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Original Research Article

A CLINICAL STUDY OF DERMATOLOGICAL DISORDERS IN OBESITY"

Article History:

Name of Author:
Dr Kaveri Shivakumar[1]*, Dr Rajkeerthi N[2] and Dr Bhashyakarla Akanksha Rao[3].

Affiliation: *[1]Assistant Professor Department of DVL KMCH Institute of Health Sciences and Research*
[2]Assistant Professor Department of Radiology SVMCH&RI.
[3]Assistant Professor Dept Of Radiology Dr Patnam Mahendar Reddy Institute of Medical Sciences

Corresponding Author:
Dr Kaveri Shivakumar

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Abstract: ***Introduction:*** Obesity is a major concernment in the present epoch. Obesity alters the normal physiological functions of the skin leading to varied dermatological conditions. This is of concern to us as many of the conditions act as window for obesity and looming systemic outcomes of obesity. This work aims at studying the various dermatoses and underlying systemic associations in obese individuals. ***MATERIALS AND METHODS***: A prospective cross-sectional study conducted from September 2017 to August 2019 at the OPD of Dermatology, Venereology and Leprology at Chigateri General Hospital and Bapuji Hospital attached to J.J.M Medical College, Davangere. 319 patients with body mass index (BMI) ≥30kg/m2 were considered. Complete medical history, dermatological examination and other relevant investigations were done. ***RESULTS:*** In the 3-4th decade, female patients who were housewives, obesity was found to be more prevalent. Majority of the patients were married, physically inactivity and consumed meat-based diet. 65.8% of the population belonged to class I obesity. Cutaneous findings with statistical significance were acanthosis nigricans, striae distensae, plantar hyperkeratosis, hirsutism, keratosis pilaris, intertrigo, cherry angioma and xerosis. ***CONCLUSION:*** Various cutaneous diseases were seen in the present study. Many of these had strong correlation with class of obesity, systemic associations Thus awareness of skin diseases in obese reflect the underlying associations and impaired metabolism.

Keywords: Obesity; body mass index; acanthosis nigricans; striae distensae; keratosis pilaris; intertrigo; hirsutism; hypertension.

INTRODUCTION

In Renaissance culture, obesity was seen as a status symbol that represented a person's wealth and power1. Nowadays, obesity is a complicated, long-term, multifaceted, non-communicable, and mostly avoidable illness2. In the beginning, obesity was only a problem in wealthy nations. Over the past few years, obesity has become much more common in developing nations, which has resulted in a significant increase in the number of diseases worldwide3. Four stages of the obesity transition are described by the conceptual model of obesity, which was created based on the world's thirty most populous nations. Obesity is more common in adults and women with greater socioeconomic position during the first stage of transition. This stage includes a number of sub-Saharan, African and South Asian nations.

The population in Latin American and Middle Eastern nations exhibits a high adult prevalence with a smaller growth in children, a closing of the gender gap and socioeconomic disparities among women, and a stage two transition to obesity. The third stage of the transition is seen in European nations, where the prevalence of obesity is higher in those with lower socioeconomic rank and plateaus in women and children with better

socioeconomic status. The prevalence of obesity is predicted to decline in the fourth stage of the transition, which is being entered by very few nations[4].

According to the Obesity Society, obesity is "a multi-causal chronic disease recognised across the life span resulting from long-term positive energy balance with development of excess adiposity that over time leads to structural abnormalities, physiological derangements, and functional impairments." Obesity raises the chance of developing other chronic illnesses and is linked to early death. Obesity is characterised by a variety of phenotypes, clinical manifestations, and treatment outcomes, much like other chronic illnesses. Obesity is defined as a BMI of 30 kg/m2 or higher6. Obesity affects skin barrier function, sebaceous glands and sebum production, sweat glands, lymphatics, collagen structure and function, wound healing, microcirculation, macro circulation, and subcutaneous fat. Certain cutaneous conditions are also caused due to obesity while few others are aggravated by obesity. Notwithstanding this, very little attention has been received to its effects on skin.[6,7]

Obesity is associated with concomitant or increased risk of nearly every chronic condition, from diabetes, to dyslipidaemia, to poor mental health. It also impacts on risk of stroke and cardiovascular disease, cancers, and osteoarthritis. Obesity itself and the other chronic conditions associated with it affects physical health, psychological health, quality of life and reduces lifespan.[2] Obesity is associated with systemic inflammation which is chronic and low grade, with growing evidence of its connection with metabolic abnormalities including glucose intolerance and lipid abnormalities.[8,9]

Material And Method

This was a prospective cross-sectional study conducted from September 2017 to August 2019. The study population included 319 obese patients attending the outpatient department of Dermatology, Venereology and Leprology at Chigateri General Hospital and Bapuji Hospital attached to J.J.M Medical College, Davangere.

