

Maternal and Perinatal Outcomes of Induction of Labour in Oligohydramnios at Term - A Cross Sectional Study

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KEYWORDS

Oligohydramnios, term, induction of labour, mode of delivery, NICU admission

ABSTRACT

Background: Oligohydramnios is decreased amniotic fluid index of less than 5cm. It is associated with increased risk of fetal growth restriction, meconium aspiration syndrome, fetal distress necessitating early delivery. Many researchers concluded that induction of labour for oligohydramnios frequently led to caesarean section and operative delivery and neonates had higher neonatal intensive care unit admissions for respiratory distress.

Objective: To study the maternal and neonatal outcomes in women with oligohydramnios at term following induction of labour.

Materials and Methods: A prospective cross sectional study performed in a tertiary level healthcare setting in rural South India between April 2021 and July 2022. 150 women with singleton pregnancy with oligohydramnios at term (37 - 42weeks) who satisfied inclusion criteria were included. Women planned for elective caesarean section, conditions which precluded vaginal delivery, prelabour rupture of membranes, anomalous fetus, multiple pregnancy and maternal complications were excluded. Labour was induced and maternal and neonatal outcomes were recorded and appropriate statistical analysis was done using SPSS version 20 (trial version).

Results: The mean gestational age at recruitment was 38weeks 6 days \pm 5days and mean induction to delivery interval was 15.68 \pm 7.51 hours. Most (64.7 %) delivered vaginally. 8.7 % had postpartum hemorrhage, 14.7 % had meconium staining of amniotic fluid. Only one neonate had Apgar less than 7 at 5 minutes. Neonatal intensive care unit admissions were commonly due to neonatal distress and average length of stay was 2.29 \pm 0.5 days.

Conclusion: This study showed that labour induction in oligohydramnios at term resulted in more vaginal delivery rates and few maternal and neonatal complications emphasizing an increased intra-partum surveillance in view of the risk of meconium staining of amniotic fluid and non-reassuring fetal heart tracings to avoid adverse perinatal outcomes.

1. Introduction

Amniotic Fluid is an important constituent of pregnancy and helps normal fetal development and in protecting fetus from trauma, maintenance of body temperature and development of musculoskeletal system by permitting fetal movements and in development of intestinal tract of fetus. Swallowing of amniotic fluid also provides vital nutrients to fetus. ^[1] The volume of amniotic fluid varies with gestational age, rising to a plateau of 700-800ml between 22-39 weeks of gestation, equivalent to an amniotic fluid index of 14-15 cm. ^[2,3] Any decrease or increase in the volume of amniotic fluid leads to pregnancy complications. ^[4]

An AFI of less than 5 cm is termed as oligohydramnios. Etiologies include prelabour rupture of membranes, congenital anomalies, fetal growth restriction, post datism, drugs, abruptio placentae, abnormalities due to multifetal gestation, severe maternal illness and idiopathic oligohydramnios. Decrease in amniotic fluid volume has been correlated with increased risk of FGR, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores, congenital abnormalities and even intrauterine fetal death. Prolonged oligohydramnios from early pregnancy can lead to pulmonary hypoplasia and fetal compression syndrome.

Diagnosis of oligohydramnios should prompt a detailed fetal evaluation using ultrasound, with a focus on the fetal genitourinary tract and free amniotic bands. Its incidence varies from 1-5% at term. ^[5] Many researchers concluded that induction of labour for oligohydramnios frequently led to caesarean section and operative delivery, commonly for fetal distress and such neonates had higher neonatal

intensive care unit admissions for respiratory distress. [6,7,8,9,10]

Hence, this study was aimed to learn the effect of induction of labour in women with oligohydramnios at term, on the maternal and neonatal outcomes.

Aim:

To study the effects of induction of labour on the maternal and neonatal outcomes in women with oligohydramnios at term.

Objectives:

To determine the prevalence of oligohydramnios at term.

To estimate the caesarean section rates in women with oligohydramnios, when labour was induced at term.

