

## ORIGINAL ARTICLE

### Assessment of Plasma Orexin- A level in patients with COPD- A Clinical Study

Sanjay Singh<sup>1</sup>, Lalit Mishra<sup>2</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor, Department of Chest and Tb, Career Institute of medical science & Hospital Lucknow, Uttar Pradesh, India

#### ABSTRACT:

**Background:** Chronic obstructive pulmonary disease (COPD) was previously known as chronic bronchitis and emphysema. The present study was conducted to assess plasma orexin- A level in patients with COPD. **Materials & Methods:** The present study was conducted in the department of chest & TB on 30 patients with diagnosed cases of COPD. In all patients, 5-ml blood samples were taken and added into tubes containing EDTA. Orexin-A level was analyzed via an ELISA method. The body mass index (BMI) was calculated as weight/(height)<sup>2</sup> and BMI classifications were determined according to the WHO standards. **Results:** Out of 30 patients, males were 15 and females were 15. The difference was non- significant (P= 1). Plasma Orexin- A level was 1.4 ng/ml in males and 1.3 ng/ml in females. The difference was non- significant (P= 0.1). Mean weight in males was 74.2 kg and in females was 70.4 kg, height was 162.8 cm in males and 168.8 cm in females, BMI was 27.2 Kg/m<sup>2</sup> in males and 28.4 Kg/m<sup>2</sup> in females, BMR was 1526 Kcal in males and 1348 Kcal in females. The difference was significant in relation to height and BMR (P< 0.05). The level was higher in obese males (1.4 ng/ml) and females (1.3 ng/ml). It was lowest in underweight males (0.7 ng/ml) and obese females (0.8 ng/ml). The difference was significant (P< 0.05). **Conclusion:** Orexin-A may be associated with the severity of hypoxemia in COPD patients. Its level found to be increased in obese patients as compared to underweight patients of COPD.

**Key words:** Body mass index, Orexin-A, Obese.

Corresponding author: Dr. Lalit Mishra, Associate Professor, Department of Chest and Tb, Career Institute of medical science & Hospital Lucknow, Uttar Pradesh, India

This article may be cited as: Singh S, Mishra L. Assessment of Plasma Orexin- A level in patients with COPD- A Clinical Study. Int J Res Health Allied Sci 2015;1(1):28-30.

#### INTRODUCTION

Chronic obstructive pulmonary disease (COPD) was previously known as chronic bronchitis and emphysema. Chronic bronchitis has been defined by (BMRC) as “daily productive cough for at least three consecutive months for more than two successive years. Emphysema has been defined as an “anatomic alteration of the lung characterized by an abnormal enlargement of the air spaces distal to the terminal, non-respiratory bronchiole, accompanied by destructive changes of the alveolar walls.”<sup>1</sup>

Chronic obstructive pulmonary disease (COPD) has high mortality and morbidity and is the main reason for death. It is responsible for a huge social and economic burden for the health care infrastructure. The prevalence of COPD is approximately 9% in men and 7% in women. There have been a few reports on COPD epidemiology in India in the past.<sup>2</sup> Malnutrition is frequently reported in COPD patients and is an indicator of poor prognosis. Being underweight is associated with a high mortality rate in patients with COPD, which may be explained by the weakening of the respiratory and skeletal muscles. Specific hypothalamic neuropeptides, including orexin, are generally affected by nutritional status and dietary food intake. Ghrelin is also an important polypeptide that stimulates food intake. Orexins play an important role in various physiological events, including the stress response and the sleep/wake cycle.<sup>3</sup>

Among various causative factors for COPD, smoking, consumption of biomass and environmental exposures play

important role. Biomass combustion results in high levels of pollutants such as benzopyrene, carbon monoxide, formaldehyde, oxides of nitrogen and sulphur, and benzene that are a major source of respiratory irritants leading to COPD.<sup>4</sup> The present study was conducted to assess plasma orexin- A level in patients with COPD.

