A study on fetal outcome in patients with oligohydramnios

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ABSTRACT

Background: There is an association between oligohydramnios and intrauterine growth restriction as well as increased perinatal mortality. Amniotic fluid provides a protected environment for the growing fetus, moderating the fetus against mechanical and biological injury. The objective of the present study was to study the fetal outcome in patients with oligohydramnios between 20 to 42 weeks of pregnancy.

Methods: Prospective study of 87 pregnancies with oligohydramnios was carried in Department of Obstetrics and Gynaecology, NSCB Medical College, Jabalpur from 1st March 2016 to 31st March 2017. All women enrolled for the study were subjected to history taking, clinical examination and amniotic fluid index estimation.

Results: Rate of caesarean section was higher in patients with oligohydramnios and higher number of neonates were admitted to the NICU amongst the patients of oligohydramnios.

Conclusions: Oligohydramnios has a significant correlation with adverse perinatal outcome.

Keywords: Amniotic fluid index (AFI), Maximum vertical pocket (MVP), Oligohydramnios

INTRODUCTION

Earth is known as the “Blue Planet” as nearly 70 percent of Earth’s surface is covered with water. Interestingly, an average adult human body comprises 70 percent of water too. Taking clue from this law of nature, the fetus in utero is essentially surrounded by liquor amnii. The amniotic fluid is fundamental for adequate fetal development and growth of the fetus.

The assessment of amniotic fluid volume is crucial for predicting fetal well-being in uterus. The most common method for estimation of amniotic fluid volume is by ultrasonography. Oligohydramnios means reduced quantity of amniotic fluid. There is an association between oligohydramnios and intrauterine growth restriction as well as increased perinatal mortality. Normal amniotic fluid volume changes with gestational age and the methods of accurately estimating it have changed over the years. Oligohydramnios is defined as

- Maximum vertical pocket (MVP) of less than 2 cm from late mid-trimester.
- Amniotic fluid index (AFI) of less than 5 cm or less than the 5th percentile, from late mid-trimester.

Amniotic fluid provides a protected milieu for the growing fetus, cushioning the fetus against mechanical and biological injury, supplying nutrients and facilitating growth and movement. The quantity of amniotic fluid increases from 25 ml at 10 weeks to about 400 ml at 20 weeks. The composition of the amniotic fluid up to this period is identical to that of fetal plasma as there is free diffusion of the fluid to and from the fetus. The fetal skin then begins to keratinize, the process being completed by 25 weeks. Thereafter, the two major source of amniotic fluid are fetal urine and lung secretions. Removal of fluid...
depends largely on fetal swallowing and intramembranous transport via the skin, placenta and cord surfaces. The volume increases to about 800-1000ml at 28 weeks plateau at term and declines to about 400ml at 42 weeks. Oligohydramnios is associated with increased risk of adverse perinatal outcome which include:

- Abortion
- Meconium aspiration syndrome
- Fetal pulmonary hypoplasia
- Fetal deformity
- Cord compression
- Perinatal mortality.

Oligohydramnios is associated with increased rate of caesarean deliveries due to fetal distress, most commonly due to underlying cord compression.²

**METHODS**

This was a hospital based prospective observational study conducted in Department of Obstetrics and Gynaecology in N.S.C.B. Medical College, Jabalpur (M.P.). Period of study was between March 2016 to March 2017. In this study, 87 singleton pregnancies with gestation age between 20 to 42 weeks with AFI ≤5cm were analysed for perinatal outcome.

**Inclusion criteria**

- Pregnant women with gestational age of 20-42 weeks with amniotic fluid index 5cm or less.

**Exclusion criteria**

- Patients with premature rupture of amniotic membranes,
- Patient <20 weeks of gestation.
- Patients >42 weeks of gestation.
- Multiple gestation
- Treated cases of pregnant women with oligohydramnios between 20-42 weeks.

A written and informed consent was taken from each of the patient included in the study. This study was approved by Ethics Committee of Madhya Pradesh Medical Science University, Jabalpur (M.P.). History including age, parity, duration of gestation, menstrual history, obstetric history and history of any complications in present pregnancy was recorded. General clinical examination was performed. Obstetric examination included uterine size, presentation and adequacy of amniotic fluid clinically. Fetal heart rate was recorded. Per-speculum and per-vagina examination were done to exclude rupture of the membranes. Appropriate investigations were done. An ultrasound examination was done for fetal well-being and amniotic fluid index was measured. Patients with AFI less than or equal to 5 were selected for the study. These patients were followed further for the mode of delivery and the condition of neonate was assessed by birth weight, APGAR score, color of liquor and the need for neonatal admission to NICU. All relevant information was recorded and analyzed by Chi-square test, Fishers exact test and Students t-test.

