ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 68 . 16
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 5, Issue – 1, February - 2020, Page No. : 345 - 349

A Study of Foetal Transcerebellar Diameter for Estimation of Gestational Age at Department of Obstetrics and Gynaecology at SMS Medical College, Jaipur

[1]Dr. B S Meena, [2]Dr. Samta Solanki, [3]Dr. Anusha S, [4]Dr. Alka Jilowa, [5]Dr. Neelam Bunkar, [6]Dr. Purva Sharma

[1]Senior Professor and Head, [2-6]Resident Doctor

Department of Obstetrics & Gynaecology, SMS Medical College & Attached Group of Hospitals, Jaipur, Rajasthan

Corresponding Author: Dr. Samta Solanki**,** Resident Doctor, Department of Obstetrics & Gynaecology, SMS Medical College & Attached Group of Hospitals, Jaipur, Rajasthan

Citation this Article: Dr. B S Meena, Dr. Samta Solanki, Dr. Anusha S, Dr. Alka Jilowa, Dr. Neelam Bunkar, Dr. Purva Sharma, "A Study of Foetal Transcerebellar Diameter for Estimation of Gestational Age at Department of Obstetrics and Gynaecology at SMS Medical College, Jaipur", IJMSIR- February - 2020, Vol – 5, Issue -1, P. No. 345 – 349.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: In this study we explored the relationship of foetal TCD with gestational age (calculated by LMP) between 15 to 40 weeks.

Methods: This was a hospital based comparative cross-sectional study done in the Department of Obstetrics and Gynaecology, S.M.S. Medical College and attached hospitals, Jaipur, Rajasthan. The period of study was from June 2018 to October 2019, (after taking the approval from Institutional Review Board and Ethical committee).

Results: Simple linear regression analysis shows a strongly significant linear relationship between transcerebellar diameter and gestational age (graph) with high degree of correlation coefficient (r= 0.945 and p<0.001).

Conclusion: In the normally developing fetus the foetal transcerebellar diameter increases with advancing gestational age. Foetal transcerebellar diameter shows a good correlation with gestational age.

Keywords: Foetal transcerebellar diameter, Gestational age, Linear regression

Introduction

The knowledge of accurate gestational age is of utmost importance in management of pregnancy and planning of appropriate therapy and intervention. Uncertain gestational age can result in iatrogenic prematurity or post maturity with associated increased perinatal morbidity and mortality, independent of maternal characteristics[1]. Appropriate assessment of gestational age is quintessential in obstetric care.

It has been well documented and demonstrated that in pathological alteration in foetal growth pathway due to macrosomia or IUGR, there is no alteration in the cerebellar blood flow making the TCD well preserved. Even changes in vault development due to external pressure did not alter TCD. Therefore TCD appears to be the most reliable age independent biometric parameter in the evaluation of true gestational age[2].

The predicted gestational age by TCD between 22-28 weeks is within 0-2 days, between 29-36 weeks is

within 0-5 days and 37 weeks is 0-9 days of actual gestation, so TCD nomogram predicts gestational age with accuracy of 94% in the third trimester[3]

With these advantages of TCD over other parameters in this study we explored the relationship of foetal TCD with gestational age (calculated by LMP) between 15 to 40 weeks.

Materials and Methods

Study Design: This was a hospital based comparative cross-sectional study done in the Department of Obstetrics and Gynaecology, S.M.S. Medical College and attached hospitals, Jaipur, Rajasthan.

Study period: The period of study was from June 2018 to October 2019, (after taking the approval from Institutional Review Board and Ethical committee).

Study Population100 pregnant women between 15 weeks to 40 weeks of gestation and who were willing to be enrolled in the study were included in the study after applying inclusion and exclusion criteria and obtaining written informed consent. As the study was cross sectional in design, only one measurement was considered for women having multiple visits.

Inclusion Criteria

- All women with singleton viable pregnancy in the Second & third trimester (15 to 40 weeks) and willing to participate in study.
- Patient who are sure of their LMP with H/o regular menstrual cycles.

