Clin. Lab. 2022;68:XXX-XXX

LETTER TO THE EDITOR

Performance of Sampson's Formula for LDL-C Estimation in an Iranian Population

Asma Kheirollahi [1] and Azam Karkhaneh [2]

[1] *Department of Comparative Biosciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran*
[2] *Reference Laboratory, Social Security Organization, Tehran, Iran*

Clin. Lab. 2022;68:xx-xx. DOI: 10.7754/Clin.Lab.2021.210604)

Correspondence:
Asma Kheirollahi
Department of Comparative Biosciences
Faculty of Veterinary Medicine
University of Tehran
Tehran
Iran
Phone: +98 21 61117132
Fax: +98 21 61117132
Email: Kheirolahi_asma@ut.ac.ir

KEY WORDS

LDL-C estimation, LDL-C equations, Sampson equation

LIST OF ABBREVIATIONS

LDL-C - low-density lipoprotein cholesterol
SF - Sampson's formula
TG - triglyceride

LETTER TO THE EDITOR

Nowadays, the calculation methods for LDL-C estimation are widely applied in clinical laboratories especially in developing countries. Since incorrectly estimated LDL-C may lead to misclassification of individuals in cardiovascular disease [1], finding a new formula for accurate estimation of LDL-C is of paramount importance. In this context, Sampson et al. introduced a new equation in 2020 [2]. So far, only a few studies assessed the performance and accuracy of Sampson's formula (SF) as a newly proposed formula for LDL-C estimation [2-4]. Recently, two studies evaluated the performance and accuracy of this formula [3,4]. According to their results, SF with the highest concordance rate displayed the best performance compared to other formulas, even in the setting of hypertriglyceridemia [3,4]. In our recently published article, we compared various equations for LDL-C calculation in an Iranian population with different metabolic statuses [5]. We observed that Hattori and de Cordova formulas have better performance than the others [5]. Prompted by the articles by Sampson et al. and Piani et al., we investigated

Letter to the Editor accepted June 30, 2021

Table 1. Comparison between directly measured LDL-C and calculated LDL-C by Sampson's formula.

Group	Direct LDL-C mean ± SD mmol/L	Sampson LDL-C mean ± SD mmol/L	Mean difference mmol/L	Correlation (r)	p-value
Total (n = 2,752)	2.53 ± 0.63	2.74 ± 0.77	0.20	0.943	0.0001
TG < 0.56 mmol/L (n = 66)	1.84 ± 0.43	1.99 ± 0.52	0.15	0.913	0.0001
TG 0.56 - 1.69 mmol/L (n = 1,727)	2.43 ± 0.59	2.68 ± 0.73	0.25	0.970	0.0001
TG 1.7 - 3.38 mmol/L (n = 817)	2.75 ± 0.66	2.94 ± 0.82	0.19	0.901	0.0001
TG 3.39 - 4.51 mmol/L (n = 77)	2.79 ± 0.68	2.82 ± 0.82	0.03	0.978	0.133
TG > 4.51 mmol/L (n = 65)	2.59 ± 0.63	2.59 ±0.74	0	0.927	0.414

whether SF can be applied in the Iranian population particularly in subjects with increasing triglyceride levels. A data set of 2,752 subjects from Tehran city was used in the study. All samples were analyzed in terms of lipid profiles using direct homogeneous assay, as previously reported [5].

The results of calculated LDL-C by SF are shown in Table 1. The estimated LDL-C by SF was significantly correlated with the directly measured LDL-C. However, a significant mean difference was observed between the calculated LDL-C by SF and the directly measured LDL-C. Moreover, SF was not a better estimator over the Hattori, de Cordova, Friedewald, and Chen formulas, as compared to our previously reported data [5]. By assessing performance according to triglyceride (TG) levels, it was found that SF overestimated LDL-C in TG < 3.39 mmol/L ranges. SF showed the best performance in the setting of hypertriglyceridemia in such a way that the mean difference between directly measured LDL-C and Sampson estimated LDL-C was insignificant in TG > 3.39 mmol/L subgroups.

In conclusion, despite promising results of SF in some studies and here, particularly in individuals with hypertriglyceridemia, it seems that the performance and accuracy of this novel formula for estimation of LDL-C should be assessed in other populations with larger sample size and different metabolic statuses. Given the free availability of this equation, it is recommended that other researchers investigate its validity and performance in their target population.

Declaration of Interest:

The authors declare that they have no conflict of interest.

References:

1. Expert Panel on Detection E. Executive summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). JAMA 2001; 285:2486-97 (PMID: 11368702).
2. Sampson M, Ling C, Sun Q, et al. A new equation for calculation of low-density lipoprotein cholesterol in patients with normolipidemia and/or hypertriglyceridemia. JAMA Cardiol 2020;5:540-8 (PMID: 32101259).
3. Vargas-Vázquez A, Bello-Chavolla OY, Antonio-Villa NE, Mehta R, Cruz-Bautista I, Aguilar-Salinas CA. Comparative assessment of LDL-C and VLDL-C estimation in familial combined hyperlipidemia using Sampson's, Martin's and Friedewald's equations. Lipids Health Dis 2021;20:46 (PMID: 33952259).
4. Piani F, Cicero AF, Borghi C, D'Addato S; BLIP Study group. Is the 2020 Sampson equation the best formula for LDL-C estimation? Eur J Intern Med 2021;83:99-101 (PMID: 32978038).
5. Karkhaneh A, Bagherieh M, Sadeghi S, Kheirollahi A. Evaluation of eight formulas for LDL-C estimation in Iranian subjects with different metabolic health statuses. Lipids Health Dis 2019;18:231 (PMID: 31883533).