Statin Intensity Regimens in Thai Type 2 Diabetic Patients Who Achieved LDL-C Targets

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Background: *Type 2 diabetes mellitus (T2D) increases the risk of developing atherosclerotic cardiovascular disease (ASCVD). Statins reduce ASCVD events and are recommended in patients with T2D. Low-, moderate, and high-intensity regimens are predicted to achieve LDL-C reduction by about <30%, 30% to <50%, and ≥50%, respectively.*
Objective: *To investigate the proportions of different statin intensity regimens used in patients with T2D that achieved LDL-C targets.*
Material and Method: *This retrospective cross-sectional study was conducted in 269 T2D adults with LDL-C <100 mg/dL that were stratified into three groups by statin intensity according to 2013 ACC/AHA guideline. Factors significantly associated with higher-intensity statin use were determined by multivariate analysis.*
Results: *Subjects were mostly elderly with long-standing T2D and hypertension (HT). Prevalence of ASCVD was 12.3%. Only 8.9% received high-intensity statins, while 40.9% and 50.2% received low- and moderate-intensity statins, respectively. Overall, attainment of LDL-C <70 mg/dL was 52.8%. Average LDL-C reduction was 54.6% (49.6%, 54.4%, and 59.7% in the low-, moderate-, and high-intensity groups, respectively). Rates of ASCVD, HT, and smoking were higher in the high-intensity group. Factors significantly correlated with higher-intensity statin therapy included diabetic nephropathy (DN), HT, high-density lipoprotein cholesterol (HDL-C), and non-HDL-C levels (OR: 2.633, 2.381, 1.027, and 1.037, respectively).*
Conclusion: *Low- and moderate-intensity statin users accounted for about 90% of Thai T2D patients who achieved LDL-C <100 mg/dL. LDL-C reduction in these two groups was greater than anticipated. HT and DN were associated with the use of higher-intensity statins to achieve LDL-C targets.*

Keywords: *statin intensity, LDL-C target, LDL-C reduction, type 2 diabetes mellitus*

J Med Assoc Thai 2017; 100 (5): 603-11
Full text. e-Journal: *http://www.jmatonline.com*

Type 2 diabetes mellitus (T2D) confers a substantially elevated risk of atherosclerotic cardiovascular disease (ASCVD) and is classified as a coronary heart disease risk (CHD) equivalent[1]. Statin therapy reduces primary and secondary ASCVD events in T2D individuals[2,3], and is recommended by the American Diabetes Association (ADA) for all T2D subjects, except those aged <40 years without ASCVD risk factors[4].

The previous widely implemented National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) guideline and the more recent 2014 International Atherosclerosis Society guideline recommend targets of plasma low-density lipoprotein cholesterol (LDL-C) of <100 mg/dL in T2D subjects and <70 mg/dL in high-risk patients[5,6]. However, the 2013 American College of Cardiology/American Heart Association (ACC/AHA) cholesterol guideline recommends an evidence-based, yet controversial paradigm shift away from the traditional treat-to-target approach. In T2D patients, the ACC/AHA guideline advocates fixed-dose moderate- or high-intensity statins[7], which is a recommendation that is also endorsed by the 2016 ADA guideline[4]. Low-, moderate-, and high-intensity regimens are predicted to achieve LDL-C reduction by about <30%, 30%

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to <50%, and ≥50%, respectively. Ezetimibe may be considered in T2D patients on maximally tolerated statins who have not attained the anticipated ≥50% LDL-C reduction or LDL-C goal of <100 mg/dL[4,8].

Application of the ACC/AHA guideline may not be entirely suitable for Asian subjects due to the following reasons. Firstly, statin use in Asian patients has demonstrated greater lipid-lowering efficacy at lower doses compared with Caucasians, purportedly due to genetic variability in drug metabolism[9]. Secondly, drug levels of rosuvastatin have been found to be twice as high in Asians, and the recommended dosage is lower due to increased risk of rhabdomyolysis [10]. There has, however, been no other evidence of serious adverse effects in Asians using standard statin regimens. Simvastatin at doses of 20-80 mg/day has been relatively well-tolerated in Asian patients[11].

