

Cutaneous manifestations in obesity

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Abstract *Objective* To study the frequency of various dermatoses in obese patients and their comparison with the control group of normal weight individuals.

Methods The duration of study was one year starting from March 2011 to March 2012. A total of 93 obese (BMI >30kg/m²) and 93 normal weight (BMI 18.5-24.9 kg/m²) individuals were included in the study. All the individuals underwent a complete medical and dermatological evaluation. All of them were evaluated for the presence of metabolic syndrome, as well.

Results Common dermatoses seen in obese patients were acanthosis nigricans, striae, acrochordons, and various infections. Out of these acanthosis nigricans, acrochordons and striae had statistically significant relationship with obesity as compared to control group ($p<0.05$). All the manifestations were also compared for diabetes, dyslipidemia and metabolic syndrome.

Conclusion Obesity is associated significantly with certain dermatoses. Understanding and thorough knowledge of these disorders is necessary both for the physicians as well as for a dermatologist, as many of these conditions are treatable, leading to an improved life quality. Early recognition of these lesions may also warn the patients for a need of weight reduction.

Key words

Cutaneous manifestation, obesity, acanthosis nigricans.

Introduction

Obesity is now widely considered as a major public health problem. It is considered to be a global epidemic. The prevalence of obesity has significantly increased among the US population over the past 30 years. Health care expenditures are significantly higher for overweight and obese individuals.¹

Obesity is defined as body mass index (BMI) of 30kg/m² or more. Over the past 30 years its prevalence has increased significantly worldwide.² Morbidity and mortality in obese

population is significantly more than the normal weight individuals.³

Obesity carries a significant impact on psychological health, as well. It is indirectly labeled to anxiety, impaired social interaction and depression.⁴

Skin is affected in a number of different ways in obesity.⁵ Apart from certain dermatoses that appear in obesity, certain cutaneous disorders are aggravated by obesity.⁶ Effects of obesity on skin have received minimal attention so far. Various studies have been done internationally but so far no data are available from Pakistan.

The present study aimed to find out the prevalence of cutaneous manifestations in obesity in our population.

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Methods

The study was conducted in the Department of Dermatology, Sharif Medical & Dental College from March 2011 to March 2012.

93 obese (BMI>30kg/m²) and controls with normal weight (BMI 18.5-24.9kg/m²) were included in the study. The sample size was calculated using WHO calculator for two groups for a difference in proportion of 20% between the groups giving significance of 0.05 and power of 80%.

Clinical evaluation included detailed history and cutaneous and systemic examination. Waist circumference was also noted along with measurement of weight and height.

For evaluation of underlying metabolic syndrome/syndrome X, certain lab investigations were carried out. This included fasting glucose, total cholesterol, and HDL and triglycerides levels. To rule out underlying immunosuppression HBsAg, anti-HCV and anti-HIV antibodies were also done and such patients were excluded from the study. Fungal smears were carried out to rule out tinea pedis as a cause of plantar hyperkeratosis.

Statistical analysis

All the data were entered in a pre-designed proforma. Statistical analysis was done using chi square test and *p* value of <0.05 was considered significant. The t-test for independent sample was used for analysis of quantitative variables.

Results

A total of 93 patients were enrolled in each group. Demographic data of both the groups are shown in **Table 1**.

Table 1 Demographic data of patients and controls.

	Obese N=93	Control N=93
M/F	39/54	41/52
Age(years)	18-69years	17-70years
Weight(kg)	79-105kg	55-70kg
BMI(kg/m ²)	30-42kg/m ²	20-28kg/m ²

BMI=body mass index

Table2 Comparison of co-morbid conditions in obese and control group.

Comorbid conditions	Obese (%)	Control (%)	P value
Hypertension	72	26	<0.05
Diabetes mellitus	45	17	<0.05
Ischemic heart disease	36	11	<0.05
Depression	33	5	<0.05
Metabolic syndrome	16	2	<0.05

Table 3 Frequencies of cutaneous manifestations in obese and control group.