INCLUSION CRITERIA

- Patients of all ages and sexes.
- Patients with BMI ≥ 30 kg/m².
- Patients willing for study.

EXCLUSION CRITERIA

- Pregnant and breast-feeding women.
- Intake of oral corticosteroids for more than three weeks.
- Use of potent topical corticosteroids for more than four weeks.

METHOD OF STUDY

Outpatient department patients were screened for their BMI status. Patients with BMI

≥ 30 mg/kg² were explained about the purpose and the procedure of the study and were asked to participate. Those who agreed and gave consent were included as study population. The study population were interviewed and information about their socio- demographic characteristics and detailed history was collected. Complete cutaneous examination and systemic examination was carried out in all patients.

RESULTS

A total of 319 cases of obesity, attending the department of Dermatology, Venereology and Leprology, at Chigateri General Hospital and Bapuji Hospital, Davangere between September 2017 to August 2019.

Table 1: Distribution Of Study Population According to Age

Age group (in years)	Frequency (N=319)	Percentage (%)
11-20	31	9.7
21-30	51	16
31-40	89	27.9
41-50	85	26.6
51-60	45	14.1
61-70	16	5
71-80	2	0.6

In the present study, the mean age of the patient was 39.5±13.131. Most of the patients were between the age of 31-40 years (27.9%), followed in descending order by patients in the age group of 41-50 years (26.6%), 21-30 years (16%), 51-60 years (14.1%), 11- 20 years (9.7%), 61-70 years (5%) and 71-80 years (0.6%).

Table 2: Distribution Of Study Population According to Sex

Sex	Frequency (N= 319)	Percentage (%)

Male	100	31.3
Female	219	68.7

In our study population, females (219) outnumbered males (100).

Table 3: Distribution Of Study Population According to Marital Status

Marital status	Frequency (N=319)	Percentage (%)
Married	250	78.9
Unmarried	67	21.1

In the present study, 78.9% patients were married while 21.1% were unmarried.

Table 4: Distribution Of Study Population According to Occupation

Occupation	Frequency (N=319)	Percentage (%)
Housewife	135	42.3
Student	47	14.7
Farmer	15	4.7
Retired personnel	7	2.2
Professional workers	35	11
Skilled workers	22	6.9
Merchants	27	8.5
Others	31	9.7

In the present study, majority of patients were housewives (42.3%) followed by students (14.7%) and professional workers (11%). 9.7% of patients belonged to the other group. 8.5% of patients were merchants, 6.9% were skilled workers, 4.7% were farmers and 2.2% were retired personnel.

Table 5: Distribution Of Study Population According to Dietary Habits

Diet	Frequency (N=319)	Percentage (%)
Plant based	113	35.4
Meat based	206	64.6

In the present study, 64.6% of obese patients followed meat-based diet and 35.4% followed plant-based diet.

Table 6: Distribution Of Study Population According to Lifestyle

Lifestyle	Frequency (N=319)	Percentage (%)
Physically inactive	272	85.2
Physically active	47	14.8

In the present study, most of the population were physically inactive (85.2%) and 14.8% were physically active.

Table 7: Distribution Of Study Population According to Class of Obesity

Obesity Class	Frequency (N=319)	Percentage (%)
Class I	210	65.8
Class I I	80	25.1
Class I I I	29	9.1

In the present study, 65.8% (210) patients belonged to obesity class I. 25.1% (80) belonged to obesity class I I and 9.1% (29) to obesity class I I I.