To determine the induction to delivery interval among these patients, when labour was induced by different methods.

To estimate the percentage of neonates born with low Apgar scores among these women.

To determine the neonatal intensive care unit admission rate among these women.

2. Materials and Methods

A prospective cross sectional study was conducted among pregnant women presenting to Department of Obstetrics and Gynaecology in a tertiary level healthcare setting in rural South India between April 2021 and July 2022. Sample size of 147 was obtained by using prevalence of oligohydramnios as 25% from previous study by simple random sampling. AFI measurement done during their regular antenatal visit with Conventional gray scale ultrasound (Versana balance) with curvilinear transducer probe of 2.0 – 5.0 MHz.

After obtaining written and informed consent, 18 to 35 years of singleton antenatal women between 37 to 42weeks of gestational age with AFI ≤5cm, fetus in cephalic presentation and bishop’s score <6 were included. Women planned for elective caesarean section, conditions which precluded vaginal delivery, prelabour rupture of membranes, anomalous fetus, multiple pregnancy, abnormal lie and presentation and maternal complications were excluded. After ruling out contraindications for induction of labour, induction with either Foley’s catheter or intracervical PGE2 gel or PGE1 or augmentation with oxytocin was done and maternal and neonatal outcomes were recorded in a predesigned proforma.

The data collected was tabulated using Microsoft excel spreadsheet. Results was compiled as frequency, mean ± SD and analyzed using SPSS version 20 (trial version) for 150 sample size.

3. Results

Table 1: Basic distribution of participants

| Basic characteristics | Percentage | Mean ± SD |
|---|------------|-----------------------|
| Age(21-25years) | 42.7% | 25.61±3.78 |
| Obstetric score(P0) | 76.7% | |
| Gestational age (37-37 ⁺⁶ weeks) | 30% | 38weeks 6 days± 5days |
| Risk factors(uncomplicated) | 63.3% | |
| AFI (4.1-5cm) | 94% | |
| FGR associated | 14.7% | |

Among 150 term study participants, 42.7% were aged between 21 and 25 years with a mean age group of **25.61±3.78 years**. 76.7% were nulliparous. 30% participants at the time of induction of labour was 37-37⁺⁶ weeks with 38weeks 6 days± 5days as mean gestational age. The most commonly associated maternal risk factor was hypothyroidism and fetal risk factor was fetal growth restriction (FGR). **94% (n=141)** of patients had an AFI of **4.1-5cm**.

Induction was begun with either intracervical Foley’s balloon or PGE2 gel followed by PGE1, ARM and oxytocin, in that order as necessary for satisfactory progress of labour. It was observed that most of the patients (66%) needed only PGE2gel induction for labour without use of any other additional agents (n=99; 66%),

