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Placental thickness - a sonographic parameter for estimation of gestational age

Dr.E.Ramadevi, Dr.P.V.Spandana
PROFESSOR AND HOD, Department of OBG, CAIMS, KARIMNAGAR, (POST GRADUATE) .

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ABSTRACT

Background: Gestational age is the most important criteria in taking decision, for managing high risk pregnancies and to determine the optional management in certain difficult situations like intrauterine growth restriction.Estimation of gestational age lies on the relevant regular menstrual history, pelvic examination, USG biometry parameters, regular follow up.

Gestational age is routinely assessed sonographicallyby using Biparietal Diameter (BPD),Femur Length (FL), Abdominal Circumference (AC), Head Circumference (HC). However, all of these parameters have certain limitations. Hence there is a need for other parameters which compliments the present biometric parameters for estimating gestational age. Present study aims to assess if any correlation exists between placental thickness and menstrual age, and to identify the differences inultrasonographic placental thickness with advancing gestational age based on implantation site, age and parity of the mother.

Methods: A cross sectional prospective study is carried out in hundred and fifty pregnant women between 13 to 40 weeks of gestation, who came for routine antenatal checkup. Placental thickness is measured at its midposition or at the level of cord insertion along with other routine parameters.

Result: 150 Pregnant women, mean age of 24.6 years (range 18-33yrs) were included. Sixteen (10.66%) patients were in 21 weeks, 12 in 20 weeks and 32 weeks each and 10 in 22 weeks of pregnancy.

Anterior placenta was noted in 52%, followed by posterior (22.6%) and lateral (13.3%) placement. PT gradually increased from 11.1mm (13 weeks) to 38mm at 40 weeks of gestation, almost matched GA from 11-35 weeks, lowered by 1-4mm from 36-40 weeks of gestation. At no stage of pregnancy was the normal placenta > 38mm. There was a linear relationship between PT and GA, with slight increased variations in 30-32 weeks of gestation.

Conclusion: There is a linear and direct relationship between PT and GA. PT can be an important additional parameter for estimating GA, especially from 12-35 weeks of gestation and when the duration of the pregnancy is unknown or uncertain.

I. INTRODUCTION

Estimation of fetal maturity is one of the frequent problem faced by most of the obstetricians. An accurate estimated date of delivery is very crucial for this.

Patients menstrual history is considered adequate if she has adequate clinical information about her cycles, she is sure about her last menstrual period with her previous cycles being regular and no history of use of any oral contraceptive pills in the past 3 months. However 30% of patients do not meet these criteria, making estimation of LMP based EDD unreliable.

Clinically gestational age can be estimated by measuring the uterine size of the pregnant women but this is not 100% accurate. According to Naegele's formula, EDD is calculated by adding 9 calendar months and 7 days to the first day of the last normal (28 days cycle) period.

"Quickening" denotes the perception of active fetal movements by the women. It is usually felt about the 18th week, about 2 weeks earlier in multiparae. Its appearance is an useful guide to calculate the expected date of delivery with reasonable accuracy. A rough idea about the probable date of delivery can be deduced by adding 22 weeksin primigravidae and 24 weeks in multiparae to the date of quickening.

Gestational age can be estimated also by other clinical methods such as measurement of symphysiofundal height, abdominal girth but these tend to identify only 40% of SGA fetuses.

But assessment of uterine size is made unreliable by many variables like Maternal obesity, Position of uterus, Multiple gestations, Amount of amniotic fluid, Observer experience, Fetal growth disorders .

The most effective way to estimate gestational age presently is with an ultrasound examination.

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FIRST TRIMESTER

- G S - 5weeks
- GS + Yolk Sac - 5.5weeks
- GS + Yolk Sac + Embryo - 6weeks

Estimated by measuring gestational sac and crown rump length

SECOND TRIMESTERonwards, following measurements are taken for calculating mean gestational age.

- Biparietal diameter
- Abdominal circumference
- Head circumference
- Femur length

But none of these parameters appear to be accurate in the third trimester.

