

Maternal and Perinatal Outcomes Among Pregnancies Complicated by Isolated Oligohydramnios Compared with Normal Amniotic Fluid Index

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Aims: The study was aimed to compare the maternal and perinatal outcomes among pregnancies with isolated oligohydramnios compared to normal amniotic fluid volume between 37-42 weeks.

Methods: It was a prospective cohort study done among the singleton pregnancies between 37-42 weeks with isolated oligohydramnios taken as cases (n=100) and pregnancies with normal levels of amniotic fluid matched to cases by gestational age and parity in 2:1 ratio fulfilling the inclusion criteria were taken as controls (n=200). Both the mother and baby were followed up till discharge for outcomes.

Results: Majority of the patients (n=300) were of age group 20-30 years (79.0%). Most of them (n=300) were primigravida (74.0%). The overall caesarean section rate was 24.66% (n=300). In the oligohydramnios group, 43.0% had undergone induction of labour (*p value*<0.05), 63.0% had undergone caesarean section (*p value*=0.001) and the most common indication for caesarean section was non-reassuring NST (44.44%) (*p value*<0.05). 26.0% babies had low birth weight, 12% had birth defects, 10.0% were small for gestational age (*p value*<0.05). There were significantly more ICU admission (13.0% vs 3.5%), early neonatal death (6.0% vs 1.5%), fetal distress (6.0% vs 1.5%) in the oligohydramnios compared to control group (*p value*<0.05).

Conclusions: Patients with oligohydramnios have increased labour induction, increased operative interferences and increased neonatal mortality and morbidity compared to patients with normal fluid volume.

Keywords: amniotic fluid index, caesarean section, non stress test, oligohydramnios

INTRODUCTION

Oligohydramnios, as defined by amniotic fluid index less than 5 cm, has been associated with poor maternal and fetal outcomes. Oligohydramnios occurs in about 1-5% of pregnancies at term. Oligohydramnios is associated with increased pregnancy complications, increased risk of labour induction and caesarean delivery, fetal deformities, growth restriction, fetal distress and meconium stained liquor, perinatal mortality, low Apgar score, low birth weight and increased ICU admission.¹ Oligohydramnios poses challenge to obstetrician, when diagnosed before term. About 12% of women whose pregnancies continue for a week beyond expected date of delivery; develop oligohydramnios due to declining placental function. Every case of oligohydramnios needs careful antenatal evaluation, continuous intrapartum fetal monitoring and good neonatal care for better perinatal

outcome.² Because adverse outcomes occur in high-risk pregnancies complicated by oligohydramnios, it commonly prompts labour induction for delivery as the standard management. Amniotic fluid volume is a predictor of the fetal tolerance of labour with increased incidence of cord compression leading to variable decelerations and fetal distress in oligohydramnios.³ Many consider induction of labour nowadays even with an isolated finding of a so-called "border-line" amniotic fluid volume (5-8 cm).¹ Ultrasound is a non invasive procedure ideal for evaluation of amniotic fluid volume⁴. The most widely used method is the amniotic fluid index, proposed by Phelan et al.⁵ It is calculated by adding the depth in centimeters of the largest vertical pocket in each of four uterine quadrants. The normal AFI is 8-18 cm, borderline oligohydramnios is 5-8 cm, oligohydramnios is <5 cm, borderline high is 18-25 cm and high is >25 cm.

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METHODS

This was a prospective case control study done over 12 months from march 2012-february 2013 AD. It was done in the antenatal ward of the department of obstetrics and gynaecology, BP Koirala Institute

