

## ORIGINAL RESEARCH

# A Randomized Controlled Study to assess the Role of Routine Third Trimester Ultrasound in Low-risk Pregnancy on Antenatal Interventions and Perinatal Outcome

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## ABSTRACT

**Objective:** To assess the role of routine third trimester ultrasound in low-risk pregnancy on antenatal interventions and perinatal outcome.

**Design:** Randomized controlled study.

**Setting:** KLES Dr Prabhakar Kore Hospital and Medical Research Center, Belgaum.

**Subjects:** A total of 290 low-risk pregnant women between 34 and 37 weeks attending antenatal clinic and fulfilling inclusion criteria were allotted using computer-generated randomization numbers into study and control groups.

**Intervention:** In study group, third trimester ultrasound was performed to assess fetal growth, amniotic fluid index (AFI), malpresentations, and late onset fetal anomalies. In control group, no routine ultrasound was performed, unless indicated by clinical suspicion during subsequent visits. High-risk fetuses identified were managed as per the standard protocol. All women were followed to assess antenatal interventions, intrapartum events and perinatal outcome.

**Results:** Detection of high-risk fetuses antenatally in study and control groups was 17.25 and 2.07% respectively. This difference was statistically significant ( $p = -0.0001$ ). Rates of antenatal interventions among study and control were 24.8 and 4.44% respectively. Prevalence of small for gestational age (SGA) fetuses among study and control was 6.9 vs 11.03% respectively. This difference was not statistically significant ( $p = -0.253$ ). There was no statistical difference in adverse intrapartum events, cesarean section rate for nonreassuring cardiotocography (CTG), low Apgar score and neonatal intensive care unit (NICU) admissions among study and controls.

**Conclusion:** Routine third trimester ultrasound is a logical solution for detection of high-risk fetuses in low-risk pregnancies which would otherwise be missed by clinical examination. However, this leads to an increase in antenatal interventions without significantly influencing the perinatal outcome.

**Keywords:** Fetal growth scan, Third trimester, Low-risk pregnancy, Perinatal outcome.

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**Conflict of interest:** None

## INTRODUCTION

The role of routine third trimester ultrasound in low-risk pregnancies has been controversial<sup>1</sup> and the policies for routine third trimester obstetrical ultrasound examinations differ among countries. In Canada, a routine third trimester ultrasound scan is not offered in the low-risk pregnancy but is used selectively where there are specific clinical indications, that is, in high-risk pregnancies with known complications.<sup>2</sup> However, 80% of pregnancies are considered antenatally to be 'low-risk' and large studies in Dublin and Belfast have demonstrated that perinatal mortality is higher in the apparent 'low-risk' pregnancy than in the 'high-risk' pregnancy.<sup>3</sup>

Clinical assessment of fetal weight and amniotic fluid have sensitivities of less than 50% in the hands of most providers, leading to a high degree of false negative identification. Third trimester ultrasound can be used to detect conditions which may not be apparent by clinical examination, such as abnormalities in the fetal growth and liquor. The identification of these abnormalities followed by appropriate obstetric interventions would improve maternal and perinatal outcome. A meta-analysis in 2001<sup>1</sup> on the value of routine third trimester ultrasound concluded that routine late pregnancy ultrasound in low-risk or unselected population does not confer benefit on the mother or the fetuses. Another meta-analysis in 2008,<sup>4</sup> to re-evaluate the results of 2001 meta-analysis concluded that the previous (2001) meta-analysis included outdated techniques, and none of the studies included were designed to answer the specific question: 'Does routine third trimester ultrasound in a low-risk population, followed by an adapted perinatal management

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plan, improve perinatal outcomes?' So at present, since there are no adequately designed studies, it cannot be concluded that routine third trimester ultrasound does not improve perinatal outcome.

The meta-analysis further suggested the need for a randomized controlled trial using the current ultrasound technologies for routine third trimester ultrasound evaluation followed by appropriate obstetric interventions to answer the question raised in the meta-analysis.<sup>4</sup> This study was undertaken to answer the question raised in the meta-analysis.

## METHODOLOGY

The present study was carried out at KLE University's Teaching Hospital, Belgaum.

- *Study Design:* A randomized controlled trial.
- *Duration:* 1 year
- *Sample size:* 290

## Inclusion Criteria

- Singleton pregnancy
- Gestational age assigned by LMP and/or first trimester ultrasound and/or second trimester anomaly scan
- Normal mid trimester anomaly scan
- Gestational age between 34 and 37 completed weeks

## Exclusion Criteria

- High-risk antenatal women like gestational diabetes mellitus, cardiac disease, hypertensive disorders in pregnancy, severe anemia, intrauterine growth retardation, oligohydramnios, polyhydramnios, macrosomia, placenta previa, Rh isoimmunized pregnancy, known fetal abnormality, clinically suspected growth, liquor abnormalities and malpresentations.
- Previous intrauterine fetal deaths/early neonatal death/recurrent abortions.

