



The Value of Routine Ultrasound in the First and Second Trimester of Pregnancy

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ABSTRACT:

Background: Routine obstetric ultrasound during early pregnancy has transformed prenatal care by improving gestational dating accuracy, identifying fetal and maternal abnormalities, and enhancing perinatal outcomes. Early assessment is critical for optimal management, particularly in high-risk pregnancies. This study evaluated the clinical utility of routine ultrasonography at initial antenatal visits during the first and second trimesters.

Methods: A cross-sectional observational study was conducted at the Department of Obstetrics & Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, from December 2005 to June 2006. A total of 203 pregnant women in their first or second trimester attending their initial antenatal clinic visit were enrolled. Examinations included obstetric history, physical examination, and ultrasound scan. Gestational age, fetal viability, number of fetuses, anatomical abnormalities, and clinical findings were recorded. Data were analyzed using SPSS.

Results: Of 203 participants, 194 (95.57%) had viable pregnancies. Significant findings were detected by ultrasound in 130 cases (64.04%), including missed abortion (2.96%), molar pregnancy (0.98%), ectopic pregnancy (0.49%), and multiple gestations (4.43%). Discrepancies between menstrual and ultrasound dating occurred in 47.78% of cases. 72.22% of women with certain LMPs had ultrasound dates earlier than the reported LMP. Physical examination detected only 29.23% of abnormalities confirmed by ultrasound.

Conclusion: Routine ultrasound at first antenatal visit provides critical diagnostic information, improves gestational dating accuracy, and identifies potentially life-threatening conditions early. Integrating early ultrasonography into routine prenatal care can enhance maternal and fetal outcomes.

Introduction

Pregnancy Ultrasound scans provide valuable information, but accurate findings depend on the

pregnancy stage and examination purpose. Routine ultrasound screening changed obstetric practice significantly. The screening program provides the most



precise estimation of gestational age [1]. Ultrasonograms show physical abnormalities, placental location, pregnancy number, fetal viability, pregnancy confirmation, suspected intrauterine death, abortion, ectopic pregnancy, molar pregnancy, vaginal bleeding during pregnancy & genetic testing [2].

Accurate gestational age knowledge aids pregnancy management, particularly for labor induction and elective caesarean decisions in high-risk cases. Routine ultrasound assessment of gestational age is accurate, particularly in the first trimester [3] Ultrasound is recommended for determining gestational age when menstrual dates are uncertain. In routine ultrasound programs, biparietal diameter measurement between 12-18 weeks proves more accurate (89.4%) than menstrual history predictions [4] Early pregnancy ultrasound screening reduces post-maturity rates, post-term pregnancy induction [5,6], and emergency caesarean sections [7]. Reliable dating is essential for chorionic villus sampling, amniocentesis, and fetal morphology scans at 18-20 weeks, reducing iatrogenic preterm delivery risk [1]. First antenatal visit, ultrasound provides precise gestational age estimation and reduces mid-gestation delivery date adjustments [8].

Ultrasound detects multiple gestations often missed in clinical examination, with 98% of twins detected antenatally through screening [1]. Early twin pregnancy detection improved perinatal outcomes. In the Helsinki Ultrasound Trial, all twins were detected before 21 weeks in the screened group versus 73.3% in controls, significantly decreasing twin perinatal mortality [9]. Routine screening accurately determines placental location. Initially, many false placenta previa diagnoses occurred, but now 17th-week ultrasound excludes low implanted placenta in 90% cases [1].

Knowing the placental location is important before amniocentesis and chorionic villus sampling. Placental localization is essential in antepartum haemorrhage to exclude placenta previa. Fetal malformations, including cardiac, gastrointestinal, renal, limb, and neural tube defects, can be detected by current ultrasound techniques. Evidence suggests routine ultrasound in the 2nd trimester improves the diagnosis of congenital malformations. Chitty et al. reported that in their screening program, 130 fetuses had an abnormality at birth or after pregnancy termination, 125 were examined

in the 2nd trimester, and 93 cases were detected before 24 weeks [10]. The prediction value of ultrasound in the 2nd trimester was 97.9%.10 Approximately 50% of major fetal malformations were detected in the Helsinki Ultrasound Trial [9]. The sensitivity of abnormality detection by combining 1st and 2nd trimester scans was 82.3% [11].

