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Oligohydramnios in Third Trimester and Perinatal Outcomes

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Abstract

Background and objective: Oligohydramnios has been reported to be correlated with unfavorable outcomes in pregnancy, including fetal distress and stillbirth. So, this study aimed to examine the association between oligohydramnios diagnosed during the third trimester of pregnancy and perinatal outcomes.

Methods: A prospective observational study was conducted on 55 pregnant women diagnosed with oligohydramnios in Sulaimani Maternity Teaching Hospital, Sulaimaniyah, Iraq, from 15 May 2022 to 30 May 2023. A convenient sampling method was used to collect data from pregnant women with gestational ages of 28 to 41 weeks. Using ultrasound, the amniotic fluid index was measured to analyze the perinatal outcomes, and then correlations between different variables were determined.

Results: Highly significant correlations were found between mean women's age, gestational age, gravida, para, Apgar score 5 minutes after delivery, newborn weight and mean amniotic fluid index levels ($p<0.001$). Most women (50.9%) received antenatal care >4 times, had <2 years' pregnancy interval (96.4%), had emergency cesarean section (67.3%), and without induction of labor (94.5%). Most patients did not have any medical disorders (94.5%) or obstetrical disorders (65.5%); however, pregnancy-induced hypertension was the most common disorder (21.8%), followed by gestational diabetes mellitus (7.3%). Additionally, most infants were born alive with average Apgar scores (78.18%), whereas ten infants had low Apgar scores and were admitted to the neonatal intensive care unit.

Conclusion: Women affected with oligohydramnios were likely to experience unfavorable perinatal outcomes, including admission to the neonatal intensive care unit and stillbirth.

Keywords: Amniotic fluid, Apgar score, Oligohydramnios, Third trimester

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Introduction

Oligohydramnios is characterized by a lower-than-normal amount of amniotic fluid surrounding the fetus in the uterus. Amniotic fluid is essential for fetal development, providing support, protection, and facilitating various functions. It is detected using ultrasound and measured by an amniotic fluid index (AFI) or maximum vertical pocket (MVP).[1] Oligohydramnios is often identified when the AFI is <5.0 cm or the MVP is <2.0 cm. Although it can occur at any stage of pregnancy, it is more frequently seen in the third trimester.[2] Oligohydramnios is linked to various pregnancy complications in high-income countries.[3] Likewise, in low- and middle-income countries, oligohydramnios also have the same effect on both the mother and the fetus/newborn.[4] Oligohydramnios is a condition with risks for every pregnancy, potentially affecting the fetus's well-being by compressing the umbilical cord. Its reported incidence varies from 1.0 to 5.0% of all pregnancies. While the leading cause of oligohydramnios in full-term pregnancies is unknown (idiopathic), research has identified contributing factors such as hypertensive disorders, intrauterine growth restriction (IUGR), vasculopathy linked to cardiac, renal, and diabetic conditions, abruption placenta, medication usage, and congenital anomalies.[5] Pregnancies affected by oligohydramnios can have varying outcomes, including fetal distress, meconium aspiration syndrome, or stillbirth. The risk of experiencing these complications is generally higher in severe cases of oligohydramnios.[6] Moreover, oligohydramnios affects stillbirths with a five-fold higher rate and a three-fold increase in neonatal deaths among infants under 28 days old. Additionally, oligohydramnios also result in infants being born prematurely or having a low birth weight.[4] Oligohydramnios could increase the risk of fetal distress during labor, meconium passage, low Apgar (Appearance, Pulse, Grimace, Activity and Respiration) score, neonatal resuscitation, admission to the neonatal intensive care unit (NICU), cesarean delivery, instrumental delivery, and shoulder dystocia.[7-9] Different factors, such as the severity of the condition and gestational age at diagnosis, influence oligohydramnios complications.[1] Due to the mentioned causes, managing oligohydramnios is intricate.[10] Obtaining these factors is crucial for healthcare providers to assess risks and make informed decisions about managing and caring for pregnant patients and the fetus. In premature cases, efforts may be made to prolong the pregnancy until the fetus reaches a more advanced stage of development. This can involve bed rest, careful monitoring of fetal well-being, and administering corticosteroids to promote lung maturation.[11] Perinatal care refers to the health care women receive during and directly after the birth of their child. Many women who receive perinatal care have high-risk pregnancies, or the mother or child has a severe medical condition. Women with oligohydramnios must receive care from proficient obstetricians.[10] Generally, the perinatal outcome in pregnancies affected by oligohydramnios can be enhanced through timely identification, vigilant monitoring, and suitable intervention.[12] Therefore, this study aimed to examine the association between oligohydramnios diagnosed during the third trimester of pregnancy and perinatal outcomes.

