Original Article

Prevalence of obesity and overweight among type 2 diabetic patients in Bisha, Saudi Arabia

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Abstract

Context: Obesity is a significant worldwide public health issue and one of the significant risk factors for type 2 diabetes and cardiovascular diseases. **Aims:** This study aims to determine the prevalence of obesity and overweight among type 2 diabetic patients, and explore the association between Body Mass Index (BMI), social demographics and time since diagnosis. **Settings and Design:** This study followed a cross-sectional study design in Bisha, Saudi Arabia. **Methods and Material:** Participants were identified by convenience sampling from 6 Primary Health Care Centers (PHCC) over a period of two weeks from March 16 to March 28, 2020. **Statistical Analysis Used:** Frequency and percentage were used to report the obesity prevalence. Chi-Square test was used to test the association between social demographics and time since diagnosis with BMI. **Results:** Obesity and overweight prevalence was 85.8% (n = 525), among which 27.9% (n = 171) were overweight, 57.8% were obese (n = 354), and only 13.2% (n = 81) had normal weight. A statistically significant difference between BMI and age was observed (P = 0.01). Differences between BMI and time since obesity diagnosis were statistically significant (P < 0.0001). Differences between BMI and time since type 2 diabetes diagnosis were not found to be statistically significant. **Conclusion:** There is a high prevalence of obesity and overweight among type 2 diabetic patients in Bisha. Differences in BMI were found to be statistically significant according to age, gender, education level and time since obesity diagnosis. Patient education programs and public health awareness about diabetes and obesity are highly recommended.

Keywords: Diabetes mellitus, obesity, overweight, Saudi Arabia, type 2

Introduction

Over recent decades, obesity prevalence has flooded in numerous nations around the globe. The World Health Organization (WHO) characterizes obesity as the disease in which the abundance of body fat has become so much that health might be at odds.[1]

Obesity is firmly connected with other metabolic disorders, including hypertension, diabetes, cardiovascular disease, dyslipidemia, and some cancers.[2] It is a significant factor of the type 2 diabetes (T2DM) epidemic where almost 88% of those with T2DM are viewed as overweight or obese.[3]

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Received: 04-07-2020 **Revised:** 13-09-2020
Accepted: 12-10-2020 **Published:** 30-01-2021

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_1349_20

In spite of the expanded risk of poor clinical results and negative effect on the quality of life, just a single portion of people with diabetes and other chronic conditions get guiding on diet or potentially practice by their primary care provider.[4]

For as far back as twenty years there has been a critical increment in obesity rates in Saudi Arabia and Gulf countries.[5-7] A recent Saudi study found obesity and overweight among the high prevalence and risk factors of T2DM.[8]

Bisha is a small town in the southern region of Saudi Arabia. Few studies have been conducted to report the prevalence of obesity in the province of Bisha, Saudi Arabia. This study aims to determine the prevalence of obesity and overweight among type 2 diabetic patients and explore the association between Body Mass Index (BMI), social demographics and time since diagnosis.

How to cite this article: AlShahrani MS. Prevalence of obesity and overweight among type 2 diabetic patients in Bisha, Saudi Arabia. J Family Med Prim Care 2021;10:143-8.

The results of this study will be reflected on better understating of the relation between obesity prevalence and T2DM, effective ways to tackle this issue and optimal practice for primary care physicians.

Methods

This study followed a cross-sectional study design. A total of 612 diabetic patients were identified by convenience sampling to participate in this study from 6 Primary Health Care Centers (PHCC) in Bisha, Saudi Arabia, over a period of two weeks from March 16 to March 28, 2020. Approval from the ethics committee was obtained on March 4, 2020.

Weight was measured using calibrated scales in PHCC, and height was taken in the same setting through experienced nurses using standard techniques. BMI was calculated according to person's weight in kilograms divided by the square of the person's height in meters, and World Health Organization's (WHO) classification of overweight and obesity was used.[9]

The collected data were entered into the computer (MS-Office, Excel), after which was subjected to statistical analyses using SPSS Version 22. Frequency and percentage were used to report the obesity prevalence. Chi-Square test was used to test the association between social demographics and time since diagnosis with BMI.

