RESEARCH ARTICLE

Depression in patients with Type 2 Diabetes in Maltese primary care

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ABSTRACT

Background

Type 2 diabetes and depression are two common chronic conditions affecting the Maltese population with significant and costly effects on health. Multiple studies have demonstrated a higher prevalence of depression in diabetic patients and a link with uncontrolled diabetes; however, despite this, depression is still not considered as important to chronic conditions in terms of the effects it has on health.

Objectives

This study was conducted to estimate the prevalence of depression in type 2 diabetic patients in primary care and to study their associated risk factors.

Method

A quantitative, cross-sectional, retrospective, descriptive study was performed among 400 participants with type 2 diabetes attending diabetes clinics within the public health centres in Malta. Patients completed a self-administered questionnaire to quantify depressive symptoms and to study patient and disease characteristics. Convenience sampling was used to collect the data.

Results

Data analysis showed that the prevalence of depression is around 29.7% among type 2 diabetic patients. Younger diabetics, women, lower educational levels, unemployment, obesity, a family history of depression and uncontrolled diabetes were found to be associated with a higher risk of developing depressive symptoms.

Conclusions

Screening for depression in type 2 diabetic patients is important due to the high prevalence and significant impact on health. Appropriate management can significantly improve the outcome of both conditions and consequently improve both health and quality of life.

Key words

Type 2 diabetes, depression, prevalence, primary care

INTRODUCTION

Diabetes and depression are two highly prevalent conditions in the Maltese population (Ministry for Social Policy, 2008) with studies showing that diabetic patients can be more prone to suffering from depression than the rest of the population (Cols-Sagarra, et al., 2016).

In Malta, approximately 50,000 people, or 13.2% of the population, between the ages of 20 and 79 years suffer from type 2 diabetes (International Diabetes Federation, 2017), with approximately 10,000 people unaware of having the disease (Cuschieri, et al., 2016). Chronic depression affects around 20,000 people or 5.1% of the Maltese population (World Health Organization, 2016). The direct and indirect costs associated with the burden of both conditions can be staggering, especially when factoring in

the morbidity and mortality associated with these conditions if they are not well-treated (Ministry for Energy and Health – Health, 2014). Diabetes costs the Maltese public around 29 million euros per year, or 3.64% of the total health expenditure (Cuschieri, et al., 2016). While there is no data available for Malta, studies have shown that mental ill health costs developed countries in the European Union around 3-4% of the total health expenditure (Gabriel and Liimatainen, 2000).

Several studies have demonstrated a link between depression and chronic conditions. This often results in worsening of the patient's quality of life independently of the chronic condition on its own and an increased risk of developing complications (Cassano and Fava, 2002; Chapman, Perry and Strine, 2005).

It is possible to reverse the effect that depression has on diabetes by early recognition and adequate treatment of depression, either with psychopharmacological agents and/or psychotherapy, depending on the patients' characteristics and needs (Chapman, Perry and Strine, 2005). Despite several studies indicating a link between depression and poor control of diabetes, depression is still not considered to be as important as chronic health conditions in terms of the effect it has on general health (Moussavi, et al., 2007).

The aim of this study is to identify the type 2 diabetic patients most likely to develop depression in a primary care setting. The objectives are to study the prevalence of depression and examine the associated factors in type 2 diabetic patients.

METHOD

A quantitative, cross-sectional, retrospective, descriptive study was carried out in a random sample of patients attending the diabetic clinics in the Mosta, Floriana and Paola health centres. The inclusion criteria included subjects older than 18 years, having an established diagnosis of type 2 diabetes, in a stable condition, those who consented to participate, and attended the clinic during the study period. Subjects having another type of diabetes or cognitive impairment, those attending other clinics in the health centre, and those who were unable to perform the study, unstable or refused to participate were excluded. The recruitment process was carried out between June and September 2018. A total of 400 questionnaires were collected, with 123 questionnaires collected from Mosta, 151 questionnaires from Floriana and 126 questionnaires from Paola Health Centre. Those that did not satisfy the inclusion criteria were excluded from the final number.

