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Correlation of Absolute Eosinophil Count (AEC) and Body Mass Index (BMI) of MBBS Students in an Indian Scenario

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Abstract

Background: Obesity is a fastest growing problem attaining epidemiological proportion worldwide. It is associated with an increased risk of premature death due to many allergic diseases. The present study is attempted to find any correlation between Absolute eosinophil count and body mass index (BMI).

Methods: The Study was conducted at the Dept. of physiology, Hi-Tech Medical College, Bhubaneswar, Odisha during the year: 2015-2016. Total no of persons subjected to the study was 50. All subjects were MBBS students in the age group of 18-25 years old of both the sexes. Study group has BMI>25 and control has BMI<25. Their Absolute eosinophil count (AEC) was done by using Pilot's solution.

Results: Mean Absolute eosinophil count in male study group is 360 with a standard deviation of 85.95 and in control group it is 296 ± 26.50 and it is statistically highly significant. Mean absolute eosinophil count in female study group is 408.33 ± 62.42 and in control group it is 295 ± 36.74 which is highly significant.

Conclusion: In our study we have found significantly high absolute eosinophil count in study group having body mass index>25 and this is highly significant in female study group.

Keywords: Correlation; BMI; AEC

Introduction

Obesity is a fastest growing problem attaining epidemiological proportion worldwide [1]. In USA 55% of the population are overweight and 22% are obese making it a public health problem [2]. In India, incidences of obesity in young adults are also increasing. It is associated with an increased risk of premature death due to many allergic diseases. The epidemics of allergies in the developed countries have lent urgency to the question to understand the pathogenesis of these chronic inflammatory diseases that is associated with eosinophilia [3].

Epidemiological data indicate that obesity increases both prevalence and incidence of asthma. There is a hot debate about whether WBCs-eosinophil are involved in pathogenesis of asthma [4,5]. The present study is attempted to find any correlation between Absolute eosinophil count and body mass index (BMI).

Materials and Methods

The Study was conducted at the Dept. of physiology, Hi-Tech Medical College, Bhubaneswar, Odisha during the year: 2015-2016. The subjects were explained about the study and their consent was taken. Total no of persons subjected to the study was 50. All subjects were MBBS students in the age group of 18-25 years old of both the sexes. Control group also has 50 numbers of MBBS students. The individuals were first subjected to anthropometry using standard procedures and instruments. First age was recorded. Standing height was recorded without shoes with a standiometer in centimeters. Weight was recorded without shoes and with light clothes on a weighing machine. Then BMI: weight in kg/height in m^2 [6] was calculated. Study group has BMI>25 and control has BMI<25.

Their Absolute eosinophil count was done by using Pilot's solution [7]. Subjects having asthma, skin allergy, worm infestation, history of drug allergy and steroid therapy are excluded from the study. All values were analyzed statistically for finding mean, standard deviation, correlation coefficient and significance.

Results and Discussion

Weight gain during adult life or even during adolescence seems to have a greater probability risks for many skin diseases (dermatitis), allergic rhinitis, asthma, diabetes, gastro esophageal reflux, sleep disorders and many other cardiovascular risks. As the present study aims to correlate the Body mass index (BMI) and absolute eosinophil count (AEC) it is pertinent to discuss the possible causes of eosinophilia.

Any conditions that relates to eosinophilia will be invited by increasing body mass index (BMI). Epidemiological data also indicate that obesity increases prevalence and incidence of asthma.

BMI of male study group is 27.84 ± 2.46 and control group is 20.49 ± 1.08 (Table 1) (Figure 1) which is statistically significant (p value ≤ 0.05) (Table 2). Mean Absolute eosinophil count in male study group is 360 with a standard deviation of 85.95 and in control group it is 296 ±

26.50 and it is statistically significant (p value ≤ 0.05) (Table 2), (Figure 2). BMI in female study group is 28.17 ± 2.20 and in control group 21.66 ± 0.93 (Table 3) (Figure 3) and it is statistically significant (p value ≤ 0.05) (Table 4). Absolute eosinophil count in female study and control group are 408.33 ± 62.42 and 295 ± 36.74 respectively and this is highly significant (p value ≤ 0.05) (Table 4) (Figure 4). Figures 5 and 6 shows absolute eosinophil count is positively correlated with high BMI.