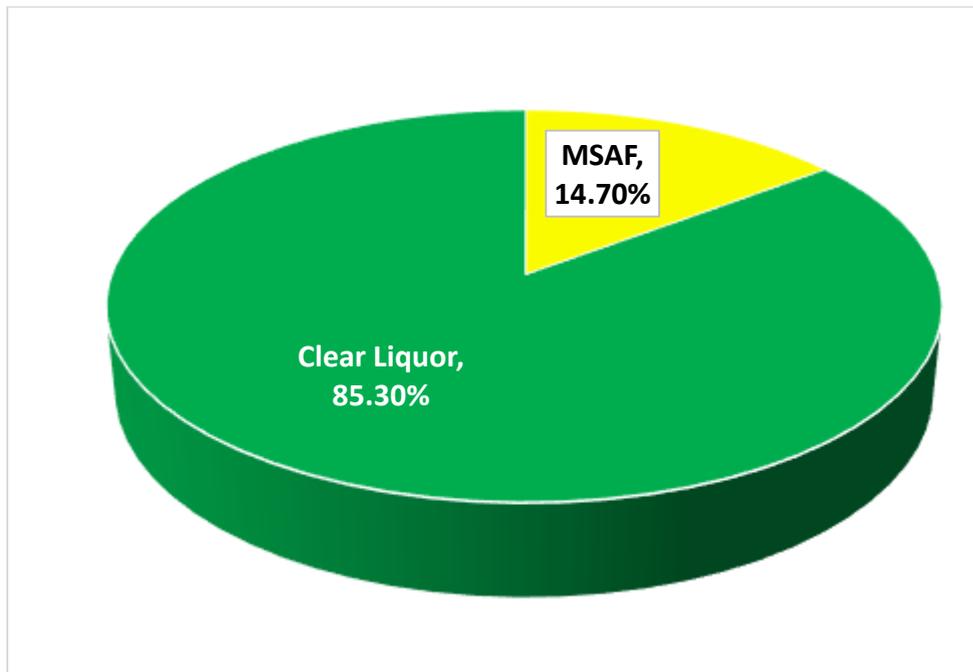


Figure 1: Meconium stained amniotic fluid among the study participants

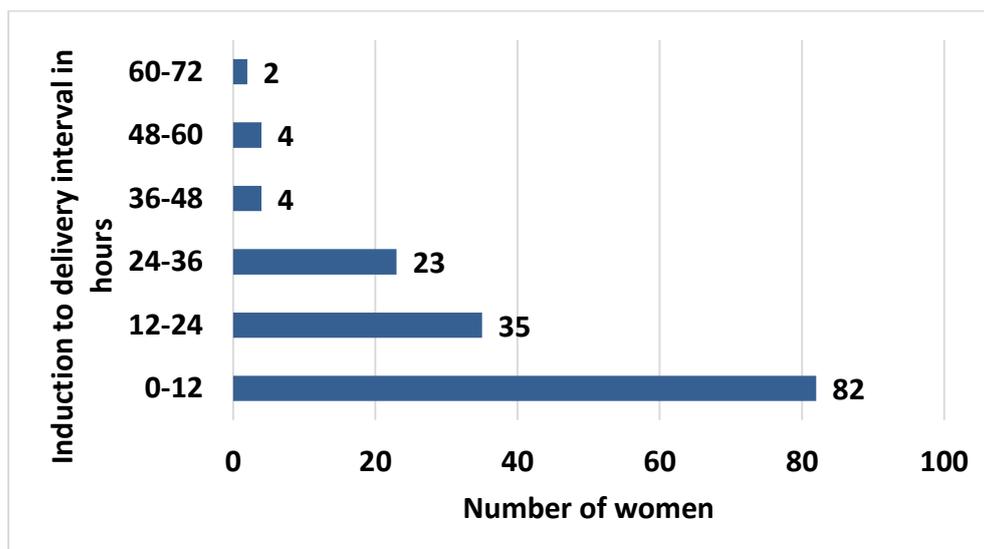


Figure 2: Induction to delivery interval among the study participants

Amniotic fluid was found to be meconium stained in 14.7% (n=22) of the study participants. More than half of the patients (54.6%) delivered within 12 hours from induction of labour, with a significant number of women (n=36) delivering within 6 hours of induction (24%).

