

Study of Clinical Profile Associated with Obesity amongst Dermatology Patients In A Tertiary Care Centre

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Abstract :

Background: Obesity is a global epidemic. Obesity is associated with a number of dermatoses, including acanthosis nigricans, skin tag, keratosis pilaris, hyperandrogenism and hirsutism, striae distensae, and adiposis dolorosa. Objective: To elucidate the various skin changes in obesity and to determine if it is considered as an obesity marker. Methodology: 100 patients, aged 18 years or above satisfying the inclusion and exclusion criteria were drawn for a period of 18 months. Results: Out of 100 patients 54% were female, in their third and fourth decade. By occupation most of the females were housewives (40%) and the majority of males were farmers (14%). Type 2 diabetes mellitus was the most common systemic illness (24%). Pseudoacanthosis nigricans was the most prevalent skin change. 51% of patients had skin tags. 48% had striae distensae as a skin change. 10.86% male and 14.81% female patients had stasis dermatitis, 6% had leg venulectasias and 2% had leg ulcer. 26% had plantar hyperkeratosis. 41% of our patients had one or other types of fungal infections. Bacterial infections were detected in 15% cases, folliculitis being the commonest. Conclusion: Obesity is strongly related to several skin alterations that could be considered as markers of excessive weight. The dermatoses that showed a statistically significant relationship with obesity were Pseudo acanthosis nigricans, Skin tag, Striae, Plantar hyperkeratosis and Fungal infections. Prevention of obesity is important to prevent these dermatoses and

dermatologists must work with primary care physicians and patients to reduce the harmful effects of obesity on the skin.

Keywords: Obesity, Skin disease in obese, Body Mass Index

Introduction:

Obesity is the accumulation of excess of adipose tissue to an extent that it has serious physical, social and psychological consequences. World Health Organization (2000) has termed the phenomenon an "epidemic". It is often neglected and not even thought of as a disease, but obesity is one of the most important, yet preventable health hazards.¹ Obesity's physical effects include heightened risk of diabetes, cardiovascular disease, some cancers, blood circulation problems, mobility problems and earlier death. The condition has also been linked to poorer psychological health; including depression, anxiety, stress & stressful life events, lower self-esteem, eating disorder, diminished self-efficacy, less effective coping skills and personality psychopathology.² The skin maladies seen with increased frequency in obese patients are caused by a variety of factors, specifically: (1) the mechanical changes associated with increased weight; (2) the hyperandrogenism of obesity; and (3) the secondary hyperinsulinemia of obesity.³ Moreover, obesity is implicated in a wide spectrum of dermatological diseases like acanthosis nigricans and skin tag which are related to insulin resistance, hirsutism due to hyperandrogenism, striae distensae due to skin over-distension, stasis dermatitis due to chronic venous insufficiency, keratosis pilaris, plantar hyperkeratosis, cellulitis and infections due to excess fat folds that favor humidity and maceration, hidradenitis suppurativa, adiposis dolorosa, lymphedema and psoriasis.⁴ The impact of obesity on skin has received minimal attention, though the effects of obesity on other systems have been exhaustively studied. Therefore, the current study has been undertaken.

Methodology:

Cross Sectional observational study was conducted in 100 patients, attending Dermatology OPD over a period of 18 months from 2017.

Inclusion criteria:

- 1) All obese individuals with skin lesions
- 2) Aged 18 years and above
- 3) Those willing to give consent

Exclusion criteria:

- 1)Pregnant and breast feeding
- 2)Immunocompromised patients

A written and informed consent was taken from all the individuals selected for the study.

Patients were classified into 3 groups based on their BMI:

- Group 1 with BMI > 30-34.9
- Group 2 with BMI 35-39.9
- Group 3 with BMI ≥40.

A detailed history with complete systemic and dermatologic examination was carried out in all patients. Data was collected and recorded in the Performa. Photographs were taken as required.

