesium level in Stable COPD patients is 1.84 mg%, compared with exacerbation patients in them it is only around 1.540 mg%. P value<0.002, statistically significant. So serum Magnesium is low in patients admitted with exacerbation. From this study we can know Hypomagnesemia is one of the risk factor for COPD exacerbation.

Table 2 Shows Mean And S.d Of Patients With Stable And Acute Exacerbation Of COPD

	Stable Copd		Exacerbation		P-value
	MEAN	SD	MEAN	SD	
Serum Magnesium	1.84	0.27	1.540	0.31	0.002
Number of admissions/year	0.68	0.90	1.28	0.96	<0.001

In patients with mean serum Magnesium levels of 1.84 an average frequency of admissions 0.68 per year, in contrast 1.28/year in patients with hypomagnesemia. When Magnesium level is around 1.792 mg%, there is no previous admissions. So Hypomagnesemia increases the risk of exacerbations & frequency of exacerbations. When Magnesium level is around 1.792 mg% there is no previous admissions. As the Magnesium level decreases the no. of admissions also increases. This implies Hypomagnesemia is not only risk factor for exacerbation but it also increases the no. of exacerbations in future too. There is no significant change in the other variables like Age, Blood pressure, Blood sugar, S. K+ and S. Creatinine. They are comparable in both the control and study group.

Summary

The study contained 286 cases of COPD patients out of which 143 were stable patients and 143 patients presented with acute exacerbation. Most number of cases were in 4th to 6th decade. Among the 286 patients studied, 40 people were female. 17 in stable group and, 23 in the exacerbation group. Because of smoking and exposure to outdoor air pollution are less common in females, they are less prone to develop COPD. Hypomagnesemia is associated with acute exacerbations of COPD. And also no. of exacerbations are more in patients with low magnesium levels. According to this study exacerbations are common in current smokers than ex smokers. So cessation of smoking will delay the decline in lung function.

Conclusion

COPD is a preventable chronic respiratory disease with increasing trend having modifiable and nonmodifiable risk factors. The stages of COPD worsen with increasing age, continued smoking and exacerbations. The most common conditions predisposing to exacerbations are respiratory tract infections, air Pollution associated systemic illnesses. Recent studies showed that there is significant role for Magnesium in pulmonary disease. It is a case control study, in which we examined serum Mg²⁺ levels in a 143 stable patients

who came for regular follow up and we also examined serum Mg²⁺ levels in another 143 COPD patients who came with symptoms suggestive of acute exacerbation, they are selected into exacerbation group based on the ANTHONIESEN criteria. On comparing the Magnesium values of the both groups we found that there is a significant differences in the serum Magnesium values. Average level of Magnesium in stable patients 1.84 mg%, exacerbation patients 1.54 mg%. Hypomagnesemia is seen in COPD patients with exacerbations. And also there was more frequent exacerbations found in Hypomagnesemia group. Hypomagnesemia is one of the modifiable risk factor. So by checking and correcting the Magnesium level at earlier stage we can reduce exacerbations.

Limitation of the study

But it is not an intervention study. By doing interventional studies we can prove the association and we can use Magnesium as a therapeutic agent.

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