This study was conducted to assess the proportion of different statin intensity regimens, and to evaluate factors correlated with the use of moderate- or high-intensity statin therapy in Thai T2D patients who achieved LDL-C target of <100 mg/dL.

Material and Method

Subjects and study design

This retrospective cross-sectional study was conducted in 269 T2D adults with either calculated or direct LDL-C <100 mg/dL who were randomly recruited from the Diabetes Clinic at Siriraj Hospital during the 1 November 2013 to 28 February 2014 study period. Siriraj Hospital is Thailand's largest national tertiary referral center. Only patients with stable statin doses for at least two months were included. Demographic data, ASCVD and its risk factors, chronic diabetic microvascular complications, medication use, and biochemical data were collected by retrospective chart review. ASCVD was defined as CHD, stroke, peripheral artery disease (PAD), or other atherosclerotic vascular diseases. Subjects were stratified into three groups according to expected LDL-C lowering from baseline: <30% (low-intensity statin users), 30 to <50% (moderate-intensity statin users), and ≥50% (high-intensity statin users), all of which are consistent with the 2013 ACC/AHA guideline[7]. Fourteen participants received ezetimibe add-on therapy. These patients were classified into either the moderate- or high-intensity statin groups according to the percentage of plasma LDL-C reduction achieved by statin-ezetimibe combination, as described in the drug information leaflet (ezetimibe plus simvastatin 40 mg, atorvastatin 20 mg, and rosuvastatin 10 mg were considered high-intensity). All of the candidate subjects agreed to participate and each provided both oral and written consent. The Siriraj Institutional Review Board (SIRB) approved the study protocol.

Biochemical analysis

Plasma total cholesterol and triglycerides (TG) were assayed enzymatically, while high-density lipoprotein cholesterol (HDL-C) and direct LDL-C were measured using a homogeneous enzymatic colorimetric assay. All analyses were performed on a c502/Cobas 8000® analyzer (Roche Diagnostics, Manheim, Germany). Baseline plasma LDL-C concentration before initiation of statin therapy was available in 66 patients. Percentage of plasma LDL-C reduction was calculated using the formula: [(last LDL-C-baseline LDL-C) / baseline LDL-C] x100. Apolipoprotein B-100 (Apo B) concentrations measured by immunoturbidimetry (Roche) were available for patients who had participated in a previous study[12].

Statistical analysis

We estimated that the proportion of high-intensity statin users was 10% based on our own previous study (unpublished). In order to obtain a 95% confidence interval with a margin error of 4% according to the formula: $n = Z^2\alpha\ P\ (1\text{-}P)\ /d^2$. A sample size of 261 subjects was required after accounting for a sample loss of approximately 20%.

Data are expressed as mean±standard deviation, median (range), or percentage, and are stratified according to statin intensity. Categorical variables were compared using Fisher's exact test or chi-square analysis. Continuous variables were compared using Student's t-test or Mann-Whitney U test for the comparison between 2 groups. One-way ANOVA and Kruskal-Wallis H were used to test statistical significant differences among the 3 groups as appropriate.

For the final analysis, participants were divided into two groups: low-intensity and "higher-intensity" (moderate- or high-intensity) statin users. Univariate and multivariate analyses were performed using binary logistic regression to identify factors independently correlated with the higher-intensity group. A *p*-value of <0.05 was considered to be statistically significant. Statistical analysis was performed using SPSS Statistics version 18.0 (SPSS, Inc., Chicago, IL, USA).