Ethical approval from the Faculty and University of Malta Research Ethics Committees was obtained in addition to permission from the Data Protection Officer of the Primary HealthCare department. All patients taking part in the study gave consent after explanation of what the study entailed. The data was collected via a self-administered questionnaire and no study-specific interventions were carried out.

The questionnaire used consisted of a validated tool to measure depression, the Patient Health Questionnaire-9 (PHQ-9) (Kroenke, et al., 2010), and a questionnaire developed by the author to quantify the patient sociodemographic and disease characteristics. These were translated to Maltese and peer-reviewed to reduce translation errors. A pilot study amongst 17 subjects was carried out in Birkirkara Health Centre to improve the understandability of the questionnaires.

The PHQ-9 was developed specifically to assess the severity of depression and monitor the effectiveness of treatment. It can also be used to make a tentative diagnosis of depression in populations at risk (Kroenke, Spitzer and Williams, 2001). Scores of 0, 1, 2 and 3 are assigned to the

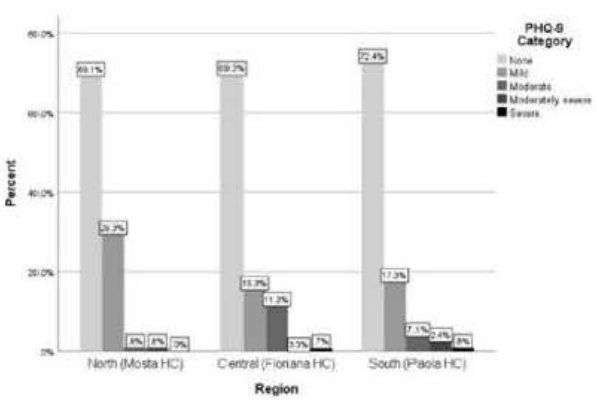

Figure 1: Regional differences according to PHQ-9 Depression Categories

response categories: "not at all", "several days", "more than half the days" and "nearly every day" respectively. The total score ranges from 0 to 27, with the following scores: 0-4 (none), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe) and 20-27 (severe depression) (Kroenke, et al., 2010).

The sociodemographic data collected included the age, gender, nationality, marital status, highest level of education, employment status and monthly income. Questions about general health included smoking status, weight and family history of diabetes and depression. The disease characteristics questions assessed the years with diabetes, medication used, medication compliance, the subjective and objective diabetic control and the presence of co-morbidities and diabetes complications.

For descriptive analysis, the absolute (N) and relative (%) frequencies were used to describe qualitative variables. The non-parametric Kruskal-Wallis test was used to compare the mean depression scores between several independent groups, clustered by demographic variables, such as age and gender. Pearson's Chi-squared and Fisher's tests was used to assess the association between two categorical variables when using depression categories. A p-value of less than 0.05 was used to signify statistical significance. Data analysis was performed using the Statistical Package for Social Science (SPSS) program Version 25.0 (IBM Corp, 2017).

RESULTS

The mean age of all the participants was 69 years, and 54% of participants were men. Women were generally older and more morbidly obese, more likely to be widowed, worked at home, had a lower income and received minimal education. Men smoked more, were less compliant with medication and had worse glucose control. Hypertension and dyslipidaemia were commoner in women, while myocardial infarction and cerebrovascular accidents were more prevalent in men. Depression was commoner in women, with 37% of the female cohort having some degree of depression compared to 23.6% of the male cohort.

An overview of the participants' characteristics according to gender can be viewed in Table 1. Significant results for gender differences were obtained for marital status, the level of education and employment, smoking, the presence of co-morbidities and complications, and the presence or absence of depression. Tables 2, 3 and 4 detail the participants' characteristics according to presence of depression. The results show that women and younger diabetic patients had a higher risk of developing depression; same as those with a poorer educational level, those who had no job and were not pensioners, those who were obese and those with a family history of depression. The result of the 2-hour post-prandial capillary glucose test as reported by the participants, and the perceived diabetic control as measured by the participants' self-rating of their usual control, were recorded. Both indicated that uncontrolled diabetes is a strong risk factor for development of depression.

