MORPHOMETRIC FOETALMEASUREMENT IN IInd AND IIIrd TRIMESTER OF GRAVID FEMALES AROUND FH MEDICAL COLLEGE.

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ABSTRACT:
Introduction: Ultrasonographic determination of foetal size to estimate the gestational age is very important in the present day obstetric practice as a significant proportion of pregnant women are unsure of their last menstrual period.
Aims & objectives: This study is an attempt to measure various parameters of the foetus for the prediction of gestational age in the IInd and IIIrd trimester of pregnancy by USG.
Place and Duration of Study: FH Medical College with effect from Aug 2015- March 2017.
Materials and methods: This is an observational study. Healthy pregnant ladies with a single live foetus were selected for the study. 328 cases were selected and they were examined for BPD, HC, AC, FL by a single observer on a single machine.
Results: All parameters were measured in 328 pregnant females from 18 years to 35 years age for BPD, HC, AC, FL. A significant positive correlation was observed between the gestational age and all the parameters.
Conclusion: All our values were slightly more than those of other authors in the early weeks of gestation, but as pregnancy advanced our measurements were nearly the same as those of other authors.

Key Words: Bi-parietal Diameter, Abdominal Circumference, Head Circumference, Femur Length, Ultrasonography Measurements.

INTRODUCTION:

Appropriate assessment of gestational age is quite essential in obstetric care.**(1)**An average normal gestational age, which is the length of the pregnancy, is approximately 40 weeks, with a normal range of 38–42 weeks. Reliable estimation of gestational age is essential as it allows appropriate scheduling of a woman's antenatal care, informs obstetric management decisions and facilitates the correct interpretation of foetal growth assessment.**(2)**With the help of ultrasonographic measurements of the foetal parts such as the biparietal diameter (BPD), abdominal circumference (AC), head circumference (HC), and femur length (FL) are relies solely for determination of gestational age. Many variables affect foetal growth such as maternal illness, drug exposure, genetic syndromes, congenital anomalies, placental insufficiency, and others. Previous reports have shown that ethnicity plays a role in foetal growth.**(3)** Morphometric analyses are performed to record the parameters of foetal anatomical features as well as to describe the developmental changes and are useful in planning appropriate care for the fetus.**(4)**

Accurate determination of gestational age information is helpful in evaluating foetal growth pattern because the range for the size of any foetal parameter changes with advancing age and it also allows obstetrician to manage obstetrical conditions such as preterm labour, intra uterine growth retardation postdate pregnancy and plan the mode of delivery.**(3)**In the IInd and IIIrd trimester of pregnancy, the fetus has grown sufficiently in size so that anatomic details are clearly identified, visualized, and measured. Optimal imaging can be difficult in some clinical situations, such as in a late pregnancy abnormal lie when the head is deep in the maternal pelvis or maternal obesity.**(5)**Measuring the several parts of foetal anatomy and their growth is easily distinguished by foetal biometry methodology. The prenatal measurements of foetal parameters and estimated size and weight vary among different populations depending upon their racial, demographic characteristics and nutrition as observed by various workers. In routine all radiologists measure the bi-parietal diameter (BPD), head circumferences (HC), abdominal circumference (AC), femur lengths (FL) and foetal weight. We have also studied these to find out if foetuses in and around FH Medical College are the same as in other developed and developing countries or are different in any manner.

1. **METHODOLOGY**

A study was conducted on observation collected from 328 normal pregnant females between 20 weeks to 38 weeks of gestation referred from the antenatal clinics of the departments of Obstetrics and Gynaecology to the department of Radio Diagnosis and in association with the department of Anatomy at FH Medical College with effect from Aug 2015- March 2017.Patients was informed about the procedure and data will be used for research purpose and consent was taken before inclusion in the study. The data collected included the gestational age, date of the

last menstrual period, Bi parietal Diameter (BPD), Head Circumference (HC), Abdominal Circumference (AC) and Femur Length (FL).

1.1 Inclusion & Exclusion Criteria:

Only singleton pregnancies were included. Exclusion criteria included pregnant women who had concomitant disease that could possibly affect foetal growth (e.g. diabetes mellitus, asthma, hypertension, renal disease, and thyroid , bleeding, preeclampsia), foetal abnormality detected during the examination..

1.2 Biparietal Diameter (BPD): Biparietal diameter measurements were taken by the same investigator using GE Logiq S7 Expert ultrasound machine. From the outer edge of the closest parietal bone to the inner edge of the opposite parietal bone was the criteria for the measurement of foetal biparietal diameter.

1.3 Head Circumference (HC): The foetal HC was taken along the outer perimeter of the calvarium using the electronic digitizer at the same level as for the BPD.

1.4 Abdominal Circumference (AC): It was measured on the transverse image of the foetus at the level of liver. A major landmark was the umbilical portion of left portal vein deep in the liver; foetal stomach represented the second landmark. The measurements were made from the outer edge of one side to the outer edge of other side.