Results

Patient characteristics and biochemical measurements

Mean age and BMI of subjects were 65.1 years and 26.4 kg/m^2, respectively. Women accounted for 65.4% of participants. The average duration of T2D was 11.0 years, mean HbA1c was 7.4%, and at least one microvascular complication was present in 51.3% of subjects. Glycemic control was worst in the high-intensity group, with fasting plasma glucose (FPG) being significantly higher than the other two groups (mean FPG 170.6 mg/dL; $p<0.01$). HbA1C was also significantly elevated in the high-intensity group (mean HbA1c 7.9%; $p = 0.06$). Similarly, hyperlipidemia was more difficult to control in the high-intensity group, with TG and Apo B concentrations being significantly elevated ($p = 0.02$ and $p = 0.03$, respectively). LDL-C and non-HDL-C levels on statins were not different among groups. Overall prevalence of hypertriglyceridemia (TG >150 mg/dL) and low HDL-C (HDL-C <40 mg/dL in men and <50 mg/dL in women) was 26.6% and 15.8%, respectively. Seventy-eight percent of participants had well-controlled hypertension (HT) (Tables 1 and 2).

Prevalence of ASCVD and ASCVD risk factors

Although the overall prevalence of ASCVD was low (12.3%), the presence/occurrence of CHD, stroke, or PAD was 2.8-fold and about 2-fold greater between the high-intensity and low-intensity groups and the high-intensity and moderate-intensity groups, respectively. The high-intensity statin group had a significantly higher proportion of ASVD risk factors, such as smoking ($p = 0.03$) and HT ($p = 0.02$). There was a trend towards higher prevalence of diabetic nephropathy (DN) and abdominal obesity (waist circumference >80 cm in women and >90 cm in men) in this group (Table 1).

Proportion of statin intensity regimens and use of other medications

Among T2D subjects who achieved LDL-C <100 mg/dL, low- and moderate-intensity statin users accounted for 40.9% and 50.2%, respectively, while only 8.9% were high-intensity users. In patients with ASCVD who achieved LDL-C <70 mg/dL, 50.0% were low-intensity statin users while only 15% were high-intensity statin users (Supplement Table). Fibrates and ezetimibe were prescribed as add-on therapy to statins in only 17 patients and 14 patients, respectively, while niacin was not used in any patient. Among the 14 participants who received ezetimibe-statin combination therapy, one had a history of stroke and three had CHD, although none had a recent acute coronary syndrome and no statin intolerance was reported. Metformin, sulfonylureas, and insulin were used in 78.4%, 64.7%, and 27.9% of patients, respectively. Angiotensin-converting enzyme inhibitors or angiotensin receptor blockers were the most frequently prescribed antihypertensive drugs (64.31%), and aspirin was given in 43.9% of subjects.

Achievement of LDL-C targets and percentage of LDL-C reduction

All subjects had LDL-C <100 mg/dL, while 95.5% and 84.6% of participants attained corresponding goals of non-HDL-C <130 mg/dL and apo B <90 mg/dL, respectively. About half (52.8%) of all participants had LDL-C <70 mg/dL. Significantly fewer patients in the high-intensity group achieved non-HDL-C <100 mg/dL and apo B <80 mg/dL when compared with the other 2 groups. Sixty-six participants had baseline lipid data. The overall percentage of LDL-C reduction was 54.57%, while the low-, moderate-, and high-intensity groups (n = 38, 24, and 4, respectively) had incrementally greater reductions of 49.59%, 54.44%, and 59.68%, respectively (Fig. 1). Among these, all four subjects who were in the high-intensity group had received ezetimibe add-on therapy, and as did one patient in the moderate-intensity group (Table 3).

Factors associated with higher-intensity statin use

Univariate analysis showed that HT (OR: 2.095; $p = 0.013$), and levels of FPG (OR: 1.010; $p = 0.019$), TG (OR: 1.006; $p = 0.008$), and non-HDL-C concentration (OR: 1.017; $p = 0.015$) were correlated with higher-intensity statin use. Other factors with $p<0.2$, such as DN, body weight, and HDL-C level, were included in subsequent multivariate analysis. DN, HT, and levels of non-HDL-C and HDL-C were found to be significantly correlated with higher-intensity statin therapy (adjusted OR: 2.633, 2.381, 1.037, and 1.027, respectively) (Table 4).

