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ORIGINAL ARTICLE

Comparing Pregnancy, Childbirth, and Neonatal Outcome in Women with Idiopathic Polyhydramnios with Those of Healthy Pregnant Women

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ABSTRACT

Idiopathic polyhydramnios is a common high-risk obstetric condition associated with increased maternal and perinatal morbidity. This study aimed to compare pregnancy, childbirth, and neonatal outcomes in women with idiopathic polyhydramnios versus healthy pregnant women with normal amniotic fluid volume. This prospective case-control study was conducted at the Maternity and Pediatrics Teaching Hospital in Al-Diwaniyah, Iraq, between 1 February and 1 December 2024. Thirty singleton pregnancies with idiopathic polyhydramnios (amniotic fluid index >25 cm) and 30 matched controls with normal amniotic fluid volume (5–24 cm) were enrolled. Detailed clinical history, physical examination, and transvaginal ultrasound assessment of cervical length were performed. The primary obstetric outcome was the cesarean section rate. Neonatal outcomes included Apgar score at 5 minutes, respiratory distress, and neonatal intensive care unit (NICU) admission. Multivariable logistic and linear regression models adjusted for gestational age and cervical length were used. Gestational age at delivery was significantly lower in the polyhydramnios group (34.63 ± 0.93 vs. 37.63 ± 1.03 weeks, $p < 0.001$), and cervical length was shorter (3.03 ± 0.54 vs. 3.58 ± 0.20 cm, $p < 0.001$). The cesarean section rate was significantly higher in the polyhydramnios group (66.7% vs. 36.7%, $p = 0.020$). Neonates in the polyhydramnios group had lower Apgar scores at 5 minutes (6.75 ± 1.02 vs. 7.50 ± 0.61, $p = 0.007$), higher respiratory distress (13.3% vs. 0%, $p = 0.040$), and higher NICU admission rates (63.3% vs. 23.3%, $p < 0.001$). Multivariable analysis confirmed idiopathic polyhydramnios as an independent predictor of cesarean delivery (adjusted odds ratio 13.72, 95% CI 2.46–76.38, $p = 0.003$) and lower Apgar score ($\beta = -0.66$, $p = 0.021$). Idiopathic polyhydramnios is independently associated with increased risks of cesarean delivery and adverse neonatal outcomes. Intensified antenatal surveillance and timely intervention are warranted in these pregnancies.

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1- INTRODUCTION

Polyhydramnios is defined as excess volume of amniotic fluid during pregnancy, considered a pathological condition [1]. It is commonly referred to as a high-risk obstetrics condition that causes both increased maternal and fetal morbidity and mortality. The potential complications that can occur due to polyhydramnios include: intra-uterine fetal death (IUFD), preterm pre-labor ruptured membranes (PPROM), cord prolapse, macrosomia, breech presentation, cesarean section, and postpartum hemorrhage [2, 3]. In pregnancies complicated by polyhydramnios, 20% can be attributed to congenital fetal anomalies, while 60-70% of cases are thought to be idiopathic with no identifiable cause for polyhydramnios [1]. Currently, the underlying cause for idiopathic polyhydramnios is believed to be a minor aberration in the regulation of normal production and absorption of amniotic fluid [1]. The clinical signs and symptoms of polyhydramnios, as well as the degree of severity, are determined by the excess amount of amniotic fluid and whether or not an underlying etiology can be identified. The diagnosis of polyhydramnios is achieved through ultrasonography. Typically, the criteria for polyhydramnios are defined by either the deepest vertical single pocket of amniotic fluid measuring > 8 cm or an amniotic fluid index (AFI) > 25 cm [1, 4]. All patients who present with polyhydramnios should have an antepartum evaluation with increased fetal surveillance, especially in cases of severe polyhydramnios, to determine the cause or causes where possible; to guide management; and to determine appropriate timing for delivery of the fetus and amniotic fluid.

