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Fetomaternal Outcomes in Pregnancy with Oligohydramnios: A Prospective Observational Study

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ABSTRACT

Oligohydramnios, characterized by reduced amniotic fluid volume, poses significant risks to both maternal and fetal health. Understanding its impact on pregnancy outcomes is essential for effective management and intervention. This study aims to investigate the consequences of oligohydramnios on maternal and fetal outcomes throughout full-term pregnancy. A prospective observational study was conducted at a tertiary care hospital in central India. Pregnant females with singleton pregnancies, gestation periods exceeding 28 weeks, cephalic presentation and amniotic fluid index less than 5 cm on ultrasound were included. Data on maternal demographics, risk factors, delivery outcomes, perinatal outcomes and congenital anomalies were collected and analyzed using statistical methods. The study included 100 participants with oligohydramnios. Demographic analysis revealed a varied distribution across age groups, antenatal visit frequencies, parity status and gestational age at delivery. Maternal risk factors associated with oligohydramnios included anemia, hypertensive disorders and post-date pregnancy. Delivery outcomes indicated a significant proportion of cesarean deliveries (57%) and complications such as preterm labor (25%) and meconium-stained liquor (48%). Perinatal outcomes showed high rates of low birth weight (53%), intrauterine growth retardation (15%) and NICU admissions (61%). Congenital anomalies were observed in 13% of cases. Oligohydramnios is associated with adverse maternal and fetal outcomes, including increased cesarean rates, perinatal complications and congenital anomalies. Timely detection and intervention through ultrasonography are crucial for improving maternal morbidity and enhancing fetal prognosis. Comprehensive management strategies should focus on monitoring and addressing maternal risk factors to mitigate the occurrence and impact of oligohydramnios on pregnancy outcomes.

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Key Words
Oligohydramnios, amniotic fluid index, maternal and perinatal outcome, ultrasonography

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INTRODUCTION

The amniotic fluid cavity, filled with liquor amnii, serves as a floating bed created by nature to meet the needs of the fetus. It provides a sterile environment for the fetus to exist and grow, regulates temperature, prevents external harm and reduces the impact of uterine contractions. Oligohydramnios refers to a reduction in the volume of amniotic fluid. The fluid has a slightly basic pH and a low specific gravity of 1.010. A osmolarity level of 250 mOsmol/liter indicates fetal maturity. During the early stages of pregnancy, the fluid is transparent, but as the pregnancy progresses towards the end, it takes on a pale straw color. This change in color is caused by the presence of shed lanugo and epidermal cells from the baby's skin.Sufficient quantity of amniotic fluid is crucial for the proper development of the fetus, as it provides protection against many types of injuries and disturbances. The bacteriostatic qualities of this substance prevent infection and it serves as the main source of nutrients for the developing fetus[1].

During typical pregnancies, the quantity of amniotic fluid progressively rises to around one liter by the 36th week, reaching its maximum capacity[2]. The amount of amniotic fluid increases gradually throughout pregnancy until 36 weeks, at which point the average volume of amniotic fluid remains rather stable at around 700-800 mL. Following 40 weeks, there is a gradual decrease in the amount of amniotic fluid at a pace of 8% per week, resulting in an average volume of approximately 400 mL at 42 weeks. Oligohydramnios is the medical word used to describe the condition of decreased amniotic fluid volume[3]. The study revealed that when the amniotic fluid index is less than 5cm, the occurrence of oligohydramnios is 2.3% after 34 weeks[4]. Oligohydramnios is linked to a higher likelihood of negative perinatal outcomes. Umbilical cord compression during labor is frequently observed in cases of oligohydramnios, which raises the likelihood of a cesarean delivery due to fetal distress and a 5-minute Apgar score below 7.2[5]. The reduction in amniotic fluid volume is linked to an elevated need for labor induction, stillbirth, abnormal fetal cardiac patterns, meconium aspiration syndrome and newborn mortality. The purpose of this study was to investigate the impact of oligohydramnios on mother and fetal outcomes throughout full-term pregnancy.

