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Original Research Article

Expectant versus active management of small for gestational age pregnancies with normal Doppler parameters: an observational study

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ABSTRACT

Background: A successful pregnancy depends on the foetus developing normally, which in turn impacts the foetal health in future. While 70% of small for gestational age (SGA) babies are naturally small and safe, 30% are abnormally little and have a lesser kind of fetal growth restriction (FGR) when their Doppler measurements are normal. Despite normal Doppler at 37 weeks, clinicians often induce all SGA pregnancies, which increases the risk of iatrogenic preterm delivery and surgical treatments. The aim of this study was to assess pregnancy outcome of expectant and active management of small for gestational age pregnancies with normal Doppler parameters.
Methods: Study included pregnant women diagnosed as small for gestational age pregnancy with normal Doppler parameters between 28 and 39weeks. The study population (n=60) were divided into two groups- Group 1- Expectant management: To wait up to 39weeks for spontaneous onset of labor, if not induction at 39 weeks. Group 2 - Active management: Induction of labor at 37weeks of gestation. All study participants were followed until delivery. Maternal parameters like onset of labour, Mode of delivery were studied, fetal and neonatal parameters like Apgar score, birth weight and NICU admission were studied.
Results: Group 1 expectantly managed group had more spontaneous onset of labour compared to Group 2 which was statistically significant and higher birth weight, more vaginal deliveries and lesser NICU admissions were noted in group 1 compared to group 2.
Conclusions: We concluded that SGA pregnancies with normal Doppler parameters may be considered for elective induction at a later date for better maternal and fetal outcomes.

Keywords: Expectant management, Normal Doppler parameters, Small for gestational age pregnancy

INTRODUCTION

A successful pregnancy depends on the foetus developing normally, which in turn impacts the foetus health in the future.[1] One of the most important metrics for identifying and categorizing unfavourable health outcomes at delivery is birth weight.[2] When a live birth is referred to as small for gestational age (SGA), it means that its weight is less than the 10th percentile when compared to babies of the same sex and gestational age. Fetal growth restriction (FGR) and other forms of abnormal fetal development have been linked to adult health problems including type 2 diabetes and heart disease.[1]

The American College of Obstetricians and Gynecologists Practice Bulletin 2 states that "intrauterine growth restriction is one of the most common and complex problems in modern obstetrics.". The absence of standardized diagnostic criteria and the use of ambiguous language both contribute to the difficulty of diagnosis and treatment. Size on its own does not always mean that a problem exists. This uncertainty can lead to both under and over-intervention.[2] FGR is defined as the failure of the fetus to meet its growth potential due to a pathological factor, most commonly placental dysfunction.[3]

While 70% of SGA babies are naturally small and safe, 30% are abnormally little and have a lesser kind of fetal growth restriction (FGR) when their Doppler measurements are normal. All SGA pregnancies are classified as FGR since there are no clear criteria to distinguish between a healthy fetus and one with growth restriction. The following characteristics are used to classify an SGA fetus as FGR according to the criteria proposed by some researchers: abnormal doppler values for the uterine artery (Ut), middle cerebral artery (MCA), and umbilical artery (UA), EFW, or AC.

When it comes to healthy small fetuses and growth restriction fetuses, there are definite rules regarding time of delivery. Despite normal Doppler at 37 weeks, clinicians often induce all SGA pregnancies, which increases the risk of iatrogenic preterm delivery and surgical treatments. A higher risk of cesarean sections and infant respiratory problems are linked to inducing labor before 39 weeks. When planning a delivery for a woman carrying an SGA baby, it is essential to weigh the risks of premature birth against those of intrauterine fetal mortality. Intrauterine fetal mortality is not a danger in healthy, petite SGA pregnancies. Thus, it would be advantageous to deliver these fetuses late so that labor induction and, by extension, the rate of cesarean sections, might be reduced.[4]

METHODS

This hospital-based prospective observational study was conducted in the department of Obstetrics and Gynecology at Mahatma Gandhi Medical College and Research Institute after obtaining approval from the Institutional Human Ethics Committee.

