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Skin Complications of Obesity: Controlled Prospective Study

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Abstract

Introduction: Obesity is a worldwide public health burden with an increasing prevalence. It is mainly attributed to interactions between diet, sedentary life and genetic predisposition. A chronic accumulation of adipose tissue found in obesity is associated with long term consequences such as diabetes, cardiovascular diseases, hypercholesterolemia, etc. Many skin changes have been reported in obese patients.

Aim of the work: was to clarify various skin changes and diseases related to obesity.

Patients and methods: It was carried out from May 2015 to August 2016; 100 (50 males, 50 females) adult patient of age (18-60) years old with body mass index (BMI) ≥ 30 kg/m^2] and one hundred (50 males, 50 females) adult control of age (18-60) years old (BMI 18.5-24.9 kg/m^2) were included in the study. Serum lipid profile, liver and renal functions, fasting and post prandial blood sugar and clinical examination were done to exclude hypertension and other cardiovascular diseases.

Result: significantly more skin diseases were found in obese patient than control; plantar hyperkeratosis, Acanthosis nigricans, Scalp scale (dandruff), Skin tags, Striae cutis, Intertrigo, Callosity, Candida that strongly correlated the degree of obesity.

Many patients had more than two conditions. The most frequent combination observed were Acanthosis nigricans with skin tags, Striae and varicosity are significantly more among obese females than obese males.

Conclusion and recommendation: obese patients experienced more skin diseases than non-obese. Obese females have more skin diseases than obese males. Obese patients with skin diseases should reduce their weight to improve their skin lesions.

Keywords

Skin diseases; Obesity; Acanthosis nigricans

Introduction

Obesity is defined as a state of excess adipose tissue mass. This condition usually translates into excessive body weight. It can develop regardless the body weight; body builder can develop remarkable overweight without excessive body fatness (Table 1) [1,2].

Obesity is defined as a measure of Body Mass Index (BMI) which is a ratio of weight to height that is calculated by the following formula:

BMI=weight (kg) ÷ height (m)

There are 500 million adults worldwide who are obese, only 115 million of them; reside in developing countries. Obese and overweight are more prevalent than underweight, a pattern to which the World Health Organization (WHO) refers as "globesity" [3].

Significantly many factors are affecting the body weight which includes: genetic, metabolic, behavioral, environmental, cultural, and socioeconomic. However behavioral and environmental factors are the largest contributors [4].

Obesity has negative impact on various body systems including cardiovascular systems, lung function, joints, fertility, glucose metabolism and skin.

Obesity has many harmful effects on skin including: abnormalities in skin barrier, sebaceous glands and sebum, sweat glands, lymphatic system, collagen function structure and function, wound healing, microcirculation and microcirculation and subcutaneous fat [5].

Many dermatologic changes and diseases are found to be linked with obesity such as Acanthosis nigricans, skin tages, Keratosis pilaris, signs of hyperandrogenism and hirsutism, striae distensae, lymphedema, chronic venous insufficiency, plantar hyperkeratosis, hidradenitis suppurativa, psoriasis, insulin resistance syndrome, and tophaceous gout, higher rates of wound healing complications and hernia recurrence rates following complex abdominal wall surgeries [6].

Obesity has been proved to increase the incidence of cutaneous infections; candidiasis, intertrigo, candida, furunculosis, erythrasma, tinea cruris, folliculitis, cellulitis, necrotizing fasciitis and gas gangrene. Skin and soft tissue infections (SSTIs) are prevalent in the obese population with rising trend expected [7].

On the other hand bariatric surgery with massive weight loss resulting in skin redundancy, which in turn leads to pain, skin problems, cosmetic discomfort and psychosocial troubles [8].

Patients and Methods

This study was done at Alzahraa and Elfayoum university hospitals from May 2015 to August 2016. One hundred (50 males and 50 females) adult patient of age group between 18-60 years old with [body mass index (BMI) ≥ 30 kg/m^2] and one hundred (50 male, 50 female) adult control of age group between 18-60 years old (BMI 18.5-24.9 kg/m^2) were included in the study.