Discussion

The present study was conducted during the transition period when the LDL-C target-based approach was still widely practiced and the ACC/AHA had recently introduced fixed-dose moderate- or high-intensity statin therapy in subjects with T2D. Data from 269 Thai T2D subjects who had achieved targets of LDL-C <100 mg/dL using various intensities of statin treatment were analyzed. Overall, ASCVD events were

low (12.3%); however, among high-intensity users, ASCVD prevalence was two- to three-times greater than in the other two groups. This was not surprising given that these patients had worse glycemic and lipid control, as well as a significantly higher proportion of ASCVD risk factors, such as smoking and HT.

The low- and moderate-intensity groups together accounted for about 90% of subjects who attained LDL-C <100 mg/dL and LDL-C <70 mg/dL, as well as their corresponding non-HDL-C and apo B targets. In the high-intensity group, which had a larger proportion of subjects with ASCVD, non-HDL and apo B goals were significantly less often attained, suggesting more difficult lipid control. This data was similar to a previous double-blind, randomized trial in six Asian countries (including Thailand) that found that about 80% of patients using low- and moderate-intensity statins (simvastatin 10-20 mg and atorvastatin 10-20 mg daily) achieved their NCEP goals. As in this study, NCEP goals were less often attained in CHD patients[13].

Percentage of LDL-C reduction was recently demonstrated to be superior to absolute LDL-C levels with regard to incremental prognostic value in patients with ASCVD[14]. Moreover, while the treat-to-target concept has not been assessed by large randomized controlled trials, a randomized trial of 17,082 subjects who received high-intensity statins found that the percentage of LDL-C decrease was directly correlated with effective primary prevention of ASCVD events[15]. The magnitude of LDL-C reduction achieved by low- and moderate-intensity regimens in the present study corresponded with the predicted efficacy of moderate- and high-intensity statins, respectively. This information is comparable with a previous study in which the effect of low-intensity statins in Japanese patients was similar to that of moderate-intensity statins in Western subjects (simvastatin 5 mg versus 20 mg daily; LDL-C reduction 28.9%)[16,17]. Interestingly, the present study found that the percentage change in LDL-C was not much different among the three groups (about 5%).

Adverse drug effects from statin treatment in this study were minimal across all groups. Although liver enzymes were mildly increased in 30 patients, some of them had abnormal liver function tests due to non-alcoholic fatty liver disease before statin exposure. Creatine phosphokinase level was slightly increased in just one subject, despite the study population having several risk factors for statin-induced myopathy[18]. These risk factors include advanced age, more female patients, and concurrent drug therapy, including amlodipine and fibrates. Extensive use of higher-intensity statins as advocated by the ACC/AHA guideline may increase the incidence of statin-induced adverse drug reactions, which may negatively impact drug adherence.

Factors significantly associated with higher-intensity statin use included DN, HT, non-HDL-C, and HDL-C concentrations. HT is a well-established cardiovascular risk factor[1]. Diabetic subjects with albuminuria are considered to be at very high risk for ASCVD[19], while high levels of plasma non-HDL-C are associated with elevated risk of CHD[20]. Accordingly, these factors which may have resulted in more frequent prescription of higher-intensity statins.

Study limitations included a rather small number of T2D patients with a relatively low prevalence of ASCVD. Lipid parameters and statin dose adjustments between the baseline and final visits, and the duration of statin exposure were not recorded; however, statin doses were stable for at least two months before data collection. The causal relationship between associated factors and statin intensity could not be determined due to retrospective study design. Finally, this study included only subjects who had reached LDL-C goals, which may explain the profoundly positive response to statins. However, in a real-world setting, inter-individual variability in statin responsiveness may be more evident[21].