#### MATERIALS & METHODS

The present study was conducted in the department of chest & TB. It comprised of 30 patients with diagnosed cases of COPD. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

General information such as name, age, gender etc. was recorded. In all patients, 5-ml blood samples were taken and added into tubes containing EDTA . A protease inhibitor, aprotinin, was added to the tubes. The samples were centrifuged at 1,600 x g at 4°C for 15 min. The plasma samples were separated and maintained at -32°C until required for analysis. Orexin-A level was analyzed via an ELISA method. The minimum detection limits of orexin-A were 0.2 ng/ml. The body mass index (BMI) was calculated as weight/(height)<sup>2</sup> and BMI classifications were determined according to the WHO standards. Results thus obtained were subjected to statistical analysis using chi-square test. P value less than 0.05 was considered significant.

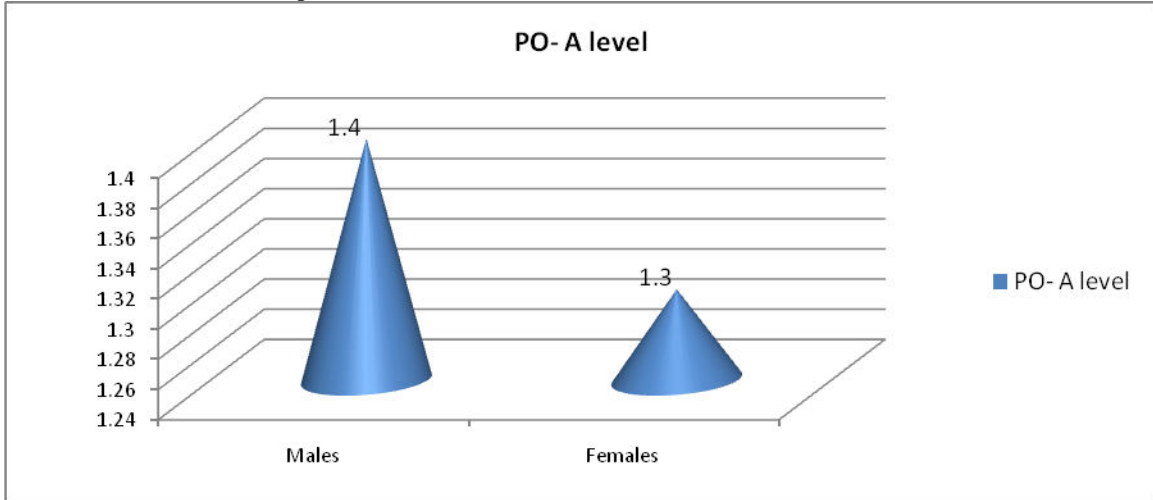
**RESULTS**

**Table I** Distribution of patients

Total- 30		
Males	Females	P value
15	15	1

Table I shows that out of 30 patients, males were 15 and females were 15. The difference was non- significant (P- 1).

**Graph I** Plasma orexin- A level in patients



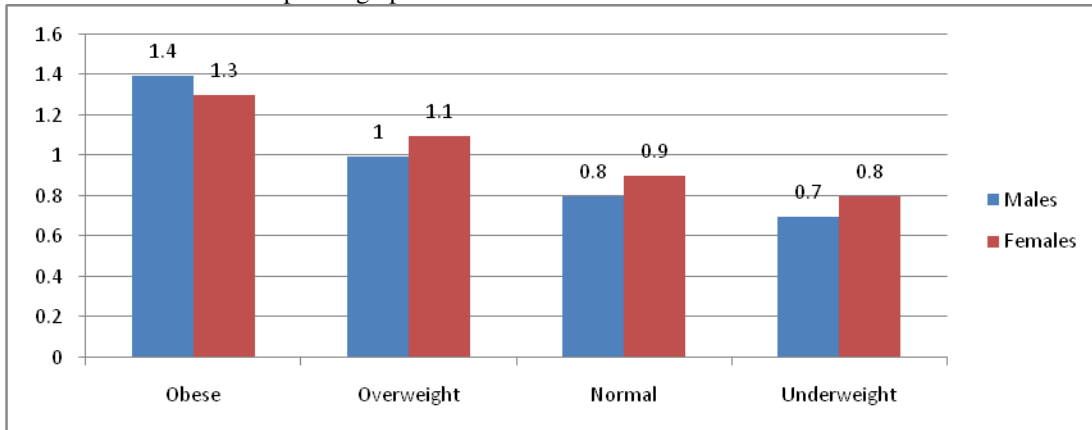
Graph I shows that plasma Orexin- A level was 1.4 ng/ml in males and 1.3 ng/ml in females. Th difference was non- significant (P- 0.1).

