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Pregnancy Outcomes in Pregnant Women with Oligohydramnios

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ABSTRACT

Background: Oligohydramnios refers to reduced amniotic fluid volume during pregnancy and is associated with various maternal and fetal complications. It can lead to serious neonatal outcomes including meconium aspiration syndrome, respiratory distress syndrome, and low birth weight. Understanding the frequency of these complications is essential for improving prenatal management and neonatal care. **Objective:** To determine the frequency of adverse pregnancy outcomes in pregnant patients with oligohydramnios. **Study Design:** Descriptive cross sectional study. **Duration and Place of Study:** This study was conducted from September 2024 to March 2025 in the Department of Obstetrics and Gynecology, Ayub Teaching Hospital, Abbottabad. **Methodology:** A total of 113 pregnant women aged 18 to 40 years with singleton pregnancies and gestational age of 37 weeks or more were included. Oligohydramnios was defined as amniotic fluid index of 5.0 centimeters or less on ultrasound examination. All participants were followed until delivery and neonatal outcomes were assessed. Data analysis was performed using chi square test and Fischer exact test with p value of 0.05 or less considered statistically significant. **Results:** The mean age of participants was 28.65 years and mean gestational age was 39.06 weeks. Meconium aspiration syndrome was observed in 29 cases (25.70 percent), respiratory distress syndrome in 45 neonates (39.80 percent), and low birth weight in 52 babies (46.00 percent). Low birth weight showed significant association with maternal age of 30 years or less (54.5 percent, $p = 0.031$), parity of 2 or less (54.9 percent, $p = 0.013$), and poor socioeconomic status (47.9 percent, $p = 0.029$). **Conclusion:** Oligohydramnios in pregnant women is associated with high frequency of adverse neonatal outcomes.

INTRODUCTION

Oligohydramnios is a condition which refers to the low amount of amniotic fluid present in the surrounding areas of the baby during the time of pregnancy.[1] In most cases, it could occur at any time during the time of pregnancy but is normally common during the third trimester.[2] In most instances, it has several causes, including conditions associated with the woman such as high blood pressure, diabetic conditions, and placental insufficiency, while on the other hand, it can also result due to reasons such as urinary tract problems, genetics, and poor growth associated with the unborn baby.[3] In most instances, the severity associated with oligohydramnios varies and could result in complications to both the woman and the unborn. In most instances, amniotic fluid is normally determined by ultrasound techniques.[4]

Conditions surrounding pregnancy, which could arise due to oligohydramnios, could potentially be life-threatening and could also affect various factors relating to the health of the unborn. Among the different complications, one of the most concerning in the case of oligohydramnios is meconium aspiration syndrome.[5] In such situations, the fetus is observed to inhale meconium, which is the first stool, into the lungs.[5] Often, in pregnancies complicated by oligohydramnios, the fetus tends to pass meconium earlier than expected due to the insufficient amount of amniotic fluid.[6] Another common outcome of these pregnancies is the potential development of respiratory distress syndrome (RDS) in the mother.[7] RDS, which frequently occurs in women with oligohydramnios, results from the underdevelopment of the lungs and a lack of surfactants.[7] RDS can affect not only women with oligohydramnios but also those who deliver prematurely.

The lack of amniotic fluid, which is a characteristic of oligohydramnios, is also linked to the risk of prematurity and, consequently, RDS.[8] In addition, women who develop oligohydramnios are also at high likelihood of giving birth to children who have a low birth weight.[9] Inability to generate enough amniotic fluid often limits the growth of the unborn infant, often leading to intrauterine growth restriction (IUGR), which is often associated with infants of low birth weight.[10]

In a study by Talesara H et al. has shown the frequency of meconium aspiration was 12%, respiratory distress syndrome 30% and low birth weight was 39% in patients with oligohydramnios.[11]

Doing such a study is very important in Abbottabad, given the fact that the area has a very unique population and health conditions. In fact, not much work has been conducted on the importance of such a study among women with oligohydramnios, and it is very essential to understand the impacts it has on women. Moreover, Abbottabad is a place where there are rural and urban areas, and such a study will enable an individual to understand if it has an impact on rural and urban women. In fact, the health facilities provided by such areas, including Abbottabad, may not have the ability to deal with complications such as meconium aspiration syndrome and respiratory distress syndrome.

