JURNAL FARMASIMED (JFM)
E-ISSN: 2655-0814
https://ejournal.medistra.ac.id/index.php/JFM

Pola Dan Kesesuaian Terapi Dislipidemia pada Pasien Diabetes Melitus Tipe 2 di Rumah Sakit Angkatan Laut Jakarta, Indonesia

Patterns And Appropriateness Of Dyslipidemia Treatment Among Patients With Type 2 Diabetes Mellitus At A Naval Hospital In Jakarta, Indonesia

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Abstrak

Latar Belakang: Dislipidemia merupakan gangguan metabolik yang umum ditemukan pada pasien Diabetes Melitus Tipe 2 (DMT2) dan berkaitan dengan peningkatan risiko kardiovaskular. Terapi penurun lipid, terutama statin, memiliki peran penting dalam pengelolaan dislipidemia, namun pola penggunaan dan kesesuaian terapi dapat bervariasi dalam praktik klinis. **Tujuan:** Penelitian ini bertujuan untuk menggambarkan pola terapi dislipidemia dan mengevaluasi kesesuaian terapi pada pasien DMT2 di RSAL dr. Mintohardjo Jakarta, Indonesia. **Metode:** Penelitian ini merupakan penelitian observasional analitik dengan desain *cross-sectional* retrospektif menggunakan data rekam medis 200 pasien DMT2. Terapi dislipidemia diklasifikasikan menjadi terapi statin, non-statin, kombinasi statin dan non-statin, serta tanpa terapi penurun lipid. Kesesuaian terapi dikategorikan menjadi sesuai dan tidak sesuai berdasarkan kriteria yang telah ditetapkan dalam protokol penelitian. Data dianalisis menggunakan IBM SPSS Statistics versi 27.0 dan disajikan dalam bentuk frekuensi dan persentase. **Hasil:** Dari 200 pasien DMT2, sebanyak 105 pasien (52,5%) mendapatkan terapi statin, 14 pasien (7,0%) mendapatkan terapi non-statin, 23 pasien (11,5%) mendapatkan terapi kombinasi, dan 58 pasien (29,0%) tidak mendapatkan terapi penurun lipid. Sebanyak 165 pasien (82,5%) memperoleh terapi yang dikategorikan sesuai, sedangkan 35 pasien (17,5%) memperoleh terapi yang dikategorikan tidak sesuai. **Kesimpulan:** Statin merupakan terapi penurun lipid yang paling banyak digunakan dan sebagian besar pasien memperoleh terapi yang sesuai berdasarkan kriteria penelitian. Namun, masih terdapat 29,0% pasien yang tidak mendapatkan terapi penurun lipid dan 17,5% memperoleh terapi yang dikategorikan tidak sesuai. Evaluasi terapi secara berkala diperlukan untuk mendukung optimalisasi pengelolaan dislipidemia pada pasien DMT2.

Kata Kunci: Diabetes melitus tipe 2; Dislipidemia; Kesesuaian terapi; Statin; Terapi penurun lipid.

Abstract

Background: *Dyslipidemia is a common metabolic disorder among patients with Type 2 Diabetes Mellitus (T2DM) and is associated with an increased risk of cardiovascular disease. Lipid-lowering therapy, particularly statins, plays an important role in dyslipidemia management; however, treatment patterns and appropriateness may vary in clinical practice.* ***Objective:*** *This study aimed to describe dyslipidemia treatment patterns and evaluate treatment appropriateness among patients with T2DM at Dr. Mintohardjo Naval Hospital, Jakarta, Indonesia.* ***Methods:*** *This analytical observational study employed a retrospective cross-sectional design using medical records from 200 patients with T2DM. Dyslipidemia treatment was classified into statin therapy, non-statin therapy, combination therapy with statins and non-statin agents, and no lipid-lowering therapy. Treatment appropriateness was categorized as appropriate or inappropriate based on predefined criteria established in the research protocol. Data were analyzed using IBM SPSS Statistics version 27.0 and presented as frequencies and percentages.* ***Results:*** *Of the 200 patients with T2DM, 105 (52.5%) received statin therapy, 14 (7.0%) received non-statin therapy, 23 (11.5%) received combination therapy, and 58 (29.0%) received no lipid-lowering therapy.*

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Doi : 10.35451/jfm.v9i1.3881
Received : September 5, 2026, Accepted: October 13, 2026, Published: October 30, 2026
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Overall, 165 patients (82.5%) received treatment categorized as appropriate, whereas 35 patients (17.5%) received treatment categorized as inappropriate. ***Conclusion:*** *Statins were the most commonly used lipid-lowering therapy, and most patients received treatment categorized as appropriate according to the study criteria. However, 29.0% of patients received no lipid-lowering therapy, and 17.5% received treatment categorized as inappropriate. Periodic evaluation of lipid-lowering therapy is needed to support the optimization of dyslipidemia management in patients with T2DM.*

