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Original Research Article

A study on fetomaternal outcomes in term pregnancies with isolated oligohydramnios

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ABSTRACT

Background: Isolated oligohydramnios at term is still a matter of controversy among obstetricians, since there is conflicting evidence as to its effect on maternal and neonatal outcomes. The present study looked at the fetomaternal outcomes in term pregnancies which were complicated by isolated oligohydramnios.

Methods: A prospective observational study was conducted among 350 pregnant women with singleton term pregnancies (37–40 weeks) diagnosed with isolated oligohydramnios (amniotic fluid index (AFI) $\leq$ 8 cm) at a tertiary care hospital in Puducherry, India. Women with maternal and fetal comorbidities, congenital anomalies, pre-labour rupture of membranes or intrauterine fetal demise were excluded. Participants were followed from admission until delivery and 1st week of neonatal period. The maternal, fetal and neonatal outcomes were analysed using SPSS version 21.0 and the associations between AFI and the obstetric outcomes were evaluated by means of appropriate statistical tests, taking $p < 0.05$ as the criterion for significance.

Results: The average age of the mothers was 26.8 ± 4.2 years and the average gestational age at the time of admission was 38.4 ± 1.1 weeks. Caesarean section was carried out in 53.4% of the women, fetal distress being the most common reason (33.1%). A non-reassuring non-stress test (NST) was noted in 23.4% of the pregnancies. 25.4% of the newborns required admission to the neonatal intensive care unit (NICU) and 15.4% had an Apgar score of less than 7 at five minutes. Meconium aspiration syndrome (13.7%) was the most common neonatal complication. Women who had severe oligohydramnios (with an amniotic fluid index of 0 to 5 cm) had a considerably higher rate of caesarean delivery than those with an AFI of 5.1 to 8 cm (73.2% versus 39.9%, $p < 0.001$). Both a lower AFI and non-reassuring NST were significantly linked to caesarean delivery and to adverse neonatal outcomes.

Conclusions: Though isolated oligohydramnios at term, there is higher need of obstetric intervention and poor perinatal outcomes that too when oligohydramnios is severe. Fetomaternal outcomes can be improved by early diagnosis by carrying out careful antenatal monitoring and by providing individualised obstetric care.

Keywords: Amniotic fluid index, Cesarean section, Fetomaternal outcome, Isolated oligohydramnios, Non-stress test, NICU admission, Perinatal outcome, Term pregnancy

INTRODUCTION

Amniotic fluid is an essential element of the intrauterine environment, significantly contributing to fetal development and health. It offers a protective buffer for the

fetus, promotes musculoskeletal development by enabling unrestricted movement, aids in lung maturation and averts umbilical cord compression.¹ The optimal estimates of daily amniotic fluid volume in the term fetus indicate that oligohydramnios, characterized by a pathologically diminished quantity of amniotic fluid, constitutes a notable

obstetric problem impacting roughly 1-5% of all pregnancies.² Sonographically, it is characterized by an amniotic fluid volume below the 5th percentile for gestational age; the amniotic fluid index (AFI) is ≤ 8 cm or the single deepest vertical pocket (SDP) is < 2 cm.³ Amniotic fluid performs several essential physiological roles during gestation. During late gestation, fetal urine production is the primary source of amniotic fluid volume, whereas its elimination transpires via fetal swallowing and intramembranous absorption through placental membranes. Disruption of this meticulously maintained dynamic equilibrium leads to quantitative anomalies in fluid volume.^{4,5}

This disease may result from multiple etiologies, including placental insufficiency, fetal congenital defects (particularly of the renal system), preterm rupture of membranes, certain maternal disorders such as preeclampsia and post-term pregnancy and fetal demise.⁶ The term "isolated oligohydramnios" refers to oligohydramnios occurring without maternal or fetal risk factors, such as intrauterine growth restriction, spontaneous rupture of membranes, diabetes, pre-eclampsia or significant maternal systemic illnesses.⁷

