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Control of Diabetic Dyslipidemia among Type-II Diabetics in Western Region of the Republic of Macedonia

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Abstract **Background:** Serum lipids are poorly controlled in most European countries and the control rate is even lower in diabetic patients. All international guidelines recommend aggressive management of lipids in this population. To date, evidence on whether diabetic dyslipidemia is adequately managed or not in western region of the Republic of Macedonia are scarce. **Objective**: To determine the degree of dyslipidemia control in diabetics patients, according to evidence and current guidelines, by primary healthcare physicians, in our region. **Methods:** This is a multicenter, non-interventional, observational study. Prospectively tested were 555 participants. The study was conducted at outpatient in Primary Health Care Clinics in 8 towns, on western region Republic of Macedonia. Study participants were selected among primary care patient, who were receiving ongoing care for diabetes mellitus type-2(T2DM) and dyslipidemia, during 1 calendar year. We recorded information from all healthcare encounters during 1 calendar year. **Results:** Our study showed that among diabetic patients with overt cardio-vascular disease(CVD), target LDL-C level of (< 70 mg/dL),was achieved in 21.4% of patients, whereas 78.6% of patient did not achieved target LDL-C level, respectively.(p=.0000). Among diabetic patients without overt CVD, target LDL-C level of (< 100 mg/dL) was achieved in 44.2% of patients, whereas 55.7% of patients did not achieved target LDL-C level, respectively (p=.06). It was observed that, only 36.7% of the total study population, had achieved LDL-C goals according to evidence and current guidelines, whereas 63.3% of patients did not achieved target LDL-C level, despite an ongoing medical treatment, respectively.(p= .0000). Among the total study population (N=555), target LDL-C level was achieved in 14.0% of the female patients and in 47.3% of the male patients, respectively. (p=.002). Age, BMI and Duration of T2DM, were significantly associated with uncontrolled LDL-C level, according to evidence and current guidelines. (Age: OR=1.214; 95%CI 1.165-1.1263; p=.000; BMI: OR=1.270; 95% CI 1.203-1.341; p=.000; Duration of T2DM: OR=1.035; 95% CI 0.950-1.121;p=.036). **Conclusions:** Control rates of dyslipidemia among T2DM patients, in the western region of the Republic of Macedonia, continue to be alarmingly low, particularly in women. It is clear that aggressive dyslipidemia management is the need of the hour in patients with diabetes.

Keywords Control of Diabetic Dyslipidemia, Western Region of the Republic of Macedonia

1. Introduction

Diabetes mellitus is one of the most common chronic diseases globally and continues to increase in numbers. It is among the top five causes of mortality[1].Diabetes is considered a coronary heart disease (CHD)- risk equivalent and it is frequently associated with various other cardiovascular (CV) risk factors. The risk of developing atherosclerotic changes is significantly higher in diabtics in comparation with peoples without diabetes, which is mostly due to the differences in the plasma lipid metabolism and development of typical diabetic dyslipdemia with high atherogenic potencial. It is well-established that dyslipidemia is a major risk factor for macrovascular complications in patients with type-2 diabetes mellitus (T2DM) and affects 10%-73% of this population[2-4].Abnomalities in lipid metabolism that are observed in the context of type 2 diabetes are among the major fators contributing to an increasing cardiovascular risk. Diabetic dyslipidemia includes not only quantitative

lipoprotein abnormalities, but also qualitative and kinetic abnormalities that, together result in a towards a more atherogenic lipid profile[5]. Approximately, 80% of deaths in patients with diabetes are attributable to cardiovascular disease [6]. Dyslipidemia in diabetes commonly manifests as raised low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL-C) levels, or elevated triglyceride (TG) levels. Furthermore, data from the United Kingdom Prospective Diabetes Study suggest that both decreased HDL-C and elevated LDL-C predict cardiovascular disease in diabetes[7]. All international guidelines recommend aggressive management of lipids in this population[8-10].It is very well-established that reducing LDL-C can reduce cardiovascular events both in primary as well as secondary prevention patients[10].

Serum lipids are poorly controlled in most European countries and the control rate is even lower in diabetic patients. However, studies show that, 35-85% of treated diabetics, do not reach the recommended targets [7, 11, 12].

