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Original Research Article

Fetomaternal outcome in abnormal liquor volume pregnancies

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ABSTRACT

Background: Variation in the amniotic fluid reflects fetal compromise, and congenital anomalies and also may predict perinatal morbidity and mortality.
Methods: Singleton pregnancy subjects with well-established dates at ≥28 weeks of gestational age were taken into study. These subjects were ultrasonographically diagnosed to have abnormal liquor volumes. This study was a hospital-based single-center prospective observational study conducted in Midnapore medical college and hospital, west Bengal. The chi-square test was applied for statistical significance and a $p<0.05$ was considered to be significant.
Results: In all subjects of abnormal liquor volume, the incidence of oligohydramnios and polyhydramnios are in the proportion of 3:1 in our study. Postdated pregnancy (28.4%), hypertensive disease (16.8%), intrauterine growth restriction (IUGR) (12.6%), and anemia (2.2%) were associated with oligohydramnios. Congenital anomalies (23.3%), GDM (16.6%), and Rh-incompatibility (3.3%) were associated with polyhydramnios. The incidence of caesarean section, meconium-stained liquor and 5-minute APGAR score <7 and NICU admission was higher in the oligohydramnios group as compared to polyhydramnios. In abnormal liquor volume, the statistical association was significant with onset of labour (p=0.00), mode of delivery (p=0.00), the colour of liquor(p-0.00), and fetal outcome (p=0.00).
Conclusions: Postdated pregnancy, IUGR, and hypertensive disorders were associated with oligohydramnios and congenital anomalies, and GDM and Rh-isoimmunization were associated with polyhydramnios. In abnormal liquor volume onset of labour, mode of delivery, the colour of the liquor, and fetal outcome were significant.

Keywords: Oligohydramnios, Polyhydramnios, Amniotic fluid index, NICU admission, Caesarean section

INTRODUCTION

Oligohydramnios affects 3-5% of pregnancies.[1] Oligohydramnios is associated with high-risk adverse perinatal outcomes like fetal distress, meconium staining, low APGAR, and neonatal resuscitation/NICU admission but is a poor predictor. Oligohydramnios is often used as an indicator for delivery.

The incidence of polyhydramnios is around 1% of all pregnancies. The etiology of polyhydramnios is diverse and involves many maternal and fetal conditions including DM, congenital anomalies, iso-immunization, multiple gestation, and placental abnormalities. Half of cases are found to be idiopathic.[2] Premature labour complicated 40% of polyhydramnios patients.[3]

So, assessment of amniotic fluid volume is a helpful tool in determining who is at risk for potentially adverse obstetric and perinatal outcomes.

Therefore, this study is conducted to determine the maternal and perinatal outcomes in pregnancies with abnormal amniotic fluid index (AFI).

METHODS

This was a prospective observational study carried out in the department of obstetrics and gynecology, Midnapore medical college and hospital, Midnapore, West Bengal for a period of twelve months in 2019. Out of 11,333 antenatal subjects who attended OPD during this period, 136 had abnormal liquor volumes. Out of the 136 subjects, 100 were clinically suspected to have low AFI, while the 95 (95%) were ultrasonically confirmed to have oligohydramnios (AFI<5 cm); whereas thirty-six subjects were clinically suspected to have the polyhydramnios, while thirty (83%) were confirmed polyhydramnios ultrasonically (AFI≥25 cm).

Finally, 125 patients were recruited using the inclusion and exclusion criteria, and a written informed consent of the patients was obtained.

A total 125 women attended the ANC OPD regularly, were closely monitored, and also made up the study population. Detailed data was recorded and related investigations were carried out.

Inclusion criteria

Pregnant women with gestational age between 28^{+0} to 41^{+6} weeks with intact membranes, AFI lesser than 5 and AFI greater than or equal to 25cm as determined by ultrasonography and Singleton pregnancy were included from the study.

Exclusion criteria

Premature rupture of membranes, pregnancies of ≥42 weeks, Multiple gestation and women who were sick or did not give consent for the study were excluded.

Data was entered into a Microsoft excel data sheet and was analyzed using SPSS 22 version software. Continuous data was represented as mean and SD. P value (Probability that the result is true) of <0.05 was considered statistically significant after assuming all the rules of statistical tests.[4,5]

RESULTS

The statistical association between maternal age and gravidity about abnormal liquor volumes was not significant. The majority of oligohydramnios and polyhydramnios had a gestational age of >37 weeks and there was no statistical significance.

