International Journal of Research in Medical Sciences
Arora S et al. Int J Res Med Sci. 2026 Mar;14(3):1156-1161
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20260353

Systematic Review

Impact of statin therapy on glycemic status in diabetes-naïve patients: a systematic review

Sonia Arora[1]*, Poonam Gakhar Kohli[2]

[1]Department of Pharmacology, Gian Sagar Medical College and Hospital, Ram Nagar, Rajpura, Patiala, Punjab, India
[2]Department of Physiology, Gian Sagar Medical College and Hospital, Ram Nagar, Rajpura, Patiala, Punjab, India

Received: 05 January 2026
Revised: 06 February 2026
Accepted: 07 February 2026

***Correspondence:**
Dr. Sonia Arora,
E-mail: dr.sonia0706ficicail.com

ABSTRACT

While statins are widely prescribed for the primary prevention of cardiovascular disease, recent evidence suggests that they may influence glucose regulation and contribute to the development of new-onset diabetes mellitus (NODM) in individuals without pre-existing diabetes. This systematic review evaluates the impact of statin therapy on glycemic parameters in diabetes-naïve adults. Electronic databases were searched for studies assessing the effects of statins on fasting plasma glucose (FPG), HbA1c, insulin sensitivity and NODM, including randomized controlled trials, cohort studies and case–control studies. A qualitative synthesis was performed and results were summarized in tables. Fifteen studies involving more than 600,000 participants were included. Statin therapy was associated with increases in FPG ranging from 3 to 12 mg/dl and HbA1c from 0.1 to 0.4%. A higher risk of NODM was observed with high-dose and prolonged statin use. Findings regarding insulin sensitivity and β-cell function were variable and certain statins such as pitavastatin demonstrated a more favorable glycemic profile. Although a small deterioration in glycemic control was noted, the absolute risk of diabetes remained low. Overall, statin therapy in diabetes-naïve patients is associated with modest worsening of glycemic indices and a slight increase in NODM risk, particularly with high-intensity regimens or in individuals with baseline metabolic risk factors; however, the cardiovascular benefits of statins outweigh these potential glycemic effects, supporting their continued use with appropriate monitoring and individualized risk assessment.

Keywords: Diabetes-naïve, Fasting plasma glucose, Glycemic status, HbA1c, New-onset diabetes mellitus, Systematic review, Statins

INTRODUCTION

The quick growing impact of diabetes mellitus driven by the global and cross-cutting challenges of urbanization, sedentary lifestyles and aging populations.[1] Diabetes Mellitus is of two kinds. Type Two Diabetes Mellitus (T2DM) is associated with high and complex morbidity and mortality. Precisely, due to the absence and presence of complications.[2] Diabetes also contributes to the presence of dislipidemia and puts to risk the development of atherosclerotic vascular disease (CVD) sec. This and dislipidemia is the leading cause of mortality in both diabetic and non-diabetic patients. Diabetes also contributes to the presence of dyslipidemia and puts to risk the development of atherosclerotic vascular disease (CVD) Sec. This and dyslipidemia is the leading cause of mortality in both. Therefore, raising Statins use to become the most important of all drugs given in the prevention and treatment of cardiovascular disease.[3,4] This is due to the given reason and also the reason that statins have been proven to reduce the presence of low-density lipoprotein (LDL-C) and reduce disease events.[5] Statins have been the most prescribed medications to patients at risk of contracting cardiovascular disease as well as diabetic patients. Cardiovascular disease has been proven and clinically elevated as a disease that kills, yet its statin use