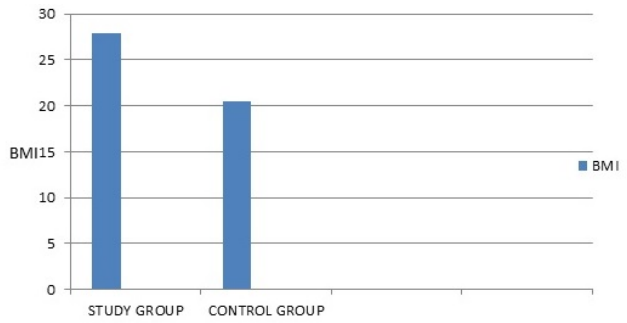

Figure 1: Graph showing comparison of body mass index (BMI) of male study group and control group

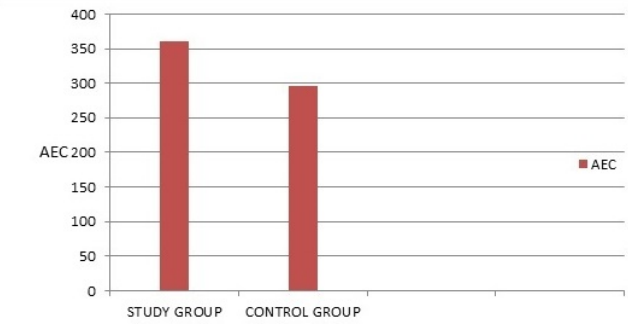

Figure 2: Graph showing comparison of absolute eosinophil count (AEC) between male study cases and controls

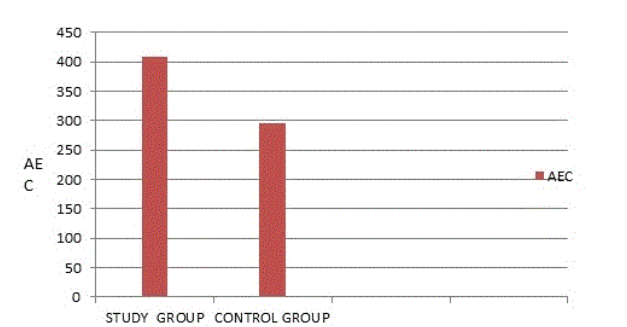

Figure 3: Graph showing comparison of absolute eosinophil count between female study cases and controls

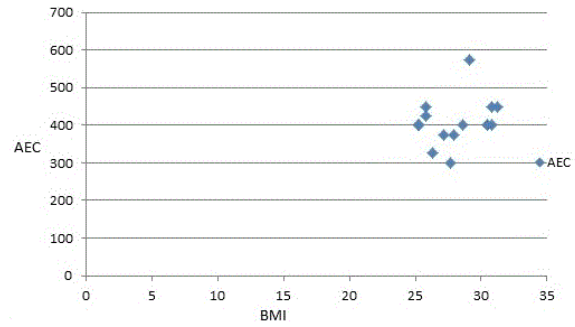

Figure 4: Correlation of absolute eosinophil count in male study cases

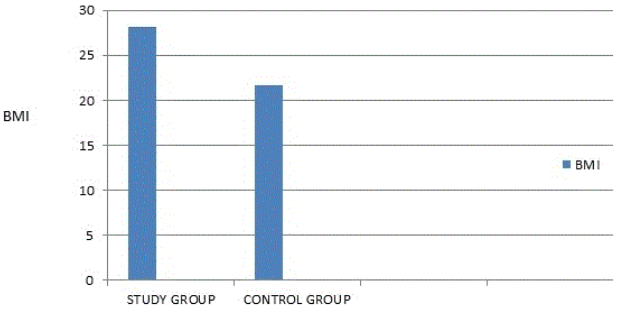

Figure 5: Graph showing comparison of body mass index of female study and control group

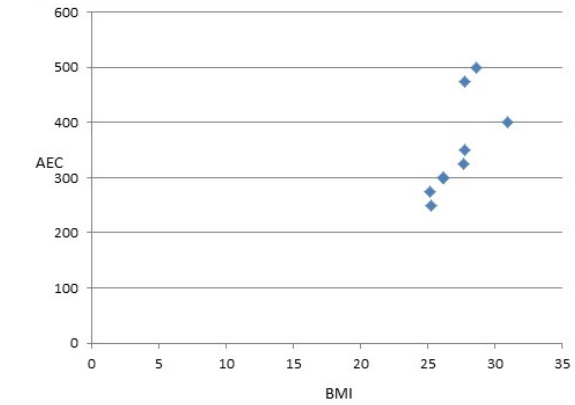

Figure 6: Graph showing Correlation of absolute eosinophil count in female study cases

So In the study we found that high BMI is positively correlated with high AEC and it is more significant in female study group. This may be related to more BMI in female study group with respect to males.