Fetal malformations significantly contribute to perinatal mortality. Without ultrasonography, a malformed fetus unable to survive is counted as perinatal death, whereas if detected early by ultrasound, it would be considered an antenatal case of early abortion. Induced abortion from malformations detected by ultrasound decreases the numerator but leaves the perinatal mortality denominator unchanged. In a randomized trial of 7992 pregnancies using routine ultrasound scanning, live birth rates were identical in screening and control groups, though perinatal mortality was lower in the ultrasound group. Differences in perinatal morbidity between groups measured by newborn APGAR scores below 7 at one minute were not significant [12]. 95% of pregnant women in the Greater Helsinki Area entered a 19-month study where perinatal mortality was lower in the screened group compared to controls (4.6 per 1000 VS 9.0 per 1000). This reduction was attributed to the early detection of major malformations leading to induced abortion before 20 weeks [9].

The first prenatal visit is important to evaluate maternal and pregnancy status, including medical history, physical examination, laboratory tests, and ultrasound assessment [13] While routine ultrasound screening in first-half pregnancy is beneficial, optimal timing remains debatable. Evidence indicates routine ultrasound screening in first 2 trimesters benefits both mother and fetus [4,8, 11].

Objective

The objective of this study was to evaluate the role of routine obstetric ultrasonography at the time of the first prenatal visit.

Methodology & Materials

This cross-sectional observational study was conducted at the Department of Obstetrics & Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from 15th December 2005 to 15th June 2006. A total of 203 women who were



in their 1st and 2nd trimesters of pregnancy are included in this study.

Inclusion criteria: Only women who were in their first or second trimester and attending the antenatal clinic for the first time were included in the study.

Exclusion criteria: Women who were in their 3rd trimester of pregnancy and women who were in their first or second trimester but had a previous ultrasound examination.

Ethical approval was maintained, and informed consent was obtained from all participants before conducting the ultrasound examinations. Scans were performed in the ultrasound room of the Department of Obstetrics & Gynaecology at BSMMU Hospital by a trained sonographer. A single scan was done at the first opportunity during the booking visit, which also included antenatal history, physical examination, and routine investigations. A Toshiba Tosbee machine with a 3.75 MHz linear array transducer was used, and scans were conducted with the woman's bladder full. The following

parameters were recorded: crown-rump length in the first trimester (three measurements taken, with the largest used), biparietal diameter and femur length in the second trimester, number of fetuses, fetal cardiac movement, and any gross abnormalities (fetal or uterine). A variation of up to seven days from the last menstrual period (LMP) was accepted for pregnancy dating; if the variation exceeded seven days, the ultrasound findings were used for dating. All collected data were entered into a pre-designed data collection sheet and analyzed using SPSS software.

Results

A total of 203 cases were taken as a sample. Among them, 194 (95.57%) were found to have viable pregnancy & 6 (2.96%) patients had non-viable pregnancy, i.e., missed abortion and blighted ovum. Molar pregnancy was diagnosed in 2 (0.98%) patients, and 1 (0.49%) was found with ectopic pregnancy. Of the 194 women with viable pregnancies, 54 cases were in the first trimester and 140 were in the second trimester.

Table 1: Baseline characteristics of the respondents (n=203)

Characteristics	Number of Women	Percentage (%)
Age of the mother	15-20	13.30
	21-25	38.42
	26-30	25.12
	31-35	15.76
	36-40	6.40
	41-45	0.98
Residence	City dwellers	73.89
	Rural dwellers	22.66
	Slum dwellers	3.45
Parity	Primipara	33.50
	Multipara	66.50
Abnormal laboratory findings	Anemia	38.42
	Positive Urine culture	10.34
	Positive serological test (VDRL, Hbs Ag)	0.98
	Raised blood sugar 2 hours after 75 gm glucose	3.44

Table I shows the baseline characteristics of the respondents. From all, 13.30% mothers were age between 15-20 years, 38.42% were between 21-25 years,

25.12% were between 26-30 years, 15.76% were between 31-35 years, 6.40% were between 36-40 years, and 0.98% were between 41-45 years. It also shows that



73.89% of the patients reside in the city area, 22.66% in the rural area & 3.45% in the slum area. Regarding the parity, 33.5% were primipara & 66.5% were multipara. Anemia was the most common laboratory abnormality. It was present in 78 patients (38.42%) next common

abnormality was positive urine culture (10.34%). Raised blood sugar level after challenge was found in 7 patients (3.44%). Only 2 patients showed serological positivity for the Hepatitis B Virus.