Patients and methods

This prospective observational study was carried out in Sulaimani Maternity Teaching Hospital, Sulaimaniyah, Iraq, from 15th May 2022 to 30th May 2023 on 55 pregnant women who were diagnosed with oligohydramnios in their 3rd trimester. A convenient sampling method was utilized to collect patients' data, including their age, number of gravida/paras, gestational age at the time of delivery, Apgar score 5 minutes

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after delivery, AFI, and newborn weight. Also, obstetrical characteristics of the studied patients were obtained, including antenatal care visit, pregnancy interval, mode of delivery, and induction of labor together with maternal medical/obstetrical disorders, delivery complications and perinatal outcomes. Pregnant women aged 28 to 41 weeks (3rd trimester) were analyzed for perinatal outcomes. Oligohydramnios was considered when clinically amniotic fluid was suspected to be reduced, and sonographically, AFI was ≤5.0 cm. However, pregnant women with average amniotic fluid volume and those with ruptured membranes were excluded. Required data were collected from the pregnant women's medical profiles. Further data were collected based on the analyses of the perinatal outcomes. The collected data were analyzed using Statistical Package for Social Sciences (SPSS, IBM, Chicago, USA, version 24.0). Both descriptive and inferential statistics tests were employed. The study's protocol was approved by the Ethics Committee of the Kurdistan Higher Council of Medical Specialties (KHCMS) on 10th May 2022 with approval number 961. Moreover, informed consent was obtained from the participants before starting the study. A p-value of <0.05 was set as significant, <0.001 as highly important, and >0.05 as non-significant.

Results

Most patients (45.5%) were aged 25 - 31 years, followed by18 - 24 years (30.9%), then 32 - 38 years (20%), and 39 - 45 years (3.6%); however, there were no significant correlations (p=0.095) between different age groups, as shown in Table (1).

Table (1): Distribution of age group among women with oligohydramnios.

Age group (Years)	Frequency	Percentage	p-value
18 – 24	17	30.9	0.095
25 – 31	25	45.5	
32 – 38	11	20	
39 – 45	2.0	3.6	
Total	55	100	

Furthermore, women's mean age was 27.83±6.26 years, and the mean gestational age at delivery was 36.92±3.08. Their mean gravida was 2.63±1.75, and their mean para was 1.47±1.33. Also, their mean Apgar score 5 minutes after delivery was 9.43±0.99, mean AFI was 3.56±1.10, and mean newborn weight was 2660±739 grams. Highly significant correlations (p<0.001) were found between all variables mentioned above and varying AFI levels, as shown in Table (2).

Table (2): The mean maternal data and their correlation to various amniotic fluid indices.

Variable	Mean ± SD	p-value
Age (Years)	27.83 ± 6.26	<0.001**
Gravida	2.63 ± 1.75	<0.001**
Para	1.47 ± 1.33	<0.001**
Gestational age at the time of delivery (Weeks)	36.92 ± 3.08	<0.001**
Apgar score 5 minutes after delivery	9.43 ± 0.99	<0.001**
Amniotic fluid index (AFI)	3.56 ± 1.10	<0.001**
Newborn weight (gram)	2660 ± 739	<0.001**

**: Highly significant difference using the Chi-square test

Most women (50.9%) had visited for antenatal care >4 times, while 49.1% visited antenatal care only 1 – 3 times. The pregnancy interval was <2 years in 2 women (3.6%), while it was >2 years in 53 patients (96.4%). None of the women (100%) had a

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previous history of oligohydramnios, and none (100%) were smokers. Regarding the mode of delivery, most women (67.3%) had emergency cesarean section (CS), 23.6% had spontaneous vaginal delivery, and 9.1% had elective CS. Furthermore, most women (94.5%) did not need labour induction, while 5.5% needed the procedure. Consequently, no significant differences were seen between variables (p>0.05), as shown in Table (3).

Table (3): Obstetrical characteristics of the studied patients with oligohydramnios.

