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Perinatal Outcome in Pregnant Women with Isolated Oligohydroamnios Diagnosed with Single Deepest Pocket Method

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ABSTRACT

Background: Oligohydramnios is a pregnancy condition where amniotic fluid volume becomes less than normal level. Amniotic fluid is important for fetal growth, lung development and fetal movements. **Objective:** To determine the perinatal outcome in pregnant women with isolated oligohydramnios diagnosed by single deepest pocket method. **Study Design:** Descriptive analytical study. **Duration and Place of Study:** This study was carried out from 25 October 2024 to 25 March 2025 in the Department of Obstetrics and Gynecology, Mardan Medical Complex, Mardan. **Methodology:** A total of 135 pregnant women aged 18–40 years with singleton pregnancy at term gestation were included in the study. Diagnosis of oligohydramnios was made by trans abdominal ultrasound where single deepest pocket of amniotic fluid less than 2 centimeters was taken as oligohydramnios. All patients were followed until delivery and perinatal outcomes were recorded. Data analysis was done using Statistical Package for Social Sciences version 23. **Results:** Mean age of patients was 28.31 ± 6.44 years and mean gestational age was 38.93 ± 1.35 weeks. Abnormal cardiotocography was observed in 38 patients (28.1%), meconium stained liquor in 34 patients (25.2%), caesarean section in 27 patients (20.0%) and neonatal intensive care unit admission in 27 patients (20.0%). No statistically significant association was found between demographic variables and perinatal outcomes ($p > 0.05$). **Conclusion:** Isolated oligohydramnios is associated with considerable adverse perinatal outcomes, particularly abnormal cardiotocography and meconium stained liquor.

INTRODUCTION

Oligohydramnios is a pregnancy condition in which the amount of amniotic fluid is below the normal range.[1] Amniotic fluid is very important in the growth and movements of the fetus. It is also important in the development of the musculoskeletal system and the lungs.[2] A reduction in the amount of amniotic fluid can result in problems such as restricted movements of the fetus, compression of the umbilical cord, and growth problems.[3] Oligohydramnios can result from several etiologies, including rupture of membranes, placental insufficiency, hypertension, and fetal anomalies.[4] However, in some cases, there is no exact etiology for oligohydramnios. This is referred to as isolated oligohydramnios.

Diagnosis of oligohydramnios is normally confirmed through the measurement of the amount of fluid present in the uterus using an ultrasound scan.[5] The two major methods used to measure the amount of fluid present in the uterus are the amniotic fluid index (AFI) method and the single deepest pocket (SDP) method.[6] The AFI method involves dividing the uterus into four sections, then measuring the deepest layer of fluid present in each section.[5] The single deepest pocket method involves measuring the deepest layer of fluid present in the uterus, provided the fluid is not associated with the umbilical cord or the fetus.[6] A layer of fluid less than 2 cm in depth is an indicator of oligohydramnios. Various clinical guidelines recommend the single deepest pocket method, especially for low-risk pregnancies.[7]

The perinatal outcome in cases of pregnancy with isolated oligohydramnios depends on gestational age and fetal status. Some studies have also indicated an increased incidence of interventions such as cesarean delivery in cases of fetal distress.[8] Some of the possible findings in cases of isolated oligohydramnios include meconium-stained amniotic fluid, abnormal patterns of cardiotocography, and increased neonatal intensive care unit admissions.[9] Oligohydramnios is associated with an increased risk of umbilical cord compression during delivery, resulting in abnormal fetal heart rate patterns.[10] Therefore, it is important that there be vigilant surveillance in cases of pregnancy with isolated oligohydramnios in order to reduce adverse perinatal outcome.

The isolated oligohydramnios is a commonly occurring issue in obstetric practice and is associated with several adverse perinatal outcomes. However, there is a scarcity of information on the perinatal outcome of pregnant women with isolated oligohydramnios in the Mardan area. The health status of pregnant women, as well as their socioeconomic status, might have an impact on pregnancy outcome.