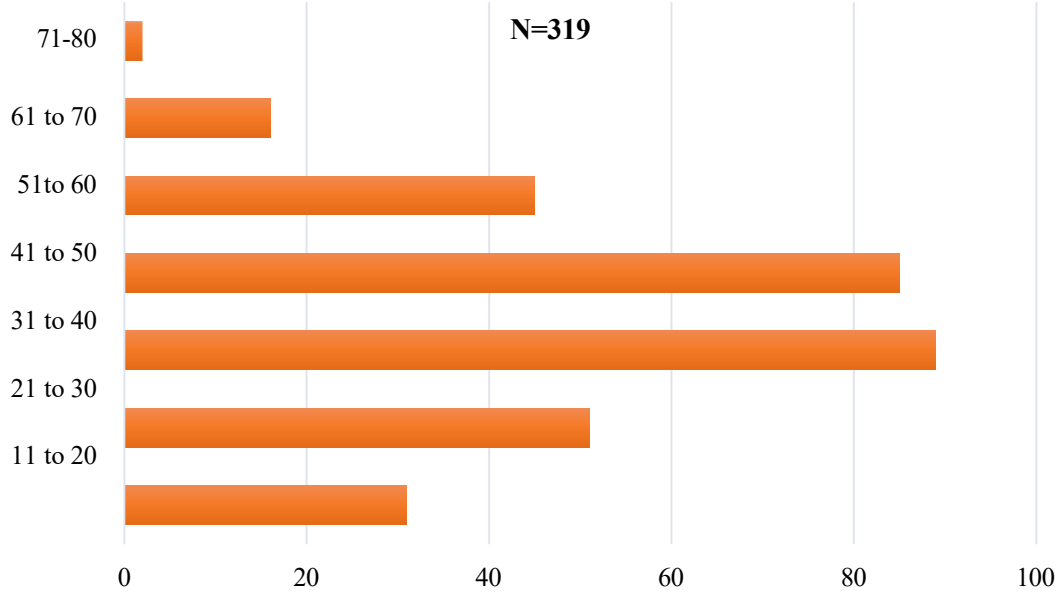
Table 8: Distribution Of Associated Systemic Diseases in the Study Population

Associated systemic diseases		Frequency (N=319)	Percentage (%)
Diabetes mellitus	Present	52	16.3
	Absent	267	83.7
Hypertension	Present	82	25.7
	Absent	237	74.3
Cardiovascular disease	Present	2	0.6
	Absent	217	99.4

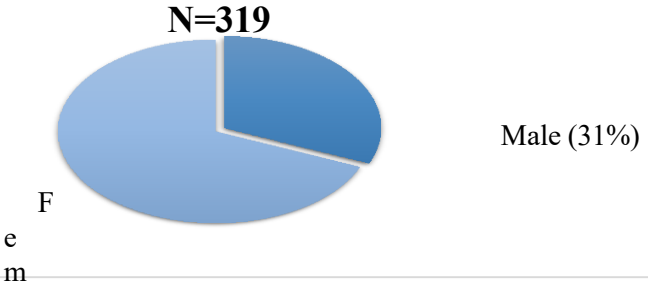
Cerebrovascular disease	Present	0	0
	Absent	0	100
Psychiatric illness	Present	6	1.9
	Absent	313	98.1
Atopy	Present	21	6.6
	Absent	298	93.4
Osteoarthritis	Present	19	6.0
	Absent	300	94.0
Hypothyroidism	Present	16	5.0
	Absent	303	95.0
Epilepsy	Present	3	0.9
	Absent	316	99.1

In the present study, hypertension was the most common systemic illness (25.7%) followed by diabetes mellitus (16.3%). 6.6% had atopy, 6% had osteoarthritis, 5% had hypothyroidism and 1.9% patients had psychiatric disorder. Three patients were found to have epilepsy and another two patients had history of cardiovascular diseases.

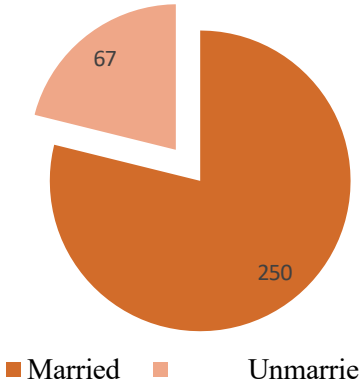
Graph 1: Distribution of study population according to age