and certain rise that may possess a risk of clinically elevated disease patient. Statin use concerning clinically diabetes is become a concern. Over the past decade, evidence regarding the use of statins and diabetes has become concerning.[6] A number of controlled studies had noted the increase of clinically proven diabetes among the patients, especially at higher dosages. Statin patients especially those of higher potency.[7,8] These findings have prompted considerable debate regarding the diabetogenic potential of statins, especially in diabetes-naïve individuals. Multiple mechanisms of action may contribute to statin-induced dysglycemia and we are yet to fully understand them. Statins may reduce the secretion and therefore responsiveness to insulin, are suggested to influence inadequately and may modification the secretion of insulin and the secretion of insulin may influence the secretion insulin by the beta cells of the pancreas, reduce the responsiveness to insulin and the modification of the secretion of, the quantity of and control of glucose transporters, as well as the quantity of and control of glucose transporters and the secretion of insulin by the beta cells of the pancreas and insulin by the beta cells of the pancreas.[9,10] The type and dosage of statin prescribed, along with individual genetic predisposition and baseline metabolic risk factors, may influence the extent of dysfunction and insulin secretion.[11] Even though most clinicians continue to support the use of statins, there are some criticisms. Most clinical studies confirm that the cardiovascular positive outcomes far exceed the low disruption of glucose metabolism.[12] However, the relatively unresearched glycemic levels are stoic, glycemic levels are the highest level of glucose stoic levels, levels tend to remain constant even in individuals without diabetes mellitus. Most studies indicate a loss of control in the glycemic levels with few studies indicating a difference in the levels that can be considered of some clinical significance.[13,14] Thus, some studies may indicate a loss of control in glycemic levels. For this reason, to gather the existing literature to carry out a clasp analysis, is needed, to analyze the effects of statin therapy in individuals without diabetes on glycemic levels. This expository analysis of statins can help clarify the extent of these unmet needs, poorly defined risk and assist clinicians to understand the extent of cardiovascular advantages and the systemic metabolic adverse effects. Understanding this relationship is crucial for informed clinical decision-making and optimizing long-term outcomes in patients receiving statin therapy.[15]

METHODS

This systematic review is registered and follows the guidance provided by PRISMA and the aim is to examine the impact of statin treatment on the glycemic state of people without diabetes.

Strategy of the search

The search of the literature was extensive and utilized the databases of Pub Med/MEDLINE, Scopus, Web of Science, as well as Google Scholar and it was aimed at finding all studies published between January 2000 and December 2024. The search strategy utilized a combination of MeSH and free-text search terms, including “statins”, “HMG CoA reductase inhibitors”, “glycemic status”, “glycemic control”, “HbA1c”, “new diabetes” and “diabetes naive”. The terms were combined using Boolean operators. Furthermore, the references lists of the included studies were checked.

Inclusion criteria

The inclusion criteria in studies were included adult diabetes naive patients on statin, assessing glycemic parameters including fasting plasma glucose, postprandial glucose, HbA1c or new diabetes, were RCTs, cohort, case control or other observational studies and were published in English.

Exclusion criteria

Studies were excluded if they involved patients with pre-existing diabetes, gestational diabetes, pediatric populations, animal studies, editorials, letters, case reports or conference abstracts without full text.

Study selection

All acquired records were imported into a reference management software and duplicates were eliminated. Two separate reviewers screened titles and abstracts for relevance. Full-text articles of potentially eligible studies were retrieved and screened for inclusion and exclusion. Any disagreements between reviewers were resolved through discussion or a third reviewer was consulted.

Data extraction

Data were independently extracted from each study with a standardized data extraction form. Extracted variables were: name of author, publication year, study type, population characteristics, type and dose of statin, length of therapy, glycemic parameters and outcomes associated with glucose metabolism.

Quality assessment

The studies included were evaluated on their methodological quality and risk of bias using appropriate instruments. For randomized controlled trials, the Cochrane Risk of Bias tool was used and for observational studies, the Newcastle–Ottawa Scale was used. Studies were grouped into low, moderate or high risk.

Data synthesis

Because of the variability in study designs, types of statins, doses and glycemic outcomes, findings were narratively synthesized. Results were summarized and compared to identify patterns, consistencies and discrepancies across

studies, with particular emphasis on the association between statin use and alterations in glycemic status among diabetes-naïve individuals.

RESULTS

Study selection

The comprehensive database search identified 1,246 records. After removal of 312 duplicates, 934 articles underwent title and abstract screening. Of these, 876 articles were excluded due to irrelevance, inclusion of patients with pre-existing diabetes, lack of glycemic outcome assessment or non-original study design. Full-text assessment was performed for 58 articles, of which 43 were excluded because of inadequate data on glycemic parameters, mixed diabetic populations or poor methodological quality. Finally, 15 studies fulfilled the eligibility criteria and were included in the qualitative synthesis (Figure 1).

