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Original Research

Correlation between oligohydramnios and anaemia in the third trimester of pregnancy: A study in a tertiary care hospital in Pakistan.

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Abstract

Background: Maintaining normal amniotic fluid index and normal hemoglobin level is crucial for normal fetal development. Their reduction can lead to maternal and fetal morbidity in the form of operative delivery and poor perinatal outcome such as, low birth weight. There is an association between oligohydramnios and anaemia, although there is scarcity on this correlation in literature. Early detection of oligohydramnios can improve maternal and perinatal outcome. This study aimed to investigate the association between oligohydramnios and anaemia during the third trimester of pregnancy.

Methodology: This retrospective cohort study was conducted at NESCOM Hospital, Pakistan. The study spanned from August 1, 2021, to July 31, 2022.

Results: The study included 109 pregnant individuals with oligohydramnios, resulting in an incidence of 22% among the total of 551 deliveries during the study period. The average age of participants was 29.75 years. The average gestational age was 33.52 weeks, with a range of 28 to 38 weeks. The analysis indicated that 44.03% of cases with oligohydramnios were associated with anaemia, followed by idiopathic causes (41.28%). Pearson's correlation revealed a significant association between oligohydramnios and anaemia ($r = 0.307$, $p = 0.001$), supporting the hypothesis of a potential interconnection between these two conditions. Regarding delivery outcomes, 81.6% underwent cesarean section, emphasizing the need for careful management in cases of oligohydramnios and anaemia. Neonatal outcomes indicated that 1.8% and 44.5% of neonates were extremely low birth weight and low birth weight, respectively.

Conclusion: This study provides empirical evidence supporting a significant association between oligohydramnios and anaemia in the third trimester.

Key words: Oligohydramnios; Anaemia; Maternal and Fetal Outcome.

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Quick Response Code:

Introduction:

Pregnancy, a transformative and delicate period in a woman's life, introduces a multitude of physiological changes crucial for the growth and development of the fetus. Oligohydramnios (AFI less than 8cm) and anaemia (Hemoglobin less than 11g/dl), characterized by abnormally low amniotic fluid volume, emphasizes the significance of maintaining adequate levels of both liquor [1] and hemoglobin [2] respectively. The global incidence of oligohydramnios ranges from 0.7% to 23% [3, 4]. In South Asia, where anaemia prevalence is notably high, 52% and 49% [5, 6], Pakistan stands out with the second-highest prevalence among the seven countries in the region. Oligohydramnios disrupts the balance between amniotic fluid production and absorption, leading to adverse outcomes likes fetal growth restriction [7, 8] and preterm birth [9]. Conversely, anaemia, a common hematologic disorder during pregnancy, arises when maternal blood lacks sufficient hemoglobin to meet physiological demands for both mother and fetus.

Mechanism of association of oligohydramnios and anaemia, proposed in the literature include compromised placental blood flow due to maternal anaemia, resulting in reduced fetal urine production and subsequently lower amniotic fluid levels. Additionally, anaemia's impact on fetal oxygenation and nutrient supply may contribute to impaired fetal renal function and decreased amniotic fluid formation. While several theoretical frameworks exist, empirical evidence supporting a causal relationship in the third trimester is limited. The literature emphasizes the importance of comprehensive maternal-fetal monitoring, including regular ultrasound assessments and hemoglobin level monitoring. Individualized treatment strategies, such as iron supplementation and blood transfusions where necessary, play a vital role in optimizing maternal and fetal health. Despite advancements in understanding the individual aspects of oligohydramnios and anaemia, there is a notable paucity of studies specifically investigating their combined impact in the third trimester.

The study aims to investigate the potential association between oligohydramnios and anaemia during the third trimester of pregnancy. It seeks to assess the prevalence of both conditions, explore the interconnection between them, and evaluate potential adverse outcomes. The goal is to provide recommendations for comprehensive maternal-fetal monitoring and individualized interventions to optimize the health of both mothers and fetuses in such cases.

Methodology:

It was a retrospective cohort study. The study was conducted for one year**,** from 01-08-2021 to 31-07-2022 at NESCOM hospital, Islamabad, Pakistan, a leading healthcare facility with a specialized obstetrics department Having around 600 deliveries per year. Participants with complete record regarding oligohydramnios (amniotic fluid index less than 8cm measured in four quadrants by radiologist) and hemoglobin level (less than 11cm) measured in third trimester of pregnancy, were included. Patients with incomplete medical records or missing essential data, Cases with multiple pregnancies and pre-existing medical conditions (hypertension, diabetes, chronic anaemia, renal disease etc) that may independently influence amniotic fluid levels or hemoglobin levels were excluded.

Data Collection:

Data collection was started after approval from hospital ethical committee. Data was collected from hospital records by postgraduate students in obstetrics on a specified proforma. Maternal demographics like age, parity, medical history, and ultrasound reports indicating amniotic fluid levels, hemoglobin levels during the third trimester, gestational age at the time of assessments, delivery outcomes e.g, Mode of delivery and birth weight were recorded.

Statistical Analysis:
Descriptive statistics were utilized to summarize the demographic and clinical characteristics of the study population. Pearson's correlation was employed to examine the association between oligohydramnios and anaemia.

Results:
In this hospital based retrospective study, the total number of deliveries in the study period was 551. Patients with oligohydramnios were 121, yielding an incidence of 22%. However, documentation of hemoglobin level was unavailable for 12 patients. Consequently, the analysis was restricted to the remaining 109 patients with oligohydramnios. As shown in table 1, the average age of the participants was 29.75±4.51 years, minimum age of the participants was 19 years and maximum 40 years. The minimum gestational age was 28 weeks and maximum were 38 weeks with an average of 33.52±2.71 weeks.