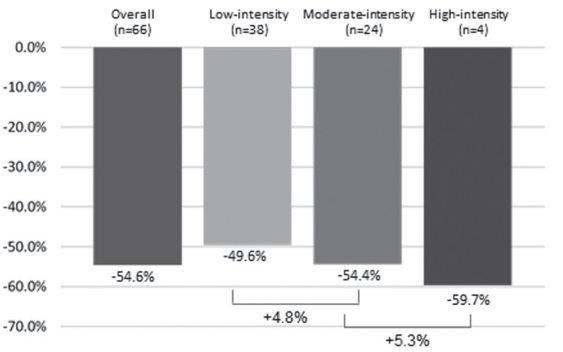

Fig. 1 Percentage of LDL-C reduction stratified by statin intensity. For all subjects with available baseline LDL-C measurements before statin initiation (n=66), percentage change was calculated using the formula: [(last LDL-C – baseline LDL-C) / baseline LDL-C] x 100. The same was performed for each of the low-, moderate-, and high-intensity statin subgroups.

Table 1. Patient demographic, clinical, and anthropomorphic characteristics stratified by statin intensity

Characteristics[a]	Total subjects n = 269, unless otherwise specified)	Low-intensity statin users (n = 110)	Moderate-intensity statin users (n = 135)	High-intensity statin users (n = 24)	*p*-value
Women, %	65.4	68.2	64.4	58.3	0.62
Age, yr	65.1±10.1	65.1±11.1	65.1±9.5	65.0±9.3	1.00
Smoking, %	20.5	18.1	18.5	41.7	0.03
Alcohol use, %	3.1	3.9	3.1	0.0	0.88
Family history of premature CHD, %	4.4	4.2	4.5	4.8	1.00
Duration of T2D, yr	11.0 (0.5-40.0)	12.5 (1.0-38.0)	10.0 (0.5-40.0)	10.0 (2.0-27.0)	0.73
Hypertension, %	77.7	70.0	81.5	91.7	0.02
CHD, %	8.9	7.3	9.6	12.5	0.66
Stroke, %	3.7	2.7	3.0	12.5	0.10
PAD, %	1.9	0.9	2.2	4.2	0.511
Any ASCVD, %	12.3	9.1	12.6	25.0	0.10
Diabetic retinopathy, % (n = 259)	35.5	35.8	35.7	33.3	0.10
Diabetic nephropathy[b], % (n = 255)	36.9	32.1	38.1	52.2	0.18
Diabetic neuropathy[c], % (n = 65)	18.5	16.7	19.2	22.2	0.91
Any microvascular complication, %	51.3	47.3	51.7	78.6	0.09
SBP, mmHg	134.6±15.6	133.8±16.7	135.0±14.8	135.8±15.0	0.78
DBP, mmHg	75.3±10.6	73.9±11.0	76.0±10.1	78.3±11.5	0.12
Body weight, kg	67.2±13.3	65.6±12.7	67.7±13.5	71.6±13.5	0.11
Height, cm	159.1±8.3	157.8±8.4	159.5±8.1	162.6±7.8	0.02
BMI, kg/m^2	26.4±4.6	26.2±4.6	26.5±4.7	27.0±4.3	0.75
Abdominal obesity[d], %	68.1	60.6	70.0	87.5	0.10

[a]Values are presented as mean±standard deviation, median (range), or percentage. [b]Diabetic nephropathy was diagnosed when micro or macroalbuminuria was present. [c]Diabetic neuropathy was defined by an abnormal 10-g monofilament test. [d]Abdominal obesity was defined by a waist circumference of >80 cm in women and >90 cm in men

CHD, coronary heart disease; T2D, type 2 diabetes mellitus; PAD, peripheral artery disease; ASCVD, atherosclerotic cardiovascular disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; BMI, body mass index

