

## A Cross-Sectional Observational Study on The Cutaneous Manifestations of Obesity from Central West India

Poonam Singh<sup>1</sup>, Ratnakar R Kamath<sup>2</sup>, Shreya K<sup>3\*</sup>, Reena Singh<sup>4</sup>

<sup>1</sup>Dermatology and Venereology, AIIMS, Saketnagar, Bhopal, India

<sup>2</sup>Grant medical College, Mumbai, India

<sup>3</sup>Department of Dermatology and Venereology, AIIMS, Habibganj, Saketnagar, Bhopal, India

<sup>4</sup>General Medicine, Gandhi Medical College, Bhopal, India

---

**Citation:** Poonam Singh, Ratnakar R Kamath, Shreya K, Reena Singh. A Cross-Sectional Observational Study on The Cutaneous Manifestations of Obesity from Central West India. *Int Clin Med Case Rep Jour.* 2023;2(9):1-9.

DOI: <https://doi.org/10.5281/zenodo.8000981>

**Received Date:** 27 March, 2023; **Accepted Date:** 30 March, 2023; **Published Date:** 31 March, 2023

**\*Corresponding author:** Shreya K, Department of Dermatology and Venereology, AIIMS, Habibganj, Saketnagar, Bhopal, India

**Copyright:** © Shreya K, Open Access 2023. This article, published in *Int Clin Med Case Rep Jour (ICMCRJ)* (Attribution 4.0 International), as described by <http://creativecommons.org/licenses/by/4.0/>.

---

### ABSTRACT

“Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems”. A hospital-based cross-sectional study was conducted in the Department of Dermatology, Venereology & Leprosy, central west part of India. The aim was to study various dermatological manifestations of obesity. A total of 107 subjects with clinical evidence of obesity were included (BMI>25 or waist circumference Men: >90 cm, women>80 cm). After taking consent, demographic details, height, weight, waist circumference, and cutaneous examination findings were recorded. Investigations like fasting plasma glucose level, post prandial plasma glucose level, serum lipid profile, and fasting serum insulin level were also performed. The mean age of the study subjects was 38.27 years with over half of the subjects (55.1%) being 40 years or below. Female predominance was seen among study subjects with 79.4% females to 20.6% males.

Out of total 107 subjects, 39.3% had a sedentary lifestyle. As per BMI criteria, 5.6% were normal and 27.1% were overweight. While 26.2%, 27.1% and 14% were in obesity category I, II and III respectively. All female respondents had abdominal girth above 80 cm, while 44.7% had abdominal girth above 100 cm. All male respondents had abdominal girth above 90 cm, while 9.1% and 13.6% had abdominal girth above 100 cm and 110 cm respectively. Out of total 107 cases, 34 (31.8%) were vegetarians while remaining 73 (68.2%) were on mixed diet. Associated comorbidities among study subjects included diabetes (5.6%), hypertension (4.7%), PCOS (1.9%) and hypothyroidism (0.9%). On investigation, raised fasting insulin was seen in 36.4% while diabetes as per fasting and post-prandial criteria was observed in 17.8% and 34.6% subjects. High total cholesterol, triglycerides, LDL and VLDL levels were seen in 71%, 33.6%, 59.8% and 47.7% while low HDL levels were seen in 77.6%. Insulin resistance as per

raised HOMA-IR levels was seen in 69.2% subjects. In 69.2% cases, skin manifestations developed gradually while acute onset was seen in 30.8% cases. The most common site involved was the neck (65.4%), followed by groin (15%) and axilla region (10.3%). The most common skin manifestation of obesity seen in present study was acanthosis nigricans (61.7%), followed by tinea corporis (39.3%) and acrochordons (26.2%). Other skin condition seen were hirsutism (4.7%), intertrigo (1.9%), furuncle (1.9%), striae (1.9%), acne (1.9%) and adiposis dolorosa (0.9%).