**Table II** Body composition of patients

Composition	Males	Females	P value
Weight (Kg)	74.2	70.4	0.1
Height (cm)	162.8	168.8	0.05
BMI (Kg/m <sup>2</sup> )	27.2	28.4	0.2
BMR (Kcal)	1526	1348	0.01

Table II shows that mean weight in males was 74.2 kg and in females was 70.4 kg, height was 162.8 cm in males and 168.8 cm in females, BMI was 27.2 Kg/m<sup>2</sup> in males and 28.4 Kg/m<sup>2</sup> in females, BMR was 1526 Kcal in males and 1348 Kcal in females. The difference was significant in relation to height and BMR (P< 0.05).

**Graph II** Plasma Orexin- A level depending upon BMI



Graph II shows that the level was higher in obese males (1.4 ng/ml) and females (1.3 ng/ml). It was lowest in underweight males (0.7 ng/ml) and obese females (0.8 ng/ml). The difference was significant (P< 0.05).

## DISCUSSION

Orexin, also known as hypocretin, was first described in 1998 by de Lecea et al.. In 1999, orexin neurons were found to be present in the lateral hypothalamic area, perifornical nucleus, diffuse part of the dorsomedial hypothalamic nucleus, and posterior hypothalamus. It has been previously shown that orexins can pass the blood brain barrier by simple diffusion and that orexins and orexins receptors are present in the hypothalamus as well as the enteric nervous system, adipose tissue, the pancreas and the gut.<sup>5</sup>

COPD affects twice as many males as females, this difference will diminish, given the fact that more and more females throughout the world have taken up smoking in the past few years in developed countries, and non-smoking females are exposed to biomass combustion products in developing countries.<sup>6</sup>

Body weight is an important prognostic factor of chronic obstructive pulmonary disease in that a low body weight correlates with increased morbidity and poor prognosis. This is mainly because a low body weight in COPD patients implies weakening of both respiratory muscles and skeletal muscles. The weakening of respiratory muscles, in turn makes COPD patients vulnerable to respiratory failure. It is widely known that COPD is one of the main causes of acute respiratory failure. Resting hypoxia, usually due to VA/Q mismatching, and exercise aggravation of hypoxia due to increased flow and oxygen disequilibrium are often seen in COPD patients.<sup>7</sup>

In present study, out of 30 patients, males were 15 and females were 15. Plasma Orexin- A level was 1.4 ng/ml in males and 1.3 ng/ml in females. The mean weight in males was 74.2 kg and in females was 70.4 kg, height was 162.8 cm in males and 168.8 cm in females, BMI was 27.2 Kg/m<sup>2</sup> in males and 28.4 Kg/m<sup>2</sup> in females, BMR was 1526 Kcal in males and 1348 Kcal in females. This is in agreement with Aswat et al.<sup>8</sup>

