

Cutaneous Manifestation of Obesity among Sudanese Patients in Khartoum Dermatology Hospital University of Bahri - Khartoum, Sudan

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Abstract: *The impact of obesity on the skin has received very little attention mainly in Sudan. The aim were to investigate the relationship between overweight/obesity and some of the dermatological manifestations and to identify skin conditions associated with BMI and the relation between waist to hip circumference and dermatological diseases in Khartoum dermatology and STIs Teaching Hospital patients. Study design it is a cross-sectional hospital based descriptive and analytical study. Methods Selective sample from fifty patients was chosen from Khartoum Teaching Hospital of Skin and Venereal Diseases. Measurements and all the medical assessments were done by the researcher. Result this study indicated high association between body mass index and planter hyperkeratosis (p value 0.03) and between W/H ratio and planter hyperkeratosis among female patients at p value 0.032 but not among male. High association was found between W/H ratio and intertrigo disease among male patients but not among female. Positive associations were observed between W/H ratio hirsutism and acne among female patients (p value .003, .002). We concluded that the increase in Body Mass Index and waist to hip circumferences are associated with increase in some of the dermatological diseases. More attention should be imposed on the weight control and management programs.*

Keywords: Cutaneous Manifestation, Body Mass Index, Obesity, Overweight, Waist to Hip Ratio

1. Background

Although obesity is recognized as a major public health problem and is increasing in prevalence mainly in western regions, however little attention has been paid to the impact of obesity on the skin in Sudan. There is lack of reliable information concerning the impact of obesity on the skin, including skin physiology, skin manifestations of obesity, and dermatologic diseases in developing countries. Obesity in the developing world can be seen as a result of a series of changes in diet, physical activity, health and nutrition, collectively known as the 'nutrition transition.' As poor countries become more prosperous, they acquire some of the benefits along with some of the problems of industrialized nations [1]. This research aimed to study the relation between overweight and various dermatological conditions in Khartoum dermatology and STIs teaching Hospital and to identify skin conditions associated with BMI as well as to identify the relation between waist to hip circumference and dermatological diseases.

2. Obesity and Skin Physiology

Obesity is associated with a number of significant changes in skin barrier function used bioengineering methods to investigate the correlation between BMI and epidermal functions. Obese individual demonstrated significantly increased transepidermal water loss and erythema compared with control subjects[2]

Sebaceous glands and sebum production:

There are no epidemiologic studies examining the relationship between obesity and sebum production. This relationship is potentially important because sebum production plays a major role in the pathogenesis of acne [3, 4] other researches revealed that obesity associated changes in skin physiology may be related to increased sweat gland

activity [2,3,4] Obese patients have larger skin folds and sweat more profusely after becoming overheated because of thick layers of subcutaneous fat, thereby increasing both the frictional and moisture components[5,6]

Lymphatics: Obesity impedes lymphatic flow, which leads to collection of protein-rich lymphatic fluid in the subcutaneous tissue. This accumulation frequently results in lymphedema. Lymphedema is associated with dilatation of tissue channels and reduced tissue oxygenation. Further accumulation of fluid in the setting of decreased oxygen tension leads to fibrosis and a chronic inflammatory state. [5]

Subcutaneous fat: In adults, subcutaneous fat is made up almost entirely of white adipose tissue, which provides insulation and serves as an energy depot? White adipose tissue plays an important role in endocrine functions as well as metabolism of lipids and glucose. [7] Endocrine peptides secreted by adipocytes include leptin and tumor necrosis factor α , among others. In contrast, brown fat is most prominent in newborn infants and its exact role in obese adults is not yet clear [7].

Interrelation between obesity and skin disease; Obesity is a chronic disease that may lead to skin problems, including acanthosis nigricans, skin tags, hyperandrogenism, striae distensae, plantar hyperkeratosis, and candidal intertrigo. Although some conditions (eg, skin tags and striae distensae) may simply be annoying or present cosmetic issues, conditions such as acanthosis nigricans and hyperandrogenism may be indicative of systemic diseases[8].

