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Original Research Paper

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ASSESSMENT OF ROLE OF SERUM MAGNESIUM IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

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ABSTRACT **Introduction:** Chronic Pulmonary Obstructive Disease is a treatable and preventable disease but characterize by frequent exacerbations which leads to complications and even death. Magnesium, because of its association with bronchial wall relaxation and inflammatory process, has been recognized as one of the factors influencing acute exacerbation of COPD. **Aim:** This study aims to assess the role of hypomagnesaemia in acute exacerbation of COPD. **Methods:** This is an observational study with COPD patients having 40 years or more and did not have co- morbid illnesses were selected. 50 cases each of stable COPD and acute exacerbation of COPD were taken and their serum magnesium level were measured. Comparison of the serum magnesium level between the two groups was done. **Result:** Majority of the patients in both acute exacerbation and stable groups were of 50-70 years of age, male (78% and 76% respectively) and smokers (82% and 68% respectively). Majority of patients in stable group were GOLD GRADE A (62%) where as in acute exacerbation group majority of patients were GOLD D (42%). 64% of the patients in acute exacerbation group had low magnesium level (<1.5mg/dl) but no patient in stable group had low magnesium. Mean serum magnesium level was 2.118mg/dl ± 0.209SD in stable group and in acute exacerbation group it was 1.406mg/dl± 0.361SD. **Conclusion:** Present study shows that low serum magnesium level is significantly associated with acute exacerbation of COPD.

KEYWORDS : Hypomagnesaemia, Chronic Obstructive Pulmonary Disease , Acute Exacerbation of COPD

INTRODUCTION

COPD is the leading cause of death worldwide though it is a treatable and preventable disease. Global initiative for chronic obstructive lung disease (GOLD) has defined acute exacerbation of COPD as an acute worsening of respiratory symptoms that is beyond normal day to day variations. [1] There are several factors that lead to exacerbations like low FEV_1 , poor performance status, past history of frequent exacerbations, hypercapnea, prolonged illness, poor quality of life, depression and so on[2]. COPD is associated with inflammation of large and small air ways, mucus hypersecretion, airway narrowing and alveolar destruction. Magnesium plays an important role in bronchial wall relaxation in association with Calcium and it has also close relation with inflammatory response. Low magnesium level has been shown to contribute acute exacerbation of asthma[3]. There are few studies that show low magnesium level in cases of acute exacerbation of COPD compared to stable COPD[4,5]. In the present study we try to assess the role of serum magnesium in acute exacerbations by measuring serum level in both patients with stable COPD and patients having acute exacerbation of COPD.

MATERIALS & METHODS

This is an observational study conducted after obtaining permission from institutional ethics committee. Total 100 COPD cases having age 40 years or more were selected from patients attending OPD as well as from patients admitted in indoor with their written consent.. The patients who were of less than 40 years of age, patients having other respiratory diseases or having other comorbid conditions like hypothyroidism, diabetes mellitus, cerebrovascular diseases, renal, cardiac and gastrointestinal diseases were excluded from the study. The patients taking diuretics, proton pump inhibitors, H2Blockers were also excluded. Pregnant female and lactating mothers were also excluded from the study. All patients were examined clinically and spirometry was conducted in all patients.Patients were pooled into two groups-either acute exacerbation of COPD or stable COPD depending on clinical examination and spirometry following GOLD2017 criteria. All consecutive patients of either stable COPD or acute exacerbation of COPD were selected till 50 cases were obtained in each group. Baseline demographic data of all patients was noted.Serum Magnesium level was measured at the time of admission in all the patients.Serum Magnesium level was compared between two groups using Student T-test.

RESULT

Total 100 cases were taken in this study;50 cases in each of the two groups that is acute exacerbation group and stable group.The baseline demografic characteristics of the two groups is depicted in Table 1. Majority of patients in both the groups were between 50 to 70 years of age. Gender distribution was also almost similar in two groups with male made up almost three fourth of total patients in both acute exacerbation and stable groups (table 1). In both groups majority of patients were smokers though the number of non-smokers were more in stable group in comparison to the acute exacerbation group (32% vs18%).Smoker patients in acute exacerbation group consumed more pack-years than their counterparts in stable group (Table 1).

GOLD grading of patients is depicted in Table 2.In stable group majority of patients were in Grade A (62%) while in

acute exacerbation group maximum number of patients are in Grade D(42%) closely followed by Grade B(40%)(Table 2).

