Statin prescription among patients with type 2 diabetes in Botswana: findings and implications

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Abstract

Background There is evidence of statin benefit among patients with diabetes regardless of their cholesterol levels or prior cardiovascular disease history. Despite the evidence, there is under-prescription of statins in clinical practice. This study aimed to assess statin prescriptions and associated factors among patients with type 2 diabetes in Botswana. Methods The study was a secondary data analysis of 374 randomly selected type 2 diabetes patients at a specialised diabetes clinic at Gaborone Botswana. We assessed the proportion of statin-eligible patients who are prescribed statins and evaluated the adjusted associations between various factors and statin prescription. Results Overall, 356 (95.2%) participants were eligible for a statin prescription. Clinicians prescribed statins in 162 (45.5%%; 95% confidence interval [CI]: 40.4% - 50.7%)) of eligible participants, and only one (5.5%) ineligible participant. The probability of statin prescription was high in participants with high baseline low-density lipoprotein cholesterol (risk ratio [RR]: 1.49; 95%CI: 1.17 - 1.89), increasing duration of diabetes (RR: 1.01; 95%CI 1.00 - 1.03) and the presence of chronic kidney disease (RR: 1.35; 95%CI: 1.06 - 1.74). Conclusion Most patients with type 2 diabetes are not receiving statins. Clinicians did not consider most guideline-recommended indications for statin prescription. The findings call for improvement in diabetes quality of care by implementing evidence-based guideline recommendations. Key words: statin, type 2 diabetes mellitus, prescription and Botswana

Background

Cardiovascular disease (CVD), which includes coronary artery disease (CAD), cerebrovascular accident, and peripheral arterial disease (PAD), are common and contribute to over two-thirds of mortality among patients with type 2 diabetes mellitus [1-3]. Although the presence of type 2 diabetes alone confers the highest risk for CVD of any single risk factor, the coexistence of other cardiovascular risk factors is a common phenomenon [3, 4]. Consequently, guidelines advise screening and optimal treatment of CVD risk factors in people with diabetes [5, 6]. Besides, prescribing of 3-hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors (statins) among patients with type 2 diabetes reduces the risk of major CVD events by 23%-33% [7-9]. There is evidence of statin benefit among patients with diabetes regardless of their low-density lipoprotein cholesterol (LDL-C) values or prior CVD history [7, 9-14]. For each mmol/l reduction in LDL-C, there is evidence of a 9 % relative reduction in all-cause mortality in patients with diabetes[15]. Irrespective of LDL-C, guidelines recommend statins for patients with diabetes aged ≥ 40 years without atherosclerotic cardiovascular disease(ASCVD), or those who are younger than 40 years but with existing ASCVD or additional risk factors [5, 6]. While some studies in developed countries have reported high use of statins among patients with type 2 diabetes, there has generally been under-prescription of statins across many countries [16-18]. Statin prescription ranges between 0% and 100% in developed countries [17-20]. The proportion of patients with type 2 diabetes in Africa receiving a statin currently ranges between 3 and 13% [21-23]. The suboptimal utilisation of statin therapy in Africa is due to many factors, but mainly limited access to standard diabetes care because of the high cost of tests and medications [22]. Affordability is a critical issue in several African countries where there is no universal healthcare,

with the cost of medicines accounting for up to 70% of total healthcare expenditure, much of which is out-of-pocket [24, 25]. This is a concern given the high growth rates of cardiovascular diseases in sub-Saharan African countries and current poor control of cardiovascular diseases [26-30]. The underuse of statins significantly increases the incidence of cardiovascular events and associated mortality [31]. Although healthcare is free in Botswana, factors not related to cost may still affect the uptake of statins in patients with diabetes. This is an issue given current prevalence rates of diabetes in Botswana and the resultant impact on morbidity and mortality [32]. Currently, there is no study assessing statin prescriptions among patients with type 2 diabetes in Botswana. We aimed to address this by evaluating the extent of statin prescriptions among patients with diabetes in Botswana. Our secondary aim was to determine factors associated with statin prescriptions among Type 2 diabetes. Subsequently, we will use the findings to develop appropriate strategies to address the situation identified concerns.

