ASSESSMENT OF GESTATIONAL AGE - A COMPARITIVE EVALUATION OF FETAL FOOT LENGTH VS BIPARIETAL DIAMETER AND FEMUR LENGTH

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ABSTRACT

105 ultrasonographic measurements of Biparietal diameter, femur length and foot length was correlated with gestational age. A comparitive evaluation of foot length vs Biparietal diameter and femur length was also done* foot length showed a strong correlation with gestational age $r_1 = 0.85$ with BPD $r_2 = 0.82$ and femur length $r_3 = 0.91$. B.P.D. and femur length also showed a strong correlation with gestational age $r_4 = 0.90$ and $r_5 = 0.88$ respectively. It was hence concluded that all three parameters showed a strong correlation with gestational age. In cases like microcephaly, short limb dysplasia etc. where B.P.D. measurements are not reliable the foot length can be used as a reliable parameter for the estimation of gestational age.

Key words : Foot length, gestational age, biparietal diameter, femur length.

INTRODUCTION :

Assessment of gestational age is of paramount importance in the management of high risk pregnancies. With the advent of obstetrical ultrasound various parameters have been studied for assessment of gestational age. However, to-date no single parameter has been found which could accurately predict the gestational age. A combination of various parameters is taken for the approximation to the nearest gestational age. The study of fetal foot length as a predictor of gestational age was conducted on the basis of Streeter's study of 576 pathological specimens in which he showed a strong correlation of fetal foot length with gestational age. This was further corraboarated by Usher and Maclean in their study on post-partum data.

In the present study we endeavoured to established a correlation between fetal foot length and gestational age and to correlate foot length with Biparietal diameter and femur length which were again correlated with gestational age.

MATERIAL & METHODS :

One hundred and five ultrasonographic measurements were performed with the help of an Aloka real time scanner with a 3.5 m H_3 linear away transducer. The study included normal pregnant women from 13th to 42nd week of

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TABLE - I

Gestation weeks	Ultrasonographic foot length	Streeter's Data	Mercer's Data
12	1.2	0.9	0.9
13	1.42	1.1	1.0
14	1.63	1.4	1.6
15	1.85	1.7	1.6
16	2.06	2.0	2.1
17	2.28	2.3	2.4
18	2.49	2.7	2.7
19	2.70	3.1	2.8
20	2.92	3.3	3.3
21	3.13	3.5	3.5
22	3.35	4.0	3.8
23	3.56	4.2	4.4
24	3.77	4.5	4.4
25	3.99	4.8	4.7
26	4.20	5.0	5.1
27	4.41	5.3	5.4
28	4.63	5.5	5.8
29	4.84	5.7	5.7
30	5.06	5.9	6.1
31	5.27	6.1	6.2
32	5.48	6.3	6.3
33	5.70	6.5	6.4
34	5.91	6.8	6.8
35	6.12	7.1	7.1
36	6.34	7.4	7.4
37	6.55	7.7	7.5
38	6.77	7.9	7.8
39	6.98	8.1	7.8
40	7.19	8.3	8.2
41	7.41		
42	7.62		

gestation. In all cases the Biparietal diameter and femur length were taken. The leg was then traced to the heel. Caliper measurements were taken from the heel to the tip of the big toe (Fig.1).

The correlation between foot length and gestational age was assessed with the help of a linear regression model. At each week of gestation 95% confidence intervals were calculated based on ± 2 S.D. from predicted data.

Foot length was also correlated with B.P.D. and femur length.

RESULTS

The study included 105 ultrasonographic foot lengths, Biparietal diameter and femur length measurements from 13th to 42nd week of gestation.

Scatter plots of foot length versus gestational age and gestational age versus foot length were made.

A linear regression model was derived at 4 = 12.79 + 3.36 x, where x = foot length y = gestational age. The correlation coefficient r_1 = 0.85 derived (P < 0.001) (Fig. II).

95% confidence interval at each week of gestation was also calculated. The correlation of Biparietal diameter with gestational age r_4 = 0.90. and femur length with gestational age r = 0.88 was also derived. Foot length was then correlated with B.P.D. and femur length. The correlation r_2 = 0.92 (P < 0.001) and r_3 = 0.91 (P < 0.001) respectively.

DISCUSSION

The foot length data showed a good correlation with Streeter's (1920) data and Mercer's et al 1987. However, after 20 weeks though the data followed streter's predictive curve, the foot lengths were consistently 1 cm less than the predicted data. This could be due to lower average birth weight of Indian babies. This has also been corraborated by Buckshee et al 1983 in "study of Biparietal diameter in India babies".

Fetal foot length was found to be a reliable predictor of gestational age. It showed a good correlation with Biparietal diameter and femur length. Mercer et al 19 have also found foot length to be a reliable predictor of gestational age in case of diabetes, anencephaly and short limb dysplasia and twins. Hence in the management of preterm labour ultrasonographic foot length measurements can be undertaken in conjugation with other parameters for prediction of gestational age. Further on it can be used when other parameter do not accurately predict gestational age as well as when abnormality of long bone length or biparietal diameter is suspected.

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