**RESULTS**

Out of 87 cases, 22 were booked and 65 cases were unbooked. Among booked cases, 1 neonate died, whereas among unbooked cases 7 died, thus 12.50% neonatal deaths were among booked and 87.50 neonatal deaths were among unbooked cases. It was found to statistically insignificant in present study (Table 1). Table 1 highlights perinatal outcome according to booking status of mother. Out of total 22 booked cases, 1 neonate died and 21 survived.

**Table 1: Perinatal outcome according to booking status of mother.**

| Booking status of mother | Perinatal outcome | Survived | Died |
|--------------------------|------------------|---------|------|
|                          | Count | Column % | Count | Column % |
| Booked                   | 21    | 26.60    | 1     | 12.50    |
| Un-booked                | 58    | 73.40    | 7     | 87.50    |

**Table 2: Showing labour findings among women with oligohydramnios.**

| First stage of labour | Normal | % of normal | Abnormal (prolonged) | % of abnormal (prolonged) | Z value | P value |
|-----------------------|--------|-------------|----------------------|---------------------------|---------|---------|
| First stage of labour | Normal | % of normal | Abnormal (prolonged) | % of abnormal (prolonged) | Z value | P value |
| Caesarean              | % of Caesarean | Vaginal delivery | % of vaginal delivery | Z value | P value |
| Active management      | %     | Spontaneous % | 85 | 97.7 | 13.19 | <0.0001 |

Chi Square -0.76, P-value - 0.67
The total subjects were 87, Table 2 highlights that in patients with oligohydramnios 8.1% of subjects had prolonged first stage of labour. P Value < 0.0001. Hence significant. Selection criteria for length of various stages of first stage of labour, a latent phase that exceeds 20 hours in a primigravida or 14 hours in a multigravida is considered prolonged or abnormal. An active phase longer than 12 hours in a primigravida and longer than 6 hours in a multigravida was considered abnormal. Caesarean Section was done in 50.5% whereas 49.5% of patients with oligohydramnios 8.1% of subjects had prolonged first stage of labour. P Value is > 0.05. Oligohydramnios was more common in primigravida (57.47%) (Table 2). Clinical judgement of liquor was done for all the patients who were diagnosed as oligohydramnios by USG. It was found to be adequate in 44 and inadequate in 43 patients. Out of all neonatal deaths (n=8) 87.50% was in the group which had inadequate liquor (Table 3).

Table 3: Perinatal outcome according to amount of liquor (clinical judgement).

| Liquor clinically | Survived | Died |
|-------------------|---------|------|
| Adequate          | 43      | 1    |
| Not-adequate      | 36      | 7    |
| Chi Square - 5.11, P value - 0.03 |

Table 3 highlights perinatal outcome according to clinical assessment of liquor (Per abdomen). Liquor was clinically found to be inadequate in 43 subjects. 7 out of 43 new born died. This data is statistically significant as P value is < 0.05. Out of 87 subjects 43 were delivered vaginally and 44 underwent LSCS.

Table 4: Perinatal outcome according to mode of delivery.

| Mode of delivery | Survived | Died |
|------------------|---------|------|
| Vaginal          | 36      | 7    |
| LSCS             | 43      | 1    |
| Chi Square - 6.91, P value - 0.03 |

Table 4 highlights perinatal outcome according to mode of delivery. Out of 87 subjects, 43 delivered vaginally and 44 underwent LSCS. Out of 43 delivered by vaginal route, 7 died and 36 survived. Only 1 out of 44 babies delivered by LSCS died. This value is statistically significant. Out of 43 deliveries by vaginal route 7 new born died and 37 survived, only 1 out of 44 new born delivered by C-section died. This value was statistically significant in present study. Rate of Cesarean-section was 50.5% in present study. 19 new born had APGAR <7 at 5 minutes in present study. This was statistically significant.