The prevalence of polyhydramnios is estimated to be approximately 1-2% of all pregnancies [5, 6]. In Iraq, the reported incidence is 0.7% [7]. Most cases are detected incidentally during routine or indicated ultrasound examinations [4]. Although many cases of idiopathic polyhydramnios are self-limited and resolve spontaneously without intervention [8], the condition can still be associated with significant complications due to uterine overdistension. These include maternal dyspnea, preterm labor, premature rupture of membranes, breech presentation, umbilical cord prolapses, postpartum hemorrhage, and an increased risk of fetal macrosomia, particularly when associated with maternal diabetes [8, 9, 10].

The present study aimed to compare pregnancy, childbirth, and neonatal outcomes in women with idiopathic polyhydramnios with those of healthy pregnant women, to better characterize the potential risks specifically attributable to idiopathic polyhydramnios.

2- MATERIALS AND METHODS

This prospective case-control study was conducted at the Maternity and Pediatrics Teaching Hospital in Al-Diwaniyah, Iraq, from 1 February 2024 to 1 December 2024. Thirty pregnant women with idiopathic polyhydramnios (cases) and 30 healthy pregnant women with normal amniotic fluid volume (controls) were enrolled. The study protocol was approved by the Department of Obstetrics and Gynecology, Iraqi Board for Medical Specializations. Written informed consent was obtained from all participants after they received a full explanation of the study's nature and objectives.

2.1 Inclusion Criteria

- Pregnant women were included in the case group if they had a singleton pregnancy with idiopathic polyhydramnios, diagnosed by ultrasound as an amniotic fluid index (AFI) > 25 cm performed by a senior radiologist. Additional criteria included: normal body mass index (BMI 20–25 kg/m²), gestational age > 34 weeks at recruitment, normal fetal anatomy scan at 18–20 weeks (no structural or chromosomal abnormalities), negative TORCH screening, no maternal diabetes mellitus, and no Rh isoimmunization.
- The control group consisted of low-risk pregnant women with normal AFI (5–24 cm), matched for gestational age, and meeting the same inclusion criteria except for the presence of polyhydramnios.

2.2 Exclusion criteria

- BMI > 25 kg/m²
- gestational age ≤ 34 weeks
- multiple gestation
- preterm prelabor rupture of membranes
- antepartum fetal demise
- evidence of fetal isoimmunization
- significant fetal structural or genetic anomalies (detected prenatally or postnatally)

- positive TORCH infection
- maternal diabetes mellitus

All participants underwent detailed history taking, physical examination (including digital vaginal examination), and ultrasound assessment of amniotic fluid index. Recorded variables included maternal age, BMI, gravidity, parity, gestational age at delivery, mode of previous deliveries, and cervical length. The primary obstetric outcome was the rate of cesarean section. Main neonatal outcomes included Apgar score at 5 minutes, need for neonatal intensive care unit (NICU) admission, and frequency of respiratory distress syndrome.

Data were collected using a structured proforma and entered into Microsoft Excel 2010, then analyzed using SPSS version 26 (IBM Corp., Armonk, NY, USA). Quantitative variables were presented as mean ± standard deviation (SD), median, and interquartile range (IQR). Categorical variables were expressed as numbers and percentages. Comparisons between groups were performed using the independent samples t-test for normally distributed continuous data, the Mann-Whitney U test for non-normally distributed data, and the chi-square test or Fisher's exact test for categorical variables, as appropriate. A p-value ≤ 0.05 was considered statistically significant.

3- RESULTS AND DISCUSSION

A total of 60 pregnant women with singleton pregnancies were enrolled in this study (30 with idiopathic polyhydramnios and 30 controls with normal amniotic fluid volume). Maternal baseline characteristics are summarized in Table 1. There were no statistically significant differences between the two groups in maternal age (27.77 ± 3.53 vs 26.53 ± 2.33 years, p = 0.116) or body mass index (23.03 ± 1.35 vs 22.90 ± 1.77 kg/m², p = 0.137). However, gestational age at delivery was significantly lower in the idiopathic polyhydramnios group (34.63 ± 0.93 weeks) compared with the control group (37.63 ± 1.03 weeks, p < 0.001). Gravidity, parity, and history of previous delivery modes were similar between groups (p > 0.05).