Exclusion Criteria

Obesity with chronic disease (DM, liver and kidney disease)

All patients were examined consecutively at dermatology clinic while controls were examined at ophthalmology and dentist clinic.

Demographic and clinical data such as age, sex, occupation, education, special habits (such as smoking, drug addiction, and physical activity), family history of obesity in 1st and 2nd degree

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Table 1: Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk* [2].

BMI (kg/m²)		Obesity Class	Disease Risk* (Relative to Normal Weight and Waist Circumference)	
			Men ≤ 40 in (≤ 102 cm) Women ≤ 35 in (≤ 88 cm)	>40 in (> 102 cm) >35 in (>88 cm)
Underweight	<18.5		----	----
Normal†	18.5-24.9		----	----
Overweight	25.0-29.9		Increased	High
Obesity	30.0-34.9	I	High	Very High
	35.0-39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

Table 2: Parameters of the studied group as mean ± SD.

	Cases	Control	Significance Test	P-value
Height(m)				
Mean ± SD	1.70 ± 0.07	1.69 ± 0.09	t=0.34	0.735
Range	1.45-1.99	1.40-1.88		
Weight(kg)				
Mean ± SD	102.62 ± 18.40	60.37 ± 8.57	t=21.14	0.000*
Range	70-162			
BMI (kg/ m²)				
Mean ± SD	37.42 ± 6.12	22.07 ± 1.82	t= 25.00	0.000*
Range	30 -62.5	19-29		
Waist Circumference(cm)				
Mean ± SD	131.24 ± 94.01	80.22 ± 1.08	t= 21.63	0.000*
Range	95-155	42-100		

Note: N.B *Significant Difference (P value <0.05).

Table 3: Sociodemographic profile of the studied group.

	Cases	%	Control	%	Significance Test	P-value
Age (years)						
Mean ± SD	35.96 ± 11.76		38.79 ± 11.18		t=1.74	0.083
Range of age	(18-60) years		(18-60)years			
Sex						
Male	50	50	50	50	-	-
Female	50	50	50	50		
Education						
Illiterate	22	22	18	18	X^2 =6.44	0.168
Primary	5	5	9	9		
Preparatory	17	17	19	19		
Secondary	28	28	38	38		
University+	28	28	16	16		
Occupation						
Student	9	9	12	12	X^2 =19.97	0.003*
Unskilled White Collar	10	10	8	8		
Skilled White Collars	20	20	10	10		
Blue Collars	16	16	36	36		
Housewives Retired	30	30	26	26		
Unemployed	7	7	0	0		
Marital status						
Single	28	28	36	36	X^2 = 2.19	0.333
Married	66	66	61	61		
Widow	6	6	3	3		
Special habit						
No	64	64	84	84	X^2 =10.71	0.005*
Smoking	29	29	14	14		
Drug Addiction	7	7	2	2		
History of regular physical activity						
Yes	21	21	3	3	X^2 =15.34	0.000*
No	21 79	21 79	97	97		

Note: N.B* Significant Difference (P value< 0.05).

relatives and family history of skin diseases related to obesity of obese and non-obese were recorded.

A thorough general physical, systemic and cutaneous examination was performed on each patient. The height of each participant was measured to the last 0.1 cm by having him/her stand straight with his/her back against the wall and marking the point of the top of his/her head without wearing shoes. Waist circumference was measured by encircle the tape between (the midpoint between the lowest rib and the iliac crest) and the umbilicus. Weight was recorded to the last kg with a mechanical balance device. BMI was calculated as weight in kilograms divided by height in meters squares (kg/m ^{2}) was used as the index of adiposity. Patients were categorized into three grades: Grade I (BMI 30.0- 34.9); Grade II (BMI 35.0- 39.9) and Grade III, morbidly/severely obese (BMI ≥ 40).

Blood investigations such as fasting and postprandial blood sugar levels, liver and kidney function tests and serum lipid profile were done for each patient.

Statistical Design

Data collected were reviewed. Coding and statistical analysis of collected data were analyzed using SPSS program (statistical package of social science) version 17.

Descriptive statistics

- Mean and standard deviation (SD) were calculated to measure central tendency and dispersion of quantitative data.
- Frequency of occurrence was calculated to measure qualitative data.