Therefore, treated but uncontrolled diabetic dyslipidemia is major problem i preventive health care. Primary healthcare physicians play a very important role in treating dyslipidemia in diabetics patient, as most of them are being followed up at primary hethcare clinics.

It would therefore be worthwhile to investigate diabetic dyslipidemia control, the pursuit of recommended targets, in a cohort of diabetics patients, who were under general practisioners care.

To date, evidence on whether diabetic dyslipidemia is adequately managed or not in western region of the Republic of Macedonia are scarce.

Objective: To determine the degree of dyslipidemia control in diabetics patients, according to evidence and current guidelines, by primary healthcare physicians, in our region.

Methods: Study Design: This is a multicenter, non-interventional, cross-sectional study. The study is in compliance with the Declaration of Helsinki. All patient that participated in this study were written informed, consent was obtained from all participating patients before they were enrolled into the study.

Prospectively tested were 555 participans. Out of the total population, 47.9% were males and 52.1% were females.

The study was conducted at outpatient in Primary Health Care Clinics in 8 towns, on western region Republic of Macedonia. Study participans were selectet among primary care patient, who were receiving ongoing care for diabetes mellitus type-2(T2DM) and dyslipidemia, between September 1, 2015 and Sepemer 1, 2016.We recorded information from all healthcare encounters during 1 calendar year.

Inclusion criteria: Patient was eligible for inclusion in the study if they were between 40 and 79 years of age, were under treatment for T2DM and dyslipidemia diagnosed by use validated criteria [10, 13, 14].

Exclusion criteria: Patients with kown a type 1diabetes,acute cerebrovascular and cardiovascular disease, history of malignancy, history of chronic kidney disease, unexplained increased creatinine, uncontrolled hypothyroidism, current active liver disease or ALT,AST level >3 times the ULN, pregnant or breast feeding women or planning to conceive, initiation of hormone-replacement therapy or oral contraceptives within 3 mounth of enrolement, history of alcohol and drug abuse within the last 5 years, refusal to sign informed consent form.

Clinical and Demographic Characteristics: The survey obtained data on: age, gender, calculated body mass index(BMI),duration of diabetes, cardiovascular medical history such as family history of premature CHD, the presence of known cardiovascular risk factors, cardiovascular atherosclerotic disease (CVAD) or CHD-risk equivalents (metabolic syndrome, smoking habits),cerebral and peripheral vascular disease, current lipid-lowering therapy.

An overnight fasting blood sample was drawn from each patient to determine: blood glucose, lipid profile tests (TC, LDL-C, HDL-C, TG), urea, creatinin, ALT, AST, urine protein. The sample analysis was performed using standard biochemical analytical methods.

The mean value of lipids (TC, LDL-C, HDL-C, TG), recording during the study period, were calculated.

Patients with one or more parameters, that is, TC, LDL-C, HDL-C, TG, outside the recommended targets [13, 14], were considered to have dyslipidemia.

For the current analysis, LDL-C cholesterol < 70 mg/dL (1.8 mmol/L) in patient at very-high cardiovascular(CV) risk group and < 100 mg/dL (<2.6mmol/L) in high cardiovascular(CV) risk group, have been considered as per European Society of Cardiology (ESC)the European Atherosclerosis Society(EAS) guidelines[13] and American Diabetes Association[14] (ESC/EAS/ADA) guidelines.

Table 1. The therapeutic LDL-C goal as per ESC/ EAS/ADA guidelines

Lipid parameters	goal
LDL-C	< 70 mg/dl in patient with overt CVD;
	< 100 mg/dl in patient without overt CVD
HDL-C	> 40 mg/dl for males and >50mg/dl for females
Triglycerides	< 150 mg/dl
Total Cholesterol	< 240 mg/dl

CDV: Cardiovascular disease, LDL-C: Low-density lipoprotein cholesterol, HDL-C: High-density lipoprotein cholesterol, ESC: European Society of Cardiology, EAS: European Atherosclerosis Society, ADA: American Diabetes Association.

The therapeutic LDL-C goal of each patient were then classified according to definitions and criteria set by the (ESC/EAS/ADA) guidelines[13, 14]. Details are provided in Table 1.