Idiopathic factors were common in both oligohydramnios and polyhydramnios, followed by post-dated pregnancies in oligohydramnios and congenital anomalies in polyhydramnios (Table 2).

In abnormal liquor volume pregnancies, meconium was found at 57.8% in oligohydramnios and 13.3% in polyhydramnios which has a significant difference. Further, in abnormal liquor volume pregnancies; the percentage of caesarean section in oligohydramnios and polyhydramnios has a significant difference, (Table 3).

Table 1: Baseline parameters.

Parameters	AFI<5	AFI≥25	Chi square	P value
	N (%)	N (%)		
Age (in years)				
≤19	9 (9.4)	2 (6.6)	6.86	0.14
>19-25	50 (52.6)	10 (33.3)		
>25-30	28 (29.4)	13 (43.3)		
>30-35	6 (6.3)	2 (6.6)		
>35	2 (2.1)	3 (10)		
Mean	24.4±4.1	26.5±5.1		
Gravida				
Primi	57 (60)	13 (43.3)	3.91	0.14
G2-3	35 (36.8)	14 (46.6)		
G4-5	3 (3.1)	3 (10)		
Gestational age (in weeks) at delivery				
28-32	8 (8.4)	4 (13.3)	0.88	0.64
>32-37	28 (29.4)	7 (23.3)		
>37	59 (62.1)	19 (63.3)		
Mean	36.7±2.9	36.2±2.9		

AFI-Amniotic fluid index, Chi-square was used.

Table 2: Factors associated with oligohydramnios and polyhydramnios.

Factors	AFI<5	AFI≥25
	N (%)	N (%)
Post dated pregnancy	27 (28.4)	0

Continued.

Factors	AFI<5	AFI≥25
IUGR	12 (12.6)	0
Hypertensive disorders	16 (16.8)	0
Congenital anomalies	5 (5.2)	7 (23.3)
Idiopathic	35 (36.8)	16 (53.3)
GDM	0	5 (16.6)
Rh-isoimmunization	0	1 (3.33)
Chorioangioma of placenta	0	1 (3.33)

Table 3: Intrapartum observations.

Intrapartum observations	AFI<5	AFI≥25	Chi-square value	P value
	N (%)	N (%)		
Colour of liquor				
Clear	40 (42.1)	26 (86.6)	18.16	0.00
Meconium	55 (57.8)	4 (13.3)		
Mode of delivery				
Vaginal	32 (33.6)	22 (73.3)	17.35	0.00
Instrumental	6 (6.3)	3 (10)		
Caesarean	57 (60)	5 (16.6)		

The chi-square test was used.

Table 4: Perinatal outcome.

Perinatal outcome	AFI<5	AFI≥25	Chi square value	P value
	N (%)	N (%)		
Fetal outcome				
Alive	88 (92.6)	22 (73.3)	8.04	0.00
Perinatal death	7 (7.3)	8 (26.6)		
5-min APGAR score				
<7	37 (38.9)	8 (26.6)	0.05	0.82
≥7	58 (61.0)	14 (46.6)		
NICU admission				
Admitted	55 (57.8)	9 (30)	7.10	0.00
Not admitted	40 (42.1)	21 (70)		
Birth weight (kg)				
≤2.5	51 (53.6)	5 (16.6)	-	-
>2.5-3	28 (29.4)	7 (23.3)		
>3-3.5	12 (12.6)	11 (36.6)		
>3.5-4	4 (4.2)	4 (13.3)		
>4	0 (0)	3 (10)		
Mean	2.5±0.5	3.1±0.6		

The chi-square test was used.

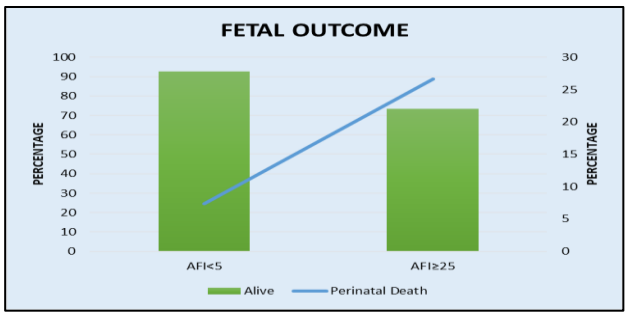

Figure 1: Fetal outcome in abnormal liquor volume, (n=125).