Accuracy in

- 1st Trimester +3days
- 2nd Trimester +1 or 2 weeks
- 3rd Trimester +2 to 3 weeks

Other parameters which are being evaluated for the estimation of gestational age are

- Placental thickness
- Renal length
- Foot length
- Clavicle length

Present study aims in assessing placental thickness for the estimation of gestational age.

Placenta is a vascular structure developed partly from the maternal tissue and partly from the fetal tissue. It is attached to the uterus and umbilical cord connects the fetus to the placenta. It is developed from the chorionic villi at site of implantation at 5^{th} week of gestation, and in sonography, diffuse granular echotexture becomes apparent by 9^{th} to 10^{th} week. It has got important metabolic, endocrine and immunological functions. Accurate estimation of fetal age is important for appropriate antenatal management.The estimation of fetal age byultrasound is based to know the relationship between fetal age and weight.

Placental thickness measured at the level of theumbilical cord insertion and can be used as a new parameter to estimate gestational age of fetus. Placental length is approximately 6 times itsmaximal width at 18 to 20 weeks gestation. The mean thickness of theplacenta in millimeters in the first half of pregnancy closely approximatesthe gestational age in weeks. If the thickness of the placenta >4 cm (40 mm) before 24 weeks, abnormalities such asischemic-lp,thrombotic damage, intra placental hemorrhage, chorioangioma, and fetalhydrops should be suspected.The size of the placenta increases dramatically until approximately 15 to 17 weeks gestation. Later, there is a fourfold increase in placental size until delivery, whereas the fetus has a 50-fold increase in size until delivery. Trimester placental volume is associated with maternal nutritionalstatus, birth weight, and pregnancy outcome. A very small placenta may be associated with growth retardation. >3cm thickness before 20 weeks and>5cmbefore 40 weeks is consider abnormal.

Aim and Objectives

Aim of the study is

1. To evaluate the placental thickness as a sonographic parameter for estimation of gestational age
2. To find out if a correlation exists between the placental thickness and maternal age, parity and menstrual age, to identify the differences in ultrasonographic placental thickness with advancing gestational age based on implantation site.

METHODS

The present study entitled 'Placental Thickness-A Sonographic Parameter for Estimation of Gestational Age was conducted in the Department of Obstetrics and Gynaecology, chalmedaanandrao institute of medical science, Karimnagar, Telangana

Selection criteria

- Antenatal mothers of gestational age (11 - 40 weeks).
- Known LMP.
- Regular periods.
- Singleton pregnancy.
- Uncomplicated pregnancy.
- Willing to participate

Examination method

1. A thorough history regarding medical illness and obstetric history is taken for each patient who satisfied the inclusion criteria, after signing consent form.
2. Complete clinical examination done.
3. Symphysio – fundal height is measured after emptying the bladder

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4. Routine ultrasound scanning is done in the radiology department in all cases, in all trimester, transabdominally with a real time ultrasound.