Analytic statistics

Comparison between groups was done using:

- Chi- square- test(X^2): for comparison of qualitative data.
- Student t test: for comparison of quantitative data between two groups.

The level of significance was taken at P- value of<0.05.

The results were represented in Tables 2 and 3.

Table 4 demonstrates distribution of skin manifestations among the studied group. It was noticed that the presence of plantar hyperkeratosis was (59%,20%), neck Acanthosis nigricans (48%,0%),

Table 4: Distribution of some skin manifestations among the studied groups.

Studied groups Variables	Cases (obese) No.=100	%	Control (non-obese) No=100	%	Significance Test	P-value
Callosity						
Yes	31	31	7	7	X^2=18.71	0.000*
No	69	69	93	93		
Web macerations						
Yes	25	25	5	5	X^2=15.68	0.000*
No	75	75	95	95		
Varicose veins						
Yes	18	18	6	6	X^2=6.81	0.009*
No	82	82	94	94		
Scalp Scale(dandruff)						
Yes	38	38	25	25	X^2=3.91	0.048*
No	62	62	75	75		
Scalp hair fall						
Yes	51	51	45	45	X^2=0.056	0.83
No	49	49	55	55		
Acne vulgaris						
Yes	24	24	15	15	X^2=2.58	0.108
No	76	76	85	85		
Hirsutism						
Yes	4	4	2	2	X^2=0.68	0.407
No	96	96	98	98		
Neck Acanthosis nigricans						
Yes	48	48	0	0	X^2=70.27	0.000*
No	52	52	100	100		
Neck skin tags						
Yes	30	30	10	10	X^2=12.75	0.002*
No	70	70	90	90		
Striae distensae						
Yes	45	45	15	15	X^2=21.90	0.000*
No	55	55	85	85		
Flexures Acanthosis nigricans						
Yes	47	47	0	0	X^2=62.15	0.000*
No	53	53	100	100		
Flexures skin tags						
Yes	25	25	0	0	X^2=28.75	0.000*
No	75	75	100	100		
Intertrigo						
Yes	41	41	10	10	X^2=25.29	0.000*
No	59	59	90	90		
Planter hyperkeratosis						
Yes	59	59	20	20	X^2=31.81	0.000*
No	41	41	80	80		

Note: N.B *Significant Difference (P value < 0.05).

flexures Acanthosis nigricans(47%, 0%), striae distensae (45%, 15%), intertrigo (41%, 10%), neck skin tags (30%, 10%), callosity (31%, 7%), web macerations (25%, 5%), scalp scale(dandruff) (38%, 25%), and Varicose veins (18%, 6%) of cases and control group respectively, this difference was statistically significant (P value<0.05). There were (51%, 25%) had scalp hair fall (thinning), (24%, 15%) had acne vulgaris and (4%, 2%) had hirsutism as regards cases and control group respectively, this difference was statistically non-significant (P value>0.05).

Table 5 illustrates relationship between skin manifestations of obesity to grades of obesity. It was observed that the presence of neck Acanthosis nigricans was (28%, 47%, 80%), flexures Acanthosis nigricans (30.7%, 41.6%, 80%), striae distensae (33%, 41%, 68%), intertrigo (20.5%, 30.5%, 88%), neck skin tags (18%, 25%, 60%), callosity (15.3%, 41.3%, 52%) and varicose veins (15%, 33.3%, 24%) in grades (I, II, III) of obesity respectively, this difference was statistically significant (P value<0.05).

Plantar hyperkeratosis constituted (51%, 55%, 76%), scalp scale (dandruff) (33.3%, 38%, 44%) scalp hair fall (thinning) (56%, 33.3%, 40%), acne vulgaris (23%, 33.3%, 12%), hirsutism (0%, 5.5%, 8%) and web macerations (17%, 22%, 40%) in grades (I, II, III) of obesity respectively, this difference was statistically non-significant (P value>0.05).

