

Ultrasound Biometric Parameters Differences Between Breech and Cephalic Presenting Fetuses: A Case-control Study

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ABSTRACT

Introduction: Fetal presentation is usually determined by maternal abdominal palpation. The sensitivity of this examination was widely different between studies (57–70%), and this had a significant dependency on the skill and experience of the examiner. The study assesses the relationship between fetal presentation (cephalic or breech) and ultrasonic fetal biometric measurements.

Methods: a case-control study involved 86 aberrantly healthy pregnant women whose gestational age ranged between 24 to 40 weeks divided into two groups according to fetal presentation. The first group, their fetus, was presented as Breech (n = 33); in the second group, their fetuses were in cephalic presentation (n = 53) as determined by abdominal and ultrasound examination. For both groups, ultrasonic assessment of fetal biparietal diameter, femoral length, head circumference, abdominal circumference, and estimated fetal weight was done. The results were expressed as weeks of gestation and compared them using Statistical Package for Social Science; SPSS version 24, a p-value of less than 0.05 considered statistically significant. Multiple pregnancies, maternal disease during pregnancy (complicated pregnancy). Fetus with growth restriction and fetuses with congenital abnormalities, and those in labor were excluded from this study.

Results: In term pregnancy, no statistically significant difference in all biometric parameters between the two groups except femoral length, which was significantly lower in breech than cephalic presenting fetus (36.06 ± 1.34 vs. 37.25 ± 1.21 , respectively). While in preterm pregnancy, all the parameters in the breech-presenting fetuses were lagged behind those of the cephalic group with very highly obvious statistical values.

Conclusions: There is no statistically significant difference in biometric parameters between term breech and cephalic presenting fetus apart from femoral length, which is shorter in breech while preterm breech had significantly lower biometric parameters than a cephalic presenting fetus.

Keywords: Case-control study, Breech and cephalic presenting, Ultrasound biometric.

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INTRODUCTION

The fetal presentation is usually determined by maternal abdominal palpation. The sensitivity of this examination was widely different between studies (57–70%), and this had a great dependency on the skill and experience of the examiner. Recently there is no guidance on which rate of the false-negative result is acceptable when an abdominal examination is used to screen a breech-presenting fetus. In contrast, a faster, more accurate, and safer method could be achieved by using ultrasound examination to determine whether the fetus was presenting as a breech or not.¹ A term pregnancy, fetus presenting as a breech in 3-4%. It could be due to disturbed fetal orientation in utero or from maternal and fetal pathology.

Some adverse conditions associated with breech presentation are intrauterine growth restriction, short umbilical cord, and aberrant amniotic fluid volume (either polyhydramnios or oligohydramnios). Even after birth, a fetus presenting as a breech is more liable to undesirable health outcomes and has a lower neurological score test compared with a newborn in cephalic presentation.² For many years ago, different studies have been done to assess the effect of fetal presentation as a breech on newborn development during early neonatal and in later life. These studies mainly focused on the effect of the mode of delivery of breech presenting fetus on postnatal development. It has been found that there is a strong association between breech presentation and congenital fetal anomalies, preterm deliveries, and Mullerian abnormality, especially

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uterine one. Still, no cause was found for breech presentation at term in more than 80% of cases.³ The fetal biometry is a vital element of obstetrical practice; it means assessment of fetus by measuring different fetal anatomical segments as fetal head, femoral length, and abdominal circumference, which are most frequent parameters, used in addition to crown-rump measurement during early weeks of pregnancy. All of these parameters can be used to calculate the gestational age, weight of the fetus and monitor fetal growth throughout pregnancy to determine whether the fetus has impaired growth or not.

Both ante and intrapartum management are affected by these measurements also it could anticipate postnatal sequels.⁴ Neonatal weight at birth is of great importance determinant of wellbeing for both mother and her newborn and significantly affect the management of pregnancy obstetrically.⁵ So antenatal assessment of fetal weight becomes one of the most important parts of the obstetrical examination, especially during the last trimester of pregnancy, and this could be achieved in many ways as abdominal examination in the form of Leopold's maneuvers.⁶ Birth weight also could be determined by using ultrasound techniques through biometric fetal measurements.⁷ Even Magnetic Resonance Imaging (MRI), although not a routine, could assess fetal weight.⁸ However, determining fetal weight by ultrasound is still the most common way used throughout the world because it is easy and objective test.⁹ In this study, we try to assess different fetal anatomical parameters in both breech and cephalic presenting fetuses in the form of measurement of Biparietal diameter BPD, Femoral length FL, abdominal circumference AC, and fetal weight to determine whether these parameters are affected by fetal presentation in singleton healthy pregnancy or not.

