

CEREBROPLACENTAL RATIO : A POTENTIAL PREDICTOR OF ADVERSE NEONATAL OUTCOMES IN TERM PREGNANCIES



01. Introduction

The cerebroplacental ratio (CPR), calculated as MCA PI/UA PI, reflects fetal blood flow redistribution due to hypoxia. Unlike individual Doppler indices, CPR can detect subtle compromise. A low CPR at term is associated with intrapartum distress and adverse neonatal outcomes. CPR offers a simple, effective tool for identifying at-risk fetuses, guiding surveillance and intervention, especially in resource-limited settings.

02. Objective

To investigate the association between the cerebroplacental ratio calculated prior to induction of labour in appropriate for gestational age fetuses and adverse neonatal outcomes

03. Methodology

This prospective study included 210 term pregnancies with appropriate-for-gestational-age fetuses undergoing induction of labour. After applying eligibility criteria and obtaining informed consent, a sonographic evaluation was done within 24 hours prior to labor. Fetal parameters, AFI, and Doppler indices (MCA and UA) were assessed. Pulsatility Index (PI) values of MCA and UA were averaged from three readings, and CPR was calculated (MCA PI / UA PI). CPR values were categorized into gestational age-specific centiles using Fetal Medicine Foundation charts.(1)

04. Results

CPR $\leq$ 10th centile was significantly associated with increased rates of CTG abnormalities, LSCS for intrapartum fetal compromise (2)(3), APGAR $\leq$ 7 at 5 mins (3), NICU admissions (p = 0.0001), (4) but not with meconium-stained liquor (p = 0.424) or duration from induction to CTG abnormalities (p = 0.25)(2).

The sensitivity and specificity of CPR $\leq$ 10th centile in predicting NICU admission were 93.8% and 97.7%, respectively; for APGAR $\leq$ 7 at 5 minutes, 95.3% and 86.5%; and for meconium stained liquor, 58.5% and 66.4%.