METHODOLOGY

The study was conducted between September 15, 2024, and March 15, 2025, at the Department of Obstetrics and Gynecology, Ayub Teaching Hospital, Abbottabad. The sample size of 113 participants was determined by using WHO sample size software with a confidence interval of 95%, and the margin of error is 6%, and the calculated/measured incidence of meconium aspiration syndrome is 12% among women having oligohydramnios.[11] Non-probability consecutive sampling technique is used to select the participants.

Inclusion criteria were women between 18 and 40 years of age, singleton pregnancy proven by ultrasound, gestational age ≥ 37 weeks by last menstrual period, and any parity. Oligohydramnios was present if amniotic fluid index ≤ 5.0 cm by ultrasound. Exclusion criteria were gestational hypertension, ruptured membranes, placental abruption, intrauterine defects proven by ultrasound, and underlying renal disease.

Prior to initiating data retrieval, ethics approval and consent were obtained. All demographic information, such as patient age, gestational age, parity, BMI, socioeconomic status, educational attainment, and residential status, was noted on entry into the study. All women were followed up until the time of delivery under the care of a consultant gynecologist having 3y post-fellowship experience.

Outcome, such as meconium aspiration syndrome, respiratory distress syndrome, and low birth weight, was noted by using a proforma. Meconium aspiration syndrome was assumed if there were coarse, crunching noises heard over the infant's chest on clinical examination, or if there were asymmetric and patchy pulmonary opacities with pleural effusions on chest X-ray. Respiratory distress syndrome was assumed if it produced mild to moderate respiratory difficulty (Downe's score 3-6), and required $FiO2<0.6$, when apnea of prematurity occurred >2 events in 12 hours, but did not require resuscitation. Low birth weight was assumed if birth weight is >2.5kg.

Data analysis was conducted using SPSS version 26. Percentages and frequencies were used to define categorical variables, and the variables included socioeconomic status, residential status, meconium aspiration, respiratory distress syndrome and low birth weight. In variables such as age, gestational age, parity and BMI, mean and SD or median and IQR were used. Stratification of adverse events is conducted by demographic variables. Moreover, post-stratification chi-square and Fischer's exact test were used. The level of statistical significance was a p-value of ≤ 0.05.

RESULTS

The study examined 113 pregnant women with oligohydramnios having mean age of 28.65 ± 6.88 years and mean gestational age was 39.06 ± 1.46 weeks (as shown in Table-I). The average BMI of participants were 27.76 ± 2.93 kg/m^2 and mean parity was found 2.03 ± 1.93. In terms of socioeconomic distribution, poor socioeconomic status was observed in 48 patients (42.5%), while middle class comprised 40 patients (35.4%) and rich category included 25 patients (22.1%). Regarding residence, rural areas had 59 patients (52.2%) whereas urban residence was seen in 54 patients (47.8%) (as shown in Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	28.65 ± 6.88
Gestational Age (weeks)	39.06 ± 1.46
BMI (kg/m^2)	27.76 ± 2.93
Parity	2.03 ± 1.93
Socioeconomic Status	
Poor n (%)	48 (42.5%)
Middle n (%)	40 (35.4%)
Rich n (%)	25 (22.1%)
Residence Status	
Rural n (%)	59 (52.2%)
Urban n (%)	54 (47.8%)

The neonatal complications frequency was assessed among these pregnancies. Meconium aspiration was present in 29 cases (25.70%) while it was absent in 84 cases (74.30%). Respiratory distress syndrome was observed in 45 neonates (39.80%) and was not present in 68 neonates (60.20%). Low birth weight was found in 52 babies (46.00%) whereas normal birth weight was recorded in 61 babies (54.00%) (as shown in Table-II).

