

# A Clinical Study on the Spectrum of Skin changes in Obesity

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## Abstract:

**Background:** Obesity is a major concern in our era with many adolescents and adults being obese. Obese individuals have numerous physiological changes which predispose them to many dermatological conditions. This is of concern to us as many of these conditions can act as markers for obesity and impending systemic consequences of obesity. This study was done to find the common dermatoses associated with adults with a BMI of > 30 kg/m<sup>2</sup> who presented to the skin outpatient department.

**Materials & Methods** –This is a descriptive study conducted from August 2021 to July 2022 at the OP department of skin, P.E.S Medical College Hospital. A hundred patients with ages > 13 years and BMI > 30 kg/m<sup>2</sup> were selected and included in the study. Other necessary investigations like a biopsy, KOH mount, and immunofluorescence were done for relevant cases.

**Results:** There were 200 patients, 132 were males and 68 were females. The majority of patients were in the age group of 41 – 50 year age group. The youngest patient is a 13-year-old male and the oldest patient is a 79-year-old female, in this study 70 % of patients belong to class 1 obesity.

**Conclusion:** Obesity is a rising modern epidemic that can impact the normal physiology of the skin leading to various dermatological conditions. Many of these dermatoses are so common among obese patients that they can be considered as a marker for obesity. Early identification of these conditions can be useful in preventing the deleterious effects of obesity on the body. The severity of obesity also determines the nature of lesions occurring in these patients.

**Key words:** Acanthosis nigricans, Plantar hyperkeratosis, Intertrigo, Striae

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Date of Submission: 07-03-2023

Date of Acceptance: 20-03-2023

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## I. Introduction

Obesity, an epidemic of modern days is taking rapid strides in becoming the leading healthcare problem affecting not only developed but also developing countries. Obesity is responsible for innumerable effects on the body, of which dermatological manifestations form a considerable part.

It is found to alter the epidermal barrier of the skin causing increased transepidermal water loss. It also affects the sebaceous glands, sweat glands, and subcutaneous fat.

Obesity is found to play a contributory role in various skin disorders like acrochordons, acanthosis nigricans, plantar hyperkeratosis, keratosis pilaris, striae, Dercums disease, lymphoedema, and hirsutism.

Many infectious and inflammatory conditions like acne, folliculitis, intertrigo, hidradenitis suppurativa, psoriasis, and cellulitis have been proven to be aggravated by the coexistence of obesity. Grading of obesity is done by various means of which body mass index (BMI) is the most commonly used method.

Our present study will attempt to find out the various patterns and presentations of dermatological conditions occurring in the background of obesity and the occurrence of these lesions in association with BMI.

## II. Materials And Methods

This is a prospective comparative study that was conducted from August 2021 to July 2022 at the PES Institute of Medical Sciences And Research, Kuppam. A total of 200 subjects (both males and females) of age >13 years of age were taken for this study.

**Study design:** Descriptive study

**Study location:** This study was done in the department of Dermatology, Venereology, and Leprosy, PESIMSR, Kuppam, Andhra Pradesh.

**Study duration:** August 2021 to July 2022

**Sample size:** 200 patients

**Inclusion criteria:**

All patients aged more than 13 years with a BMI of more than 30 kg/m<sup>2</sup> attended the outpatient clinic.

**Exclusion criteria:**

1. Patients not willing for the study
2. Patients with BMI < 30
3. Patients on treatment with drugs for obesity
4. Pregnant women and lactating women.

**Procedure methodology**

One hundred patients above the age of 13 years with a BMI > 30 kg/m<sup>2</sup> attending the outpatient clinic of Dermatology, Venereology, and Leprosy were taken up for the study. Informed consent was obtained before the interview and examination. Detailed history, chief complaints related to skin, presence of skin lesions, onset, past and family history of similar lesions, and associated medical or skin disorders was elicited and recorded. Complete cutaneous examination and relevant systemic examination were done. If any specific dermatoses of obesity were present, the morphology of skin lesions, distribution, and sites involved was studied. Results were tabulated and analyzed.