of Health Sciences, Dharan. The study was done only after approval by Institutional Ethical Review Board. For sample size calculation, all the pregnant patients who met the inclusion criteria during study period were taken as cases (n= 100) based on hospital record of previous year. For each case, two pregnant patients matched by gestational age and parity with normal liquor volume and meeting the inclusion criteria were taken as controls (n=200). The inclusion criteria were singleton pregnancies of 37-42 weeks gestation and isolated oligohydramnios (AFI<8 cm). The exclusion criteria were pregnancy of <37 weeks and >42 weeks gestation, hypertension complicating pregnancy, uncertain pregnancy dating, placental abruption, placenta previa, prelabour rupture of membrane, congenital fetal anomalies, multifetal pregnancy, intrauterine fetal death, malposition and malpresentation. The cases and controls were enrolled in the study based on the ultrasound done within one week from admission (AFI<8 cm) and within two weeks from admission (AFI=8-18 cm) respectively. Cases and controls were enrolled before onset of labour or during early labour. Written consent was taken before enrolling the patients. At admission, detailed history, general physical examination, abdominal examination and pelvic examination were done. Non stress test was done after admission for fetal assessment. Patient were managed according to the standard management protocol followed in the hospital after explaining the maternal and fetal prognosis. Both the mother and baby were followed up till discharge after delivery for outcomes.

The data were collected and entered in Microsoft Excel software and analysis done using SPSS software version 17. Pearson Chi-square test was used for comparison of data and difference was considered significant when P value was less than 0.05.

RESULTS

Majority of the patients (79.0%, n=237) were of age group 20-30 years. 74.0% of them (n=222) were primigravida and 77.66% (n=233) were nullipara (Table 1).

Characteristics	Oligohy dramnios group (n=100)	Normal AFI group (n=200)	Total
Age of the patients			
<20 years	14	29	43(14.3%)
20-30 years	80	157	237(79.0%)
>30 years	6	144	20(6.7%)

Number of visits			
Booked	41	87	128 (42.67%)
Unbooked	59	113	172(57.33%)
Gestational age			
37-40 weeks	47	98	145(48.3%)
40-42 weeks	53	102	155(51.7%)
Number of gravida			
1stgravid	74	148	222(74.0%)
2ndgravid	17	34	51(17.0%)
3rdgravida	9	18	27(9.0%)
Number of parity			
Nullipara	77	156	233(77.66%)
Primipara	17	30	47(15.66%)
2 para	6	14	20(6.66%)

Majority of the patients in the oligohydramnios group had symphysis-fundal height (36.0% vs 5.0%) and abdominal girth (24.0% vs 4.5%) smaller than the gestation compared to normal AFI group which was significant (Table 2).

Table 2. Distribution of study population based on the symphysis-fundal height and abdominal girth

Characteristics	Oligohy dramnios group (n=100)	Normal AFI group (n=200)	P value
Symphysis-fundal height			p value<0.05
Corresponds with gestational age	64(64.0%)	190(95.0%)	
Smaller than gestational age >2cm	36(36.0%)	10(5.0%)	
Abdominal girth			p value<0.05
Correspond with gestational age	76(76.0%)	191(95.5%)	
Smaller than gestational age >2 cm	24(24.0%)	9(4.5%)	

74 patients had undergone caesarean section accounting for the overall caesarean section rate of 24.66%. 63.0% (n=63) in the oligohydramnios and 5.5% (n=11) in the normal AFI group had undergone caesarean section which was significant. Similarly; 43.0% (n=43) of the patients in the oligohydramnios and 23.5% (n=47) in the normal AFI group had undergone induction of labour which was also significant (Table 3).

Table 3. Maternal outcomes based on different variables

Characteristics	Oligohy dramnios group (n=100)	Normal AFI group (n=200)	P value
Onset of labour			p value<0.05
Spontaneous onset of labour	39(39.0%)	153(76.5%)	
Induction of labour	37(37.0%)	47(23.5%)	
LSCS at admission	24(24.0%)	0(0%)	
Mode of delivery			p value<0.05
Spontaneous vaginal delivery	34(34.0%)	171(85.5%)	
Instrumental vaginal delivery	3(3.0%)	18(9.0%)	
Caesarean section	63(63.0%)	11(5.5%)	

Majority of the patients in the oligohydramnios group (63.0%, n=63) had undergone caesarean section for non-reassuring NST (44.44%, n=28). But the most common indication in the normal AFI group was meconium stained liquor (36.36%, n=4) followed by non-reassuring NST (27.27%, n=3) and it was significant (Table 4).

