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Original Research Article

Anxiety and health related quality of life among obese women with type 2 diabetes mellitus

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ABSTRACT

Background: T2DM is often accompanied by a marked reduction in QOL. Psychiatric comorbidity further worsens the QOL and is associated with poor glycaemic control and long term treatment outcomes in T2DM. Obesity may lead to anxiety disorders and is often associated with T2DM. Women in the general population are known to suffer from psychiatric problems more often than men. The health related QOL in a woman having T2DM and comorbid anxiety disorders is likely to be worse. We therefore analysed the QOL and anxiety symptomatology among obese women with T2DM.
Methods: We conducted a cross-sectional study at the Government General Hospital, Chennai. We recruited 50 age and BMI matched obese women with and without T2DM. We also recruited 50 each of diabetic and non-diabetic non-obese women. We used the WHO QOL BREF to assess the QOL, HAM A to quantify anxiety and HAM D to assess depression.
Results: A 71.5% of our patients experienced anxiety symptoms with scores on HAM A indicating mild to moderate levels of anxiety disorder. Obese patients irrespective of their glycaemic status had significantly higher levels of anxiety compared to our non-obese subjects. All our obese patients with T2DM scored statistically significant lowest means across all subdomains on the WHO QOL BREF scale. Obese subjects who had diabetes for >10 years were found to have severe anxiety disorder. The odds ratio that an obese woman would suffer from psychiatric comorbidity was found to be 10.211 (odds ratio = 10.211; 95% C.I. 2.963-35.185).
Conclusions: Anxiety disorders are common in obese women having T2DM. They also had decreased physical health, social relation and psychological domain scores. Having diabetes mellitus for >10 years predicted anxiety symptoms among obese subjects. We suggest early diagnosis and prompt treatment of anxiety disorders in obese women with T2DM as part of their routine primary health care.

Keywords: Anxiety disorders, QOL, Obese women, T2DM

INTRODUCTION

Diabetes among adults is a major public health problem all over the world. The worldwide prevalence of diabetes mellitus is fast reaching epidemic proportions. It is estimated that more than 75% of people with diabetes globally would be residing in developing countries. Diabetes prevalence among Asian population is increasing rapidly due to socioeconomic improvements, sedentary lifestyles and nutrition transition.[1] Type 2 diabetes mellitus accounts for all the diabetes cases. It has a number of chronic effects both physical and psychological.

The most investigated psychological disorder associated with diabetes is depression, with a meta-analysis indicating that people with diabetes are two fold likely to be diagnosed with depression as compared with those

who do not have diabetes. However there has been little research conducted into the association of diabetes with anxiety. Anxiety disorders are the most common psychiatric disorders among the general population with an estimated prevalence ranging from 12% to 21%.[2] Anxiety disorders typically present with core features such as anxious cognitions, somatic symptoms and behavioural disturbance with different subtypes of anxiety possessing distinct characteristics. Anxiety disorders typically have a chronic and recurrent life course and occur early in adult life. The main anxiety disorders associated with medical illness are, generalized anxiety disorder and panic disorder. Literature shows that anxiety is an important comorbidity to be examined in diabetics. In people with diabetes comorbid anxiety disorders and elevated anxiety symptoms are known to be associated with increased diabetes symptom burden, increased diabetes complications, worsened blood glucose levels, poor quality of life, increased depression and increased Body Mass Index (BMI).[3] Despite this, there are only few reviews that have examined the prevalence of anxiety disorders and elevated anxiety in people with diabetes and there has only been little research conducted into the association of diabetes with anxiety. Obesity may be a risk factor for anxiety disorders. Obesity is an increasingly prevailing disease characterized by excess body weight. It is estimated to be one of the most important contributors to the burden of disease worldwide. Obesity may lead to anxiety disorders through different ways. For instance weight related discrimination and stigma can be deeply distressing for obese individuals. In addition the negative effects of obesity on health and quality of life might be particularly stressful.

Diabetes is accompanied with a marked reduction in the patient's quality of life and leads to higher disability adjusted life years (DALY) than most diseases. Comorbid anxiety and depression further reduces quality of life in people with type 2 diabetes and is associated with poor treatment outcomes. The purpose of the study was to compare anxiety symptomatology in obese type 2 diabetic and non-diabetic women as there is a paucity of research in this area.