Dermatoses	Obese (%)	Control (%)	P value
Acanthosis nigricans	63%	22%	<0.05
Acrochordons	52%	12%	<0.05
Striae	40%	10%	<0.05
Infections	33%	20%	>0.05
Plantar hyperkeratosis	26%	19%	>0.05
Hirsutism	16%	9%	>0.05
Psoriasis	10%	4%	>0.05
Hidradenitis	6%	4%	>0.05
Lymphedema	3%	1%	>0.05

Table 2 shows comparison of various comorbid conditions in obese and control groups. All comorbid conditions like hypertension, diabetes, ischemic heart disease, depression and metabolic syndrome were significantly more in obese group (*p*<0.05).

Table 3 shows the comparison of various cutaneous manifestations in obese and controls. The dermatoses that showed a significant association with diabetes included acanthosis nigricans, onychomycosis and acrochordons (*p*<0.05). Similarly hirsutism was significantly more in patients with metabolic syndrome (*p*<0.05).

Discussion

Obesity is associated with a number of mucocutaneous manifestations.^{7,8} Some of these manifestations show statistically significant relationship with increasing BMI.

Acanthosis nigricans (AN) was observed in 63% of patients. Besides obesity, certain other comorbid conditions like endocrine disorders, diabetes, hyperinsulinemia and metabolic syndrome are also associated with acanthosis nigricans.⁹ Hud *et al.*¹⁰ found that 74% of obese population shows AN along with elevated plasma insulin levels. Obese children with AN also have insulin resistance.

In our study, we found a significant association of AN with diabetes mellitus ($p < 0.05$). This was in accordance with the studies carried out by Araujo *et al.*¹¹ and Hud *et al.*¹⁰ Boza *et al.*⁶, however, did not establish any association of AN with diabetes or insulin resistance. They reported that obesity is an independent factor for AN. This could be because of racial and genetic differences.

Acrochordons followed AN, being 52% in frequency. Boza *et al.*⁶ reported it to be 36%. Acrochordons, when correlated with diabetes and dyslipidemias revealed significant association ($p < 0.05$). This association has already been established by various researches worldwide,^{12,13} so our result further augmented the already established association of skin tags with insulin resistance, hypertriglyceridemia and BMI.

Striae were seen in 40% obese population in our study. They were the most frequent manifestation reported from Brazil.⁶ The researcher also found that striae increases with increasing grades of BMI. Hus *et al.*¹⁴ reported a

frequency of 40% in children with moderate to severe obesity, and the incidence was higher in those with longer duration of obesity. In Korean adolescents, Cho *et al.*¹⁵ gave a prevalence of 83.4% in 2006. The difference might be due to a different sampling technique, as he included both obese and non-obese individuals with other underlying causes of striae like Marfan's syndrome,¹⁶ familial forms¹⁷ etc.

Skin infections are usually more in frequency in obese patients, mainly due to friction of skin in body folds resulting in maceration and superadded infection. 33% of patients had skin infections in the present study.¹⁸ Of these 14% had onychomycosis, 11% had intertrigo and 8% had bacterial infections. Boza *et al.*⁶ found a statistically significant association of obesity with infections. We, however, were not able to find out such association.

Several studies have been conducted to find out the association of psoriasis with obesity.¹⁹ Armstrong *et al.*²⁰ in 2012 reported a higher prevalence and incidence of obesity in patients of psoriasis. We were not able to establish an association of this skin disorder ($p > 0.05$) with obesity, possibly because of a smaller sample size and also because our study included obese population only instead of including patients of psoriasis.

The dermatoses which did not establish a correlation with obesity in our study were acne, plantar keratoderma and lymphedema ($p > 0.05$).

We conclude that obesity is one of the major public health problems. It, directly or indirectly, starts unfavorable processes in almost all organ systems. Therefore, only a multidisciplinary care may secure treatment and rehabilitation of obese patients. Certain obesity-related dermatoses may require hospital admissions like lymphedema,

pressure ulcers and diminished wound healing. Recognition and control of the dermatological complications of obesity play an important role in diminishing the morbidity of obesity.

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