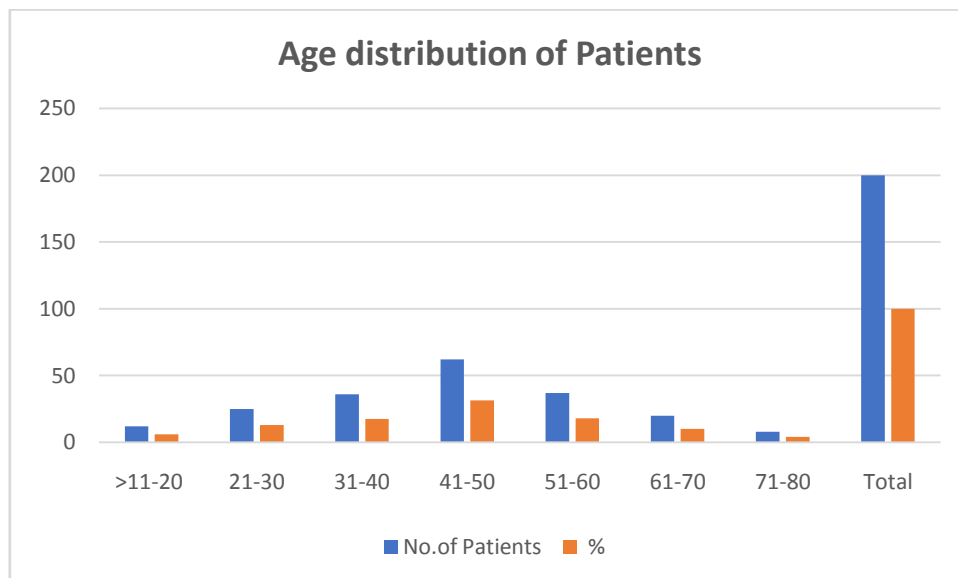
**Statistical analysis:** The data will be entered into MS EXCEL 2019 version and further analyzed using SPSS 21. The data is presented in the form of frequency and percentages using tables and charts.

**III. Results**

In this observational study, the Age distribution of the dermatoses is noted, out of which the 41-50 years age group had the highest number of cases in the study with 62 cases followed by the 51-60 years age group which had 37 cases. The least number of cases was seen in 71-80 years age group with 8 cases.

**Table no 1: Age distribution of patients studied**

Age in years	No. of Patients	%
11-20	12	6.0
21-30	25	13.0
31-40	36	17.5
41-50	62	31.5
51-60	37	18.0
61-70	20	10.0
71-80	8	4.0
Total	200	100

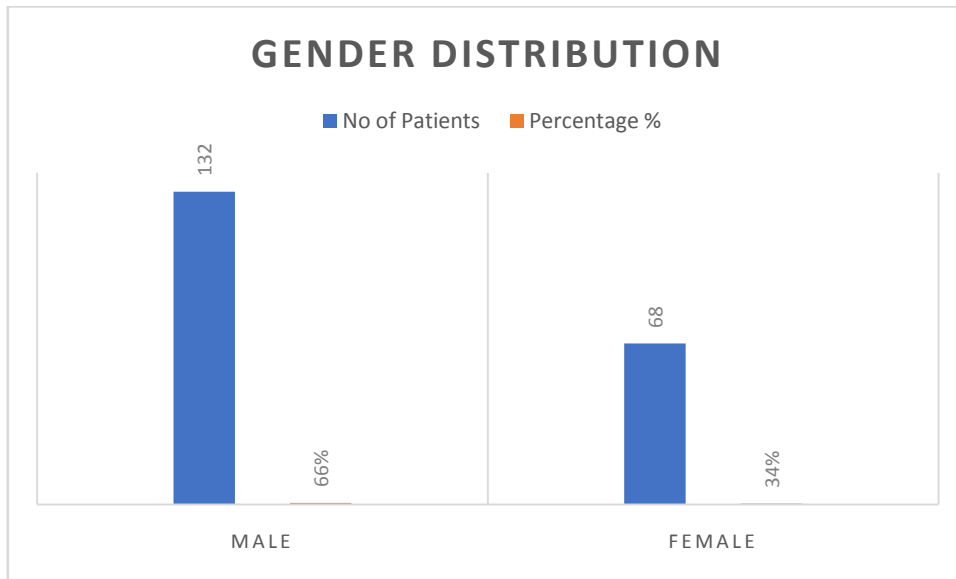


**II. GENDER DISTRIBUTION OF PATIENTS STUDY**

In this observational study of 200 patients, the majority are male patients with, 66% and female patients accounting for 34 %.

