Original Article

Adipose Tissue in Women

Quantitative and Morphometric Study of Adipose Tissue from Abdomen in Adult Women of Hyderabad

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ABSTRACT

Objective: To determine adipocytes count per unit area in the superficial subcutaneous layer of the abdomen of an adult woman.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at Department of Anatomy, Isra University Hospital Hyderabad from July 2011 to December 2011.

Materials and method: 80 adult women including 40 obese and 40 non obese for different abdominal surgeries visited in the Isra university hospital Hyderabad. Superficial subcutaneous layer of the abdominal adipose tissue were obtained during surgery. Tissues were processed for routine H&E staining. After processing, the number of adipocytes was counted through ocular grid microscopy method.

Results: In obese, the mean number of adipocytes was 119.02±5.81 with range of 100-140 and in non-obese, the mean number of adipocytes was 79.02±6.02 with range of 50-98.The result showed a significant ($p<0.05$) increase number of adipocytes in obese women as compare to non obese women.

Conclusion: From this study it was conclude that in obese women there is increased number of adipocytes as compare to non obese women. As increased number of adipocytes enhance the cardiovascular as well as metabolic diseases and producing fatal health risks. Therefore there is need to elaborate the cause of disorder and its proper diagnosis through counting or assessment of adipocytes which helpful for management of diseases.

Key Words: Adipose tissue, subcutaneous tissue. Abdomen

INTRODUCTION

Adipose tissue is a supporting tissue which is derived from primitive mesenchyme. It is found in clumps throughout the loose supporting tissue. Two type of adipose tissue are present, white adipose tissue and brown adipose tissue[1]. Adipose tissue is present below the skin and around the internal organs. It accumulates in the deepest level of skin which provides insulation from heat and cold[2]. Two main compartments of subcutaneous abdominal adipose tissue are present, superficial subcutaneous adipose tissue and deep subcutaneous adipose tissue[3]. These compartments are anatomically and morphologically are different. Fat in different parts of the body grows differently, and despite the prevailing belief that the number of fat cell in the body remain constant in an adult study that found the number of fat cells in the lower body actually increases with weight gain, while weight gain in the abdomen causes to fat cells grow in size[4]. The total number of fat cells and the size of the fat cells are the components determining total fat mass accumulated in adipose tissue. In lean and obese individuals the number of adipocytes is set during childhood and adolescence. The number of adipocytes shows little variation during adulthood, but annually 10% of the fat cells are renewed[5]. In order to study and examine the clinical relationship of common metabolic factors related to obesity, the fat cell size and fat cell number is important and these factors are related to obesity[6]. Since at present no baseline data in the population of our region (sindh) with unique metabolic demography is available. Hence the attempt is to be made to count the number of cells per unit area in adipose tissue from abdomen in adult women, i.e of subcutaneous tissue of both obese and non obese women for comparison and measurement of disease.

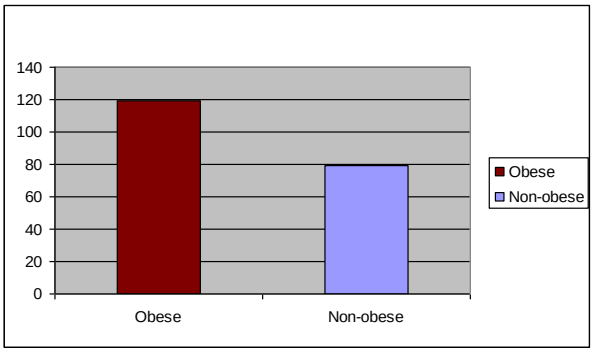
MATERIALS AND METHODS

This cross sectional study was conducted at department of Anatomy, Isra University Hospital Hyderabad. Practical laboratory work was carried out in postgraduate Laboratory Isra University Hospital. 80 adult women including 40 obese and 40 non obese presented for different surgeries. Superficial subcutaneous layer of the abdominal adipose tissue were obtained during surgery. Tissue was processed for routiene H&E staining. After processing, counting the number of cells per unit area was carried out through ocular grid microscopy method. Data was analyzed by using SPSS version 16.0.

RESULTS

In Obese, the mean number of adipocytes was 119.02±5.81 with range of 100-140 and in non-obese,

the mean number of adipocytes was 79.02±6.02 with range of 50-98. The mean of number of adipocytes of obese and non- obese is shown in Graph 1. When we correlate the value of number of adipocytes per unit area the (P value <0.05) was found significant .