METHODS

Study design and tools

We conducted a cross-sectional study to assess the Quality of life (QOL) among patients living with type 2 diabetes mellitus. We have employed the WHO QOL BREF which is a short version of the WHO QOL 100 survey tool. Field trials in many countries have validated WHO QOL BREF as a standard tool for measuring Quality of life cross culturally. The WHO QOL BREF is a structured questionnaire consisting of 26 items in 4 domains namely physical health, psychological health, social relationships and environmental domain. The salient features of this scale are given in Table 1. We included in our self-designed, semi structured questionnaire, sociodemographic variables, time since diagnosis of diabetes, current alcohol drinking status, smoking status, current medication use, family history of psychiatric illness and obesity.

Table 1: Summary of who QOL-BREF survey components.

Domain	Features
Physical	Activities of daily life Work capacity Energy and fatigue Pain and discomfort Dependence on medicinal substances/aids Sleep and rest
Psychological	Bodily image and appearance Negative feeling Positive feeing Self-esteem Thinking, learning; memory and concentration
Social relations	Personal relationships Social support Sexual activity
Environment	Financial resources Freedom, physical safety and security Health and social care: accessibility & quality Home environment Opportunities for acquiring new information and skills Participation opportunities for recreation & leisure Physical environment (pollutant, noise/traffic/climate) Transport

Hamilton anxiety rating scale (HAM A) was used in the study to quantify anxiety in our subjects. HAM A is a 14 item scale, each of which is rated from 0 to 4 on an unanchored severity scale with the total score ranging from 0 to 56. Hamilton rating scale for depression (HAM D) has 24 items. Each item is scored from 0 to 4 on an anchored severity scale. Diabetes is often accompanied by overweight and obesity. Hence, we measured the Body mass index (BMI) of all our subjects as this can further help explore the Quality of life in people with diabetes. We conducted anthropometric measurements such as height and weight of the participants. Height of the respondents was measured in a standing position to the nearest centimetres. Weight was measured using a bathroom scale, calibrated at 0 initially, which could detect a mass to nearest 0.1kg. We took two readings for a given patient and the average values were considered as final.

Study setting and sample

The study was conducted at the Department of Psychiatry and the Institute of Diabetology of the Rajiv Gandhi government general hospital, Chennai during a 6 month

period from May 2017 to October 2017. We recruited fifty obese women with type 2 diabetes mellitus and fifty age and BMI matched women without type 2 diabetes as normal controls. We also recruited age matched fifty each of diabetic and non-diabetic non-obese women. Each of our participant was subjected to a face to face interview by the second author. They were further assessed using the above mentioned validated tools. Every participant was thus examined and rated for about half an hour. All of our participants were in the age group of 20 to 80 years of age. We obtained written informed consent from all our subjects after explaining them about our study in the local Tamil language. Respondents were informed about their right to not answer any questions or to withdraw any time during the interview. We also obtained the approval from our institutional ethical committee to conduct the study.

Statistical analysis

We analysed our data using the Statistical Program for Social Sciences version 22. Descriptive statistics were presented as frequency, percentage, mean and median. Chi square test and analysis of variants (ANOVA) were used for discrete and continuous variables respectively. P value <0.05 was considered as significant.

RESULTS

Sociodemographic data

A 48% (n=96) of our subjects were in the age group of 36 to 50 years and 38% (n=76) were in the age group of 51 to 65 years. 26% of our sample (n=52) had no formal school education. 59% (n=118) were school drop outs. 95.5% (n=191) of our sample were married, 56% were unemployed and 87% belonged to the low socioeconomic status. 92.5% of our subjects had never used substances. 50% (n=100) of our study group had a BMI ≥30. Family history of obesity was denied by 62% (n=124) of our subjects. While 52.5% of our patients had a positive family history of diabetes mellitus, 92.5% denied any family history of psychiatric illness. 9% of our study subjects had a past history of psychiatric illness. While 15.5 % (n=31) of our patients claimed that they have attempted suicide in the past, 25% (n=50) said that they just had death wishes and did not harbour any active suicidal thoughts or plans. 40% (n=80) of our study sample were suffering from diabetes mellitus for less than 10 years. Up to 32% (n=64) of our subjects had a fasting plasma glucose of >126 mg/dl.

Clinical data

While 65% (n=130) of our patients had mild levels of anxiety, 16.5% (n=33) had moderate anxiety and 5% (n=10) severe anxiety as rated on the HAM A scale. On the HAM D scale, 4% (n=8) of our patients had severe levels of depression, 10.5% (n=21) had moderate depression and 21.5% (n=43) had mild depression.