## PROCEDURE

Ethical clearance was obtained. Pregnant women between 34 and 37 completed weeks of gestation attending antenatal clinic for routine antenatal checkups were screened for eligibility by a detailed history, routine antenatal examination and investigations by the trained residents in the department of obstetrics and gynecology. The eligible women were randomly allotted to the study group or the control group using a computer generated randomization chart after an informed consent.

If randomized to the study group, in addition to the routine antenatal care, ultrasound was performed using the 3.5 MHz curvilinear probe of Philips HD 11 machine, to assess fetal growth, expected fetal weight

and amniotic fluid volume by the trained obstetricians and gynecologists.

Fetal growth was assessed using the fetal parameters like biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), femoral length (FL). These values were plotted on a growth chart to obtain the centile values. Expected fetal weight (EFW) was assessed using these fetal parameters and obtained in grams and in centiles using SonoCare software. Amniotic fluid volume was quantified by the standard four quadrant technique. The values of EFW and/or AC for gestational age were categorized as follows:

- < 10th percentile, for intrauterine growth retardation (IUGR).
- 10 to 20th percentile, for borderline IUGR
- 80 to 90th percentile, for borderline macrosomia
- >90th percentile, for macrosomia

The values of AFI were categorized into five groups as follows:

- <5 cm for oligohydramnios
  - 5 to 8 cm for borderline oligohydramnios (less liquor)
  - 20 to 24 cm for borderline polyhydramnios (more liquor)
  - ≥25 cm for polyhydramnios
- borderline growth and liquor abnormalities were also noted as they could influence a change in antenatal management and pregnancy outcome. During the ultrasound evaluation, fetal malpresentations and late onset anomalies were also noted.

Any abnormalities detected on ultrasound in the study group at the time of randomization were subjected for subsequent ultrasound as indicated based on the abnormality detected. The number of subsequent scans and the indication for the scans in both the groups were noted.

No scan was offered to the patients in control group at the time of randomization. However during subsequent antenatal visits, women in the control group and women with normal ultrasound findings in the study group were subjected to ultrasound evaluation based on clinical indications only.

The high-risk fetuses thus identified were managed as per the standard management protocol by the treating obstetrician. All women were followed-up to assess antenatal interventions, events during labor and perinatal outcome.

The various antenatal interventions recorded were antenatal ward admissions, subsequent indicated scans (indication and number), antepartum fetal surveillance by daily fetal kick count, nonstress test and Doppler studies, oral glucose tolerance test (OGTT), oral and intravenous hydration therapies, external cephalic version, amnioreduction, decision for induction of labor/

C-section. Intrapartum events like nonreassuring cardiotocography (CTG), meconium stained amniotic fluid and continuous CTG monitoring were noted in all cases. The perinatal outcome of all the cases were recorded in terms of: live birth/still birth/early neonatal deaths, gestational age at delivery, birth weight, Apgar score at 1 and 5 minutes, mode of delivery, NICU admission.

## STATISTICAL ANALYSIS

The data obtained were coded and entered into Microsoft Excel worksheet. The categorical data were expressed as

**Table 1:** Antenatal detection of high risk fetuses in the study and control group

Antenatal detection of high-risk fetuses	Study group (n = 145)		Control group (n = 145)	
	Number	Percentage	Number	Percentage
Intrauterine growth retardation	3	2.07	3	2.07
Macrosomia	1	0.69	0	0.00
Oligohydramnios AFI ≤5	0	0.00	0	0.00
Less liquor AFI = 5-8	11	7.59	0	0.00
Polyhydramnios AFI > 25	2	1.38	0	0.00
Excess liquor AFI = 20-25	2	1.38	0	0.00
Malpresentations	3	2.07	0	0.00
Late onset anomalies	3	2.07	0	0.00
Total	25	17.25	3	2.07

rates, ratios and proportions, and continuous data were expressed as mean ± standard deviation (SD). The data were analyzed using Chi-square test and Fisher's exact test. A probability value (p-value) of less than or equal to 0.05 was considered as statistically significant.

## RESULTS

The prevalence of high-risk fetuses based on the criteria of growth/liquor abnormalities, malpresentations and late onset fetal anomalies, detected among the study group as 17.25% (25 out of 145) and among the control group was 2.07% (3 out of 145). This was statistically significant (p = -0.0001) (Table 1). Rates of antenatal interventions were higher among the study group (24.8%) than among the control group (4.44%). Statistically significant difference was noted in the antenatal ward admission (p = -0.029) and oral hydration therapy (p = -0.002) among the study and control group (Table 2). Adverse intrapartum event in the form of nonreassuring CTG was 4.83% in the study group and 0.69% in the control group. Meconium staining of liquor was noted in 2.76% in the study group and none in the control group. Continuous CTG monitoring was done in 4.83% in the study and none among the control group. Among the intranatal events, statistically significant difference was noted in study group only for continuous CTG monitoring (p = -0.014) (Table 3). Perinatal outcomes were measured using variables like live birth rates, gestational age at delivery, low birth weights, mode of delivery (Table 4), low Apgar scores

