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SERUM MAGNESIUM LEVELS DERANGEMENTS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD).

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Abstract;

Background; chronic obstructive pulmonary disease (COPD) leads to significant morbidity and poor quality of life among patients. This study was conducted to evaluate serum magnesium levels among patients with COPD as there is no such study done in Pakistan on this topic. **Material and Methods;** A total of 137 patients presenting with COPD were registered from Department of medicine, Nishtar Hospital, Multan in this cross-sectional study from June 2016 to June 2017. Once registered in the study, all the relevant baseline investigations were done. Venous blood sample was taken (3 ml) and sent to central laboratory of Nishtar Hospital Multan, for serum Mg levels. Statistical analysis was performed by entering all the data in SPSS version 20. **Results;** Of these 137 study cases, 84 (61.3%) were male patients while 53 (38.7%) were female patients. Mean age of our study cases was 56.79 ± 4.81 years. Of these 137 study cases, 41 (29.9%) were from rural areas while 96 (70.1%) were from urban areas and 109 (79.6%) were poor. Diabetes was present in 28 (20.4%) and hypertension in 56 (40.9%) our patients. Mean height of our patients was 152.24 ± 10.87 centimeters while mean weight of our study cases was 66.41 ± 7.23 kilograms and mean body mass index was 24.87 ± 4.13 kg/m^2. Our study results reported 66 (48.2 %) were normal weight, 41 (29.9 %) were overweight and 30 (21.9 %) were obese. Smoking was noted in 53 (38.7 %) of our study cases. Mean duration of illness was 30.81 ± 14.74 months and 112 (81.8%) had disease duration more than 18 months. Mean serum magnesium level of our patients was 1.52 ± 0.54 meq/liter (Range; 1.15 meq/liter to 2.75 meq/liter) and hypomagnesemia was present in 50 (36.5 %) patients. **Conclusion;** Frequency of hypomagnsemia among patients with chronic obstructive pulmonary disease was very high in our study. Hypomagnesemia was significantly associated with male gender, increasing age, poor socioeconomic status, diabetes, hypertension, smoking and prolonged disease duration. Clinicians treating such patients should monitor their serum magnesium levels on regular basis to improve their prognosis and to decrease disease morbidity.

Keywords; Chronic Obstructive pulmonary disease, hypomagnesemia, frequency.

Introduction:

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide, and represents a huge and growing economic and social burden [1]. It is the fourth leading cause of death in the world and further increases its prevalence and mortality can be predicted in the coming decades [2]. In 2011, a major shift in Global Initiative for Chronic Obstructive Lung Disease (GOLD) treatment recommendations was proposed that stratifies patients with COPD on the basis of symptoms and exacerbation history [3]. Chronic obstructive pulmonary disease has a rising incidence and is about to become the third leading cause of death worldwide in 2020. The disease is characterised by slowly progressive airflow obstruction, resulting in dyspnoea and exercise limitation [4, 5]. Chronic obstructive pulmonary disease (COPD) represents an overlap of chronic bronchitis and emphysema, and patients with COPD have an element of asthmatic bronchitis. 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]. A growing body of evidence suggests that Mg^{+2} deficiency contributes to exacerbations of asthma and, as a corollary, that Mg^{+2} is useful in alleviating bronchospasm in these patients. Magnesium is involved in such important functions as bronchodilation and contraction in respiratory tract smooth muscles, mast cell stabilization, neurohumoral mediator release, and mucociliary clearance. Magnesium is thought to have a protective effect against chronic respiratory tract diseases. It has been suggested that insufficient magnesium intake through diet may lead to development of asthma and COPD. However, insufficient information is available concerning the effect of magnesium on frequency of COPD [7]. Thus, Mg^{+2} may have a role in maintaining disease stability in COPD patients. That not withstanding, the relationship between serum Mg^{+2} levels and outcome with regard to disease flares in COPD patients has not been, hitherto, thoroughly explored and a study demonstrated 35 % hypomagnesemia in COPD [8].

Owing to the lack of local data this study was done to evaluate derangement in serum Mg levels among patients with COPD.

Material and methods:

A total of 137 patients presenting with COPD were registered from Department of Medicine, Nishtar Hospital, Multan. Known cases with asthma, pulmonary embolus, lung cancer and sleep apnea, patients with concomitant heart disease, confusion secondary to exacerbation of COPD and patients who were taking magnesium supplementation were excluded from our study. Once registered in the study, all the relevant baseline investigations were done. Venous blood sample was taken (3 ml) and sent to central laboratory of Nishtar Hospital Multan, for serum Mg levels. Statistical analysis was performed by entering all the data in SPSS version 20.

Results;

Of these 137 study cases, 84 (61.3%) were male patients while 53 (38.7%) were female patients. Mean age of our study cases was 56.79 ± 4.81 years (with minimum age was 40 years while maximum age was 60 years). Mean age of the male patients was 58.69 ± 1.09 years while that of female patients was noted to be 53.77 ± 6.60 years. Our study results have indicated that majority of our patients i.e. 122 (89.1%) belonged to the age group ranging 46 – 60 years. Of these 137 study cases, 41 (29.9%) were from rural areas while 96 (70.1%) were from urban areas and 109 (79.6%) were poor. Diabetes was present in 28 (20.4%) and hypertension in 56 (40.9%) our patients. Mean height of our patients was 152.24 ± 10.87 centimeters while mean weight of our study cases was 66.41 ± 7.23 kilograms and mean body mass index was 24.87 ± 4.13 kg/m^2. Our study results reported 66 (48.2 %) were normal weight, 41 (29.9 %) were overweight and 30 (21.9 %) were obese. Smoking was noted in 53 (38.7 %) of our study cases. Mean duration of illness was 30.81 ± 14.74 months and 112 (81.8%) had disease duration more than 18 months. Mean serum magnesium level of our patients was 1.52 ± 0.54 meq/liter (Range; 1.15 meq/liter to 2.75 meq/liter) and hypomagnesemia was present in 50 (36.5 %) patients.