Keywords**:** *Dyslipidemia; Lipid-lowering therapy; Statin; Treatment appropriateness; Type 2 diabetes mellitus*

1. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is frequently accompanied by lipid abnormalities that contribute to increased cardiovascular risk. Studies conducted in different populations have demonstrated a high prevalence of dyslipidemia among patients with T2DM, although the magnitude and patterns vary according to population characteristics and diagnostic criteria [1-4]. For example, dyslipidemia prevalence of 95.4% was reported among patients with T2DM in Jordan [1], while another study in Ethiopia reported a prevalence of 81.5% [2]. These findings emphasize the importance of lipid assessment and appropriate lipid-lowering treatment in diabetes.

Statins remain the predominant pharmacological treatment for dyslipidemia in patients with diabetes. Nevertheless, real-world evidence demonstrates considerable variation in statin utilization and lipid target attainment. A nationwide study in Türkiye found that although 94.9% of patients with T2DM had an indication for statin treatment, only 42.4% received therapy, and only 24.8% of treated patients achieved their LDL-C targets [5]. Similarly, population-based evidence has demonstrated that LDL-C target achievement is influenced by treatment intensity and adherence [6-7].

In a large U.S. study involving 241,232 patients with diabetes without established atherosclerotic cardiovascular disease (ASCVD), only 58.1% were receiving moderate- to high-intensity statin therapy, while the use of non-statin lipid-lowering therapy remained low [8]. Other studies have similarly identified gaps between recommended lipid management and actual clinical practice [9-11].

Lipid profile monitoring is an important component of T2DM management because lipid abnormalities contribute to cardiovascular risk. Kusumaningrum et al. reported improvement in lipid profile control among patients with T2DM after three months of therapy, including increased proportions of patients achieving HDL-C and triglyceride targets [21].

The selection of lipid-lowering therapy should therefore be considered together with its appropriateness for the patient's clinical condition and cardiovascular risk. Evaluation of treatment patterns and treatment appropriateness in routine hospital practice may identify areas requiring optimization. Accordingly, this study aimed to describe the patterns of dyslipidemia treatment and evaluate treatment appropriateness among patients with T2DM at Dr. Mintohardjo Naval Hospital, Jakarta, Indonesia.

2. METHODS

2.1 Study Design and Setting

This study was an observational analytical study with a retrospective cross-sectional design using secondary data obtained from medical records. The study was conducted at Dr. Mintohardjo Naval Hospital, Jakarta, Indonesia.

2.2 Study Population and Sample

The study included 200 adult patients with T2DM. Patients aged ≥18 years with a diagnosis of T2DM and medical records containing the variables required for the study were included according to the predefined eligibility criteria. Medical records with insufficient information for evaluation of the study variables were excluded.

2.3 Study Variables

The primary study variables were dyslipidemia treatment patterns and treatment appropriateness. Dyslipidemia treatment patterns were classified into four categories: statin therapy, non-statin therapy, combination therapy with statins and non-statin agents, and no lipid-lowering therapy. Non-statin therapy included lipid-lowering agents such as fibrates and/or ezetimibe, according to the medications documented in the patients' medical records.

Treatment appropriateness was classified as appropriate or inappropriate based on predefined criteria established in the research protocol, considering the indication for lipid-lowering therapy, selection of the therapeutic agent, treatment intensity, and the patient's clinical characteristics and cardiovascular risk profile.

2.4 Data Collection

Data were retrospectively collected from medical records. Variables included age, sex, body mass index (BMI), HbA1c, duration of T2DM, hypertension, lipid profile, and lipid-lowering therapy. All patient information was anonymized and treated confidentially throughout the study.

2.5 Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 27.0. Categorical variables were summarized as frequencies (*n*) and percentages (%). Treatment patterns and treatment appropriateness were analyzed descriptively and presented in tables and figures.

2.6 Ethical Approval

This study was approved by the Health Research Ethics Committee of RUMKITAL Dr. Mintohardjo Jakarta, Ethical Clearance Number B/08/EC/VI/RSMTH/2026, dated 29 June 2026 and valid until 29 June 2027. Patient confidentiality and anonymity were maintained throughout the study.

3. RESULTS

3.1 Characteristics of the Study Population

A total of 200 patients with type 2 diabetes mellitus (T2DM) were included in this study. The characteristics of the study population are presented in Table 1.