The clinical significance of isolated oligohydramnios at term remains debated. Many clinicians interpret it as an early marker of placental dysfunction and institute increased surveillance or elective delivery. Several studies have demonstrated higher induction of labour rates attributable to concern regarding intrauterine compromise.⁸ Increased cesarean delivery rates have likewise been reported, predominantly due to non-reassuring fetal heart rate tracings rather than true labour dystocia. Meconium-stained liquor and operative vaginal delivery are also observed more frequently in affected pregnancies.⁹ The precise etiology of intrauterine oligohydramnios (IO) remains ambiguous; however, it is regarded as a sign of chronic or late-onset placental insufficiency. In mature pregnancies complicated by intrauterine infection, delivery is advised, while in preterm instances, expectant care is favored to mitigate perinatal problems associated with prematurity.¹⁰ Some researchers report a heightened prevalence of poor Apgar scores, admissions to NICU, respiratory complications and birth asphyxia. While perinatal mortality is often low in cases of isolated oligohydramnios, the risk escalates when accompanied by fetal growth limitation or significant placental disease.¹¹

The management of isolated oligohydramnios at term is still a subject of debate. ACOG advises delivery between 36+0 and 37+6 weeks for uncomplicated oligohydramnios detected by SDP < 2 cm, because to the potential risk of stillbirth, but recognizing the inadequate quality of evidence. Conversely, RCOG guidance recommends personalized care with increased fetal monitoring instead of standard rapid induction when no other risk factors are present. Considering the significant occurrence of oligohydramnios in Indian obstetric practice and the

ongoing discourse surrounding appropriate therapy at term, assessing fetomaternal outcomes in pregnancies affected by isolated oligohydramnios is clinically relevant. The present study aimed to assess the fetomaternal outcome in term pregnancies with isolated oligohydramnios in the tertiary care hospital, Puducherry.

METHODS

Study design

This study was undertaken as a prospective observational study

Study setting

The study was carried out in the Department of Obstetrics and Gynaecology at Sri Venkateswaraa Medical College Hospital and Research Centre, Ariyur, Puducherry.

Study population

The study population comprised antenatal women attending the obstetric outpatient department or labour ward of SVMCH&RC between 37 completed weeks and 40 weeks of gestation who were diagnosed with isolated oligohydramnios on ultrasonographic assessment defined by an amniotic fluid index (AFI) ≤ 8 cm.

Sample size calculation

The required sample size was determined using the formula for estimation of a proportion in a descriptive study:

$$N = Z^2 \times P \times (1-P) / d^2$$

$$N = (1.96)^2 \times 0.66 \times 0.34 / (0.05)^2$$

$$N = 344$$

The minimum calculated sample size was 344. To compensate for rounding and potential attrition, the final sample size was fixed at 350 participants.

Sampling technique

Simple random sampling was used to collect the sample.

The study was carried out over a period of eighteen months following approval from the Institutional Ethics Committee and Scientific Research Committee (February 2024 - August 2025). All pregnant women presenting at term were screened through detailed history, clinical examination and ultrasonography to exclude high-risk pregnancies and congenital anomalies. Inclusion criteria were Women who have given their consent to be a part of the study, Pregnant women from 37 to 40 weeks of gestation, Pregnant women irrespective of their parity,

USG findings showing AFI less than or equal to 8 cm and Participants with no co-existing maternal and fetal conditions. Exclusion criteria were USG findings showing AFI more than or equal to 8.1 cm, Intrauterine fetal demise and Pre-labour rupture of membranes

Eligible women received counselling regarding the study and written informed consent was obtained in their preferred language. Baseline demographic details, obstetric, menstrual, medical and surgical histories were recorded. General examination included assessment of pallor, edema, pulse, blood pressure and systemic examination. Obstetric evaluation comprised measurement of symphysiofundal height, uterine activity, fetal presentation, engagement of the presenting part, fetal heart rate and per abdominal/per vaginal examinations for Bishop scoring and labor progress. Routine antenatal investigations, including hemoglobin, blood group and Rh typing, blood glucose, thyroid-stimulating hormone, urine analysis and serological screening, were performed as per hospital protocol. Ultrasonography assessed gestational age, fetal presentation, placental location and grading, estimated fetal weight, amniotic fluid index (AFI) and congenital anomalies. An AFI ≤ 8 cm was considered clinically significant oligohydramnios based on evidence associating reduced amniotic fluid with adverse perinatal outcomes.