MATERIAL AND METHODS

This Prospective observational study was conducted at a tertiary care hospital in central India. It included pregnant females with a singleton pregnancy, gestation period of more than 28 weeks, cephalic presentation, amniotic fluid index less than 5 cm on ultrasound and intact membranes. Pregnant females with premature rupture of membranes, malpresentation, previous caesarean section and those requiring elective caesarean section for medical or obstetric conditions unrelated to amniotic fluid variations were excluded from the study. One hundred Women who were believed to have low amniotic fluid volume underwent obstetric ultrasonography to determine the well-being of the foetus, its position, gestational age, the state of the amniotic fluid, the location of the placenta and any defects that may be present. Phelan's approach was used to measure the amniotic fluid index. The maximum depth of the vertical pocket was measured in each quadrant and the aggregate of these measurements determined the value of the amniotic fluid index. Women whose amniotic fluid index is below 5 cm are categorised as having oligohydramnios. These women were attentively observed and the result of their pregnancies was recorded. The data was collected using a pre-designed form, inputted into MS Excel and subsequently evaluated using freely accessible statistical tools online.

RESULT

The demographic profile of study subjects with oligohydramnios, consisting of 100 individuals, revealed a predominance of subjects aged between 21 to 25 years (57%), followed by 26 to 30 years (23%). The majority of subjects had either one (31%) or three or more (32%) antenatal visits. In terms of parity, over half of the subjects were primigravida (52%), while 45% had parity between two to three pregnancies and a small percentage (3%) had four or more pregnancies. Regarding gestational age at delivery, most subjects delivered between 37 to 40 weeks (43%), followed by delivery after 40 weeks (32%), with fewer deliveries occurring between 32 to 36 weeks (20%) and 28 to 31 weeks (5%). Overall, the demographic profile reflects a varied distribution across age groups, antenatal visit frequencies, parity status and gestational age at delivery among individuals with oligohydramnios (Table 1).

Table 1:Demographic profile of study subjects

Demographic profile	Frequency	Percentage (n = 100)
Age Group		
<20 years	4	4
21-25 years	57	57
26-30 years	23	23
31-35 years	13	13
>35 years	3	3
Number of antenatal visits		
0	18	18
1	31	31
2	19	19
≥3	32	32
Parity		
G1	52	52
G2-G3	45	45
≥G4	3	3
Gestational age at delivery		
28-31 weeks	5	5
32-36 weeks	20	20
37-40 weeks	43	43
>40 weeks	32	32

Table 2: Maternal risk factors associated with oligohydramnios

Maternal risk factors	Frequency	Percentage (n = 100)
Anemia	20	20
Hypertensive disorders of pregnancy	22	22
Post date pregnancy	32	32

Table 3: Maternal outcome in Oligohydramnios

Maternal outcome	Frequency	Percentage (n = 100)
Onset of labor		
Spontaneous	55	55
Induced	45	45
Mode of delivery		
Vaginal delivery	43	43
Cesarean section	57	57
Complications during delivery		
Preterm labor	25	25
Abruption	1	1
Atonic PPH	2	2
Retained placenta	2	2

Table 4: Perinatal outcome in Oligohydramnios

Perinatal outcome	Frequency	Percentage
Birth weight<2.5 kg	53	53
Intrauterine growth retardation	15	15
5'APGAR<7	56	56
Meconium stained liquor	48	48
Respiratory distress	31	31
NICU admission	61	61
Intrauterine demise	6	6
Early neonatal death	9	9

Table 5: Congenital anomalies in Oligohydramnios

Congenital anomalies	Frequency
Cleft lip	1
CTEV	1
Skeletal hypoplasia	1
Pelvi-ureteric junction obstruction	1
Renal agenesis	1
multicystic dysplastic kidney disease.	1
Hydronephrosis	2
Gastroschisis	1
Hirschsprung'sdisease	1
Micro cephaly	1
Singleumbilicalartery	1
Hydrocephalus	1
Total	13(13%)