Table 1. Characteristics of Patients with T2DM (n=200)

Characteristics	N	%
Age (years)		
18–44	44	22.0
45–59	74	37.0
60–75	82	41.0
Sex		
Male	108	54.0
Female	92	46.0
BMI		
Underweight	4	2.0
Normal	41	20.5
Overweight	38	19.0
Obesity I	75	37.5
Obesity II	42	21.0
HbA1c		

<7%	65	32.5
≥7%	135	67.5
Duration of T2DM		
<5 years	45	22.5
5–10 years	79	39.5
≥10–15 years	49	24.5
>15 years	27	13.5
Hypertension		
No	93	46.5
Yes	107	53.5

Source: IBM SPSS Statistics version 27.0.

As shown in Table 1, the largest proportion of patients was aged 60–75 years (41.0%), and 54.0% were male. Obesity I was the most frequent BMI category (37.5%). Most patients had HbA1c ≥7% (67.5%), the most common duration of T2DM was 5–10 years (39.5%), and 53.5% had hypertension.

3.2 Patterns of Dyslipidemia Treatment

The distribution of dyslipidemia treatment among patients with T2DM is presented in Table 2.

Table 2. Patterns of Dyslipidemia Treatment Among Patients with T2DM

Dyslipidemia Treatment	Frequency (n)	Percentage (%)
Statin	105	52.5
Non-statin	14	7.0
Combination therapy	23	11.5
No lipid-lowering therapy	58	29.0
Total	200	100.0

Source: Data processed using IBM SPSS Statistics version 27.0.

As shown in Table 2, statins were the most frequently used lipid-lowering therapy (52.5%), followed by no lipid-lowering therapy (29.0%), combination therapy (11.5%), and non-statin therapy (7.0%). The distribution of dyslipidemia treatment patterns among patients with T2DM is illustrated in Figure 1.

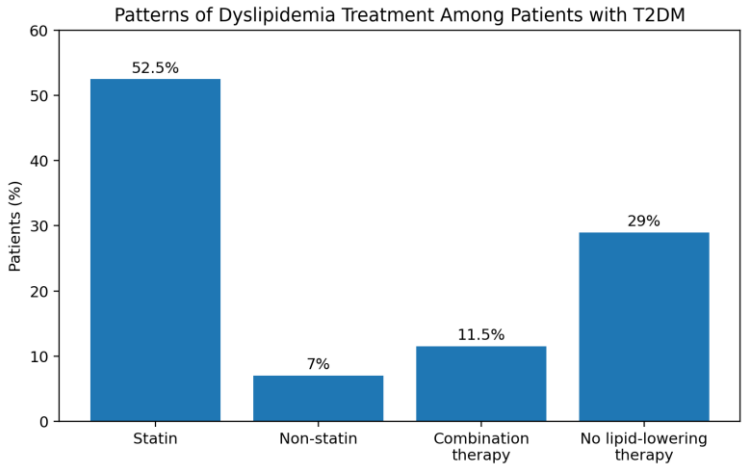

Figure 1. Patterns of Dyslipidemia Treatment Among Patients with T2DM

Figure 1 shows that statin therapy was the predominant treatment pattern among patients with T2DM, while non-statin therapy was the least frequently used. A considerable proportion of patients received no lipid-

lowering therapy.

3.3 Appropriateness of Dyslipidemia Treatment

The distribution of dyslipidemia treatment appropriateness among patients with T2DM is presented in Table 3.

Table 3. Appropriateness of Dyslipidemia Treatment Among Patients with T2DM

Treatment Appropriateness	Frequency (n)	Percentage (%)
Appropriate	165	82.5
Inappropriate	35	17.5
Total	200	100.0

Source: Data processed using IBM SPSS Statistics version 27.0.

As shown in Table 3, most patients received treatment classified as appropriate (82.5%), while 17.5% received treatment classified as inappropriate according to the predefined study criteria. The distribution of treatment appropriateness among patients with T2DM is illustrated in Figure 2.

