

# Assessment of the Angle of the Anterosuperior Horn of the Sylvian Fissure on the Transcerebellar Section Between 18–32 Weeks in Normal Fetuses – A Cross-Sectional Study

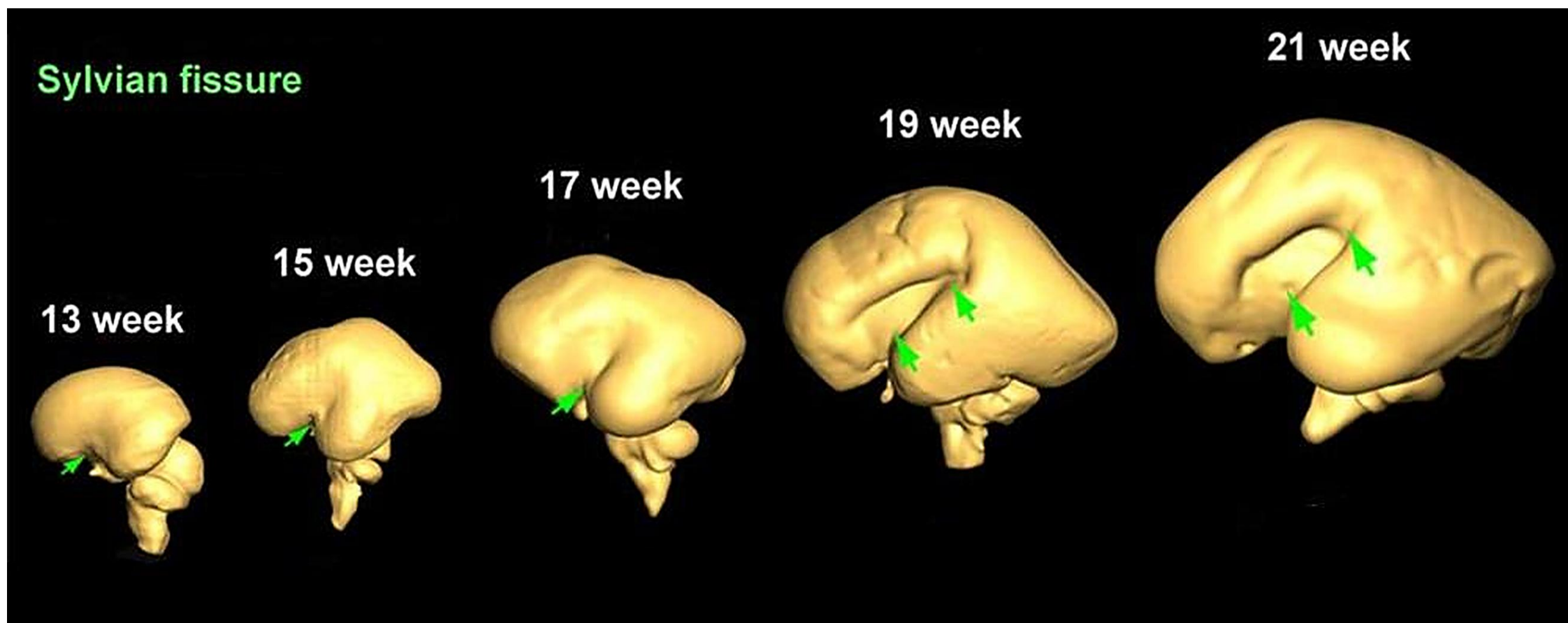


Dr Loukya Kodumuri MS, DNB, MRCOG, PDF Fellow in Fetal Medicine     Dr Geeta Kolar MD, Professor & Head, Fetal Medicine  
Fernandez Hospitals, Hyderabad, India

## INTRODUCTION

- Sylvian Fissure is a pivotal anatomical landmark in fetal brain development and cortical maturation.
- Its development begins around 14–16 weeks of gestation with progressive deepening and maturation thereafter.
- Operculisation is a dynamic process, that follows a characteristic, gestational age dependent timetable.
- Delayed or abnormal development is an indicator of migration and sulcation disorders.
- The Transcerebellar section offers feasible, clear visualisation of the Sylvian fissure.
- The Angle of the Anterosuperior Horn of the Sylvian Fissure (SFA) serves as a surrogate marker for cortical maturation.
- Establishing Gestational age-specific normative values for SFA is therefore essential.

Sylvian fissure maturation, 13–21 weeks (3D reconstruction)



Progressive reduction of SFA reflects cortical folding and sulcation as gestation advances.