1.5 Femur Length (FL): It is usually easy to see foetal long bone from 13 weeks onwards. A linear array transducer was used for the measurement.Femur length was taken by straight line from the tip of greater trochanter to lateral epicondyle along the long axis of diaphysis.

The gestational age and expected date of delivery (EDD) were calculated by traditional LMP method by adding 9 calendar months and 7 days to the first day of the last normal menstrual period. Thereafter, with respect to each parameter predictive gestation age and its mean was recorded. Gestational age was measured in weeks and other foetal parameters (BPD, HC, AC, FL) were measured in mm and their mean was calculated. Ideal parameters for the third trimester to assess gestational age were found from the observation obtained. The Mean and standard deviation value of gestational age BPD, HC, AC, and FL were calculated to find statistical significance and correlation.

2. RESULTS: For the purpose of statistical study, adjustments have been made to get the gestational age in complete figures as 21 weeks 4 days to 22 weeks 3 days = 22 wks. Cross sectional data with descriptive statistical values of the present study are presented in **Table-3.1 (Page-05).**

3. DISCUSSION:

Foetal biometry is being done in all countries around the globe irrespective of races and ethnic groups colour for the last 4 decades. Different authors have published their findings in various countries on a small group of population. A recent study has shown that there were no significant

racial differences in foetal biometry measurements of HC and AC of Chinese, Malay and Indian foetuses in our local populationm.(6)

Various other studies done on morphometric measurements of foetus are compared in followingtables. In all the pregnancies, the parameters taken are correlating with the gestational age andhence the ultrasound examination of parameters is a good guide to the age estimation of thefoetus.**Comparatively study with others authors and present study is given in Tables4.1-4.4 on page 6 onwards** .This study on fetal biometry by ultrasonography has attempted to show the importance of assessing the gestational age and fetal growth patterns, in the care and management of the pregnant patient, to date the pregnancy, to distinguish normal from abnormal growth patterns, in antepartum management of complications. All our values were slightly more than those of other authors in the early weeks of gestation, but as pregnancy advanced our measurements were nearly the same as those of other authors. After the study of various parameters in present study as well as other studies it was found that by term all foetuses are the same all over the world.

COMPETING INTERESTS: Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS: " 'Chetna Thakur' designed the study, 'Bhawani Shankar Modi' wrote the protocol and the first draft of the manuscript and analyses of the study. 'Tejendra Singh' did critical analysis'Bhumija Sharma' performed the statistical and biochemical analysis of exclusion criteria and 'Shikha Sharma' as supervisor, managed the literature searches…… All authors read and approved the final manuscript."

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Result Table: 3.1

Table-3.1

GA(Weeks) according to USG	n	BPD		Head Circumference		Abdomen Circumference		Femur Length	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
17	3	38.8	0.17	141.87	0.23	115.67	0.23	24.8	0.11
18	14	41.7	0.18	153.53	0.59	130.28	0.39	27.5	0.15
19	17	46	0.11	169.99	0.48	145.18	0.48	31.01	0.12
20	11	51.1	0.79	188.65	2.77	160.03	3.14	33.96	0.18
21	16	53.6	0.68	199.31	2.61	174.37	2.85	38.64	0.54
22	21	55.49	0.14	204.27	0.37	176.31	0.53	39.42	0.14
23	6	58.63	0.4	219.58	0.48	190.58	0.82	40.9	0.09
24	14	60.7	0.16	225.22	0.44	198.12	0.41	44.8	0.14
25	6	62.93	0.36	232.38	1.26	199.35	1.37	45.32	0.42
26	12	67.12	0.33	247.25	1.27	221.88	1.4	50.65	0.37
27	10	69.77	0.14	252.82	1.28	234.16	0.94	52.38	0.1
28	19	72.44	0.65	267.96	1.02	241.02	1.38	54.75	0.35
29	17	74.57	0.15	273.42	0.52	254.08	0.54	57.41	0.19
30	27	77.99	0.18	281.91	0.58	264.33	0.79	59.84	0.24
31	29	79.68	0.21	284.14	1.63	270.23	0.72	61.1	0.11
32	23	82.33	0.17	297.16	0.44	281.83	0.75	63.54	0.11
33	22	84.26	0.13	301.58	0.43	295.06	0.37	63.91	0.59
34	26	86.83	0.14	310.71	0.32	305.98	0.48	67.65	0.18
35	19	88.32	0.24	317.27	0.6	315.5	0.8	69.12	0.18

| 36 | 7 | 90.6 | 0.22 | 324.64 | 0.21 | 322.78 | 0.55 | 71.76 | 0.11 |
| 37 | 9 | 92.52 | 0.11 | 330.78 | 0.19 | 335.48 | 0.36 | 73.64 | 0.09 |

Following Tables 4.1 to Table 4.4 showing the comparison of present study with others study with different parameters of gestation age.