The maternal risk factors associated with oligohydramnios, based on a sample of 100 cases, indicate notable frequencies: anemia was present in 20% of cases, hypertensive disorders of pregnancy in 22% and post-date pregnancy in 32%. This suggests that these factors may potentially contribute to the development or presence of oligohydramnios. Anemia, hypertensive disorders and post-date pregnancy represent significant considerations in assessing and managing oligohydramnios cases, highlighting the importance of monitoring and addressing these maternal health conditions during pregnancy to potentially mitigate the risk of oligohydramnios occurrence (Table 2).

In cases of oligohydramnios, maternal outcomes varied in terms of onset of labor, mode of delivery and complications during delivery. Approximately 55% of cases experienced spontaneous onset of labor, while 45% required induction. Cesarean section was the predominant mode of delivery, accounting for 57% of cases, with vaginal delivery comprising 43%. Complications during delivery were observed in a subset of cases, with 25% experiencing preterm labor, 1% presenting with abruption and 2% each encountering atonic postpartum hemorrhage and retained placenta. These findings underscore the diverse array of maternal outcomes associated with oligohydramnios, highlighting the necessity for comprehensive management strategies to address potential complications and optimize delivery outcomes (Table 3).

Perinatal outcomes associated with oligohydramnios demonstrate several significant findings. Among the cases studied, 53% of newborns had a birth weight of less than 2.5 kg, indicative of low birth weight. Intrauterine growth retardation was observed in 15% of cases, reflecting impaired fetal growth. A significant proportion of newborns, approximately 56%, scored below 7 on the 5-minute Apgar test, suggesting compromised neonatal health. Meconium-stained liquor occurred in 48% of cases, potentially indicating fetal distress during labor. Additionally, 31% of newborns experienced respiratory distress, necessitating medical intervention. A high percentage, 61%, required admission to the Neonatal Intensive Care Unit (NICU), highlighting the severity of perinatal complications associated with oligohydramnios. Tragically, intrauterine demise was reported in 6% of cases, while early neonatal death occurred in 9%, underscoring the gravity of adverse outcomes associated with this condition. These findings underscore the critical importance of vigilant monitoring and comprehensive management strategies to optimize perinatal outcomes in pregnancies complicated by oligohydramnios (Table 4).

Congenital anomalies observed in cases of oligohydramnios were diverse, with each anomaly occurring only once within the studied sample. These anomalies included cleft lip, congenital talipes equinovarus (CTEV), skeletal hypoplasia, pelvi-ureteric junction obstruction, renal agenesis, multicystic dysplastic kidney disease, hydronephrosis, gastroschisis, Hirschsprung's disease, microcephaly, single umbilical artery and hydrocephalus. In total, 13 anomalies were identified, collectively representing 13% of cases. This highlights the spectrum of structural and developmental abnormalities that can coexist with oligohydramnios, necessitating thorough antenatal screening and management approaches to address both the oligohydramnios and associated congenital anomalies (Table 5).

DISCUSSION

The majority of participants in this study were between the ages of 21 and 25, which is similar to the age range found in previous studies conducted by Sharma *et al*.[6] and Gupta *et al*.[7] In this study, it was revealed that 22% of cases of oligohydramnios were linked to hypertensive disorders of pregnancy. A study

conducted by Bansal *et al*.[8] found that 22.2% of cases of oligohydramnios were associated with hypertensive conditions. 32% of the participants in the study experienced a pregnancy that occurred after the expected due date. According to Sharma *et al*.[6], 15.3% of cases of oligohydramnios were found to occur after the expected due date. A study conducted by Ahmer *et al*.[9] found that 20% of pregnancies with oligohydramnios were postdate.