Graph 2: Distribution Of Study Population According to Sex



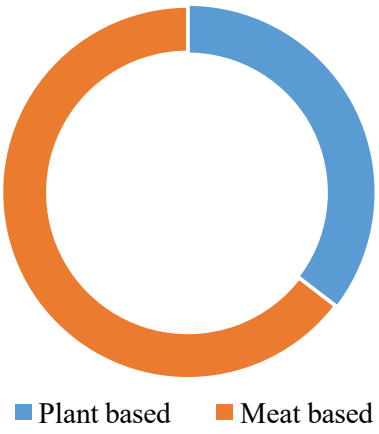
Graph 3: Distribution Of Study Population According to Marital Status
N=319



Graph 4: Distribution Of Study Population According to Occupation

Graph 5: Distribution Of Study Population According to Dietary habits

N=319



DISCUSSION

Three hundred and nineteen patients of all ages with BMI of 30 or more were included in our study. BMI ≥ 30 is taken as cut off value for defining obesity internationally. In the present study, the majority (27.9%) of the patients belonged to the age group 31-

40 years (Table 1) and the mean age of the population was 39.5±13.131. Deepa et al159. reported 40±13 years as the mean age in their study on 2350 population.

In South Asians, the prevalence was highest in 30-50 years of age as reported by Jayawardhan et al160. Ageing is followed by a gradual increase in the ratio of fat to lean body mass. It occurs even in people who can maintain a constant BMI as they age. So, age dependent relationship exists between BMI and body fat161.

Female (68.7%) preponderance was seen in our study (Table 2). Gouda et al162. documented high risk of obesity in Southern Indian women when compared to Northern region. Increased prevalence of obesity in Indian women in the duration of seven years has been noted to be 24.52%. Sex hormone related variations leading to tonic craving and cue- induced craving have been attributed to the gender difference in obesity prevalence164.

In the present study, 78.9% patients were married and 21.1% were unmarried (Table 3). Girdhar et al. and Palo et al166. also reported higher incidence of obesity prevalence in married people. Married people are more likely to have a confidant to eat with people and can therefore eat more often, contributing to weight gain. Married people are more unlikely to smoke, which increases body weight and are less conscious about their weight as they are not actively seeking a mate167.

42.3% of the study population were housewives by occupation in our study (Table 4). Girdhar et al.165 reported significant prevalence of obesity in Punjabi housewives. Being a housewife was identified as a significant independent cause for obesity.168 Students accounted for 14.7% and professional workers for 11% of our study population. 8.5% of patients were merchants, 6.9% were skilled workers, 4.7% were farmers and 2.2% were retired personnel in our study (Table 4).

In our study, 64.6% consumed meat-based diet and 35.4% consumed plant-based diet (Table 5). Chiu et al169. observed lower BMI in population consuming plant-based diet. Wang et al. described positive association between meat consumption and BMI170. In the present study, patients with physical inactivity outnumbered (85.2%) while 14.8% of the population were physically active (Table 6). Physical inactivity is an independent risk factor for obesity172. Vicious spiral of less activity, high energy consumption and increased adiposity is responsible for obesity. Physical inactivity during adolescent phase is a strong and independent risk factor for obesity development in adulthood173.

Majority (65.8%) of patients belonged to obesity class I in our study. 25.1% belonged to obesity class I I and 9.1% to obesity class I I I (Table 7). Similar prevalence of class I was observed in other studies as well174,175.

Obesity and cutaneous dermatoses:

In the present study, acanthosis nigricans was observed in 60.5% of obese patients. Other studies showed a slightly higher prevalence of acanthosis nigricans179,202. The prevalence of acanthosis nigricans is positively associated with severity of obesity in the present study. Similar association was observed by Hud et al202.

Striae distensae was observed in 40% of obese population Severity of obesity and occurrence of striae distensae were consistent with previous studies. Excessive tension on the skin caused by excessive weight leads to development of striae distensae179. In the current study, 33.2% of patients had acrochordons. These findings were in line with previous studies with slightly higher prevalence205,207,208.

In the current study, 104 had plantar hyperkeratosis. In the current study, 3.8% of study population had keratosis pilaris. Other studies report a slightly higher incidence of keratosis pilaris in obese individuals.

In the present study, 10% patients had intertrigo. Al mutairi et al. and Gupta et al216. observed intertrigo in 22.2% and 16% of their study population respectively. Increased body folds, humid and moist intertriginous areas with elevated skin surface pH are responsible for increased incidence of intertrigo in obese population216, 217.

