ORIGINAL ARTICLE

Pattern of dermatological manifestations of Obesity: An observational study from tertiary healthcare centre in North India

Amandeep Singh, MBBS, Sunil Kumar Gupta, MD, Sukhjot Kaur, MD, Naveen Mittal, DM
Shriya Garg, MBBS, Navneet kaur, MD

Department of Dermatology, Venereology and Leprology, Department of Endocrinology
Dayanand Medical College and Hospital, Ludhiana, India

ABSTRACT

Background: Obesity has reached epidemic proportions in many parts of world. Obesity is associated with an increased risk of development of various health problems like hypertension, diabetes mellitus type II, dyslipidemias along with various skin manifestations which can be diagnosed early.

Objective: To study the pattern of various dermatological manifestations in patients with obesity.

Methods: This was an observational study conducted at Department of Dermatology and Endocrinology, Dayanand Medical College and Hospital, Ludhiana. A total of 250 patients with BMI>25kg/m^2 were included. Anthropometric measurement with fasting lipid profile and FBS were done. Patients were divided into obesity grade I & grade II and cutaneous examination was done.

Results: Out of 250 patients, 168 were of grade I and 82 of grade II obesity. There were many patients with multiple manifestations, so in total there were 354 dermatoses. The most common finding was acrochordons (24.58%) followed by xanthelasma (11.30%), follicultitis (9.89%) and other manifestations with slight female preponderance (51.60%).

Conclusions: Obesity is commonly associated with wide range of dermatological manifestations. Identification and treatment at an early stage can prevent long term cutaneous complications.

KEY WORDS: Obesity, dermatological manifestations, lipid profile, fasting blood glucose

INTRODUCTION

Obesity is a state of excessive amount of body fat associated with an increased risk of medical illness and premature death.[1] The World Health Organization (WHO) classifies "overweight" as a body mass index (BMI) of 23-24.9 kg/m^2 and obesity as a BMI of ≥25 kg/m^2 for asian population.[2] Regional fat distribution may have an effect on risks associated with obesity. Cut off for waist circumference for South Asian men and women are more than 90 cm and more than 80 cm respectively.[3] The increase in the prevalence of obesity in general population is accompanied by an increase in other co-morbidities which are associated with obesity and are less frequently seen in population with normal BMI.[4]

Obesity is commonly accompanied by various co-morbid conditions such as hypertension, diabetes mellitus type II, cardiovascular disease, and is itself a major risk factor for respiratory, endocrine & psychiatric disorders and is indirectly related to anxiety, impaired social interaction, and depression.[4,5]

Obesity causes various abnormalities in functions

of the skin, like barrier function and sweat production, collagen structure and function, wound healing, microcirculation and macro-circulation. Dermatological changes have been classified according to pathophysiologic origin as being associated with insulin resistance (IR), hyperandrogenism, skin folds, mechanical causes, and hospitalization.[6,7]

A number of significant skin complications are associated with obesity such as:

1. Plantar keratosis
2. Acanthosis nigricans
3. Striae
4. Skin tags
5. Keratosis pilaris

There is characteristic peripheral insulin resistance that leads to hyperisulinemia, which is considered as a root cause of obesity. Hyperinsulinemia is implicated in causation of type 2 diabetes, hypertension, dyslipidemia, coronary artery disease, and some skin diseases, such as acne, acanthosis nigricans.[5]

Being aware of such clinical signs and the underlying systemic disorders may facilitate earlier diagnosis, thereby permitting early therapy initiation and prevention of long-term sequelae of obesity.

Understanding of these disorders is necessary both for the physicians as well as for the dermatologists, as many of these conditions are treatable, leading to an improved quality of life and reduction in psychological distress.

Thus, the present study was conducted to study incidence of various dermatological manifestations in obese patients.

MATERIALS AND METHODS

This study included patients attending the outpatient clinic in the Department of Dermatology and Endocrinology of Dayanand Medical College and Hospital, Ludhiana. Study was done from October 2019 to March 2021.

Ethical committee clearance was obtained and informed consent was obtained in the regional as well as in English language.

INCLUSION CRITERIA

Patients aged >18 years, belonging to either sex attending outpatient and inpatient in Department of Dermatology and Endocrinology of Dayanand Medical College and Hospital, Ludhiana, were included in the study.

EXCLUSION CRITERIA

- Patients not willing to participate
- Pregnant women and patients on systemic corticosteroids were excluded from the study.

METHODS

A total of two hundred and fifty clinically diagnosed cases of obesity were included in this study. After informed consent, a detailed history, a comprehensive general and systemic examination was done, followed by a detailed skin examination. The demographic details of the enrolled patients were documented. Height (meters) and weight (kg) were measured and BMI was calculated using the formula weight (kg) / height(m)^2. Patients having BMI >25kg/m² were included in the study. Cases were labelled as obesity grade I and obesity grade II as per classification of BMI by WHO for Asians.[2] Cutaneous lesions were

diagnosed clinically. A detailed physical examination including recording of vitals; anthropometry measurements-height (in meters), weight (in kgs), waist circumference in cms (at level of umblicus) and hip circumference in cms (at the level of widest part of buttocks) was done.