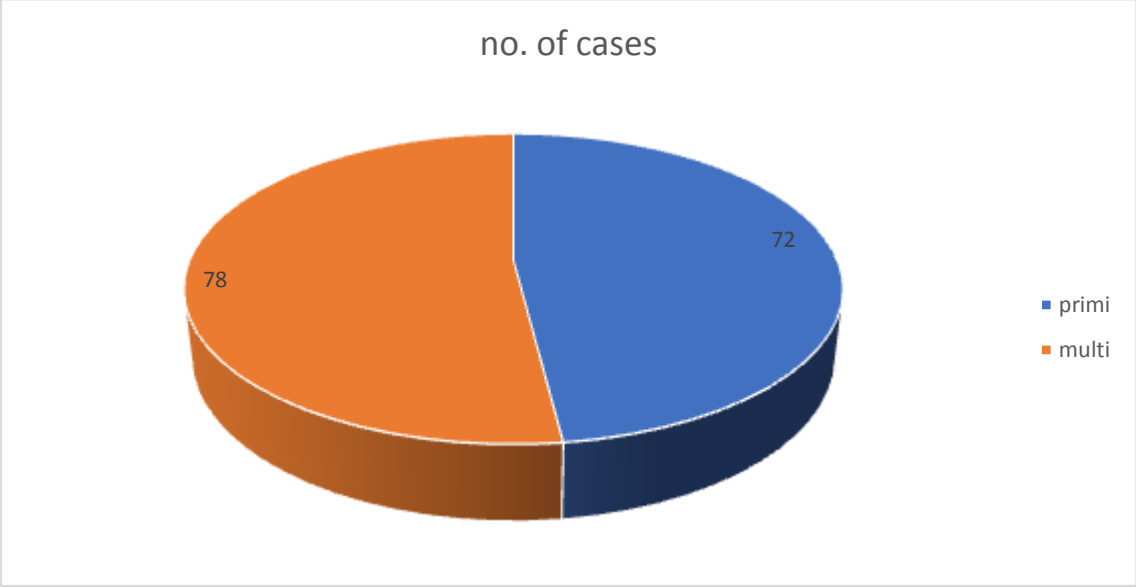
After estimating the fetal age by CRL, BPD, HC, AC and FL, placental thickness is measured and comparison done with other parameters. The patients were followed until delivery

II. RESULTS:

Among the total 150 antenatal women 72 were primi and 78 were multi as evident from the table.

DISTRIBUTION OF WOMEN ACCORDING TO PARITY

Parity	No. of cases	%
Primi	72	47
Multi	78	53



In our study 150 uncomplicated antenatal cases of more than 11 weeks gestation were included. Along with other fetal biometry, placental thickness was measured and the labor outcomes of those women were followed.

DISTRIBUTION ACCORDING TO GESTTIONAL AGE

Gestational age(in weeks)	No. of cases	%
11-20weeks	23	15.33
21-28weeks	58	38.66
28-36weeks	47	31.33
>36weeks	22	14.66
Total	150	100

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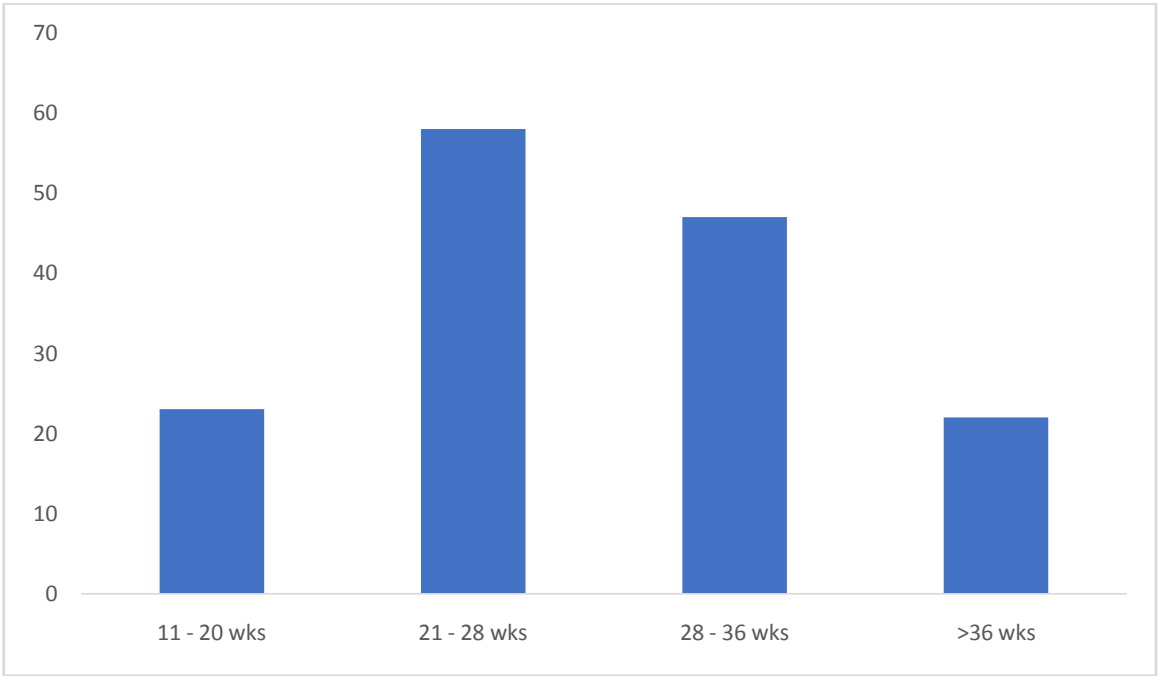