A summary of the p-values obtained from the results of the non-parametric Kruskal-Wallis and Chi-square tests used to study the statistical significance of different characteristics in the development of depression can be seen in Table 5.

DISCUSSION

Table 1 shows that the prevalence of depression in the Maltese diabetic population is around 29.7% (95% Confidence Interval: 25.4%-34.4%), which is comparable to a similar study by Cols-Sagarra, et al. (2016) whereby the prevalence was 29.2%. Similarly, a systematic review concluded that around a third of diabetics developed depression (Roy and Lloyd, 2012).

Several international studies showed that women are more prone to developing depression than men (Cols-Sagarra, et al., 2016; Roy and Lloyd, 2012; Salinero-Fort, et al., 2018). This current study was concordant, with 37% of female participants reporting depressive symptoms compared to 23.6% of men. Similarly, younger patients with diabetes reportedly were more at risk, possibly due to the increased co-morbid disease in younger diabetics (Roy and Lloyd, 2012). Comparable results were replicated in this study with 39.1% of those younger than 65 years having depressive symptoms contrasting with 26.0% of those 65 years or older. The exact figures can be observed in Table 2.

This study did not find any significant association between depressive symptoms and the nationality, possibly due to the much higher proportion of Maltese participants. A review of the literature did not provide any conclusive association between these factors, as few studies pointed towards a positive association while others failed to show any relation (Roy and Lloyd, 2012; Salinero-Fort, et al., 2018). This hints at the idea that multiple factors are involved, including the possible genetic predisposition and the social status of immigrants in their new homeland (Roy and Lloyd, 2012). More detailed studies are required in this area to fully understand the effect of different nationalities on the development of depressive symptoms in diabetics.

When reviewing local regional differences, no overall significance was found between the presence of depression and place where patients were reviewed. However, upon comparing with the PHQ-9 depression categories, a statistically significant result was obtained (p=0.006). Subjects reviewed in the northern region (Mosta) were found to have a higher risk for mild depression, while those in the central region (Floriana) had a higher prevalence of moderate and moderately-severe depressive symptoms. Severe depression was commonest in the southern region served by Paola Health Centre, with 0.8% of participants followed closely by 0.7% in the region served by Floriana Health Centre (Figure 1). This could be explained by the socio-economic differences between the regions, where people living in the southern harbour region of Malta, which is served by Paola Health Centre, have a lower average household disposable income and higher unemployment rates than other regions (National Statistics Office, 2017).

Lower level of education, unemployment, poor financial situation and the unmarried state were all positively associated with increased risk of depression (Engum, et al., 2005; Roy and Lloyd, 2012). This study was concordant in relation to education and employment, whereby those with a low educational level and unemployment (including those who work at home or live on social benefits) had a higher risk of developing depression. The financial and marital status were however not statistically significant (Table 3). Evidence showed that poor social support is a known risk for depression (Roy and Lloyd, 2012); thus it might be that despite a poor financial situation and the unmarried state, the affected persons might still be receiving adequate social support, either from their close family and friends, or from state benefits.

Obesity, smoking, and the presence of co-morbid diseases such as cardiovascular ischaemia, cerebrovascular accidents, and retinopathy, all of which are associated with the development of diabetes, have been positively linked with an increased risk of depression (Engum, et al., 2005; Roy and Lloyd, 2012). The present study found statistically significant association with obesity only, and not with smoking and the presence of comorbidities and diabetic complications (Table 3). Similarly, the study by Col-Sagarra et al. (2016) did not find any association in this regard; however, there was a positive association with smoking and no correlation with obesity. These variations might reflect different methodologies for quantifying the different factors in each study, as there was more reliance on the subjects' interpretation of their general health in this study, while factors in the Spanish study more reliance was put on objective measurements when classifying weight and defining cardiovascular risk factors (Cols-Sagarra, et al., 2016).