**Keywords:** Obesity, Cutaneous manifestations, Acanthosis nigricans, Tinea corporis, Dyslipidemia

## INTRODUCTION

“Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems”.<sup>[1]</sup> Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population. <sup>[2]</sup> A person with a body mass index of 23 kg/m<sup>2</sup> will now be considered overweight and below that as one with a normal BMI unlike the cut-off limit of 25 kg/m<sup>2</sup> earlier. Those with BMI of 25 kg/m<sup>2</sup> will be clinically termed obese (as opposed to 30 kg/m<sup>2</sup> at the international level) and those with BMI of 32.5 kg/m<sup>2</sup> will require bariatric surgery to eliminate excess fat. According to JAPI guidelines, cut-offs for waist circumferences will now be 90 cm for Indian men (as opposed to 102 cm globally) and 80 cm for Indian women (as opposed to 88 cm at the international level). After applying more stringent revised cut-off criteria, the prevalence of obesity will rise to 17% i.e. about 70 million people.<sup>[2]</sup> Altered physiological functions of skin secondary to obesity include changes in barrier function, excessive sweat, and sebaceous glands secretion. Furthermore, there is impaired lymphatic drainage, altered collagen structure, and functioning, delayed wound healing, impaired micro and macrocirculation.<sup>[3-5]</sup>

Very few studies have been conducted about cutaneous manifestations of obesity. The current study thus aimed to determine the spectrum of various dermatological manifestations associated with obesity.

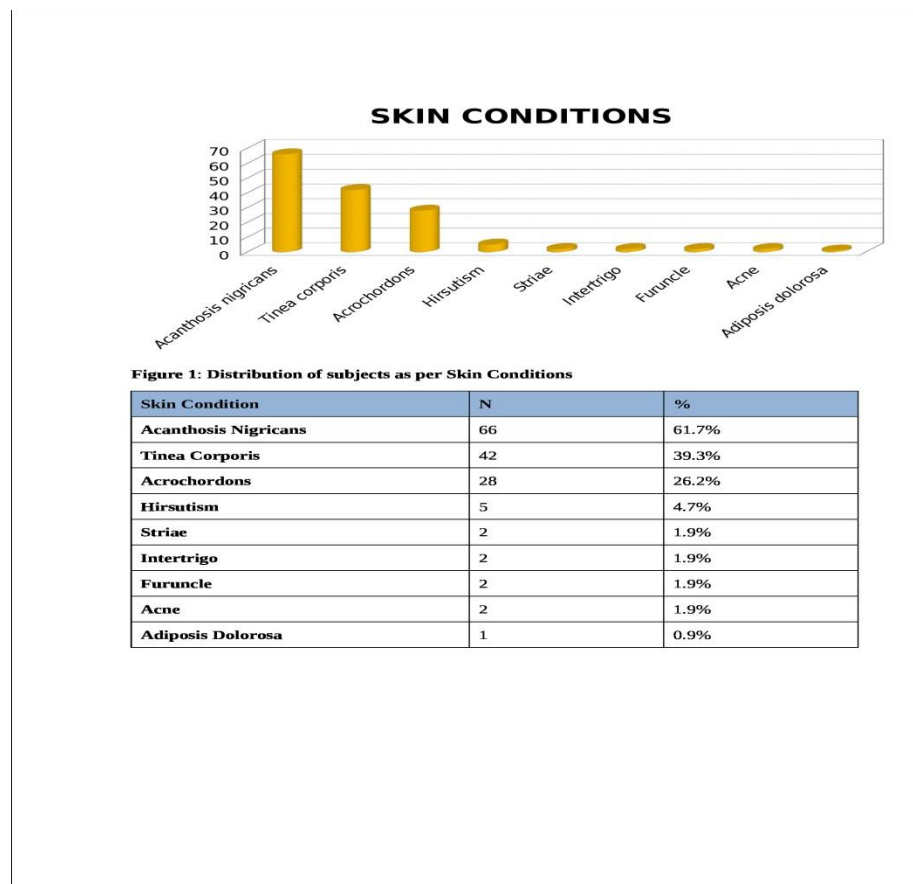
## MATERIALS AND METHODOLOGY

The aim of the study is to identify and classify patients with obesity (as per the JAPI criteria), study the dermatological manifestations associated with obesity, identify underlying systemic co-morbidities with obesity, and correlate dermatological manifestations with associated underlying co-morbidities if any. A cross-sectional, observational study was conducted after IHEC approval in central west India from December 2016 to November 2017. The patients attending OPDs of the Dermatology department between the age of 18 years-75 years, with BMI>25, waist circumference for men: >90 cm, and women>80 cm who has given consent were included. Patients exposed to physiological factors known to be responsible for causing weight gain like pregnancy and lactation, and on medications responsible for causing weight gain like steroids were excluded. Consecutive type of non-probability sampling was followed during the study period. A total of 107 consecutive cases with clinical characteristics of obesity attending our OPD and fulfilling eligibility criteria were included. Investigations like fasting plasma glucose level, post prandial plasma glucose level, serum lipid profile, and fasting serum insulin level was also carried out in