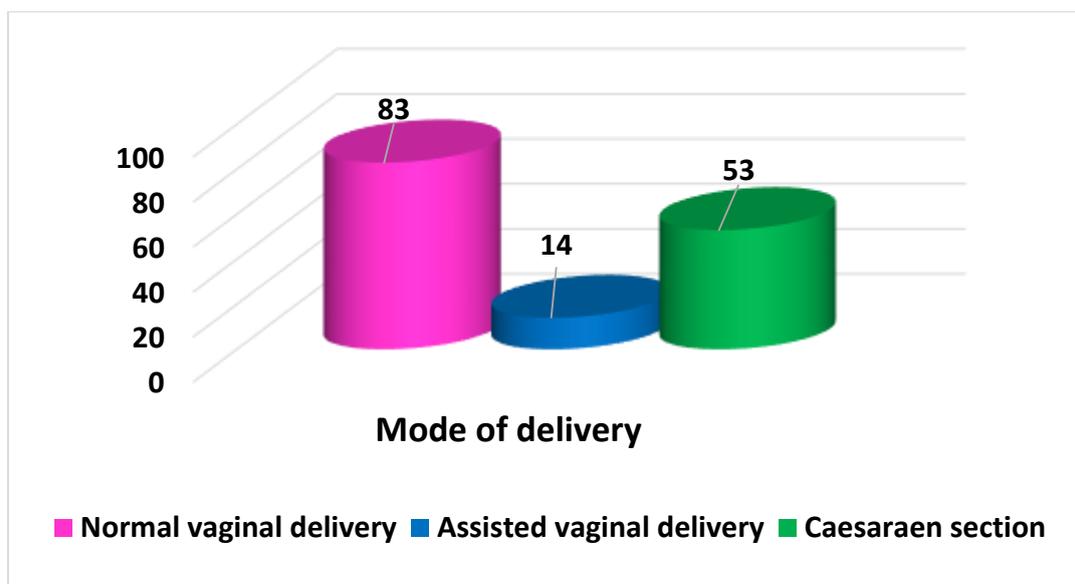


Figure 3: Mode of delivery among the study participants

Table 2: Indication for LSCS among study participants

| Indication | N (%) |
|-----------------------------|-----------|
| Fetal distress | 33 (62.2) |
| Maternal request | 8 (15.0) |
| Cephalopelvic disproportion | 4 (7.5) |
| MSAF in early labour | 4 (7.5) |
| Failed induction | 1 (2.2) |
| Arrest of descent | 3 (5.6) |

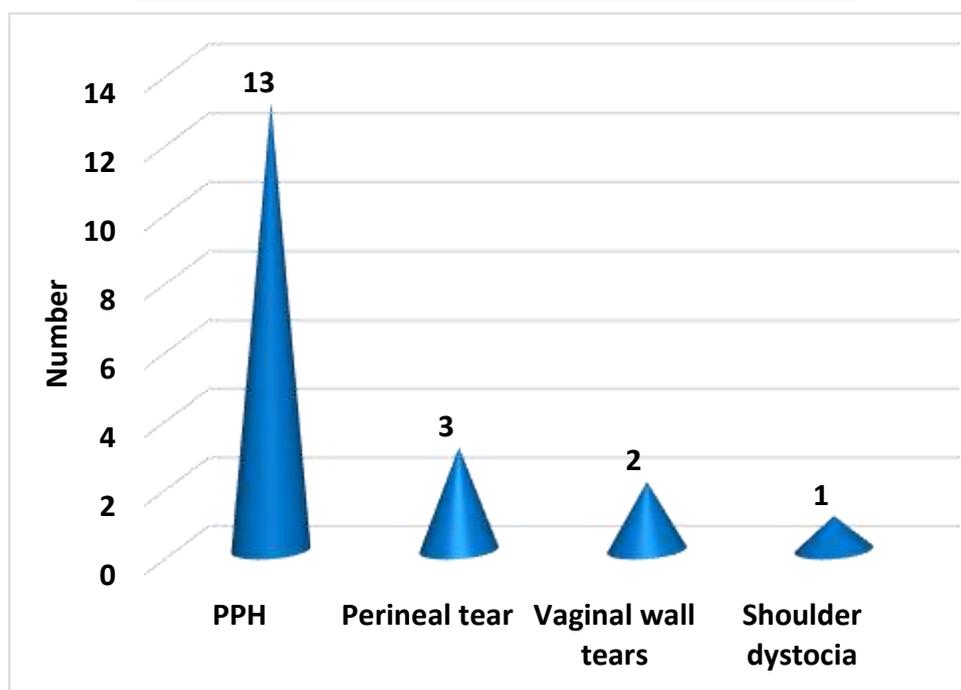


Figure 4: Maternal complications encountered among study participants

Most of the women delivered vaginally (64.7%, n=97). Vacuum assisted vaginal deliveries were 12 (8%) and by forceps application were 2 (1.3%). The caesarean section rate in the study participants was found to be 35.3% (n=53) and the most common indication was fetal distress. Post-partum hemorrhage was the most common complication encountered.