**Table no 2: Gender distribution of patients studied**

Gender	No of Patients	Percentage %
Male	132	66%
Female	68	34%
Total	200	100

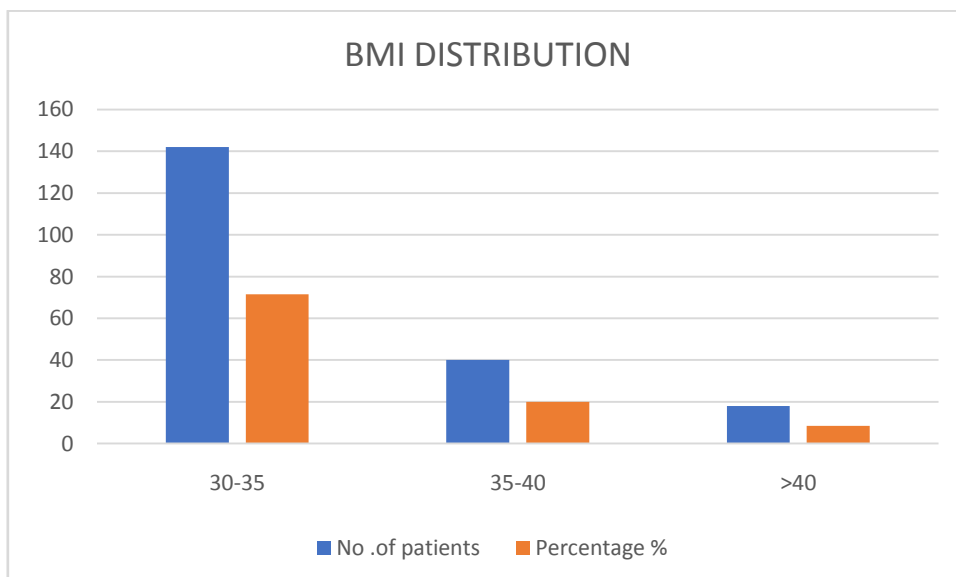


### III. BMI DISTRIBUTION OF PATIENTS STUDIED

In this present study, 142 (70 %) patients have a BMI of 30-35 (class I) obesity, 40 (21.5%) patients have a BMI of 35-40 (class II obesity), and 18 (8.5%) patients have a BMI >40(class III obesity).

**Table no 3: BMI (kg/m<sup>2</sup>) distribution of patients studied**

BMI (kg/m <sup>2</sup> )	No.of patients	Percentage %
30-35	142	71.5
35-40	40	20.0
>40	18	8.5
total	200	100.0