every patient. Calculation of HOMA-IR (homeostatic model assessment for insulin resistance) index was also done. The quantitative data was represented as the mean  $\pm$  SD. Categorical and nominal data were expressed in frequency & percentage. All analysis was carried out by using SPSS software version 21.

## RESULTS

Out of total 107 cases, female predominance was seen among study subjects with 79.4% females to 20.6% males and 34 (31.8%) were vegetarians while the remaining 73 (68.2%) were on mixed diet. Associated co-morbidities among study subjects included diabetes (5.6%), hypertension (4.7%), PCOS (1.9%) and hypothyroidism (0.9%). Out of 107 cases, 39.3% had sedentary occupation. In 69.2% cases, skin manifestations developed gradually while acute onset was seen in 30.8% cases. Most common site involved was neck (65.4%) followed by groin (15%) and axilla region (10.3%). Associated co-morbidities among study subjects included diabetes (5.6%), hypertension (4.7%), PCOS (1.9%) and hypothyroidism (0.9%). Most common skin manifestation of obesity seen in present study was Acanthosis nigricans (61.7%) followed by Tinea corporis (39.3%) and Acrochordons (26.2%). Other skin condition seen were hirsutism (4.7%), intertrigo (1.9%), furuncle (1.9%), striae (1.9%), acne (1.9%) and adiposis dolorosa (0.9%) (Figure 1).



**Figure 1:** Distribution skin lesions

## DISCUSSION

Obesity is emerging as a global epidemic and is implicated in many dermatoses. Its rising incidence ensures that obesity related skin diseases will represent an increasing proportion of a dermatologist's work load. In the present study, we described the pattern of various dermatological manifestations associated with obesity. The mean age of the study subjects was 38.27 years with over half of the subjects (55.1%) being 40 years or below. Female predominance was seen among study subjects with 79.4% females to 20.6% males. Mean age of the study subjects in a similar study by Furquana N et al on 93 obese subjects was 41.2 years with 54 females to 39 males.<sup>[6]</sup> This consistent female preponderance of obesity is in concordance with the findings of the NHFS-3 survey, which revealed that the incidence of obesity amongst Indian women had shown a 24% increase as compared to NHFS-2.<sup>[7]</sup> Then increased prevalence of obesity among females is further explained in a study by Kimet al which revealed that Asian women generally assume much of the responsibility for housework. This cultural norm increases stress among female workers, who have less time to complete household duties after long hours spent at the workplace. Women are thus more vulnerable to anxiety due to overwork than men. Working long hours induces chronic stress, which can increase the risk for obesity in Asian women.<sup>[8]</sup> The prevalence of mixed diet found in our series was 68.2% subjects and rest 31.8% are vegetarian. Lin BH *et al* on examining the relationship between fruits and vegetables and obesity, found the negative correlation between vegetable consumption and BMI to be significant among adults<sup>[9]</sup>, as in our study.

In our study the mean BMI is  $33.5 \pm 6.3 \text{ kg/m}^2$  and  $34.9 \pm 6.6 \text{ kg/m}^2$  for females and males respectively. There was a strong positive linear association of waist circumference with all-cause mortality. Men with a waist circumference of 110+ cm had 52% greater mortality risk compared with those <90cm. Women with a waist circumference  $\geq 95$ cm had 80% greater mortality risk compared with those <70cm. Each 5cm increment in waist circumference was associated with a 7% increased mortality risk for men and a 9% increased mortality risk for women. Similar findings were present in our series where we found 4 out of 107 patients having normal BMI but raised waist circumference. Acanthosis nigricans is the commonest dermatological manifestation of obesity (Figure 2). In the study by Shivkumar S & Banupriya K<sup>[10]</sup>, acanthosis nigricans was the most common skin lesion found among obese patients (65%). Our results are thus in concordance with the findings of most of the previous studies. Thus acanthosis nigricans in obese patients is a reliable marker of insulin resistance, and indicates a higher risk of development of cutaneous virilism, DM and metabolic syndrome.