Table 5. Neonatal outcomes based on different variables

Variables	Oligohy dramnios group	Normal AFI group	Total	P value
Birth weight				p value<0.05
<2500 gms	26(26.0%)	17(8.5%)	43(14.33%)	
2500-4000 gms	74(74.0%)	180(90.0%)	254(84.66%)	
>4000 gms	0	3(1.5%)	3(1.5%)	
5 minute APGAR score	16(16%)	20(10.0%)	36(12.0%)	p value=0.18
Birth defects				p value<0.05
Club foot	10(10.0%)	0	10(3.33%)	
Pulmonary hypoplasia	1(1.0%)	0	1(0.33%)	
Both	1(1.0%)	0	1(0.33%)	
Small for gestational age	10(10.0%)	0	10(3.33%)	p value<0.05
ICU admission	13(13.0%)	7(3.5%)	20(6.66%)	p value<0.05
Early neonatal death	p value<0.05	3(1.5%)	9(3.0%)	p value<0.05
Ventilatory support	p value<0.05	3(1.5%)	9(3.0%)	p value<0.05
Neonatal hyperbilirubinemia	p value<0.05	3(1.5%)	9(3.0%)	p value<0.05

DISCUSSION

In the present study, 79.0% (n=237) of the total patients were of age group 20-30 years. 74.0% (n=74) and 57.33% (n=172) patients were primigravida and unbooked respectively which is in consistent with the

Table 4. Distribution of study population based on the indications of caesarean section

Indications of LSCS	Oligohy dramnios group	Normal AFI group	P value
Non-reassuring NST	28(44.44%)	3(27.27%)	p value<0.05
Failed induction	14(22.22%)	1(9.09%)	
Fetal bradycardia	11(17.46%)	1(9.09%)	
Meconium stained liquor	7(11.11%)	4(36.36%)	
Others	3(4.77%)	2(18.18%)	
Total	63(100%)	11(100%)	

26.0% (n=26) of the babies delivered in the oligohydramnios group and 8.5% (n=17) in the normal AFI group had low birth weight (<2500 grams). In the oligohydramnios group, 12.0% (n=12) babies had birth defects, 10.0% (n=10) were small for gestational age (p value<0.05). There were significantly more neonatal ICU admission (13.0% vs 3.5%), early neonatal death (6.0% vs 1.5%), need of ventilator support (6.0% vs 1.5%) and neonatal hyperbilirubinemia (6.0% vs 1.5%) among babies delivered in the oligohydramnios group compared to normal AFI group (Table 5).

study by Bangal VB et al.² The present study showed 77.66% (n=233) patients with oligohydramnios were nulliparous and the rate of neonatal ICU admission among babies born to oligohydramnios mothers was 13.0% (n=13) similar in a study by Garmel et

al⁶ in which 67.0% women with oligohydramnios were nullipara and rate of neonatal Intensive Care Unit admission at birth was 18.5%. The present study showed an increased caesarean section rate of 63.0% (n=63) in the oligohydramnios group similar in a study by Conway⁷ and the increased caesarean delivery was attributed to non-reassuring fetal surveillance (44.44%, n=28) which is in contrast to the study by Conway as it was attributed to induction process.