Table 2: Demographic characteristics of the study participants.

Characteristics	Frequency (N = 200)	%
Age (Mean ± SD: 49.3 ± 2.378)		
20-35 years	16	8
36-50 years	96	48
51-65 years	76	38
>65 years	12	6
Education		
Graduate	12	6
Completed schooling	18	9
Incomplete schooling	118	59
Illiterate	52	26
Residence		
Urban	69	34.5
Rural	131	65.5
Marital status		
Unmarried	0	0
Married	191	95.5
Broken marriage	9	4.5
Employment		
Employed	88	44
Unemployed	112	56
Socioeconomic status		
Upper	7	3.5
Middle	81	40.5
Upper lower	99	49.5
Lower	13	6.5
Body mass index (BMI)		
< 30 kg/m^2	100	50
≥ 30 kg/m^2	100	50
Use of substances		
Present	15	7.5
Absent	185	92.5
Years since diabetes diagnosed (Mean ±SD: 10.15±9.55) N = 100		
< 1 year	16	8
1-10 years	64	32
> 10 years	20	10
Family history of diabetes mellitus		
Present	105	52.5
Absent	95	47.5
Family history of obesity		
Present	76	38
Absent	124	62
Past history of psychiatric illness		
Present	18	9
Absent	182	91
Family history of psychiatric illness		
Present	15	7.5
Absent	185	92.5
History of suicidal attempts in the past		
Present	31	15.5
Absent	119	59.5
Just thoughts	50	25
HAM A scores		
0 (normal)	27	13.5

Contin….		
≤ 17 (mild)	130	65
18-24 (moderate)	33	16.5
≥ 25 (severe)	10	5
HAM D scores		
0-7 (normal)	126	63
8-13 (mild)	43	21.5
14-18 (moderate)	21	10.5
19-22 (severe)	8	4
≥23 (very severe)	2	1
Psychiatric morbidity		
Only anxiety	99	49.5
Only depression	0	0
Both anxiety and depression	74	37
None	27	13.5

While 49.5% (n=99) had anxiety alone, 37% of our sample population (n=74) had combined anxiety and depression. We did not find any statistically significant differences between our patient age groups. This study also did not find an association between increased age and psychiatric morbidity.

We found that our obese subjects irrespective of whether they had diabetes or not had a statistically significant (p=0.001) lower educational status when compared to their non-obese counter parts. Majority of our obese patients were school dropouts, in contrast to the non-obese patients who had either completed schooling or were graduates. Patients with poor educational status in the form of either incomplete schooling or illiteracy were also found to have statistically significant higher scores on the HAM A scale (p=0.021). We also found that those who were school drop outs had moderate levels of anxiety and the illiterate patients had severe levels of anxiety. While 61% of our non-obese subjects were unemployed, only 51% of the obese patients had no regular employment. Surprisingly, we found this difference between non-obese and obese subjects to be statistically significant (p=0.001). 7% of our obese patients reported a broken marriage. Only 2% of the non-obese subjects said that their marriage had broken down. Thus, we found obese individuals having statistically significant (p=0.022) levels of marital disharmony and problems in their married life. In spite of having a regular source of income, a significant number of our obese subjects (p=0.004) belong to the lower socioeconomic status when compared with our non-obese subjects majority of whom belong to the upper lower socioeconomic status.

While 61% of our obese patients had a family history of obesity in either one of their siblings or parents or both, only 15% of our non-obese subjects gave us a positive family history of obesity in either their sibling or parents. This difference, we found, was statistically significant (p=0.001). Our non-obese diabetic subjects had a significantly greater (p=0.003) family history of diabetes mellitus when compared to the obese diabetic individuals. We found a statistically significant (p=0.015) number of obese patients having a past history of psychiatric illness when compared with the non-obese group of patients. Obese patients irrespective of their glycaemic status had significant levels (p=0.001) of anxiety on the Hamilton rating scale for anxiety when compared to our non-obese patients. There were no statistically significant differences in the scores obtained on the Hamilton rating scale for depression between the obese and the non-obese groups.