Table 2. Biochemical measurements stratified by statin intensity

Parameters[a]	Total patients (n = 269, unless otherwise specified)	Low-intensity statin users (n = 110)	Moderate-intensity statin users (n = 135)	High-intensity statin users (n = 24)	*p*-value
Total cholesterol, mg/dL (n= 265)	149.1±22.3	146.6±21.1	151.6±22.8	146.0±24.1	0.18
Triglycerides, mg/dL (n = 267)	123.0±56.6	111.8±50.1	129.9±61.1	135.3±51.6	0.02
HDL-C, mg/dL (n = 266)	54.8±15.6	56.3±16.0	54.2±15.2	50.8±15.3	0.24
Calculated LDL-C, mg/dL (n = 265)	70.5±15.4	69.5± 15.1	71.7±15.6	67.9±15.7	0.37
Direct LDL-C, mg/dL (n = 187)	82.6±18.1	79.3±16.4	84.9±17.3	81.4±27.1	0.13
Calculated or direct LDL-C[b], mg/dL (n = 269)	70.52±15.3	69.38±15.0	71.92±15.6	67.93±15.69	0.30
Non-HDL-C[c], mg/dL (n = 264)	96.4±20.3	93.0±20.1	98.8±20.8	95.8±16.7	0.20
Apo B, mg/dL (n = 182)	74.7±15.4	70.8±14.1	76.8±15.1	78.0±19.5	0.03
FPG, mg/dL	143.4±41.7	133.6±36.1	145.5±40.3	170.6±58.5	<0.01
HbA1C, %	7.4±1.2	7.2±1.0	7.4±1.2	7.9±1.7	0.06
MAU/Cr, mg/gCr (n = 253)	16.4 (0-6571.4)	14.2 (0-3804.9)	20.3 (1.8-6571.4)	422.3 (0-1422.7)	0.38
Cr, mg/dL	0.94 (0.1-6.2)	0.9 (0.5-5)	1.01 (0.1-3.34)	1.01 (0.62-6.2)	0.36
eGFR, mL/min/1.73 m^2	68.1±23.1	69.7±21.7	67.2±23.6	66.4±27.1	0.67

[a]Values are presented as mean±standard deviation or median (range). [b]Calculated LDL-C (Friedewald formula) was used whenever available. [c]Non-HDL-C = total cholesterol-HDL-C

HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; Apo B, apolipoprotein B-100; FPG, fasting plasma glucose; Cr, creatinine; MAU/Cr, spot urine microalbumin/Cr ratio; eGFR, estimated glomerular filtration rate (CKD-EPI equation)

Table 3. Achievement of lipid targets stratified by statin intensity

Achievement of lipid targets	Total patients	Low-intensity statin users	Moderate-intensity statin users	High-intensity statin users	*p*-value
LDL-C <100 mg/dL (n=269)	269/269 (100%)	110/110 (100%)	135/135 (100%)	24/24 (100%)	-
LDL-C <70 mg/dL (n=269)	142/269 (52.8%)	63/110 (57.3%)	66/135 (48.9%)	13/24 (54.2%)	0.421
Non-HDL-C[a] <130 mg/dL (n=264)	252/264 (95.5%)	102/107 (95.3%)	126/133 (94.7%)	24/24 (100%)	0.521
Non-HDL-C <100 mg/dL (n=264)	166/264 (62.9%)	81/107 (75.7%)	71/133 (53.4%)	14/24 (58.3%)	0.002
Apo B <90 mg/dL (n=182)	154/182 (84.6%)	58/66 (87.9%)	83/100 (83.0%)	13/16 (81.2%)	0.644
Apo B <80 mg/dL (n=182)	125/182 (68.7%)	53/66 (80.3%)	63/100 (63.0%)	9/16 (56.2%)	0.033
Mean percentage of LDL-C reduction[b] (n=66)	54.6%	49.6 %	54.4 %	59.7%	0.435

[a]Non-HDL-C = total cholesterol – HDL-C. [b]Percentage of LDL-C reduction = [(last LDL-C – baseline LDL-C) / baseline LDL-C] x 100
HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; Apo B, apolipoprotein B-100

Table 4. Factors associated with the use of higher-intensity statins[a]