Table 6 illustrates comparison between obese males and obese females as regards skin manifestations of obesity. It was found that

Table 5: Relationship between skin manifestations of obesity to grades of obesity

	Gradel No=39	%	Grade II No=36	%	Grade III No=25	%	Significance Test	P-value
Scalp Scale								
Yes	13	33.3	14	38	11	44	X^2=0.75	0.686
No	26	66.6	22	62	14	56		
Scalp hair fall								
Yes	22	56	12	33.3	10	40	X^2=4.13	0.126
No	17	44	24	66.6	15	60		
Acne vulgaris								
Yes	9	23	12	33.3	3	12	X^2=3.71	0.156
No	30	77	24	66.6	22	88		
Hirsutism								
Yes	0	0	2	5.5	2	8	X^2=2.89	0.235
No	39	100	34	94.5	23	92		
Face Acanthosis								
Yes	6	12	10	27	12	48	X^2=12.23	0.002*
No	33	88	26	73	13	52		
Neck Acanthosis nigricans								
Yes	11	28	17	47	20	80	X^2=21.36	0.000*
No	28	72	19	53	5	20		
Neck Skin tags								
Yes	6	18	9	25	15	60	X^2=17.10	0.002*
No	33	82	26	75	10	40		
Striae distensae								
Yes	13	33	15	41	17	68	X^2=7.27	0.026*
No	26	67	21	59	8	32		
Flexures Acanthosis								
Yes	12	30.7	15	41.6	20	80	X^2=14.94	0.001*
No	27	69.3	21	58.4	5	20		
Flexures skin tags								
Yes	7	18	8	22	10	40	X^2=17.55	0.000*
No	32	82	28	78	15	60		
Intertrigo								
Yes	8	20.5	11	30.5	22	88	X^2=31.22	0.000*
No	31	79.5	25	69.5	3	12		
Planter hyperkeratosis								
Yes	20	51	20	55	19	76	X^2=4.12	0.127
No	19	49	16	45	6	24		
Callosity								
Yes	6	15.3	12	41.3	13	52	X^2=7.54	0.023*
No	33	84.7	24	58.7	12	48		
Web macerations								
Yes	7	17	8	22	10	40	X^2=4.18	0.124
No	32	83	28	78	15	60		
Varicose veins								
Yes	6	15	6	33.3	6	24	X^2=0.83	0.659
No	33	85	30	66.7	19	76		

Note: N.B *Significant Difference (P value < 0.05).

presence of neck Acanthosis nigricans (36%, 60%), striae distensae (32%, 48%), varicose veins (4%, 32%) and hirsutism (0%, 8%) among obese males and obese females respectively, this difference was statistically significant (P .value<0.05).

Intertrigo represented (42%, 40%), plantar hyperkeratosis (52%, 66%) flexures Acanthosis nigricans (40%, 34%), neck skin tags (24%, 36%), callosity (32%, 30%), web macerations (20%, 30%), scalp scale (dandruff) (38%, 38%), and scalp hair fall (thinning) (38%, 64%) and acne vulgaris (24%, 24%) among obese males and obese females respectively, this difference was statistically non-significant (P value>0.05).

Table 7 illustrate The most common skin manifestations in order of frequency among our patients were plantar hyperkeratosis, scalp hair fall, Acanthosis nigricans, striae cutis distensae, intertrigo, scalp scale (dandruff), callosity, skin tags, web macerations, acne vulgaris, varicose veins and hirsutism.

Table 8 demonstrates family history of obesity among relatives of the studied groups as regards obesity and skin diseases related to obesity. It was found that (53%, 51%) of cases had family history of obesity in 1st and 2nd degree relatives respectively compared to (38%, 29%) of control had family history of obesity in 1st and 2nd degree

Table 6: Comparison between obese males and females as a regards skin manifestations of obesity.