All our obese patients who also had diabetes mellitus scored statistically significant lowest means on the WHO QOL BREF scale. Table 3 summarizes the QOL domain scores among the study participants. We also found that this significant difference persisted when we analysed the mean scores for the four subdomains of the scale. When we compared obese patients, who had diabetes mellitus and with those who did not on the WHO quality of life scale, we found statistically significant differences between the two groups on the physical domain (p=0.001), social domain (p=0.012) and environment domain (p=0.067). All our obese patients with type 2 diabetes had psychiatric morbidity in the form of anxiety or depression. A greater number of obese diabetics had anxiety than depression. Surprisingly, more number of obese patients without diabetes were suffering from anxiety disorders when compared to those who had comorbid diabetes. However, obese patients who did not have diabetes were less depressed compared to those having diabetes. Obese patients who had diabetes and depressive disorder were found to have statistically significant (p=0.001) poorer quality of life across all the four subdomains of the WHO QOL BREF scale. Obese patients who had severe anxiety disorder were found to have significantly low scores on the physical health and social relationship subdomains of the WHO QOL BREF scale. Similarly, those patients who had moderate anxiety disorder were found to have statistically significant lower scores on the psychological and environment subdomains (p=0.001).

Comparison between the groups using ANOVA revealed that irrespective of the BMI, patients with diabetes mellitus had depression. However, we found that the non-obese patients with comorbid diabetes mellitus had mild depression when compared with the obese diabetic patients who had moderate to severe depressive disorder. In addition, we also found that the obese diabetic patients having moderate depression had higher mean fasting plasma blood glucose levels when compared to the non-obese group (Mean fasting plasma glucose of obese diabetes mellitus patients =200.22mg/dl and Mean fasting plasma glucose of non-obese diabetes mellitus patients = 189.82mg/dl). This difference was statistically significant (p= 0.043). Individuals who had suffered from diabetes for >10 years were found to have severe anxiety disorder as measured by the HAM A scale. Patients with diabetes for <10 years had mild to moderate anxiety. This

difference was found to be statistically significant (p=0.015). We also found that this difference persisted between non-obese and the obese group of patients. The obese group of patients with longer duration of diabetes mellitus had greater psychiatric morbidity as compared to the non-obese group of patients. Higher fasting plasma glucose levels was also found to be associated with lowest scores in the physical health, social relationship and psychological domains on the WHO quality of life scale. Similarly, individuals with diabetes mellitus for >10 years were found to have significantly lower physical domain QOL scores when compared to those who had diabetes for <10 years.

Table 3: Quality of life domain scores among the various groups of the study participants.

Domains	Minimum	Maximum	Mean	Standard deviation
Non-obese diabetics				
Physical health	25	94	58.92	20.518
Psychological health	0	100	58.98	24.051
Social relationship	0	56	34.36	17.986
Environment	38	100	70.62	15.498
Obese diabetics				
Physical health	31	81	57.70	14.122
Psychological health	13	81	56.26	16.134
Social relationship	0	56	26.32	14.070
Environment	38	75	63.22	9.988
Obese non-diabetics				
Physical health	13	94	72.28	13.398
Psychological health	31	94	59.84	16.157
Social relationship	6	50	33.86	10.039
Environment	44	100	67.96	10.677
Non-obese non-diabetics				
Physical health	19	100	78.06	22.003
Psychological health	6	100	65.78	22.996
Social relationship	0	56	43.26	16.013
Environment	38	100	72.56	14.553

A 92% of our patients with diabetes mellitus both obese and non-obese were found to have psychiatric comorbidity in the form of either anxiety or depression. We found that the odds that a patient with diabetes could suffer from anxiety or depression to be 2.698 times more than a patient without diabetes mellitus (Odds ratio=2.698; 95% confidence interval 1.121-6.493). 97% of patients with BMI ≥30 were found to be suffering from psychiatric comorbidity in the form of anxiety and or depression. The odds that an obese patient is likely to suffer from psychiatric comorbidity was found to be 10.211 times more than a non-obese individual (Odds ratio=10.211; 95% confidence interval 2.963-35.185). We also found that all of our obese patients with diabetes had a psychiatric comorbidity in the form of either anxiety or depression.

DISCUSSION

It is a well-known fact that being female is significantly associated with psychiatric problems, most commonly depression not only in the general population but also among people with diabetes. Our study showed a similar association even when we did a pilot sample. We therefore decided to exclude male subjects completely from our study. To our knowledge, there are very few studies focusing on psychiatric problems exclusively among diabetic female patients. This study is one among the few from a tertiary care hospital in southern India. A possible explanation for this female preponderance could be that, women play many gender specific roles thereby exposing them to increased social demand and responsibilities. Furthermore, the social roles attributed to women in India like passivity, dependence and emotional expression allows them to be more emotional in nature when compared to men. Hence, being a female is an independent risk factor associated with anxiety and depression.