Obesity also may contribute to poor healing of acute and chronic wounds that develop in this population. Some of the most common obesity-related skin disorders and factors affecting wound healing. Massive obesity leads to nonspecific skin disorders. Skin folds are more numerous

and deeper in the obese subject, and can become the site of various disorders. Hence the difficulty of diagnosis and treatment is increased. Acanthosisnigricans should be recognized, but not solely attributed to obesity, since other causes, particularly cancer, may be involved [9]. Specific dermatoses as skin tags, striaedistensae and plantar hyperkeratosis, could be considered as a cutaneous stigma of severe obesity[10].

canthosisnigricans; Acanthosisnigricans is the most common dermatological manifestation of obesity. Appears as symmetric, velvety, hyperpigmented plaques that may occur in almost any location. It is most commonly observed in the axilla, groin, and posterior neck but can also be seen on the elbows, knuckles, and face, particularly in ethnic skin. Some researchers [10] Found that 74% of an obese population exhibited acanthosisnigricans along with elevated plasma insulin levels[10]. The plaques can be managed by improved control of hyperinsulinemia. Treatment with a low-calorie diet and weight reduction can improve the insulin resistance state, thus decreasing the severity of the skin disease [11]. Other treatments have been reported[12, 13, 14, 15, 16,17,18].

Acrochordons; Are pedunculated soft brown papules most commonly seen on the neck and in the axillae and groin; they are frequently seen in association with acanthosisnigricans. In a study of 156 obese patients, the percentage of those with acrochordons increased with the severity of obesity[5]In general,acrochordons are more strongly associated with diabetes than with obesity. patients with acrochordons had greater impairment of carbohydrate metabolism [19].

Keratosis pilaris; Keratosis pilaris often presents as small, perifollicular,spiny papules on extensor aspects of extremities. Often associated with atopic diathesis [20], thisbenigndermatosis also manifests in those with greater BMI.[5,20, 21]
Treatments are of varying success and include keratolytics, retinoids, and mild topical corticosteroids [20].

Hyperandrogenism and hirsutism; Hyperandrogenism can be the result of increased production of endogenous androgens due to increased volumes of adipose tissue (which synthesizes testosterone) and hyperinsulinemia (which increases the production of ovarian androgens)[22].

Adiposis dolorosa; Adiposis dolorosa, or Dercum's disease, is a rare progressive condition characterized by multiple, painful, subcutaneous lipomas that usually occur in obese, postmenopausal women[23].

The painful lipomas are symmetrically distributed and are either diffuse or localized. These fatty deposits have been reported to occur in any location, except on the head and the neck; however, the trunk and lower extremities, especially around the knees, are the most commonly involved sites. Characteristically, pain is out of proportion to physical findings[24,25]. Pain increases with BMI, and patients are usually 50% above normal weight for their age.

3. Methods; Study Design

This study designed to determine the relationship between overweight/obesity and some of the dermatological manifestation. Selected Data collected from fifty patients attended Khartoum Hospital of Dermatology. The results of this cross sectional hospital based study were presented in tables using SPSS version 16 for data analysis (Statistical Product and Services Solution). The majority of the group's ages were between 20-35 years.

Study area

The study conducted at Khartoum Teaching Hospital of Skin and Venereal Diseases located in the north –east of Khartoum Teaching Hospital at the corner between Hospital Street and Almac-NimirSrear.

Khartoum Teaching Hospital of Skin and Venereal Diseases consider as the first specialized hospital in Sudan that caring of about 300-500 patient per day. It is working 24hrs/7 days a week with regular clinic during the day time. The general clinic includes, the out-patient clinics for new cases and emergencies as well as referred clinic for follow up patients

There are different clinic every week such as psoriasis and leprosy clinic, as well as pediatrics dermatology clinic working daily. It is consider the first Hospital included pediatrics dermatology in Khartoum state.

Ethical consideration; Proposal was presented to the ethics review committee of Sudan Medical Specialization Board, council of Dermatology and approved. Permission to conduct study was requested from authorities of health care in study area. A written Consent was taken from caretaker. Patients and Methods; The first method of data collection was through preliminary information obtained from previous researches, articles and official sectors. The second method was interviews guided by a questionnaire. The third method involved the anthropometric techniques (weight, height, waist circumferences, hip circumference). The fourth method involved patient's medical history and examination