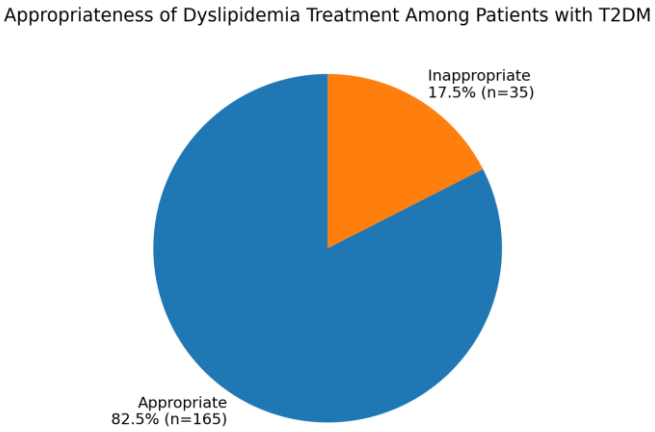

Figure 2. Appropriateness of Dyslipidemia Treatment Among Patients with T2DM

Figure 2 shows that the majority of patients received treatment classified as appropriate, whereas a smaller proportion received treatment classified as inappropriate according to the predefined study criteria.

4. DISCUSSION

4.1 Patterns of Dyslipidemia Treatment

The present study showed that statins were the predominant lipid-lowering therapy among patients with T2DM, accounting for 52.5% of the study population. Combination therapy was used in 11.5%, non-statin therapy in 7.0%, while 29.0% received no lipid-lowering therapy. These findings demonstrate that statin-based treatment was the principal pharmacological strategy for lipid management in this population.

Similar patterns have been reported internationally. Hyassat *et al.* [1] found that 80.5% of patients with T2DM in Jordan received statins, while 10.7% received fibrates and 9.5% received statin–fibrate combination therapy. Li *et al.* [12] similarly reported that statins accounted for the majority of lipid-lowering therapy among treated patients with T2DM in Northwest China. These findings consistently demonstrate the central role of statins in real-world dyslipidemia management.

The use of statins in patients with T2DM is also reflected in previous Indonesian evidence. Saragi and Fitriana reported that statins accounted for 87.24% of cardiovascular preventive therapy among patients with T2DM and hypertension [22].

However, the proportion receiving statins differs considerably among populations. Bayram *et al.* [5] reported that only 42.4% of Turkish patients with T2DM who required statin treatment were receiving it. In a large U.S. study, DeCicco *et al.* [8] reported that 58.1% of patients aged 40–75 years with diabetes but without ASCVD received moderate- to high-intensity statin therapy. Such variations may reflect differences in patient characteristics, cardiovascular risk, prescribing practices, health systems, treatment definitions, and study populations.

4.2 Statin and Non-Statin Therapy

Evidence from clinical and real-world studies supports the effectiveness of statins in improving lipid profiles among patients with T2DM. Wu *et al.* [13] compared simvastatin and rosuvastatin in patients with T2DM and dyslipidemia and found high rates of combined lipid-goal attainment with both treatment strategies. More recent evidence has also demonstrated significant reductions in LDL-C after statin treatment across BMI categories among patients with T2DM [14].

Nevertheless, statin therapy does not guarantee lipid-target attainment. A population-based study found that approximately one-third of individuals with diabetes receiving statins did not achieve LDL-C targets, with poorer target achievement among users of lower-intensity statins [6]. Similarly, De Zoysa *et al.* [15] reported that only about one-third of patients with moderate-to-high ASCVD risk received high-intensity statins, and a substantial proportion failed to achieve LDL-C targets even while receiving high-intensity treatment.

Non-statin and combination therapies may provide additional lipid lowering in selected patients. In the present study, 7.0% received non-statin therapy and 11.5% received combination therapy. A 2025 clinical study comparing atorvastatin/fenofibrate combination therapy with atorvastatin monotherapy in patients with T2DM and dyslipidemia provides contemporary evidence regarding combination approaches for selected lipid abnormalities [16]. Large real-world Italian data have also demonstrated increasing utilization of combination lipid-lowering strategies over time [17].

4.3 Patients Without Lipid-Lowering Therapy

An important finding of this study was that 29.0% of patients did not receive lipid-lowering therapy. This proportion is clinically relevant but should not automatically be interpreted as inappropriate treatment because treatment decisions may depend on age, cardiovascular risk, lipid levels, contraindications, intolerance, patient preferences, and other clinical considerations.

Similar treatment gaps have been documented in other populations. Li *et al.* [12] reported that approximately one-third of patients with T2DM and dyslipidemia did not receive lipid-lowering therapy. Bayram *et al.* [5] also identified a substantial discrepancy between patients requiring statin treatment and those actually receiving treatment. Furthermore, Morieri *et al.* [9] identified important unmet needs in cholesterol-lowering treatment and lipid-target achievement among large populations of patients with T2DM.

The importance of treatment uptake is further illustrated by Beernink *et al.* [7], who found that 80% of patients with T2DM had a statin prescription and 89% of those prescribed statins were adherent. LDL-C target achievement was substantially higher among adherent patients than among patients who were not receiving statins. Hyassat *et al.* [1] also found that poor compliance with statin therapy was associated with elevated LDL-C among patients with T2DM.