In our study, 9.4% obese females had hirsutism. A slightly higher prevalence (15.8%) was noted by Almutair et al215. Vascular endothelial inflammation, oxidative stress leading to increased renal reabsorption of sodium and water, development of hypertension and progression of atherosclerosis are induced by androgen excess218. Many studies have documented cardiovascular risk associated with androgen excess218, 219.

In the present study, 27.8% had fungal infections, 4.09% had bacterial infections, 1.25% had viral infections and another 1.5% had parasitic infestation. Gupta et al220. reported an increased incidence of fungal infections in obese patients, in line with our study.

17.24% of the study population had xerosis. Increased blood sugar levels and microangiopathic changes leads to development of xerosis222. In our study, 11.91% patients had cherry angiomas. Cherry angiomas increases with aging due to angiogenic

factors and in diabetes mellitus, due to cutaneous macroangiopathy223,224.

Other dermatoses that was found in our study were hyperhidrosis (25.70%), leg venulectasias (14.1%), acne (7.21%), kumkum dermatitis (6.58%), hair loss (5.32%), psoriasis (4.70%), seborrheic dermatitis (4.70%), DPN (3.76%), stasis dermatitis (3.13%), keloid (2.82%), urticaria (2.50%), melasma (2.19%), periorbital melanosis (2.19%), xanthomas (2.19%), amyloidosis (2.19%), polymorphus light eruptions (1.88%), contact dermatitis (1.56%), frictional dermatitis (1.25%), seborrheic melanosis (1.25%), lichen planus (0.94%), hidradenitis suppurativa (0.62%), vitiligo (0.62%). Single case reports of bullous pemphigoid, erythroderma, fixed drug reaction, Hailey Hailey disease, ichthyosis vulgaris, idiopathic guttate hypomelanosis, senile comedones, steatocystoma multiplex, trichotillomania was seen during our study period Isolated case reports such as adiposis dolorosa, lymphedema, tophaceous gout, papular mucinoses, cutaneous angiosarcomas, lipodermtosclerosis were not seen in this study group.

Obesity and systemic associations:

In the present study, 82 patients were hypertension (Table 8). Many studies observed a positive association between obesity and hypertension in their studies176-180. The renal and neurohormonal pathways of obesity are interconnected leading to development of hypertension in prolonged obesity states181.

In our study, 52 patients had diabetes mellitus (Table 8). Obesity is an independent risk factors for diabetes mellitus182. Many other studies also reported higher incidence of diabetes mellitus in obese individuals183-185. A moderately positive association between obesity and diabetes mellitus was observed in Indian patients as one-fourth of the undiagnosed persons with diabetes mellitus present with weight loss176. This spuriously suggest that obesity may not be a significant risk factor and could be a reason for a moderately positive correlation as seen in our study.

In the present study, 6.6% patients had history of atopy (Table 8). Few cross-sectional studies showed positive relationship between BMI and atopy while few show no significant difference atopic profile and BMI186,187.

In our study, 6% patients had osteoarthritis (Table 8). Increased load of the weight- bearing over the joints, aberrant adipokine expression with direct and downstream effects contribute to destruction and remodelling of joint tissue188. A temporal association has been observed between BMI and risk of osteoarthritis189.

Hypothyroidism was observed in 5% study population (Table 8). A meta-analysis of 22 studies showed significant association between obesity and with the increased risk of hypothyroidism190. Changes in thyroid-stimulating hormone (TSH) could be secondary to obesity with leptin as a linking key factor. Decreased thermogenesis, decreased metabolic rate in hypothyroidism has shown to correlate with a higher BMI191.

1.9% patients had psychiatric illness in our study (Table 8). Rajan and Menon192 reported significant association of psychiatric illness in obese individuals. Lin et al193 reported psychiatric disorder in 42% of obese population. Psychiatric illness leads to unhealthy lifestyle and weight gain, and living with obesity may also lead to psychopathology194.

CONCLUSION

From the present study the following conclusion can be drawn Obesity was more common in the 3-4th decade of life with female preponderance. Occupation, physical inactivity, meat-based diet consumption had impact on obesity. Acanthois nigricans was the most common skin condition in obese and hypertension was the most common systemic association observed in our study. Other dermatological conditions that showed significant association with obesity were striae distensae, keratosis pilaris, plantar hyperkeratosis, intertrigo, hirsutism, xerosis and cherry angioma.

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