Clin. Lab. 2022;68:1-4

ORIGINAL ARTICLE

Influence of RBC Indices on HbA1c Measurement by Capillary Electrophoresis and HPLC Methods

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SUMMARY

Background: **HbA1c is the gold standard of diabetic surveys to monitor the long-term glycemic control. Anemia is cited as a major confounder to HbA1c analysis; however, the effect of RBC indices influences on HbA1c analysis is not known. The aim of this study is to compare ion-exchange high-performance liquid chromatography, and capillary electrophoresis to evaluate the influence of RBC parameters on HbA1c values in anemia patients.**
Methods: **Erythrocyte parameters were collected from the 307 randomly selected specimens from the Hematology division. HbA1c was measured on the same specimen using Tosoh G8 and Capillarys 2 Flex Piercing on the same day.**
Results: **There is acceptable concordance between the results of capillary electrophoresis and HPLC methods ($R^2 = 0.953$, $p < 0.001$). However, significant differences in HbA1c value between the two assay methods were obtained in the patients with abnormal RBC indices ($p < 0.001$).**
Conclusions: **Our results demonstrated HbA1c differences were significantly different in the patients with low Hb (≤ 8 g/dL) and high RDW-CV (≥ 13.7%). It is suggested that in the analysis of HbA1c level in anemia patients, simultaneous testing for hemoglobin level is needed. In addition, development of a new reference value of HBA1c for patients with severe anemia should be considered.**
(Clin. Lab. 2022;68:1-4. DOI: 10.7754/Clin.Lab.2021.211053)

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Manuscript accepted May 3, 2021

Supplementary Data

Table S1. Baseline demographic and RBC parameters characteristics of the study participants.

Variables		n = 307
Gender	Male	163 (53.1) *
	Female	144 (46.9)
Age		60.85 (15-98) **
RBC (10^6/μL)		3.20 ± 1.01 ***
Hb (g/dL)		8.92 ± 2.59
Hct (%)		27.60 ± 7.71
MCV (fL)		87.91 ± 10.95
MCH (pg/cell)		28.53 ± 4.44
MCHC (g/dL)		32.34 ± 2.03
RDW-CV (%)		16.55 ± 7.75