Neonatal outcomes: Among the babies born to the study participants, majority (82%) were found to be appropriate for gestational age (AGA) with an Apgar scores of less than 7 at 1 minute was seen in 12 neonates (8%) and less than 7 at 5 minutes was seen in only one neonate (0.6%). Neonatal intensive care unit (NICU) admissions were required for 26 of the 150 neonates mostly for respiratory distress which lasted for 24-72hours, while majority of the neonates (82.7%) did not require admission to NICU. The mean length of stay in NICU was 2.29 ± 0.5 days.

Table 3: Birth weight in accordance with gestational age

| Category | N (%) |
|---------------------------------------|----------|
| Small for gestational age (SGA) | 27 (18) |
| Appropriate for gestational age (AGA) | 123 (82) |
| Large for gestational age (LGA) | 0 |

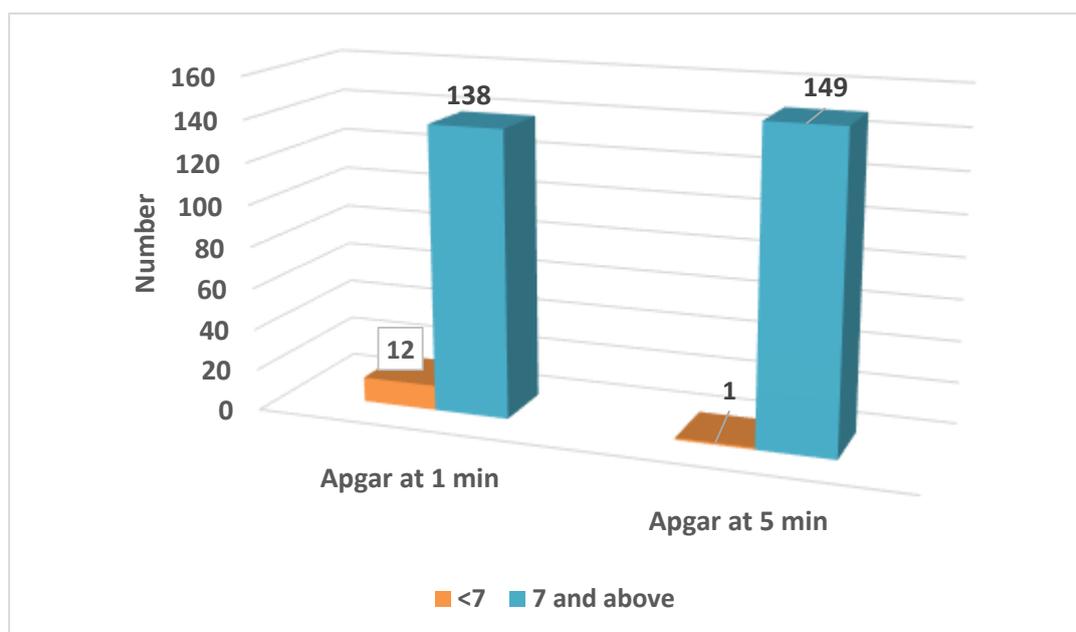


Figure 5: Neonatal Apgar scores for babies born to study participants

Table 4: Distribution based on NICU admissions

| Outcome | N (%) |
|-------------------|------------|
| NICU admission | 26 (17.3) |
| No NICU admission | 124 (82.7) |

Table 5: Indications for NICU admission

| Indication | N (%) |
|---------------------------|------------|
| Respiratory distress | 23 (88.46) |
| Small for gestational age | 3 (11.54) |