Relevant laboratory investigations like fasting lipid profile, fasting blood sugar and other relevant investigations were performed when required.

RESULTS

A total of 250 obese patients were included in study. It was observed that majority of patients were in 41-50 years age group (27.60%). Mean age was 44.62 ±13.36 years (Table 1).

Table 1 Age distribution of cases

Age (Years)	No. of patients	Percentage
18-20	10	4.00%
21-30	25	10.00%
31-40	65	26.00%
41-50	69	27.60%
51-60	49	19.60%
61-70	25	10.00%
< 70	7	2.80%

There was a slight female preponderance with 51.60% females compared to 48.40% males (Table 2). A total of 67.20% patients were of grade I obesity and 32.80% patients of grade II obesity (Table 3). Waist circumference was raised in 90% patients (Table 4). Waist-Hip ratio was higher in 71.60% patients (Table 5). Dyslipidemia was present in 29.60% patients and FBS was raised in 21.20% patients (Table 6). Acrochordons (24.58%) was most common dermatosis in this study, followed by xanthelasma

Table 2 Gender distribution of patients

Gender	No .of patients	Percentage
F	129	51.60%
M	121	48.40%

Table 3 Grading of obesity as per BMI

BMI GROUP	No .of patients	Percentage
I	168	67.20%
II	82	32.80%

Table 4 Waist circumference of patients in study

Waist circumference(cm) GROUP	No. of patients	Percentage
Normal	25	10%
High	225	90%

Table 5 Waist-hip ratio in patients

Waist-hip ratio	No. of patients	Percentage
Normal	71	28.40%
High	179	71.60%

palpebrum (11.30%), folliculitis (9.89%), intertrigo (9.60%) followed by various other dermatoses like tinea, acanthosis nigricans, pyoderma, striae distensae, balanoposthitis, corns, onychomycosis, psoriasis vulgaris, cellulitis, oral thrush, chronic paronychia (Table 7, Fig. 1-6).

Acrochordons was most common finding in our study, with slight female preponderance

Table 6 Lipid profile abnormalities in patients

Total Cholesterol GROUP	No. of patients	Percentage
< 200	176	70.40%
> 200	74	29.60%
TG GROUP		
< 50	3	1.20%
50-200	182	72.80%
> 200	65	26.00%
LDL GROUP		
<80	60	24.00%
80-130	126	50.40%
> 130	64	25.60%

Table 7 Frequency of individual dermatoses

	No. of cases	Percentage
Acrochordons	87	24.58%
Xanthelasma Palpebrum (XP)	40	11.30%
Folliculitis	35	9.89%
Intertrigo	34	9.60%
Tinea Cruris	32	9.04%
Tinea Corporis	30	8.47%
Acanthosis Nigricans (AN)	24	6.78%
Pyoderma	17	4.80%
Striae Distensae	16	4.52%
Balanoposthitis	4	1.13%
Corns	4	1.13%
Onychomycosis	4	1.13%
Psoriasis Vulgaris	6	1.69%
Cellulitis	2	0.56%
Chronic Paronychia	2	0.56%
Generalised Pruritus	2	0.56%
Oral Thrush	3	0.85%
Seborrhoeic Dermatitis	2	0.56%
Acute Paronychia	1	0.28%
Asteotic Eczema	1	0.28%
Herpes Genitalis	1	0.28%
Herpes Zoster	1	0.28%
Hidradenitis Suppurativa (HS)	1	0.28%
Molluscum Contagiosum	1	0.28%
Non Healing Ulcer	1	0.28%
Plane Warts	1	0.28%
Scrotal Dermatitis	1	0.28%
Vulvo-Vaginal Candidiasis (VVC)	1	0.28%

Fig. 2 Acanthosis nigricans with acrochordons over axilla

Fig. 3 Xanthelasma Palpebrum

Fig. 4 Intertrigo

Fig. 1 Acanthosis nigricans with acrochordons over neck

Fig. 5 Tinea corporis

Fig. 6 Striae Distensae

(52.87%). Neck was most common site to be affected followed by axilla. Most common association was with acanthosis nigricans followed by striae distense and xanthelasma palpebrum. acanthosis nigricans and striae distensae were significantly associated with grade II obesity (p-value-0.001 and 0.0001 respectively).

Pyoderma and folliculitis were significantly associated with grade I obesity with P- value of 0.001.

A statistically significant waist circumference was seen in acrochordons (p-value 0.019) and pyoderma (p-value 0.030). WHR was significantly associated with XP, pyoderma and striae distensae (p-value: 0.011, 0.002, 0.015 respectively).

A statistically significant association with FBS was seen in intertrigo (p-value 0.026) and TC and TG with striae distensae (p-value 0.025 and 0.041 respectively).

DISCUSSION

In this study of 250 patients with obesity, the pattern and frequency of various cutaneous manifestations and their co-relation with anthropometric measurements (BMI, Waist circumference, waist-hip ratio), fasting lipid profile and fasting blood glucose levels were evaluated and compared.