Table 5: Perinatal outcome according to admission of baby in NICU.

| Admission of baby in NICU | Survived | Died |
|---------------------------|---------|------|
| No                        | 60      | 6    |
| Yes                       | 19      | 2    |
| Chi Square - 0.004, P value - 1.00 |

Table 5 is statistically non-significant. 21 new born out of 87 were admitted in the NICU. Reason for admission in NICU were prematurity, low birth weight, perinatal asphyxia, respiratory distress, neonatal jaundice, central cyanosis, apnoea, neonatal convulsion, shock, meconium aspiration. Major congenital anomaly was observed in 2 new-borns who died subsequently. Most patient with oligohydramnios were in the age group of 21 to 25 years.

Table 6: Perinatal outcome according to age distribution.

| Age distribution | Survived | Died |
|------------------|---------|------|
| Upto 20 years    | 11      | 1    |
| 21-25 years      | 37      | 3    |
| 26-30 years      | 29      | 3    |
| >30 years        | 2       | 1    |
| T test - 0.93, P value - 0.36 |

Table 6 shows perinatal outcome according to age groups.

Table 7: Perinatal outcome according to parity of mother.

| Parity          | Survived | Died |
|-----------------|---------|------|
| Primigravida    | 47      | 3    |
| Multigravida    | 32      | 5    |

Table 7: Perinatal outcome according to parity of mother.

Table 8: Perinatal outcome according to APGAR-5.

| Apgar-5 | Survived | Died |
|---------|---------|------|
| 0       | 0       | 0    |
| 4       | 6       | 2    |
| 5       | 2       | 0    |
| 6       | 3       | 0    |
| 7       | 4       | 0    |
| 8       | 63      | 0    |
| 10      | 1       | 0    |
| Chi Square - 69.04, P value - 0.001 |

Study depicts higher neonatal deaths in age group 21-25 and 26-30 which coincides with higher number of...
patients in the same age group. Data is statistically insignificant.

Table 7 represents perinatal outcome according to parity of mother. Statistically non-significant. Mean gestational age for new born who survived was 37±2 weeks and for those who died was 33±4 weeks. Mean weight of new born who survived was 2.38±0.42kg and for who died 1.37±0.58kg. Mean AFI for the new born who survived was 3.79±1.28 and those who died 2.56±1.50 cm. Table 8 highlights comparison of APGAR scores at 5 minute of birth of baby, among babies who died and survived. Low values of APGAR score was obtained among babies who died. Data is statistically significant.

Table 9: Perinatal outcome according to reason for admission of baby in NICU.

| Reason for admission of baby in NICU | Survived | Died | Chi-square | P value |
|-------------------------------------|----------|------|------------|---------|
|                                     | Count    | %    | Count      | %       |
|                                     |          |      |            |          |
| Prematurity                         |          |      |            |          |
| No                                  | 75       | 94.90| 6          | 75.00   | 4.50   | 0.01 |
| Yes                                 | 4        | 5.10 | 2          | 25.00   |        |      |
| Low birth weight                    |          |      |            |          |
| No                                  | 74       | 93.70| 6          | 75.00   | 3.42   | 0.12 |
| Yes                                 | 5        | 6.30 | 2          | 25.00   |        |      |
| Perinatal Asphyxia                  |          |      |            |          |
| No                                  | 72       | 93.70| 6          | 100.00 | 2.04   | 0.192|
| Yes                                 | 7        | 6.30 | 2          | 0.00    |        |      |
| Neonatal Jaundice                   |          |      |            |          |
| No                                  | 75       | 94.90| 8          | 100.00 | 0.42   | 1.0   |
| Yes                                 | 4        | 5.10 | 0          | 0.00    |        |      |
| Respiratory Distress                |          |      |            |          |
| No                                  | 67       | 86.10| 6          | 87.50  | 0.52   | 0.61  |
| Yes                                 | 12       | 13.90| 2          | 12.50  |        |      |
| Large Baby                          |          |      |            |          |
| No                                  | 78       | 98.70| 8          | 100.00 | 0.10   | 1.0   |
| Yes                                 | 1        | 1.30 | 0          | 0.00    |        |      |
| Refusal to accept Feed             |          |      |            |          |
| No                                  | 77       | 97.50| 7          | 87.50  | 2.17   | 0.25  |
| Yes                                 | 2        | 2.50 | 1          | 12.50  |        |      |
| Central Cyanosis                    |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Apnea                               |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Neonatal Convulsion                 |          |      |            |          |
| No                                  | 78       | 98.70| 6          | 75.00  | 12.29  | 0.02  |
| Yes                                 | 1        | 1.30 | 2          | 25.00  |        |      |
| Diabetic Mother                     |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Oliguria                            |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Hypothermia                         |          |      |            |          |
| No                                  | 78       | 98.70| 7          | 87.50  | 4.08   | 0.18  |
| Yes                                 | 1        | 1.30 | 1          | 12.50  |        |      |
| Hyperthermia                        |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Hypoglycemia                        |          |      |            |          |
| No                                  | 77       | 97.50| 7          | 87.50  | 2.17   | 0.25  |
| Yes                                 | 2        | 2.50 | 1          | 12.50  |        |      |
| Shock                               |          |      |            |          |
| No                                  | 77       | 97.50| 6          | 75.00  | 8.36   | 0.04  |
| Yes                                 | 2        | 2.50 | 2          | 25.00  |        |      |
| Meconium Aspiration                 |          |      |            |          |
| No                                  | 74       | 93.70| 8          | 100.00 | 0.54   | 1.0   |
| Yes                                 | 5        | 6.30 | 0          | 0.00    |        |      |
| Bleeding                            |          |      |            |          |
| No                                  | 78       | 98.70| 8          | 100.00 | 0.10   | 1.0   |
| Yes                                 | 1        | 1.30 | 0          | 0.00    |        |      |
| Diarrhea                            |          |      |            |          |
| No                                  | 79       | 100.00| 8        | 100.00 | -      | -     |
| Yes                                 | 0        | 0.00 | 0          | 0.00    |        |      |
| Major congenital malformation       |          |      |            |          |
| No                                  | 79       | 100.00| 6        | 75.00  | 20.21  | 0.001 |
| Yes                                 | 0        | 0.00 | 2          | 25.00  |        |      |