Depressive symptoms were present in 44.8% of those reporting a family history of depression, while in those having a family history of diabetes the proportion was 29.8% (Table 3). Similarly, a study by Salinero-Fort, et al. (2018) reported a positive correlation with a family history of depression but not type 2 diabetes. Few studies have investigated the relationship between the duration of diabetes and the development of depression, which according to Salinero-Fort, et al., (2018) was found to be significant. This was not however replicated in this study, possibly due to recall bias.

The study by Cols-Sagarra, et al., (2016), did not find any significant difference between the use of different medication with depressive symptoms (p=0.07). Conversely, the current study showed that vildagliptin was associated with a higher prevalence of depressive symptoms.

Vildagliptin is commonly used as second or third-line treatment when other medications were not adequate to achieve good glycaemic control, indicating that hard-to-treat diabetes might increase the risk for depression. This was reflected strongly when investigating the subjective and objective glucose control, whereby subjects were asked to rate their usual glucose control and to quote their 2-hour post-prandial glucose finger pinprick test. The prevalence of depressive symptoms was higher in patients with poor glycaemic control. These results were in concordance with other studies which showed that uncontrolled diabetes was associated with a higher prevalence of depressive symptoms (Roy and Lloyd, 2012; Salinero-Fort, et al. 2018). Table 4 gives a more detailed review of these results.

Study strengths

The pilot study carried out helped to fine-tune the questionnaire and pre-empt problems prior to the main study. The large sample of 400 participants chosen from the three main health centres helped ensure that there was a good cross-sectional representation of the population, while the validated PHQ-9 questionnaire used allowed comparison with other studies in the literature.

Study limitations

When comparing the outcome of this study with other studies, the different methodologies utilized and limitations must be taken into consideration (Roy and Lloyd, 2012). Some of the limitations of this study include self-report and response bias, both of which depend on the subjects answering the questions honestly, and the Hawthorne effect, as the questionnaire was carried out in a waiting area with most subjects asking for the questions to be read out to them. Furthermore, recall bias needs to be considered in questions requiring remembering certain information, while subjective questions depended on the subjects' interpretation of the question. Moreover, due to time and resource constraints, peripheral clinics and Gozo were excluded from the study, and convenience sampling was used.

CONCLUSION

This study determined the prevalence of depression in the local type 2 diabetic patients and those factors strongly associated with development of depressive symptoms.

Increasing awareness of both health care professionals and the general population about depression and the risks it imposes on diabetic patients should be the first step so that effective action could be implemented. Furthermore, local structured guidelines can help to screen diabetic patients for depression. These recommendations can help to serve as guidance for GPs and other clinicians, policy makers, public health educators and researchers to improve the management of diabetic patients with depression.

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Table 1: Overview of participants' characteristics according to gender

Variable	Total N=400	Males N=216	Females N=184	p-value
DEMOGRAPHIC INFORMATION				
Mean of Age (S.D; 95% C.I.)	69.0 (8.80; 68.13-69.86)	68.4 (8.98; 67.2-69.61)	69.7 (8.54; 68.44-70.92)	0.150**
Age N(%)				0.126
<65 years	115 (28.7%)	69 (60.0%)	46 (40.0%)	
>/= 65 years	285 (71.3%)	147 (51.6%)	138 (48.4%)	
Nationality N(%)				0.312*
Maltese	391 (97.8%)	213 (54.5%)	176 (45.5%)	
Other	9 (2.3%)	3 (33.6%)	6 (66.7%)	
Marital Status N(%)				<0.001*
Single	39 (9.8%)	22 (56.4%)	17 (43.6%)	
Married	283 (70.8%)	66 (58.7%)	117 (41.3%)	
Separated	15 (3.8%)	11 (73.3%)	4 (26.7%)	
Divorced	7 (1.8%)	3 (42.9%)	4 (57.1%)	
Widowed	56 (14.0%)	14 (25.0%)	42 (75.0%)	
SOCIOECONOMIC STATUS				
Level of Education N(%)				<0.001*
Up to Primary School	188 (47.0%)	82 (43.6%)	106 (56.4%)	
Secondary School	152 (38.0%)	90 (59.2%)	62 (40.8%)	
Tertiary Education	56 (14.0%)	41 (73.2%)	15 (26.8%)	
Post-Tertiary Education	4 (1.0%)	3 (75.0%)	1 (25.0%)	
Employment Status N(%)				<0.001
Currently Working	41 (10.3%)	27 (65.9%)	14 (34.1%)	
Work at home/Depend on social benefits/ Don't Work	86 (21.5%)	18(20.9%)	68 (79.1%)	
Retired	273 (68.3%)	171 (62.6%)	102 (37.4%)	
Monthly Income N(%)				*0.066
< €800	331 (82.8%)	170 (51.4%)	161 (48.6%)	
€800 - €1500	56 (14.0%)	38 (67.9%)	18 (32.1%)	
€1500 - €2500	12 (3.0%)	7 (58.3%)	5 (41.7%)	
> €2500	1 (0.3%)	1 (100.0%)	0 (0.0%)	
Region N(%)				0.908
North	123 (30.8%)	66 (53.7%)	57 (46.3%)	
Central	150 (37.5%)	83 (55.3%)	67 (44.7%)	
South	127 (31.8%)	6 (52.8%)	60 (47.2%)	
GENERAL HEALTH				
Smoking N(%)				<0.001
Never Smoked	220 (55%)	85 (38.6%)	135 (61.4%)	