Follow-up

Participants were monitored till delivery. Intrapartum surveillance encompassed fetal heart rate monitoring, evaluation of labor progression and documenting of amniotic fluid features. The mode of delivery, induction prerequisites and surgical indications were documented. Postpartum maternal monitoring encompassed the observation of hemorrhage, wound complications and thromboembolic occurrences. Neonates were assessed at birth and observed daily for one week to detect early neonatal problems.

Outcome measures

Maternal outcomes

Mode of delivery, indication for cesarean section, intrapartum complications, postpartum complications and wound healing status.

Fetal outcomes

Non-reassuring fetal status, meconium-stained liquor and intrapartum fetal compromise.

Neonatal outcomes

APGAR scores, birth weight, congenital anomalies, NICU admission, hypoglycemia, convulsions, respiratory distress and perinatal mortality.

Data collection method

Data were recorded using a structured proforma incorporating demographic details, obstetric history, clinical findings, laboratory investigations, ultrasonographic parameters, intrapartum events, maternal complications and neonatal outcomes.

Data analysis

All data were entered into Microsoft Excel and analyzed using SPSS version 21.0. Quantitative variables were summarized as mean, standard deviation and range. Normally distributed data were analyzed using the Student's t-test or ANOVA, while non-normally distributed data were analyzed using the Mann-Whitney U test. Qualitative variables were compared using the Chi-square test.

RESULTS

The majority of the participants belonged to 26-30 years followed by 34.9% belonged to 21-25 years and 14.3% belonged to 31-35 years of age group. The mean age of the participants was 26.8 ± 4.2 years.

The majority of study (29.7%) were at 38 weeks, followed by 28.0% were at 39 weeks, 26.3% were admitted at 40 weeks and 16.0% were at 37 weeks. Most of the participants (76.6%) had reassuring NST findings, while 23.4% showed non-reassuring NST patterns.

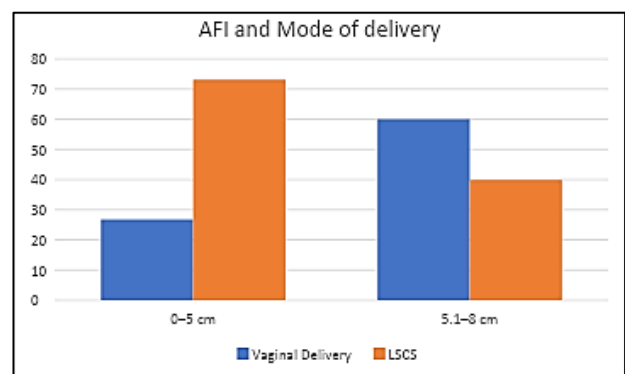


Figure 1: Association between AFI and mode of delivery among the study participants.

Most of the participants had LSCS (53.4%) followed by Normal vaginal delivery (40.6%) and 3.7% had forceps assisted delivery. Majority of the cesarean sections were performed due to fetal distress (33.1%) followed by failed induction in 26.2%, Previous LSCS IN 21.9% and meconium-stained liquor contributed to 11.3%. The majority of the intrapartum complications observed were fetal distress (66.7%) and prolonged labour (33.3%). The majority of the neonates had an APGAR score ≥ 7 at 5 minutes (84.6%), while 15.4% had an APGAR score < 7 . The majority of the neonates did not require NICU admission (74.6%), while 25.4% required admission to the

NICU. The majority of the neonatal complications observed were meconium aspiration syndrome (13.7%), followed by neonatal sepsis (10.3%), hypoglycemia (8.3%) and convulsions in 2.0%. The majority of women with AFI 0–5 cm underwent LSCS (73.2%), while the

majority of women with AFI 5.1 -- 8 cm delivered vaginally (60.1%). There was a significant association between AFI and Mode of Delivery among the study participants ($p < 0.001$).