Methods

Study design

We conducted a secondary analysis of data from a previous study among type 2 diabetics at a specialised diabetes clinic in Gaborone, Botswana. Any concerns with the management of diabetic patients in this dedicated leading clinic are likely to be exacerbated in non-specialist centres such as primary healthcare centres.

Participant recruitment and data collection

The original study took place between August 2017 and February 2018. The primary objective of the original study was to assess glycemic, low-density lipoprotein, and hypertension control in patients with type 2 diabetes. The study included 500 randomly selected patients with type 2 diabetes aged ≥ 18 years who had received care from the clinic for at least three months before data collection. Demographic data (age, sex, occupation, educational attainments, and marital status), duration of diabetes, and the type of diabetes medications were collected. Other information was the history of hypertension, lipid disorders, ischemic heart diseases, stroke or peripheral vascular disease. We also recorded data on the use of medications for hypertension and lipid disorders (including statins), and anthropometric measurements (weight, height, hip and waist circumferences).

For the present study, we evaluated the extent of statin prescriptions among the participants in the dataset. As LDL-C is a consistent predictor of statin prescribing and usage in most patients with diabetes, we only included participants with available LDL-C results [9, 33]. Consequently, we analysed data of a subset of 374 participants. The primary outcome measure was receiving a statin prescription among statin-eligible participants. We assessed statin eligibility based on the Society for Endocrinology, Metabolism, and Diabetes of South Africa (SEMDSA) guidelines[6]. According to SEMDSA, the eligibility for statin prescribing included any cardiovascular disease (CVD) or chronic kidney disease (CKD),

participant's age above 40 years, and diabetes duration longer than ten years. Also, the presence of one or more additional cardiovascular risk factors, i.e. hypertension, cigarette smoker, low high-density lipoprotein cholesterol (HDL-C) level, family history of early CAD, and any albuminuria were the other eligibility criteria [6]. Thus, we assessed the association of the above eligibility criteria for statin prescribing. Other independent variables included baseline serum LDL-C, body mass index (BMI), waist-hip ratio (WHR) and education attainment.

Definition of terms

The diagnosis of hypertension was based on the self-reported history of hypertension, the use of hypertension-lowering medications or sustained blood pressure ≥140/90 mmHg in more than one visit [34]. We defined CVD as the history of CAD, cerebrovascular diseases (ischemic stroke, transient ischemic attacks), or peripheral vascular diseases (PAD) [6]. CAD was any documented definite or probable myocardial infarction, CAD-related revascularisation (surgery, angioplasty, stenting, or any combination of these), or stable angina in patients' medical records [35]. Cerebrovascular and peripheral vascular diseases were extracted from patients' medical records as defined by the treating physician. Smoking status was a documented self-report of current smoking habits. We estimated glomerular filtration rate (eGFR) using the Modification of Diet in Renal Disease (MDRD), and classified patients with eGFR < 60 ml/minute/1.73m^2 as having chronic kidney disease and an increased risk of a cardiovascular event [5, 6, 36]. Body mass index (BMI) was categorized into underweight for BMI <18.5 kg/m^2; normal for BMI of 25.0–29.9 kg/m^2; or obese for BMI ≥30 kg/m^2 [37]. We measured waist and hip circumferences using standard procedures and defined WHR ≥ 0.85 for women and ≥ 0.90 for men as high[38]. Dipstick proteinuria appeared as negative (−), trace, (+), (++), or (+++) in the dataset. We classified proteinuria in individuals with ≥(+) dipstick proteinuria results. For patients already on lipid-lowering medications and whose baseline 'untreated' levels of lipid profile were not available, we estimated the LDL-C levels before the initiation of statin treatment as in previous studies [39]. The adjustment was made based on the assumption that most patients received atorvastatin (the only statin available in the public sector in Botswana) at a dosage of at least 10mg per day. With an estimated adherence of 58.2 %, we calculated the baseline LDL-C levels by assuming that the measured LDL-C is a result of a 25% reduction from baseline [39]. Baseline LDL-C levels above 4.13 mmol/l were considered high[40].