Previous researchers have reported a significant association of age with anxiety, depression and other psychological disorders.[4,5] Even though, our study did not find a significant association between age and anxiety disorders, we did find that severe levels of anxiety were observed only among patients in the age groups of 50 to 60 years. This study found significant higher odds of

anxiety disorders in obese compared with non-obese patients. Obese individuals also had a higher mean fasting plasma glucose values when compared to the non-obese individuals. Obese individuals having anxiety had a significantly higher odds of suffering from poorly controlled diabetes mellitus. Obesity may be linked to anxiety disorders through a number of pathways. Studies in the past have shown that obese people experience weight discrimination in both their public and private lives.[6] Our obese patients were poorly educated and belonged to the lower socioeconomic status. This finding correlated well with the studies by Carr D et al, who had found obese individuals to have poorer social support and social networks compared with the normal weight individuals.[7] Obese persons are at a greater risk of developing psychological distress and subsequent anxiety disorders because of poorer life opportunities and limited psychosocial resources. In fact, many of our obese patients harboured anti-fat biases and hatred towards their bodily appearances. During the interview sessions, our obese patients shared with us their distress over their repeatedly failed attempts to lose weight. Constant dieting and preoccupation with foods eaten were found to be closely related to their higher levels of anxiety. Many studies in the past have found obesity to be a strong predictor of a number of chronic medical conditions including diabetes mellitus. This could in addition contribute to the risk of anxiety in obese individuals. On the contrary, it is also possible for anxiety disorders to lead to weight gain. Symptoms of anxiety disorders may not only increase appetite but also stimulate a craving for high sugars and high fat foods. Studies by Torres et al, have shown hypothalamic-pituitary-adrenal axis dysregulation as a mechanism for excessive appetite leading on to weight gain in stressed and anxious individuals.[8] Several studies in the past have found that obesity and anxiety disorders are both partly heritable diseases and may actually share a common genetic basis. We also found significantly higher family history of obesity and psychiatric disorders (mainly anxiety) among our obese study subjects. During interviews, our obese subjects reported less obesity related stigma in their lives compared to those of a higher socioeconomic status. It is possible that our obese subjects had structured and altered their lives to avoid situations associated with higher stigma. It is also possible that the financial and psychosocial problems faced by our obese individuals were greater in magnitude compared to the stigma and stress caused by their excessive body weight.

A 54% of our subjects with diabetes mellitus were found to be suffering from anxiety disorders. Obese patients with type 2 diabetes mellitus had significantly greater anxiety compared to non-obese with type 2 diabetes. Overall, 92% of our study subjects were found to have some form of psychiatric morbidity in the form of anxiety or depression or both. To our surprise, we found very low levels of depression even among obese type 2 diabetic patients with anxiety disorders. Mean duration of type 2 diabetes among our patients was 10.15 (SD ±9.55) years and the mean duration for treatment was 9.5 (SD ±8.54) years. A previous study from a large tertiary care centre in India, had reported prevalence of depression among patients with type 2 diabetes to be 41%. This is in stark contrast to our study which found low levels of depression. Moreover, mean duration of diabetes was lesser (8 years) in this study when compared to the current study. Some recent studies from Asia have reported a higher prevalence. A study by Khuwaja et al, found the prevalence of depression and anxiety at 44% and 58%, respectively.[9] Anxiety disorder found among our subjects correlated well with the above mentioned study. Most of the western studies have found a relatively more prevalence of both depression and anxiety. Some of the reasons for such differences are, poor literacy levels, low awareness about diabetes mellitus, low socioeconomic status, poor employment opportunities and difficulty in accessing health care services.

Only very few studies have tried to elucidate the complex interrelationship between diabetes, obesity and anxiety disorders. Studies in the past have demonstrated that in people with diabetes, anxiety is significantly associated with diabetes complications, increased pain, engaging in unhealthy self-care behaviours, greater disability, depression and an increased body mass index. However, many of these factors have also been shown to be associated with anxiety and anxiety disorders in the absence of diabetes. In our study, we found higher mean fasting plasma glucose levels among patients who were obese and having moderate depression when compared to the normal weight group. Moreover, individuals who had diabetes for more than 10 years, were found to suffer from severe anxiety disorder when compared to those patients who had diabetes for less than 10 years. The association of duration of diabetes with the development of anxiety and depression has been reported by other researchers as well.[4,10] Increased duration of the disease is known to significantly increase the risk of developing diabetes complications and health care expenditures. As a result, these patients are more prone to develop psychiatric morbidity.