A *P* value of less than 0.05 was considered to represent statistical significance.

Prior to data collection, an official ethical and institutional approval was obtained. An informed consent was provided to all participants. Collected data were kept fully confidential and were used only for research purposes. The study was self-funded. Some participations were not complete, with frequent missing responses.

Results

Table 1 shows socio demographic data of participants. A total of 612 type 2 diabetic patients participated in this study. Male participants were 298 (48.7%) and females were 314 (51.3%). Almost half participants were among the 41-60 years age group (49.5%, $n = 303$). A quarter of participants were illiterate (25%, $n = 153$), while 28.1% ($n = 172$) had acquired primary level education and 22.7% (139) had university level education.

Table 2 shows the time since each participant was diagnosed with obesity and type 2 diabetes. For obesity, almost a quarter of participants were not obese (24.7%, $n = 151$), 152 participants (24.8%) were diagnosed between 3 to 5 years ago, and 156 (25.5%) were diagnosed between 6 to 10 years ago.

For type 2 diabetes, fifty-three participants (8.7%) were diagnosed less than two years ago, 115 participants (18.8%) were diagnosed between 3 to 5 years ago, 194 (31.7%) were diagnosed between 6 to 10 years ago, while 250 (40.8%) were diagnosed more than 10 years ago.

Table 3 shows the BMI distribution among participants. A total of 171 participants (27.9%) were overweight and 354 participants (57.8%) were obese. A third of participants ($n = 206$) were classified as class I obese, 105 participants (17.2%) were class II obese, and 43 participants (7%) were class III obese.

Table 4 shows the BMI distribution according to age group. Differences between BMI and age group were statistically significant ($P = 0.01$).

Table 1: Socio-demographic data of participants

	No.	%
Gender		
Male	298	48.7
Female	314	51.3
Total	612	100.0
Age group		
<20	9	1.5
21-40	84	13.7
41-60	303	49.5
61-80	200	32.7
>80	16	2.6
Education		
Illiterate	153	25.0
Primary	172	28.1
Intermediate	49	8.0
Secondary	99	16.2
University	139	22.7

Table 2: Time since getting diagnosed with obesity and type 2 diabetes

	No.	%
Time since diagnosed with obesity		
Not obese	151	24.7
<2 years	107	17.5
3-5 years	152	24.8
6-10 years	156	25.5
>10 years	46	7.5
Time since diagnosed with type 2 diabetes		
<2 years	53	8.7
3-5 years	115	18.8
6-10 years	194	31.7
>10 years	250	40.8

Table 3: BMI distribution among participants

BMI	No.	%
Underweight	6	1.0
Normal Weight	81	13.2
Overweight	171	27.9
Class I Obesity	206	33.7
Class II Obesity	105	17.2
Class III Obesity	43	7.0
Total	612	100.0

Table 4: BMI distribution according to age group

BMI	Age group in years (%)					*P*
	<20	21-40	41-60	61-80	>80	
Underweight	0 (0.0)	1 (1.2)	2 (0.7)	2 (1.0)	1 (6.25)	0.01
Normal Weight	5 (55.6)	15 (17.9)	43 (14.2)	18 (9.0)	0 (0.0)	
Overweight	0 (0.0)	17 (20.2)	90 (29.7)	60 (30.0)	4 (25.0)	
Class I Obesity	1 (11.1)	33 (39.3)	95 (31.4)	70 (35.0)	7 (43.75)	
Class II Obesity	3 (33.3)	11 (13.1)	53 (17.5)	34 (17.0)	4 (25.0)	
Class III Obesity	0 (0.0)	7 (8.3)	20 (6.6)	16 (8.0)	0 (0.0)	
Total	9 (100.0)	84 (100.0)	303 (100.0)	200 (100.0)	16 (100.0)	

Table 5 shows the BMI distribution according to Gender. Differences between BMI and gender were statistically significant ($P < 0.0001$).

Table 6 shows the BMI distribution according to education level. Differences between BMI and education level were statistically significant ($P = 0.004$).