4. Results and Analysis Presentation

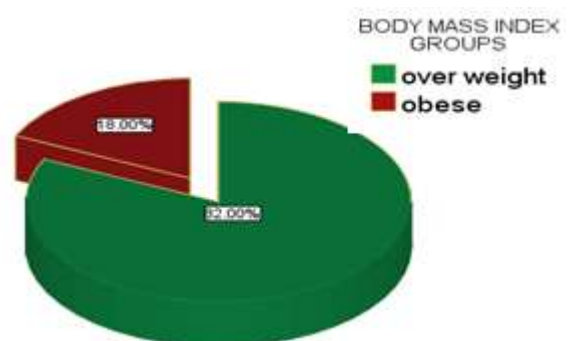


Figure 1: Distribution of Body Mass Index Among the Studied Patients

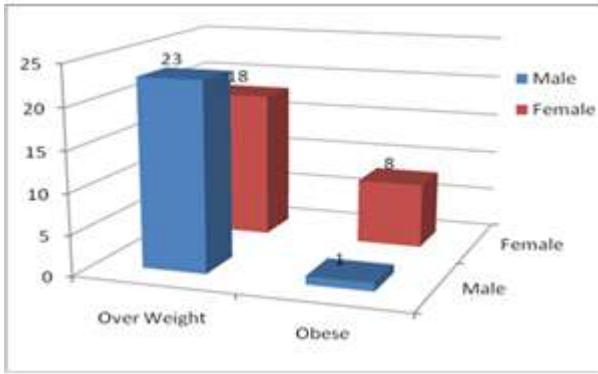


Figure 2: Distribution between Body Mass Index and Gender

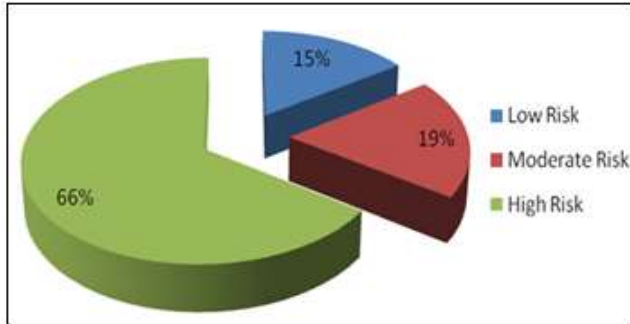


Figure 3: Waist to Hip Ratio among Female Patients

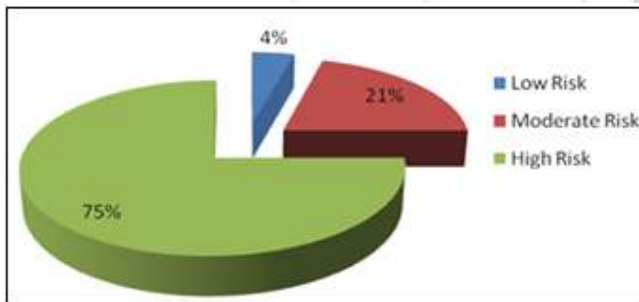


Figure 4: Distribution of W/H Ratio and Male Patients

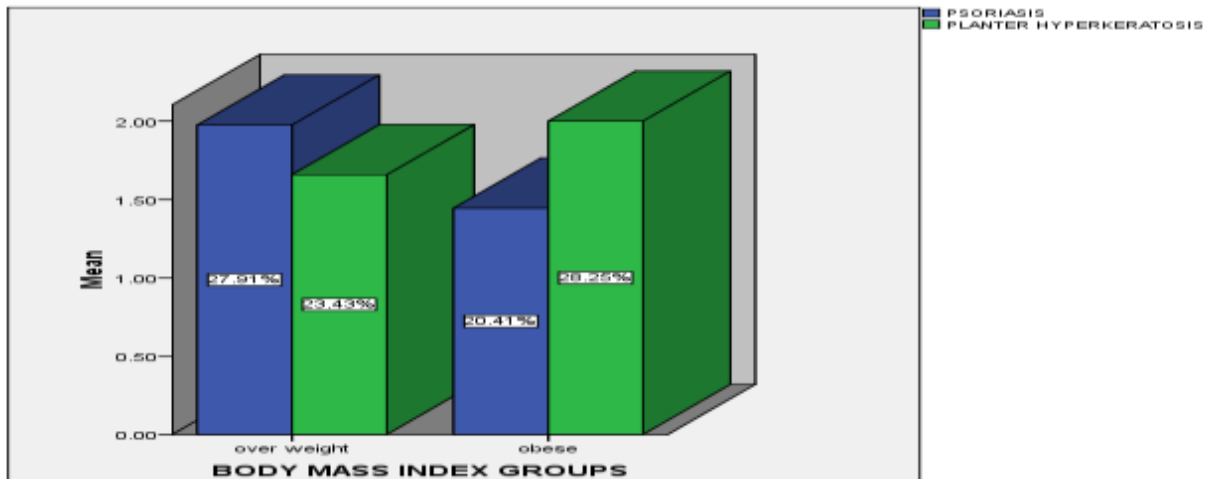


Figure 5: Association between body mass index and psoriasis, planter hyperkeratosis and body mass index