Special investigations like scraping and KOH mount, Wood's lamp examination, fungal and bacterial culture, skin biopsy was carried out in selected cases after informed consent.

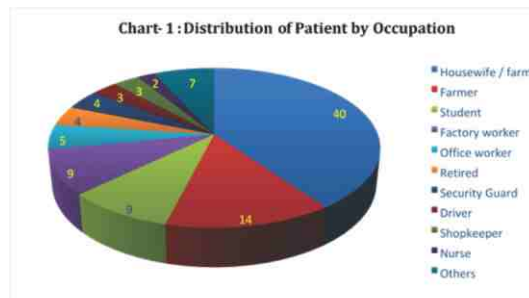
Data was analyzed to derive demographical information by doing clinico-etiological grouping.

The following World Health Organization (WHO) classification of adults according to Body Mass Index was used to classify obesity:⁵

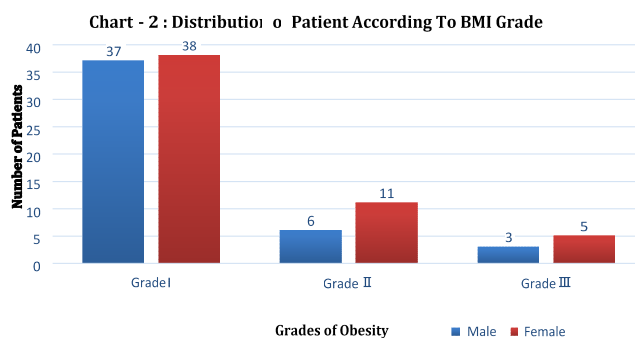
CLASSIFICATION	BMI (KG/M ²)	RISK OF CO-MORBIDITIES
Underweight	<18.50	Low
Normal range	18.50-24.99	Average
Pre-obese	25.00-29.99	Increased
Obese class I	30.00-34.99	Moderate
Obese class II	35.00-39.99	Severe
Obese class III	=40.00	Very severe

Observation & Results:

Out of 100 patients, 54% were female and 46% were male, majority of them in their third and fourth decade. By occupation most of the females were housewives (40%) and the majority of males were farmers (14%), (Chart 1).

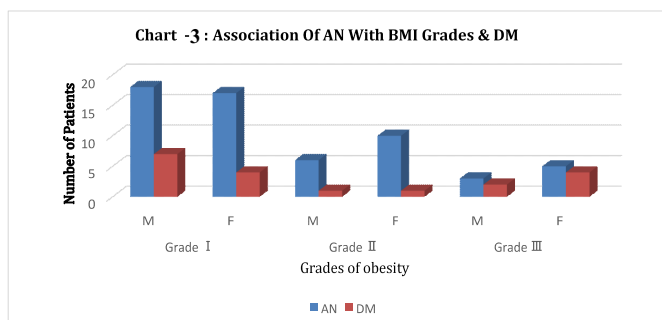


The percentage distribution of BMI grading in males and females is shown in Chart 2. On comparison with men, women were found to be more likely to have BMI > 35 Kg /m2.



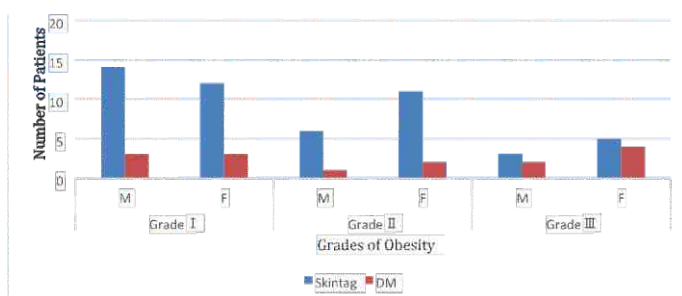
Type 2 diabetes mellitus was the most common systemic illness (24%), followed by hypertension (21%). 4% patients had cardiovascular disease, 2% PCOS, and another 4% had hypothyroidism. 1 patient had allergic rhinitis.