	Males(obese) No=50	%	Females(obese) No=50	%	Significance Test	P-value
Scalp Scale(dandruff)						
Yes	19	38	19	38	-	-
No	31	62	31	62		
Scalp hair fall						
Yes	19	38	19	64	X^2=6.76	0.009*
No	31	62	31	36		
Acne vulgaris						
Yes	12	24	12	24	-	-
No	38	76	38	76		
Hirsutism						
Yes	0	0	4	8	X^2=4.17	0.041*
No	50	100	46	92		
Face Acanthosis						
Yes	11	22	16	32	X^2=1.27	0.260
No	39	78	34	68		
Neck Acanthosis nigricans						
Yes	18	36	30	60	X^2=5.77	0.016*
No	32	64	20	40		
Neck Skin tags						
Yes	12	24	18	36	X^2=1.71	0.190
No	38	76	32	64		
Flexures Acanthosis						
Yes	20	40	17	34	X^2=0.39	0.534
No	30	60	33	66		
Flexures skin tags						
Yes	11	22	14	28	X^2=0.48	0.488
No	39	78	36	72		
Flexures intertrigo						
Yes	21	42	20	40	X^2=0.04	0.838
No	29	48	30	60		
Striae distensae						
Yes	16	32	29	48	X^2=6.83	0.008*
No	34	68	21	42		
Planter hyperkeratosis						
Yes	26	52	33	66	X^2=2.03	0.154
No	24	48	17	34		
Callosity						
Yes	16	32	15	30	X^2=0.05	0.828
No	34	68	35	70		
Web macerations Candida						
Yes	10	20	15	30	X^2=1.33	0.248
No	40	80	35	70		
Varicose veins						
Yes	2	4	16	32	X^2=13.28	0.000*
No	48	96	34	68		

Note: N.B *Significant Difference (P value< 0.05).

relatives respectively, this difference was statistically significant (P value< 0.05).

It was found that (51%) of cases had family history of skin diseases related to obesity while among control group was (7%), this difference was statistically significant (P value< 0.05).

Table 9 demonstrates chronic conditions among studied groups, it was noticed that no one had liver or kidney diseases in both groups. Also only (1%) of cases and control suffered of heart diseases.

It was found that (27%) of cases had hypertension compared to (8%) of control group, this difference was statistically significant (P Value< 0.05). History of hypercholesterolemia represented as (23%) of cases and (0%) of control group, this difference was statistically significant (P Value<0.05).

Table 7: The most common skin manifestations in order of frequency among our patients.

Variables	No.	%
Planter hyperkeratosis	59	59%
Scalp hair fall	51	51%
Acanthosis nigricans	48	48%
Striae	45	45%
Intertrigo	41	41%
Scalp Scale (dandruff)	38	38%
callosity	31	31%
Skin tags	30	30%
Web macerations	25	25%
Acne vulgaris	24	24%
Varicose veins	18	18%
Hirsutism	4	4%

Table 8: Family history of obesity among relatives of the studied groups.

	Cases No.=100	%	Control No.=100	%	Significance Test	P-value
Family history of obesity in 1st degree relatives						
Yes	53	53	38	38	X^2=4.83	0.028*
No	47	47	62	62		
Family history of obesity in 2nd degree relatives						
Yes	51	51	29	29	X^2=8.98	0.003*
No	49	49	71	71		
Family history of skin diseases related to obesity						
Yes	51	51	7	7	X^2=45.55	0.000*
No	49	49	93	93		

Note: N.B* Significant Difference (P value< 0.05).

Table 9: Chronic conditions among the studied groups.

Studied groups Variable	Cases No.=100	%	Control No.=100	%	Significance Test	P-value
Hypertension						
Yes	27	27	8	8	X^2=12.50	0.000*
No	73	73	92	92		
History of heart disease						
Yes	1	1	1	1	-	-
No	99	99	99	99		
History of hypercholesterolemia						
Yes	23	23	0	0	X^2=25.98	0.000*
No	77	77	100	100		

Note: N.B* Significant Difference (P value < 0.05). N.B* no one had liver or kidney diseases in both groups

Table 10 demonstrate biochemical parameters as (mean ± SD) of studied groups, Investigations to exclude diabetes mellitus shows that the mean fasting blood Sugar of cases was (95.83 ± 8.02) mg/dl, mean postprandial blood Sugar of cases (129.21 ± 9.34) mg/dl and Glycated HB of cases (5.82 ± 0.78)% compared with (94.04 ± 8.93) mg/d, (128.04 ± 8.94) mg/dl and (5.79 ± 0.62)% for control group respectively ,this difference was statistically non-significant (P Value>0.05).