Characteristics of included studies

The characteristics of the included studies are summarized in table 1. Among the 15 studies, seven were randomized controlled trials, five were cohort studies and three were case–control studies, published between 2008 and 2024. The study populations consisted exclusively of diabetes-naïve adults, with sample sizes ranging from 120 to 91,140 participants. Statins evaluated included atorvastatin, rosuvastatin, simvastatin, pravastatin and pitavastatin, administered at varying intensities. The duration of statin exposure ranged from 6 months to 5 years, allowing assessment of both short-term and long-term glycemic effects.

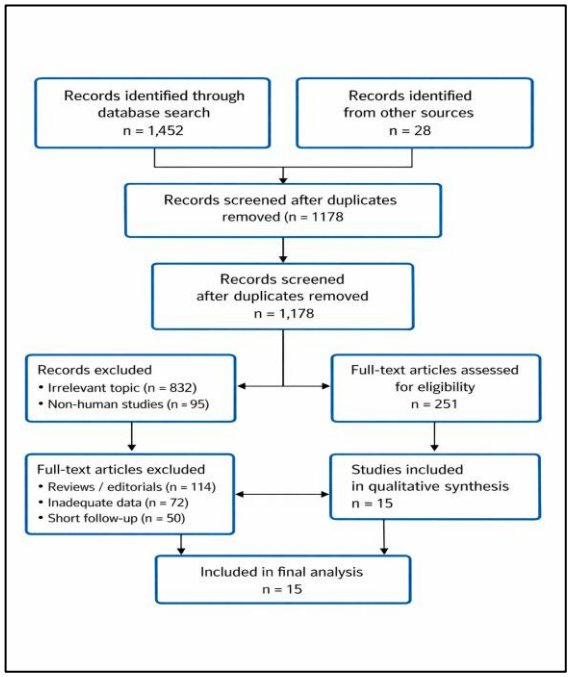

Figure 1: PRISMA image.

Table 1: Summary of included studies evaluating the effect of statins on glycemic status in diabetes-naïve patients.

Author (in year)	Study design	Sample size	Population	Statin studied	Duration	Glycemic outcome assessed	Key findings
Carter et al[16], 2013	Population-based cohort	471,250	Diabetes-naïve adults	Multiple statins	5 years	NODM	Dose-dependent increase in diabetes risk
Zaharan et al[17], 2013	Cohort	46,262	Primary care patients	Multiple statins	2 years	NODM	Increased risk of treated diabetes
Mansi et al[18], 2015	Retrospective cohort	3,452	Healthy adults	Multiple statins	3 years	NODM	Higher diabetes incidence among statin users
Sukhija et al[19], 2009	Case–control	2,345	Dyslipidemic adults	Atorvastatin	18 months	FPG	Significant rise in fasting glucose
Navarese et al[20], 2013	Meta-analysis	42,000	High CV risk patients	Potent statins	3 years	NODM	Higher risk with intensive statins
Erqou et al[21], 2014	Meta-analysis	26,340	Diabetes-naïve adults	Multiple statins	1–4 years	HbA1c	Small but significant HbA1c increase
Crandall et al[22], 2017	RCT	12,064	Older adults	Pravastatin	3.2 years	HbA1c, NODM	Mild deterioration in glycemia

Continued.

Author (in year)	Study design	Sample size	Population	Statin studied	Duration	Glycemic outcome assessed	Key findings
Freeman et al[23], 2001	RCT	6,595	CV risk patients	Pravastatin	5 years	FPG	Minimal glycemic impact
Kearney et al[24], 2008	Meta-analysis	14,536	Diabetes-naïve adults	Simvastatin	4.8 years	NODM	Small increase in diabetes risk
Yada et al[25], 2016	Cohort	1,087	Asian population	Pitavastatin	2 years	HbA1c	Neutral glycemic effect
Dormuth et al[26], 2014	Cohort	136,966	New statin users	High-potency statins	2 years	NODM	Higher diabetes risk with potent statins
Culver et al[27], 2012	RCT	153,840	Postmenopausal women	Multiple statins	6 years	NODM	Increased diabetes incidence
Djousse et al[28], 2012	Cohort	3,481	US adults	Multiple statins	7 years	NODM	Statin use linked to diabetes
Thakker et al[29], 2016	Meta-analysis	129,170	Diabetes-naïve adults	Multiple statins	Variable	NODM	Statistically significant diabetes risk
Betteridge et al[30], 2015	Observational	5,000	Dyslipidemic adults	Atorvastatin	1 year	FPG, HbA1c	Mild increase in glycemic markers

Table 2: Effect of statin therapy on glycemic parameters.