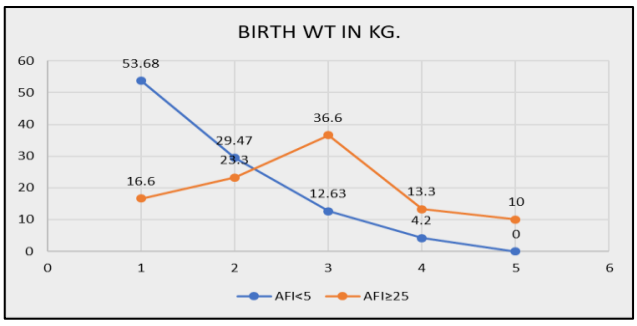

Figure 2: Birth weight in kg in abnormal liquor volume, (n=125).

Perinatal death difference in abnormal liquor volume pregnancies was also significant. NICU admission difference in oligohydramnios (57.8%) and polyhydramnios (30%) was significant.

DISCUSSION

The present study was a prospective observational study where 125 cases were included. In this, the majority of the patients with abnormal liquor volumes were at gestational ages of >37 weeks at the time of delivery. The median gestational ages were 38 and 37 weeks respectively in both oligohydramnios and polyhydramnios and the mean gestational age in the present study was 36.7±2.9 weeks in the oligohydramnios and 36.2±2.9 weeks in the polyhydramnios group. The mean gestational age in the study done by Biradar et.al on oligohydramnios subjects was 38.5±2.1 weeks and in Nankali et al study which was a case-control study on the term oligohydramnios; the mean gestational age was 38.18±1.24 weeks in the study group and 38.85±1.24 weeks in the control group.[7,8] In the study done by Vidyasagar et al the mean gestational age was 36.395±3.396 weeks in the oligohydramnios study group and 36.975±2.75 weeks in the control group.

Abnormal liquor volumes were seen in both adolescent and elderly patients in the study with a major chunk of patients belonging to the ages of 19-30 years. Also, in our study, we found that oligohydramnios was mostly seen in primi patients while polyhydramnios was seen mostly in multiparous women. The median maternal ages were 24 and 26 years in oligohydramnios and polyhydramnios respectively and the mean maternal age was 24.4±4.1 years in the oligohydramnios group and the majority of cases were nulliparous (60%). This is almost comparable to the studies done by Kaur et al, Bangal et al and Aspgharnia et al where the mean maternal ages were 25.8±4.1 years, 22.8years and 25.96 years respectively in oligohydramnios and a higher frequency of oligohydramnios 54% by Asgharnia et al and 42.9% in Kaur et al was seen in nulliparous women.[10-12] In the polyhydramnios group, the mean age of incidence was 26.5±5.1 years which is comparable to the mean age of Guin et al where the mean age was 25.39 years. The majority of studies report a higher frequency of polyhydramnios in multiparous women, 81.1% by Tashfeen et al and 86.7% by Guin et al and we found only 56.6% multiparous women with polyhydramnios.[13,3]

Studies in the literature widely reported that most of the cases of oligohydramnios as well as polyhydramnios were idiopathic. We also found idiopathic cases to a greater extent in both oligohydramnios and polyhydramnios in our study. Jagatia et al and Zhang et al studies support a higher incidence of idiopathic oligohydramnios of 52% and 53% respectively.[14,15] Chen et al observed that 60% of cases of polyhydramnios in their study were idiopathic.[16] Umbilical artery Doppler findings in our study showed that IUGR was found only in 12.6% of oligohydramnios cases whereas the bulk of the patients were postdated and hypertensive. Congenital anomalies were five times more common in the polyhydramnios group compared to the oligohydramnios group. Congenital anomalies were multicystic dysplastic kidney (1%), infantile PCKD (2.1%), single umbilical artery (1%), microcephaly (1%) seen in oligohydramnios and anencephaly (6.66%), diaphragmatic hernia (3.33%), duodenal atresia (3.33%), non-immune hydrops (3.33%), spina bifida (3.33%), hydrocephalus with meningomyelocele (3.33%) in polyhydramnios in the present study. Morris et al found that 60 % of babies were of LBW in the group with AFI<5, indicating that oligohydramnios had an association with growth restriction.[17] A study by Rutherford et al showed that when there was oligohydramnios, 36 % of pregnancies resulted in infants with IUGR.[18]