Table 2: Significant abnormalities on initial physical examinations (n=203)

Abnormality	Number of cases	Percentage (%)
Uterine size incompatible with menstrual dates (in pts with certain LMP)	27	13.30
Suspected multiple pregnancy	3	1.48
Suspected pelvic mass	3	1.48
Suspected incompetent cervix	1	0.49
Suspected low laying placenta	0	0.00
Suspected missed abortion	2	0.99
Unexpected cardiac findings	2	0.99
Total	38	18.72

Table 2 shows clinically pertinent abnormalities on initial physical examination in 38 patients, i.e., 18.72% of total cases (n=203), and constitutes 29.23% of clinical

problems identified at routine ultrasound scan (n=130). This means that physical examination alone would detect only 29.23% of actual abnormalities.

Table 3: Clinical problems identified at routine ultrasound scan (n=203)

Clinical Problems	Number of Women	Percentage (%)
Uncertain menstrual dates	43	21.18
USG dating not equal to certain menstrual dating	54	26.60
Missed abortion & blighted ovum	6	2.96
Multiple pregnancy	9	4.43
Fetal Anomaly	2	0.99
Ectopic Pregnancy	1	0.49
Gestational trophoblastic disease	2	0.99
Uterine Leiomyoma ē pregnancy	4	1.97
Ovarian tumor ē pregnancy	2	0.99
Dilated Cx	2	0.99
Low lying placenta	4	1.97
Total	130	64.04



Table 3 shows the relative population of each of the clinical problems identified at routine USG scan. Clinically pertinent ultrasonographic findings occurred in 64.04% of the total number of cases. Evidence of missed abortion was noted in 2.96% of all patients presenting in the first trimester. Only one of them had

experienced bleeding. The diagnosis of twin & triplet gestation was made in 9 patients, i.e., in 4.43% of all cases. 8 cases were diagnosed in the 1st trimester & 1 case was in the 2nd trimester (because she came late) Gestational trophoblastic disease was diagnosed in 2 cases & both of them were in the 1st trimester.

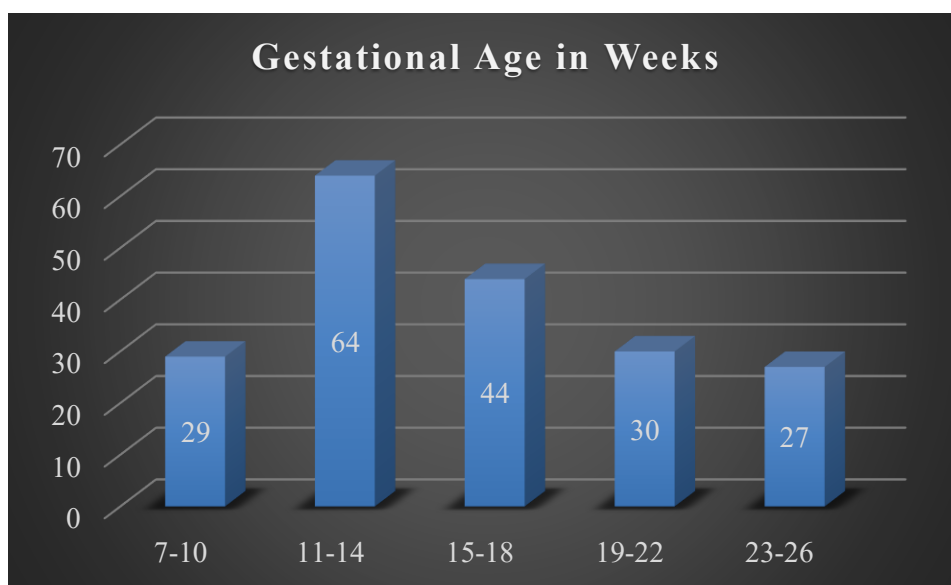


Figure 1: Range of ultrasound gestation for viable pregnancy (n=194)

Figure 1 shows the range of gestation for the viable pregnancy. The mean gestational age was 15.716 weeks.

Table 4: Incidence of various problems found with viable pregnancies at the time of ultrasound (n=194)

Problem	Number of women	Percentage (%)
Twin pregnancy	8	4.12
Triplet Pregnancy	1	0.52
Uterine abnormality	4	2.06
Ovarian abnormality	2	1.03
Dilated Cx	2	1.03
Fetal abnormality	2	1.03
Low laying placenta	4	2.06

Table 4 shows the incidence of twins in 4.12%, triplets in 0.52%, Uterine abnormalities in 2.06%, Ovarian

tumors in 1.03%, Fetal abnormalities in 1.03%, low-laying placenta in 2.06%, & Dilated Cx in 1.03% cases.