METHODOLOGY

A descriptive study was carried out in the Department of Obstetrics and Gynecology at Mardan Medical Complex, Mardan from 25 October 2024 to 25 March 2025. Ethical permission was obtained from the hospital ethical committee of Mardan Medical Complex before starting the study with approval reference No. 546/BKMC, dated 24/07/2024. A total sample of 135 pregnant women was required. Sample size was estimated through WHO sample size calculator by taking NICU admission 14.8% as one of the perinatal outcomes in pregnant women having isolated oligohydroamnios diagnosed with single deepest pocket method,[7] with margin of error 6% and confidence level 95%. Pregnant women aged 18–40 years having singleton pregnancy at term gestation (>37+0 weeks) and diagnosed with isolated oligohydroamnios by single deepest pocket method were included in the study. Pregnant women with polyhydramnios, structural or chromosomal fetal malformation, intrauterine fetal death, fetal growth restriction, hypertensive disorders of pregnancy, and gestational diabetes were not included. Diagnosis of oligohydroamnios was made by trans-abdominal ultrasound examination where the largest vertical pocket of amniotic fluid in uterine cavity was measured and value <2 cm was taken as oligohydroamnios. After explaining the study purpose, written informed consent was taken from each participant. Basic demographic variables including age, BMI, education status, socio economic status and area of residence were recorded. History related to pregnancy and general clinical examination was done. Ultrasound examination was performed to identify the single largest vertical pocket of amniotic fluid within uterine cavity through trans-abdominal probe for confirmation of isolated oligohydroamnios. All enrolled women were then followed until delivery in the same hospital and delivery details were documented under supervision of consultant obstetrician having at least 5 years post-fellowship experience.

Perinatal outcomes were assessed at the time of delivery and during the neonatal period immediately following birth. Cesarean section was described as the delivery of the fetus from the uterus by a surgical incision through the abdomen. Meconium-stained amniotic fluid was reported if the amniotic fluid was green, yellow, or brown with the presence of meconium particles, as opposed to clear amniotic fluid. Abnormal cardiotocography was reported if there was tachycardia with a baseline heart rate of more than 160 beats per minute for 10 minutes or more, or bradycardia with a baseline heart rate of less than 110 beats per minute for 10 minutes or more. Neonatal intensive care unit admission was reported if the newborn was admitted to the NICU for a serious health condition.

All collected information was entered and analyzed using IBM SPSS version 23. Numerical variables such as age, height, weight, BMI and gestational age were presented as mean ± standard deviation or median with interquartile range according to data distribution. Categorical variables including perinatal outcomes (C-section, Meconium-stained liquor, Abnormal cardiotocography and NICU admission), education status, socio economic status and area of residence were described in frequencies and percentages. Stratification of perinatal outcomes was done with respect to age, gestational age and BMI to observe effect modifiers. Post-stratification Chi-square test was applied and p value ≤0.05 was considered statistically significant.

RESULTS

The mean age of the participants was founded to be 28.31 ± 6.44 years, and the mean gestational age was 38.93 ± 1.35 weeks. The mean weight and height of the patients were recorded as 68.88 ± 9.31 kg and 1.60 ± 0.06 m respectively, while the mean body mass index was calculated to be 26.80 ± 2.87 kg/m^2. In terms of socioeconomic background, the majority of the womens belonged to low socioeconomic class that was 67 (49.6%), followed by middle class which was 49 (36.3%), and only a small proportion was from high socioeconomic class that is 19 (14.1%). Regarding the area of residence, most of the patients was from rural areas 91 (67.4%) as compare to urban areas 44 (32.6%). The educational status showed that literate patients were slightly more in number that is 74 (54.8%) as compared to illiterate patients which was 61 (45.2%). Furthermore, majority of the participants were unemployed 104 (77.0%) and only 31 (23.0%) were found to be employed (Table 1).