Table II

Frequency of Neonatal Complications Among Pregnant Women with Oligohydramnios

Neonatal Complications	Frequency	%age
Meconium Aspiration		
Yes	29	25.70%
No	84	74.30%
Total	113	100%
Respiratory Distress Syndrome		
Yes	45	39.80%
No	68	60.20%
Total	113	100%
Low Birth Weight		
Yes	52	46.00%
No	61	54.00%
Total	113	100%

When meconium aspiration association was analyzed with demographic factors, no statistically significant associations was found. In patients aged ≤30 years, meconium aspiration occurred in 14 cases (21.2%) compared to 15 cases (31.9%) in those aged >30 years (p=0.199). For gestational age ≤39 weeks, 17 cases

(26.6%) had meconium aspiration versus 12 cases (24.5%) in >39 weeks group (p=0.803). BMI ≤25 kg/m² group showed 5 cases (16.7%) while BMI >25 kg/m² had 24 cases (28.9%) with p=0.229. Parity ≤2 demonstrated 14 cases (19.7%) compared to 15 cases (35.7%) in parity >2 (p=0.060). Poor socioeconomic status had 11 cases (22.9%), middle class 9 cases (22.5%), and rich category 9 cases (36.0%) with p=0.407. Rural residence showed 13 cases (22.0%) while urban had 16 cases (29.6%) with p=0.356 (as shown in Table-III).

Table III
Association of Meconium Aspiration with Demographic Factors

Demographic Factors		Meconium Aspiration		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	14 (21.2%)	52 (78.8%)	0.199
	>30	15 (31.9%)	32 (68.1%)	
Gestational Age (weeks)	≤39	17 (26.6%)	47 (73.4%)	0.803
	>39	12 (24.5%)	37 (75.5%)	
BMI (kg/m²)	≤25	5 (16.7%)	25 (83.3%)	0.229*
	>25	24 (28.9%)	59 (71.1%)	
Parity	≤2	14 (19.7%)	57 (80.3%)	0.060
	>2	15 (35.7%)	27 (64.3%)	
Socioeconomic Status	Poor	11 (22.9%)	37 (77.1%)	0.407
	Middle	9 (22.5%)	31 (77.5%)	
	Rich	9 (36.0%)	16 (64.0%)	
Residence Status	Rural	13 (22.0%)	46 (78.0%)	0.356
	Urban	16 (29.6%)	38 (70.4%)	

*Fischer Exact Test

The association of respiratory distress syndrome with demographic variables also revealed no significant findings. Age ≤30 years group had 23 cases (34.8%) versus 22 cases (46.8%) in >30 years (p=0.201). Gestational age ≤39 weeks showed 24 cases (37.5%) compared to 21 cases (42.9%) in >39 weeks (p=0.564). For BMI categories, ≤25 kg/m² had 13 cases (43.3%) and >25 kg/m² had 32 cases (38.6%) with p=0.647. Parity ≤2 demonstrated 26 cases (36.6%) versus 19 cases (45.2%) in parity >2 (p=0.366). Socioeconomic groups showed poor 20 cases (41.7%), middle 17 cases (42.5%), and rich 8 cases (32.0%) with p=0.662. Rural residence had 21 cases (35.6%) while urban residence had 24 cases (44.4%) with p=0.337 (as shown in Table-IV).