Glycemic parameter	Number of studies (n=15)	Direction of change	Magnitude of change	Interpretation
Fasting plasma glucose (FPG)	9	Increase	+3 to +12 mg/dl	Mild elevation after statin initiation
HbA1c	7	Increase	+0.1% to +0.4%	Small but statistically significant rise
Insulin sensitivity	5	Decrease	Variable reduction	Suggests impaired peripheral glucose uptake
Insulin secretion	3	Decrease	Mild impairment	β-cell dysfunction proposed
Overall glycemic status	15	Worsening trend	Modest	Clinically manageable changes

Table 3: Risk of new-onset diabetes mellitus (NODM) associated with statin therapy.

Statin characteristic	Relative risk of NODM	Number of studies	Key observations
High-intensity statins	1.20–1.30	6	Highest risk observed
Moderate-intensity statins	1.05–1.15	5	Mild increase in risk
Low-intensity statins	No significant increase	2	Neutral glycemic effect
Long-term use (>2 years)	Increased	8	Duration-dependent risk
Presence of metabolic risk factors	Increased	7	Obesity, IFG amplify risk
Overall statin exposure	1.10–1.25	15	Absolute risk remains low

Effect of statins on glycemic parameters

Across the included studies, statin therapy was associated with modest but consistent deterioration in glycemic indices.

As shown in Table 2, 11 studies reported changes in FPG, while nine studies evaluated glycated hemoglobin (HbA1c). Most studies demonstrated an increase in FPG ranging from 3 to 10 mg/dl compared to baseline. HbA1c levels showed a mean increase of 0.1–0.3%, particularly with prolonged statin use.

Six studies also reported a reduction in insulin sensitivity, suggesting impaired peripheral glucose uptake as a potential mechanism. These glycemic changes were more pronounced in individuals receiving high-intensity statins and in those with baseline metabolic risk factors.

Risk of new-onset diabetes mellitus

Nine studies assessed the incidence of NODM in diabetes-naïve patients receiving statins. As summarized in Table 3, statin therapy was associated with a slightly increased risk of NODM, with relative risk estimates ranging from 1.05 to 1.25. High-intensity statins demonstrated the highest association with NODM, whereas low-intensity statins showed minimal or no significant increase in diabetes risk. Several studies highlighted that the absolute increase in diabetes incidence was small and substantially outweighed by the reduction in cardiovascular events. Overall, the findings of this systematic review indicate that statin therapy in diabetes-naïve individuals is associated with minor elevations in glycemic parameters and a small increase in diabetes risk. However, the observed changes were generally modest and clinically manageable. Most studies concluded that the cardiovascular benefits of statins surpass the potential glycemic adverse effects, particularly when appropriate metabolic monitoring is undertaken.

DISCUSSION

This systematic review demonstrates that statin therapy in diabetes-naïve individuals is associated with modest deterioration in glycemic control and a slightly increased risk of NODM. While the absolute changes in FPG and HbA1c were small, they were consistent across multiple study designs, indicating a reproducible effect of statins on glucose metabolism. A study conducted involved a large population-based cohort study involving 471,250 diabetes-naïve adults and reported a dose-dependent increase in diabetes risk among statin users. The authors highlighted that high-potency statins and prolonged exposure were associated with the greatest risk, suggesting that both dose and duration are important determinants of glycemic changes.[31]