Table 5: Number of cases with certain menstrual dates versus uncertain menstrual dates at first and second trimester. (n=194)

Gestational Age	Certain menstrual date	Uncertain menstrual date
First trimester (Before 13 weeks)	40	14
2 nd trimester (between 13-26 weeks)	111	29
Total	151 (77.8%)	43 (22.2%)

Table 5 shows that of the total 194 women with viable pregnancy, 151 (77.8%) were certain of their LMP and 43 (22.2%) were uncertain of their last menstrual period.

Table 6: Concordance and discordance of certain menstrual dating with USG dating (n=151)

Gestational Age	Concordance of USG dating & LMP dating	Discordance of USG dating & LMP dating	Total	P value
1 st Trimester	17 (11.26)	23 (15.23)	40 (26.49)	<0.001
2 nd Trimester	80 (52.98)	31 (20.53)	111 (73.51)	<0.001
Total	97 (64.24)	54 (35.76)	151 (100.0)	<0.001

Table 6 shows women with certain menstrual dates (n=151). There were 97(64.24%) cases, which had concordance between their ultrasonographic dating & menstrual dating. 54 (35.76%) women had a discrepancy between ultrasonographic dating & dating from the last

menstrual period. Pearson chi-squared test, which is a P value, is <0.001, which is a highly significant difference between the results of ultrasonographic dating with menstrual dating in both the 1st & 2nd trimesters.

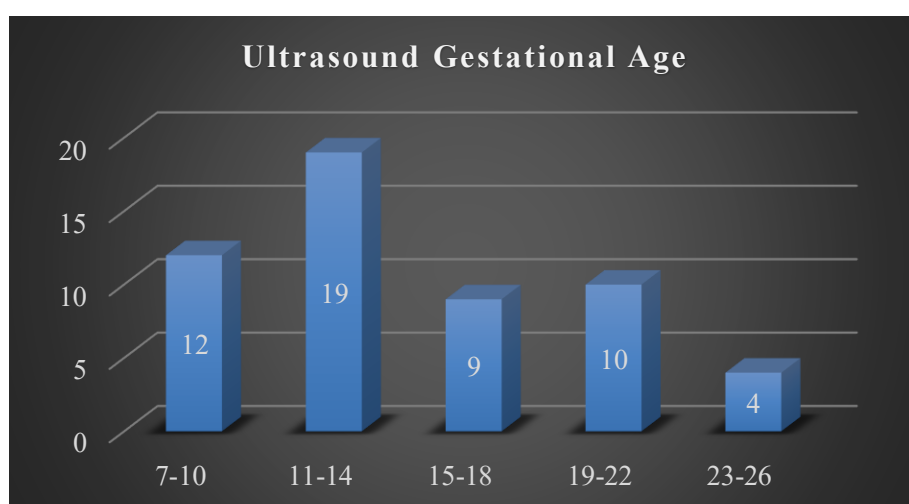


Figure 2: Range of ultrasound gestation in weeks for women with certain menstrual dating where menstrual dating did not concord with ultrasound dating (n=54)

Figure 2 shows a number of women in different gestational periods, where dating by LMP did not

correspond with USG dating. Of the 54 patients, the majority, i.e., 57.40%, were below 15 weeks of gestation.

**Table 7: Range of discrepancies between certain LMP dates and USG dates (n=54)**

First trimester scans		Second trimester scans	
USG dating minus LMP dating		USG dating minus LMP dating	
Days	Number of Cases	Days	Number of Cases
21	2	40	1
15	1	21	2
11	4	14	2
9	3	-10	4
-8	2	-12	3
-10	1	-14	4
-11	4	-16	2
-13	2	-18	3
-20	3	-21	4
-26	1	-24	3
		-28	2
		-30	1

Table 7 shows the range of discrepancies of dates for women with certain LMP dates, where ultrasound dating did not agree with LMP dating. 39 (72.22%) women from this group of 54 had ultrasound dating one or more weeks earlier than their menstrual dating. The remaining 15 (27.77%) had USG dates that were later than their menstrual dates.

Discussion

This cross-sectional study was performed to evaluate the role of routine obstetric ultrasonography at the time of the first prenatal visit. Special emphasis of this study was placed on the evaluation of the ability to diagnose discrepancies between ultrasonographic dating and menstrual dating, and also to compare the frequency of clinically pertinent ultrasonographic findings with those found on physical examination.