Fat tissue is a source of adipokines which are considered to play a role in the low grade systemic inflammation. Leptin, mainly produced by adipose tissue is proinflammatory agent.

Serum leptin is markedly increased in obese humans correlating to BMI [8]. It activates eosinophils [9] and increases their survival [10]. Again Eotaxin is an eosinophil specific chemokine that is increased in obesity [11]. Adipocytes produce more eotaxin when stimulated by leptin [12]. Plasma adiponectin, an anti-inflammatory hormone is inversely correlated to body mass index [13]. These facts may be related to positive correlation of absolute eosinophil count to high body mass index.

	Study Group	Control Group
Age Mean ± SD	21 ± 2.21	22.26 ± 3.17
Height (CM)	165.9 ± 6.69	166.46 ± 8.00
Weight (KG)	76.4 ± 6.07	56.4 ± 5.77
BMI	27.84 ± 2.46	20.49 ± 1.08

Table 1: Comparison of anthropometric parameters between male study cases and controls

	Study Group	Control Group	P Value
BMI Mean ± SD	27.84 ± 2.46	20.49 ± 1.08	<0.001*
AEC Mean ± SD	360 ± 85.95	296 ± 26.50	<0.05*
*significant			

Table 2: comparison of absolute eosinophil count (AEC) between male study cases and controls

These facts may be related to positive correlation of absolute eosinophil count to high body mass index.

Originally, the Eosinophils were considered only as a protective cell, e. g. in host defense against parasites. At present, the Eosinophils are regarded also as pro-inflammatory cell that can mediate allergic disease. Recent studies indicate a role for Eosinophils disruption and degranulation in inducing tissue destruction [14]. A large observational study (National Health and Nutrition Examination Survey) showed that elevated blood eosinophil counts are associated with higher prevalence of asthma, wheezing, asthma attacks and asthma related emergency department visits (PMID 23890753). Moreover clinical studies have demonstrated a significant co-relation between peripheral blood eosinophil counts and clinical severity of asthma and pulmonary function (PMID 2215562). Eosinophilia is frequently associated to Allergic Dermatitis (AD) and generally its degree correlates with the severity of the disease. Although the pathophysiology of AD is not fully understood, there is evidence that Eosinophils may play an important role in this process.

	Study Group	Control Group
Age Mean ± SD	22.73 ± 4.04	23 ± 4.10
Height (CM)	154.53 ± 2.64	157 ± 9.83
Weight (KG)	67.53 ± 5.84	52.4 ± 6.02
BMI	28.17 ± 2.20	21.66 ± 0.93

Table 3: comparison of anthropometric parameters between female study cases and controls

Several potent, toxic and cationic proteins have been described in the Eosinophils granules. These include Major Basic Protein (MBP), Eosinophil-derived Neurotoxin (EDN), Eosinophil Cationic Protein (ECP), and Eosinophil Peroxidase (EPO). These granule matrix cationic proteins have been implicated in tissue damage associated with cutaneous inflammation [15,16]. The eosinophil granule proteins MBP, EPO, and ECP are toxic to diverse tissues, and hypereosinophilia is known to induce tissue damage and dysfunction in the brain, heart, skin, and lungs [17-20]. Eosinophils are not only active in mediating allergic inflammation, but interact in cellular networks with antigen presenting cells, mast-cells, and T lymphocytes. These other cells influence Eosinophils maturation, mobilization, tissue localization and activation.

	Study Group	Control Group	P Value
BMI Mean ± SD	28.17 ± 2.20	21.66 ± 0.93	<0.001*
AEC Mean ± SD	408.33 ± 62.42	295 ± 36.74	<0.001*
*significant			

Table 4: Comparison of Absolute Eosinophil Count between Female Study Cases And Controls

Eosinophil cationic proteins in serum of patients with AD usually, serum levels of MBP are elevated in patients affected by various disorders associated to Eosinophilia and correlate significantly with the number of peripheral blood Eosinophils [16,21].