## Clinical Relevance

- Provides **normative reference values** for South Indian fetuses.
- Supports **routine assessment** of Sylvian fissure maturation during fetal neurosonography.
- May facilitate **earlier recognition** of malformations of cortical development.

## METHODOLOGY

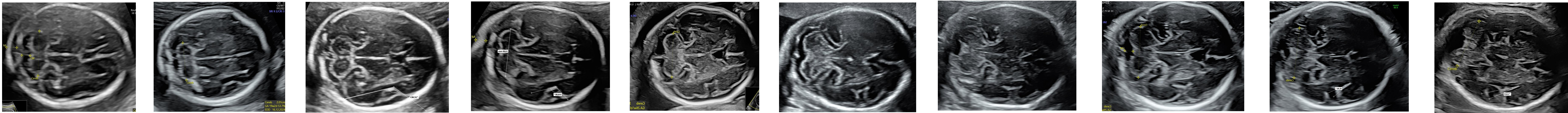
**OBJECTIVE** To construct a normal reference range for the SFA on the Transcerebellar section between **18–32 weeks** in normal fetuses.

| Inclusion                                | Exclusion                                                       |
|------------------------------------------|-----------------------------------------------------------------|
| ✓ Singleton pregnancies                  | X Multifetal pregnancies                                        |
| ✓ 18–32 weeks GA, dating confirmed in T1 | X Cases lost to follow-up                                       |
| ✓ Structurally normal fetuses            | X Known neurological / non-neurological / chromosomal anomalies |
| ✓ Delivered at Fernandez Hospital        | X Biological vs actual GA discrepancy                           |
|                                          | X Maternal chronic hypertension or diabetes                     |

## Study Design

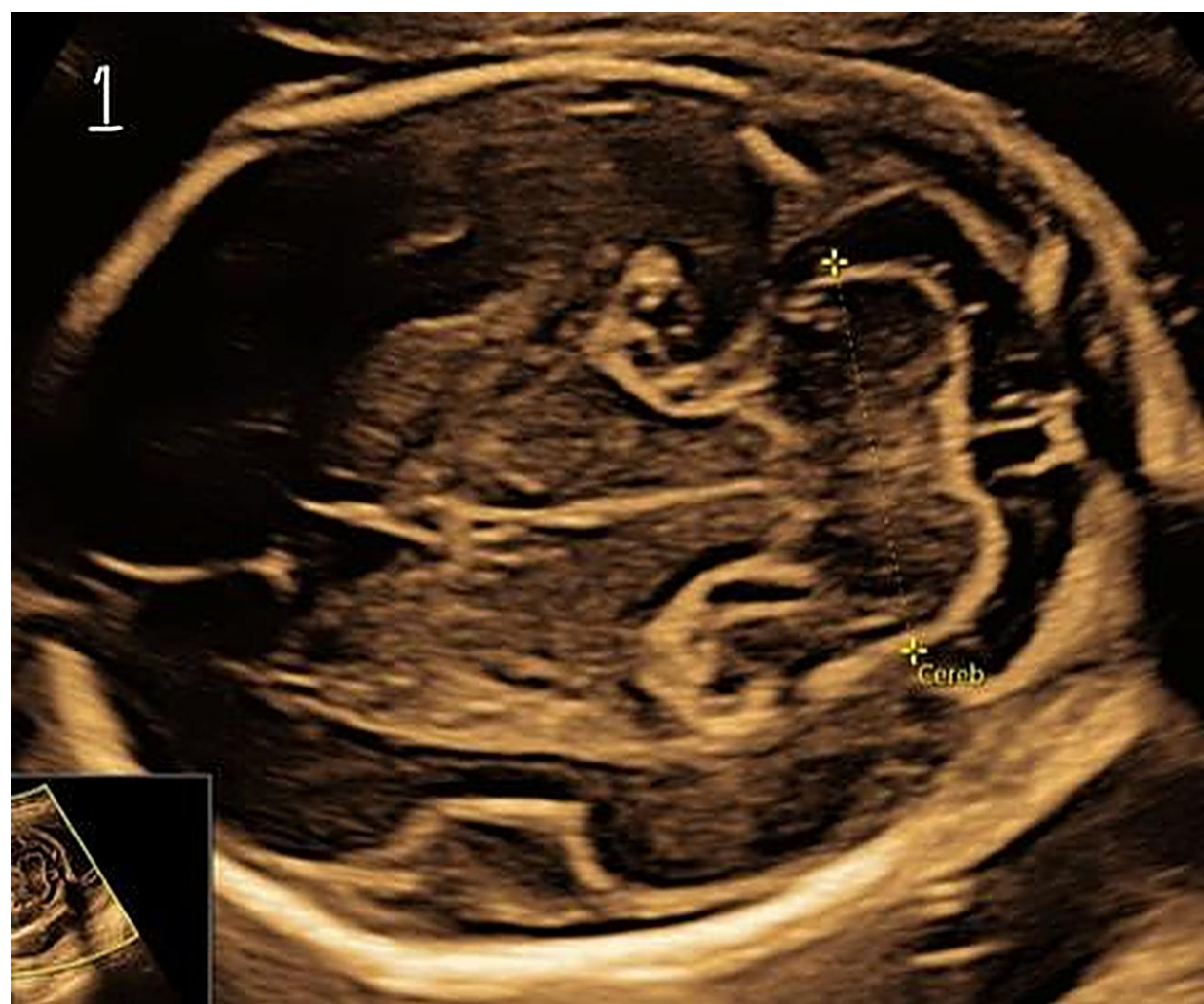
- Cross-sectional study, July 2024 – March 2025
- Sample size N = 976 (N ≥ 902), calculated using Bellera & Hanley's formula (2007)