The study revealed that the majority of participants with oligohydramnios gave birth at full term, a conclusion that aligns with Punithavathi *et al*.[10] research. Labor induction was performed in 45% of instances, which aligns with the findings of Sharma *et al*.[6] (44%).

Our study revealed that 57.7% of women diagnosed with oligohydramnios required a Cesarean delivery. Gupta *et al*.[7] confirmed similar findings, stating that 52% of the cases in their study underwent cesarean section. According to a study conducted by Guin *et al*.[11], 42.8% of cases with oligohydramnios were delivered via cesarean section (LSCS). The study was conducted at the same institution as Guin et al. The rate of cesarean delivery in cases of oligohydramnios rose from 42% in 2008 to 57% in 2022. This can be linked to the greater utilization of methods such as Colour Doppler and cardiotocography for antenatal fetal evaluation. Fetal discomfort was the primary reason for a substantial proportion of cesarean sections (55%). According to a study conducted by Bansal *et al*.[8], fetal discomfort was observed in 86.4% of the instances. Preterm labor, occurring in 25% of pregnancies, was the most common problem during labor. By contrast, Punithavathi *et al*.[11] colleagues found that oligohydramnios was present in 30% of premature delivery cases. Meconium-stained amniotic fluid was seen in 48% of the women included in our study. In 56.67% of cases diagnosed with oligohydramnios, the presence of meconium-stained liquid was observed. The authors of the study are Punithavathi *et al*.[11] In this study, oligohydramnios was found to be linked with low birth weight (LBW), very low birth weight (VLBW) and extremely low birth weight (ELBW) in 39.3, 10.7 and 3.7% of cases, respectively. According to Ghimire *et al*.[12], 45% of the subjects were classified as LBW (low birth weight), whereas 4% were classified as VLBW (very low birth weight). Sarmishta *et al*.[13] also found similar results, with 50.9% of patients being classified as LBW. 14.67% of the women had growth limitation. Gupta N et al reported a prevalence of 26% of intrauterine growth restriction (IUGR) in cases of oligohydramnios[7].

In this study, 56% of cases had an APGAR score below 7 at 5 minutes, which is consistent with the findings of Punithavathi *et al*.[10] (56%). Oligohydramnios was found to have a correlation with a higher rate of admissions to the Neonatal Intensive Care Unit (NICU), with a percentage of 61%. This percentage is similar to the findings of Punithavathi *et al*.[10] (53.3%) and Sarmishta *et al*.[13] (48.1%). The most prevalent problem observed in neonates was respiratory distress, with a frequency of 31%. In a study conducted by Gupta *et al*.[7], it was observed that 40% of the cases experienced respiratory distress. Our investigation observed congenital malformations in 13 cases, accounting for 13% of the total. This finding aligns with the research conducted by Gupta *et al*.[7], who reported a 3% prevalence of defects. Among these, there were 5 cases that exhibited abnormalities related to the Genito-urinary system. This finding aligns with the research conducted by Tajinder *et al*.[14], which indicated that kidney malformations were the most prevalent congenital anomalies in cases of oligohydramnios. Guin *et al*.[11] found that 8.5% of cases of anomalies were reported, however Gupta *et al*.[7] reported a lower percentage of 3% anomalies in cases of oligohydramnios. The incidence of early infant fatalities in cases of oligohydramnios was 9% in our study, although Ahmer R et al reported a somewhat lower rate of 7.7%[9].

CONCLUSION

The findings of this study indicate that oligohydramnios is linked to unfavourable outcomes for both the mother and the fetus. This is evident in the increased likelihood of problems during childbirth, the need for surgical procedures and the elevated rates of morbidity and mortality in the postpartum period. Ultrasonography is crucial for promptly detecting, closely monitoring and carefully treating oligohydramnios, a condition characterized by presumed reduced amniotic fluid. Timely detection and prompt intervention are crucial in preventing maternal morbidity and enhancing fetal prognosis.

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