Variable	Total N=400	Males N=216	Females N=184	p-value
Ex-Smoker	135 (33.8%)	94 (69.6%)	41 (30.4%)	
Currently Smoking	45 (11.3%)	37 (82.2%)	8 (17.8%)	
Weight N(%)				0.213
Not Obese	168 (42%)	95 (56.5%)	73 (43.5%)	
Obese	193 (48.3%)	105 (54.4%)	88 (45.6%)	
Morbidly Obese	39 (9.8%)	16 (41.0%)	23 (59.0%)	
Family History N(%)				0.714
Type 2 Diabetes	319 (65.6%)	170 (53.3%)	149 (46.7%)	0.573
Depression	96 (19.8%)	49 (51.0%)	47 (49.0%)	0.505
None	71 (14.6%)	42 (59.2%)	29 (40.8%)	0.337
DISEASE CHARACTERISTICS				
Years with diabetes N(%)				0.943
<5 years	108 (27.0%)	60 (55.6%)	48 (44.4%)	
5-10 years	107 (26.8%)	59 (55.1%)	48 (44.9%)	
10-15 years	91 (22.0%)	47 (51.6%)	44 (48.4%)	
>15 years	94 (23.5%)	50 (53.2%)	44 (46.8%)	
Medication Use N(%)				0.530
Metformin	363 (59.7%)	201 (55.7%)	160 (44.3%)	0.057
Gliclazide	171 (28.1%)	91 (52.6%)	82 (47.4%)	0.703
Insulin	37 (6.1%)	17 (45.9%)	20 (54.1%)	0.302
Vildagliptin	37 (6.1%)	17 (45.9%)	20 (54.1%)	0.302
Compliance N(%)				0.137
Always took medication	322 (80.5%)	168 (52.2%)	154 (47.8%)	
Sometimes forgot	78 (19.5%)	48 (61.5%)	30 (38.5%)	
Never took medication	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Subjective Diabetic Control N(%)				0.963*
Very Good	36 (9.0%)	20 (55.6%)	16 (44.4%)	
Good	244 (61.0%)	129 (52.9%)	115 (47.1%)	
Could be Better	111 (27.8%)	62 (55.9%)	49 (44.1%)	
Not Controlled	9 (2.3%)	5 (55.6%)	4 (44.4%)	
Objective Diabetic Control N(%)				0.877
<10 mmol/L	257 (64.3%)	139 (54.1%)	118 (45.9%)	
>/=10 mmol/L	42 (10.5%)	24 (57.1%)	18 (42.9%)	
Don't remember	101 (25.3%)	53 (52.5%)	48 (47.5%)	
Presence of Co-morbidities and Diabetic Complications N(%)				0.021
Hypertension	299 (38.2%)	159 (53.2%)	140 (46.8%)	0.570
Dyslipidaemia	278 (35.5%)	146 (52.5%)	132 (47.5%)	0.369
Retinopathy	59 (7.5%)	36 (61.0%)	23 (39.0%)	0.241
Nephropathy	17 (2.2%)	8 (47.1%)	9 (52.9%)	0.557
Neuropathy	12 (1.5%)	9 (75.0%)	3 (25.0%)	0.138
Heart Disease	70 (9.0%)	51 (72.9%)	19 (27.1%)	<0.001