2. Statistical Analyses

The acquired continuous data from the examinations for each group shown as middle value +/- for standard deviation (SD).

At the series with atributive marks the percentage of

structure is determined (%).

The differences at the series with atributive marks are tested with Difference tests (p).At the series with numerical marks it has been worked with Descriptive statistics (Mean, 95%CI, Min., Max, Std. Dev.).

At the series with numerical marks where there is no deviation from the normal distribution, the difference is tested with t-test for independent samples (t).

The logistical regressive analysis is used for testing the assotiation between the categorized variables. A, p-valuae of 0.05 or less was considered as the indication for statistical significance. The data are shown in tables and graphics.

The statistical processing of data is done by the statical programs STATISTICA 7.1 and SPSS 19.0.

3. Results

Baselines clinical and laboratory data are shown in the Tables (2,2a).The majority of demographic and clinical data did not showed significant differences between patients in different groups. Significant differences between the groups in the clinical variables, were observed in the relation to Age and BMI, respectively,

(Age: 56.3±5.8 vs. 62.1±4.8 p=

=.000;BMI: 25.7±4.4 vs.31.9±3.1,p=.000).

Table 2. Basic demographic, clinical and laboratory characteristics of study population (n=555).

Variables		N (%)	Mean	S.D.	±95% C.I.
Gender	Females	289(52.1)			
	Males	266(47.9)			
Age(y)		555(100)	60.4	±6.4	59.8-60.9
BW (kg)		555(100)	75.4	±11.1	74.5-76.4
BH(cm)		555(100)	168.8	±6.5	168.2-169.3
BMI(kg/m)		555(100)	30.6	±4.1	30.3-31.0
DM-d(y)		555(100)	5.6	±2.1	5.4-5.8
No- of visits.		555(100)	4.4	±0.6	4.3-4.4
Art.aa.dis.	Coro.dis.	60(10.8)			
	Cer-strok.	42(7.5)			
	Peri.vasc.dis	3(0.5)			
Smoker		28(5.0)			
SCORE >10%		21(3.8)			
GFR <30ml/min/1.73m^2		2(0.3)			
SBP (mmHg)		555(100)	134.0	±8.6	133.2-134.7
DBP (mmHg)		555(100)	80.9	±8.5	80.2-81.6
Medic.	Atorvastatin	321(57.8)			
	Rosuvastatin	165(29.7)			
	Ator.+Fibrate	58(10.8)			
	Rosu.+Fibrate	11(2.0)			
Proteinuria		48(8.6)			
Glic.(mmol/dl)		555(100)	6.2	±0.4	6.1-6.3
T.C. (mmol/dl)		555(100)	5.9	±0.3	5.86-5.92
LDL-C (mmol/dl)		555(100)	3.4	±0.3	3.42-3.49
HDL-C. (mmol/dl)		555(100)	1.3	±1.4	0.76-1.9
TG. (mmol/dl)		555(100)	1.96	±0.24	1.94-1.97
Creatin. (mmol/dl)		555(100)	80.9	±7.5	80.4-81.6

Values are mean ± SD; y=year; No- of visits=number of measures of Lipids during 1-year; BW: body weight; BH: body height; BMI: body mass index; D.M-d: diabetes mellitus duration; Art. aa. disease: Arteriosclerotic arterial disease; coro. dis: chronic coronary artery disease; cer-strok: cerebral strok;

Perifer.dis: periferic arteriosclerotic artery disease; SCORE: systematic coronary risk estimation;

GFR: glomerular filtrationrate; SPB: Systolic Blood Presure; DBP: Diastolic Blood Presur; Medic: medicine used; Glic: glicemia; Creatin: creatinin; TC: total holesterol; LDL-C: low density holesterol; HDL-C: hight density holesterol; TG: trigicerides.

Table 2a. Basic demographic, clinical and laboratory characteristics of study population (n=555).