Table 1- descriptive statistics of age and gestational age.

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age	109	19	40	29.75	4.518
Gestational age	109	28	38	33.52	2.717

Table 2- Risk factors for oligohydramnios

Variables	Number	Percentage
Anaemia	48	44.03%
Idiopathic	45	41.28%
Pregnancy induced hypertension	6	5.50%
Obstetric cholestasis	3	1.83%
Gestational diabetes	7	6.42%
Total	109	100%

The leading risk factors for oligohydroamnios were anaemia (44.03%) and Idiopathic causes (41.28%) as shown in Table 2.

Pearson's correlation in Table 3 demonstrates a significant association between oligohydramnios and anaemia, with a noteworthy correlation coefficient of 0.001, which shows significant correlation between oligohydramnios and anaemia.

Table 3- Pearson's correlation between Oligohydramnios and Anaemia

	Hemoglobin	AFI
HB Pearson Correlation Sig (two Tailed) N	1 109	.307** 0.001 109
HB Pearson Corelation Sig (two Tailed) N	0.307 0.001 109	1 109

**correlation is significant at 0.01 levels (2 tailed).

As regard to mode of delivery, 81.6% of our patients delivered by abdominal route and only 18.3% delivered by vaginal route as shown in table 4.

Table 4- Frequency and percentages of birth weight and mode of delivery.

Variables	Categories	Frequency	Percentage
Mode of delivery	SVD*	20	18.3%
	lSCS**	89	81.6%
Birth weight	Less than 1 kg	2	1.8%
	1.1-2.5 kg	49	44.9%
	2.6-3.5 kg	58	53.2%
	3.5-4.5kg	Nil	nil

*SVD (spontaneous vertex delivery), **LSCS (lower segment cesarean section)

Table 4 shows the frequency of low-birth-weight neonates. 1.8% and 44.5% neonates were extremely low birth weight and low birth weight respectively.

Discussion:
The potential association between oligohydramnios and anaemia is a subject of growing interest. During routine hospital practice, anecdotal observations by the authors showed that most of the patients admitted with oligohydramnios were found anemic on investigation, and their amniotic fluid index improved when they were treated for anaemia. This observation prompted further evaluation and evidence for this association considering that there is a paucity of literature and research on the association between oligohydramnios and anaemia.

In the present hospital-based study, we detected oligohydramnios in about one out of every 5 women at 28 weeks of gestation or beyond. The mean age of participants of present study was 29±4.5 years and mean gestational age was 33.52±2.71 weeks. The prevalence of oligohydramnios of 22% reported in this study is similar to the prevalence of 17% reported in India and 23% in South Africa [10, 11]. In contrast to our research, the study conducted in India did not exclude the women with ruptured membranes. On the other hand, Buchmann and colleagues in South Africa focused solely on mothers who were referred due to post-term pregnancies. However, oligohydramnios was higher than the prevalence of 4.4% that was reported in China [12] and Italy 11% [13].

A study conducted in Uganda [14] found that the average age of patients was 27 years which is almost the same as in present study. However, contrary to the present study, the incidence of oligohydramnios was 9.4%. This difference may be because in their study they included the pregnant women at 37 weeks of gestation, but in present study we include patients after 28 weeks of gestation. Another noticeable point in their study was that their patients had malaria. As it is understood that patients with malaria could be anemic. So, their patients also had oligohydramnios and anaemia. Although they did not mention this association, despite the results of their study which suggested an association.

Anaemia is crucial among all nutritional disorders all over the world [14]. More than 50% of females worldwide suffer from anaemia during their pregnancy [15,16,17,]. In the present study, 48 out of 109 participants (44.4%) were found to be anemic. Yarlini [18] and colleagues also reported a 43% prevalence of anaemia in pregnancy in low-resource countries. In our study, we specifically investigated patients with oligohydramnios and observed a strong association with anaemia. However, the aforementioned study solely focused on anaemia and did not establish any correlation with other obstetrical problems.

In the present study, 81.6% of patients underwent delivery by cesarean section, while only 18.4% had a vaginal delivery. This contrasts with findings from a study conducted at Sir Ganga Ram Hospital [19] and the study by Manzanares S et al [20], which reported cesarean section rates of 32% and vaginal delivery rate of 68%. The high rate of cesarean sections in our study may be attributed to the fact that, as a low-resource country, we relied on cardiotocographic findings rather than scalp blood sampling to determine the need for cesarean sections. In the present study we abandoned the trial of labour, when cardiotocograph becomes suspicious or pathological. Another reason for the high cesarean section rate in this study was due to repeated scar. If fetal monitoring were conducted using scalp blood sampling, it is possible that this high cesarean section rate could be reduced. Our results align with those of studies conducted by Vyas [21], KnounJW[22], and Chaudhari KR[23].

Oligohydramnios is associated with low birth weight in the present study, more than 46% neonates were low birth weight, as supported by evidence in other studies [24,25,26].

Conclusion: It is concluded from this study that early diagnosis and treatment of anaemia could help in the preventing the development of oligohydramnios. However, further research is warranted to comprehensively explore the potential association between these conditions in the third trimester, particularly in the unique context of tertiary care hospitals where complex cases are managed. A more nuanced understanding of this association holds the promise of refining clinical practices and improving outcomes for mothers and their infants.

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