Variable	Total N=400	Males N=216	Females N=184	p-value
CVA or TIA	18 (2.3%)	12 (66.7%)	6 (33.3%)	0.270
No Complications	29 (3.7%)	16 (55.2%)	13 (44.8%)	0.895
DEPRESSION STATUS				
Presence/Absence of Depression N (%)				0.004
No Depression	281 (70.3%)	165 (58.7%)	116 (41.3%)	
Have Depression	119 (29.7%)	51 (42.9%)	68 (57.1%)	
Depression Category according to PHQ-9 N (%)				0.017*
No Depression	281 (70.3%)	165 (58.7%)	116 (41.3%)	
Mild	81 (20.3%)	38 (46.9%)	43 (53.1%)	
Moderate	27 (6.8%)	10 (37.0%)	17 (63.0%)	
Moderately-Severe	9 (2.3%)	2 (22.2%)	7 (77.8%)	
Severe	2 (0.5%)	1 (50.0%)	1 (50.0%)	

*Fisher's Exact Test was used

**Independent Sample t-test was used

Table 2: Demographic information according to the presence of depression

Variable	Without Depression n= 281	With Depression n=119	p-value
Mean of Age (S.D; 95% C.I.)	69.72; (8.62; 68.71 – 70.73)	67.27; (9.00; 65.63-6.90)	0.011**
Age N(%)			0.009
<65 years	70 (24.9%)	45 (39.1%)	
>/= 65 years	211 (75.1%)	74 (26.0%)	
Gender N(%)			0.004
Male	165 (76.4%)	51 (23.6%)	
Female	116 (63.0%)	68 (37.0%)	
Nationality N(%)			1.00*
Maltese	274 (70.1%)	117 (29.9%)	
Other	7 (77.8%)	2 (22.2%)	
Marital Status N(%)			0.119*
Single	33 (84.6%)	6 (15.4%)	
Married	199 (70.3%)	84 (29.7%)	
Separated	8 (53.3%)	7 (46.7%)	
Divorced	5 (71.4%)	2 (28.6%)	
Widowed	36 (64.3%)	20 (35.7%)	

* Fisher's Exact Test was used due to small numbers

** Independent Samples t-test was used to calculate the p-values to assess any significant difference between the mean of age of those not depressed and those depressed

Table 3: Socioeconomic status and general health characteristics according to the presence of depression

Variable	Without Depression n= 281	With Depression n=119	p-value
Level of Education N(%)			0.013*
Up to Primary School	123 (65.4%)	65 (34.6%)	
Secondary School	106 (69.7%)	46 (30.3%)	
Tertiary Education	48 (85.7%)	8 (14.3%)	
Post-Tertiary Education	4 (100%)	0 (0%)	
Employment Status N(%)			0.010
Currently Working	31 (75.6%)	10 (24.4%)	
Work at home/Depend on social benefits/ Don't Work	49 (57.0%)	37 (43.0%)	
Retired	201 (73.6%)	72 (26.4%)	
Monthly Income N(%)			0.080*
< €800	224 (67.7%)	107 (32.3%)	
€800 - €1500	46 (82.1%)	10 (17.9%)	
€1500 - €2500	10 (83.3%)	2 16.7%)	
> €2500	1 (100%)	0 (0%)	
Region N(%)			0.807
North	85 (69.1%)	38 (30.9%)	
Central	104 (69.3%)	46 (30.7%)	
South	92 (72.4%)	35 (27.6%)	
Smoking N(%)			0.609
Never Smoked	159 (72.3%)	61 (27.7%)	
Ex-Smoker	92 (68.1%)	43 (31.9%)	
Currently Smoking	30 (66.7%)	15 (33.3%)	
Weight N(%)			0.001
Not Obese	133 (79.2%)	35 (20.8%)	
Obese	127 (65.8%)	66 (34.2%)	
Morbidly Obese	21 (53.8%)	18 (46.2%)	
Family History N(%)			0.016
Type 2 Diabetes	224 (70.2%)	95 (29.8%)	0.979
Depression	53 (55.2%)	43 (44.8%)	<0.001
None	51 (71.8%)	20 (28.2%)	0.748