	Gr. of Diabetics with Controlled dyslipidemia. (n-204)			Gr. of Diabetics with Uncontrolled dyslipidemia (n-351)			
Variables	n	Mean	SD	n	Mean	SD	P-value
Age(y)		56.3	± 5.8		62.1	±4.8	0.000
BW (kg)		74.3	±10.9		75.1	±11.2	0.669
BH(cm)		167.7	± 7		168.8	±8	0.858
BMI(kg/m)		28.7	± 4.4		31.9	±3.1	0.000
SBP(mmHg)		134.6	± 9.3		137.8	±9.1	0.280
DBP(mmHg)		80.7	± 8.2		81.1	±8.8	0.616
DM-d(y)		5.5	± 2.1		5.7	±2.6	0.882
Smoker(n)	7			19			0.308
Glic.(mmol/dl)		6.1	±5		6.5	±7	0.287
Creatinin(mmol/dl)		81.5	±6		80.3	±5	0.713

Values are mean ± SD;y=year; N=number of smokers;BW:body weight; BH:body height; BMI: body mass index;SBP:systolic blood presure;DBP:diastolic blod presure; D.M-d:diabetes mellitus duration; glic:glicemia;

Table 3. Achievement of therapeutic LDL-C goal as per ESC/ EAS/ADA guidelines

Therapeutic LDL-C goal as per ESC/ EAS/ADA guidelines			**Totals**
Chi-square: 42.7; p= 0.0000			
Diabetic group with overt CVD(n-182)			
	Controlled LDL-C	Uncontrolled LDL-C	
Count (No)	39	143	**182**
Percent (%)	**21.4%**	**78.6%**	100
Chi-square: 3.31; p= 0.06			
Diabetic group without overt CVD(n-373)			**Totals**
	Controlled LDL-C	Uncontrolled LDL-C	
Count (No)	165	208	**373**
Percent (%)	**44.2%**	**55.7%**	100
Chi-square: 26.16; p= 0.0000			
Diabetics with and without overt CVD(n-555)			**Totals**
	Controlled LDL-C	Uncontrolled LDL-C	
Count (No)	204	351	555
Percent (%)	**36.7**	63.3	100

TC:total holesterol; LDL-C: low density holesterol; HDL-C:hight density holesterol;TG: trigicerides.CVD:cadiovascular disease. ESC/ EAS/ADA; ESC: European Society of Cardiology; EAS: European Atherosclerosis Society; ADA: American Diabetes Association.

Table 3a. Achievement of therapeutic goal as per ESC/ EAS/ADA guidelines

Parameter	**Categoty**	**N**	**Goal (mg/dl)**	**N (%)**
LDL-C	with overt CVD	182	<70	39(21.4)
	without overt CVD	353	<100	165(44.2)
HDL-C		555	>40(M; >50(F)	248(44.6%)
TG		555	<150	340(61.2%)
TC		555	<240	263(47.4%)

LDL-C: low density holesterol; HDL-C:hight density holesterol;TG: trigicerides.TC:Total holesterol;M:Males;F:Females. ESC/ EAS/ADA; ESC: European Society of Cardiology; EAS: European Atherosclerosis Society;ADA: American Diabetes Association

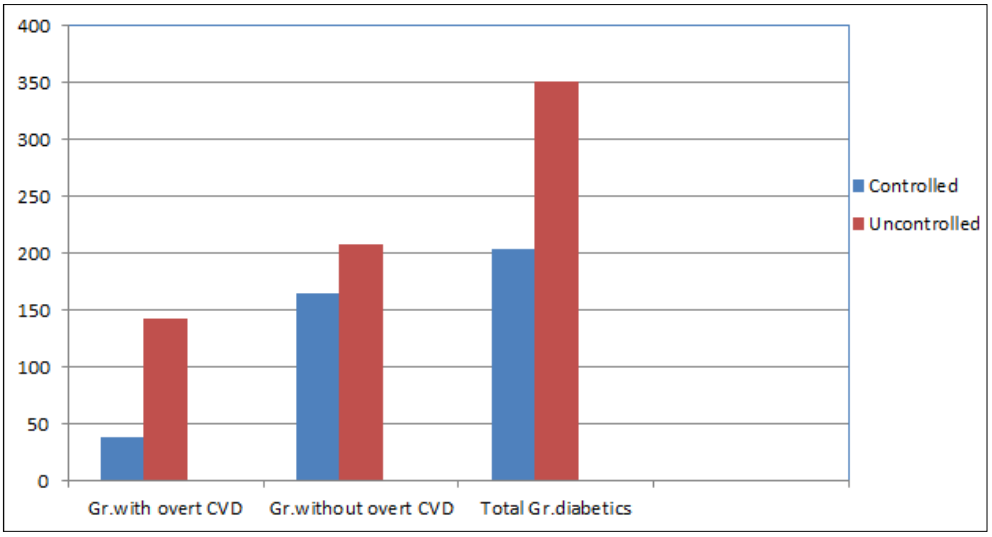

Figure 1. Control of dyslipidemia in diabetic patients, according to evidence and current guidelines

