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Original Research Article

Third trimester oligohydramnios and pregnancy outcome in a tertiary care hospital

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ABSTRACT

Background: Amniotic fluid has an important function in achieving a successful pregnancy outcome. An amniotic fluid Index of <08 cm is considered oligohydramnios and is expected to result in an adverse pregnancy outcome. Many of its etiologies are preventable and treatable with early diagnosis and timely intervention.

Methods: The present retrospective, cross-sectional study was conducted in the Department of Obstetrics and Gynecology, Mamata Medical College, Khammam, Telangana, from 1st January 2024 to 31st December 2024, including all eligible oligohydramnios cases. Detailed patient data were collected from the Department of Medical Records, analyzed using standard descriptive statistics, and the significance of the correlation of the degree of oligohydramnios on pregnancy outcome was determined using p-values in Microsoft Excel 21. Results were discussed critically and compared with those of other studies.

Results: A total of 74 oligohydramnios cases constituted an incidence of 05.90%. Mean age was 24.20±04.21years, 79.73% caesarean delivery, <7 Apgar score at 01 min in 60.81%, and 58.11% at 05 min, 56.76% low birth weight, and neonatal intensive care unit (NICU) admission was 56.76%. Significant differences were found in mode of delivery, meconium-stained liquor, Apgar score, and NICU admission between the two groups of oligohydramnios.

Conclusions: Adverse pregnancy outcome in the third trimester oligohydramnios can be reduced, with adequate antenatal care, though not completely preventable. The study aimed to determine the incidence of oligohydramnios in the third trimester of pregnancy, the contributing factors prevalent in the region, and the effect on pregnancy outcome.

Keywords: Amniotic fluid, Apgar score, Caesarean delivery, NICU, Pregnancy outcome, Third trimester

INTRODUCTION

Amniotic fluid plays an important role in achieving the aim of every pregnancy to get a healthy baby out of a healthy mother. It is essential for fetal protection, development, and successful pregnancy outcomes. Though different sources are there, it is primarily produced (500-700 ml/day) by fetal urine in the third trimester.¹ Cushioning of the fetus and protection from injury, prevention of cord compression, musculoskeletal and lung development are the main functions of amniotic fluid at this stage of

pregnancy.² The amount of liquor amnii is assessed clinically and confirmed by ultrasonography (USG). The addition of the height of the amniotic fluid packets without umbilical cord in each of four quadrants of the amniotic cavity, with the maternal umbilicus as the centre, measured in centimeters by USG, is the amniotic fluid index (AFI). Deficient amount of liquor was first coined by Moore and Coyle in 1990 as oligohydramnios with AFI <5th percentile for gestational age (GA). Between 28-40 weeks of pregnancy, an AFI of 05-24cm is considered normal. Phelan et al defined severe oligohydramnios as AFI < 05cm or the largest single vertical pocket less than 2 cm,

and AFI between 5-8 cm as borderline oligohydramnios.^{3,4} Though the incidence of oligohydramnios depends on the study population and gestational age, it is about 01-05% in the third trimester of pregnancy.^{5,6} Etiology in majority of cases are of idiopathic or premature rupture of membrane, and others being uteroplacental insufficiency, chronic hypertension, hypertensive disorder of pregnancy, poor nutrition, dehydration, vasculopathies like in diabetes mellitus, psoriasis, antiphospholipid antibody syndrome, congenital cyanotic heart disease, postdated pregnancy and fetal congenital anomalies, like obstructive uropathy or absence of fetal kidneys or reduced renal perfusion.⁷⁻⁹ Third trimester oligohydramnios is associated with intrauterine growth restriction (IUGR), preterm birth, fetal distress and death, intrapartum fetal distress, birth asphyxia, meconium-stained liquor, low Apgar score, need for neonatal intensive care unit (NICU), neonatal death, and Late complications of birth asphyxia and meconium aspiration syndrome.^{10,11} There is an increased incidence of induction of labor, operative vaginal delivery, and lower segment caesarean section (LSCS), causing maternal morbidity.¹² Oligohydramnios is a serious complication of pregnancy affecting maternal and perinatal outcomes. Detected during a regular antenatal check-up, it must be evaluated and managed effectively for a better pregnancy outcome. The present study aims to find the incidence of oligohydramnios in the third trimester of pregnancy, contributing factors for it in the region, and its effect on maternal, antenatal, and perinatal outcomes.