Table 7 shows the BMI distribution according to time since obesity diagnosis. Differences between BMI and time since obesity diagnosis were statistically significant ($P < 0.0001$).

Table 8 shows the BMI distribution according to type 2 diabetes diagnosis.

Discussion

This study aimed to determine the prevalence of obesity and overweight among type 2 diabetic patients, and explore the association between BMI, social demographics, and time since diagnosis.

The current study results revealed an obesity and overweight prevalence of 85.8% ($n = 525$), among which 27.9% ($n = 171$) were overweight, 57.8% were obese (n = 354), and only 13.2% ($n = 81$) had normal weight. Moreover, the number of overweight and obese females (47.1%, n = 288) was significantly higher than its corresponding number in males (38.7%, $n = 237$, $P < 0.0001$).

These findings are in line with a number of Saudi studies. A study by Mugharbel and Al-Mansouri reported high prevalence of overweight and obesity among type 2 diabetics (71.1%, $n = 271$).[10] Findings by Bakhotmah also reported high prevalence of obesity among type 2 diabetics (76.6%, $n = 572$), with a number of obese females (34.1% $n = 195$) that is more than double its corresponding number in males (14.3%, $n = 82$).[11] In a study by Alqurashi *et al.*, a statistically significant higher prevalence of obesity among type 2 diabetic females was observed (83.1%, $P = 0.008$).[12]

Moreover, similar findings were observed globally. In Tanzania, Damian *et al.* reported high prevalence of overweight and obesity among type 2 diabetics (85%), and a higher prevalence among females (92.2%) than males (69.9%).[13] Similar findings were reported in the United States, United Kingdom, Nepal, Iran, Yemen and Ghana.[14-20]

There exists a high prevalence of overweight and obesity among type 2 diabetics which might be explained by the vast junk food market in Saudi Arabia, as well as the continuous modernization and development of infrastructure which encourages fewer physical activity such as drive-thru automated teller machines (ATM), online groceries and food delivery.

The significant gender difference in the prevalence of overweight and obesity among diabetics might be caused by physiological and genetic factors. Other factors could also be attributed to differences in eating behavior and lifestyle between males and females in Saudi Arabia.

In the current study, the highest numbers of obese and overweight participants were observed among the 41–80 age groups (71.6%, n = 438) with a statistically significant difference between BMI and age groups ($P = 0.01$).

These findings are in concordance with several studies which reported a significant effect of age on the occurrence of diabetes.[21,22] However, other studies reported an inverse linear relationship between BMI and age groups.[11,23] Difference in study settings and population may account for the difference in results. In addition, most participants in the current study were above 40 years, and therefore the age range and sample size limitation might contribute to different findings.

In this study, differences between BMI and education level were statistically significant (p = 0.004). Similar findings were reported by Sánchez *et al.* where low education level was independently associated with the presence of obesity.[24] Another study by Seiglie *et al.* found that greater level of educational attainment was associated with higher diabetes risk.[25]

However, while obesity and overweight are considered factors contributing to the expanding diabetes epidemic, several studies have concluded that higher BMI is not the sole contributor to the relationship between education level and risk of diabetes.[26,27]

In the present study, differences between BMI and time since obesity diagnosis were statistically significant ($P < 0.0001$).

However, differences between BMI and time since type 2 diabetes diagnosis were not found to be statistically significant.

Several studies report a diagnosis driven lifestyle, behavior change and physical activity. In a study conducted by Schneider *et al.*, it was found that participants who received a diabetes diagnosis were more likely to increase their physical activity.[28] Another study by Penn *et al.* reported the diagnosis as a motivational factor for participants to exercise and follow a healthy diet.[29] Findings by Chong *et al.* report changes in participants lifestyle after receiving their diagnosis.[30]

These findings may be explained by the knowledge of diagnosis acting as a threat or call to action, and therefore contributing to a change in lifestyle, behavior and habits.[30] Differences between our findings and other study findings may be due to the limited sample size and population, as well as the study setting.

However, it is important to note that the practice of primary care physicians can affect prevalence of obesity. Physicians often overlook obesity by under coding it. Findings by Mattar *et al.* suggest that physicians usually document obesity in patients' records for those with morbid obesity. Patients with slightly lower BMI scores are often undocumented.[31]

Therefore, findings of the current study can be concluded in the following conclusion.