All the ANC cases included in our study were divided into four groups according to gestational age estimated by LMP as shown in Table 1. Maximum number of pregnancies (38%) were between the GA of 21-28 weeks followed by 28-36 weeks (32%).

DISTRIBUTION ACCORDING TO AGE

Age distribution	**No. of cases**	**%**
Below 20years	2	1.3
20-24years	57	38
25-29years	68	45.33
30-34years	18	12
35years&above	5	3.33
	150	100

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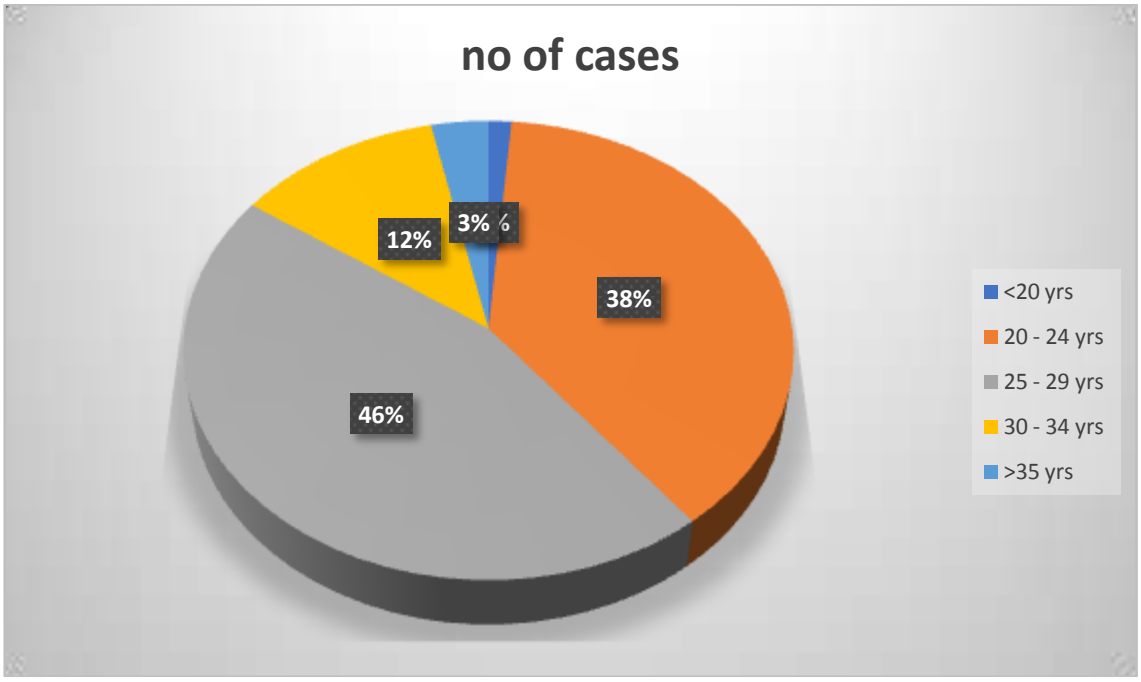

There were total of 150 antenatal women. Age distribution ranged from 18 years to 40 years. There were 2 cases below 20 years, 57 cases between 20 - 24 years, 68 cases between 25 - 29 years, 14 cases between 30 - 34 years, 5 cases above 35 years. Mean age is 26.4years.