Table No. 1 Stratification of hypomagnesemia with regards to gender.

Gender	Hypomagnesemia		P – value
	Yes (n = 50)	**No** (n = 87)	
Male (n = 84)	46	38	**0.000**
Female (n = 53)	04	49	
Total	**137**		

Table No. 2 Stratification of hypomagnesemia with regards to age.

Age groups	Hypomagnesemia		P – value
	Yes (n = 50)	**No** (n = 87)	
30 – 45 Years (n = 15)	00	15	**0.001**
46 – 60 Years (n = 122)	50	72	
Total	**137**		

Table No. 3 Stratification of hypomagnesemia with regards to hypertension.

Hypertension	Hypomagnesemia		P – value
	Yes (n = 50)	**No** (n = 87)	
Yes (n = 56)	03	53	**0.000**
No (n = 81)	47	34	
Total	**137**		

Table No. 4 Stratification of hypomagnesemia with regards to obesity.

Obesity	Hypomagnesemia		P – value
	Yes (n = 50)	**No** (n = 87)	
Normal weight (n = 66)	08	58	**0.000**
Overweight (n = 41)	12	29	
Obese (n = 30)	30	00	
Total	**137**		

Table No. 5

Stratification of hypomagnesemia with regards to disease duration.

Disease duration	Hypomagnesemia		P – value
	Yes (n = 50)	**No** (n = 87)	
Up to 18 months (n = 25)	00	25	
More than 18 months (n = 112)	50	62	**0.000**
Total	**137**		

Discussion;

Currently the fifth leading cause of death and disease burden globally, COPD is characterized by significant physical and psychosocial challenges [9, 10]. Our study comprised of a total of 137 study cases having COPD meeting inclusion criteria of our study. Of these 137 study cases, 84 (61.3%) were male patients while 53 (38.7%) were female patients. Sertogullarindan et al [2] reported 56 % male gender predominance which is close to our study results. A study conducted by Gologanu et al [11] reported male gender predominance showing similar trends to our study. Maula et al [12] also reported 65.4 % male patients with COPD showing male gender predominance which is in compliance with our study results. A study conducted by Waqas et al [13] has reported 70 % male patients predominating over female gender with 30 % frequency, these findings are similar to that of our study results. Hassan et al [14] reported 53 % male patients with COPD which is same as that of our study results. Motiani et al [15] reported 80 % male patients compared with 20 % female patients with COPD which is showing same trend as that of our study results. Mean age of our study cases was 56.79 ± 4.81 years (with minimum age was 40 years while maximum age was 60 years). Mean age of the male patients was 58.69 ± 1.09 years while that of female patients was noted to be 53.77 ± 6.60 years. Our study results have indicated that majority of our patients i.e. 122 (89.1%) belonged to the age group ranging 46 – 60 years. Gologanu et al [11] reported 66.2 years which is higher than that being reported in our study. The reason for this difference is due to our inclusion criteria as we included only patients up to 60 years of age (30 – 60 years range). A study conducted by Maula et al [12] in Bannu reported 60.18 ± 11.67 years mean age which is close to our study results. Sertogullarindan et al [2] also reported 67 ± 10 years which is again slightly higher than our findings. Phulpoto et al [16] reported 56.8 ± 7.8 years mean age of COPD patients, these findings are close to our study results. Motiani et al [15] reported 60.87±10.93 years mean age of the patients, which is similar to that of our study results. A study conducted by Mahishale et al [17] also reported 58 ± 9.6 years mean age which is close to our study results.

Of these 137 study cases, 41 (29.9%) were from rural areas while 96 (70.1%) were from urban areas and 109 (79.6%) were poor. Diabetes was present in 28 (20.4%) and hypertension in 56 (40.9%) our patients. Mean height of our patients was 152.24 ± 10.87 centimeters while mean weight of our study cases was 66.41 ± 7.23 kilograms and mean body mass index was 24.87 ± 4.13 kg/m^2. Our study results reported 66 (48.2 %) were normal weight, 41 (29.9 %) were overweight and 30 (21.9 %) were obese. Smoking was noted in 53 (38.7 %) of our study cases. Mean duration of illness was 30.81 ± 14.74 months and 112 (81.8%) had disease duration more than 18 months. A study conducted by Mahishale et al [17] also reported 21.24 % diabetes in patients with COPD which is close to our study results. Zaman et al [18] from Peshawar also reported 34 % smoking in these patients. A study conducted by Gumus et al [7] has also documented hypertension in 25 % while diabetes in 15 % patients with COPD which are consistent to our findings.

Mean serum magnesium level of our patients was 1.52 ± 0.54 meq/L (Range; 1.15 meq/liter to 2.75 meq/liter) and hypomagnesemia was present in 50 (36.5 %) patients. A study conducted by do Amaral et al [8] has reported 35 % hypomagnesemia in patients with COPD which is close to our study results. A study conducted by Gumus et al [7] reported 1.88 ± 0.26 meq/liter which is close to our findings. A study conducted by Singh et al [19] from Jammu and Kashmir has reported 34 % hypomagnesemia which is close to our study results.

Conclusion; Frequency of hypomagnsemia among patients with chronic obstructive pulmonary disease was very high in our study. Hypomagnesemia was significantly associated with male gender, increasing age, poor

socioeconomic status, diabetes, hypertension, smoking and prolonged disease duration. Clinicians treating such patients should monitor their serum magnesium levels on regular basis to improve their prognosis and to decrease disease morbidity.

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