Pseudoacanthosis nigricans was the most prevalent skin change (59%). Higher chance of getting pseudoacanthosis nigricans was associated with higher BMI. Females were more affected than males. Patients with Grade III BMI were more likely to have pseudoacanthosis nigricans. 19 (79.16%) out of 24 diabetic obese patients were associated with pseudoacanthosis nigricans. (Chart3)



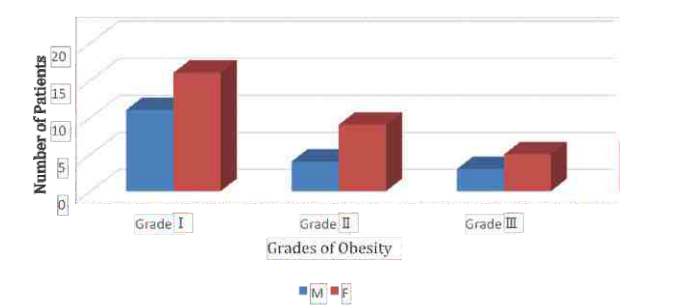
51% of patients had skin tags, out of which 28 (54.90%) were female and 23 (45.09%) were male. All of the grade 2 and 3 obese were diabetic who had skin tag (Chart 4).

Chart - 4: Association of Skin tag with BMI grads & DM



A total of 48 out of 100 patients had striae distensae. It was more prevalent in patients with higher grades of obesity. (Chart 5) Among the 48 patients, 30 were females and 18 were male.

chart - 5: Association of Striae with BMI Grades



10.86% Male and 14.81% female patients had stasis dermatitis, 6% had leg venulectasias and 2% had leg ulcer. Among the 100 patients, 26 % had plantar hyperkeratosis out of which 8 (17.39%) were males and 18 (33.33%) were females. On comparing with BMI grades, it was noted that it has a strong association with higher grades of obesity.

41% of our patients had one or other types of fungal infections. Out of these 41 patients, 12 had Type 2 DM. There was a trend toward greater prevalence of fungal infections in patients with higher grades of obesity. One or more types of bacterial infections were detected in 15% cases, among which 5 had Type 2 DM. Folliculitis (5 patients) was more common among the bacterial infections with erythrasma (4 Patients) being second most common. BMI grading bacterial infections did not

show any positive correlation. 3 patients had cellulitis and 1 patient had pitted keratolysis. 3 patients had Herpes labialis, 2 had Herpes zoster and 1 patient had scabies. No other viral infections and parasitic infestations were noted. Intertrigo due to physical factors and infective etiology was noted in 9% patients. It was slightly more prevalent among the obese individuals with higher grades of obesity. Out of 9 patients 3 had type 2 DM. Psoriasis was noticed in 10% but there was no significant correlation with BMI grades. Other skin diseases, which were seen in our study are mentioned in Table 1:

TABLE – 1 :SPECTRUM OF OTHER SKIN DISEASE

Name	Number
Psoriasis	10
Androgenetic Alopecia (AGA)	4
Dermatosis Papulosa Nigra (DPN)	7
Acne Vulgaris	5
Asteatotic dermatitis (AD)	5
Eczema	4
Idiopathic Guttate hypomelanosis (IGH)	4
Keratosis pilaris (KP)	4
Lichen simplex Chronicus (LSC)	2
Melasma	4
Polymorphus light eruption (PMLE)	3
Seborrheic dermatitis	1
Seborrheic Keratosis (SK)	3
Sebomelanosis (SM)	3
Macular Amyloidosis (MA)	2
Acne keloid nuchae	1
Cheilitis	1
Keloid Scar	1
Genital Vitiligo	1
Urticaria	3
Generalized itching	2
Hirsutism	2

DISCUSSION:

Obesity is a result of genetic, behavioral, environmental, physiological, social and cultural factors that cause energy imbalance and promote excessive fat deposition. Three types of obesity are known.¹

a) Hypertrophic obesity: It is due to an enlargement of fat cell size (Mild).

b) Hyperplastic obesity: It is due to increase in fat cell number (Morbid).

c) Combination of both.