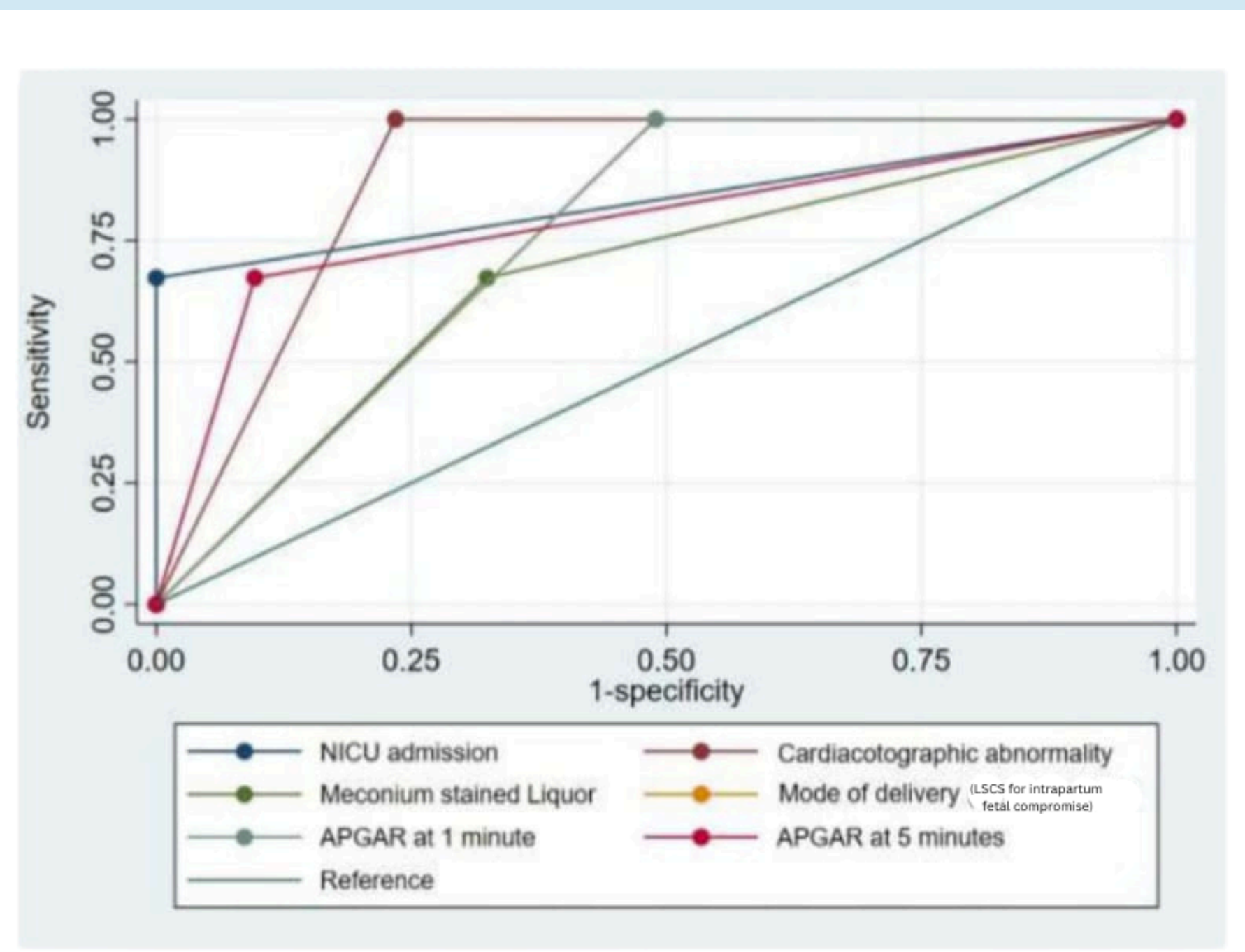
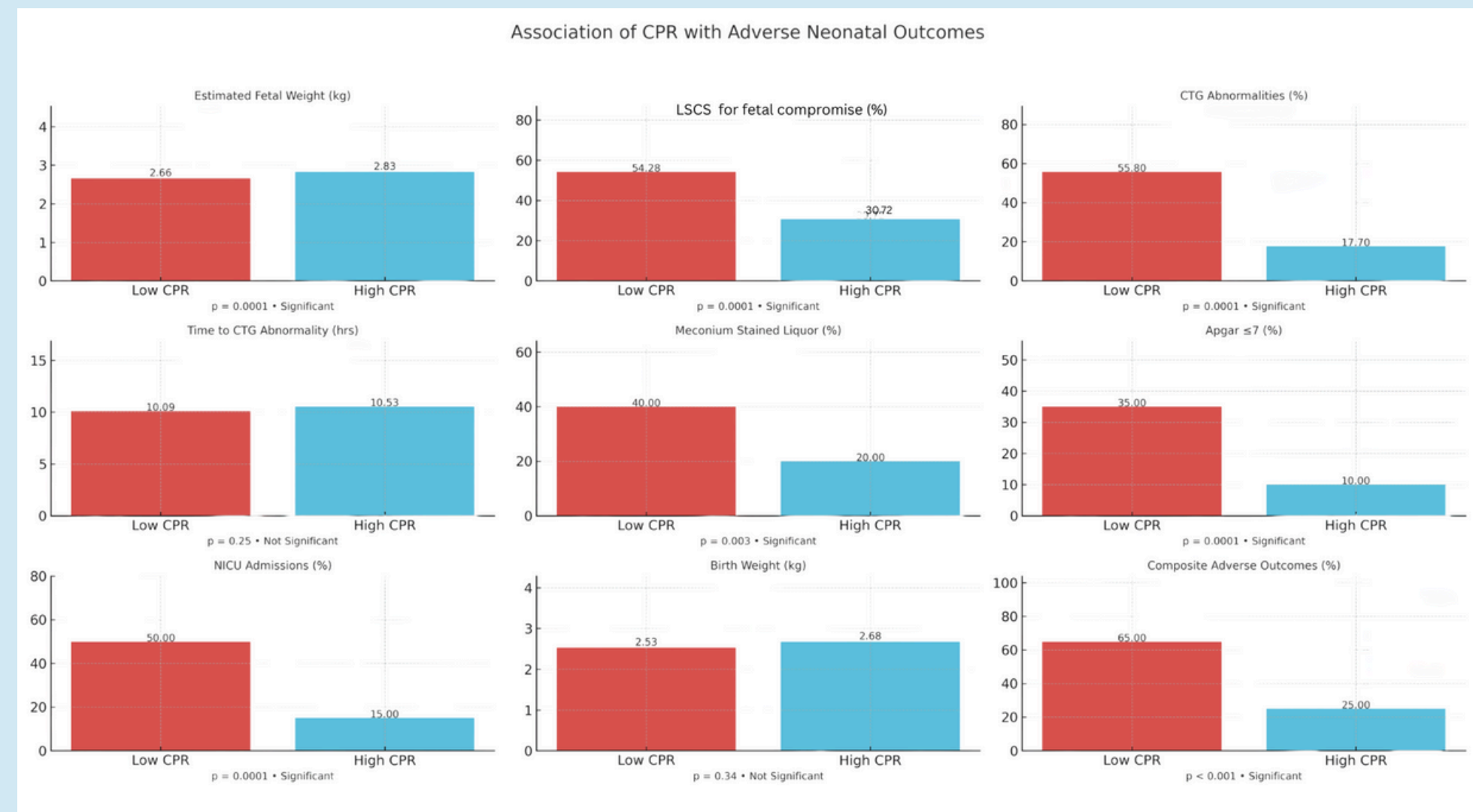
ROC curve analysis identified CPR cutoffs of 0.553 (MSL), 0.9 (APGAR $\leq$ 7), and 0.961 (NICU admission) as most predictive.