*** n (%), ** Mean (range), *** Mean ± SD.**

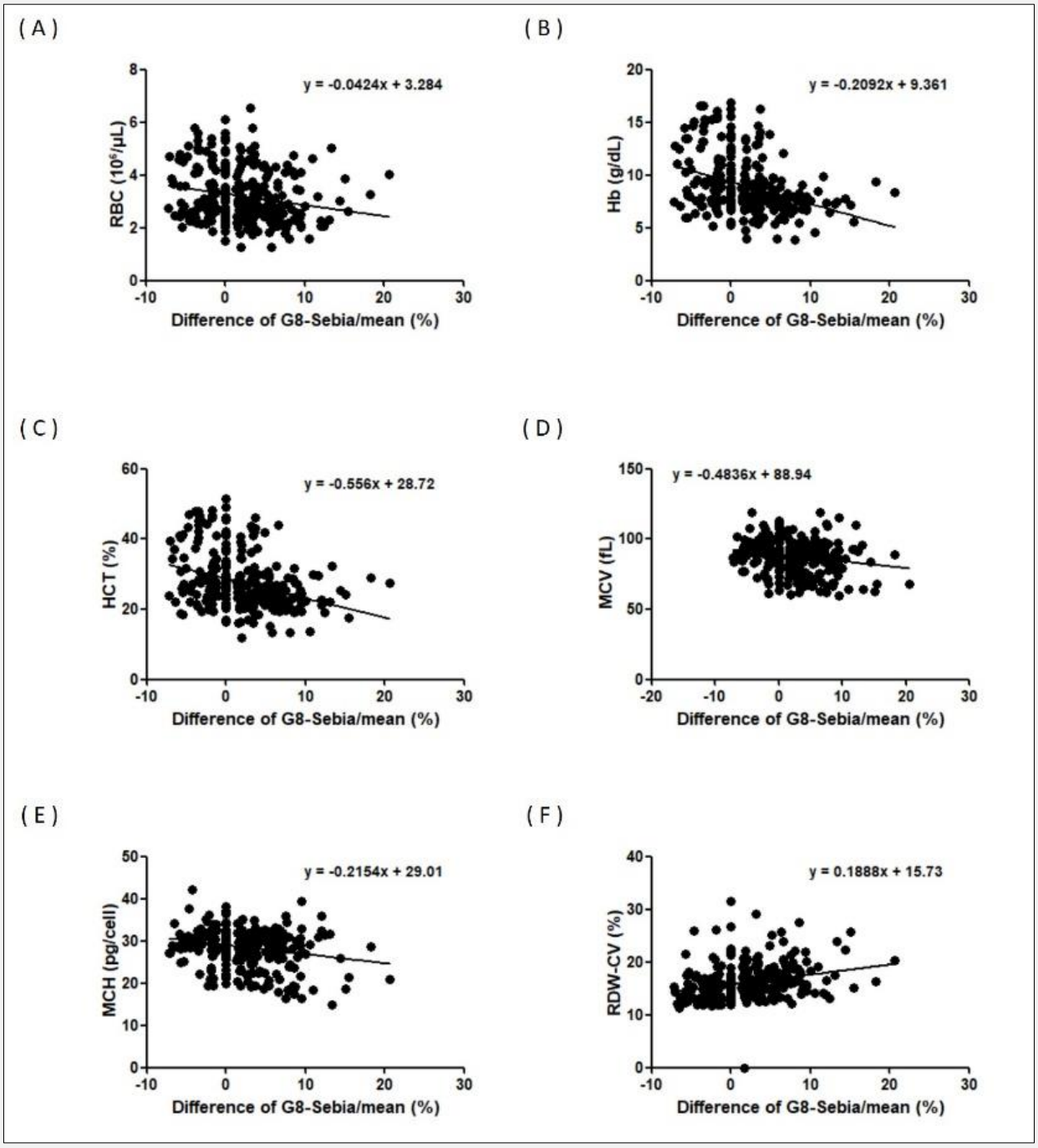

Figure S1. Linear regression curves.

The relationship between (A) RBC (p = 0.0007), (B) Hb (p < 0.0001), (C) Hct (p < 0.0001), (D) MCV (p = 0.0004), (E) MCH (p < 0.0001) and (F) RDW-CV (p < 0.0001) with HbA1c differences between Tosoh G8 and Sebia Cap2FP analysis.

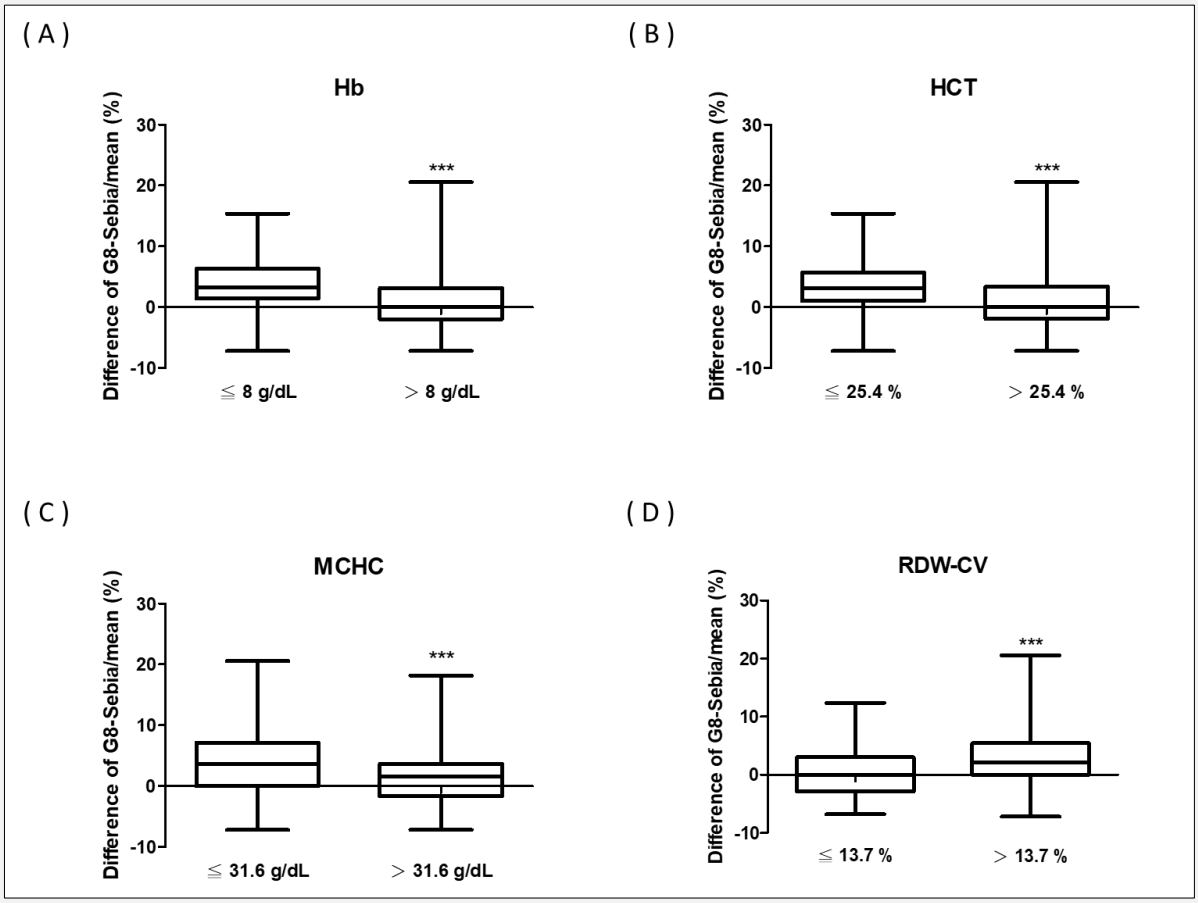

Figure S2. Comparison of the HbA1c differences obtained with Tosoh G8 and Sebia Cap 2FP between the cutoff RBC parameters at (A) Hb = 8 g/dL, (B) Hct = 25.4%, (C) MCHC = 31.6 g/dL, and (D) RDW-CV = 13.7%.