Conclusion

There is a high prevalence of obesity and overweight among type 2 diabetic patients in Bisha, with higher prevalence among females than males. Differences in BMI were found to be statistically significant according to age, gender, education level and time since obesity diagnosis. Patient education programs, public health awareness, and trainings and seminars for primary care physicians on how to deal with obesity and overweight patients are highly recommended for effective primary care practice and better public health. Further research is required to further understand the prevalence of obesity among type 2 diabetic patients and its health implications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Table 5: BMI distribution according to Gender

BMI	Gender (%)		*P*
	Male	Female	
Underweight	2 (0.7)	4 (1.3)	<0.0001
Normal Weight	59 (19.8)	22 (7.0)	
Overweight	93 (31.2)	78 (24.8)	
Class I Obesity	81 (27.2)	125 (39.8)	
Class II Obesity	49 (16.4)	56 (17.8)	
Class III Obesity	14 (4.7)	29 (9.2)	
Total	298 (100.0)	314 (100.0)	

Table 6: BMI distribution according to education level

BMI	Education (%)					*P*
	Illiterate	Primary	Intermediate	Secondary	University	
Underweight	1 (0.7)	1 (0.6)	0 (0.0)	2 (2.0)	2 (1.4)	0.004
Normal Weight	11 (7.2)	16 (9.3)	5 (10.2)	18 (18.2)	31 (22.3)	
Overweight	51 (33.3)	42 (24.4)	17 (34.7)	28 (28.3)	33 (23.7)	
Class I Obesity	59 (38.6)	53 (30.8)	13 (26.5)	34 (34.3)	47 (33.8)	
Class II Obesity	22 (14.4)	41 (23.8)	12 (24.5)	12 (12.1)	18 (12.9)	
Class III Obesity	9 (5.9)	19 (11.0)	2 (4.1)	5 (5.1)	8 (5.8)	
Total	153 (100.0)	172 (100.0)	49 (100.0)	99 (100.0)	139 (100.0)	

Table 7: BMI Distribution according to time since obesity diagnosis

BMI	Time since obesity diagnosis in years (%)					*P*
	Not Obese	<2	3-5	6-10	>10	
Underweight	2 (1.3)	0 (0.0)	0 (0.0)	2 (1.3)	2 (4.3)	<0.0001
Normal Weight	61 (40.4)	14 (13.1)	2 (1.3)	2 (1.3)	2 (4.3)	
Overweight	57 (37.7)	43 (40.2)	36 (23.7)	27 (17.3)	8 (17.4)	
Class I Obesity	22 (14.6)	32 (29.9)	80 (52.6)	57 (36.5)	15 (32.6)	
Class II Obesity	7 (4.6)	13 (12.1)	27 (17.8)	49 (31.4)	9 (19.6)	
Class III Obesity	2 (1.3)	5 (4.7)	7 (4.6)	19 (12.2)	10 (21.7)	
Total	151 (100.0)	107 (100.0)	152 (100.0)	156 (100.0)	46 (100.0)	

Table 8: BMI Distribution according to type 2 diabetes diagnosis

BMI	Time since type 2 diabetes diagnosis in years (%)				*P*
	<2	3-5	6-10	>10	
Underweight	1 (1.9)	2 (1.7)	2 (1.0)	1 (0.4)	0.3
Normal Weight	8 (15.1)	22 (19.1)	25 (12.9)	26 (10.4)	
Overweight	12 (22.6)	31 (27.0)	65 (33.5)	63 (25.2)	
Class I Obesity	15 (28.3)	37 (32.2)	61 (31.4)	93 (37.2)	
Class II Obesity	11 (20.8)	18 (15.7)	28 (14.4)	48 (19.2)	
Class III Obesity	6 (11.3)	5 (4.3)	13 (6.7)	19 (7.6)	
Total	53 (100.0)	115 (100.0)	194 (100.0)	250 (100.0)	

Conflicts of interest

There are no conflicts of interest.

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