

Cordova Formula, A Better Alternative to Martin's Formula for the Calculation of LDL-C in Patients with TG above 350 mg/dL

350 mg/dL Üstündeki TG'li Hastalarda LDL-C Ölçümü İçin Cordova Formülü Martin Formülünden Daha İyi Bir Alternatif

LETTER TO THE EDITOR EDİTÖRE MEKTUP

Dear Editor,

The authors read with interest the original article titled "Comparison of Martin and Friedewald equation for estimated LDL-C in adults" and the editorial titled "Is it time to abandon Friedewald formula? New equations for LDL-C calculation" published in the December 2021 issue of this journal.^{1,2}

Medine Alpdemir and Mehmet Fatih Alpdemir¹ have compared directly measured low-density lipoprotein cholesterol (LDL-C), Friedewald, and Martin formula in the Turkish adult population and found that Martin formula to be a better alternative to Friedewald in calculating LDL-C. Özcan Başaran,² in the editorial, has advocated the need for validating the newer formulae in different populations before implementing it in clinical practice.

The authors agree with Özcan Başaran regarding the imminent need to replace the Friedewald formula with another novel formula to overcome the limitations of the Friedewald formula. The authors have been working in the Indian population to test and validate the different alternatives to the Friedewald formula to successfully implement the same in clinical practice. In this regard, we would like to add our experience regarding the Cordova formula in patients with triglyceride (TG) >350 mg/dL when compared with Martin's, Sampson's, and Friedewald's formula.

We collected 10 000 patient sample lipid profile results for the years 2020 and 2021 and performed a comparative analysis of Cordova's, Martin's, Sampson's, and Friedewald's formula in comparison with direct estimation. We selected 443 samples with TG >350 mg/dL for our further analysis. The lipid profile, including TG, total cholesterol (TC), high-density lipoprotein cholesterol, and LDL-C by direct assay, was estimated in Beckmann AU 680 clinical chemistry analyzer. All the parameters were calibrated using a system multi-calibrator provided by Beckman Coulter, Inc., CA, USA. Quality Control was assessed using 2 Levels of Liquichek Lipids Control from Bio-Rad Laboratories, Inc. The calibrators used were traceable to the US CDC LDL Cholesterol reference method.

Table 1. Comparison of Different Formula for the Calculation of LDL-C in Patients with TG above 350 mg/dL

LDL-C	Direct estimation	Friedewald	Cordova	Martin	Sampson
N	443	443	443	443	443
Mean	144.5801	83.05237	139.3713	119.51	100.8156
SD	61.59215	92.0207	66.55445	82.60	70.40265
P		<.0001	.0001	<.0001	<.0001

SD, standard deviation.

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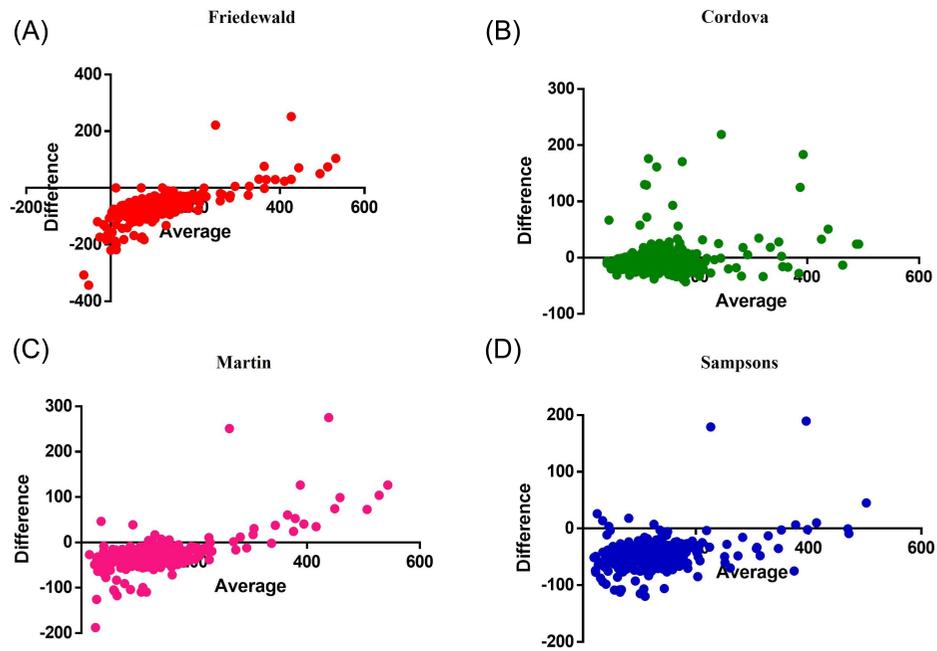


Figure 1. Bland-Altman plots for calculated LDL-C and direct estimation. (A) Friedewald (B) Cordova (C) Martin Hopkins (D) Sampsons. LDL-C, low-density lipoprotein cholesterol.

In patients with TG >350 mg/dL, we observed the Cordova formula to be having a better approximation with directly estimated LDL-C. After the Cordova formula, Martin's formula appeared to have the closest approximation with directly estimated LDL-C (Table 1). We also assessed the Bland-Altman plots for the 4 formulae to assess the formula with the least bias. The Bland-Altman plots demonstrated the Cordova formula to be one with minimum bias when compared with direct estimation (Figure 1). We also observed that the Cordova formula had the lowest standard deviation when compared with Martin's, Sampsons's, and Friedewald's formula (Table 1). Our finding is in concordance with the study conducted in the German population-based study cohort.³

The authors have already shown recently the superior ability of the Cordova formula in distinguishing patients requiring lipid-lowering treatment.⁴ The Cordova formula does not include TG as a factor for the calculation of LDL-C, which acts in its favor at higher ranges of TG.⁵ From the present analysis, the close approximation to directly estimated LDL-C, lower bias when compared with other formulae, and lower SD of Cordova formula in patients with TG >350 mg/dL makes it an attractive alternative to another formula in patients with increased TG. Further population-based studies will help us to validate the Cordova formula in other populations and may pave the way for adoption

in clinical practice for the calculation of LDL-C in patients with increased TG.

Declaration of Interests: The authors have no financial conflicts of interest.

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