Inclusion criteria

Inclusion criteria was antenatal women aged 18-35 years diagnosed as small for gestational age with normal Doppler parameters between 28 and 39 weeks of gestation.

Exclusion criteria

Exclusion criteria were antenatal women with gestational hypertension, overt diabetes mellitus and cases of previous cesarean section.

Sample size was calculated based on the article Outcome of expectantly managed small for gestational age pregnancies with normal Doppler parameters by Mishra et al, where the alpha type 1 error rate is 0.01 and the beta value is 10%. The total sample size was calculated to be 60.

The participants were evaluated by obtaining demographic details like age, parity, detailed antenatal history, clinical examination, and USG findings. A growth scan with Doppler estimation was done by an experienced obstetrician. Abdominal circumference <10th centile or estimated fetal weight less than 10th centile, was diagnosed as small for gestational-age pregnancies. Once they were diagnosed with SGA pregnancies with normal Doppler parameters, mothers were randomized into 2 groups: Group 1 and Group 2. Group 1: Expectant management: To wait up to 39 weeks for spontaneous onset of labor, if not induction of labor at 39 weeks. Group 2: Active management: induction of labor at 37 weeks. All study participants were followed until delivery. The maternal parameters studied were- onset of labor and mode of delivery. The fetal/neonatal parameters studied were- Apgar Score, birth weight and NICU admission.

All the data were collected in a pro forma sheet and entered in an Excel sheet (MS Excel 2019). Participation in the study was voluntary, and they were free to withdraw from the study at any point in time without giving reasons and without any loss of medical care. All eligible participants were informed about the study and its objectives. Written informed consent of those willing to participate was obtained in the consent form. All details were kept under strict confidentiality, and participants were assured of the same. Statistical analysis is done using the statistical package for social services, version 21. Chi-square tests are used to measure non-parametric measurements like parity, onset of labor, mode of delivery, Apgar score, and need for NICU admission. Mean and standard deviation are used to describe continuous variables like age, birth weight, and agar score. Microsoft Word and Excel are used to generate graphs and tables. Bar diagrams were used for graphical representation of data.

RESULTS

The mean age for Group 1 is 25.27 years with a standard deviation of 3.88, while the mean age for Group 2 is 24.50 years with a standard deviation of 3.95. The mean difference in age between the two groups is 0.77 years. For parity, 83.33% of Group 1 were primigravida compared to 90.00% in Group 2, while 16.67% of Group 1 were multigravida compared to 10.00% in Group 2.

The mean gestational age for Group 1 is 273.77 days with a standard deviation of 3.14 days, while the mean gestational age for Group 2 is 262.93 days with a standard deviation of 3.10 days. The mean difference in gestational age between the two groups is 10.83 days. The t-test value is 13.46, with a p value of less than 0.001, indicating a statistically significant difference in gestational age between the two groups. The mean estimated fetal weight (EFW) by USG for Group 1 is 2.64 kg with a standard deviation of 0.23 kg, while for Group 2, it is 2.41 kg with a standard deviation of 0.26 kg. The mean difference in EFW between the two groups is 0.22 kg.

For the mode of onset of labor, 36.67% of Group 1 had a spontaneous onset of labor compared to 0% in Group 2. Induced onset was observed in 63.33% of Group 1 and 100% of Group 2. The p value is less than 0.001, indicating a statistically significant difference in the mode of onset of

labor between the two groups (Table 1). For the mode of delivery, 70.00% of Group 1 had a vaginal delivery, compared to 63.33% in Group 2. LSCS was performed in 30.00% of Group 1 and 33.33% of Group 2. Instrumental delivery was not performed in Group 1 but was performed in 3.33% of Group 2. The p value is 0.562, indicating no statistically significant difference in the mode of delivery between the two groups, though higher number of vaginal deliveries were noted in the expectant group (Table 2).

Table 1: Comparison of mode of onset of labor between the groups.

Mode of onset of labor	Group 1 N (%)	Group 2 N (%)	P value
Spontaneous	11(36.67)	0 (0.00)	<0.001
Induced	19 (63.33)	30 (100.00)	

Table 2: Comparison of mode of delivery between the groups.