Table 1

Patient Demographics

Demographics		Mean ± SD / n (%)
Age (years)		28.31 ± 6.44
Gestational Age (weeks)		38.93 ± 1.35
Weight (kg)		68.88 ± 9.31
Height (m)		1.60 ± 0.06
BMI		26.80 ± 2.87
Socioeconomic Status	High n (%)	19 (14.1%)
	Middle n (%)	49 (36.3%)
	Low n (%)	67 (49.6%)
Residence Area	Rural n (%)	91 (67.4%)
	Urban n (%)	44 (32.6%)
Education Status	Literate n (%)	74 (54.8%)
	Illiterate n (%)	61 (45.2%)
Employment Status	Employed n (%)	31 (23.0%)
	Unemployed n (%)	104 (77.0%)

Abnormal cardiotocography was the most frequently reported outcome and it was found in 38 patients that represent 28.1% of the total cases. Meconium stained liquor was observed in 34 patients which corresponds to 25.2% of the cases. Both caesarean section and NICU admission was equally reported, and each was found in 27 patients that account for 20.0% of the study population respectively (Table 2).

Table 2
Frequency of Perinatal Outcomes in Pregnant Women with Isolated Oligohydramnios (n=135)

Perinatal Outcome	Frequency	% age
C-Section	27	20.00%
Meconium Stained Liquor	34	25.20%
Abnormal CTG	38	28.10%
NICU Admission	27	20.00%

When the patients were stratified by age group, women aged ≤30 years showed higher proportion of meconium stained liquor 23 (26.1%), abnormal CTG 27 (30.7%), and NICU admission 18 (20.5%), while caesarean section was more common in those aged >30 years that was 13 (27.7%) as compare to 14 (15.9%) in younger age group, however the p-value was 0.104 which indicate no statistically significant association was present. Regarding gestational age stratification, women with gestational age ≤39 weeks had caesarean section rate of 20 (23.3%), meconium stained liquor of 17 (19.8%), abnormal CTG of 22 (25.6%), and NICU admission of 15 (17.4%), whereas in those with gestational age >39 weeks, meconium stained liquor was notably higher that is 17 (34.7%) and abnormal CTG was also elevated 16 (32.7%), and NICU admission was found to be 12 (24.5%), but the association was also non-significant statistically with p-value of 0.210. For BMI stratification, patients with BMI >25 kg/m^2 demonstrated caesarean section rate of 18 (20.0%), meconium stained liquor of 20 (22.2%), abnormal CTG of 20 (22.2%), and NICU admission was notably higher in this group that is 21 (23.3%) as compared to those with BMI ≤25 kg/m^2 where NICU admission was only 6 (13.3%), though the p-value of 1.000 indicated that no statistically significant association was founded between BMI and perinatal outcomes (Table 3).

Table 3
Association of Demographic Factors with Perinatal Outcomes

Demographic Factors	Subgroup	C-Section n(%)	Meconium Stained Liquor n(%)	Abnormal CTG n(%)	NICU Admission n(%)	p-value*
Age (years)	≤30	14 (15.9%)	23 (26.1%)	27 (30.7%)	18 (20.5%)	0.104
	>30	13 (27.7%)	11 (23.4%)	11 (23.4%)	9 (19.1%)	
Gestational Age (weeks)	≤39	20 (23.3%)	17 (19.8%)	22 (25.6%)	15 (17.4%)	0.210
	>39	7 (14.3%)	17 (34.7%)	16 (32.7%)	12 (24.5%)	
BMI (kg/m^2)	≤25	9 (20.0%)	14 (31.1%)	18 (40.0%)	6 (13.3%)	1.000
	>25	18 (20.0%)	20 (22.2%)	20 (22.2%)	21 (23.3%)	

*Chi-Square Test

DISCUSSION

Of all the significant findings, abnormal CTG was the most common perinatal outcome, occurring in 38 patients (28.1%). This finding can be scientifically justified as the reduced amniotic fluid volume allows for increased compression of the umbilical cord during fetal movement and uterine contractions, thereby causing transient periods of hypoxia. These periods are indicated by the presence of variable or late decelerations in the cardiotocogram. Meconium-stained amniotic fluid was observed in 34 patients (25.2%), another significant finding. In cases of Oligohydramnios, the volume of amniotic fluid is already compromised, and even the slightest passage of meconium from the fetus results in thick meconium-stained amniotic fluid. This occurs due to the presence of fetal hypoxia, which is more prevalent in Oligohydramnios, thereby causing a vagal reaction resulting in the relaxation of the anal sphincter and the passage of meconium. The rate of caesarean section and NICU admissions were each observed in 27 patients (20.0%). The high rate of caesarean sections can be justified as Oligohydramnios often complicates labor due to the presence of fetal distress during labor, thereby necessitating a caesarean section. Similarly, the high rate of NICU admissions can be justified as the newborns are more prone to birth asphyxia, meconium aspiration syndrome, and respiratory distress, thereby necessitating NICU admissions.