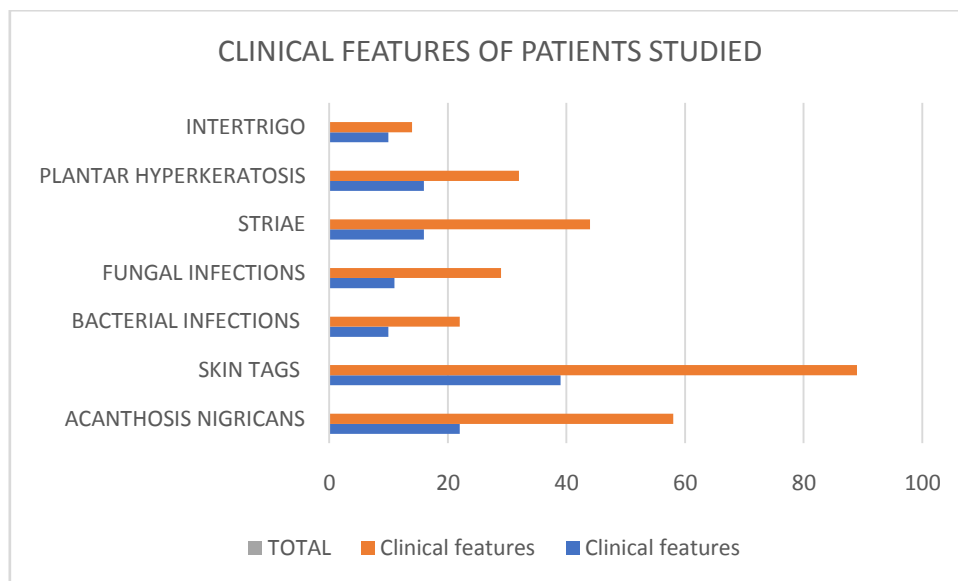


### IV. CLINICAL FEATURES OF PATIENTS STUDIED

Among 200 patients, 64% of patients have skin tags (Acrochordans), 40% of patients have acanthosis nigricans, 30 % of the patients have striae, 24 % of patients have plantar hyperkeratosis, 16% of patients have bacterial infections, 12% of patients have intertrigo.

**Table no 4: Clinical features of patients studied**

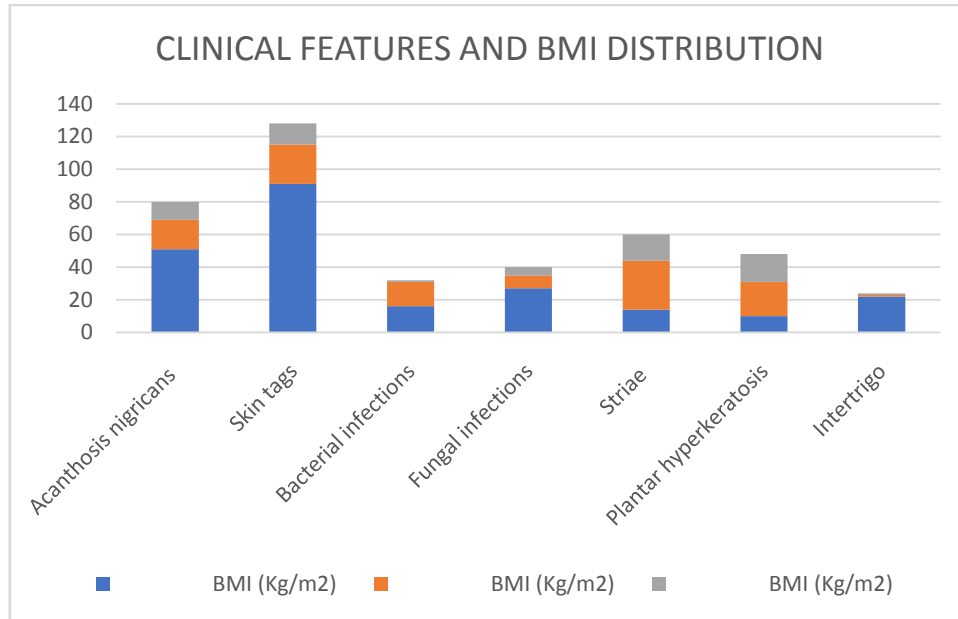
CLINICAL FEATURES	GENDER		TOTAL
	Female(n=68)	Male(n=132)	
ACANTHOSIS NIGRICANS	22	58	80(40%)
SKIN TAGS	39	89	128(64%)
BACTERIAL INFECTIONS	10	22	32(16%)
FUNGAL INFECTIONS	11	29	40(20%)
STRIAE	16	44	60(30%)
PLANTAR HYPERKERATOSIS	16	32	48(24%)
INTERTRIGO	10	14	24(12%)



This study clearly shows that plantar hyperkeratosis was most commonly seen in the BMI >40 with 17 patients, where striae are more commonly seen in BMI 35 -40 with 30 patients affected, fungal infections were more commonly seen in BMI 30-35 with 27 patients affected.

