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Corresponding Author
Sudhir Rakholia,
Department of Obstetrics and Gynaecology, Shantaba Medical college and General Hospital, Amreli, Gujarat, India
sudhir.rakholia13@gmail.com

Author Designation
[1,4]Associate Professor
[2,3]Assistant Professor

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Oligohydramnios: Maternal Challenges and Neonatal Consequences

[1]Medha Kanani, [2]Janki M. Kanani, [3]Jayvir Parmar and [4]Sudhir Rakholia

[1-4]Department of Obstetrics and Gynaecology, Shantaba Medical college and General Hospital, Amreli, Gujarat, India

ABSTRACT
Oligohydramnios, characterized by reduced amniotic fluid volume, poses significant maternal and neonatal challenges. The condition, diagnosed via ultrasonography, is linked to complications such as intrauterine growth restriction, pregnancy-induced hypertension (PIH) and increased cesarean deliveries due to fetal distress. A prospective cross-sectional study was conducted over a year, involving 100 pregnant women diagnosed with oligohydramnios at a gestational age of over 36 weeks. Data were collected through obstetric examinations, real-time B-scanning for amniotic fluid index (AFI), and analysis via SPSS. Among the 100 cases, 52% had vaginal deliveries, while 48% underwent cesarean sections. The study found that 24% of newborns required NICU admission, with neonatal complications including respiratory distress, low birth weight, and jaundice. Maternal outcomes showed a higher cesarean rate, especially in PIH cases. Oligohydramnios necessitates vigilant fetal monitoring and appropriate clinical interventions to reduce perinatal morbidity and mortality, emphasizing the importance of individualized care in managing high-risk pregnancies.

INTRODUCTION

Amniotic fluid plays a critical role in ensuring the fetus's health by cushioning it from physical harm, preventing the compression of the umbilical cord and allowing space for movement and growth. Additionally, its bacteriostatic properties help protect the intra-amniotic environment from infections.

Earth is often called the "Blue Planet" due to its surface being covered by nearly 70 percent water. Similarly, the human body is composed of about 70 percent water. Reflecting this natural principle, the fetus in the womb is surrounded by amniotic fluid, also known as liquor amnii. This fluid creates a protective environment for the fetus, shielding it from mechanical and biological harm, supplying necessary nutrients and supporting its growth and movement. The amount of amniotic fluid increases from 25 ml at 10 weeks to approximately 400 ml at 20 weeks[1].

Oligohydramnios is a common pregnancy complication characterized by a reduced amount of amniotic fluid. Evaluating amniotic fluid volume is essential for determining fetal health in utero, with ultrasonography being the most widely used method for this assessment. Oligohydramnios is defined as having a Maximum Vertical Pocket (MVP) of <2 cm from the late mid-trimester or an Amniotic Fluid Index (AFI) of <5 cm or below the 5th percentile, also from the late mid-trimester[2-3].

This condition can result from various factors, including placental insufficiency, fetal anomalies and maternal health problems and is associated with increased risks to both maternal and fetal health[4]. A reduced volume of amniotic fluid is particularly concerning when it coincides with fetal structural anomalies, intrauterine growth restriction, prolonged pregnancies, and poor maternal and neonatal outcomes. When Oligohydramnios is detected at term, labor is typically induced, or a cesarean section is performed[5], even in pregnancies without other complications. Reduced amniotic fluid levels increase the likelihood of cesarean delivery, often due to non-reassuring fetal heart rates[6]. Additional reasons for cesarean sections include fetal malposition, malpresentation and other obstetric factors. This condition also raises the risk of neonatal intensive care unit admissions and increases neonatal morbidity and mortality[7-8].

MATERIALS AND METHODS

A prospective cross-sectional study was conducted in the Obstetrics and Gynecology In-patient Department, Shantaba Medical college and General Hospital, Amreli, Gujarat, India. Over a one-year period, from March 2022 to February 2023. Informed consent was taken for study. The study specifically targeted pregnant women with a gestational age of more than 36 weeks who were diagnosed with oligohydramnios through ultrasonography. The selection of participants was done purposively. Amniotic fluid index (AFI) was measured using real-time B-scanning, which involved summing the vertical diameters of the largest pockets in each of the four quadrants. Oligohydramnios was characterized by an AFI of 5 cm or less. A comprehensive obstetric history was obtained through face-face interviews with the pregnant women. General, systemic and obstetrical examinations were performed and fetal well-being parameters were recorded. The newborn's APGAR score was documented at 1 and 5 minutes post-delivery. Data analysis was performed using SPSS version 19 and statistical significance was determined using the Chi-square test. A P-value of less than 0.05 with a 95% confidence interval (CI) was considered statistically significant.