Distribution of the location of placenta

Maximum pregnant women (52%) were presented with location of placenta on anterior side.

Placental Location

Location	No. of cases	%
Anterior	78	52
Posterior	34	22.66
Lateral	12	8
Fundal	20	13.33
Low lying	6	4
	150	100

Placental thickness vs gestational age.

Gestational age in weeks	No. of cases	Mean
11	3	11.1
12	2	13.2
13	4	16.7
14	2	18.2
15	1	18.8
16	2	20.1
17	3	20.8
18	3	21.5
19	2	22.6
20	1	23.2
21	8	23.8
22	10	26.3
23	8	27.2

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24	10	27.6
25	9	27.9
26	6	28.1
27	5	28.4
28	2	29.6
29	4	30.2
30	6	30.9
31	6	32.9
32	5	33.8
33	7	34.0
34	6	34.6
35	7	36.8
36	6	37.2
37	9	39.5
38	6	39.0
39	4	38.5
40	3	38.1

Mean placental thickness for each week of gestation were calculated. Mean placental thickness is approximately same as the gestational age in weeks and can be useful in estimation of gestational age, for example, mean PT at 18 weeks of GA is 21.5 mm, also mean PT at 35 weeks of GA 36.8 mm. The placental thickness was observed to increase linearly with advancing gestational age till 37 wks of gestation, thereafter decline in the placental thickness was observed.

Placental thickness and birth weight in patients predicted to have IUGR by biometric parameters.

Gestational age (weeks)	Placental thickness	Birth weight (in kg)	Low birth weight
32	30.2	2	Yes
32	30.8	1.8	Yes
32	31.2	2.3	No
33	31.5	2.0	Yes
33	31.2	1.9	Yes
34	33.1	2.1	No
34	32.2	1.9	Yes
35	31.6	1.8	Yes
35	33.1	2.1	No
36	32.8	2.0	Yes
36	33.2	1.9	Yes
36	32.6	2.0	Yes

III. DISCUSSION:

Without dependable menstrual history, there is no precise technique for calculating the expected date of delivery. With the advance of real-time high-resolution ultrasound, the ability to image various structures in utero has significantly improved. However, sometimes ultrasonography fails to determine accurate gestational age due to variability in the other biometric parameter readings. Ladies booked late in pregnancy and in especially those who are unsure of their last menstrual period, it is really hard to date pregnancies.There is in this way a need to research a strategy for dating pregnancies that is straightforward, simple to characterize and reproducible.

Placental thickness is one such parameter to determine exact gestational age. Placental thickness is the easiest dimension to measure, but little is known about the normal placental thickness as measured by sonography during different stages of gestation. If placental thickness can be measured properly, it would become a parameter to assess the gestational age of the fetus.

In our study a total of 150 antenatal women of various gestationalages were studied for

their placental thickness. The meanvalues of placental thickness was calculated from 11 - 40 weeks.It was observed that placental thickness gradually increasedfrom 11.1 mm at 11 weeks to 38.1 mm at 40 weeks gestation.After 36 weeks, placental thickness started decreasing by 0.5to 1 mm and did not match with the corresponding gestationalage till 40 weeks. Our study results are consistent with observations madeby Mittal et al[1], JainA[2] who reported the mean placentalthickness increased with advancing gestation and almostmatches from 22 to 35weeks.Similar observations were reported by Adhikari R et al[3].Strong positive correlation between placental PT and GA have been shown by previous studies[4,5,6].

In our study there is no significant difference in placentalthickness with advancing gestation based on implantationsite unlike Durnwald et al[7] study in whichplacental thickness of posterior and fundal placenta in 3rdtrimester was greater than anterior placenta.

Another important finding, we came across our study was that 12 patients were having placental thickness <10th percentile in third trimester, out of which 9 patients had low birth weight babies. This was suggesting that placental thickness could be useful in detecting IUGR babies. Placental thickness is an accurate parameter in determining IUGR, suggested by Habib et al[8]. He concluded that placental diameter of 18 cm and placental thickness of 2 cm at 36 weeks' gestation were calculated to predict low birth weight infants.

