

Racial/Ethnic Differences on Baseline Coagulation Parameters using Point of Care Viscoelastic Testing for Obstetric Patients.



Jin Yoo¹; Marah Alian²; Antonio Fiol-Gonzalez, MD³; David Yanez, PhD⁴; Nayema Salimi, MD³; Aymen Alian, MD³.

1. Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ.

2. University of New England College of Osteopathic Medicine, Biddeford, ME.
3. Department of Anesthesiology, Yale School of Medicine, New Haven, CT.

4. Department of Biostatistics, Yale Center for Analytical Sciences, New Haven, CT.



Introduction

Point of Care Viscoelastic Testing (POCVT) time-efficiently monitors whole blood coagulation. Its use in postpartum hemorrhage (PPH) guides blood product management and improves patient outcomes, especially in high-risk women.¹ Baseline parameters for obstetric patients, who are hypercoagulable at baseline, have been reported, but the impact of race/ethnicity has not been described. Our primary aim is to provide baseline parameters for the rotational thromboelastrometry (ROTEM) device in a diverse, representative sample.

Methods

From 2015 to 2020, ROTEM was conducted on 681 obstetric patients. Inclusion criteria included healthy patients with a history of PPH, preeclampsia, gestational diabetes, and hypertension. Exclusion criteria included antepartum hemorrhage, thrombophilia, and receiving medications affecting coagulation, tranexamic acid, or blood products before ROTEM analysis. Welch's t-tests and pairwise comparisons were performed on ROTEM parameters by self-identified race/ethnicity on a total of 485 charts (Table 1).



Pictured: ROTEM® Device.

Table 1. Average ROTEM parameters and comorbidity prevalence by self-identified race/ethnicity.

	Self-Identified Race/Ethnicity, n(%)				p-value
	White 261(53.8%)	Black 110(22.7)	Asian 22(4.5)	Other 92(19)	
Comorbidities					
BMI >35 kg/m ²	84 (32)	58 (52.7)	2 (9.1)	34 (37)	
gHTN	66(25.3)	42 (38.2)	2 (9.1)	25 (27.2)	
gDM	29(11.1)	21 (19.1)	7 (31.8)	16 (17.4)	
PEC	40(15.3)	30 (27.2)	0	7 (31.8)	
ROTEM Parameters					
Mean (standard deviation)					
FIBTEM					
CT	58.0 (18.6)	57.5 (13.1)	57.0 (9.2)	58.1 (10.1)	0.96
Alpha angle	75.2 (4.8)	76.3 (5.0)	72.8 (4.5)	75.8 (4.0)	0.007
MCF	25.5 (6.0)	27.4 (7.8)	21.7 (5.1)	26.2 (6.2)	<0.001
A10	23.0 (5.4)	25.6 (6.7)	19.7 (5.0)	24.1 (5.2)	<0.001
EXTEM					
CT	63.3 (37.3)	61.7 (12.9)	60.6 (7.1)	61.2 (9.7)	0.80
CFT	74.7 (33.3)	63.8 (17.6)	85.5 (24.5)	70.7 (26.3)	<0.001
Alpha angle	76.2 (4.5)	77.5 (3.6)	73.8 (3.2)	76.6 (4.0)	<0.001
MCF	70.1 (6.1)	70.7 (7.5)	67.8 (5.2)	71.0 (6.3)	0.083
A10	62.7 (7.5)	65.0 (6.5)	59.5 (6.4)	64.2 (7.8)	<0.001
INTEM					
CT	164.1 (39.7)	159.6 (34.9)	172.2 (28.9)	166.0 (42.4)	0.30
CFT	73.2 (37.4)	63.3 (21.7)	80.2 (33.7)	63.3 (22.1)	0.001
Alpha angle	76.0 (5.2)	77.3 (3.8)	74.1 (5.0)	77.5 (3.7)	<0.001
MCF	67.7 (6.8)	68.6 (8.4)	66.0 (6.1)	69.6 (6.2)	0.027
A10	60.4 (7.9)	63.2 (7.2)	58.1 (7.2)	63.1 (7.3)	<0.001
Difference of means (standard error), [95 % Confidence interval], p-value					
FIBTEM A10		2.67 (0.73), [1.23,4.11], p <0.001	- 3.38 (1.09), [-5.43, -1.13], p = 0.003		
EXTEM A10		2.40 (0.78), [0.87, 3.93], p =0.002	- 3.30 (1.41), [-6.08, -0.52], p = 0.020		
INTEM A10		2.85 (0.86), [1.16,4.54], p = 0.001		2.69 (0.92), [0.87, 4.50], p = 0.004	

Comorbidity prevalence and average ROTEM parameters of 485 patients, stratified by self-identified race/ethnicity, included in statistical analysis for obtaining baseline parameters at our tertiary care unit in the United States. Difference of means indicates a comparison between specified race/ethnic patients to White patients. “Other” included patients identifying as Hispanic/Latino, Pacific Islander, or multiple groups. Y: years; BMI: body mass index; gHTN: gestational hypertension; gDM: gestational diabetes mellitus; PEC: preeclampsia; CT: clotting times; MCF: Maximum clot firmness; A10: amplitude at 10 minutes; A20: amplitude at 20 minutes

Results

Compared to White counterparts, Black patients exhibit a hypercoagulable profile, evidenced by increases in fibrinogen, internal, and external pathway parameters. Asian patients demonstrate a hypocoagulable state, with decreases in fibrinogen and external parameters.

Conclusions

This corroborates previous studies that show lower and higher risk of venous thromboembolism (VTE) in Asian and Black patients, respectively.² Despite providing plausible relation between race and coagulopathy, our study does not account for social determinants of health or the obesity prevalence in our sample’s Black patients: for instance, social stressors (e.g., unemployment, access to care, obesity) may increase fibrinogen levels, leading to a hypercoagulable state.^{3,4} Our results agree with previous population studies that suggest race/ethnicity is associated with variable risk of VTE.⁴ Although more research must confirm our findings, some literature suggests that race/ethnicity should be considered when assessing thromboprophylaxis prophylaxis. However, while such algorithms may help, their impact should be closely monitored as they could exacerbate systemic disparities.⁵ Rather, our results elicit the need to better understand the intricate relationship of social/ethnic factors and health.

References

Shah A, Collis RE. Managing obstetric haemorrhage: is it time for a more personalised approach? Anaesthesia. 2019;74:961-4.

Blondon M, et al. Racial and ethnic differences in the risk of postpartum venous thromboembolism: a population-based, case-control study. J Thromb Haemost. 2014;12:2002-9.

Sumner RC, et al. Unemployment, employment precarity, and inflammation. Brain Behav Immun. 2019;83:303-8.

Blondon M, et al. Pre-pregnancy BMI, delivery BMI, gestational weight gain and the risk of postpartum venous thrombosis. Thromb Res. 2016;145:151-6.

Vyas DA, et al. Hidden in Plain Sight—Reconsidering the Use of Race Correction in Clinical Algorithms. NEJM. 2020;383:874-82.