Exclusion Criteria

- Suspected IUGR fetus.
- Anomalous fetus.
- Multiple gestations.
- Pregnant woman with medical disorders.
- Use of contraception in last 3 months
- History of abortion in last 3 months
- History of lactational amenorrhea

Transcerebellar Diameter

Transcerebellar diameter is measured by placing calipers on the outer margin of cerebellum. Cerebellar view obtaining by rotating the transducer in the axial plane centred on the thalamus to show the cerebellar hemisphere. This view show the cerebellum, the cisterna magna, the cavum septi pellucidi and frequently the anterior horn of lateral ventricls.

Statistical Analysis

Descriptive and Inferential statistical analysis has been carried out in the present study using computer software (SPSS Trial version 23 and primer). The qualitative data were expressed in proportion and percentages and the quantitative data expressed as mean and standard deviations. Correlation between quantitative outcomes was assessed using Pearson correlation coefficient. Significance level for tests were determined as 95% ($P< 0.05$).

Results

The present study was conducted in the Department of Obstetrics and Gynaecology, S.M.S. Medical College and attached hospitals, Jaipur. 100 pregnant women with singleton pregnancy, between 15 to 40 weeks of gestation were included in the study after obtaining informed written consent.

Foetal Transcerebellar diameter, BPD, HC, AC and FL were measured in millimeter by performing transabdominal ultrasound scan.

Table 1: Distribution of women according to Age

Age (Years)	Number	Percentage %
19 to 29	83	83
30 to 40	17	17
Total	100	100
Mean ± SD	25.24±4.12	
Min to max	19 to 35	

Above table shows distribution of pregnant women according to their age. Majority of the women (83%) were between 19 to 29 years. 17% of the women were between 30 to 40 years. Maternal age ranged from 19 to 35 years with mean age of 25.24 ± 4.12 years.

Table 2: Distribution of the cases according to Trimester

Trimester	Number	Percentage %
2	48	48
3	52	52
Total	100	100

The above table shows 48% women in their 2nd trimester and 52% women in their 3rd trimester.

Table 3: Distribution of women according to USG Cerebellar Grading

Grade	Number	Percentage
I	8	8
II	42	42
III	50	50
Total	100	100

Above table shows USG cerebellar grading 8%, 42% and 50% of grade I, II and III respectively.

Table 4: Transcerebellar Diameter according to Gestational Age 15-40 weeks

GA (weeks)		TCD (mm)	N (cases)
15	Mean	15.00	2
	SD	0.000	
16	Mean	16.00	1
	SD	0 .00	
17	Mean	16.75	4
	SD	.500	
18	Mean	18.00	3
	SD	0.000	
19	Mean	19.38	8
	SD	1.598	
20	Mean	20.40	5
	SD	1.342	
21	Mean	21.75	4
	SD	.957	
22	Mean	22.33	3
	SD	1.528	
23	Mean	23.67	3
	SD	.577	
24	Mean	24.50	2
	SD	0.506	
25	Mean	26.33	3
	SD	.577	
26	Mean	30.33	3
	SD	2.082	
27	Mean	31.50	4
	SD	1.732	
28	Mean	31.67	3
	SD	2.517	
29	Mean	33.50	2
	SD	.707	
30	Mean	36.00	4
	SD	.816	
31	Mean	38.50	3
	SD	3.786	
32	Mean	39.33	3
	SD	1.155	
33	Mean	44.00	1
	SD	0.00	
34	Mean	46.30	10
	SD	5.293	
35	Mean	43.60	5
	SD	2.074	
36	Mean	48.11	9
	SD	6.071	

GA (weeks)		TCD (mm)	N (cases)
37	Mean	54.50	2
	SD	4.950	
38	Mean	48.00	6
	SD	1.095	
39	Mean	48.33	3
	SD	4.509	
40	Mean	53.33	3
	SD	1.155	
Total	Mean	34.12	100
	SD	13.089	

Above table shows ultrasonographic measurement of foetal transcerebellar diameter in mm (mean ± SD) for a given menstrual age between 15 to 40 weeks. It demonstrate a linear relationship between foetal transcerebellar diameter and gestational age. The mean sonographic transcerebellar diameter at 15 weeks is 15 ± 0.00mm and mean sonographic transcerebellar diameter at 40 week of gestation is 53.33 ±1.15.