**Figure 2: AN**

Increased incidence of tinea, intertrigo, candida, furunculosis, erythrasma and folliculitis has been described in obese patients. Erysipelas, cellulitis, necrotizing fasciitis, and gas gangrene have also been described rarely. In the present study, tinea corporis (Figure 3) was the most common infection and second most common skin manifestation (39.3%) followed by intertrigo (1.9%) and furunculosis (1.9%). In the study by Abdel Maguid et al <sup>[12]</sup>, 30.65% of obese patients had skin infections with tinea being the most common (15%) followed by furunculosis (6.8%). Sivakumar & Banupriya <sup>[10]</sup> in their study also observed the incidence of tinea and intertrigo was 16% and 8% respectively.



**Figure 3: Tinea corporis**



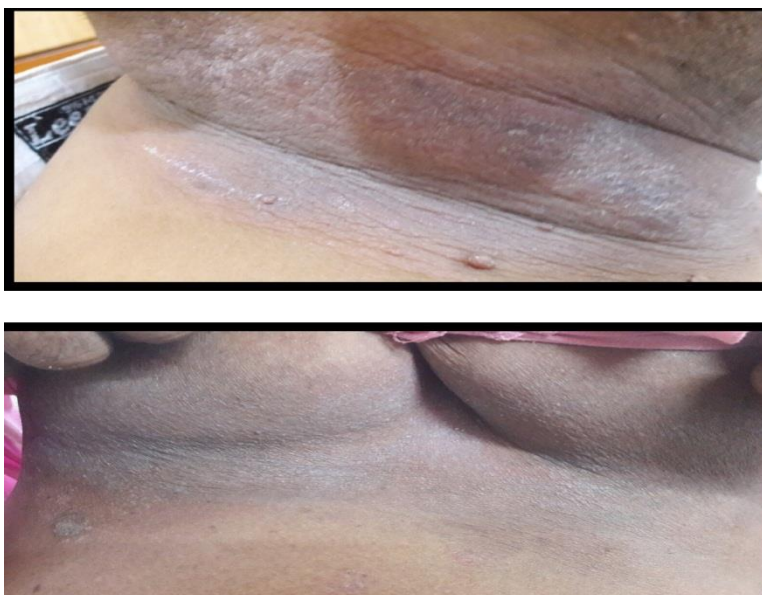
In the present study, acrochordons were the third most common skin manifestation observed among obese subjects found in 26.2% subjects. Comparatively, the prevalence of skin tags in the study by Abdel Maguid et al<sup>[12]</sup> was 13.3% with significant association with obesity ( $p < 0.05$ ). Other skin condition seen were hirsutism (4.7%) (Figure.4), furuncle (1.9%), striae (1.9%) (Figure 5), acne (1.9%) and adiposis dolorosa (0.9%). The limitations of our study were follow up in the morphology of lesions could not be assessed since it was a cross sectional study, specific indicator which would correlate with the BMI was not identified. (Figure 6, 7)