## Progressive Sylvian fissure Operculisation on Transcerebellar imaging across 18-32 weeks Gestational age in Normal fetuses.

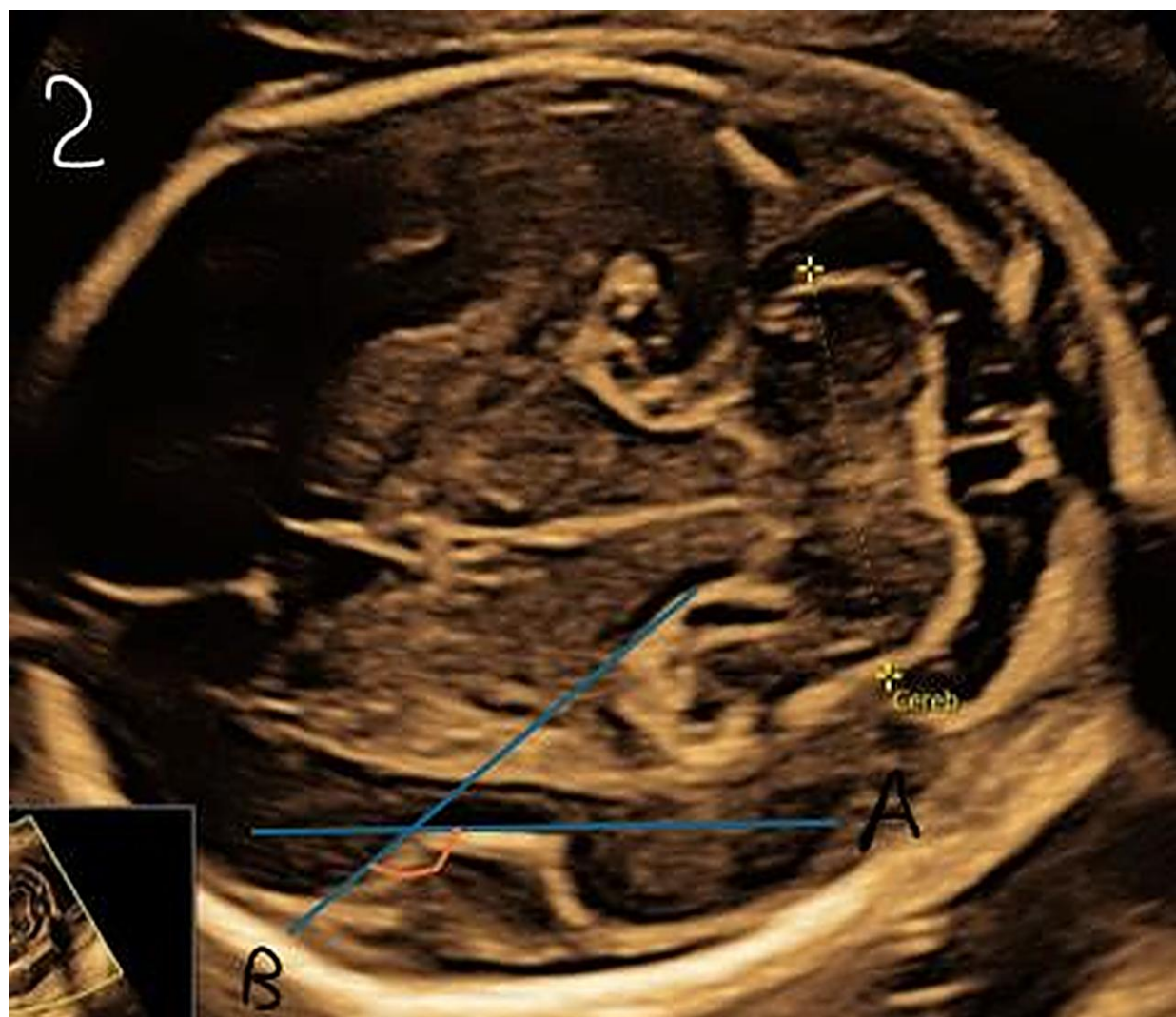


## Technique

- Transabdominal ultrasound: Voluson S8, S10, P8 (4–8 MHz 2D transducer)
- Fetal biometry & structural screening to assess GA and growth
- Transcerebellar section obtained per ISUOG guidelines
- SFA measured between the top and rear edges on this section
- One experienced Fetal Medicine Specialist measured the angle 3× per fetus to minimise intraobserver variability



SFA measurement on the transcerebellar section



## RESULTS N = 976 total fetuses studied (18–32 weeks)

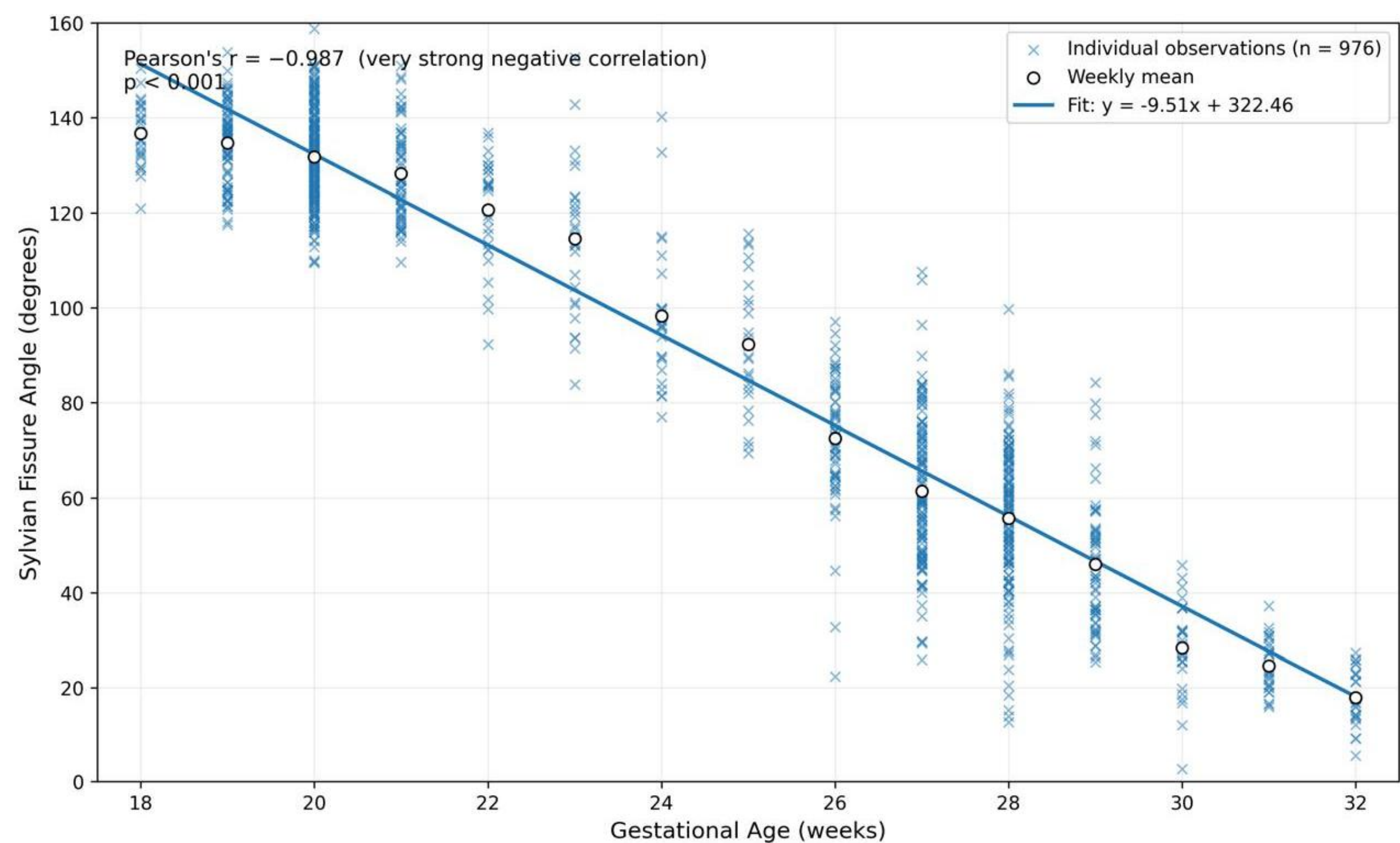
| GA (wks) | N   | Mean*  | SD    | 95% Reference Range |
|----------|-----|--------|-------|---------------------|
| 18       | 26  | 136.70 | 6.75  | 133.98–139.43       |
| 19       | 78  | 134.63 | 8.10  | 132.80–136.46       |
| 20       | 241 | 131.69 | 9.37  | 130.50–132.87       |
| 21       | 62  | 128.23 | 9.85  | 125.73–130.74       |
| 22       | 28  | 120.68 | 11.35 | 116.28–125.08       |
| 23       | 28  | 114.53 | 15.61 | 110.44–123.77       |
| 24       | 26  | 98.31  | 14.97 | 92.26–104.35        |
| 25       | 25  | 92.29  | 13.90 | 86.55–98.03         |
| 26       | 60  | 72.59  | 13.61 | 69.07–76.10         |
| 27       | 117 | 61.45  | 15.75 | 52.87–60.22         |
| 28       | 138 | 55.73  | 15.36 | 49.99–59.45         |
| 29       | 61  | 46.02  | 13.58 | 41.60–48.00         |
| 30       | 32  | 28.41  | 8.93  | 24.05–31.19         |
| 31       | 29  | 24.70  | 5.41  | 22.64–26.76         |
| 32       | 25  | 17.89  | 5.95  | 14.62–19.33         |