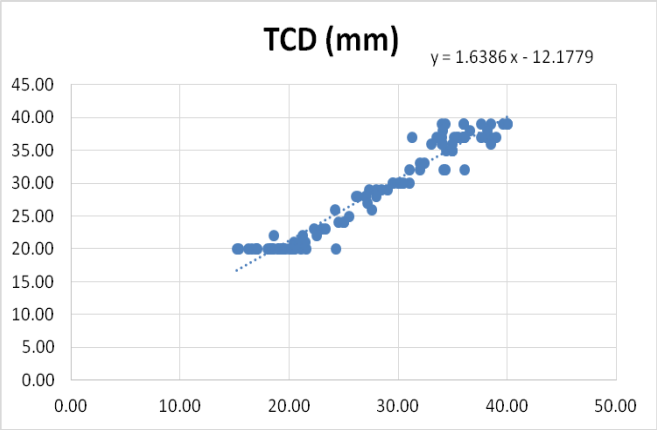
Table 5: Correlation between TCD (mm) and Descriptive Statistics Gestational Age (weeks. days)

	Mean	Std. Deviation	N
TCD (mm)	34.1200	13.08888	100
GA (weeks.days)	28.41	7.478	100

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.945[a]	.893	.892	4.30280	.893	818.088	1	98	<0.001 S

a. Predictors: (Constant), GA (weeks. days)



Simple linear regression analysis shows a strongly significant linear relationship between transcerebellar diameter and gestational age (graph) with high degree of correlation coefficient (r= 0.945 and p<0.001).

Gestational age (weeks) = 1.6386 × transcerebellar diameter (mm) - 12.1779

Discussion

The mean sonographic transcerebellar diameter at 15 weeks is 15 ± 0.00mm and mean sonographic transcerebellar diameter at 40 week of gestation is 53.33 ±1.15 in our study. Mean TCD in our study (34.12±13.089) was higher then (33.09±12.5) observed in R Nagesh at el 2016.[4]

Mean gestational age (by LMP) in our study (28.41±7.478 weeks) was higher than (27.64±7.3 weeks) observed in R Nagesh et al 2016[4]

Simple linear regression analysis shows a strongly significant linear relationship between transcerebellar

diameter and gestational age (graph) with high degree of correlation coefficient (r= 0.945 and p<0.001).

Gestational age (weeks) = 1.6386 × transcerebellar diameter (mm) - 12.1779

The result of our study is consistent with other studies done in the past. Sumanta Kumar Mandal et al 2019[5] in their study shows a linear relationship between transcerebellar diameter and gestational age with high degree of correlation(r=0.990).Y, Chauhan et al 2018[6], had found r to be 0.989, Ramireddy Harikiran Reddy et al 2017[55], had found r to be 0.982, R Nagesh et al 2016[4], had found r to be 0.992. From our study and other studies done in past we can conclude that the ultrasonographic measurement of transcerebellar diameter is a reliable indicator of gestational age.

Conclusion

In the normally developing fetus the foetal transcerebellar diameter increases with advancing gestational age. Foetal transcerebellar diameter shows a good correlation with gestational age (Pearson's correlation coefficient = 0.945, p value<0.001)

References

1. Platt LD, Queenan JT, Hobbins JC, Spong CY, editors. Protocols for high risk pregnancies Assessment of gestational age. Oxford. Wiley-Blackwell; 2005 P: 64-8.
2. Behrman RE, Lees MW, Peterson ED. Distribution of the circulation in the normal and asphyxiated fetal primate. Am J Obstet Gynecol. 1970; 108 (6): 956-9.
3. Meyer WI, GawthienDW, Golden berg B, Santolya et al. Fetal TCD, AC ratio: As gestational age independent method of assessment of assessing fetal size. Journal Med; 1993; 12: 379-82.
4. R Nagesh, S Pramila VV, Anil Kumar Shukla. Transverse cerebellar diameter – As an ultrasonographic parameter for estimation of fetal gestational age. International journal of contemporary medical research, 2016; 3(4).
5. Sumanta Kumar Mandal, Sandip Kumar Ghosh, Saikat Roy, Barun Prakash. Evaluation of Fetal Transcerebellar Diameter as a Sonological Parameter for the Estimation of Fetal Gestational Age in Comparison to Biparietal Diameter and Femur Length. IAIM, 2019; 6(6): 41-50.
6. Y,Chauhan RD. A study of ultrasonographictranscerebellar diameter in assessment of fetal gestational age. Int J Res Med Sci 2018;6:3390-6