Parameters	Odds ratio	95% CI	*p*-value	Adjusted odds ratio	95% CI	*p*-value
Diabetic nephropathy	1.428	0.846-2.409	0.182	2.633	1.117-6.207	0.027
Hypertension	2.095	1.172-3.746	0.013	2.381	1.057-5.363	0.036
DBP	1.022	0.998-1.046	0.068	-	-	
ASCVD	1.691	0.771-3.712	0.190	-	-	
Body weight	1.016	0.997-1.036	0.106	-	-	
FPG	1.010	1.002-1.019	0.019	-	-	
Triglycerides	1.006	1.002-1.011	0.008	-	-	
HDL-C	0.989	0.973-1.005	0.171	1.027	1.001-1.053	0.044
Non-HDL-C	1.017	1.003-1.030	0.015	1.037	1.007-1.067	0.015
LDL-C	1.008	0.992-1.025	0.308	0.967	0.932-1.002	0.064

[a]Higher-intensity statins refer to moderate- or high-intensity statins
DBP, diastolic blood pressure; ASCVD, atherosclerotic cardiovascular disease; FPG, fasting plasma glucose; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol

Supplement Table. Achievement of LDL-C targets in subcategories of patients stratified by statin intensity

Patient category	LDL-C targets	Numbers of achievement cases	Low-intensity statin	Moderate-intensity statin	High-intensity statin
All cases (n = 269)	<100 mg/dL	269 (100%)	110 (40.9%)	135 (50.2%)	24 (8.9%)
CHD (n = 24)	<70 mg/dL	15 (62.5%)	8 (53.3%)	6 (40.0%)	1 (6.7%)
ASCVD (n = 33)	<70 mg/dL	20 (60.6%)	10 (50.0%)	7 (35.0%)	3 (15.0%)

CHD, coronary heart disease; ASCVD, atherosclerotic cardiovascular disease; LDL-C, low-density lipoprotein cholesterol

Conclusion

Thai T2D patients were frequently prescribed low- and moderate-intensity statins, accounting for about 90% of subjects who achieved LDL-C <100 mg/dL. The percentage of LDL-C reduction was higher than predicted by the ACC/AHA guideline. These findings may support the use of low- and moderate-intensity statin regimens to achieve recommended LDL-C reduction targets of 30 to <50% and ≥50%, respectively, in Thai patients and perhaps in other Asian populations. After adjusting for other factors, DN, HT, and non-HDL-C levels were found to be independently associated with higher-intensity statin use.

What is already known on this topic?

In contrast to the LDL-C target-based approach endorsed by the NCEP ATP III guideline in T2D patients, the 2013 ACC/AHA guideline recommends fixed-dose moderate- or high-intensity statins that are expected to lower LDL-C by 30-50% and ≥50%, respectively. In Asians, lower doses of statins have achieved greater LDL-C reduction compared with Caucasians, and higher doses may increase statin-induced adverse drug reactions.

What this study adds?

In this study, the majority of Thai T2D patients achieved optimal LDL-C targets and percentage LDL-C reductions using low- and moderate-intensity statins. The magnitude of LDL-C reduction achieved by low- and moderate-intensity statins corresponded with the predicted efficacy of moderate- and high-intensity statins, respectively. HT and DN were associated with the use of higher-intensity statins.

Acknowledgement

This study was funded by a Siriraj Grant for Research Development.

Conflict of interest declaration

The authors hereby declare no personal or professional conflicts of interest regarding any aspect of this study.

Funding disclosure

This study was funded by a Siriraj Grant for Research Development.

Potential conflicts of interest

None.

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สัดส่วนการใช้ยาลดไขมันสเตตินประสิทธิภาพต่ำ ประสิทธิภาพปานกลาง และประสิทธิภาพสูงในผู้ป่วยโรคเบาหวานชนิดที่ 2 ชาวไทยที่มีระดับไขมัน LDL-C บรรลุเป้าหมาย

ไบรอัน ลี, กรกฎ ดำรงกิจชัยพร, สุทิน ศรีอัษฎาพร, นันทกร ทองแตง

ภูมิหลัง: *เพื่อศึกษาสัดส่วนของการใช้ยาลดไขมันสเตตินประสิทธิภาพต่ำ ประสิทธิภาพปานกลาง และประสิทธิภาพสูง ในผู้ป่วยโรคเบาหวานชนิดที่ 2 ชาวไทยที่มีระดับไขมัน LDL-C บรรลุเป้าหมาย <100 มก. ต่อ ดล.*