Table 1: Age distribution among the study participants.

Age group (in years)	Frequency	%
<21	28	8.0
21–25	122	34.9
26–30	138	39.4
31–35	50	14.3
>35	12	3.4
Total	350	100
Mean age	26.8±4.2 years	

Table 2: Gestational age at admission among the study participants.

Gestational age (in weeks)	Frequency	%
37	56	16.0
38	104	29.7
39	98	28.0
40	92	26.3
Total	350	100
Mean gestational age	38.4±1.1 weeks	

Table 3: NST findings among the study participants.

NST status	Frequency	%
Reassuring	268	76.6
Non-reassuring	82	23.4
Total	350	100

Table 4: Mode of delivery among the study participants.

Mode of delivery	Frequency	%
LSCS	187	53.4
Normal vaginal delivery	142	40.6
Forceps	13	3.7
Vacuum	8	2.3
Total	350	100

Table 5: Indications for LSCS among the study participants (n=187).

Indications for LSCS	Frequency	%
Fetal distress	62	33.1
Failed induction	49	26.2
Previous LSCS	41	21.9
Meconium-stained liquor	21	11.3
Others	14	7.5
Total	350	100

Table 6: Intrapartum complications among the study participants (n=156).

Intrapartum complications	Frequency	%
Fetal distress	104	66.7
Prolonged labour	52	33.3

Table 7: APGAR score at 5 minutes.

APGAR score	Frequency	%
<7	54	15.4
≥7	296	84.6
Total	350	100

Table 8: NICU admission.

NICU admission	Frequency	%
Yes	89	25.4
No	261	74.6
Total	350	100

Table 9: Neonatal complications.

Complication	Frequency	%
Meconium aspiration syndrome	48	13.7
Neonatal sepsis	36	10.3
Hypoglycemia	29	8.3
Convulsions	7	2.0

DISCUSSION

Maternal characteristics

In the present study, the majority of the participants belonged to 26-30 years followed by 34.9% belonged to 21-25 years and 14.3% belonged to 31-35 years of age group. The mean age of the participants was 26.8±4.2 years (Table 1). Similarly, Naykodi et al reported that the mean age of participants was 25.12±4 years, with 60% aged 20-24 years.¹²

The present study suggested that amniotic fluid volume is not significantly affected by maternal age. However, placental insufficiency, hypertension and metabolic abnormalities may indirectly affect amniotic fluid dynamics as maternal age increases. Since the marginal predominance of primigravid women, it would seem that in the case of isolated oligohydramnios, there is a higher chance of detection in the first pregnancies, which is likely due to the greater antenatal surveillance and a more circumspect obstetric approach towards the cohort.

Gestational age at admission

In this present study, regarding the gestational age, the majority of study (29.7%) were at 38 weeks, followed by 28.0% were at 39 weeks, 26.3% were admitted at 40 weeks and 16.0% were at 37 weeks (Table 2). This finding reflects the common clinical scenario in which isolated oligohydramnios is detected during routine third-trimester ultrasonographic surveillance. Casey et al observed that the majority cases of isolated oligohydramnios were diagnosed between 37 and 40 weeks of gestation.¹³ Similarly, Rutherford et al, noted that reduced amniotic

fluid volume is most frequently identified during the late third trimester.¹⁴

NST findings

In the current study, reassuring non-stress test (NST) findings were reported in 76.6% of cases, whereas 23.4% of patients observed non-reassuring NST patterns (Table 3). Similarly, Locatelli et al observed an increased frequency of non-reassuring fetal heart rate tracings in women with reduced amniotic fluid volume.⁸

The current study suggested that, despite most of the fetuses with isolated oligohydramnios showing sufficient well-being of the fetus, a considerable number of fetuses can still show clinical evidence of fetal compromise.