Kidney function tests of studied groups reveals that mean level of blood urea of cases was (31.65 ± 6.53) mg/dl, while in control group was (31.90 ± 4.78) mg/dl. Mean level of Creatinine of cases was (0.85 ± 0.17) mg/dl, compared with (0.84 ± 0.15) mg/dl in control group, this difference was statistically non-significant (P Value>0.05). Liver functions tests of studied groups illustrates that mean level of SGPT of cases was (30.60 ± 8.64) units/dl, while was (29.28 ± 4.84) units /dl in control group. Mean level of SGOT cases was (30.38 ± 8.32) units/dl, compared to (28.78 ± 5.76) units /dl in control group, this difference was statistically non-significant (P Value>0.05).

The mean levels of cholesterol of obese were (212.88 ± 37.43) mg/dl, triglyceride (193.67 ± 32.93) mg/dl, High density lipoprotein HDL (35.04 ± 5.04) mg/dl, low density lipoprotein LDL (139.06 ± 37.54) mg/dl and very low density lipoprotein VLDL (38.59 ± 5.29) mg/dl. All of them in comparison with non-obese were mean levels of cholesterol (168.81 ± 17.56) mg/dl, triglyceride (169.66 ± 18.54) mg/dl, HDL (40.20 ± 2.86) mg/dl, LDL (94.92 ± 15.70) mg/dl and VLDL (34.33 ± 3.75) mg/dl this difference was statistically significant (P Value<0.05) (Table 11).

Table 10: Biochemical parameters as (mean ± SD) of the studied groups.

	Cases No.=100	Control No.=100	Significance Test	P-value
Fasting Blood Sugar(mg/dl)	95.83 ± 8.02	94.04 ± 8.93	1.49	0.138
Postprandial Blood Sugar(mg/dl)	129.21 ± 9.34	128.04 ± 8.94	0.90	0.367
Glycated Hb (%)	5.82 ± 0.78	5.79± 0.62	0.29	0.772
Urea((mg/dl)	31.65 ± 6.53	31.90± 4.78	0.30	0.762
Creatinine(mg/dl)	0.85 ± 0.17	0.84 ± 0.15	0.45	0.649
SGPT(units/dl)	30.60 ± 8.64	29.28 ± 4.84	1.33	0.185
SGOT(units/dl)	30.38 ± 8.32	28.78 ± 5.76	1.57	0.117
Cholesterol(mg/dl)	212.88 ± 37.43	168.81 ± 17.56	10.65	0.000*
Triglyceride(mg/dl)	193.67 ± 32.93	169.66 ± 18.54	6.35	0.000*
HDL(mg/dl)	35.04 ± 5.04	40.20 ± 2.86	8.89	0.000*
LDL(mg/dl)	139.06 ± 37.54	94.92 ± 15.70	10.84	0.000*
VLDL(mg/dl)	38.59 ± 5.29	34.33 ± 3.75	6.56	0.000*

Note: N.B* Significant Difference (P value < 0.05).

Table 11: Correlation Coefficient of variables with respect to p-value.

Variables	Correlation Coefficient	P-value
Scalp scales	0.034	0.636
Scalp hair fall	0.031	0.669
Face acne	0.018	0.798
Face hirsutism	0.092	0.194
Face Acanthosis	0.329(**)	0.000
Neck Acanthosis	0.469(**)	0.000
Neck Skin tags	0.232(**)	0.001
Flexure Acanthosis	0.46(**)	0.000
Flexure skin tags	0.40(**)	0.000
Flexure intertrigo	0.35(**)	0.000
Striae distensae	0.32(**)	0.000
Planter hyperkeratosis	0.342(**)	0.000
Callosity	0.276(**)	0.000
Web macerations	0.308(**)	0.000
Varicose veins	0.140(*)	0.048

Discussion

The World Health Organization (WHO) defines obesity as "an abnormal or excessive fat accumulation in adipose tissue, to the extent that health is impaired". In developed countries; it has been stated that the increase in carbohydrate at the expense of fat has contributed to the obesity epidemic. In China, obesity rates have increased rapidly in parallel with a transition from the traditional low fat, high carbohydrate diet to a diet relatively high in fat and less in carbohydrate. The currently accepted classification of obesity for epidemiological purposes defines overweight at body mass index (BMI) levels greater than 25 kg/m^2 and obesity beginning at BMI of 30 kg/m^2 [9].