Table 4. Logistic Rgresion Model: Assotioation of (Age, BMI, Duration of D.M) with uncontrolled dyslipidemia.

		B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	**AGES**	.194	.020	95.142	1	.000	1.214	1.168	1.263
	Constant	-10.930	1.168	87.552	1	.000	.000		
Step 1[a]	**BMI**	.239	.028	74.207	1	.000	1.270	1.203	1.341
	Constant	-6.732	.846	63.251	1	.000	.001		
Step 1[a]	**D. duration**	.035	.041	.721	1	.036	1.035	.956	1.121
	Constant	.355	.245	2.099	1	.147	1.427		
BMI: Body mass index; D. duration: Duration of Diabetes Mellitus.									

Our study showed that among those with overt CVD (N = 182), target LDL-C level of < 70 mg/dL was achieved in 21.4%(39 out of 182) of patients, whereas 78.6%(143 out 182) of patient did not achieved target LDL-C level, respectively.(Chi-square=42,7; p=.0000).The difference was found to be statistically significant. Among those without overt CVD (N = 351),target LDL-C level of < 100 mg/dL was achieved in 44.2% (165 out of 373),whereas 55.7% (208 out of 373) did not achieved target LDL-C level. respectively. (Chi-square:3.31; p=.06).The difference was found not to be statistically significant. It was observed that, only 36.7% of the total study population (204 out of 555),had achieved LDL-C goals according to evidence and current guidelines, whereas 63.3% (351 out of 555) did not achieved target LDL-C level, despite an ongoing medical treatment, respectively.(Chi-square: 26.16; p= .0000).The difference was found to be statistically significant.(Table 3,3a,Figure 1).

Among the total study population (N=555), target LDL-C level was achieved in 14.0% (78 out of 555) of the female patients and in 47.3% (126 out of 555) of the male patients, respectively. (Chi-square:9.55; p=.002). The difference was found to be statistically significant.

Fitting logistic regression models including all study participants(N=555),we found the following variables: Age, BMI and Duration of T2DM, to be significantly associated with uncontrolled LDL-C level, according to evidence and current guidelines.(Table 4). With increasing age, paticipans had significantly higher odds of failing to reach target LDL-C level according to evidence and current guidelines(OR=1.214; 95% CI 1.165-1.1263; p=.000). With increasing BMI, paticipans had significantly higher odds of failing to reach target LDL-C level according to evidence and current guidelines (OR=1.270; 95% CI 1.203-1.341; p=.000). With increasing Duartion of D.M, paticipans had significantly higher odds of failing to reach target LDL-C level according to evidence and current guidelines (OR=1.035; 95% CI 0.950-1.121; p=.036).

Diabetic dyslipidemia was the most common dyslipidemia pattern observed in our study, which include: hypertriglyceridemia, low high-density lipoprotein cholesterol (HDL-C), and mildly elevated low-density lipoprotein cholesterol (LDL-C), and this accounted for a 2/3 of the study population.

Top four molecules used in the study were atorvastatin (57.8%), rosuvastatin (29.7%), combination of atorvastatin and fenofibrate (10.8%), and rosuvastatin and fenofibrate (2.0%).(Figure 2).