* Fisher's Exact Test was used due to small numbers

Table 4: Disease characteristics of participants according to the presence of depression

Variable	Without Depression n= 281	With Depression n=119	p-value
Years with diabetes N(%)			0.826
<5 years	80 (74.1%)	28 (25.9%)	
5-10 years	78 (72.9%)	29 (27.1%)	
10-15 years	58 (63.7%)	33 (36.3%)	
>15 years	65 (69.1%)	29 (30.9%)	
Medication Use N(%)			0.074
Metformin	254 (70.4%)	107 (29.6%)	0.804
Gliclazide	113 (65.3%)	60 (34.7%)	0.051
Insulin	21 (56.8%)	16 (43.2%)	0.059
Vildagliptin	20 (54.1%)	17 (45.9%)	0.024
Compliance N(%)			0.826
Always took medication	227 (70.5%)	95 (29.5%)	
Sometimes forgot	54 (69.2%)	24 (30.8%)	
Never took medication	0 (0.0%)	0 (0.0%)	
Subjective Diabetic Control N(%)			<0.001
Very Good	27 (75.0%)	9 (25.0%)	
Good	190 (77.9%)	54 (22.1%)	
Could be Better	58 (52.3%)	53 (47.7%)	
Not Controlled	6 (66.7%)	3 (33.3%)	
Objective Diabetic Control N(%)			0.002
<10 mmol/L	192 (74.7%)	65 (25.3%)	
>/=10 mmol/L	20 (47.6%)	22 (52.4%)	
Don't remember	69 (68.3%)	32 (31.7%)	
Presence of Co-morbidities and Diabetic Complications N(%)			0.303
Hypertension	207 (69.2%)	92 (30.8%)	0.443
Dyslipidaemia	183 (65.8%)	95 (34.2 %)	0.003
Retinopathy	35 (59.3%)	24 (40.7%)	0.047
Nephropathy	9 (52.9%)	8 (47.1%)	0.111
Neuropathy	6 (50.0%)	6 (50.0%)	0.119
Heart Disease	40 (57.1%)	30 (42.9%)	0.008
CVA or TIA	11 (61.1%)	7 (38.9%)	0.385
No Complications	23 (79.3%)	6 (20.7%)	0.268

Table 5: The p-values for the Kruskal-Wallis and Chi-square tests comparing the mean Depression Score, the PHQ-9 depression categories and the Presence of Depression against No Depression

Factor	PHQ-9 Mean Depression Scores (Kruskal-Wallis Test)	PHQ-9 Depression Categories (Chi-Squared Test)	Presence of Depression (Chi-Squared Test)
Gender	<0.001	0.027	0.004
Age	0.04	0.027	0.009
Nationality	0.169	0.915	0.617
Region	0.590	0.006	0.807
Marital status	0.484	0.387	0.143
Highest level of education attended	0.025	0.49	0.017
Employment status	0.001	0.05	0.010
Financial status	0.183	0.592	0.100
Smoking	0.509	0.348	0.609
Weight	<0.001	0.007	0.001
Family history of type 2 diabetes and depression	0.005	<0.001	0.003
Years with type 2 diabetes	0.39	0.587	0.826
Medication in use	0.081	0.059	0.074
Medication compliance	0.794	0.806	0.826
Subjective diabetic control	<0.001	<0.001	<0.001
Objective diabetic control	0.001	0.012	0.002
Co-morbidities and complications	0.070	0.914	0.303

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