**Table no 5: BMI distribution in clinical features of patients studied**

CLINICAL FEATURES	BMI (Kg/m <sup>2</sup> )			P value
	30-35 (n=142)	35-40 (n=40)	>40 (n=18)	
Acanthosis nigricans	51	18	11	0.077
Skin tags	91	24	13	0.292
Bacterial infections	16	15	1	0.001
Fungal infections	27	8	5	0.595
Striae	14	30	16	<0.001
Plantar hyperkeratosis	10	21	17	<0.001
Intertrigo	22	1	1	0.044



#### IV. Discussion

Overweight and obesity were defined as abnormal or excessive fat accumulation that may impair health. Out of 200 obese patients, 132 were males and 68 were females. Males are most commonly affected than females.

Majority of patients are in the age group of 41-50 year age group. the youngest patient is a 13-year-old male and the oldest patient is a 79-year-old female

In the present study, the mean age at presentation is  $43 \pm 14$  years

Among 200, 142 patients have a BMI of 30-35 (CLASS I obesity ) 70%, 40 patients have a BMI of 35-40 (class II obesity ), 18 patients have BMI >40 ( class III obesity )8.5%

All the patients in this study were evaluated and examined for skin changes.

There are many cutaneous changes seen in obese individuals, few of them are summarized :

INSULIN RESISTANCE :

Insulin resistance syndrome, acanthosis nigricans, acrochordons, keratosis pilaris, hyperandrogenism, hirsutism  
MECHANICAL; Plantar hyperkeratosis, striae distensae, cellulite, adiposis dolorosa, lymphedema, chronic venous insufficiency.

INFECTIOUS: Intertrigo, Candidiasis, Dermatophytes, folliculitis, necrotizing cellulitis/fasciitis

INFLAMMATORY: Hidradenitis suppurativa, Psoriasis.

Metabolic: Tophaceous gout

The most common skin changes seen in the present study were skin tags followed by acanthosis nigricans.

In this study, plantar hyperkeratosis and striae increase with the increase in grades of BMI whereas skin tags and acanthosis nigricans were seen in class 1 and class 2 obesity.

In the current study, acanthosis nigricans had more class 1 obesity patients, out of 80 patients 58 were male and 22 were female.

In this present study, the majority of the patient that is 128 patients had skin tags. Among 128 patients, 89 were males and 39 were females.

Among skin infections, patients with fungal infections were more in number compared with bacterial infections. 40 patients were affected with fungal infections whereas 32 patients were affected with bacterial infections.

In the present study, 60 patients were affected with striae, out of which 44 were male and 16 were female.

In a present study, skin tags and acanthosis nigricans were mostly seen in class I and class 2 obesity.

Plantar hyperkeratosis and striae increase with an increase in grades of obesity.

The development of plantar hyperkeratosis may be regarded as a physiologic response to mechanical trauma, as obese patients have increased forefoot width and higher plantar pressures during walking and standing.

According to Divyashree RA et al., the majority of patients belong to the 41-50 year age group, out of 100 patients 74 were female and 26 were male, majority of patients were in class I obesity, acanthosis nigricans was the commonest skin finding followed by skin tags, fungal infections, and intertrigo was to be more common in obese patients.

According to Naiz F et al, the majority of patients belong to the 41-50 years age group, out of 196 patients 120 were female and 76 were male, acanthosis nigricans were 49 % and 35% were having skin infections and 17 % were having striae and the majority were in class 2 obesity.

### **V. Conclusion**

The present study aimed to find out the prevalence of cutaneous manifestations and associated systemic diseases in obesity in our population. Acanthosis nigricans and skin tags should be considered clinical markers of hyperinsulinemia in obese patients. Plantar hyperkeratosis should be considered a cutaneous stigma of severe obesity. This is probably a result of pressure directly related to the excess weight.

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**FIG 1: ACANTHOSIS NIGRICANS**



**FIG 2: ACROCHORDANS**



**FIG 3: PLANTAR HYPERKERATOSIS**



**FIG 4: STRIAE DISTENSAE**



Dr.KeerthanaB, et. al. "A Clinical Study on the Spectrum of Skin changes in Obesity." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(3), 2023, pp. 10-16.