Table (1): Baseline maternal characteristics of the study participants

Characteristic	Polyhydramnios group (n = 30)	Control group (n = 30)	P-value
Age (years), mean ± SD	27.77 ± 3.53	26.53 ± 2.33	0.116
Body mass index (kg/m²), mean ± SD	23.03 ± 1.35	22.90 ± 1.77	0.137
Gravida, median (IQR)	3 (2–4)	3 (2–4)	0.926
Para, median (IQR)	2 (1–3)	2 (1–3)	0.926
Previous normal vaginal delivery*, n (%)	13 (43.3)	17 (56.7)	0.302
Previous cesarean section, n (%)	17 (56.7)	13 (43.3)	0.302

SD = standard deviation; IQR = interquartile range

Women with idiopathic polyhydramnios had a significantly shorter cervical length on transvaginal ultrasound examination (3.03 ± 0.54 cm vs. 3.58 ± 0.20 cm, p < 0.001). Gestational age at delivery was also significantly lower in this group, as shown in Table 2.

Table (2): Cervical length and gestational age at delivery

Characteristic	Polyhydramnios group (n = 30)	Control group (n = 30)	P-value
Cervical length (cm), mean ± SD	3.03 ± 0.54	3.58 ± 0.20	<0.001
Gestational age at delivery (weeks), mean±SD	34.63 ± 0.93	37.63 ± 1.03	<0.001

SD = standard deviation

The mode of delivery differed significantly between groups (Table 3). Cesarean section rate was higher in the idiopathic polyhydramnios group (66.7%) than in the control group (36.7%, p = 0.020). In the polyhydramnios group, the main indications for cesarean delivery were previous cesarean section (n=14), malpresentation (n=4), and placental abruption (n=2). In contrast, all cesarean sections in the control group were performed due to a history of previous cesarean section. No cases of postpartum hemorrhage were observed in either group.

Table (3): Mode of delivery and indications for cesarean section

Characteristic	Polyhydramnios group (n = 30)	Control group (n = 30)	P-value
Mode of delivery, n (%)			0.020
- Normal vaginal delivery	10 (33.3)	19 (63.3)	
- Cesarean section	20 (66.7)	11 (36.7)	
Indications for cesarean section			
- Previous cesarean section	14	11	
- Malpresentation	4	0	
- Placental abruption	2	0	

Note: Percentages for indications are calculated based on the total number of cesarean sections performed in each group. Of the 17 women in the polyhydramnios group and 13 women in the control group who had a history of previous cesarean section, 3 and 2 women, respectively, successfully achieved vaginal birth after cesarean in the current pregnancy

Neonatal outcomes are presented in Table 4. Neonates born to mothers with idiopathic polyhydramnios had a significantly lower mean Apgar score at 5 minutes (6.75 ± 1.02 vs. 7.50 ± 0.61, p = 0.007), a higher rate of respiratory distress (13.3% vs. 0%, p = 0.040), and a markedly higher rate of NICU admission (63.3% vs. 23.3%, p < 0.001).

Table (4): Neonatal outcomes

Characteristic	Polyhydramnios group (n = 30)	Control group (n = 30)	P-value
Apgar score at 5 minutes, mean ± SD	6.75 ± 1.02	7.50 ± 0.61	0.007
Respiratory distress, n (%)	4 (13.3)	0 (0)	0.040
NICU admission, n (%)	19 (63.3)	7 (23.3)	<0.001

SD = standard deviation; NICU = neonatal intensive care unit

3.1 Multivariable regression analysis

Multivariable logistic and linear regression models were performed, adjusting for gestational age and cervical length, to determine whether idiopathic polyhydramnios was independently associated with adverse outcomes. The results are shown in Table 5. All models were adjusted for gestational age and cervical length. Idiopathic polyhydramnios remained a strong independent predictor of cesarean delivery (adjusted odds ratio (aOR) 13.72, 95% CI 2.46–76.38, p = 0.003) and lower Apgar score at 5 minutes (β = –0.66, 95% CI –1.22 to –0.10, p = 0.021). The association with NICU admission was attenuated after adjustment and was no longer statistically significant (aOR 1.68, 95% CI 0.43–6.59, p = 0.456). Multivariable modeling for respiratory distress was not feasible due to zero events in the control group.