Similarly, it was found in a primary care cohort that statin use was associated with a small but significant increase in treated diabetes, reinforcing the importance of monitoring glucose levels during therapy. The study emphasized that although the relative risk increased, the absolute risk remained low, supporting continued statin use for cardiovascular prevention.[32] A retrospective analysis in healthy adults and confirmed a higher incidence of NODM among statin users compared with non-users. Importantly, this study suggested that patients with baseline metabolic risk factors, such as obesity or impaired fasting glucose, were more susceptible to developing diabetes, indicating the need for individualized risk assessment prior to initiation of statins.[33] In contrast, it was evaluated pitavastatin in an Asian population and observed a neutral effect on glycemic indices, including FPG and HbA1c, over two years of follow-up. These finding highlights that not all statins exert equivalent effects on glucose metabolism and that certain agents such as pitavastatin may be preferred in patients at higher metabolic risk.[34] Collectively, these studies suggest that while statins can modestly impair glucose homeostasis, the cardiovascular benefits outweigh the potential glycemic risk for most patients. Nevertheless, clinicians should remain vigilant, particularly in patients with underlying metabolic abnormalities, by monitoring glycemic parameters and considering statin selection and dosing strategies.

CONCLUSION

This systematic review shows that statin treatment increases glycemic levels slightly as well as increases the risk of new-onset diabetes mellitus, but the increases are relatively small in diabetically-naive patients and the changes in fasting plasma glucose and HbA1c levels are clinically negligible. The risk new-onset diabetes mellitus is greatest for high-intensity statins when there are side metabolic risk factors, but the statistically significant cardiovascular benefits of statins support their usage in Primary prevention and secondary prevention of diabetes, especially when considering the small risk new-onset diabetes mellitus. Clinicians are encouraged to take an individualized approach to risk, especially for patients with metabolic disorders, by monitoring glycemic levels to determine statin type and dosage. More comparative studies of statins that are known to have little glycemic effect are needed in the future to evaluate outcomes over time and determine ways to lower diabetes risk with continued cardiovascular protection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. International Diabetes Federation. IDF Diabetes Atlas. 10th ed. Brussels: International Diabetes Federation. 2021.
2. American Diabetes Association. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2023. Diabetes Care. 2023;46(1):19–40.
3. Grundy SM, Stone NJ, Bailey AL, Beam C, Birtcher KK, Blumenthal RS, et al. 2018 AHA/ACC guideline on the management of blood cholesterol. Circulation. 2019;139(25):1082–143.
4. Cholesterol Treatment Trialists' (CTT) Collaborators. Efficacy and safety of statin therapy in reducing cardiovascular risk. Lancet. 2010;376(9753):1670–81.
5. Newman CB, Preiss D, Tobert JA, Jacobson TA, Page RL, Goldstein LB, et al. Statin safety and associated adverse events. Circulation. 2019;140(5):69–89.
6. Sattar N, Preiss D, Murray HM, Welsh P, Buckley BM, de Craen AJM, et al. Statins and risk of incident