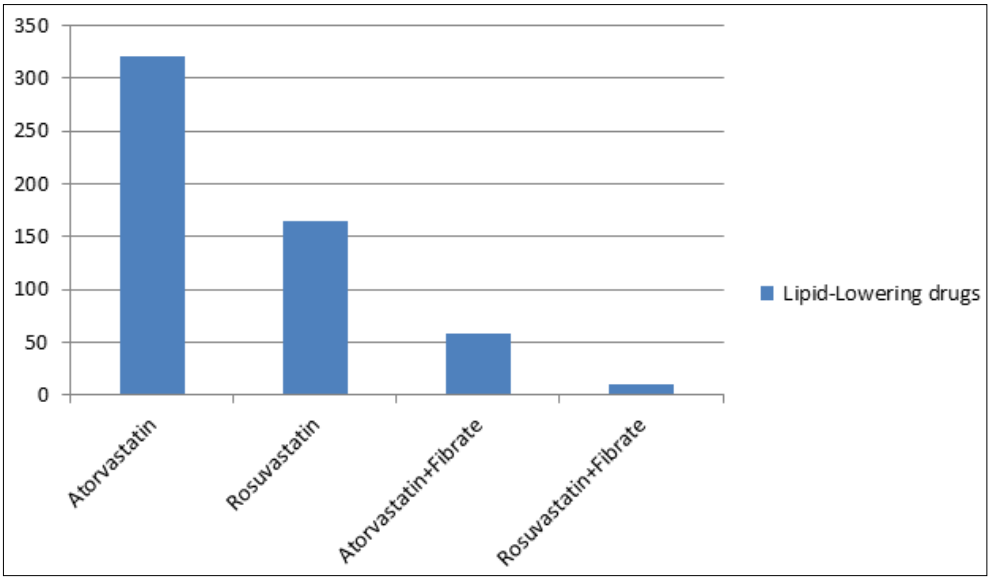

Figure 2. Lipid-lowering drugs used.

4. Conclusions

Control rates of dyslipidemia among T2DM patients, in the western region of the Republic of Macedonia,continue to be alarmingly low, particularly in women. Over half of patients with diabetic dyslipidemia, are not achieving the LDL-C goal as defined in the current guidelines despite being on treatment with LLDs. This calls for the awareness and intervention of dyslipidemia in these patients. It is clear that aggressive dyslipidemia management is the need of the hour in patients with diabetes.

5. Discussion

Dyslipidemias, cover a broad spectrum of lipid abnormalities, some of which are of great importance in CVD prevention. Elevation of LDL-C has received most attention, particularly because it can be modified by lifestyle changes and drugs. The evidence showing that reducing LDL-C can prevent CVD is strong and compelling, based on results from multiple randomized controlled trials. LDL-C levels continue therefore to constitute the primary targets of therapy[13-14].

Our study shows that only 36.7% of diabetics had their LDL-C levels within the target range, while a high percentage 63.3%,have uncontrolled LDL-C, despite ongoing medical treatment. In our study, control of LDL-C, was worst in those with overt CVD, only 21.4% of them reaching LDL-C goal, while a high percentage 78.6%, have uncontrolled LDL-C, despite ongoing medical treatment.

Treated but uncontrolled LDL-C, in diabetics, is a common problem. Rates of lipid control continue to be low, both in primary and secondary preventon.

Numerous studies have revealed poor awareness and unsatisfactory treatment and control in many countries.de la Siera et al, demonstrated that only 15% in diabetic patients with overt CVD achived LDL-C goal <70 mg/dl and less than 50% among diabetic patients without overt CVD, achived LDL-C goal <100 mg/dl[15].

Mithal A et al, demonstrated that a slightly lower proportion (only 22.9%) of the very high-risk diabetic patients, reached LDL-C level < 70 mg/dl, among those high-risk diabetic patients, target LDL-C level of < 100 mg/dl, was achieved in 48.61% [16].Marqyes da Silva P, demostretes that 58.8% of diabetic patients without overt CVD failed to attain LDL-C goal < 2.6 mmol/L, and 77% of diabetic patient with overt CVD, did not reach the optional goal of LDL-C < 1.8 mmol/L[17]. Yan L et al, demonstrated that a slightly lower proportion (only 15,3%) of the very high-risk diabetic patients reached LDL-C goal (< 70 mg/dl),among those high-risk diabetic patients target LDL-C goal(< 100 mg/dl) was achieved in 39.4% [18].

In our study, control of LDL-C, was worst in diabetic females compared to diabetic males. In study of Khan HA et al, LDL-C did not differ significantly between males and females[19].Instudy of He H et al, LDL-C was increased in females diabetic patients [20].Tabazzum et al, found that diabetic males had significantly high level of LDL-C, compare to diabetic females [21].