Statistical analysis

Clean data were imported and analysed using Stata Version 14 (Stata Corp, College Station, TX). Categorical variables were presented as percentages and continuous variables as a mean (standard deviation [SD]) or median [first–third quartiles]. Comparison of clinical and demographic factors by gender and statin use was made using Chi-square or Fisher's exact tests for categorical variables, and independent student's t-tests or Wilcoxon rank sum test for continuous variables as appropriate. A 2-sided p-value < 0.05 was considered as statistically significant. To assess for independent predictors for statin prescribing, generalised linear models for the binomial family were used, and a log link was specified to

obtain relative risks and 95% confidence intervals. All factors with p < 0.2 on univariate analysis were added to the multivariable model. We used a backward selection modelling method, with probabilities set at 0.05 and 0.1 for inclusion and exclusion; respectively. We report adjusted risk ratios (RRs), 95% confidence intervals (CIs), and p-values. We required sample size of 374 to produce a two-sided 95% confidence interval with a width equal to 3.41% based on the assumptions of approximately 13% statin use among patients with type 2 diabetes in Botswana[22].

Results

Of the 500 patients in the dataset, we included 374 (74.8%) with complete baseline LDL-C data. Patients with incomplete data had the same age (59.1 vs 58.9 years, p=0.695), gender distribution (females 61.9% vs 67.4%, p= 0.262), statin prescribing rate (43.7% vs 43.6%, p = 0.989), and median duration of diabetes (6 vs 7 years, p = 0.427) as those with complete LDL-C data.

Table 1 summarises the patients' characteristics by gender. The majority (92.6%) of participants aged ≥ 40 years, and women were significantly older than men. Approximately a third (34.0%) of participants had a diabetes duration of over ten years. Hypertension (81.3%) and obesity (52.9%) were prevalent, especially in female participants. Overall, CKD (11.2%), proteinuria (9.4%), CVD (8.3%), and smoking (3.2%) were uncommon. The mean (SD) baseline LDL-C was 3.1 (1.2) mmol/L, significantly higher in female than male participants.

[Table 1: Demographic and clinical characteristics of patients with type 2 diabetes at a specialised Diabetes clinic in Gaborone (N= 374)]

Statin eligibility and prescribing rates

Of the 374 participants, 356 (95.2%) were eligible for a statin prescription. Clinicians prescribed statins (exclusively atorvastatin) in 162 (45.5%; 95% CI: 40.4% - 50.7%) of statin-eligible participants, and only one (5.5%) ineligible participant. Four (1.1%) of all participants received prescriptions of other lipid-lowering medications alone or in combinations with statins. Of those who were eligible for statins, statin-prescribed individuals differed from those without prescriptions in several parameters on univariate analysis (Table 2). Relative to the statin-non-prescribed group, the statin-prescribed group had a longer duration of diabetes (8.9 years vs. 5.0 years; p < 0.001); a higher proportion of participants with diabetes duration above 10 years (40.5% vs 28.9%; p = 0.019); were older participants (61.4 years vs 57.0 years ; p = < 0.001), and had a higher proportion of participants above 40 years old (96.9% vs 87.7%; p = 0.001). In addition, the statin-prescribed group had a higher proportion of hypertensive patients (90.2 % vs 74.4% ; p< 0.001), a higher proportion of those on antihypertensive(87.7% vs 71.6%, p< 0.001), a higher BMI (31.4 vs 30.1 kg/m^2; p< 0.039), higher WHR (87.7% vs 80.1%; p = 0.049), a higher proportion of participants with CKD (17.2% vs 6.6%; p= 0.001), and a higher baseline LDL-C (3.3 vs 2.9 mmol/L; p <0.001). The two groups did not differ significantly in the presence of CVD, proteinuria and gender.