It is often expressed in terms of Body Mass Index (BMI). "BMI is defined as the weight in kilograms divided by the square of height in metres (Kg/m²)".⁶

Obesity is associated with a number of dermatoses, including acanthosis nigricans, skin tag, keratosis pilaris, hyperandrogenism and hirsutism, striae distensae, and adiposis dolorosa. Obesity alters diverse facets of cutaneous physiology, including in the effects on the sebaceous gland, sebum production, skin barrier function, and sweat production. It also promotes changes in lymphatics, collagen structure and function, wound healing, and subcutaneous fat.⁷

In our study, 100 patients aged 18 years or above with body mass index 30 or more were included. BMI > 30 is arbitrarily taken as cut off value for defining obesity internationally.

There was a clear female preponderance among patients (54% females vs 46% males). Worldwide obesity is more prevalent among women.¹ This difference is probably biologically based and related to men's ability to deposit more lean (muscle) than fat tissue when energy imbalance occurs with weight gain, also the adipocyte hormone leptin level is higher in women than men.⁸

Occupation wise most of females were housewife (40%) and majority of males were Farmer (14%). The above-mentioned groups had a sedentary life style and more energy intake (Housewife) compared to physical activity which is a major contributor for obesity. Also, the location of study place is peripheral village area which leads to increase number of farmers in our study.

Diabetes mellitus (24%) followed by hypertension (21%) were the most common associated illnesses in this study

group. The risk of diabetes increases linearly with obesity. A similar linear relationship is observed with hypertension and obesity.⁹ The mean age of patients in this study group was 41.72 ± 12.38. This is slightly lower than that reported by Garcia-Hidalgo L et al. (47.3years)⁸ and higher than that reported by Abdel Maguid EM et al. (36.38 years).¹⁰

Pseudoacanthosis nigricans was the most common skin change (59%) in our study group. This is lower than that reported by Hud et al¹¹ (74%) and Sharquie et al¹² (72%). A trend toward increasing severity of Pseudoacanthosis nigricans was associated with increase in grade of BMI in the present study population. 19 of 24 patients with diabetes mellitus had Pseudoacanthosis nigricans. It is an indicator for greater risk of atherosclerotic vascular disease in these patients.¹¹

In the present study 51% of obese individuals had skin tags. This finding is higher than previous reports by J.C. Boza et al¹³ (47.94%) and lower than that reported by Divyashree RA et al¹⁴ (67.6%). All the grade 2 and 3 obese patients had skin tag and 15 out of 24 type 2 DM patients had skin tag. Rasi et al¹⁵ found that diabetes mellitus was more common in patients with skin tags and that having more than 30 skin tags considerably increased the risk of diabetes. It has been suggested that an increase in unesterified fatty acid due to hyperinsulinemia results in overexpression of Epidermal growth factor receptor and contributes to skin tags.¹⁶ Striae distensae were seen in 48% patients in this study population, consistent with reports of previous studies done by Garcia-Hidalgo L et al.¹⁷ A positive correlation between presence of striae distensae and higher grades of obesity was noted in both men and women as all the grade 3 obese patients had striae. Striae was more prevalent among women in our study, majority of them being multiparas and having striae albicans on their breasts and abdomen. This is due to stretching of skin during pregnancy.¹⁸

13% of patients in present study had stasis dermatitis. Which was found not to have any statistical significance with obesity grading.