Mode of delivery

In the present study, most of the participants had LSCS (53.4%) followed by Normal vaginal delivery (40.6%) and 3.7% had forceps assisted delivery (Table 4). Naykodi et al observed that 53% of patients had a normal vaginal delivery, 4% had an instrumental delivery and 43% had LSCS.¹²

Casey et al noted that a significantly higher cesarean section rates among women with oligohydramnios, primarily due to fetal distress and nonreassuring fetal heart rate patterns, which correlate with this study.¹³

Indications for LSCS

In this present study, the majority of the cesarean sections were performed due to fetal distress (33.1%) followed by

failed induction in 26.2%, Previous LSCS IN 21.9% and meconium-stained liquor contributed to 11.3% (Table 5). Similarly, Naykodi et al observed that most common indication for LSCS was fetal distress (56.0%), FGR (19.0%), failure of induction (16.0%) and previous LSCS (9%).¹²

Maternal complications

In the current study, the majority of the intrapartum complications observed were fetal distress (66.7%) and prolonged labour (33.3%). Similarly, Most of the postpartum complications among the study participants were PPH (35 out of 63) and wound infection in 28 patients (Table 6). Likewise, Locatelli et al observed an elevated occurrence of fetal distress during labor in pregnancies accompanied by diminished amniotic fluid volume.⁸

These present findings emphasize the importance of continuous electronic fetal monitoring during labor in women diagnosed with oligohydramnios in order to facilitate early identification of fetal compromise. Therefore, appropriate intrapartum and postoperative care remains essential to minimize maternal morbidity.

Fetal/neonatal outcomes

In the current study, the majority of the neonates did not require NICU admission (74.6%), while 25.4% required admission to the NICU (Table 8). Naykodi PS et al, (2025) observed that 10.0% of the newborns required admission to the NICU.¹² The increased necessity for NICU care may be ascribed to problems including respiratory distress, meconium aspiration and newborn infections.

Neonatal complications

In the current study, the majority of the neonatal complications observed were meconium aspiration syndrome (13.7%), followed by neonatal sepsis (10.3%), hypoglycemia (8.3%) and convulsions in 2.0% (Table 9). Ingle et al observed that neonatal complications noted were respiratory distress (1.8%), meconium aspiration syndrome (1.2%) and fetal growth restriction (0.6%).¹⁵ The current study suggested that the decrease in amniotic fluid content may elevate the risk of fetal discomfort and the intrauterine passage of meconium, thereby exposing the infant to aspiration upon delivery.

Association tables

In the present study, the majority of women with AFI 0–5 cm underwent LSCS (73.2%), while the majority of women with AFI 5.1–8 cm delivered vaginally (60.1%) (Figure 1). There was a significant association between AFI and mode of delivery among the study participants ($p < 0.001$). Punithavathi et al also found that there was an association between mode of delivery and AFI ($p < 0.001$).¹⁶ The study was conducted at a single tertiary care center, which may limit generalizability to other

healthcare settings. Being an observational study, it is impossible to prove causal linkages; the results only show correlations. Pregnancies characterized by normal amniotic fluid volume were excluded from the comparison, hence constraining the accurate assessment of relative risk. Neonatal outcomes were evaluated solely during the immediate perinatal period, excluding long-term developmental assessments. Institutional differences in obstetric management, such as induction and cesarean decisions, may influence observed outcomes.

CONCLUSION

Isolated oligohydramnios at term is associated with increased obstetric intervention and adverse perinatal outcomes. Cesarean delivery (53.4%), mainly for fetal distress and NICU admissions were higher, particularly with severe oligohydramnios (AFI 0–5 cm). Lower AFI and non-reassuring NST were significantly associated with cesarean delivery and NICU admission. Early detection, close antenatal surveillance and timely individualized management are essential to improve fetomaternal outcomes.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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