Distribution of Serum Magnesium (Mg) level in both the groups of COPD is shown in Table 3. The number of patients having low Mg level (<1.5mg/dl) was more in acute exacerbation group compared to stable group (64% vs 0%)(Table 3). Mean Magnesium levels in both the groups are shown in Table 4. Mean Magnesium level was significantly low in acute exacerbation group compared to stable group. (1.406mg/dl ± 0.361SD vs 2.118mg/dl ± 0.209SD p<0.0001) (Table 4)

Table/ Figure No – 1 Demographic Distribution Of Patients

Variable		AECOPD (N=50)		Stable COPD (N=50)	
Age (Years)		NO.	%	NO.	%
	<50	3	6%	4	8%
	51-60	13	26%	22	44%
	61-70	22	44%	21	42%
	>70	12	24%	3	6%
	Total	50	100%	50	100%
Gender	Male	39	78%	38	76%
	Female	21	22%	12	24%
	Total	50	100%	50	100%
Smoking history	Non Smoker	9	18%	16	32%
	Smoker	41	82%	34	68%
	Total	50	100%	50	100%
Smoking history (pack years)	<20	31	62%	47	94%
	20-30	12	24%	2	4%
	>30	7	14%	1	2%
	Total	50	100%	50	100%

Table/ Figure No – 2 Assessment Of Copd Patients According To Gold Grading (Gold Grade Abcd)

Gold Grade	AECOPD		Stable COPD		Total	
	No.of Patients	Percentage	No.of Patients	Percentage	No.of Patients	Percentage
A	3	6%	31	62%	34	34%
B	20	40%	12	24%	32	32%
C	6	12%	6	12%	12	12%
D	21	42%	1	2%	22	22%
Total	50	100%	50	100%	100	100%

Table/ Figure No – 3 Distribution Of Serum Magnesium Level Among Copd Patients.

Serum Magnesium level	AECOPD on admission		Stable COPD	
	No.of Patients	Percentage	No.of Patients	Percentage
≤1.5mg/dl	32	64%	0	0
1.5 -2.3mg/dl	18	36%	42	84%
≥2.3mg/dl	0	0	8	16%

Table/ Figure No - 4 Distribution Of Mean Serum Magnesium Level Among Copd Patients.

Serum Magnesium level	MEAN	SD	P value (Student t-test)
AECOPD on admission	1.406	0.361	P <0.0001
Stable COPD	2.118	0.209	
Total COPD	1.762	0.462924389	

DISCUSSION

Chronic obstructive pulmonary disease is the cause of death in a large number of aged people in all over the world. This chronic disease is characterized by persistent airway inflammation and airway narrowing. Acute exacerbation of this chronic illness is quite common and is mainly responsible for complications and death. So one of the main target of treatment of COPD is to prevent acute exacerbation. Serum magnesium (Mg^{+2}) level was identified as an independent predictor of acute exacerbation in a study by Aziz Gumus et al[6]. In the present study we compared the serum Mg^{+2} level between stable COPD and acute exacerbation of COPD. Both the groups had similar number of patients and there was no significant difference in demographic profile in between the two groups. Mean serum Mg^{+2} level was significantly lower during admission in acute exacerbation group compared to the stable group. In a study by Hani S, Aziz et al also found serum Mg^{+2}level was significantly low in patients having acute exacerbation compared to the stable patients[4]. Several studies from India have also found significantly low serum Mg^{+2} level in patients having acute exacerbation[7,8]. In the present study it had also been found that while 64% of patients in acute exacerbation group had low serum Mg^{+2}(≤ 1.5mg/dl) ,no patient in the stable group had Mg^{+2} level less than 1.5mg/dl. P. G P Vignan Kumar et al in a 2017 study found that none of the 20 stable COPD patients had low Mg^{+2} (≤ 1.5mg/dl) levels where as 9 out of 20 patients of acute exacerbation of COPD had low Mg^{+2}. Our study was an observational study which showed hypomagnesaemia is one of the features associated with acute exacerbation of COPD.

Limitations

Magnesium acts on the airway in conjunction with calcium. So concomitant serum Calcium measurement should have been done in this study. Moreover as this is not a case control study, validation of correlation between serum Mg^{+2}level and acute exacerbation of COPD is not possible in this study.

CONCLUSION

Chronic Obstructive Pulmonary Diseases a common disease worldwide and characterized by frequent exacerbations. The present observational study shows that hypomagnesaemia is one of the factors associated with acute exacerbation and normal serum magnesium level is important for prevention of acute exacerbation. A case control study can validate these observations between COPD exacerbation and serum magnesium.

Conflict Of Interest: Nil

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