METHODS

This retrospective cross-sectional study was carried out in the Department of Obstetrics and Gynecology of a tertiary care hospital from 1st January to 31st December 2024, including eligible women with oligohydramnios admitted for delivery. All the data was collected from the Department of Medical Records of the institution, after taking Institutional Ethical Committee permission and verbal consent from patients. Inclusion criteria were pregnancy ≥ 34 weeks of gestation with AFI < 8 cm, singleton pregnancy with cephalic presentation and intact membrane, who delivered within a week of admission. Exclusion criteria were pregnancy < 34 weeks of gestation, multifetal pregnancy, prior caesarean section or hysterotomy, Malpresentation, and ruptured membranes. All the eligible women were admitted to the hospital after counselling. Informed consent was taken for management as per institutional protocol.

Considering the incidence of 05.10% in the previous year, sample size was calculated with the formula $n = Z^2 \times p \times (1-p/e^2)$, where n is the estimated sample size; $Z=1.96$ is the constant used as 05% level of significance; ' p ' is the prevalence of the pathology; and ' e ' is the margin of error taken as 05%. Detailed history was noted about complaints and duration, perception of fetal movement, booking status, history of present pregnancy, obstetric history, menstrual history, past medical and surgical history, and

personal and family history. General and systemic examination and obstetric examination findings were collected. Reports of relevant investigations in pregnancy like hemogram, blood group and Rh typing, blood sugar, thyroid profile, renal and liver functions, and viral markers for Human immunodeficiency virus and hepatitis B virus, and urine routine and culture, and sensitivity reports were noted, as was done following institutional protocol. Reports of non-stress test (NST) and Obstetric ultrasonography (USG) with special reference to AFI, by grey scale, as well as fetal Doppler flow and maternal uterine arteries Doppler study, were found in all cases. Patients were managed according to institutional protocol. Information about the type of delivery and indication of interference, if any, gestational age at delivery, fetal parameters like Apgar score at 01 and 05 minutes, color and consistency of liquor amnii, birth weight, NICU admission, if any, and outcome were reported. Death cases, including stillbirth and neonatal death, were noted. Maternal outcome was assessed by time and type of delivery, morbidity, or mortality, if any. All the relevant data were collected, compiled, and analyzed by standard descriptive statistics, frequency table, and percentage for categorical variables, with mean, and standard deviation. Interventional analysis, by finding the p value, was used to assess the correlations between the degree of oligohydramnios and pregnancy outcome, taking p -value of < 0.05 as significant. Microsoft Excel 21 was used as a tool for statistical analysis. The observation was discussed critically and with the findings of other studies.

RESULTS

The hospital being located in a district headquarters, all the patients were from rural areas, illiterate or had studied up to primary school, either housewives or daily laborers and belonged to the low socio-economic category. Antenatal care and nutritional supplementation were inadequate in all cases, and none of them were booked to this institution. Calculated sample size was $72.96=73$, and a total of 74 eligible cases were included in the study, considering the inclusion and exclusion criteria. There were 74 cases of oligohydramnios (5.90%) among 1254 deliveries over the study period of one year. The demographic and obstetric variables of the patients are presented in Table 1.

The mean age of women in the study group was 24.20 ± 04.21 years, and among them, the majority (56.76%) were in the age group of 20-25 years. There were 55.41% Multigravida with or without any living issue. Mean gestational age for all cases was 36.1101.27 weeks. Gestational age of 34 to < 37 weeks constituted the highest proportion (59.46%) of oligohydramnios cases, and there was not a single case with > 40 weeks of gestation, which is a natural cause of oligohydramnios due to placental ageing. There was not a single case of fetal congenital anomaly as a contributing factor for oligohydramnios. Mild or borderline oligohydramnios (AFI $5-8$ cm) was present in 35.14% of cases, whereas 64.86% of cases had severe oligohydramnios (AFI < 5 cm). 40.54% of

asymptomatic cases were diagnosed during antenatal checkups. Cases referred to a tertiary care facility after being diagnosed constituted 12.81%. 08 (10.81%) patients were already in labor.

Table 1: Demographic and clinical characteristics of women.

Variables	Number	Percentage
Age (years)		
<20	6	8.11
20-25	42	56.76
>25-30	20	27.02
>30	6	8.11
Parity		
Primigravida	33	44.59
Multigravida	41	55.41
Gestational age at delivery (weeks)		
4-<37	44	59.46
37-40	30	40.54
>40	0	0.00
Complaints		
No complaint	30	40.54
Less abdominal distension	5	6.76
Reduced FM*	21	28.38
Absent FM	1	1.35
Referred case	9	12.16
Bleeding per vagina	8	10.81
AFI (centimeter)**		
<03	10	13.51
03-<05	38	51.35
05-<08	26	35.14

*Fetal movement, **amniotic fluid index

Table 2: Associated complications in pregnancy.