IV. CONCLUSION

To conclude, wecan say the measurement of placentalthickness is an important parameter for estimation of fetalage. It is helpful in cases where the exact duration of pregnancy is not known (between 12 and 37 weeks)
where the placental thickness almost matches withgestational age.
The age, parity, placental location shows no significantbearing in the assessment of placental thickness and itscorrelation to gestational age.

REFERENCES

[1]. Mittal P, Hooja K. Placental Thickness – ASonographic Parameter for Gestatational age Estimation. Indian J Radiol Imaging 2002;12(4):553-4.
[2]. Jain A. Placental Thickness – A Sonographic indicator of Gestational age. J Obs Gyn of India. 2001;51(3):48-9.
[3]. Adhikari R, Deka PK, Tayal A, Chettri PK. Ultrasonographic Evaluation of Placental Thickness in Normal Singleton Pregnancies for Estimation of Gestation Age. International Journal of Medical Imaging. 2015;3 (1):143-7
[4]. Hamid, Ibrahim Ali Mahdi. Relationship between Gestational Age and Placenta Thickness during Third Trimester \ Ibrahim Ali Mahdi Hamid: Asma Ibrahim Ahmed Elamin - Khartoum:Sudan University of Sciences and Technology, Medical Radiographic Sciences, 2016. available from http://41.67.53.40/ handle/123456789/17191?show=full last accessed on 16 Jan 2018.
[5]. MenonM, Vinodha M. Gestational age determination by ultrasonic placental thickness measurement, Indian Journal of Obstetrics and Gynecology Research 2016;3 (1):279-82.
[6]. Ahmed A, Rahim A, Osman H, Elgyoum AA, Elzaki A. he Correlation between Placental Thickness and Fetal Age among the Pregnants in Sudan. Sch. J. App. Med. Sci., 2014; 2 (4):395-8.
[7]. Durnwald C, Mercer B. Ultrasonic estimation of placental thickness with advancing gestational age. Am J Obs Gyn. 2004;191(6):178.
[8]. Habib FA. Prediction of LBW infants from Placental Diameter and Thickness. Ann Saudi Med. 2002;22(5-6):312-4.
[9]. Suganya B, Mallika A, Sangeereni S. Estimation of gestational age by ultrasonographic measurement of placental thickness. Int.J.Modn.Res. Revs. 2015; 3 (6): 889-91.
[10]. Praful Kumar Kakumanu, Chandrasekhar Kondragunta, Nayantara Rao Gandra, Haritha Yepuri. Evaluation of placental thickness as an ultrasonographic parameter for estimating gestational age of the fetus in 2nd and 3rd trimesters. International Journal of Contemporary Medicine Surgery and Radiology. 2018;3(1):128-132..
[11]. N Idaya Vani. "Placental Thickness an Ultrasonographic Parameter for the Estimation of Gestational Age of the Fetus". Acta Scientific MedicalSciences 2.4 (2018): 27-31.
[12]. OBGYN.net Staff. The Value of 3D Ultrasound Measurement of Placental Volume in Prediction of IUGR. Physician's Practice. Available from http:// www.physicianspractice.com/obgyn-ultrasound/ value-3d-ultrasound-

measurement-placental-volume-prediction-IUGR accessed on 27 May 2017

[13]. Balakrishnan M, Virudachalam T. Placental thickness: a sonographic parameter for estimation of gestational age. International Jl of Reproduction, Contraception, Obstetrics and Gynecology. 2016;5 (6):4377-81

[14]. Nagesh R, Shukla AK, Pramila VVS. Ultrasonographic correlation of placental thickness with fetal gestational age and grading of placental maturity. J. Evid. Based Med. Healthc. 2016; 3 (3):825-9.

[15]. F Gary Cunningham. "Williams Obstetrics". 24th edition