In a study by Elsee et al<sup>9</sup>, in total 40 patients, blood samples for plasma orexin-A and ghrelin analysis were collected after 8-12 h of fasting; certain anthropometric measurements were obtained and a 24-h dietary recall was recorded. The mean plasma orexin-A levels in the male and female patients were 1.3±0.37 and 1.4±0.13 ng/ml, respectively, while the mean plasma ghrelin levels were 25.9±7.31 and 27.3±8.54 ng/ml, respectively. No significant correlation was observed between the body mass index and plasma orexin-A and ghrelin levels or between the plasma ghrelin levels and dietary nutrient intake (P>0.05). The plasma orexin-A levels were demonstrated to be higher in patients with a higher dietary total fibre intake. A similar correlation was observed between plasma orexin-A levels and dietary intake of soluble and insoluble fibre, as well as between the daily consumption of calcium and the levels of plasma orexin-A.

We found that the level was higher in obese males (1.4 ng/ml) and females (1.3 ng/ml). It was lowest in underweight males (0.7 ng/ml) and obese females (0.8 ng/ml). This is similar to Liu et al.<sup>10</sup> In a study by Ying et al<sup>11</sup>, 40 patients with hypercapnic respiratory failure and 22 healthy individuals were enrolled. Plasma orexin-A levels were higher in the underweight group, normal weight group and overweight group of COPD patients as compared with control group (*P* < .05). Plasma orexin-A in COPD patients were higher in the OW group than in the NW group and the UW group. Plasma orexin-A levels showed significant correlation with body mass index (BMI).

## CONCLUSION

Orexin-A may be associated with the severity of hypoxemia in COPD patients. Its level found to be increased in obese patients as compared to underweight patients of COPD.

## REFERENCES

1. Luo FM, Liu XJ, Li SQ, Wang ZL, Liu CT and Yuan YM: Circulating ghrelin in patients with chronic obstructive pulmonary disease. *Nutrition* 2005; 21: 793-799.
2. Baranowska B, Wolińska-Witort E, Martyńska L, Chmielowska M and Baranowska-Bik A: Plasma orexin A, orexin B, leptin, neuropeptide Y (NPY) and insulin in obese women. *Neuro Endocrinol Lett* 2004; 26: 293-296.
3. Adam JA, Manheere PP, van Dielen FM, Soeters PB, Buurman WA and Greve JW: Decreased plasma orexin-A levels in obese individuals. *Int J Obes Relat Metab Disord* 2002; 26: 274-276.
4. hu LY, Summah H, Jiang HN and Qu JM: Plasma orexin-a levels in COPD patients with hypercapnic respiratory failure. *Mediators Inflamm* 2011; 75- 84.
5. Hallin R, Koivisto-Hursti U, Lindberg E and Janson C: Nutritional status, dietary energy intake and the risk of exacerbations in patients with chronic obstructive pulmonary disease (COPD). *Respir Med* 2006; 100: 561-567.
6. Woo J, Mak YT and Swaminathan R: Nutritional status of general medical patients - influence of age and disease. *J Nutr Biochem* 1991; 2: 274-280.
7. Lee H, Kim S, Lim Y, Gwon H, Kim Y, Ahn J and Park H: Nutritional status and disease severity in patients with chronic obstructive pulmonary disease (COPD). *Arch Gerontol Geriatr* 2013; 56: 518-523.
8. Aswat, Inui A: Cancer anorexia-cachexia syndrome: are neuropeptides the key? *Cancer Res*, 1999; 59: 4493-4501.
9. Eslee, Gudmundsson G, Gislason T, Lindberg E, et al: Mortality in COPD patients discharged from hospital: the role of treatment and co-morbidity. *Respir Res* 2006; 7: 109.
10. Lio, Kalra SP, Dube MG, Pu S, et al: Interacting appetite-regulating pathways in the hypothalamic regulation of body weight. *Endocr Rev* 1999; 20: 68-100.
11. Ying, Engelen M, Schols AM, Baken WC, et al: Nutritional depletion in relation to respiratory and peripheral skeletal muscle function in out-patients with COPD. *Eur Respir J* 1994; 7: 1793-1797.

**Source of support:** Nil

**Conflict of interest:** None declared