Individuals having high BMI are more prone to have allergies of any type. In our study we have found significantly high absolute eosinophil count having body mass index>25. As cited above high absolute eosinophil count in blood is associated with higher prevalence of asthma, wheezing, asthma attacks and asthma related emergency, allergic dermatitis, It will be a beneficial effect to control BMI, so that prevalence of these types of diseases and consequences can be reduced.

Acknowledgement

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References

1. Pi-Sunyar X (2003) A Clinical View of the Obesity Role. Science 299: 859.
2. Despres JP, Leuineux I (2006) Abdominal Obesity and metabolic Syndrome. Nature 444: 881.
3. Luder E, Erclich RI, Lou WYW, Melnik TA, Kattan K (2003) Body mass Index and risk of asthma in adults. Respir Med 98: 29-37.
4. Karp W, Karp CL (2004) Eosinophils in Asthma: Remodelling a tangled tale. 305: 1726-1729.
5. Ciprandi G, Pistoria A, Tosca M, Ferraro MR, Cirillo I (2005) Body Mass Index, respiratory function & bronchial hyperactivity in allergic rhinitis & asthma. Respir Med 103: 289-295.
6. (2007) Hutchinson's Clinical Methods.
7. Jain AK (2008) Manual of Practical Physiology.
8. Considine RV, Sinha MK, Heiman ML, Kriauciunas A, Stephens TW, et al. (1996) Serum immunoreactive-leptin concentrations in normal-weight and obese humans. The New England Journal of Medicine 334: 292-295.
9. Kato H, Ueki S, Kamada R, Kihara J, Yamauchi Y, et al. (2011) Leptin has a priming effect on eotaxin-induced human eosinophil chemotaxis. Int Arch Allergy Immunol 155: 335-344.
10. Conus S, Bruno A, Simon HU, (2005) Leptin is an eosinophil survival factor. J Allergy Clin Immunol 116: 1228-1234.
11. Vasudevan AR, Wu H, Xydakis AM, Jones PH, Smith EOB, et al. (2006) Eotaxin and obesity. J Clin Endocrinol Metab 91: 256-261.
12. Kim HJ, Kim CH, Lee DH, Han MW, Kim MY, et al. (2011) Expression of eotaxin in 3T3-L1 adipocytes and the effects of weight loss in high-fat diet induced obese mice. Nutr Res Pract 5: 11-19.
13. Engeli S, Feldpausch M, Gorzelniak K, Hartwig F, Heintze U, et al. (2003) Association between adiponectin and mediators of inflammation in obese women. Diabetes 52: 942-947.
14. Leiferman KM (1989) Eosinophils in atopic dermatitis. Allergy 44: 20-26.
15. Bruynzeel-Koomen CA, Wichen DFV, Spry CJ, Venge P, Bruynzeel PL (1988)Active participation of Eosinophils in patch test reactions to inhalant allergens in patients with atopic dermatitis. Br J Dermatol 118: 229-238.
16. Wassom DL, Loegering DA, Solley GO, Moore SB, Schooley RT, et al. (1981) Elevated serum levels of the Eosinophils granule major basic protein in patients with Eosinophilia. J Clin Invest 67: 651-661.
17. Rothenberg ME, Hogan SP (2006) The eosinophil. Annu Rev Immunol 24:147-74.
18. Rosenberg HF, Dyer KD, Foster P (2013) Eosinophils: changing perspectives in health and disease. Nat Rev Immunol 13: 9-22.
19. Akuthota P, Weller PF (2012) Eosinophils and disease pathogenesis. Semin Hematol 49:113-9.
20. Valent P, Gleich GJ, Reiter A, Roufosse F, Weller PF, et al. (2012) Pathogenesis and classification of eosinophil disorder: a review of recent developments in the field. Expert Rev Hematol 5: 157-76.
21. Miyasato M, Iryo K, Kasada M, Tsuda S (1988)Varied density of Eosinophils in patient with atopic dermatitis reflecting treatment with anti-allergic drug. J Investig Dermatol 90: 589.