Aim of the Study

To assess the relationship between fetal presentation (cephalic or breech) and ultrasonic fetal biometric measurements.

METHODS

A case-control study, permitted by the Medical Ethical Agency of Medical College in the University of Babylon informed the participating women before enrollment in this study to have signed written consent. The study involved 86 aberrantly healthy pregnant women whose gestational age ranged between 24 to 40 weeks as determined by identifying the date of the last menstrual period and confirmed by ultrasound. They were divided into two groups according to fetal presentation. In the first group, their fetus was presented as breech ($n = 33$), the second group; their fetuses were in cephalic presentation ($n = 53$) as determined by both abdominal and ultrasound examination. For both groups, ultrasound assessments of fetal biometry were done by measuring biparietal diameter (BPD), femoral length (FL), abdominal circumference (AC), head circumference (HC), and fetal weight (FW) using transabdominal ultrasound with the probe of 3-5 MHZ(using ultrasound mashing -MEDISON – SONOACE X8) done by an expert radiologist. The BPD and HC measured on an axial plane that traverses the thalamus, and cavum septum pellucidum

and cerebellar hemispheres should not be in the image plane. Biparietal diameter BPD. The transducer was perpendicular to the central axis of the head, the calipers placed at the outer edge of the near calvarial wall, and the inner edge of the far calvarial wall. Head circumference HC assessed by measurement of an ellipse, this drawn around the outside of the calvarium. It could also be calculated from BPD and occipitofrontal diameter (OFD) as $HC = 1.62 \times (BPD + OFD)$

3. Abdominal circumference AC: measured by transverse section through the upper abdomen, which demonstrates fetal stomach, umbilical vein, portal sinus, the kidneys, and cord insertion should not be visible.

Femoral length FL: the length measured from blunt end to blunt end parallel to the shaft—the measurement. Measure the femoral diaphysis, but not the ossification center. All above parameters expressed as a gestational age in weeks BPD together with head circumference HC, femoral length FL and abdominal circumference AC are computed to produce an estimated fetal weight. Then a comparison of the results of above parameters was done between the 2 groups. Exclusion criteria involved: multiple pregnancies, maternal disease during pregnancy (complicated pregnancy). Fetus with growth restriction and fetus with congenital abnormalities and those who was in labor. All were excluded from this study. The main outcome measure was to determine whether fetal biometry was affected by its presentation in utero or not. Statistical analysis was done by SPSS22—mean \pm SD for continuous variables, numbers, and percentages for categorical data. Independent samples t-test utilized for means of continuous parameters, and categorical variables tested by Chi-square test. A p-value less than 0.05 is considered statistically significant.

RESULTS

The distribution of pregnant women in the study groups according to study variables including (maternal age, parity, history of abortion, placental localization, baby's gender, and weeks of gestation) showed no significant differences between cephalic & breech groups as clear in Table 1.

Comparing fetal growth biometric variables between cephalic and breech presenting term fetuses showed comparable growth regarding the BPD, abdominal circumference, and the estimated fetal weight while the mean of femoral length measurement was presenting a big statistical difference between the cephalic and breech groups, the femur was shorter in the 2nd ones (Table 2).

However, in the preterm fetuses, all the parameters in the breech-presenting fetuses were lagged behind those of the cephalic group with very highly obvious statistical values. (Table 3).

DISCUSSION

Based on the results of different studies that suggest adverse outcomes of Breech presenting fetus compared with cephalic one during intra and extrauterine life⁽²⁾, we tried to compare the fetal biometric parameters in utero and whether they are affected by fetal presentation or not. In this study, assessment of these parameters for term and preterm fetuses was done

Table 1: The distribution of groups of women according to study characteristics:

Demographic data	Cephalic presentation		Breech presentation		p-value
	Frequency	%	Frequency	%	
Parity					
Primigravida	5	9.4%	7	21.2%	
Multiparous	48	90.6%	26	78.8%	0.13
Total	53	100.0%	33	100.0%	
No. of abortions					
No abortion	45	84.9%	24	72.7%	
One	5	9.4%	6	18.2%	0.16
Two	1	1.9%	3	9.1%	
Three	2	3.8%	0	0%	
Total	53	100.0%	33	100.0%	
Gender of the baby					
Female	24	45.3%	11	33.3%	0.27
Male	29	54.7%	22	66.7%	
Total	53	100.0%	33	100.0%	
Gestational age					
Term (37–40) wk	32	60.4%	16	48.5%	0.28
Preterm (30–36 ⁺⁶) wk	21	39.6%	17	51.5%	
Total	53	100.0%	33	100.0%	
Placental site					
Posterior	26	49.06%	18	54.55%	0.62
Anterior	27	50.94%	15	45.45%	
Total	53	100%	33	100%	
Mean of maternal age ± SD (years)	(25.72 ± 6.004)		(27.61 ± 5.511)		0.15