In the present study, induction of labour was done in 37.0% (n=37) patients with oligohydramnios out of which 37.8% (n=14) were delivered by caesarean section for failed induction and there were 6.0% (n=6) babies requiring ventilator support due to respiratory distress and 6.0% (n=6) neonatal deaths. There was 17.17% increase in non-reassuring fetal heart rate patterns requiring caesarean section in oligohydramnios groups compared with normal AFI groups which is similar to the study by Casey et al⁸ in which he reported that induction of labour was done in 42.0% out of which 32.0% were delivered by caesarean section. He also found respiratory distress in 3.4% of neonates at birth and 25.0% increase in non-reassuring fetal heart rate patterns in cases of oligohydramnios compared with normal controls. The result of the present study is also consistent with the study done by Chauhan et al⁹ in which they concluded that AFI less than 5 cm was associated with increased risk of caesarean section for fetal distress and low Apgar score at 5 minutes. Chauhan et al⁹ and Yousseff et al¹⁰ reported that when amniotic fluid index was less than 5 cm, the incidence of meconium staining was increased but in the present study, the incidence of meconium staining requiring caesarean section was decreased among oligohydramnios compared to normal (11.11% vs 36.36%). Also the present study showed babies born with low birth weight (26.0%), birth defects (12.0%) and small for gestational age (10.0%) were significantly higher in the oligohydramnios group. This is consistent with the studies by Zhang et al¹¹, Chate P et al¹², Bangal VB et al², Morris J M et al¹³, Shumway J B et al¹⁴, Randeniya C et al¹⁵, Sarno et al¹⁶, Golan et al¹⁷ and Desai et al¹⁸ in which there were increased chances of intrapartum fetal heart rate decelerations resulting in increased rate of caesarean section, low APGAR score at 5 minute, birth weight <2.5 kg, admission to Neonatal Intensive Care Unit, congenital anomalies

& neonatal mortality. Consistent with the present study, Voxman et al³ observed that women with oligohydramnios were significantly more likely to have abnormal fetal heart rate tracings (14.9% vs 5.3%; p 0.005) and increased rate of caesarean section for fetal distress (9.7% vs 5.0%; p = 0.06) as compared to women with normal amniotic fluid index. Baron et al¹⁹ have reported a 50.0% increase in variable decelerations during labour and a seven-fold increased caesarean section rate in women with oligohydramnios. Similarly, Locatelli et al²⁰ reported that rate of caesarean delivery for non-reassuring fetal testing (8.2% vs. 3.9%, p<0.001) and rate of neonates with birth weight <10th percentile (13.2% vs. 5.5%, p<0.001) were significantly higher in the amniotic fluid index ≤5 cm group compared with the amniotic fluid index >5 cm.

In the present study, 39.0% (n=39) had spontaneous onset of labour, 37.0% (n=37) had induction of labour, 37.0% (n=37) women had vaginal delivery and 63.0% (n=63) had caesarean section out of which 44.44% (n=28) had non-reassuring fetal heart rate abnormalities in the oligohydramnios group. This is in consistent with a study by Jandial Charu et al¹ in which labour was spontaneous in 28.0%, induced in 58.0% women, 44.0% had normal vaginal delivery and 56.0% had caesarean section out of which 42.0% had fetal distress. Similar to the present study, Ahmad H et al²¹ reported rate of induction of labour and caesarean delivery as high as 63.0% and 42.0% respectively in patients with isolated oligohydramnios compared to 14.0% and 18.0% respectively in the unexposed group (p<0.001).

The results of the present study was also consistent with Chhabra S et al²² which showed pulmonary hypoplasia in 1-2% of newborns and compression limb deformities in 2.4% babies of retrospective cases and 3.4% of prospective cases with severe oligohydramnios. Similarly, Shumway JB et al¹⁷ reported quite higher incidence of pulmonary hypoplasia (18.0%) and similar incidence of skeletal deformities (3.0%) compared to the present study. Similarly, Rotschild et al²³ found pulmonary hypoplasia in 1 – 2% of newborns born with severe oligohydramnios. In the present study, fetus with small for gestational age was found in 10% (n=10) of the cases with oligohydramnios and none in normal AFI group. Similarly, Shenker et al²⁴ and Roberts et al²⁵ reported higher incidence of fetal growth restriction in 17.5%

and 24.1% cases of oligohydramnios respectively.

CONCLUSIONS

Pregnancies complicated by oligohydramnios is associated with increased rate of labour induction and caesarean section mostly for fetal heart rate abnormalities and adverse neonatal outcomes owing to low birth weight, low APGAR score, small for gestational age, birth defects, meconium stained liquor, ICU admission and fetal distress.

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DISCLOSURE

The authors report no conflicts of interest in this work. No violation of human rights and safety.

Findings: nil.

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