CPR $\leq$ 5th centile was significantly associated with CTG abnormalities, LSCS, low APGAR, and NICU admission, while CPR $\leq$ 1st centile was additionally linked to a shorter induction-to-CTG abnormality interval.

CPR value of 0.89 was optimal in predicting adverse outcomes and warranted the need for intervention, such as continuous CTG monitoring or early delivery.

Adverse outcomes and their association with CPR centiles.

Parameter	$\leq$ 10th centile	P value	$\leq$ 5th centile	P value	$\leq$ 1st centile	P value
CTG abnormality	48 (55.8%)	0.0001 (Significant)	21(24.4%)	0.0001 (Significant)	18 (20.9%)	0.0001 (Significant)
Mean duration between induction of labor to CTG abnormality	10.09 $\pm$ 3.19	0.25 (Non-significant)	8.8 $\pm$ 2.18	0.29 (Non-significant)	8 $\pm$ 1.91	0.013 (Significant)
LSCS for intrapartum fetal compromise	38 (54.28%)	0.0001 (Significant)	20 (21.7%)	0.001 (Significant)	17 (18.5%)	0.001 (Significant)
Meconium stained liquor	22 (31.42%)	0.424 (non - Significant)	6(10.3%)	0.666(non - Significant)	2(2.4%)	0.185 (non - Significant)
APGAR $\leq$ 7 at 5 mins	34 (69.4%)	0.0001 (Significant)	21 (42.9%)	0.0001 (Significant)	18 (36.7%)	0.0001 (Significant)
NICU admission	28 (80%)	0.0001 (Significant)	21 (60%)	0.0001 (Significant)	18 (51.4%)	0.0001 (Significant)



References

- (1)CPR Calculator: The Fetal Medicine Foundation. Available from: <https://fetalmedicine.org/research/doppler>
- (2) Prior T, Mullins E, Bennett P, Kumar S. Prediction of perinatal outcome in suspected fetal growth restriction: cerebroplacental ratio vs. umbilical artery Doppler. Am J Obstet Gynecol. 2013 Apr;208(4):286.e1–286.e7. doi:10.1016/j.ajog.2013.01.022
- (3)Maitra N, Prajapati P, Sheth TM, Vaishnav P, Patel PK. Third-trimester cerebroplacental ratio as a predictor of neonatal outcome in a low-risk pregnancy. J South Asian Feder Obst Gynae. 2020;12(3):150–154. doi:10.5005/jp-journals-10006-1781.jsafog.com
- (4) Anand S, Saini V, Kumar P, Yadav R. Cerebroplacental ratio as a predictor of adverse perinatal outcome in term pregnancies. Int J Reprod Contracept Obstet Gynecol. 2020;9(5):1893–8. doi:10.18203/2320-1770.ijrcog202015062.

05. Conclusion

A low CPR in term AGA pregnancies is significantly associated with increased risks of abnormal CTG, LSCS,low APGAR scores and NICU admissions. it is a valuable, non-invasive tool for prediction of adverse neonatal outcomes, specially in low - resource settings. Its incorporation in routine third trimester Doppler assessments can improve risk stratification and clinical decision - making, thus, helping guide timely interventions and improving neonatal outcomes.