Table:4.1

GA(Weeks) according to USG	Present Study	Hadlock et al (7)	Prashant et al (6)	Campbell et al (9)	Chitty et al (6)	Gupta et al (6)
17	38.8	35.6	32.8	37	32.8	37.5
18	41.7	39.6	30.7	44	39.8	41.4
19	46	43.2	43.1	47	43.2	44.6
20	51.1	46.3	46.4	51	46.5	48.1
21	53.6	49.4	49.8	54	49.8	51.5
22	55.49	52.5	53	58	53	54.7
23	58.63	55.8	56.3	61	56.1	57.8
24	60.7	56.8	58.3	64	59.2	60.1
25	62.93	61.6	62.5	67	62.2	63.4
26	67.12	64.3	65.4	70	65	66.9
27	69.77	66.9	68.4	73	67.8	69.5
28	72.44	69.6	71.3	75	70.5	72.2
29	74.57	72.4	74	78	73.2	74.6
30	77.99	74.9	76.5	80	75.7	76.9
31	79.68	77.2	78.8	83	78.1	79.5
32	82.33	80	80.9	85	80.4	81
33	84.26	82.2	82.7	87	82.6	80.3
34	86.83	84.4	84.3	89	84.7	85.8
35	88.32	86.8	85.8	91	86.7	87.9
36	90.6	89	87.2	93	88.6	89.7
37	92.52	91.3	88.5	95	90.3	92.1

Table:4.2

GA(Weeks) according to USG	Present Study	Hadlock et al (7)	Prashant et al (6)	Campbell et al (9)	Jeanty et al (10)	Gupta et al (6)
17	141.87	136	138	148	142	145
18	153.53	149	151	159	154	158
19	169.99	174	164	170	166	171
20	188.65	174	177	181	176	185
21	199.31	187	189	192	189	196
22	204.27	198	201	204	200	209
23	219.58	208	212	215	209	219
24	225.22	220	223	227	222	229
25	232.38	230	235	238	232	239
26	247.25	239	246	249	242	249
27	252.82	249	255	260	251	259
28	267.96	253	265	271	260	268
29	273.42	266	274	261	273	274
30	281.91	275	282	290	278	282
31	284.14	282	290	299	288	290
32	297.16	291	298	308	298	297
33	301.58	298	304	315	305	304
34	310.71	306	310	320	313	309
35	317.27	330	315	325	321	318
36	324.64	320	319	330	329	323
37	330.78	336	322	336	337	329

Table:4:3						
GA(Weeks) according to USG	Present Study	Hadlock et al (8)	Prashant et al (6)	Campbell et al (9)	Jeanty et al (10)	Gupta et al (6)
17	115.67	112.3	116.7	123	119	12.7
18	130.28	124.1	128.1	133.4	131	133.7
19	145.18	135.2	139.6	145	143	145.4
20	160.03	147.3	150	156	165	158.2
21	174.37	159.4	162	167	167	172
22	176.31	170.1	172.5	178	179	189
23	190.58	181.7	183.3	188	191	189.6
24	198.12	193.6	193.6	199	202	228.5
25	199.35	204.7	204.1	210	214	210.6
26	221.88	215.8	214	221	226	222
27	234.16	226.4	228.2	231	237	232.3
28	241.02	236.8	236.2	242	248	255.3
29	254.08	247.3	246.2	253	259	252.2
30	264.33	257.7	255.6	284	269	272.3
31	270.23	268.7	266	275	279	274.8
32	281.83	280.2	276	286	289	286.6
33	295.06	290.1	289.4	297	298	295
34	305.98	300	293	308	307	303
35	315.5	310.7	302	317	315	325.1
36	322.78	320.8	309.7	325	323	325.6
37	335.48	331.4	317.5	332	330	333.3

Table:4.4						
GA(Weeks) according to USG	Present Study	Hadlock et al (11)	Prashant et al (6)	Campbell et al (9)	Jeanty et al (10)	Gupta et al (6)
17	24.8	23.4	23.1	25	23.5	24.2
18	27.5	26.1	26	26	26.3	27.5
19	31.01	29.2	29	30	29	30.5
20	33.96	32	31.8	33	32	33.7
21	38.64	34.7	34.5	36	34.5	37.2
22	39.42	37.7	37.3	39	37.5	39.8
23	40.9	42	39.9	42	40	42.4

24	44.8	42.5	42.5	44	42.5	45
25	45.32	45.2	43.1	47	45	47.5
26	50.65	47.7	47.3	49	47.5	49.9
27	52.38	50.2	49.9	52	50	51.9
28	54.75	52.5	52.3	54	52.5	54.8
29	57.41	55.1	54.7	56	55	56.9
30	59.84	57	57	58	57.3	59.2
31	61.1	59.4	59.2	61	59.5	61.3
32	63.54	61.8	61.2	63	62.3	63.9
33	63.91	64	63	65	64.6	66.2
34	67.65	65.9	64.9	68	66.5	68.4
35	69.12	68.2	66.6	68	69	70.3
36	71.76	70.3	68.2	69	71.6	72.3
37	73.64	72.3	69.7	71	73.6	74