Quality of life (QOL) is an important health outcome, representing the ultimate goal of all health interventions. Diabetes can be a difficult condition to live with for most patients. The demands of self-care can be burdensome, sometimes frustrating and overwhelming. The impact of long term complications can be severe, thereby leading to major changes in the patient's functional ability. The continuing threat of complications and consequently repeated hospitalizations can add to the psychiatric morbidity and low QOL faced by these patients. Adjustments to the disease is often accompanied by a variety of negative emotional responses such as anger, guilt, frustration and loneliness. We found that the QOL scores were lowest across all the four domains among our obese diabetic subjects. We infer that, our obese patients with diabetes received poor support from family, community and friends. They also could not maintain a

healthy relationship between relatives and friends. Low quality of life scores for physical health domain among the obese diabetic patients indicated low energy and work capacity for daily living, higher dependence on diabetes related medicines and medical aids; fatigue, poor sleep, reduced mobility, greater pain and discomfort in everyday life. An earlier study assessing QOL among diabetic patients had found, high average QOL scores in the social domain and low quality of life scores for the physical health domain.[11]

A study among people with diabetic foot ulcers in Iran had reported that men had an overall high QOL scores in all domains compared to the women. In a traditional society like ours, women generally face greater levels of stress than men. Obese women who also suffer from a chronic illness like diabetes mellitus are likely to face many challenges in their social interrelationships and in their daily environment. This could have a devastating effect on their lives, thereby predisposing them not only to severe psychological suffering but also leading to poorly controlled diabetes mellitus and its associated complications. We therefore want to emphasize the negative impact of the presence of psychological symptoms especially anxiety on the quality of life among the obese diabetic subjects.

This study found that poor glycaemic control and longer duration of diabetes significantly predicted the occurrence of anxiety disorders among the obese diabetic patients. Similar findings have been reported by other researchers' like Lloyd et al and Pibernik-Okanovic et al.[15,16] High levels of anxiety and poor glycaemic control was significantly correlated with the reduced feeling of general well-being. Previous studies by Wang et al, have found that age, duration of diabetes mellitus and the level of fasting glucose have all affected the QOL of a patient with diabetes.[17] Rubin et al, had found that better glycaemic control is associated with better QOL and that complications of diabetes are the most important disease specific determinants of QOL.[18] We however did not look into diabetes related complications in our study.

Our study has some strengths and limitations. This is one of the very few studies to assess quality of life and anxiety among obese female diabetic patients. We used the WHO QOL BREF scale which has been widely used across many cultures and is a well validated tool for measuring health related quality of life worldwide. This study was limited to a single but a major tertiary health care centre in Tamilnadu, south India. Therefore, our findings may not necessarily be generalizable to the other populations in our country. As mentioned earlier, we did not look into diabetes mellitus related complications in the study. We also did not collect any data to assess the patient's compliance with their diabetes medications. Previous studies by, Shrestha et al, have found high rates of noncompliance among diabetes patients which is likely to have an adverse effect on disease progression and could thereby lower the QOL.[19] However, some other researchers Dimatteo et al, Lustman P J et al have found that, anxiety and depression among diabetes patients is a major risk factor for poor drug compliance.[20,21] While we found coexisting poor QOL and severe forms of anxiety disorder among the obese diabetes patients, we were unable to assess the effect of noncompliance with anti-diabetic medications.

CONCLUSION

This study shows that anxiety disorders are quite common among obese diabetic women patients compared to normal weight controls. We also found severe anxiety and decreased health related QOL scores (across all the four subdomains of the scale) among the obese women. Similarly, having diagnosed with diabetes for more than 10 years, was a significant predictor of anxiety disorder among the obese patients. While literature suggests that normal weight people with diabetes have lower QOL in general, we found that anxiety disorders among obese people with type 2 diabetes mellitus further reduced the QOL. We therefore suggest that our public health policy makers should focus on early diagnosis and prompt treatment of anxiety disorders among obese women with diabetes as a part of routine primary health care in Tamil Nadu.

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