[Table 2: Factors associated with statin prescription among statin-eligible patients with type 2 diabetes at a specialised Diabetes clinic in Gaborone (N= 356)]

Multivariable analysis

In the multivariable model which examined adjusted associations between statin prescription and various factors, the best fit had the following covariates: age, the duration of diabetes, BMI, hypertension a high baseline LDL-C, CKD, CVD, and proteinuria. Increasing diabetes duration was associated with an increased likelihood (RR: 1.01; 95%CI 1.00 - 1.03) of receiving a statin prescription (Table 3), as was the presence of CKD (RR: 1.35; 95%CI: 1.06 – 1.74) and a high baseline LDL-C (RR: 1.49; 95%CI: 1.17 - 1.89). Patients' age, BMI, history of CVD, and a diagnosis of hypertension were not associated with statin prescribing after adjustment for the other variables in the model.

[Table 3 Adjusted relative risks for associations between various factors and statin prescription among statin eligible patients with diabetes at a specialised diabetes clinic in Botswana]

Discussion

Among patients with type 2 diabetes at a specialised diabetes clinic in Botswana, less than half of the statin-eligible patients received a statin prescription. The longer duration of diabetes, a higher baseline LDL-C and the presence of chronic kidney disease were independently associated with the tendency to prescribe statins.

The under-prescription of statins in our cohort is a concern since the use of statins appreciably reduces cardiovascular events and mortality in patients with diabetes irrespective of their LDL-C levels[7, 9-13]. Although the proportion of patients with diabetes who are prescribed statins varies substantially worldwide, there is a low prescribing of statins both in developing and developed countries[18, 19, 21-23, 41-44]. The percentage of patients with diabetes who received statins (45.5%) in our cohort is consistent with findings from developed countries where 25% to 73% of patients with diabetes are prescribed statins despite recommendations from the guidelines [18, 19, 41-43]. The proportion of participants with a statin prescription in our cohort was higher than those reported in some cohorts in developed countries, such as German (25%) and British (33%) [18, 41]. While the finding of a comparatively higher statin prescription in our setting than some other settings in developed countries is encouraging, there is no reason for complacency as more than half of our patients were without CVD protection by statins. Similar to developed countries, one potential explanation for low statin prescribing rates among our patients with diabetes is poor adherence to guidelines [22, 33, 44, 45]. While there may be a fear of the association of statin therapy with a slightly increased risk of developing diabetes, the benefits of statins in reducing cardiovascular morbidity and mortality among patients with established diabetes should dispel these concerns [7-9, 46]. Several epidemiological studies have observed a lower proportion of statin prescription in patients with diabetes in Africa (3% to 13%) than in our cohort [21-23]. In addition to poor adherence to guidelines, the main reasons for low statin prescribing in Africa include limited access to these medicines

due to their high cost, lack of facilities for monitoring lipid profiles while patients are on treatment, and unavailability of guidelines[22]. The availability of free consultations, tests and medications in Botswana might explain our higher statin prescribing rates than those in other African settings without universal health access. Irrespective of the reasons, it is imperative that statins are routinely prescribed to reduce the risk of CVD events in patients with type 2 diabetes [7-13, 15, 47].

Our results of increasing statin prescribing with increasing diabetes duration also agree with previous research findings [48]. This is reassuring as a longer duration of diabetes leads to an increased risk of CVD. For this reason, guidelines recommend statins for patients with diabetes for more than ten years [5, 6]. Although this finding may suggest that clinicians correctly recognise a longer duration of diabetes as an indication for statin therapy, the results tend to agree with the fact that transmission of information between clinicians and patients about new medications requires time[49].