Mode of delivery	Group 1 N (%)	Group 2 N (%)	P value
Vaginal	70 (70.00)	19 (63.33)	0.562
LSCS	30 (30.00)	10 (33.33)	
Instrumental	0	1 (3.33)	

The mean birth weight for Group 1 is 2.71 kg with a standard deviation of 0.28 kg, while for Group 2, it is 2.49 kg with a standard deviation of 0.26 kg. The mean difference in birth weight between the two groups is 0.22 kg. The t-test value is 3.09, with a p value of 0.0031, indicating a statistically significant difference in birth weight between the two groups (Table 3).

Table 3: Comparison of birth weight between the groups.

Birth weight (kg)	Mean	Standard deviation	Mean difference	t	P value
Group 1	2.71	0.28	0.22	3.09	0.0031
Group 2	2.49	0.26			

For Apgar scores, 96.67% of Group 1 had scores of 8/10 or 9/10, compared to 100.00% in Group 2. A score of 7/10 and 9/10 was observed in 3.33% of Group 1 and none in Group 2. The p value is 0.313, indicating no statistically significant difference in Apgar scores between the two groups. For baby status, 90.00% of babies in Group 1 were with the mother, compared to 83.33% in Group 2. NICU observation was required for 10.00% of babies in Group 1 and 16.67% in Group 2. The p value is 0.448, indicating no statistically significant difference in baby status between the two groups, though higher number of babies required NICU observation in active management group (Table 4).

Table 4: Comparison of baby status between the groups.

Baby status	Group 1 N (%)	Group 2 N (%)	P value
Mother's side	27 (90.00)	25 (83.33)	0.448
NICU observation	3(10.00)	5(16.67)	

DISCUSSION

Birth weights below the 10th percentile for gestational age are characterized as small for gestational age (SGA). Two main groups are there, first group consists of babies. Who are born with a low birth weight because of fetal growth restriction (FGR), while the second group consists of babies that are born with a low birth weight because of variables such mother height, weight, and ethnicity. While many SGA infants also have FGR, and vice versa, they are not synonymous terms because FGR can occur in infants with birth weights above the 10th percentile. The prevalence of FGR leading to SGA is approximately 11% in high-income countries such as the United States and Australia. In contrast, in low and middle-income countries, an estimated 32.5 million infants are born FGR annually, with the majority in South Asia (53%). Various factors contribute to FGR, encompassing fetal, maternal, uterine/placental, and demographic influences. Research indicates that around 80% of newborns with FGR SGA achieve catch-up growth and reach a normal size by nine months of age. Prematurity, newborn asphyxia, hypothermia, hypoglycemia, hypocalcemia, polycythemia, sepsis, and death are among the difficulties that babies with FGR-SGA encounter, despite the possibility of catch-up growth. Fetal growth restriction (FGR) without aberrant uterine or umbilical artery blood flow patterns is seen in a substantial percentage of SGA pregnancies with normal Doppler measurements. Epidemiologically, the incidence of SGA pregnancies varies globally, influenced by factors such as maternal age, parity, socioeconomic status, ethnicity, and maternal health conditions.[5]

In this research, we compare and contrast the results of active and expectant management techniques for pregnancies with fetuses that are small for gestational age (SGA) and have normal Doppler indicators. The study specifically examines the differences in outcomes between expectant management (Group 1) and active management (Group 2) approaches for these pregnancies.

Our study compared the age distribution between two groups undergoing different management strategies for small for gestational age (SGA) pregnancies. Group 1, managed expectantly with potential induction at 39 weeks, had a mean age of 25.27 years, while Group 2, managed actively with induction at 37 weeks, were 24.50 years old

on average. At 0.77 years, there was no statistically significant difference in mean age between the groups (p = 0.4509). This suggests that age was evenly distributed between the groups, minimizing age related confounding factors. Moreover, it supports the interpretation of outcomes related to both maternal and neonatal health within the context of the management strategy chosen for SGA pregnancies. Groups 1 and 2 did not vary significantly from one another in terms of our study's parity distribution. Most patients in both groups were primigravida (83.33% in Group 1 vs. 90.00% in Group 2, P = 0.448). Multigravida patients were 16.67% in Group 1 and 10.00% in Group 2. This parity distribution helps in understanding the demographic similarities between the groups, reducing potential biases related to parity. This strengthens the validity of comparing outcomes between expectant and active management strategies for SGA pregnancies, supporting more informed clinical decision-making.