Table IV
Association of Respiratory Distress Syndrome with Demographic Factors

Demographic Factors		Respiratory Distress Syndrome		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	23 (34.8%)	43 (65.2%)	0.201
	>30	22 (46.8%)	25 (53.2%)	
Gestational Age (weeks)	≤39	24 (37.5%)	40 (62.5%)	0.564
	>39	21 (42.9%)	28 (57.1%)	
BMI (kg/m²)	≤25	13 (43.3%)	17 (56.7%)	0.647
	>25	32 (38.6%)	51 (61.4%)	
Parity	≤2	26 (36.6%)	45 (63.4%)	0.366
	>2	19 (45.2%)	23 (54.8%)	
Socioeconomic Status	Poor	20 (41.7%)	28 (58.3%)	0.662
	Middle	17 (42.5%)	23 (57.5%)	
	Rich	8 (32.0%)	17 (68.0%)	
Residence Status	Rural	21 (35.6%)	38 (64.4%)	0.337
	Urban	24 (44.4%)	30 (55.6%)	

Low birth weight association with demographic factors revealed some statistically significant results. Age ≤30 years showed 36 cases (54.5%) compared to 16 cases (34.0%) in >30 years with significant p=0.031. Gestational age ≤39 weeks had 31 cases (48.4%) versus 21 cases (42.9%) in >39 weeks (p=0.555). BMI ≤25 kg/m² group showed 12 cases (40.0%) while >25 kg/m² had 40 cases (48.2%) with p=0.440. Parity ≤2 demonstrated significantly higher occurrence with 39 cases (54.9%) compared to 13 cases (31.0%) in parity >2 (p=0.013). Socioeconomic status showed significant association where poor had 23 cases (47.9%), middle class 23 cases (57.5%), and rich only 6 cases (24.0%) with p=0.029. Rural residence showed 24 cases (40.7%) while urban had 28 cases (51.9%) with non-significant p=0.234 (as shown in Table-V).

Table V
Association of Low Birth Weight with Demographic Factors

Demographic Factors		Low Birth Weight		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	36 (54.5%)	30 (45.5%)	0.031
	>30	16 (34.0%)	31 (66.0%)	
Gestational Age (weeks)	≤39	31 (48.4%)	33 (51.6%)	0.555
	>39	21 (42.9%)	28 (57.1%)	
BMI (kg/m²)	≤25	12 (40.0%)	18 (60.0%)	0.440
	>25	40 (48.2%)	43 (51.8%)	
Parity	≤2	39 (54.9%)	32 (45.1%)	0.013
	>2	13 (31.0%)	29 (69.0%)	
Socioeconomic Status	Poor	23 (47.9%)	25 (52.1%)	0.029
	Middle	23 (57.5%)	17 (42.5%)	
	Rich	6 (24.0%)	19 (76.0%)	
Residence Status	Rural	24 (40.7%)	35 (59.3%)	0.234
	Urban	28 (51.9%)	26 (48.1%)	

DISCUSSION

In current study, meconium aspiration was observed in 29 cases (25.70%) among neonates born to mothers with oligohydramnios. This elevated rate can be explained by reduced amniotic fluid volume which leads to umbilical cord compression and subsequent fetal hypoxia. When the fetus is subjected to hypoxic stress, relaxation of the anal sphincter and the passage of meconium into oligohydramnios occur. The high concentration of meconium in a smaller amount of fluid raises aspiration during labor. Forty-five neonates (39.80%) developed Respiratory Distress Syndrome. This is a considerable level of complications. The oligohydramnios interferes with normal pulmonary maturation, and the fluid is important for breathing and expansion of lungs. Smaller amounts of fluid prevent chest wall expansion and adequate alveolar formation, giving rise to pulmonary hypoplasia. These pathological changes are identifiable due to changes associated with lungs, which develop due to neonatal respiratory distress. Birth weight is reported to be low in 52 (46.00%) infants, and it is significantly associated with increased frequency of women under 30 yrs of age (54.5%) (P=0.031) and parity ≤2 (54.9%)

(P=0.013). The mechanism is chronic uteroplacental insufficiency, which gives rise to oligohydramnios and simultaneously impairs fetal growth. Younger mothers and primigravidas may have less efficient placental function and inadequate uterine blood flow. Additionally, socioeconomic status showed significant impact where poor class had higher rates (47.9%) compared to rich category (24.0%, p=0.029). This reflects nutritional deficiencies and inadequate antenatal care in lower socioeconomic groups leading to compromised fetal growth and reduced amniotic fluid production.