In present study, stasis dermatitis was detected more among women than men. J.C. Boza et al¹⁹ reported lymphedema in 12.32 % patients in his study. Venous insufficiency can worsen with obesity owing to increased abdominal pressure, which limits deep venous return in the legs. The frequency of this disorder is 17.4%. in study done by A. Plascencia Gómez et al⁹⁸. Leg venulectasias were observed in 6% patients. Leg venulectasias are reported as a manifestation of chronic venous insufficiency.²⁰

Plantar hyperkeratosis though present in 26% patients only, was found to have a strongly significant correlation with higher grades of obesity. This is lower than that previous reports by Garcia et al²¹ (34.6%) who also found a statistical correlation of PHK with severity of obesity. Plantar hyperkeratosis occurs due to higher plantar pressure in obese persons during standing and walking. This skin disorder is more common in individuals aged over 60 years and should be considered a visible sign of severe obesity.²²

41% patients in present study population had one or other type of fungal infections. Tinea Cruris and Tinea corporis were the commonest. 12 out of these 41 patients had associated type 2 DM. A trend towards higher prevalence of fungal infection with severity of obesity was noted. High number of fungal infections in our study could be due to the selection bias, because most of the patients were generally from a low socioeconomic stratum from peripheral village area. Bacterial infections were present in 15% patients out of which 5 had type 2 DM. Erythrasma and folliculitis was more common among the bacterial infections, this finding is comparable to previous studies.

11.8 % bacterial infection was reported by J C Boza et al¹⁹ in his study. A positive correlation between higher grades of obesity and presence of bacterial infection was not found. Viral infection was found in 5 patients and scabies in 1 patient. Sharquie et al¹² reported 11% prevalence of warts among patients in their study. Intertrigo due to physical factors and infections was detected in 9% of obese individuals in this study and was more prevalent among those with higher grades of obesity. Previous studies have found intertrigo a more

significant finding among obese when compared with our study. Because, obese patients have larger skin folds, and sweat more profusely after becoming overheated because of thick of subcutaneous fat, thus increasing both frictional and moisture components.^{23,24}

Obesity is reported to depress immune function and thus may be an independent factor as a predisposing factor to infection. Hirsutism was observed in 2 women out of the total 56 women and both of them were known cases of PCOS. Hyperinsulinemia associated with obesity increases the production of ovarian androgens. Insulin also inhibits the synthesis of serum hormone binding globulin (thus increasing the concentration of free testosterone in a women's serum) and exerts a growth stimulating effect on pilosebaceous unit contributing to hirsutism.²³

Keratosis pilaris which Garcia et al reported as a significant finding, was seen only in 4 patients in present study. It is often associated with atopic dermatitis. But, this benign dermatosis also manifests in those with greater BMI. It has been suggested that insulin resistance may play a role in the development of keratosis pilaris.²¹

Seborrheic keratoses were seen in 3% patients in this study. There was no statistically significant correlation with BMI grades.

Psoriasis was found in 10% of patient in our study which is close to that reported by J C Boza et al¹⁹ (13.2%). There is also evidence that being overweight is a risk factor for the onset of psoriasis and that the BMI is correlated with the PASI (Psoriasis Area and Severity Index) but in our study all the patients were of grade 1 obesity.

Lymphedema and hidradenitis suppurative which are reported to be commoner among obese people was not found in the present study.²⁵

The present study has a few limitations. First, the sample was limited to one particular local organization, which may limit extending the results to the general population. Also, because BMI was used to define obesity, we were not able to distinguish central obesity from peripheral obesity in this study.

Another limitation is the relatively small number of cases for some skin disorders which might not allow detection of an association between obesity and some skin diseases. A larger cohort is necessary for validating the findings. Lastly, this is a cross-sectional observational analysis, so the direction of effect cannot be discerned. However, the objective of this study was to characterize the burden of obesity on skin regardless of the mechanism of effect.

Conclusion:

Obesity is strongly related to several skin alterations that could be considered as markers of excessive weight. Skin care in obese patients deserves special attention because obviously visible dermatosis in this patient result in cosmetic concern and psychosocial impact along with increased risk of skin infections. Although obesity is recognized as one of the world's biggest health problems nowadays, little attention has been paid to the impact of obesity on the skin. Given the growing numbers of obese patients, dermatology health care providers must work to reduce the detrimental effects of obesity on the skin.

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