Researchers Bond et al found among 459 women in one experiment, the average gestational age at birth was 10 days earlier in the group that was randomly assigned to early delivery (mean difference (MD) -9.50, 95% CI -10.82 to -8.18). Not only that, one experiment including 33 women found that the early delivery group had a much decreased risk of having a baby more than 40 weeks along in the gestational period (RR 0.10, 95% CI 0.01 to 0.67). There was an increase in the need to admit newborns to the intermediate care nursery among those whose deliveries were scheduled for early (RR1.28, 95% CI 1.02 to1.61, two trials, 491 infants). The following outcomes were not significantly different: number of trials, number of infants at risk of respiratory distress syndrome (333 in total), number of infants with an Apgar score below seven at five minutes, number of infants requiring resuscitation, number of infants on mechanical ventilation, number of infants admitted to a neonatal intensive care unit (NICU) (RR 0.88, 95% CI 0.35 to 2.23, 337 in total), length of stay in the NICU (one in total), and the incidence of sepsis (two trials in total).[6] Similarly, in our study, significant differences were found in gestational age between Group 1 (expectant management) and Group 2 (active management). Group 1 had a mean gestational age of 273.77 days compared to 262.93 days in Group 2, with a mean difference of 10.83 days (p<0.001). This difference aligns with the study design, where Group 2 underwent earlier induction at 37 weeks, impacting gestational age outcomes significantly. According to Mishra et al, there was a notable rise in the gestational age at delivery, with a difference of 39.57±0.71 weeks compared to 37.0±0.0 weeks.[7]

In our study, estimated fetal weight (EFW) by ultrasound significantly differed between the groups (p = 0.0007), with Group 1 having a higher mean EFW (2.64 kg) compared to Group 2 (2.41 kg). This finding suggests that expectant management might influence fetal growth differently compared to active management, influencing clinical decisions regarding the timing of delivery. This disparity suggests that the approach of expectant management may exert varying influences on fetal growth compared to active management strategies. Consequently, these findings prompt healthcare providers to carefully consider the timing of 41 delivery based on EFW assessments, highlighting the potential impact of management strategies on fetal development and clinical decision-making. The birth weight was greater in expectant management (2426.5±154.1 gm vs 2297.9±101.4 gm, p value <0.001) in another research that was comparable to this one.[7]

The inability of a developing fetus to reach its full developmental potential while still within the mother's body is known as intrauterine growth restriction (IUGR). There is a pathogenic process separate from just classifying a fetus as small-for-gestational age (SGA), since this disease might develop due to maternal, fetal, or placental causes. When IUGR is detected during pregnancy, however, it might be difficult to tell it apart from SGA., as it commonly refers to a fetus classified as SGA based on sonographic measurements such as abdominal circumference or estimated weight, typically falling below the 10th percentile for its gestational age, as concluded in a study by Maulik et al.[2]

In our study, significant differences were observed in the mode of onset of labor between the groups (p<0.001). Group 2 had 100% induced onset compared to 63.33% in Group 1, reflecting more planned intervention in Group 2 compared to more spontaneous onset of labor in Group 1. Conversely, expectant management may be considered in cases where allowing the spontaneous onset of labor is feasible and aligned with maternal and fetal wellbeing, thereby potentially reducing unnecessary interventions.