The previous studies have reported that ultrasonography had its highest utility in finding discrepancies in gestational age [3-5,8], and assisting with dating the pregnancy, making early diagnosis of missed abortion or twin pregnancy [9]. In the present study, discrepancies

were found between ultrasonographic dating and menstrual dating in the largest group (47.78% of cases), which included those women with certain menstrual dating (26.60%) and those with uncertain dating, which was established by ultrasonogram (21.18%).

Barrett et al. observed 26.8% discrepancies between ultrasonography and menstrual dating. [13]. These findings correspond with findings in women with certain menstrual dating (26.60%). Total discrepancies vary with (47.78%) in the present study. This may be due to the inclusion of women with uncertain LMP.

Significant differences between ultrasound dating & LMP dating were corrected where the difference was more than 1 week. Because in case of premature labor where 1 1-week discrepancy in pregnancy dating could make a tremendous difference in perinatal outcome. This correction is also important in making the correct diagnosis of post-term pregnancy.

The findings of this study, as corrected by ultrasound, would help in postponing the frequency of labor indication in cases where the estimated date of



confinement was calculated on LMP. As has been shown in the study of Bennet et al. in Memorial University, Newfoundland, Canada where routine ultrasonography has been associated with a decrease in frequency of labor induction for post term pregnancy [6].

Accurate pregnancy dating is also extremely important in timing for repeat cesarean section, assessing fetal growth, timing of anomaly scan, and timing of maternal serum alpha-fetoprotein estimation. In the present study, among the women with certain menstrual dates but significantly different ultrasound dates, 57.40% were less than 15 weeks of gestation. In view of the above findings, a policy of routine early ultrasound screening at the first visit of antenatal care will definitely benefit the mothers.

Barrett et al. observed 1.6% multiple pregnancies on initial sonography [13]. 75% of these multiple pregnancies were diagnosed in the 1st trimester. In this study, 4.43% of multiple gestations were diagnosed in the initial ultrasonography, and among them, 88.88% were diagnosed in the first trimester. In the Helsinki ultrasound trial, it was found that the identification of twin pregnancies by ultrasound examination in the first half of pregnancy is associated with a significant reduction in twin perinatal mortality [9].

Other abnormalities found on ultrasonography were also clinically important. In this study, the gestational trophoblastic disease was diagnosed in 0.98% and Ectopic pregnancy in 0.49% of all pregnancies, and all of them were diagnosed in 1st trimester. The early diagnosis allows the physicians to counsel the patients before the onset of bleeding and to manage the patient before the initiation of any grieving process.

In this study, 0.98% of fetal anomalies were diagnosed. In the Helsinki trial, the identification of some major abnormalities and subsequent termination of pregnancy probably affected perinatal mortality [9]. The most important findings were that half the serious malformations were detected, a frequency of 1/200, and perinatal mortality decreased by about the same rate, mainly because of induced abortion as a result of detected malformation.

Early diagnosis of low-lying placenta, suspicious adnexal mass, and uterine leiomyoma has potential

benefits, and all of them need closer follow-up and proper counseling for proper management.

Reasons for caution in performing ultrasonography include the risk to the fetus and the expense of ultrasonography. There is no clear evidence of an important adverse effect related to screening ultrasonography. A randomized controlled trial by Newnham JP et al. compared routine multiple ultrasound scans plus Doppler flow studies with 4 or more scans [14]. The screened group had a significantly higher percentage of infants with low birth weight below the 10th percentile. It suggests that frequent exposure to ultrasound with Doppler studies may have influenced fetal growth. So, repeated prenatal ultrasound imaging with Doppler flow examination should be restricted to those women to whom the information is not likely to be of clinical benefit.

The main disadvantages of carrying out a booking ultrasonography rather than a later scan are in the area of fetal abnormalities, which are best detected in the later scan. A booking ultrasound is not a fetal anomaly scan and will only detect gross abnormalities. In our practice, if the first prenatal visit occurs before 16 weeks, follow-up ultrasonography is performed at approximately 19-20 weeks for further evaluation of fetal anomaly. However, abnormal pregnancies that are detected could be terminated at much earlier gestation than if they were detected later.

The relatively low frequency (18.72%) of abnormalities noted on physical examination and abnormalities noted on the recommended routine laboratory studies (53.18%) should not diminish the importance of routine ultrasonography. However, the comparatively high frequency (64.04%) of clinically pertinent findings on first visit- ultrasonography should emphasize the value of this study in initial patient evaluation.