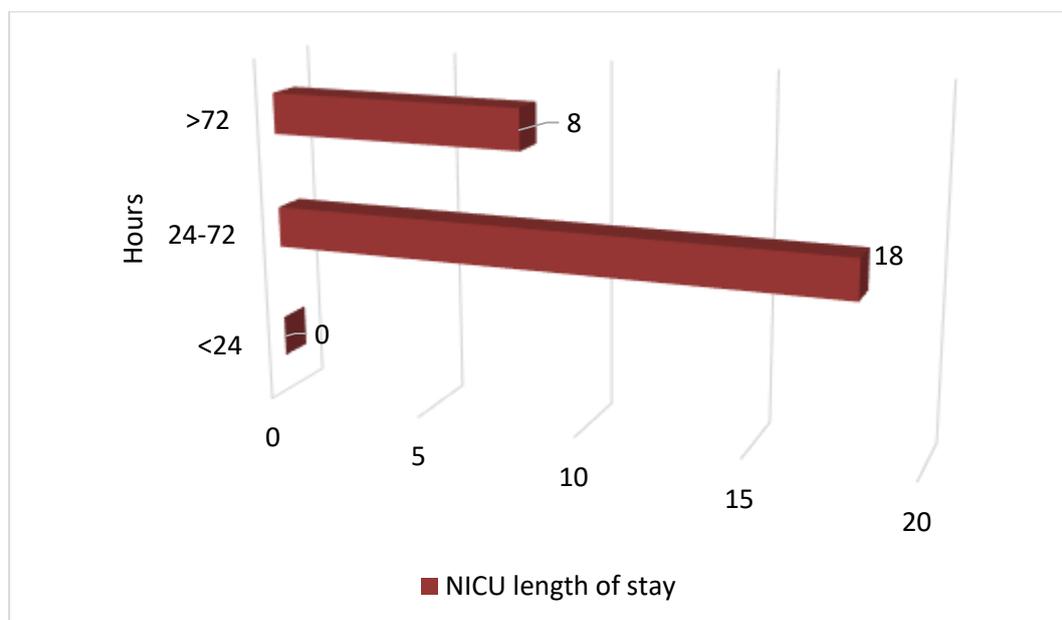


Figure 6: NICU length of stay among NICU admissions

4. Discussion

This was a cross sectional study conducted in Department of Obstetrics and Gynaecology in a tertiary care teaching hospital setting in rural South India for a period of 1.5 years. Most of the participants were aged between 21 to 30 years (82.7%), were nulliparous (76.7%) and between 37 and 37+6 weeks of gestation at the time of induction of labour. None of the participants were beyond 41 weeks of gestation.

Oligohydramnios with isolated oligohydramnios was seen in 95 of the 150 participants (63.3%). This proportion of isolated oligohydramnios was consistent with that found in other studies 79.4 % in the study by Tahmina et al and 63.3 % by Whelan et al. ^[11,12]

Induction to delivery interval among the study participants ranged between one hour and 72 hours with a mean \pm SD of 15.68 ± 7.51 hours in the present study. This duration was similar (17.45 ± 8.70 hours) to a retrospective study irrespective of the method of induction used, as in our study. ^[11] However, the induction delivery interval was reported to be longer at 21.76 ± 4.49 hours and 24.98 ± 14.92 hours in two other studies where PGE2 gel was used for induction of labour in contrast to the present study. ^[13,14] Kawakita et al reported a shorter induction to delivery interval or around 12 hours in both their study groups- induced with PGE1 or with PGE2, with no significant difference between the two groups. ^[15] Amniotic fluid was found to be meconium stained in 14.7% in the present study, and 20% in the study by Amir et al. ^[16]

In the present study, 64.7% women delivered vaginally, with similar vaginal delivery rates varying from 60 to 75% reported by various authors who studied induction of labour in oligohydramnios at term, ^[11-13] with some reporting specifically higher vaginal delivery rates when induced with PGE2. ^[15,17] Whelan et al in their study compared outcomes between 171 patients who had fetuses with isolated oligohydramnios and 99 patients who had fetuses with oligohydramnios and FGR and concluded that majority of patients in both groups (68.2%) had a vaginal delivery regardless of the method used for induction. The vaginal delivery rates were not affected by presence or absence of FGR. ^[12]

The caesarean section rate in the study participants was found to be 35.3% with the most common indication for caesarean section being fetal distress (62.3%). Venturini et al presented a similar outcome of 38.3% which was similar to the present study. ^[14] H.Kansu-Celik et al., also reported a