The present study findings are comparable with several previously published studies that has examined perinatal outcomes in pregnancies complicated by oligohydramnios. The caesarean section rate in the present study was recorded in 27 patients (20.0%), which is notably lower than what was reported by Naila *et al.* [11] where caesarean section rate was 69.9%, and also much lower than Sharif *et al.* [12] who reported caesarean section in 66.67% of their patients, and Jabbar *et al.* [13] who found rate of 60.7% in oligohydramnios group. This difference may be explained by the fact that present study used single deepest pocket method for diagnosis of oligohydramnios rather than amniotic fluid index, which is known to diagnose oligohydramnios more conservatively and result in less obstetric intervention. This explanation is further supported by Dammer *et al.* [7] who also used single deepest pocket method and similarly reported significantly higher caesarean section rate (p=0.0081) but the overall intervention rates were comparatively lower than AFI-based studies, which is consistent with the present study findings.

Meconium stained liquor was observed in 34 patients (25.2%) in the present study, which shows close similarity with Jabbar *et al.* [13] who reported meconium stained liquor in 25.0% of their oligohydramnios cases, and with Sharif *et al.* [12] who found this complication in 26.67% of their patients. Inayat *et al.* [14] also reported comparable meconium stained liquor rates of 23.61% in induced group. These similar findings across different studies suggest that meconium passage is a consistent complication of oligohydramnios regardless of the diagnostic method used, and is primarily driven by fetal hypoxia resulting from umbilical cord compression in reduced amniotic fluid volume.

Abnormal CTG was the most frequent complication found in 38 patients (28.1%) in the present study, and this finding is in agreement with Dammer *et al.* [7] who also reported significantly increased abnormal cardiotocography (p=0.0005) in isolated oligohydramnios diagnosed by single deepest pocket method. This

similarity is particularly important because both studies used same diagnostic method, and the comparable findings further validate that umbilical cord compression in reduced amniotic fluid is the underlying pathophysiological mechanism responsible for non-reassuring fetal heart rate patterns in such cases.

NICU admission was recorded in 27 patients (20.0%) in the present study, which is lower than Naila *et al.* [11] who reported NICU admission in 38.9% and Aneela *et al.* [15] who found NICU admission in 30.5% of their cases. However, the rate is comparable with Sharif *et al.* [12] who reported 18.89% and Jabbar *et al.* [13] who found 21.4% NICU admission in oligohydramnios group. In contrast, Dammer *et al.* [7] and Ahmad *et al.* [16] both reported no statistically significant difference in NICU admission between oligohydramnios and normal groups, which is somewhat different from findings of present study. These differences may be attributed to different gestational age ranges, different severity of oligohydramnios, and different hospital settings and neonatal care facilities available across these studies.

Regarding stratified analysis, no statistically significant association was founded between demographic variables and perinatal outcomes in the present study (age p=0.104, gestational age p=0.210, BMI p=1.000), which is in partial contrast with Naila *et al.* [11] who found significant association of NICU admission with maternal age (p=0.007) and parity (p=0.004), and with Sami *et al.* [17] who reported that advanced maternal age and maternal comorbidities were significantly associated with neonatal complications (p<0.005).

The current study has several limitations. First, it is important to consider the fact that the current study had a limited population sample. This is because it was conducted in a single center. Moreover, the sample used in the study had only 135 participants. This is a limited number of participants in relation to the population sample. This could have limited the ability of the study to find significant associations between demographic factors and perinatal outcomes. Moreover, the descriptive study did not have a control group of women with normal amniotic fluid.

CONCLUSION

The results of the current study have concluded that isolated oligohydramnios diagnosed by the single deepest pocket method is associated with severe perinatal complications, including abnormal CTG, meconium-stained liquor, cesarean delivery, and NICU admission in a substantial number of patients. Abnormal CTG was found to be the most common complication among the patients included in the current study.

Disclaimer: There is no disclaimer for this study.

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