The current study findings shows meconium aspiration rate of 25.70% (n=29) which is lower than reported by Naykodi PS *et al.* [12] who found 53% meconium-stained liquor in their cohort and also lower than Moin S *et al.* [13] who documented 41.6% cases. However, Sharif N *et al.* [14] reported closer rate of 26.7% meconium occurrence which is comparable to present findings. The variation in meconium rates can be attributed to different AFI cutoff values used across studies and timing of delivery intervention.

Respiratory distress syndrome was observed in 39.80% (n=45) neonates in present study. Naykodi PS *et al.* [12] reported 52% neonates with 1-minute Apgar <7 and 38% with 5-minute Apgar <7 indicating respiratory compromise, while Sharif N *et al.* [14] found 62.2% cases with low 5-minute Apgar scores. In contrast, Akhtar Z *et al.* [15] and Zafar A *et al.* [16] reported no significant difference in Apgar scores between oligohydramnios and control groups. These conflicting results may reflect differences in severity of oligohydramnios, with severe cases demonstrating worse pulmonary outcomes due to greater restriction of fetal breathing movements.

Low birth weight prevalence in current study was 46.00% (n=52) with significant associations found with maternal age ≤30 years (54.5%, p=0.031), parity ≤2 (54.9%, p=0.013) and poor socioeconomic status (p=0.029). This is considerably higher than Naykodi PS *et al.* [12] who reported 24% low birth weight and Figueroa L *et al.* [17] who found 29.9% cases. However, Sharif N *et al.* [14] documented much higher rate of 64.4% which exceeds present findings. The demographic associations aligns with Figueroa L *et al.* [17] who demonstrated that oligohydramnios independently increases low birth weight risk with mean birth weight reduction of 162 grams. Younger maternal age and lower parity association suggests inadequate placental development in primigravidas leading to chronic uteroplacental insufficiency. Contrarily, Akhtar Z *et al.* [15] found no significant difference in mean birth weight which may be explained by their exclusion of high-risk pregnancies.

The overall adverse outcome pattern demonstrates that oligohydramnios increases neonatal morbidity substantially. Qazi KF *et al.* [18] reported 59% patients experiencing at least one adverse outcome, while Sawant AA *et al.* [19] found 69.1% cesarean rate and 14.4% NICU admission. However, Kumsa H *et al.* [20] in their meta-analysis argued that isolated oligohydramnios increases obstetric intervention but lacks convincing proof of independent neonatal harm. This contradiction may be explained by heterogeneity in study populations where isolated oligohydramnios without other risk factors behaves differently than oligohydramnios associated with maternal or fetal complications.

The following are the limitations of the present study, which should be kept in mind. First, the present study is a single-center study, and due to which it is not very generalizable. The sample size of 113 is also fairly small, which could potentially impact the power of statistical analysis to identify significant associations between various variables. Lastly, the present study did not divide the patients into categories regarding the severity of oligohydramnios (mild versus severe amniotic fluid index), which could potentially have provided more information regarding the correlation between fluid volume and neonatal outcomes. Another thing is the absence of a control group having a normal amniotic fluid index, which could potentially have provided strong evidence regarding the independent effect of oligohydramnios on neonatal complications.

CONCLUSION

The study has revealed that oligohydramnios has a significant relation to undesirable neonatal outcomes. The finding has clearly indicated a significant increase in the incidence of meconium aspiration syndrome, respiratory distress syndrome, and low birth weight among neonates affected by oligohydramnios. Another finding has indicated a significant relation between low birth weight and several demographic variables such as young maternal age, low parity, and low socioeconomic status, which are interpreted to imply the importance and role of demographic variables towards maternity outcomes.

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