Inclusion Criteria:

- Antenatal patients in third trimester.
- Intact membrane.
- Singleton pregnancy.
- Above 18 years and below 35 years of age.

Exclusion Criteria:

- Antenatal patients having heart diseases.
- Renal diseases.
- Premature rupture of membranes.
- Multifetal gestation.

RESULTS AND DISCUSSIONS

A total of 100 cases of oligohydramnios that admitted in our hospital were studied. Amniotic fluid volume serves as an indicator of fetal wellbeing. Decreased amniotic fluid volume in pregnancies without premature rupture of membranes reflects a fetus in chronic stress with shunting of blood to its brain, adrenal glands and heart and away from other organs including the kidney. Decreased renal perfusion results in decrease urinary output and oligohydramnios. Thus, the evaluation of Amniotic fluid volume has become an integral component of fetoplacental assessment in pregnancies which are at risk for an adverse outcome of pregnancy.

(Table 1) shows perinatal outcome according to age groups. 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. In India, 20-25 years age group is reproductive age group. In present study, maximum group of the patients were in the 20-25 years age group. This is comparable with the study of abnormal liquor volume by Gita[9]. which suggested no association between parity and oligohydramnios. This is comparable with the study done by Akhter[10] and Gita[9].

Table 1: Perinatal Outcome According to Age Distribution.

AGE	NO.	%
<20 YEARS	9	9 %
20-25 YEARS	51	51 %
>25-30 YEARS	36	36 %
>30 YEARS	5	5 %

Table 2: Distribution of Patients According to Parity

Parity	Number
Primigarvida	61
Multigravida	39

Out of 100 patients LSCS was done in 48 patients for whereas 52 patients delivered vaginally from which one patient needed assisted vaginal delivery.

Table 3: Perinatal Outcome According to Mode of Delivery

Mode of Delivery	Total Number	Survived	Died
VAGINAL	51	44	7
LSCS	48	43	5
ASSISTED	1	1	0

Oligohydramnios was associated with following conditions which may operate as etiological factors

Table 4: Associated Conditions (Aetiology) and Maternal Outcome of Labour

Associated conditions	Vaginal Normal	Assisted (Forceps)	Caesarean	Total
PIH	10	0	19	29
POSTDATISM	16	4	5	25
FEVER	3	0	0	3
IDIOPATHIC	22	1	24	47

(Table 5) is statistically non-significant. 24 new born out of 100 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 patients with oligohydramnios were in the age group of 21-25 years.

Table 5: Perinatal Outcome According to Admission of Baby in NICU.

Admission of baby in NICU	Survived	Died	TOTAL
YES	19	5	24
NO	69	7	76
TOTAL	88	12	100

(Table 6) highlights comparison of APGAR scores at 5 minutes of birth of baby, among babies who died and survived. Low values of APGAR score were obtained among babies who died. Data is statistically significant.

Table 6: Distribution of APGAR Score at Birth at 1 Min and 5 Min.

APGAR SCORE	1 MIN.	5 MIN.	P value
8-10	03	66	<0.001
5-7	76	28	
3-4	20	06	
<3	01	00	

Adverse neonatal outcome was noticed as moderate to severe respiratory depression (32%), LBW (29%), septicemia (8%), congenital malformation (9.37%), neonatal jaundice (42%), admission to NICU (32%), perinatal death (11%).

Table 7: Distribution of Neonates According to Complications

Complication	NO.
MODERATE TO SEVERE RESP. DEPRESSION	32
LBW	29
SEPTICEMIA	8
JAUNDICE	42
CONGENITAL MALFORMATION	9
NICU ADMISSION	32
NEONATAL DEATH	12

In present study maximum number of women who had oligohydramnios (n=51) belonged to age of 21-25 years (51%). Similar observation was made by a study done by Jayati Nath *et al* in Medical College and Research centre Moradabad (UP) in a study entitled[11]. 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 21-25 years. Studies done by Casey *et al,* Chauhan *et al*, Magnan *et al* found there is no significant relation of age with oligohydramnios[12-14]. In another study by Nazlima N *et al* in a private hospital at Dhaka 46% women belonged to age group of 21-25 years[15].

Parity: Most of the primigravida (n=61) had PIH and consequently oligohydramnios. The incidence of oligohydramnios in primigravida in present study was 61%. Similar result was obtained in a study done by Modi[16] where it was 52%. Jagatia[17] 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[16-18-19].