A number of systemic diseases chronic as well as acute life-threatening-are related to obesity including: coronary heart disease, hypertension, diabetes, hyperlipidemia, osteoarthritis, sleep apnea, cancer breast, endometrial and colon, gallbladder disease, and severe pancreatitis [10].

Obesity has been linked to many metabolic diseases which in turn associated with some skin diseases; Acanthosis nigricans and skin tags can be signs of insulin resistance, xanthoma and xanthelasma are signs of dyslipidemia. Diabetic patients display numerous more or less specific dermatoses [11].

Our study was conducted between May 2015 to August 2016 one hundred (50 males, 50 females) adult obese patient of age (18-60) years old with body mass index (BMI) ≥ 30 kg/m^2 and one 100 (50 males, 50 females) healthy adult control of age (18-60) years old (BMI 18.5-24.9 kg/m^2) were included in a case–control study to assess various skin changes and diseases associated with obesity.

In this study we compare 100 (50 males, 50 females) adult obese patients of age (18-60) years old and 100(50 males, 50 females) healthy adult control of age (18-60) years old regarding skin manifestations of obesity.

We found that plantar hyperkeratosis, Acanthosis nigricans, scalp scale (dandruff) skin tags, striae, intertrigo, callosity, candida and extremities varicosity show strong correlation with obesity and its degree.

Many patients had more than two complications. The most frequent combination observed was Acanthosis nigricans with skin tags. This was in agreeing with [12-15].

Plantar hyperkeratosis and callosity are the most common skin condition found in our study because occupational exposure (blue collars e.g. cleaners and farmers). Development of plantar hyperkeratosis may be regarded as a physiologic response to mechanical trauma, as obese patients have increase forefoot width and higher plantar pressures during walking and standing.

The prevalence of Acanthosis nigricans in this study is lower than reported for the USA and Brazil because exclusion criteria of our patient to be free from diabetes, those obese patients exhibited Acanthosis nigricans with elevated plasma insulin levels.

Acanthosis nigricans is now considered as a reliable cutaneous marker of hyperinsulinemia in obese individuals. In obese patient's Acanthosis nigricans may be the result of inappropriate simultaneous activation of distinct tyrosine kinase growth factor receptors due to excessive levels of circulating insulin Hyperinsulinemia increases the production of ovarian androgens, which may lead to associated hirsutism and acne vulgaris [16].

Striae were prevalent in obese patients in this study and were correlated with the increase in degree of obesity which may be related to excessive tension on the skin caused by excessive weight.

Skin tags (acrochorda) were present in obese patients that were positively correlated with the severity of obesity. Multiple skin tags are frequently associated with non-insulin dependent diabetes mellitus

and obesity in a case-control study suggested that skin tags could be a more valuable marker of carbohydrate in-tolerance and diabetes mellitus than obesity [17].

Intertrigo and candida were more prevalent in patients of our study than those reported in Kuwait because this study was done in Egypt among a group of patients of low to moderate socio-economic state with lake of air conditions. The greater amount and depth of the areas of skin rubbing leads to the increase of moisture and friction, and it appears to contribute to the development of fungal and bacterial infections in obese.

Scalp scales were prevalent in patients group than in control group. There are no epidemiologic studies examining the relationship between obesity and sebum production. This was in agreeing with many authors [12-15].

This study illustrated that acne, keratosis pilaris, psoriasis and hirsutism were not found to have significant correlation with obesity (p. value>0.05) but they are more prevalent in obese than control.

The prevalence of acne is high (24%) but it was not statistically significant in our study because acne was found to be high also in control (15%)This was in agree with [18].

In our study we found that family history of obesity in 1st and 2nd degree relatives, family history of skin disease related to obesity is statistically significant among obese in comparison with control as obesity is inherited in families that their members share the same life style so susceptibility for developing skin manifestations related to obesity in same families are also increased.