Control of other lipid parameters, was also inadequate in our study population with less than 44.6% and 61.2% of the patients reaching HDL-C and TG goals, respectively. To date, no specific targets for HDL-C or TG levels have been determined in clinical trials, although increases in HDL-C predict atherosclerosis regression and low HDL-C is associated with excess events and mortality in CAD patients, even when LDL-C is lower than 1.8 mmol/L or 70 mg/dL. However, clinical trial evidence is lacking on the effectiveness of intervening on these variables to reduce CV risk further, and thus they have been regarded as secondary and optional [13].

In our study, Age, BMI and duration of T2DM, were found to be associated with uncontrolled LDL-C. We observed that lipid control rates went down with increasing age. Others have found similar results[16, 20, 22]. Nadeem A et al, reported that age and duration od T2DM, was not found to be correlated with lipid control [23].In the present study, diabetic patients with uncontrolled dyslipiemia, have significantly higher BMI. Others have found similar results[16, 17, 23].

Lipid abnormalities observed in patients with type 2 diabetes (Diabetic Dyslipidemia), play a central role in the development of atherosclerosis. These lipid abnormalities are not only quantitative, but also qualitative and kinetic in nature [24].Increased triacylglycerols,increased LDL-C and reduced HDL-cholesterol are the main quantitative lipid abnormalities of diabetic patients. This patern of dyslipidemia was the most common observed in our study, and this accounted for a 2/3 of the study population.

Statin therapy is recommended as the initial pharmacological treatment for lowering LDL-C levels in patients with type 2 diabetes who either have overt CVD or are over 40 years old and have increased CVD risk [25, 26], but it is cleare that statins ae not the universal solution to the problem of high cholesterol levels, and the obtimization of lipid-lowering therapy remains a therapeutic challenge.

Considering the rising prevalence and changing epidemiology of both diabetes and CVD and the higher likelihood of their coexistence in our country, this data provide important insights on control of dyslipidemia in this vulnerable population. Therefore, this calls for immediate attention by the medical community to resort to a more aggressive approach to manage dyslipidemia, especially in those with diabetes and overt CVD. We hope our study will pave the way for future research in this area and also help the medical fraternity in consciously taking measures to address these burning issues. Control rates of dyslipidemia among T2DM patients, in the western region of the Republic of Macedonia, continue to be alarmingly low, particularly i women. It is clear that aggressive dyslipidemia management is the need of the hour in patients with diabetes.

We must admit that this research has some limitations. Due to the real world setting of the study, some of the key challenges were in terms of lack of proper medical screening, high dependency on patient reported medical history, a availability of laboratory reports. While we acknowledge the limitations of the study, we believe the data are valuable given the high magnitude of diabetic dyslipidemia in the in the western region of the Republic of Macedonia. Further research is needed to gather more information and insights.

Authorship Contributions

Concept-Ylber. Jani; Design–Bekim Pocest; *Supervision*-Atila

Rexhepi; *Materials*-FatmirFerati; DaliLala;Agim Zeqiri; Arben Mirto; *Data collection/processing*-Sotiraq Xhunga; Artur Serani; *Analysis/or interpretation*-Ylber.Jani.; Atila Rexhepi; Bekim

Pocesta; *Literature search*-Dali.Lala; Fatmir Ferati; Ylber Jani; Artur Serani;

Critical Reviews: Ahmet Kamberi; Atila Rxhepi.

All authors read and approved the final manuscript.

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Used Abbreviations in the Text

AGE – Age
BW – Body weight
BH – Body height
BMI – Body mass index
BP – Blood pressure
SBP – Systolic blood pressure
DBP – Diastolic blood pressure
GLYC – Glycemia
T2D - Diabetes type-2.
ACV - Artheriorsclerotic cardio vascular disease
CHD - coronary heart disease
CV - cardio-vascular
CVAD - cardiovascular atherosclerotic disease
CRE – Creatinemia
TCH – Total cholesterol
LDC – Low density cholesterol
HDC – High density cholesterol
TG – Trigliceride
EAS - European Atherosclerosis Society
ESC - European Society of Cardiololg
ACC/AHA –Ameican Colleg of Cardiololgy;Amer Heart Assotiation.

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