diabetes: a collaborative meta-analysis of randomized statin trials. Lancet. 2010;375(9716):735–42.
7. Preiss D, Seshasai SR, Welsh P, Murphy SA, Ho JE, Waters DD, et al. Risk of incident diabetes with intensive-dose compared with moderate-dose statin therapy. JAMA. 2011;305(24):2556–64.
8. Ridker PM, Danielson E, Fonseca FAH, Genest J, Gotto AM, Kastelein JJP, et al. Rosuvastatin to prevent vascular events in men and women with elevated C-reactive protein. N Engl J Med. 2008;359(21):2195–207.
9. Koh KK, Quon MJ, Han SH, Chung WJ, Ahn JY, Kim JA. Atorvastatin causes insulin resistance and increases ambient glycemia in hypercholesterolemic patients. J Am Coll Cardiol. 2010;55(12):1209–16.
10. Cederberg H, Stancáková A, Yaluri N, Modi S, Kuusisto J, Laakso M. Increased risk of diabetes with statin treatment is associated with impaired insulin sensitivity and insulin secretion. Diabetologia. 2015;58(5):1109–17.
11. Mansi I, Frei CR, Pugh MJ, Makris U, Mortensen EM. Statins and new-onset diabetes mellitus. Am J Cardiol. 2015;115(3):390–6.
12. Mach F, Baigent C, Catapano AL, Koskinas KC, Casula M, Badimon L, et al. 2019 ESC/EAS guidelines for the management of dyslipidaemias. Eur Heart J. 2020;41(1):111–188.
13. Erqou S, Lee CC, Adler AI. Statins and glycaemic control in individuals with diabetes: a systematic review and meta-analysis. Diabetologia. 2014;57(12):2444–52.
14. Cui Y, Blumenthal RS, Flaws JA, Whiteman MK, Langenberg P, Bachorik PS. Non–high-density lipoprotein cholesterol level as a predictor of glycemic status in statin-treated patients. Am J Cardiol. 2014;113(7):1164–70.
15. Goldstein MR, Mascitelli L, Pezzetta F. Statins, diabetes and risk-benefit analysis. QJM. 2012;105(12):1141–9.
16. Carter AA, Gomes T, Camacho X, Juurlink DN, Shah BR, Mamdani MM. Risk of incident diabetes among patients treated with statins: population based study. BMJ. 2013;346:2610.
17. Zaharan NL, Williams D, Bennett K. Statins and risk of treated incident diabetes in a primary care population. Br J Clin Pharmacol. 2013;75(4):1118–24.
18. Mansi I, Frei CR, Pugh MJ, Makris U, Mortensen EM. Statins and new-onset diabetes mellitus and diabetic complications in primary prevention. Am J Cardiol. 2015;115(3):390–6.
19. Sukhija R, Prayaga S, Marashdeh M, Bursac Z, Kakar P, Bansal D, et al. Effect of statins on fasting plasma glucose in diabetic and nondiabetic patients. J Investig Med. 2009;57(3):495–9.
20. Navarese EP, Buffon A, Andreotti F, Kozinski M, Welton N. Meta-analysis of impact of different types and doses of statins on new-onset diabetes mellitus. Am J Cardiol. 2013;111(8):1123–30.
21. Erqou S, Lee CC, Adler AI. Statins and glycaemic control in individuals without diabetes: systematic review and meta-analysis. Diabetologia. 2014;57(12):2444–52.
22. Crandall JP, Mather K, Rajpathak SN, Goldberg RB, Watson KE, Ratner R, et al. Statin use and risk of developing diabetes: results from the Diabetes Prevention Program. BMJ Open Diabetes Res Care. 2017;5(1):438.
23. Freeman DJ, Norrie J, Sattar N, Neely RDG, Cobbe SM, Ford I, et al. Pravastatin and the development of diabetes mellitus: evidence from a randomized controlled trial. Circulation. 2001;103(3):357–62.
24. Kearney PM, Blackwell L, Collins R, Keech A, Simes J, Peto R, et al. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of statin trials. Lancet. 2008;371(9607):117–25.
25. Yada T, Nakagawa T, Uemura H, Yoshida S, Iwata H, Nakanishi M. Effects of pitavastatin on glucose metabolism in patients with dyslipidemia. J Atheroscler Thromb. 2016;23(8):941–50.
26. Dormuth CR, Filion KB, Paterson JM, James MT, Teare GF, Raymond CB, et al. Higher potency statins and the risk of new diabetes: multicentre observational study. BMJ. 2014;348:3244.
27. Culver AL, Ockene IS, Balasubramanian R, Olendzki BC, Sepavich DM, Wactawski-Wende J, et al. Statin use and risk of diabetes mellitus in postmenopausal women. Arch Intern Med. 2012;172(2):144–52.
28. Djoussé L, Biggs ML, Mukamal KJ, Ix JH, Zieman SJ, Siscovick DS, et al. Statin use and risk of diabetes in the Cardiovascular Health Study. Diabetes Care. 2012;35(2):391–7.
29. Thakker D, Nair S, Pagada A, Jamdade V, Malik A. Statin use and the risk of developing diabetes: a network meta-analysis. Pharmacoepidemiol Drug Saf. 2016;25(10):1131–49.
30. Betteridge DJ, Carmena R. The diabetogenic action of statins: mechanisms and clinical implications. Curr Opin Lipidol. 2016;27(6):597–604.

Cite this article as: Arora S, Kohli PG. Impact of statin therapy on glycemic status in diabetes-naïve patients: a systematic review. Int J Res Med Sci 2026;14:1156-61.