Another finding in our study was that the presence of chronic kidney disease increased the likelihood of statin prescribing. This finding is also encouraging as statins reduce mortality by up to 36% in patients with kidney failure[5, 6, 50, 51]. Besides, this finding is consistent with SEMDSA guideline recommendations of a statin for every patient with diabetes and CKD [6]. While the presence of any albuminuria is another marker of renal kidney disease used as an indication of statin use in people with diabetes, dipstick proteinuria was not associated with statin prescribing in our cohort. We can postulate that clinicians do not recognise proteinuria as a predictor of CVD and an indication for statins in patients with diabetes. We will investigate this further as it contrasts with Berthold et al. who reported increased odds of statin prescribing in type 2 diabetes patients with proteinuria in Germany[18]

Our findings that a high baseline LDL-C increased the likelihood of statin prescribing agreed with those of Berthold at al. that showed an 11% increase in statin prescribing rates for every 0.26 mmol/L increase in LDL-C [18]. Besides, this finding confirms the observation from previous studies that prescribers tend to respond more to the pre-treatment LDL-C value than to the patients' overall CVD risk profile as described in clinical guidelines [9, 33]. Although there is a lack of local guidelines, the clinic adopted the SEMDSA guidelines which recommend statins along with lifestyle changes regardless of cholesterol levels for all patients with diabetes aged > 40 with or without CVD[6]. Our findings that there is approximately a 50% increased likelihood of statin prescription in our cohort may suggest a need for deliberate efforts for improving the understanding and implementation of the adopted guidelines, and we will be taking this further.

In most clinical guidelines, the presence of CVD, CKD, patients age, diabetes and presence of CVD risk factors such as hypertension, albuminuria and cigarette smoking are indicators of prescribing statins among patients with type 2 diabetes[5, 6]. The recommendations are based mainly on the rationale that the presence of any of the above factors is associated with an increased risk of CVD. Except for CKD and duration of diabetes, none of the other indications was a predictor of statin prescriptions in our cohort. Given the high prevalence of hypertension and other indications in our cohort, most participants would have qualified for statins if guideline recommendations were adhered. As our clinic has adopted the

SEMDSA guidelines, this finding is a concern and a call for efforts to improve its implementation for the benefit of this high-risk population. We will be following this up.

We are mindful of the limitations of our study. We estimated the baseline LDL-C levels by a 25% adjustment of measured LDL. There was a risk of either overestimation or underestimation of the baseline LDL-C in case of significant errors in our assumptions of the dosage and the adherence of atorvastatin. Although measured LDL-C results were available for all the included participants, HDL cholesterol results were mostly missing. Guidelines consider HDL as one of the factors for statin prescriptions in patients with diabetes. However, all other indications for statin prescriptions were available in our cohort. We did not document the dosage of statin used in our cohort; hence, we are unable to determine whether moderate to high-intensity statins were prescribed as recommended by the guidelines. The study was also performed in one leading clinic, hence limiting the generalizability of the study findings to other facilities in the country. However, being one of the few specialised diabetes clinics in the country, our results likely represent the 'best' quality of diabetes care in Botswana. Consequently, highlighted concerns are likely to be higher in non-specialist healthcare facilities treating patients with type 2 diabetes in Botswana.

Conclusion

In conclusion, we believe this study provides a useful and reliable picture of current statin prescribing behaviour in Botswana despite the limitations mentioned above. There is under-prescribing of statins in this high-risk population. The presence of CKD, high baseline LDL, and an increased duration of diabetes strongly influence statin prescriptions in patients with diabetes. Clinicians did not consider most guideline-recommended indications for statin prescription. By identifying gaps in the prescription of statins to patients with diabetes, the study provides a substantial opportunity for improvement in diabetes quality of care. Furthermore, the study findings suggest a need for further studies to investigate the reasons for statin under-prescription in our setting. We are following this up to provide future guidance for clinicians in Botswana treating patients with type 2 diabetes, with the results likely to be of interest to other sub-Saharan African countries with high rates of type 2 diabetes.