Variable		Frequency	Percentage	p-value
Antenatal care visit	> 4 times	28	50.9	0.604
	1 – 3 times	27	49.1	
Pregnancy interval (Years)	< 2	2.0	3.6	0.475
	> 2	53	96.4	
Mode of delivery	Spontaneous vaginal delivery	13	23.6	0.373
	Elective cesarean section	5.0	9.1	
	Emergency cesarean section	37	67.3	
Induction of labor	Yes	3.0	5.5	1.000
	No	52	94.5	
Total		55	100	

Most patients (94.5%) did not have any medical disorders, while one patient (1.8%) had chronic hypertension, and two patients (3.6%) had antiphospholipid syndrome (APLS). The majority (65.5%) had no obstetrical disorders; however, pregnancy-induced hypertension (PIH) was the most common disorder (21.8%), followed by gestational diabetes mellitus (GDM) (7.3%). In comparison, multiple pregnancies and unexplained antepartum haemorrhage (APH) were less common (1.8% and 3.6%, respectively) with no fetal congenital anomalies. No significant relationship was found between different variables (p>0.05), as shown in Table (4).

Table (4): Patients' maternal medical and obstetrical disorders.

Variable		Frequency	Percentage	p-value
Medical disorder	None	52	94.5	0.838
	Chronic hypertension	1.0	1.8	
	Antiphospholipid syndrome	2.0	3.6	
Obstetrical disorder	None	36	65.5	0.546
	Pregnancy-induced hypertension	12	21.8	
	Gestational diabetes mellitus	4.0	7.3	
	Multiple pregnancies	1.0	1.8	
	Unexplained antepartum hemorrhage	2.0	3.6	

Additionally, intrauterine growth restriction (IUGR) was observed in 8 cases, and fetal malpresentation occurred in 5 cases with two stillbirths. Most infants were born alive with average Apgar scores (78.18%), of which one case of Down syndrome and one case of cardiac defect were reported (1.81% each). Ten infants had low Apgar scores and were admitted to the NICU, and 2 cases of other abnormalities were recorded. However, no significant correlations were observed between different variables (p=0.094), as shown in Table (5).

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Table (5): Delivery complications and perinatal outcomes.

Variable	Frequency	Percentage	p-value
Intrauterine growth restriction (IUGR)	8.0	14.5	0.094
Fetal malpresentation	5.0	9.09	
Stillbirth	2.0	3.63	
Alive with an average Apgar score	43	78.18	
Down syndrome	1.0	1.81	
Cardiac defect	1.0	1.81	
Low Apgar score + admission to NICU	10	18.1	
Other abnormality	2.0	3.63	

NICU: Neonatal intensive care unit

Discussion

Generally, the amniotic fluid index varies with gestational age and is used to detect fetal well-being.[13] Oligohydramnios is associated with poor maternal and perinatal outcomes.[10] In middle-resource/developing countries, including Iraq, oligohydramnios are under-detected due to the scarcity of research conducted in the field. Thus, we planned to study the correlation between oligohydramnios in the third trimester and perinatal outcomes among Sulaimaniyah City, Iraq patients. In the current study, the mean age of the patients with diagnosed oligohydramnios was 27.83±6.26 years and most of them (45.5%) were aged 25 - 31 years, while the lowest were aged 39 - 45 years (3.6%) without significant correlations ($p>0.05$) between different age groups. These outcomes are similar to those reported by other studies, such as Twesigomwe et al. (27 ± 5.3 years), Figueroa et al. (70.1% were aged 20 - 35 years), four and Minal et al. (80% were aged 20-30 years).[4,14] These matching results might be related to the sample size, and most of the enrolled patients were in their reproductive age. Additionally, the current study revealed that the mean gestational age at delivery was 36.92±3.08, mean gravida was 2.63±1.75, mean para was 1.47±1.33, mean Apgar score 5 minutes after delivery was 9.43±0.99, and mean AFI was 3.56±1.10 with highly significant correlations ($p<0.001$) between all reported variables and AFI level. These findings indicated that each advanced gestational age, number of pregnancies, live births, and Apgar score directly affected the amount of amniotic fluid volume and the incidence of oligohydramnios among pregnant women. In this regard, Shinde et al., reported that pregnant women with low amniotic fluid levels (8.0%) and those diagnosed with oligohydramnios (4.0%) were most commonly observed in the final trimester and can increase the risk of complications after 41 weeks of pregnancy.[13] Rabie et al. found that amniotic fluid volume gradually increases until 34 - 36 weeks, stabilizes until full-term, and decreases after 40 weeks in post-term pregnancies. This pattern allows clinicians to assess volume clinically using fundal height and ultrasound measurements.[1] On the other hand, some studies indicated the highest incidence of oligohydramnios among primigravida that might be related to the fact that the underlying disorders of pregnancy are exaggerated in primigravida due to maladjustment of the body to the developing fetus.[10,13,15,16] Also, this study proved that regular antenatal care did not affect the possibility of oligohydramnios. On the contrary, a pregnancy interval of >2 years strongly affected the incidence of oligohydramnios, as reported in 96.4% of pregnant women. This result warrants further