Variables	Number (n=74)	Percentage
HDP*	14	18.92
Fever	08	10.81
Vomiting	04	05.41
Uterine anomaly	02	02.70
Congenital heart disease	01	01.35
Thyroid dysfunction	12	16.22
Anemia	24	32.43
Urinary tract infection	06	08.11
Nil	17	22.97

*Hypertensive disorder of pregnancy

No cause for oligohydramnios was found in 17 (22.97%) cases, and hypertensive disorder of pregnancy with different degrees of severity as an etiological factor was present in 14 (18.92%) of cases. Anemia, as malnutrition, was present in 32.43% of cases. Details of the factors responsible for the pathology are depicted in Table 2.

The majority of cases had pre-labor LSCS (52.70%) because of very severe oligohydramnios or already in fetal distress or maternal indication of the pathology causing oligohydramnios. Delivery by LSCS was needed in 79.73% of cases due to the cause or effect of oligohydramnios, out of which 59.46% were done under emergency indications and 20.27% cases were done as elective cases. Instrumental delivery was needed in 05.41% of total deliveries of 74 babies. The details of labor delivery are presented in Table 3.

Table 3: Type of labor and delivery.

Variables	Number	Percentage
Onset of labour		
Spontaneous	15	20.27
Induced	20	20.03
Pre-labour LSCS*	39	52.70
Vaginal delivery		
Spontaneous	11	14.86
Instrumental	4	5.41
LSCS	59	79.73
Elective	15	20.27
Emergency	44	59.46

*LSCS - lower segment caesarean section

Table 4: Newborn data.

Variables	Number	Percentage
Apgar score at 1 minute		
<7	45	60.81
≥7	29	39.19
Apgar score at 5 minutes		
<7	43	58.11
≥7	31	41.89
Meconium-stained liquor	31	41.89
Birth weight (kg)		
<1.5	6	8.11
1.5-2.0	9	12.16
>2.0-<2.5	27	36.49
≥2.5	32	43.24
NICU admission (total)	42	56.76
Observation	12	16.22
Respiratory distress	18	24.32
Severe IUGR	12	16.22
Death (total)*	3	4.05
Stillbirth	1	1.35
Neonatal death	2	2.70

*Includes one case of stillbirth

Meconium-stained liquor was present in 41.89% of all cases. There was one case of stillbirth that was reported with loss of fetal movement, and was confirmed by USG, on reporting to the hospital. Apgar score at five minutes was ≥07 in 41.89% of babies, which was 39.19% at 01 minute, indicating good management of labor, delivery, and resuscitation of newborns. NICU admission was required in 56.76% of newborns, out of which 16.22%

were for observation only. Low birth weight of <02.50 kg was in 42 (56.76%) newborn babies. Despite all efforts, we had two neonatal death cases because of prematurity, IUGR, and meconium aspiration. Neonatal data is presented in Table 4.

The pregnancy outcome in different variables and corresponding AFI, categorized into severe (<05 cm) and borderline (05-<08 cm) oligohydramnios, and the calculated p-value have been depicted in Table 5.

Table 5: Correlation of AFI and pregnancy outcome.

Variables	AFI <05 (n = 48)	AFI ≥05 (n = 26)	Total	Chi-square	P value
Mode of delivery					
Vaginal	6	9	15	5.104	0.0239
Spontaneous	3	8	11		
Instrumental	3	1	4		
LSCS*	42	17	59		
Meconium-stained liquor (MSLA)					
Yes	28	3	31	30.289	0.0001
No	11	32	43		
Apgar score at 5 min					
<7	25	18	43	6.145	0.0132
≥7	9	22	31		
Birth weight (kg)					
<2.50	25	17	42	1.212	0.2702
≥2.50	23	9	32		
NICU admission					
Yes	32	10	42	5.46	0.019
No	16	16	32		

*Lower segment caesarean section, **Meconium stain liquor amnii.

No statistical significance was found in newborn birth weight between severe and borderline oligohydramnios cases. P value in mode of delivery, meconium stain liquor, Apgar score, and NICU admission showed a significant difference between the two groups of oligohydramnios.