In this study, age group varies from 18 years to 81 years, with maximum number of patients in the age group of 41-50 years (27.60%) with mean age of 44.62 ±13.36 years, which was comparable with the studies carried out by Boza et al[8] in which the mean age was 49.66 ± 15.61 years. There was slight female preponderance with 129 (51.60%) females and 121 (48.40%) males in this study. This female preponderance was also seen in various studies done by Garcia et al,[6] Boza et al[8] and Gomez et al,[9] whereas male predominance was seen in a study done by Khalil et al.[10] In this study, a total of 67.20% (168) patients had grade I obesity and 32.80% (82) patients had grade II obesity. Mean BMI was 29.27 ± 4.69 kg/m² as compared to 39.6 ± 8 kg/m² in a study by Gomez et al[9] and 39.37 ± 7.86 kg/m² in a study by Boza et al.[8] This difference in mean BMI was due to induction of patients with BMI 25.0-29.9 kg/m² in grade I obesity in this study, which was according to Asian guidelines for classification of obesity. A study done by Al- Mutairi[11] had 191 cases (45.80%) with BMI 25-29.9 kg/m² and 226 patients (54.20%) with BMI >30 kg/m².

In present study, acanthosis nigricans and striae distensae were strongly co-related with grade II obesity. Acanthosis nigricans was found to be a consistent finding in various other studies done in obese persons[12] Striae distensae was also a consistent finding in obese individuals which can be due to excessive tension on the skin caused by excessive weight.[13]

Mean waist circumference was 97.73±9.19 cm in contrast to 117±19 cm in study by Gomez et

al.[9] Mean WHR was also measured which was 0.95±0.05.

In this study, the association of higher waist circumference with acrochordons, pyoderma was statistically significant with p value of 0.019 and 0.030 respectively.

Similarly, in this study a higher WHR was associated with XP, striae distensae and pyoderma which was statistically significant with p-value of 0.011, 0.015 and 0.002 respectively.

In present study, acrochordons (24.58%) was the most common dermatosis which was comparable to the findings in the study carried out by Divyashree et al.[14] Other common cutaneous manifestations found in this study included xanthelasma palpebrum with 40 (11.30%), folliculitis with 35 (9.89%), intertrigo (9.60%), tinea cruris (9.04%), tinea corporis (8.47%), acanthosis nigricans (6.78) and other manifestations in small proportion.

In this study, 74 (29.60%) patients had dyslipidemia and an increased total cholesterol along with an abnormal raised levels of triglyceride and LDL in 65 (26%) and 64 (25.60%) patients respectively which was in contrast to the study carried out by Gomez et al[9] in which hypercholesterolemia and hypertriglyceridemia was seen in 32% and 37% patients respectively. In a study conducted by Boza et al,[8] dyslipidemia was present in 27.6% of obese individuals which was similar to the findings in this study.

A raised total cholesterol was associated with striae distense and pyoderma which was statistically significant with p value of 0.025 and 0.0001 respectively. An association of raised levels of triglycerides with striae distensae, acro-

chordons and folliculitis statistically significant with p-value of 0.041, 0.048 and 0.004 respectively. An association of hypertriglyceridemia and BMI with acrochordons has been reported in literature.[15,16]

The relation between obesity and skin infections has been well recognized in previous studies.[11,17] Various previous studies have found an increased risk of skin infections, mainly in the form of folliculitis, tinea cruris, tinea corporis and other cutaneous infections among obese individuals.

Fasting blood glucose in this study was deranged in 53 patients (21.20%), which was similar to findings in a study done by Boza et al[8] in which 23.7% patients of obesity had diabetes. Mean FBS was 101.38 ± 21.22 mg/dl. This was in contrast to the study conducted by Gomez et al[9] in which mean FBS was 95 ± 10 mg/dl.

A statistically significant correlation of raised FBS was seen with intertrigo (p-value=0.026). This can be attributed to increased risk of candidal infections in diabetics due to an immunosuppressive effect in these individuals.

CONCLUSION

Obesity is a major healthcare problem with deleterious effects on nearly all the systems of the body. The prevalence of obesity varies with a number of factors like age, gender, race, sex etc. Various physiological changes like excess body folds, increased sweating, increased blood flow, increased transepidermal water loss and the pressure effect can lead to numerous pathological dermatoses. A number of these dermatoses can be consistently associated with obesity and can even be considered as markers for the same.

With the increase in incidence of obesity, there is an increase in number of these accompanying cutaneous conditions. An understanding of underlying systemic disorder, can help in better management and avoidance of any sequelae. Understanding of various changes like lipid profile, FBS and their disease associations can be of use when it comes to treatment of these dermatoses as treatment of the underlying pathology of lipid alterations and glucose levels can be useful in controlling the skin condition.

An early recognition and proper attention to these dermatoses and their complications is cornerstone of appropriate management. A multidisciplinary approach involving physician and dermatologist is important for tackling physical distress, co-morbidities and psychological disturbances associated with self image and confidence. Any treatment used for these dermatological conditions must include measures for lifestyle modification and weight control.

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