4.4 Appropriateness of Dyslipidemia Treatment

The present study demonstrated that 82.5% of patients received treatment classified as appropriate, whereas 17.5% were classified as receiving inappropriate treatment. Thus, most treatment decisions were consistent with the predefined appropriateness criteria used in this study.

Appropriate medication use is an important component of pharmacotherapy evaluation in patients with T2DM. Rahayu et al. evaluated medication use based on appropriate drug selection, dose, indication, and patient

characteristics [23].

Treatment appropriateness should not be evaluated solely according to whether a patient receives a lipid-lowering medication. The selected agent, intensity, cardiovascular risk, lipid profile, treatment response, and clinical characteristics are also important. Real-world studies demonstrate that receiving statin therapy does not necessarily mean that lipid management is optimal. For example, Bayram *et al.* [5] found that only approximately one-quarter of treated patients reached the specified LDL-C targets. Likewise, DeCicco *et al.* [8] reported suboptimal LDL-C control despite lipid-lowering treatment in U.S. clinical practice.

Beernink *et al.* [7] demonstrated that adherence was associated with lower LDL-C concentrations and greater target attainment. Similarly, studies examining barriers to lipid-goal attainment indicate that patient adherence and treatment implementation can influence whether desired lipid outcomes are achieved [18]. These findings indicate that appropriateness of therapy should be accompanied by periodic evaluation of treatment response and adherence.

4.5 Lipid Target Attainment and Optimization of Therapy

Appropriate prescribing represents only one component of successful dyslipidemia management. Achievement of lipid targets remains challenging even among treated patients. Morieri *et al.* [9] identified substantial unmet needs in LDL-C control among patients with T2DM in specialist outpatient care. Similarly, real-world analyses have demonstrated that higher-intensity statin therapy and better adherence are associated with a greater likelihood of reaching LDL-C targets [6-7].

Recent Italian data also demonstrate that lipid-lowering therapy has progressively intensified, but LDL-C target achievement remains particularly challenging among patients at very high cardiovascular risk [17]. For example, among very-high-risk patients receiving high-intensity statin therapy without ezetimibe or PCSK9 inhibitors, LDL-C target attainment remained limited despite improvement over time.

Previous Indonesian evidence also demonstrated the importance of lipid profile monitoring in patients with T2DM. Kusumaningrum et al. reported changes in lipid profile control following therapy, including improvements in the proportions of patients achieving HDL-C and triglyceride targets [21].

Treatment optimization may therefore require escalation or combination therapy in selected patients. In addition to statin–ezetimibe or other combination strategies, newer lipid-lowering treatments provide additional options for selected high-risk patients. Recent real-world comparative research has also examined PCSK9 inhibitors versus statins in patients with T2DM and dyslipidemia [19]. Nevertheless, selection of these treatments must remain individualized according to cardiovascular risk, lipid targets, tolerability, accessibility, and clinical indications.

4.6 Clinical Implications

The predominance of statin use and the high proportion of treatment classified as appropriate are favorable findings in the present study. Nevertheless, 29.0% of patients received no lipid-lowering therapy and 17.5% had treatment classified as inappropriate, indicating opportunities for further evaluation of lipid management.

These findings are particularly relevant because dyslipidemia remains highly prevalent among patients with T2DM in diverse populations [1-4]. Furthermore, a large Indonesian analysis of diabetes care demonstrated persistent challenges in achieving satisfactory cardiometabolic laboratory indicators, including lipid parameters, highlighting the broader importance of lipid monitoring in diabetes management [20].

Periodic medication review should therefore consider treatment indication, drug selection, intensity, lipid response, adherence, adverse effects, and individual cardiovascular risk. Clinical pharmacists can contribute through medication review, identification of drug-related problems, monitoring of lipid-lowering therapy, and patient education. Multidisciplinary collaboration may further support appropriate and individualized dyslipidemia management.

5. CONCLUSION

This study showed that statins were the most frequently used lipid-lowering therapy (52.5%), and 82.5% of patients received appropriate treatment. However, 29.0% received no lipid-lowering therapy and 17.5% received inappropriate treatment, indicating opportunities to optimize dyslipidemia management. Further prospective and multicenter studies are recommended to evaluate medication adherence, treatment decisions, lipid target attainment, and long-term cardiovascular outcomes.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to Universitas 17 Agustus 1945 Jakarta for its support and permission throughout the research process, enabling this study to be successfully completed in accordance with its objectives.

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