Table 1: Association between Body Mass Index and Planter Hyperkeratosis

			Body Mass Index Groups		Total
			over weight	Obese	
Planter Hyperkeratosis	YES	Count	14	0	14
			100.00%	0.00%	100.00%
NO	Count	27	9	36	
			75.00%	25.00%	100.00%
Total	Count	41	9	50	
			82.00%	18.00%	100.00%

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.268	1	0.039
No. of Valid Cases	50		

Table 2: Association between Body Mass Index and Psoriasis

			Body Mass Index Groups		Total
			Over Weight	Obese	
PSORIASIS	YES	Count	1	5	6
			16.70%	83.30%	100.00%
NO	Count	40	4	44	
			90.90%	9.10%	100.00%
Total	Count	41	9	50	
			82.00%	18.00%	100.00%

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.718	1	0
No. of Valid Cases	50		

Table 3: Association Between Waist To Hip Ratio And Intertrigo Among Male Patients

			Waist/Hip Ratio Group Male			Total
			Low Risk	Moderate Risk	High Risk	
Intertrigo	YES	Count	1	0	1	2
			50.00%	0.00%	50.00%	100.00%
	NO	Count	0	5	17	22
			0.00%	22.70%	77.30%	100.00%
Total		Count	1	5	18	24
			4.20%	20.80%	75.00%	100.00%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.636	2	0.003
No. of Valid Cases	24		

Table 4: Association between Waist to Hip Ratio and Planter Hyperkeratosis Among Female Patients

		Waist/Hip Ratio Groups Female			Total
		Low Risk	Moderate Risk	High Risk	
Planter Hyperkeratosis	YES	0	3	2	5
		0.00%	60.00%	40.00%	100.00%
	NO	4	2	15	21
		19.00%	9.50%	71.40%	100.00%
Total		4	5	17	26
		15.40%	19.20%	65.40%	100.00%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.913	2	0.032
No. of Valid Cases	26		

Table 5: Association between Waist to Hip Ratio and Acne Among Female

		Waist/Hip Ratio Groups Female			Total
		Low Risk	Moderate Risk	High Risk	
ACNE	YES	4	2	2	8
		50.00%	25.00%	25.00%	100.00%
	NO	0	3	15	18
		0.00%	16.70%	83.30%	100.00%
Total		4	5	17	26
		15.40%	19.20%	65.40%	100.00%

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.082	2	0
No. of Valid Cases	26		

Table 6: Association between Waist to Hip Ratio and Hirsutism among Female Patients

		Waist/Hip Ratio Groups Female			Total
		Low Risk	Moderate Risk	High Risk	
Hirsutism	Yes	2	0	0	2
		100.00%	0.00%	0.00%	100.00%
	No	2	5	17	24
		8.30%	20.80%	70.80%	100.00%
Total		4	5	17	26
		15.40%	19.20%	65.40%	100.00%