40% caesarean section rate, with the most common indication being fetal distress similar to the present study. ^[13]

Maternal complications were reported by many authors. In the present study, PPH was the most common complication encountered (8.6%), in contrast with 2.5% reported by H. Kansu-Celik et al. They studied a small sample of 40 women with oligohydramnios, which could be the reason for the difference in the complication rates. Most authors reported no significant maternal complications when labour was induced in women with oligohydramnios at term, ^[18] as in the present study where 87.3% women had no complications. Post-partum hemorrhage was the most common among the maternal complications as in other similar studies, but the incidence was low in most studies ranging from 1 to 5 % ^[11,13,15,19,20]

The Apgar score of neonates of less than 7 at 5minutes was 0.6% in the present study while it was 0.5% in the study by Tahmina et al. and higher in the study by Kansu-Celik et al (4.81%). ^[11,13,15] NICU admission rate was 17.3% in the present study, while it was found to be 10%, 6.7% and 6.6% in other studies. ^[11,15,16] Most of the admissions were for respiratory distress at birth. The NICU length of stay was more than 72 hours in about 5% ^[15,16] versus 30% in the present study. Higher NICU admission rates and NICU length of stay compared with other studies could be attributed to variability in clinical practice in terms of the criteria for NICU admission and discharge from NICU.

A systematic review and meta-analysis of 12 studies up to May 2015 by Shrem et al, performed to study outcomes in isolated oligohydramnios at term found at least a seven times higher odds of labour induction, two times the odds of caesarean section and higher rates of an Apgar score <7 at 1 and 5 min and admission to the NICU with no significant difference in meconium staining of amniotic fluid or cord pH of <7.1 at birth, among women with isolated oligohydramnios (6.7% of the study population) when compared with controls having a normal amniotic fluid index. ^[21] Hence the variation in induction rates among studies from various parts of the world. ^[22]

Several authors have reported comparable outcomes between isolated oligohydramnios and those associated with other risk factors, while some authors have reported comparable outcomes between induction of labour and conservative management for oligohydramnios at term. One study concluded that induction of labour with PGE2 gel does not shorten the induction to delivery interval and actually increases the caesarean section rate in these women. This conclusion may have been affected by a small sample size (n=40) of women with oligohydramnios that were studied. ^[13] Overall, the maternal and neonatal complications reported in various studies have not been statistically significant and hence it appears that induction of labour is a safe option for women with oligohydramnios at term. ^[11,13,14,16,17]

Various induction methods have been studied and some researchers have reported a slightly higher complication rate with PGE2 gel induction compared with other methods, although this may not have been statistically significant. It is also worth noting that among the various induction methods, PGE2 gel induction seems to have a shorter induction to delivery interval and higher vaginal delivery rates. ^[13,14,17]

5. Summary and Conclusion

Oligohydramnios, whether isolated or associated with other risk factors, when detected at term is an important indication for induction of labour. When labour was induced at or after 37 weeks, irrespective of the method of induction of labour, vaginal delivery rates were high with fetal distress being the most common indication for resorting to a caesarean delivery. There were very few maternal complications in these women. Most of the neonates were born appropriate for gestational age. Low Apgar scores in such neonates was found to be rare and most NICU admissions were for respiratory distress with an average NICU length of stay of around two days.

An increased intra-partum surveillance would be required in view of the risk of meconium staining of amniotic fluid and higher rates of non-reassuring fetal heart tracings/fetal distress in such women to avoid adverse perinatal outcomes.

6. Limitations

The present study did not include a control group of women with normal AFI and hence comparisons could not be drawn. The maternal and neonatal complications were not significant as the sample size was small. A larger sample size would have been able to increase the confidence in our observations.

The present study included all those women whose labour was induced in view of oligohydramnios at term, irrespective of the method of labour induction. A larger sample size with comparable numbers in the induction-method specific groups would have helped in providing better insight and probable recommendations of the best mode of induction with least complications.

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