Chi Square for Prematurity - 4.50, P Value - 0.001, Chi Square for Neonatal- 12.29, P Value - 0.002, Chi Square for Major congenital malformation- 20.21, P Value - 0.007, P value less than 0.05. Statistically significant.
Table 10: Mean of variables.

| Perinatal outcome | Survived | Died |
|-------------------|----------|------|
|                   | Mean     | Standard deviation | Mean | Standard deviation | T test | P value |
| Gestational age (in weeks) | 37 ± 2 | 33 ± 4 | 4.27 | <0.001 |
| Gestational age by USG (in weeks) | 34 ± 3 | 30 ± 4 | 4.27 | <0.0001 |
| AFI (in cm) | 3.79 ± 1.28 | 2.56 ± 1.51 | 2.54 | 0.01 |
| Baby weight (in kg) | 2.38 ± 0.42 | 1.39 ± 0.58 | 6.09 | <0.0001 |

- Mean gestational age for babies who survived-37 weeks and for babies who died 33 weeks
  - T Test value-4.36
  - P value <0.001
  - Statistically significant.

- Mean value for gestational age by USG for babies who survived-34 weeks and died 30 weeks
  - T test-4.27
  - P value <0.001
  - Statistically significant

- Mean value of AFI for babies who survived-3.79cm and died-2.56cm
  - T test-2.54
  - P value-0.01
  - Statistically significant

- Mean value of baby weight for babies who survived-2.38kg and for babies who died-1.39kg
  - T test-6.09
  - P value <0.0001
  - Statistically significant

DISCUSSION

In present study maximum number of women who had oligohydramnios (n=37) belonged to age of 21-25 years (46%). Similar observation was made by a study done by Jayati Nath et al in Medical College and Research center Moradabad (UP) in a study entitled. A clinical study on oligohydramnios in third trimester of pregnancy with special emphasis on perinatal outcome.

In their study, 46.15% women belonged to age group of 21 to 25 years. Studies done by Casey et al, Chauhan et al, Magnan et al found there is no significant relation of age with oligohydramnios. In another study by Nazlima et al 7 in a private hospital at Dhaka 46% women belonged to age group of 21-25 years.7

Mean age

Mean age of women whose newborn survived was 25 years and those whose newborn died was 26 years (with a standard deviation of 4 years. Similar study by Chauhan et al 5, Jun. Zhang et al, Everett et al and Vidyadhar B Bangal et al found that mean maternal age were 23.6±6.5 years, 28.4±6.4 years and 23.8±5.7 year and 22.8±4.2 years respectively.5.8,10

Parity

Most of the primigravida (n=23) had PIH and consequently oligohydramnios. The incidence of oligohydramnios in primigravida in present study was 59.50%. Similar result was obtained in a study done by Modi JY et al where it was 52%. Jagatia et al 12 also reported that incidence of oligohydramnios was more in primigravida (52.0%) which is compatible with Petrozella et al and Jandial et al who showed that incidence of oligohydramnios was 60.0% in primigravida.11,13,14