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.917	2	0.003

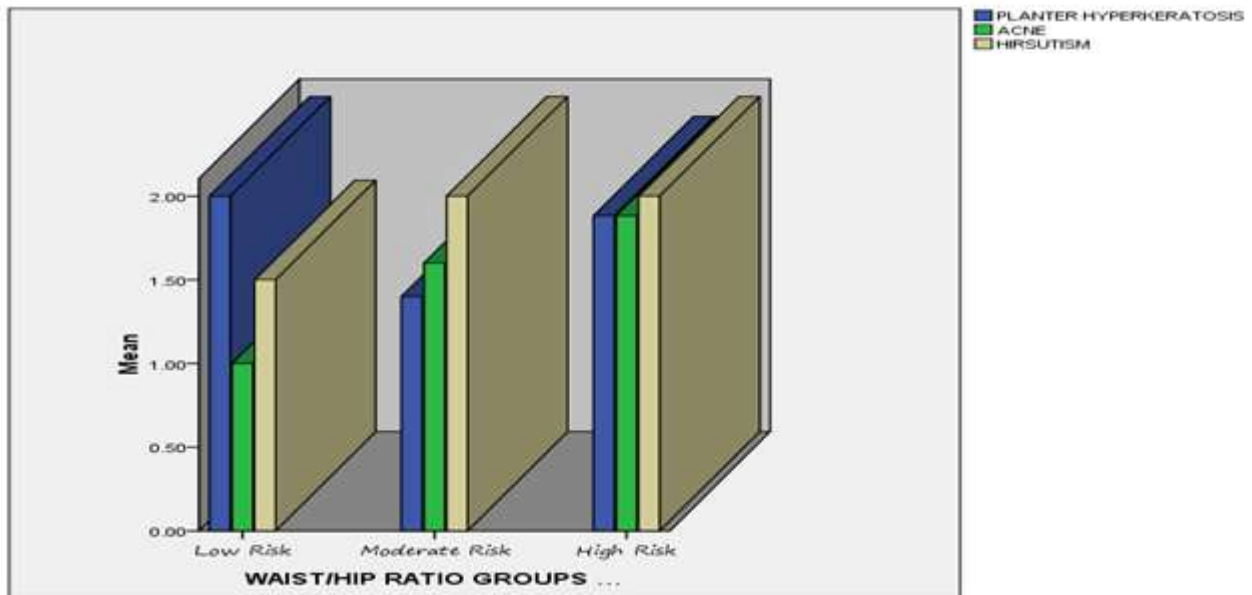


Figure 6: Distribution of Planter Hyperkeratosis, Acne and Hirsutism among Female Patient

5. Discussions

Different dermatological diseases had been tested in this study to identify their association with overweight/ obese

patients (BMI & w/h). Yosipovitch suggested that certain dermatoses such as plantar hyperkeratosis, acanthosisnigricans, skin tags, striaedistensae, and intertrigo are more common among obese persons [20]. Some, such as

plantar hyperkeratosis, could serve as markers of obesity and its severity, while the presence of acanthosisnigricans and skin tags may point to underlying internal disease such as diabetes and polycystic ovary syndrome^[51]. In this study high association was observed between body mass index and planter hyperkeratosis, in addition there was a Positive association between W/H ratio and planter hyperkeratosis among female patients at p value .032 but not among male. Birtane found that Hyperkeratosis was the most common skin finding in obese patients [26]. Obese patients have higher plantar pressures during walking and standing and increased forefoot width [27]. Plantar hyperkeratosis should be considered as a cutaneous stigma of severe obesity [26].

After testing the association between overweight/obesity Acrochrdons using chi square the result showed no association found but the percentage of overweight patients and Acrochrdons were high (33.3%). Kahana et al did not find an increased incidence with obesity but did report that those patients with acrochrdons had greater impairment of carbohydrate metabolism [19] On the other hand a study in Mexico, found that the percentage of those with acrochrdons increased with the severity of obesity [5]

Positive association between overweight/obesity and acanthosisnigricans were observed among male patients in this study. Hud et al found that 74% of an obese population exhibited acanthosisnigricans along with elevated plasma insulin levels [10].

High association (P value .003) was observed between W/H ratio and intertrigo disease among male patients but not among female. There is a linear trend between the severity of obesity and intertrigo [5]. Positive association between W/H ratio and hirsutism among female patients were observed (p 003). Ruutinen et al found that facial hirsutism is significantly correlated with BMI independently of age and testosterone level [23].

Psoriatic patients have a higher prevalence of overweight and obesity compared with non-psoriatic patients [28]. Overweight and obesity has different risk effect on severity and manifestations of psoriasis and might be useful for better evaluating psoriasis clinically (was statistically correlated with body mass index (BMI) ($r = 0.184$, $P < 0.01$) [28]. Elevated BMI (>25) was significantly associated with long-term prognosis of psoriasis [29]. However, strong association was observed between body mass index and psoriasis as indicated in this study. Sakai et al analyzed a cohort of 169 psoriasis patients over more than 10 years and found that elevated BMI >25 was significantly associated with long term prognosis of psoriasis [28]. Studies done in Sweden have also found a significant association between obesity and increased morbidity of psoriasis [29]. There is increasing evidence that progressive weight loss can produce significant improvements in the severity of psoriasis [31, 32]

Strong association was found between W/H ratio and acne within female patients (p .002). On the other hand no association was found between W/H ratio and male patients. In contrast to study in Taiwan found that the obese patient had a lower incidence of acne than non obese women [30].

StriaeDistensae was found among 34.6% of overweight female although no association was found in either body mass index nor W/H. a study done in mexico suggested that Striae Distensae are present in obese patients[5]

6. Conclusion

It seems that the increase in Body Mass Index and waist to hip ratio are associated with increase in some of the dermatological disease. There are strong association of planter hyperkeratosis, Psoriasis, intertrigo, Hirsutism and body mass index as well as with increase in waist to hip ratio.

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