In our study, birth weight significantly differed between Group 1 (2.71 kg) and Group 2 (2.49 kg, p=0.0031), indicating the potential impact of management strategy on fetal growth and outcomes. Group 1, with expectant management, showed higher birth weights on average compared to Group 2. Expectant management may be associated with higher rates of spontaneous vaginal deliveries; active management can lead to increased rates of induced or augmented labor, potentially influencing the mode of delivery. Healthcare providers weigh these factors carefully to optimize outcomes for both the mother and the baby during childbirth.[8]

In the DIGITAT Trial, infants in the expectant monitoring group gained an average of 130 g over the approximately 10 more days of gestation compared to the induction group, as noted by Boers et al, who found that the expectant monitoring group had a higher median birth weight. The majority of the infants in that study likely had birth weights below the 10th percentile, although some may have been naturally tiny rather than growth-restricted. newborns with growth restrictions may suffer from intrauterine malnutrition and slowed development, in

contrast to tiny newborns who are constitutionally capable of growing to term.[9]

In our study, the mode of delivery did not significantly differ between the groups (p=0.562). Vaginal deliveries were predominant in both groups, with similar rates of cesarean sections and instrumental deliveries, suggesting comparable delivery outcomes despite different management strategies. Indications for interventions showed no significant differences between the groups, with various medical reasons for intervention distributed similarly across both groups (p>0.05). Hidaka et al reported that GA at delivery was notably lower in the labor induction group (38+1 weeks) compared to the expectant management group (39+4 weeks), with a p value of less than 0.01. A tendency toward greater cesarean birth rates was seen in the labor induction group (10% vs. 2%, non-significant), however there was no significant difference in rates of instrumental or vaginal deliveries between the two groups. However, neonatal outcomes showed significant disparities. The labor induction group had significantly higher rates of neonatal intensive care unit (NICU) admissions (24% vs. 3%, p<0.01), hypoglycemia (32% vs. 14%, p=0.03), and hyperbilirubinemia (30% vs. 11%, p=0.02) compared to the expectant management group. This was also reported by Mishra et al and other studies that proved that AC between the 3rd and 10th centiles can be considered normal fetal Doppler parameters and can be expected to be a safe pregnancy outcome.[9,10,8,11]

The findings of this study align with previous literature to a large extent, confirming that active management of SGA pregnancies at 37 weeks significantly impacts gestational age, birth weight, and mode of onset of labor compared to expectant management until 39 weeks. The observed differences in gestational age and birth weight are consistent with studies advocating for early intervention to mitigate risks associated with SGA pregnancies, such as fetal distress and suboptimal growth outcomes.[11]

In this study, NICU admission rates were slightly higher in Group 2. This finding implies that the management strategies employed in Group 1 (expectant management) and Group 2 (active management) may not have a substantial impact on the need for neonatal intensive care, highlighting the importance of monitoring and managing other clinical factors affecting neonatal health outcomes.

More infants in the induction group needed critical care owing to their inevitably low birth weight, as found by Boers et al.[12] Sengupta and colleagues conducted a population-based retrospective cohort study, figuring out that premature babies are more likely to have hypoglycemia and need to be admitted to the neonatal ICU.[13]

However, while this study demonstrated significant differences in gestational age and birth weight, other parameters like maternal age, parity, and antenatal complications showed no significant differences between expectant and active management groups, suggesting that these factors do not necessarily influence the choice of management strategy but rather reflect demographic and clinical heterogeneity within the patient cohort.

Until 40 weeks of gestation, there was no statistically significant difference in the risk of unfavorable outcomes between expectant management and induction for term intrauterine growth-restricted newborns, according to the DIGITAT study. Fetal and maternal outcomes after induction of labor are equivalent to those of the expectant. Clinicians interested in expectant management should keep a careful eye on the continuing pregnancy, since there is a theoretical case in favor of induction that it could prevent intrauterine fetal mortality.[9] Further, for small-for-gestational-age fetuses with normal Dopplers, the American College of Obstetricians and Gynecologists advises delivery between 38 and 39 6/7 weeks.

CONCLUSION

In the present study, we observed that more number of SGA pregnancies went into spontaneous onset of labor in expectantly managed group as well as had higher birth weight of neonates which was statistically significant. Higher number of vaginal deliveries and NICU observation for babies were also noted in the study group though it was not statistically significant. Therefore, we conclude that SGA pregnancies with normal Doppler parameters may be considered for elective induction at later date for better maternal and fetal outcomes.

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