Table 2: Fetal biometric variables among cephalic and breech presenting term fetuses

Fetal biometry	Cephalic presentation N (32)		Breech presentation N (16)		p-value*
	Mean	SD	Mean	SD	
BPD range (37–40) wk	37.81	1.17	37.88	1.02	0.857
Femoral length wk	37.25	1.21	36.06	1.34	0.003**
Abdomen circumference wk	37.84	1.41	37.31	1.44	0.23
Fetal weight (gm)	3310.69	458.07	3250.56	373.08	0.652

* t-test

** p-value ≤ 0.05 was significant.

Table 3: Fetal biometric variables among cephalic and breech presenting preterm fetuses

Fetal biometry	Cephalic presentation N (21)		Breech presentation N (17)		p-value*
	Mean	SD	Mean	SD	
BPD range (30–36.6) wk	35.14	1.55	34.71	1.64	0.408
Femoral length wk	35.10	1.67	32.47	1.50	<0.001**
Abdomen circumference wk	35.19	1.99	33.29	2.25	0.009**
Fetal weight (gm)	2760.81	520.62	2329.18	423.27	0.009**

*t-test

** p-value ≤ 0.05 was significant.

separately. Regarding term fetuses, we found that there is no statistically significant difference in measurements of biparietal diameter, head circumference, abdominal circumference, and estimated fetal weight in both breech and cephalic presenting fetuses. This result disagreed with what had been found by Haberkern *et al.*, who use the term “breach head” to denote scaphocephaly which results from premature fusion of sagittal suture resulting in smaller BPD.¹⁰ Other finding of this study

is that term breech-presenting fetus had significantly shorter femoral length compared with cephalic one. This result partly agreed with Lubusky *et al.*, who concluded that breech-presenting fetuses have a significantly lower femoral length than cephalic fetuses. At the same time, opposite to our study, Lubusky *et al.* found that BPD, HC, AC, and estimated fetal weight were all significantly lower in a breech fetus.¹¹ When comparing biometric parameters of preterm breech and

cephalic presenting fetuses, this study revealed significantly lower breech measurements than a cephalic presenting fetus. This finding is in agreement with DM Sherer *et al.*, who found in their research that intrauterine growth restriction (both symmetrical and asymmetrical) is more in the preterm breech than a cephalic presenting fetus.¹² although our study not involved growth follow-up. Anna E *et al.* compare risk factors for breech presentation in preterm and term labor, found that the associated risk raised with every gestational age group beyond 28 weeks of gestation. Also they report that preterm breech laborers have the same clinical risk factors as in cephalic presentation after matching for gestational age except for PPROM.¹³ Our result regarding biometric measurements of preterm breech being smaller than cephalic supported by what has been found by Stefania *et al.*, who showed that breech presentation is significantly more in small-sized fetuses, and this represents a risk factor independent on gestational age.¹⁴ Different philosophies taxed to explain the relative between fetal mass and breech appearance. Smaller fetuses have a grade of decreased development in utero. Fetus weight and breech presentation still contrariwise related more than 90th percentile and little fetuses with IUGR.¹⁴ Another possible description of fetal weight upsurge it will disperse additional the fetal head, which may aid in forcing the head down to cephalic presentation spontaneously.¹⁵ Lesser fetuses may have a high percentage to get variation in appearance in utero. The connection between preterm baby and breech presentation is the importance of minor fetal mass of preterm fetuses. Therefore, prolonging pregnancy may give breech presenting fetuses a chance to gain more weight and recover their likelihood of revolving into cephalic appearance either naturally or by exterior cephalic version.¹⁶ Consequences of altered preceding trials sustenance this assumption as they display that between 15% to 33% of fetuses that are breech presentation (37 weeks) will instinctively turn to a cephalic location.¹⁷

CONCLUSIONS

There is no significant statistical difference in biometric parameters between term breech and cephalic presenting fetus apart from femoral length, which is shorter in the breech. While preterm breech had significantly lower biometric parameters than a cephalic presenting fetus.

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