Influence of antenatal care

In present study oligohydramnios was more common in unbooked cases. (66.66 %). Death of neonates was 12% in unbooked cases as compared with 4% in booked cases. In a study called Clinical study of oligohydramnios, mode of delivery and perinatal outcome , conducted by Kondepagu Madhavi et al at Guntur Government Medical College it was shown that low AFI is marginally more common in unbooked cases compared to booked cases indicating that a proper antenatal care reduces the number of cases with oligohydramnios.15

Mode of delivery

In present study caesarean section was done in 50.5 % of subjects. 49.5 % of subjects were delivered by vaginal route. 7 out of 8 neonatal deaths occurred in subjects, delivered vaginally and only 1 death occurred among babies delivered by LSCS. Percentage of caesarean section in different studies done by Chandra P et al, Casey et al, Sriya et al, Umber et al, Vasvalingam G et al Chate P et al were 76.9 %, 51%, 43.05 %,32%, and 75.6%, 64% respectively. Ahmad and Munin noted a more than 2-fold higher caesarian section rate in oligohydramnios (42%). For avoidance of adverse effects on perinatal outcome in most cases caesarian section was done.21 The higher caesarian rate in present study could be to avoid fetal complication like cord compression, patient’s desire and associated co-morbidities like PIH.

Apgar Score

In present study 26.4% babies had low APGAR score i.e. < 7 in 1-5 minutes . Similar results were found in studies
by Nazlima et al who noted an APGAR score of < 7 at 5 min in 26.9% and Jayati Nath et al who reported APGAR score < 7 at 5 min in 26 %.3,7

**Amount of liquor (clinical judgement)**

45.6% of our cases were clinically found to have inadequate liquor, although by ultrasound criteria all cases included had AFI less than or equal to 5. Out of clinically diagnosed oligohydramnios subjects , 19.4 % was the perinatal death rate as compared to 2% for adequate liquor. This was found be statistically significant in present study.

**Admission in NICU**

In present study there were 21 of 87 admissions in NICU i.e. 24%. This is consistent with the study of Johnson et al, who found 20% of neonates had NICU admission.22 Also agrees with Krishna Jagatia al who also found 20% of neonates had NICU admission.23 Grammel et al, Jandial et al noticed that the rate of NICU admission was found to be 16% and 18% respectively.14,21 In present study 24 % babies were shifted to NICU for various complaints such as prematurity, low birth weight, perinatal asphyxia, neonatal jaundice, respiratory distress, refusal to accept feed, central cyanosis, apnea, neonatal convulsion, oliguria, hyperthermia hypothermia, hypoglycemia, shock, meconium aspiration, bleeding, major congenital malformation. Prematurity was present in 4 and this lead to 50% mortality as 2 of them died. Occurrence of convulsions was the reason for admission of 3 babies in NICU. Mortality because of convulsion was 66.66% as 2 out of 3 babies died.

**Congenital anomaly**

Congenital anomaly of serious nature was present in 2 babies (first case with gross fetal ascites , asymmetrical hydrocephalus with occipital encephalocele and another one with gross fetal ascites with meningomyelecele). There was 100% mortality of babies with gross congenital anomalies in present study. The incidence of congenital anomaly was 6% in present study and 8.5% in study by Guin et al 24 in oligohydramnios group.

**Mean birth weight**

Birth weight has a direct impact on survival rate. In present study mean birth weight was 2.38 ± 0. 42 kg among babies who survived and 1.39 ± 0.58 kg among babies who died. The mean birth weight was 2.4 kg in study by Kondepagut et al.15 Low birth weight (less than 2500 gm.) was present in 65% in the study conducted by Nazlima et al.7

**Mean of amniotic fluid index**

Marked oligohydramnios was associated with higher neonatal mortality. Mean AFI in subjects whose babies survived was 3.77 ± 0.72 cm and those whose babies died was 1.32 ± 0.58 cm. Mean AFI in study by Bangal et al10 , 36.72 ± 4.11 week was found to be mean gestational age. In a study by Amany Hamed Gad Mohamed et al mean weeks of gestation was 38.9 ± 1.3 weeks.28 In other study by Ghike et al mean gestational age was reported as 40.30 ± 1.0 week.32 A possible explanation of above finding might be related to the fact that oligohydramnios with fetal distress which requires an early interference through induction of labor.

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