Mean angle reduced from 136.7° at 18 weeks to 17.9° at 32 weeks.

Pearson's correlation  $r = -0.987$  (very strong negative correlation)  $p < 0.001$

Regression Angle =  $-9.51 \times GA + 322.46$

Scatter plot: Gestational Age vs Sylvian Fissure Angle, with linear regression fit



## DISCUSSION

- A statistically significant linear relationship was found between gestational age and the angle of the Anterosuperior horn of the Sylvian Fissure.
- Findings align with Xu Pingping et al. (2021), showing the angle decreases linearly as gestation progresses.
- Confirmed progressive operculisation and angle narrowing, consistent with Spinelli et al. (2018) and Chaitanya et al. (2022).
- Reference values for normal fetuses may help identify abnormal larger angles in malformations of cortical development (MCD), as noted by R K Pooh et al. (2019).

## LIMITATIONS

- Precision of measurement may become challenging in advanced gestation
- Cross-sectional design – limiting assessment of longitudinal changes in individual fetuses.
- Postnatal neurodevelopment was not performed.
- Abnormal Fetal brains were not included, therefore, diagnostic performance of SFA in cortical malformations could not be assessed.

## CONCLUSION

- The Transcerebellar section is a dependable, reproducible plane for visualising the Sylvian fissure and monitoring its maturation.
- This study provides a robust reference standard for prenatal neuroimaging in the South Indian population.
- Incorporating SFA assessment into routine fetal ultrasound can help detect deviations that may warrant detailed neurosonography.
- Prenatal Sylvian fissure assessment is vital for early diagnosis of Malformations of Cortical Development.

## REFERENCES

- Pingping X, et al. Evaluation of the angle of posterosuperior horn of normal fetal Sylvian fissure by trans-cerebellar section. medRxiv. 2021.
- Spinelli M, et al. Nomograms of the fetal Sylvian fissure and insular lobe throughout gestation. Fetal Diagn Ther. 2019;45(5):325–31.
- Pooh RK, et al. Increased Sylvian fissure angle as early sign of malformation of cortical development. UOG. 2019;54(2):199–206.
- Rodriguez-Sibaja MJ, et al. Fetal cerebellar growth and Sylvian fissure maturation: INTERGROWTH-21st. UOG. 2021;57(4):614–23.
- Chaitanya A, et al. Role of USG in evaluation of normal fetal cerebral sulci, 18–32 weeks GA. Cureus. 2022;14(2).