In this study, during the intrapartum period, meconium-stained liquor was found mostly in oligohydramnios in comparison to the polyhydramnios group. The statistical association was significant with the colour of the liquor and abnormal liquor volumes with a p=0.00. This was similar to the study done by Anisodowleh et al where the p=0.009 and the colour of the liquor was significant with oligohydramnios, whereas in a study done by Bhagat Megha et al which was a prospective study; the difference between meconium-stained liquor and abnormal liquor volumes was not significant with a p=0.881.[8,19]

In our study, caesarean section was most commonly done in the oligohydramnios group whereas most of the polyhydramnios subjects delivered vaginally. The majority (60%) of oligohydramnios subjects underwent caesarean section with a p=0.00 showing a statistical significance between mode of delivery and abnormal amniotic fluid volume. Chauhan et al in their meta-analysis found that intrapartum AFI≤5 was associated with an increased risk of cesarean section for fetal distress (pooled RR=1.7), which was similar to our study, where fetal distress was the most common indication in oligohydramnios.[20] Rutherford et al found an inverse relationship between amniotic fluid index and cesarean section for fetal distress.[18]

In the present study, though a 5-min Apgar score <7 was found in both oligohydramnios and polyhydramnios, the association between them was not statistically significant with a p=0.82. A study by Driggers et al reported a 5-min Apgar score <7 in 3.8% of patients in an oligohydramnios group versus 4.6% in a normal AFI group, and concluded that there was no significant difference.[21] A study by Grubb et al found the 1-min Apgar score <7 in 84% of patients with oligohydramnios as compared to 14% in the normal AFI group, which was highly significant (p=0.01). In the same study, the 5-min score <7 was seen in 13% of patients with AFI ≤5 versus 5% in the normal AFI group.[22]

The percentage of NICU admission was doubled in oligohydramnios than in polyhydramnios which has a significant statistical difference in the present study. Neonatal morbidities were respiratory distress syndrome

(5 vs 1), low birth weight (40 vs 3), birth asphyxia (7 vs 2), very low birth weight (11 vs 2), hypoglycemia (1 vs 2) in oligohydramnios and polyhydramnios respectively in the present study. In the study by Karim et al 28% of newborns were admitted to the neonatal intensive care unit in patients having AFI<5 cm while in the control group, 12% of newborns were admitted to the neonatal intensive care unit (NICU).[23] Syria et al have reported a very high incidence of NICU admission. In their study, 88.88% of newborns were admitted to NICU in patients having AFI<5 cm while in the control group, 2.8% of newborns were admitted to NICU.[24] Casey et al in their study have reported 7% admission to the NICU in patients with AFI<5 cm.[25] In the control group, only 2% of newborns were admitted. Zhang et al in their study have reported 29.4% admission to NICU in patients with AFI<5 cm, while in the control group, 20.1% required admission.[15]

In the current study, more than half of the babies were of ≤2.5 kg in the oligohydramnios group whereas the majority of polyhydramnios babies were of birth weight >2.5 kg as shown in the line chart in Figure 2. In the study by Bhagat et al which was a prospective study done at Dr. Ram Manohar Lohia hospital, New Delhi, birth weight <2.5 kg was seen in 56% of the patients in oligohydramnios group versus 21.7% in polyhydramnios group, and the difference was statistically significant (p=0.001).[19] Mishra et al in their study found that estimated fetal weight was found to be at a lower range in the Indian population compared to the reference chart developed into the western population may be due to ethnicity, nutrition, and environmental factors.[26]

Overall, in this study, congenital anomalies and perinatal death were more common in the polyhydramnios group while meconium-stained liquor and NICU admission were seen more in the oligohydramnios group. We emphasize on the importance of AFI and analysis for better neonatal outcomes.

Limitations

It is a single-center study done in a rural teaching hospital, so a multicenter study with large sample size and different study designs may further highlight the relationship of AFI with perinatal outcome in relation to different variables.

CONCLUSION

Meconium-stained liquor and NICU admission were most commonly seen in oligohydramnios subjects while congenital anomalies and perinatal death were most commonly seen in polyhydramnios subjects. In abnormal liquor volume pregnancies, the statistical association was significant with onset of labour, mode of delivery, the colour of liquor, and foetal outcome. Hence, in our present study, we emphasize the simple clinical monitoring of foetal well-being and analysis of AFI for the neonatal outcome.

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

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