Abbreviations

ASCVD: atherosclerotic cardiovascular disease; BMI: Body mass index; CAD: coronary artery disease; CKD: chronic kidney disease; CVD: Cardiovascular disease; eGFR: estimated glomerular filtration rate; HDL-C: HbA1c: Haemoglobin A1c; HDL-C: High density lipoprotein cholesterol; HRDC: Health Research Development Committee; LDL-C: Low density lipoprotein cholesterol; MDRD: Modification of Diet in Renal Disease PAD: peripheral artery disease; SEMDSA: Society for Endocrinology, Metabolism, and Diabetes of South Africa WHR: Waist-Hip ratio.

Declarations

Ethics approval and consent to participate

The Health Research Development Committee(HRDC) of the Botswana Ministry of Health and Wellness(HPDME:13/18/1) and Stellenbosch University Health Research Ethics Committee (X19/01/001) approved the study. The participating patients provided written informed consent in the primary study.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request and with permission of the HRDC of Botswana Ministry of Health and Wellness.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JCM, BG and EMT conceptualized the study. JCM analysed data and drafted the initial draft. ETM and BG critically reviewed data and reviewed the manuscripts. All the authors read and approved the final manuscript.

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Tables

Table 1: Demographic and clinical characteristics of patients with type 2 diabetes at a specialised Diabetes clinic in Gaborone (N= 374)

Characteristics	All (N=374)	Males (n= 122)	Females (n= 252)
Age, mean (SD), years	58.9(12.5)	54.8(12.5)	60.9 (12.0)
Age > 40 years n (%)	343(91.7)	106 (86.9)	237(94.1)
Diabetes duration, median, IQR, years	7 (3-13)	6.5 (2-14)	6 (2.5-13)
Diabetes duration > 10 years	127 (34.0)	45 (36.9)	82 (32.5)
BMI, mean (SD) kg/m^2	30.6 (5.9)	29.3(5.5)	31.3(6.0)
Normal weight n (%)	65 (17.4)	27(22.1)	38(15.1)
Overweight n (%)	111(29.7)	42(34.4)	69 (27.4)
Obese n (%)	198(52.9)	53 (43.4)	145(57.5)
Marital status			
Living alone n (%)	202 (54.0)	39 (32.0)	163(64.7)
Living with a partner n (%)	172(46.0)	83 (68.0)	89(35.3)
Education status			
≤ Primary education, n (%)	230(61.5)	61(50.0)	169 (61.5)
≥ Secondary or tertiary, n (%)	144(38.5)	61 (50.0)	83 (32.9)
WHR, mean (SD)	0.94(0.10)	0.97(0.09)	0.93(0.01)
Low WHR n (%)	62(16.6)	49 (40.2)	13(5.2)
High WHR n (%)	312(83.4)	73 (59.8)	239(94.8)
Hypertension n (%)	304(81.3)	87 (71.3)	217(86.1)
Use of antihypertensive n (%)	294(78.6)	78(63.9)	216(85.7)
Smoking n (%)	12(3.2)	8(6.6)	4(1.6)
Lipid-lowering medications n (%)	167(44.7)	50(41.0)	117(46.4)
Statins n (%)	163(43.6)	49(40.2)	114(43.6)
Others n (%)	4(1.1)	2(1.6)	2(0.8)
CVD n (%)	31(8.3)	11(9.0)	20(7.9)
PAD n (%)	7(1.9)	1(0.8)	6 (2.4)
Coronary artery disease n (%)	11(2.9)	4 (3.3)	7(2.8)
Cerebrovascular disease n (%)	15 (4.0)	6(4.9)	9(3.6)
CKD n (%)	42 (11.2)	18 (14.8)	24 (7.5)
Proteinuria n (%)	35(9.4)	16(13.1)	19(7.27)
HbA1c mean (SD), %	8.5(2.5)	8.7(2.7)	8.4(2.4)

Baseline LDL-C, mean (SD), mmol/L	3.1(1.2)	2.8(1.1)	3.3(1.2)
Normal	315(84.2)	113(92.6)	202(80.2)
High	59(15.8)	9(7.4)	50(19.8)