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examination of factors associated with these rare anomalies. Exploring correlations between short pregnancy intervals or medical histories and atypical outcomes could offer valuable clinical insights for managing pregnancies with complications. While none of the women in this study smoked during pregnancy, a separate survey by Yıldırım et al. 2023 showed a significant increase in oligohydramnios risk associated with active and passive cigarette exposure.[17] Consequently, most women underwent emergency CS (67.3%), but without need for induction of labor (94.5%). These outcomes confirmed that low AFI was a leading cause of CS, which agrees with the findings of Sharma et al. (70%), Hou et al. (84.4%), and Soni et al. (72%).[15,16,18] These high rate of CS cases with oligohydramnios might be due to meconium-stained liquor, non-reactive cardiotocography due to reduced amniotic fluid volume, and fetal growth restriction.[13] Based on this study's findings, most participants did not have medical disorders (94.5%) and obstetric complications (65.5%), but a subset had PIH (21.8%) and GDM (7.3%). These results indicate the need for a more comprehensive examination of outcomes related to maternal-fetal profiles, as they can lead to adverse consequences if not managed; thus, they require monitoring and proper treatment. Overall, the results suggest satisfactory antenatal support for many participants while emphasizing the importance of specialized consideration and management for specific subgroups with medical disorders. In this respect, Molla et al. found that pregnant women diagnosed with oligohydramnios in the 3rd trimester had higher chances of adverse perinatal outcomes, including hypertensive disorders, IUGR, and being a first-time mother.[12] Also, Haruyama et al. reported a protective effect of maternal underweight, PIH, and oligohydramnios.[19] Moreover, in the current study, 3.6% of women had unexplained APH, indicating potential placental complications. Additionally, IUGR was observed in 14.5% and fetal malpresentation in 9.09%, with 3.63% stillbirths. In a similar study, Nisa et al. 2019 in Pakistan showed that PIH led to fetal problems like IUGR and stillbirth; thus, severe cases may require early delivery before 37 weeks.[20] Moreover, Long et al. reported that APH in women with placenta previa is associated with increased perinatal complications.[21] Therefore, comprehensive prenatal care is crucial for identifying and managing these disorders. Most infants were born alive with average Apgar scores (78.18%), with anomalies in 3.64% of cases (Down syndrome and cardiac defect). In this regard, Figueroa et al. reported high fetal health, with no anomalies detected in over 96% of cases. They also found no previous oligohydramnios, and most participants were free from infections or abnormalities. Four of this study identified ten infants with low Apgar scores and required NICU admission, indicating distress or complications during the perinatal period. In this regard, Huang et al. showed that a low Apgar score's contribution to identifying the risk of short-term morbidity is not clinically significant.[22] Women with oligohydramnios are more likely to have an infant with low birth weight.[23] However, the mean fetal weight in this study was within the normal range (2660±739 gram), which agrees with that found by Twesigomwe et al. (2500–3500 gram), Shinde et al. (>2500 gram), and Janas et al. (3356 ± 461 gram). [10,13,24]

Conclusion

Women suffering from oligohydramnios were prone to encountering adverse perinatal consequences, such as stillbirth and early neonatal demise. Clinical environments must implement additional strategies aimed at delivering suitable prenatal and perinatal support for pregnant women affected by oligohydramnios. Furthermore, it is advisable to conduct further investigations to

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comprehend modifiable factors that could potentially reduce unfavourable outcomes within high-risk cohorts.

Conflict of interest

There is no conflict of interest in the present study.

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