Allostatic Load and Spontaneous Preterm Birth Among Women with HIV in Lusaka, Zambia

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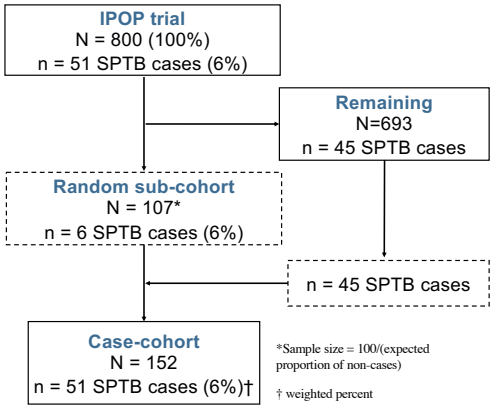
BACKGROUND

- Maternal HIV infection has been associated with increased preterm birth risk.
- Spontaneous preterm birth (SPTB) has been linked to biological markers of stress in high-income settings.
- We aimed to compare allostatic load indices between pregnant women with HIV who delivered spontaneously before term compared to those who did not.
- We hypothesized that women who experienced SPTB would have higher allostatic load index.

METHODS

- Secondary analysis of data and biological specimens collected in the Improving Pregnancy Outcomes with Progesterone (IPOP) trial in Lusaka, Zambia
- IPOP enrolled 800 women with HIV between 2015-2017
- Inclusion: 18+ years old, viable intrauterine single pregnancy, <24 gestational weeks by ultrasound, confirmed HIV+, receiving or intending to initiate ART
- Exclusion: history SPTB, planned cerclage, uterine or fetal anomaly, indication for planned PTB, evidence of PTL or PPROM at time of screening
- Allostatic load components measured at 24-26 weeks (except BMI and MUAC measured at baseline)

Case-cohort population selection



*Sample size = 100/(expected proportion of non-cases)

† weighted percent

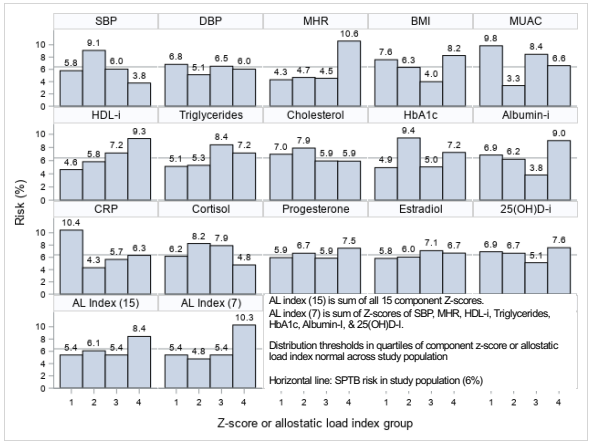
HIGH **ALLOSTATIC LOAD INDEX** WAS ASSOCIATED WITH **SPONTANEOUS PRETERM BIRTH** AMONG PREGNANT WOMEN WITH HIV IN LUSAKA, ZAMBIA

Allostatic Load Index Components

Cardiovascular	Systolic blood pressure, mmHg (SBP)	**Metabolic**	Body mass index, kg/m² (BMI)
	Diastolic blood pressure, mmHg (DBP)		Mid-upper arm circumference, cm (MUAC)
	Maternal heart rate, bpm (MHR)		High-density lipoprotein, mmol/L (HDL)
Neuroendocrine	Cortisol, ng/mL		Triglycerides, mmol/L
	Progesterone, ng/mL		Total cholesterol, mmol/L
	Estradiol, pg/mL		Hemoglobin A1C, % (HbA1c)
	25-OH Vitamin D, ng/mL	**Immune**	Albumin, g/dL
			C-reactive protein, mg/L (CRP)

Z-scores for each component standardized for GA at collection and summed to calculate allostatic load index.

Risk of SPTB by Z-scores and Allostatic Load Indices



CONCLUSIONS

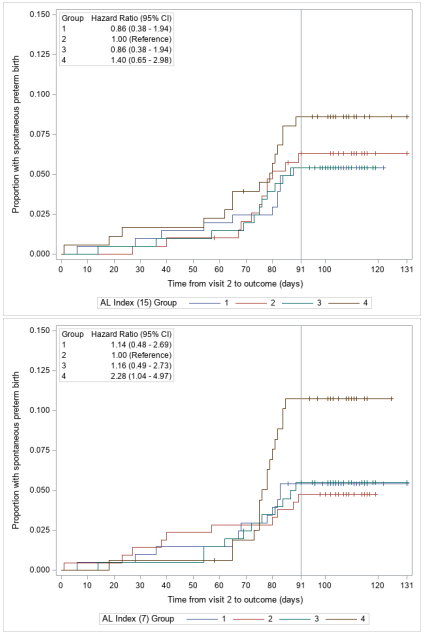
- High allostatic load in pregnant women with HIV was associated with spontaneous preterm birth.
- Early detection and preventive interventions for high-risk women with HIV could have substantial public health benefit.

Baseline Characteristics

	Unweighted Sample		Weighted[a] Sample	
	N	%(n) or Median (IQR)	N	% (n) or Median (IQR)
Participants	152	100% (152)	800	100% (800)
Maternal age, years	152	29.0 (24.0, 33.0)	800	29.0 (24.0, 33.0)
Parous	152	78.9% (120)	800	78.4% (627)
Prior preterm birth	120	2.5% (3)	627	1.5% (9)
EGA at enrollment, weeks	152	19.0 (15.0, 21.0)	800	19.0 (15.0, 21.0)
Preconceptional ART	152	75.0% (114)	800	76.8% (614)
CD4 count, cells/uL	152	557.5 (367.5, 772.0)	800	568.0 (370.0, 772.0)
Randomized to 17P	152	49.3% (75)	800	49.5% (396)
Outcome: SPTB[b]	152	33.6% (51)	800	6.4% (51)

[a] Weighted by the inverse probability of selection into the case-cohort
[b] Spontaneous preterm birth; among non-SPTB cases, 2 were provider-initiated preterm births

Incidence of SPTB by 15- and 7-component indices



Tick marks: censored observations. Participants who did not experience outcome of preterm birth were censored at time of delivery or stillbirth.
Vertical line: time by which all participants would reach full term (i.e., 37 weeks).