DISCUSSION

The sole aim of every pregnancy is to get a healthy baby out of a healthy mother. Liquor amnii, or amniotic fluid, plays a major role during pregnancy and labor in achieving this goal. That is why estimating AFI is very important during pregnancy. We included ≥34 weeks of gestation, an unscarred uterus, and cephalic presentation to avoid bias in the effect of extreme prematurity and high incidence of LSCS. This single-centre one-year study shows a prevalence of oligohydramnios in the third trimester of pregnancy as 05.90% which is 05.2% by Rahman et al and 08.5% by Sunaina et al and 02.3% by Nager et al.¹³⁻¹⁵ The prevalence of the pathology depends on factors like socioeconomic status, education and awareness,

availability of health care facilities, and presence of associated pregnancy complications. Almost all women in our study belonged to rural areas, were practically uneducated, unaware of the value of antenatal checkups, had low economic status and were unbooked cases. The mean maternal age of 24.20±04.21 years in our study, which is 23 years as reported by Nager et al and 23.66 years by Moses et al.^{15,16} Multigravida cases constituted 44 (55.41%) compared to 71% by Naykodi et al.¹⁷ Higher incidence may be because of more negligence, lower nutrition, continuing breastfeeding to the previous baby, and the prevalent social culture of the first pregnancy and delivery in the parental home under the care of her mother. Women in the majority were diagnosed on antenatal consultation in 40.54% of cases without any complaint, and 28.38% complained of reduced fetal movement. These were 12.2% and 58.9% cases in the study by Nager et al.¹⁵ On associated pregnancy complication as the etiology of Oligohydramnios, our study found HDP of various severity in the majority (18.92%), compared to 17% by Molla et al and 21% by Shaveta et al.^{18,19} Moderate to severe anemia in 32.43% of cases was found in the present study, which was 44.03% in the study by Batool et al.²⁰ Idiopathic oligohydramnios was found in 22.97% of cases in our study, though all investigations were not done due to the economic constraints of the patients. Moses et al found 32% cases as idiopathic oligohydramnios in the third trimester.¹⁶ Our study reported spontaneous onset of labor, induction, and prelabor LSCS without induction in 20.27%, 20.03% and 52.70% of cases, compared to 17.00%, 61.00% and 22% respectively by Madhurya et al, and 17.60%, 75.4% and 07.00% respectively by Shiferaw MA.^{21,22} Not only the institutional protocol for management, but also the patient's opinion affects the decision-making for the type of delivery. Severe oligohydramnios and prematurity were seen to compromise the fetus, and in some cases, the patient and attendants' unwillingness to try vaginal delivery was the reason for direct LSCS. Out of 20.27% cases of vaginal delivery, 14.86% cases were delivered spontaneously, whereas instrumental delivery was needed in 05.41% of cases in the present study. Fetal distress or prematurity was the indication for instrumental delivery using outlet forceps as per institutional policy. LSCS was done in 79.73% of cases, with elective being 20.27% and emergency being 59.46%. Batool A reported 81.6% LSCS and 18.4% of vaginal deliveries in a similar study.²⁰ The present study found severe oligohydramnios (AFI=<5cm.) in 64.86% of cases compared to 71.00% as reported by Moses et al.¹⁶ The present study showed meconium-stained liquor amnii as one of the indicators of fetal distress in 41.89% of cases, a low Apgar score of <07 at 5 min in 58.11%, NICU admission in 56.76% and low birth weight (<02.50 kg) in 56.76% of cases. Meconium stain liquor in 32%, low birth weight baby in 48.93%, Apgar score of <7 at 5min in 48.93% were reported by Fatema et al.¹⁰ Moses et al reported 49.33% of cases with an Apgar score of ≤7 at 5 min and Naykodi et al reported 69.6% cases of low birth weight babies in her study.^{16,17} Dutta et al found in oligohydramnios cases, Apgar score of <7 at

one minute was 78% compared to 60.81% in the present study, and NICU admission was 60.0% and small for gestational age baby constituted 56%.¹¹ Variation in the effect of oligohydramnios on pregnancy outcome depends on the severity of the pathology, patient profile and the status of the health care facility. Statistically significant difference was found in mode of delivery, meconium stain liquor, Apgar score, and NICU admission between severe and borderline oligohydramnios cases in the present study, with p values of 0.023, 0.001, 0.013 and 0.019, respectively, which are <0.05. Newborn birth weight did not show a significant difference between the two groups in the present study. Singh et al reported low birth weight of 54.28% with p value <0.001 and NICU admissions of 20% with p value <0.01 no difference in Apgar score in her study.²³ Report by Fatima et al shows that though the number of low birth weight babies was high (48.93%) in her study, it was not statistically significant.¹⁰ which is similar to our study.

CONCLUSION

Amniotic fluid has a major role in affecting a successful pregnancy outcome. Severe oligohydramnios is associated with higher rates of LSCS, fetal distress, low Apgar scores, and NICU admissions. Regular antenatal care, prevention of avoidable contributing factors for oligohydramnios, early detection, adequate and timely management can reduce its adverse effects.

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