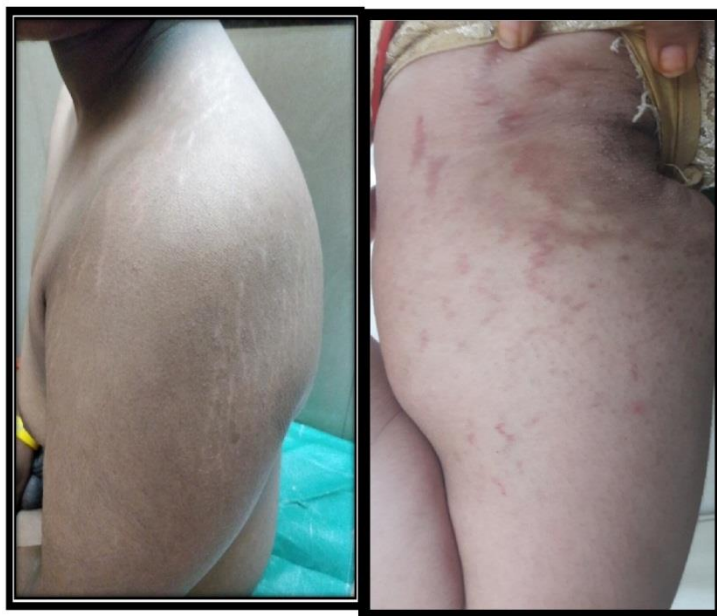
**Figure 4:** Acrocordon



**Figure 5:** Hirsutism



**Figure 6:** Candidal intertrigo



**Figure 7:** Striae distense

## CONCLUSION

In our study, the skin conditions most associated with obesity were acanthosis nigricans (61.7%), fungal infections and skin tags. Insulin resistance as assessed by HOMA-IR was detected in 69.2% patients. Considering the similar prevalence of acanthosis nigricans and insulin resistance in our study population, it confirms the contention that

acanthosis nigricans is a specific marker of insulin resistance. Presence of acanthosis nigricans is a signal for institution of weight loss and insulin sensitization therapy.

Waist circumference should be used in conjunction with BMI to identify and measure obesity. There are important limitations in using solely BMI as a measure of obesity, because BMI does not discriminate fat from lean mass or abdominal from gluteofemoral fat, both of which have different health implications.

Skin care of obese patients deserves particular attention, not only because of the high prevalence of cutaneous physiologic alteration, but mainly because many of these disorders are preventable and could be treated, improving patient's quality of life. Dermatologists must work with primary care physicians and patients to reduce the detrimental effects of obesity on the skin.

Considering the small number of patients studied, the findings in this study may need to be confirmed by further studies with more number of patients.

## REFERENCES

1. Park K. "Park's Textbook of Preventive and Social Medicine: Epidemiology of Chronic Non-Communicable Diseases and Conditions. Jabalpur: M/s Banaridas Bhanot Publishers, 21<sup>st</sup> edition 2011; 6: 366-367.
2. Kalra S, Unnikrishnan AG. Obesity in India: The weight of the nation. Journal of Medical Nutrition and Nutraceuticals 2012;1(1):37
3. Yosipovitch G, DeVore A, Dawn A. Obesity and the skin: skin physiology and skin manifestations of obesity. J Am Acad Dermatol 2007;56:901-16.
4. Guida B, Nino M, Perrino NR et al. The impact of obesity on skin disease and epidermal permeability barrier status. J Eur Acad Dermatol Venereol 2009;24(2):191-195.
5. Francischetti EA, Tibirica E, da Silva EG et al. Skin capillary density and microvascular reactivity in obese subjects with and without metabolic syndrome. Microvasc Res.3 2011;81(3):325-330.
6. Furquana N, Shams N, Qureshi S, Bashir F, Shaikh Z, Ahmed I. Dermatological manifestations in obesity. Journal of Pakistan Association of Dermatology 2015;25;(2):90-95
7. Garg C, Khan SA, Ansari SH, Garg, M. Prevalence of obesity in Indian women. Obesity Reviews. 2010;11:105108.
8. Kim B-M, Lee B-E, Park H-S, et al. Long working hours and overweight and obesity in working adults. Annals of Occupational and Environmental Medicine 2016;28(1):36
9. Lin BH, Morrison RM. Higher fruit consumption linked with lower body mass index. Food Review 2002;25
10. Sivakumar S, Banupriya K. A cross-sectional descriptive clinical study of dermatological manifestations in obesity. Int J Res Dermatol 2017;3:337-341.



11. Seleit I, Bakry OA, Abdou AG, Hashim A. Body mass index, selected dietary factors, and acne severity: are they related to in situ expression of insulin-like growth factor-1? Anal Quant Cytopathol Histpathol. 2014;36(5):267-278.
12. Abdel Maguid EM, Awad SM, Saad MM. Skin Disorders in Adult Obese Egyptian Patients: A Comparative Study. Int J Dermatol Clin Res 2017;3(1):1-7