วัสดุและวิธีการ: *ผู้ป่วยโรคเบาหวานชนิดที่สองในโรงพยาบาลศิริราชที่มีระดับไขมัน LDL-C บรรลุเป้าหมายน้อยกว่า 100 มก. ต่อ ดล. จำนวน 269 คน ถูกเลือกเข้าร่วมการศึกษาโดยสุ่ม ผู้ป่วยถูกแบ่งออกเป็นสามกลุ่มตามขนาดและชนิดของยาลดไขมันสเตตินที่ได้รับ เป็นกลุ่มที่ใช้ยาประสิทธิภาพสูง ประสิทธิภาพปานกลาง และประสิทธิภาพต่ำ ตามการแบ่งประสิทธิภาพของยาลดไขมันสเตตินของสมาคมแพทย์โรคหัวใจของสหรัฐอเมริกา (ACC/AHA) ปี พ.ศ. 2556 ปัจจัยทางคลินิกของผู้ป่วยที่มีความสัมพันธ์กับการใช้ยาลดไขมันสเตตินประสิทธิภาพปานกลางและประสิทธิภาพสูงถูกวิเคราะห์โดยใช้สถิติวิจัย multivariate analysis.*

ผลการศึกษา: *ผู้ป่วยส่วนใหญ่เป็นผู้สูงอายุที่เป็นโรคเบาหวานมานาน และมีโรคความดันโลหิตสูงร่วมด้วย ความชุกของโรคหลอดเลือดแดงแข็ง (atherosclerotic cardiovascular disease) มีจำนวน 12.3% ของผู้ป่วยทั้งหมด ยาประสิทธิภาพสูงมีการใช้เพียงร้อยละ 8.9 ของผู้ป่วยทั้งหมด ในขณะที่ร้อยละ 40.9 และ 50.2 ของผู้ป่วยใช้ยาประสิทธิภาพต่ำและ ประสิทธิภาพปานกลางตามลำดับ ผู้ป่วยที่มีระดับไขมัน LDL-C บรรลุเป้าหมาย น้อยกว่า 70 มก. ต่อ ดล. พบร้อยละ 52.8 ยาลดไขมันสเตตินประสิทธิภาพต่ำ ประสิทธิภาพปานกลางและประสิทธิภาพสูงสามารถลดระดับไขมัน LDL-C จากระดับไขมันตั้งต้นได้เฉลี่ย ร้อยละ 49.6, 54.4, และ 59.7 ตามลำดับ ผู้ป่วยที่ใช้ยาประสิทธิภาพสูงมีความชุกของโรคหัวใจและหลอดเลือด โรคความดันโลหิตสูง และการสูบบุหรี่มากกว่ากลุ่มอื่น ๆ ปัจจัยที่มีความสัมพันธ์กับการใช้ยาประสิทธิภาพปานกลางหรือประสิทธิภาพสูงได้แก่ ภาวะไตเสื่อมจากเบาหวาน โรคความดันโลหิตสูง ระดับ HDL-C และ non-HDL-C (OR 2.633, 2.381, 1.027 และ 1.037)*

สรุป: *ผู้ป่วยที่ใช้ยาลดไขมันสเตตินประสิทธิภาพต่ำและประสิทธิภาพปานกลาง พบประมาณร้อยละ 90 ของผู้ป่วยเบาหวานชาวไทยที่ระดับไขมัน LDL-C บรรลุเป้าหมายน้อยกว่า 100 มก. ต่อ ดล. และยาสเตตินสามารถลดระดับไขมันในผู้ป่วยเบาหวานชาวไทยได้มากกว่าค่าเฉลี่ยของ ร้อยละของการลดระดับ LDL-C ในผู้ป่วยผิวขาว ภาวะไตเสื่อมจากเบาหวานและโรคความดันโลหิตสูงเป็นปัจจัยที่เกี่ยวข้องกับการใช้ยาไขมันสเตตินประสิทธิภาพปานกลางและประสิทธิภาพสูง*