**Table 2:** Rates of antenatal interventions in the study and control group

Antenatal interventions	Study group (n = 145)		Control group (n = 145)		p-value
	Number	Percentage	Number	Percentage	
Antenatal ward admission	6	4.14	0	0	0.029
NST	3	2.07	0	0	0.247
Doppler	3	2.07	0	0	0.247
100 gm 3 hours OGTT	4	2.76	0	0	0.122
Oral hydration therapy	11	7.59	0	0	0.002
Total induction of labor	8	5.52	3	2.07	0.124
Induction for high-risk fetuses	4	2.76	3	2.01	1.000
IUGR fetuses	3	2.07	3	2.07	1.000
Oligohydramnios	1	0.69	0	0	1.000
Induction for postdatism	4	2.76	0	0	0.122
Subsequent indicated scans	6	4.14	1	0.69	0.500
• Determination of AFI	2	1.37	0	0.00	0.498
• IUGR	2	1.37	0	0.00	0.498
• Postdatism	1	0.69	1	0.69	1.000
• Malpresentation	1	0.69	0	0.00	1.000

**Table 3:** Intrapartum events in the study and control group

Intranatal events	Study group (n = 145)		Control group (n = 145)		p-value
	Number	Percentage	Number	Percentage	
Nonreassuring CTG	7	4.83	1	0.69	0.066
Meconium stained liquor	4	2.76	0	0.00	0.122
Continuous CTG monitoring	7	4.83	0	0.00	0.014

**Table 4:** Mode of delivery in the study and control groups

Mode of delivery	Study group (n = 145)		Control group (n = 145)	
	Number	Percentage	Number	Percentage
Vaginal	103	71.03	111	76.55
C-section	31	21.38	26	17.93
Instrumental	11	7.59	8	5.52
Total	145	100.00	145	100.00

**Table 5:** Perinatal outcomes in the study and control groups

Perinatal outcomes	Study group (n = 145)		Control group (n = 145)		p-value
	Number	Percentage	Number	Percentage	
Perinatal mortality rates	0	0.00	0	0.00	1
Mean gestational age at delivery	38.89		38.97		1
Mean birth weights	2.84 kg		2.8 kg		0.370
SGA babies with BW < 2.5 kg	10	6.90	16	11.03	0.253
Sensitivity of detection of SGA babies	30%		18.75%		0.644
APGAR at 1 min < 7	1	0.69	1	0.69	1
APGAR at 5 mins < 7	2	1.38	1	0.69	1
NICU admissions	2	1.38	0	0.00	0.498

at 1 and 5 minutes and NICU admissions. Prevalence of SGA fetuses was 6.9% among study and 11.03% among control, it was not statistically significant ( $p = 0.253$ ). There was no difference in rates of low Apgar scores and NICU admissions in both groups (Table 5). Therefore, there was no statistically significant difference noted in perinatal outcome among both the groups.

## DISCUSSION

Various trails have concluded that routine third trimester ultrasound in low-risk antenatal women does not confer benefit, but may increase interventions.<sup>1,5,6</sup> In our study, the detection of high risk fetus among the study group was 17.25% (25 out of 145) and among the control group was 2.07% (4 out of 145). This difference was statistically significant ( $p = 0.0001$ ). The rates of antenatal intervention were also significantly higher among the study group (24.8%) than among the control group (4.44%). Prevalence of SGA fetuses was 6.90% among study and 11.03% among control ( $p = 0.253$ ). This observation was similar to the Belfast study<sup>3</sup> in which rates of antenatal interventions were significantly higher among the study group (31.3%) than among the control group (16.9%) and proportion of infants assessed as SGA in the study was 6.9% compared to 10.4% in the control group.

Perinatal outcomes measured using variables like live birth rates, gestational age at delivery, low birth weights, mode of delivery, low Apgar scores at 1 and 5 minutes and NICU admissions were not statistically significant.

This finding is similar to the conclusion of 2001 meta-analysis<sup>1</sup> which stated that routine third trimester ultrasound in low-risk pregnancies does not confer benefit on the mother or the fetus. The results of another

study<sup>6</sup> also state that routine third trimester ultrasound for detection of IUGR fetuses has not significantly reduced the incidence of the most extreme cases of IUGR, perinatal or infant mortality, Apgar score <7 at 5 minutes, or the rate of C section/instrumental delivery.

## CONCLUSION

Routine third trimester ultrasound seems to be a logical solution for the detection of high-risk fetus in low-risk pregnancies which would otherwise be missed by clinical examination. Though it leads to a statistically significant increase in the identification of high-risk fetuses followed by a statistically significant increase in antenatal interventions, there is no significant improvement in perinatal outcome. Indicated third trimester ultrasound in low-risk pregnancies although leads to lesser identification of high-risk fetus and lesser antenatal interventions, the perinatal outcome is not significantly different in comparison to low-risk antenatal women undergoing routine third trimester ultrasound. Therefore, routine third trimester ultrasound in low-risk antenatal women does not improve perinatal outcome as compared to indicated third trimester ultrasound based on clinical judgment. Hence, a regular antenatal care and meticulous obstetric examination would obviate the need for routine 3rd trimester ultrasound in low-risk antenatal women.

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*A Randomized Controlled Study to assess the Role of Routine Third Trimester Ultrasound in Low-risk Pregnancy*

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