Mode of Delivery: In the current study, 48% of the participants underwent cesarean sections, while 52% delivered vaginally out of which one needed assistance in vaginal delivery. Out of the twelve neonatal deaths recorded, seven occurred in babies delivered vaginally, with only five death among those delivered by cesarean section. The percentage of cesarean deliveries in various studies conducted by Chandra P *et al*., Casey *et al.*, Sriya *et al.*, Umber *et al.*, Vasvalingam G *et al* and Chate P *et al.* were 76.9%, 51%, 43.05%, 32%, 75.6% and 64%, respectively[12,20-24]. Ahmad and Munin[25] observed that the cesarean section rate in cases of oligohydramnios was more than twice as high, at 42%. In most cases, cesarean sections were performed to prevent adverse perinatal outcomes. The higher rate of cesarean deliveries in the present study may be attributed to factors such as the prevention of fetal complications like cord compression, patient preference, and associated comorbidities such as pregnancy-induced hypertension (PIH).

Aetiology and Maternal Outcome: The most frequent cause of oligohydramnios in this study was idiopathic, accounting for 43% of cases, followed by pregnancy-induced hypertension (PIH) at 29%. Operative morbidity was highest among those with PIH, reaching 65.5%. Similar to our findings, idiopathic causes were the most common in the studies by Casey[12] (60.5%) and Magnan[14] (28.5%). Casey BM also reported a high rate of operative deliveries at 71%, which was as higher in our study at 55.5%. As a result, operative morbidity was notably higher.

Admission in NICU: In the current study, 24% of the 100 newborns were admitted to the NICU, which aligns with findings by Johnson *et al.*, who reported a 20% NICU admission rate. Similarly, Krishna Jagatia[26]. also found that 20% of neonates required NICU care. Other

studies by Grammel[27] and Jandial[19] observed NICU admission rates of 16% and 18%, respectively. In this study, 24% of the infants were transferred to the NICU due to various issues such as prematurity, low birth weight, perinatal asphyxia, neonatal jaundice, respiratory distress, feeding difficulties, central cyanosis, apnea, neonatal convulsions, oliguria, temperature instability (hyperthermia or hypothermia), hypoglycemia, shock, meconium aspiration, bleeding and major congenital malformations. Prematurity was a factor in four cases, leading to a 50% mortality rate as two of these infants died. Convulsions were the cause of NICU admission for four babies, with a mortality rate of 50%, as two out of three infants did not survive.

Perinatal Outcome by APGAR Score: In this study, the Apgar scores were recorded at 1 and 5 minutes after birth. It was found that 21% of the babies had a low Apgar score (below 7 at both 1 and 5 minutes) at 1 minute and 6% at 5 minutes. Syria R *et al.* reported a 38.8% incidence of Apgar scores below 7 at 1 minute in their study[21]. Similarly, Casey B et al. found that 6% of infants had an Apgar score of <3 at 5 minutes and out of these, seven out of nine babies died during the neonatal period[12] Jun Zhang *et al.* identified that 15 infants had an Apgar score of less than 7 at 1 minute, and six babies had an Apgar score below 7 at 5 minutes[28].

Neonatal Complications: Oligohydramnios has been independently linked to a higher risk of intrauterine growth restriction[29]. In the current study, 32% of newborns experienced birth asphyxia. Similarly, Brian et al. reported that 48% of babies born to mothers with oligohydramnios had low APGAR [30]. The higher percentage of asphyxiated infants in this study was largely due to their low birth weight. Additionally, a prolonged interval between PROM (premature rupture of membranes) and delivery (62.5%) was identified as a significant factor contributing to birth asphyxia in cases of oligohydramnios secondary to PROM. Septicemia was observed in 8% of newborns, all of whom had oligohydramnios caused by PROM. Neonatal jaundice was detected in 42% of the newborns, with the majority being low birth weight infants. The study also found that over 9% of the infants had birth defects, with 5% presenting gross congenital anomalies and 4% with minor defects. In another study, the overall rate of fetal malformations was 11%, with lethal malformations accounting for 4.8%. The perinatal mortality rate in this study was 12%, which is comparable to the 16% rate reported by Golan[7]. The leading causes of death were birth asphyxia (57%) and septicemia (21%). Similar results were observed by Padmaja *et al.*, who reported perinatal mortality due to RDS (53%) and sepsis (27%)[31].

CONCLUSION

Oligohydramnios requires careful monitoring and management during pregnancy, especially in cases with intrauterine growth restriction, pregnancy-induced hypertension, or post-term pregnancies. It is linked to higher rates of low birth weight, fetal distress, and cesarean sections. The amniotic fluid index (AFI) is crucial for assessing fetal well-being, with lower levels indicating a higher risk of complications. While cesarean delivery rates are high, decisions should be balanced to avoid unnecessary risks to the mother. Effective management of oligohydramnios is essential to improve perinatal outcomes.

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