Legend: BMI- Body Mass Index, CKD – chronic kidney disease, CVD – cardiovascular disease, HbA1c – Haemoglobin A1c, IQR – interquartile range; LDL-C – low-density lipoprotein cholesterol, PAD – peripheral artery disease, SD – standard deviation; WHR – waist-hip ratio,

Table 2: Factors associated with statin prescription among statin-eligible patients with type 2 diabetes at a specialised Diabetes clinic in Gaborone (N= 356)

Characteristics	Statin not prescribed (n= 194)	Statin prescribed (n= 162)	P-value
Sex			
Males, n (%)	63 (33.5)	49(30.2)	0.512
Female, n (%)	129(66.5)	113(69.8)	
Diabetes duration, median, IQR, years	6(2 – 12)	8.9(4 – 15)	0.001
Duration ≤ 10 years	133(68.6)	96(59.3)	0.068
Diabetes duration > 10 years	61(31.4)	66 (40.7)	
Age, mean (SD), years	59.2(11.0)	61.6(11.0)	0.038
Age ≤ 40 years, n (%)	9(4.6)	4(2.5)	0.277
Age > 40 years n (%)	185(95.4)	158(97.5)	
Marital status			
Living alone n (%)	115(54.5)	87(53.4)	0.828
Living with a partner n (%)	96 (45.5)	76 (46.6)	
Education status			
≤ Primary education, n (%)	124(63.9)	106(65.4)	0.766
≥ Secondary or tertiary, n (%)	70(36.1)	56(34.6)	
Hypertension n (%)	157(80.9)	147 (90.7)	0.009
Antihypertensive use n (%)	151(77.7)	143(88.3)	0.010
Smoking	10(5.1)	2(1.2)	0.041
CVD, n (%)	15(7.7)	16(9.9)	0.475
- PAD, n (%)	5(2.6)	2 (1.2)	0.462
- Coronary artery disease n (%)	5(2.6)	6 (3.7)	0.541
- Cerebrovascular diseases n (%)	7 (3.6)	8(4.9)	0.534
BMI, mean (SD) kg/m^2	30.4(5.8)	31.4(5.9)	0.135
Normal weight n (%)	36(18.5)	21(13.0)	0.355
Overweight n (%)	56(28.9)	49(30.2)	
Obese n (%)	102(52.6)	92(56.8)	
WHR, mean (SD) kg/m2	0.93(0.08)	0.95(0.10)	0.028
Low WHR n (%)	33(17.0))	20(12.3)	0.218

High WHR n (%)	161(83.0)	142(87.7)	
CKD, n (%)	14(7.2)	28 (17.3)	0.003
Proteinuria, n (%)	20 (10.3)	15(9.3)	0.740
HbA1c mean (SD), %	8.4(2.6)	8.4(2.2)	0.781
Baseline LDL-C mean (SD), mmol/L	3.0(0.9)	3.3(1.4)	0.004
Normal	177(91.2)	120(74.1)	<0.001
High	17(8.8)	42(25.9)	

Legend: BMI- Body Mass Index, CKD – chronic kidney disease, CVD – cardiovascular disease, HbA1c – Haemoglobin A1c, IQR – interquartile range; LDL-C – low-density lipoprotein cholesterol, PAD – peripheral artery disease, SD – standard deviation; WHR – waist-hip ratio,

Table 3 Adjusted relative risks for associations between various factors and statin prescription among statin eligible patients with diabetes at a specialised diabetes clinic in Botswana

Characteristic	Risk ratio	95% Conf. Interval	p-value
Age	1.006	0.994-1.017	0.362
CKD	1.354	1.055-1.738	0.017
Hypertension	1.336	0.846-2.110	0.213
BMI	1.014	0.994-1.034	0.16
High baseline LDL	1.488	1.173-1.887	0.001
Diabetes duration, years	1.014	1.000-1.027	0.048
Proteinuria	0.979	0.644-1.488	0.922
CVD	0.901	0.623-1.303	0.581

Legend: BMI- Body Mass Index, CKD – chronic kidney disease, CVD – cardiovascular disease, LDL-C – low-density lipoprotein cholesterol.