Graph No. 1. Comparison of Number of Adipocytes in Obese and Non-obese Patients

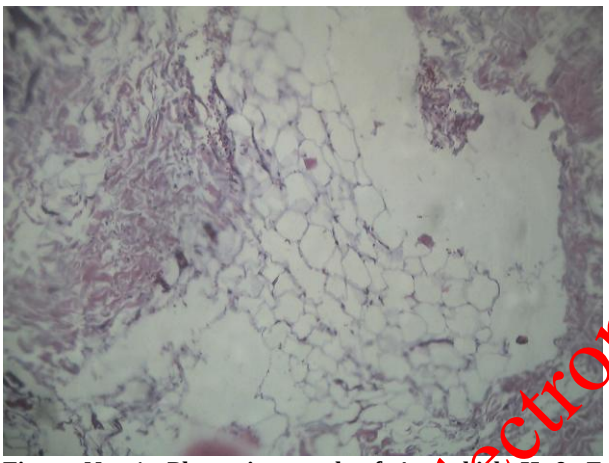


Figure No. 1: Photomicrograph of 4um thick H & E stained section of superficial layer of subcutaneous layer of adipose tissue from abdomen in non obese showing decrease number of adipocytes at power X 100.

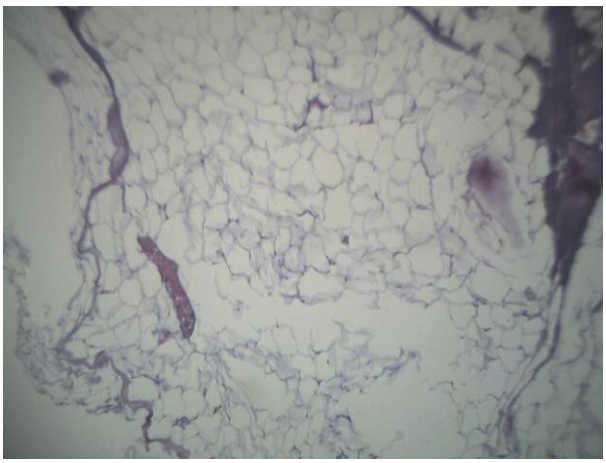


Figure No. 2: Photomicrograph of 4um thick H & E stained section of superficial layer of subcutaneous layer of adipose tissue from abdomen of obese showing increase number of adipocytes at power X 100.

Superficial layer of subcutaneous layer of adipose tissue from abdomen in non obese showing decrease number of adipocytes Figure 1, while there was increased number of adiposities observed in superficial layer of subcutaneous layer of adipose tissue from abdomen of obese women Figure 2. These findings correlate the differences between obese and non obese women.

DISCUSSION

The association of adipocytes size and number regulated by factors independent of variations in body fat distribution. Mean adipocyte size and number of adipocytes has been positively correlated with normal and obese adults **7**. The study of Lester B et al **8** said that cell number is greatest with omental cell size (in non obese was 23-65 x 10^9 and in obese was 37-237 x 10^9) and smallest with gluteal (in non obese was 20 – 41 x 10^9 and in obese was 28 – 128 x 10^9) but in our study we only compared superficial subcutaneous layer of abdomen in obese and non obese. So our results show the mean of number of adipocytes was 119.02 ± 5.81 in obese but the mean of number of adipocytes was 79.02 ± 6.02. Also Yourka D et al **9** reported that mean number of subcutaneous abdominal adipocytes in non obese was 11.6 ± 5.5 and in obese was 15.7 ± 4.4 as our study also in agreement with such study shows the mean number of subcutaneous abdominal adipocytes in non obese was 79.02 ± 6.02 but in obese was 119.02 ± 5.81. The study of swati et al **10** supported our finding that his study reported the mean number of subcutaneous abdominal adipocytes per unit area was 116 ± 6.5 that is inline of our study shows that the mean number of subcutaneous abdominal adipocytes was 128.03 ± 5.81 in obese.

CONCLUSION

From this study it was conclude that in obese women there is increased number of adipocytes as compare to non obese women. This increased number of adipocytes enhances the cardiovascular as well as metabolic diseases and producing fatal health risks. Therefore need to elaborate the cause of disorder and its proper diagnosis through counting or assessment of adipocytes which will be helpful for management of diseases.

Recommendations

- In our study, we have examined the superficial subcutaneous layer of abdomen in adult woman of Hyderabad population. Same study can be replicated in other area of country.
- Further work should be carried out by using deeper layers of abdominal tissue.
- Comparison between different layers of abdominal tissue and genders can be carried out as well.

- Comparison of abdominal adipose tissue between disease and non disease patient's can be carried out.

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