Limitations of the study

Most of the people of our country are not aware of the health facilities available. They only attend the hospital when complication arises. The great majority of births in our country take place at home, and there is no civil registration. So, from this small percent of the population, who attended the hospital for prenatal checkup and delivery, the exact benefit of ultrasonography among our antenatal women cannot be



truly assessed. In most cases, there is no opportunity to do a repeat scan of the same patient because of noncompliance. Finally, the design of this study did not allow the assessment of morbidity and mortality related to the first prenatal visit ultrasonography.

Conclusion and recommendations

The conclusion from this study is that routine use of ultrasonography in first and second trimester of pregnancy at the first prenatal visit is valuable and should be considered for all patients. Further studies involving more cases with repeat ultrasonograms at 18-20 weeks and their importance to pregnancy outcome are recommended.

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Conflicts of interest

There are no conflicts of interest.

Ethical approval

The study was approved by the Institutional Ethics Committee.

References

1. Persson PH, Kullander S. Long-term experience of general ultrasound screening in pregnancy. *American Journal of Obstetrics and Gynecology*. 1983 Aug 15;146(8):942-7.
2. Panel CD, National Institutes of Health. The use of diagnostic ultrasound imaging in pregnancy. *Journal of Nurse-Midwifery*. 1984 Jul 1;29(4):235-40.
3. Kalish RB, Thaler HT, Chasen ST, Gupta M, Berman SJ, Rosenwaks Z, Chervenak FA. First-and second-trimester ultrasound assessment of gestational age. *American journal of obstetrics and gynecology*. 2004 Sep 1;191(3):975-8.
4. CAMPBELL S, WARSOFF SL, LITTLE D, COOPER DJ. Routine ultrasound screening for the prediction of gestational age. *Obstetrics & Gynecology*. 1985 May 1;65(5):613-20.
5. Savitz DA, Terry Jr JW, Dole N, Thorp Jr JM, Siega-Riz AM, Herring AH. Comparison of pregnancy dating by last menstrual period, ultrasound scanning, and their combination. *American journal of obstetrics and gynecology*. 2002 Dec 1;187(6):1660-6.
6. Bennett KA, Crane JM, O'shea P, Lacelle J, Hutchens D, Copel JA. First trimester ultrasound screening is effective in reducing postterm labor induction rates: a randomized controlled trial. *American journal of obstetrics and gynecology*. 2004 Apr 1;190(4):1077-81.
7. BELFRAGE P, FERNSTROM I, HALLENBERG G. Routine or selective ultrasound examinations in early pregnancy. *Obstetrics & Gynecology*. 1987 May 1;69(5):747-50.
8. Crowther CA, Kornman L, O'Callaghan S, George K, Furness M, Willson K. Is an ultrasound assessment of gestational age at the first antenatal visit of value? A randomised clinical trial. *BJOG: An International Journal of Obstetrics & Gynaecology*. 1999 Dec;106(12):1273-9.
9. Saari-Kemppainen A, Karjalainen O, Ylostalo P, Heinonen OP. Ultrasound screening and perinatal mortality: controlled trial of systematic one-stage screening in pregnancy. *The Lancet*. 1990 Aug 18;336(8712):387-91.
10. Chitty LS, Hunt GH, Moore J, Lobb MO. Effectiveness of routine ultrasonography in detecting fetal structural abnormalities in a low-risk population. *British Medical Journal*. 1991 Nov 9;303(6811):1165-9.
11. Economides DL, Braithwaite JM. First trimester ultrasonographic diagnosis of fetal structural abnormalities in a low-risk population. *BJOG: An International Journal of Obstetrics & Gynaecology*. 1998 Jan;105(1):53-7.
12. Bucher HC, Schmidt JG. Does routine ultrasound scanning improve outcome in pregnancy? Meta-analysis of various outcome measures. *British Medical Journal*. 1993 Jul 3;307(6895):13-7.
13. Barrett JM, Brinson J. Evaluation of obstetric ultrasonography at the first prenatal visit. *American journal of obstetrics and gynecology*. 1991 Oct 1;165(4):1002-5.
14. Newnham JP, Evans SF, Michael CA, Stanley FJ, Landau LI. Effects of frequent ultrasound during pregnancy: a randomised controlled trial. *The Lancet*. 1993 Oct 9;342(8876):887-91.