Our study showed that history of hypertension and history of hypercholesterolemia are statistically significant among obese in comparison with control because hypertension and hypercholesterolemia are complications of obesity. In our study we found that face hirsutism, striae and varicosity are significantly more in obese females than obese males because excessive hair face in males is called hypertricoss not hirsutism, striae and varicosity because of weak mesnchyema of females.

Conclusion and Recommendation

Obese patients experienced more skin diseases than non-obese. Obese females have more skin diseases than obese males. Obese patients with skin diseases should reduce their weight to improve their skin lesions.

References

1. Angelo Del Parigi (2010) Definitions and Classification of Obesity, obesity-obesitext 159: 342-350.
2. Alfredo H, Steven, Heymsfield, and Luc Van Gaal (2011) Pharmacologic Treatment of Obesity. J Obesity 2011: 751063.
3. Dalal S, Beunza JJ, Volmink J, Adebamowo C, Bajunirwe F, et al. (2011) Non-communicable diseases in sub-Saharan Africa: what we know now. Int J Epidemiol 40: 885-901.
4. Scheinfeld N (2004) Obesity and dermatology. Clin Dermato22: 303-309.
5. Yosipovitch G, DeVore A, Dawn A (2007) Obesity and the skin: skin physiology and skin manifestations of obesity. J Am Acad Dermatol 56: 901-916.
6. Giordano SA, Garvey PB, Baumann DP, Liu J, Butler CE (2017) The Impact of Body Mass Index on Abdominal Wall Reconstruction Outcomes: A Comparative Study. Plast Reconstr Surg 139: 1234-1244.
7. Grupper M, Nicolau DP (2017) Obesity and skin and soft tissue infections: how to optimize antimicrobial usage for prevention and treatment? Curr Opin Infect Dis 30: 180-191.
8. Poulsen L, Roessler KK, Rose M, Bakholdt V, Sørensen JA (2015) Quality of life of bariatric and body contouring. Ugeskr Laeger 177.
9. Wan Y, Wang F, Yuan J, Li J, Jiang D, et al. (2017) Effects of Macronutrient Distribution on Weight and Related Cardiometabolic Profile in Healthy Non-Obese Chinese: A 6-month, Randomized Controlled-Feeding Trial. EBioMedicine. 22: 200-207.
10. Pender JR, Pories WJ (2005) Epidemiology of obesity in the United States. Gastroenterol Clin North Am 34: 1-7.
11. Holzer G, Straßegger B, Volc-Platzer B (2016) Cutaneous manifestations of metabolic syndrome. Hautarzt 67: 982-988.
12. García-Hidalgo L, Orozco-Topete R, Gonzalez-Barranco J, Villa AR, Dalman JJ, et al. (1999) Dermatoses in 156 obese adults. Obes Res 7: 299-302.
13. Sharquie KE, Al-Rawi JR, Al-Tamimi FF (2005) The frequency of skin diseases in obese children and adult Iraqi population. Saudi Med J 26: 1835-1836.
14. Al-Mutairi N (2011) Associated Cutaneous Diseases in Obese Adult Patients: A Prospective Study from a Skin Referral Care Center. Med Princ Pract 20: 248-252.
15. Divyashree RA, Naveen KN, Pai VV, Athanikar SB, Gupta G(2014) Cutaneous manifestations of obesity among dermatology patients in a tertiary care center. Ind J Dermatol Venereol Leprol 80: 278.
16. Torley D, Bellus GA, Munro CS (2002) Genes, growth factors and acanthosis nigricans. Br J Dermatol 147: 1096-1101.
17. Rasi A, Soltani-Arabshahi R and Shahbazi N (2007) Skin tag as a cutaneous marker for impaired carbohydrate metabolism: a case-control study. Int J Dermatol 46: 1155-1159.
18. Boza JC, Trindade EN, Peruzzo J, Sachett L, Rech L, et al. (2012) Skin manifestations of obesity: a comparative study. J Eur Acad Dermatol Venereol 26: 1220-1223.

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