Table (5): Multivariable regression analysis of key outcomes

Outcome	Variable	Effect Measure	Estimate (95% CI)	P-value
Cesarean section	Idiopathic polyhydramnios	aOR	13.72 (2.46–76.38)	0.003
NICU admission	Idiopathic polyhydramnios	aOR	1.68 (0.43–6.59)	0.456
Apgar score at 5 minutes	Idiopathic polyhydramnios	β	–0.66 (–1.22 to –0.10)	0.021

aOR = adjusted odds ratio; β = unstandardized regression coefficient; CI = confidence interval; NICU = neonatal intensive care unit

Polyhydramnios, defined as an abnormal increment in the volume of the amniotic fluid detected by ultrasound, affects about 1–2% of single-gestation pregnancies [4]. In the present study, the mean maternal age was comparable between the idiopathic polyhydramnios group (27.77 years) and the control group (26.53 years). These findings were in agreement with several previous studies. Asadi et al. demonstrated a mean age of 28.37 years in pregnant women with polyhydramnios and 26.81 years in the control group [11]. Crimmins et al. reported an average age of 28.3 years in the case group and 24.9 years in women with normal amniotic fluid volume [12]. Similarly, Karahanoglu et al. found a mean age of 25.8 years in the polyhydramnios group and 27.1 years in the control group (13). In contrast, Pasquini et al. enrolled older pregnant women, with a mean age of 35.6 years in the polyhydramnios group and 31.8 years in the control group [14]. Mean gestational age at delivery was significantly lower in the polyhydramnios group compared to the control group (34.63 weeks versus 37.63 weeks, $p < 0.001$). This result is consistent with a recent meta-analysis of 15 studies involving 8392 women with polyhydramnios and 296,171 controls, which reported a higher incidence of preterm labor in the polyhydramnios group (10.7% versus 6.7%) [7]. The pathophysiological link between polyhydramnios and preterm delivery may arise from increased amniotic fluid volume, which over-distends the uterus and predisposes to preterm labor [15]. Additionally, polyhydramnios exerts increased pressure on pelvic organs, including the cervix, leading to changes in mechanical orientation, an increased utero-cervical angle, and decreased cervical length [16]. The correlation between decreased cervical length and polyhydramnios has been well-documented in both singleton and multiple gestation pregnancies [17, 18]. Cervical shortening has been shown in several studies to predict preterm labor, regardless of the presence of polyhydramnios [16, 19]. The current study was consistent with these findings, demonstrating significantly shorter cervical length in women with polyhydramnios.

In the present study, there were no significant differences in gravidity, parity, or previous modes of delivery between the polyhydramnios group and the control group ($p > 0.05$). These results aligned with Ersoy et al., who found no significant differences in gravidity and parity between women with polyhydramnios and those with normal amniotic fluid [20]. Gravidity had not been significantly correlated with polyhydramnios in multiple reports [11, 21]. Similarly, several series showed no significant differences in parity between women with polyhydramnios and controls [12, 22]. One study also reported no significant difference in the number of previous cesarean sections [15], while Berezowsky et al. found no significant difference in the history of previous cesarean section between cases and controls (23). In contrast, other studies have reported significant differences in gravidity and parity between the two groups [24, 25]. The frequency of cesarean section was significantly higher in the polyhydramnios group compared to the control group (66.7% versus 36.7%, $p = 0.020$). This finding was consistent with a recent meta-analysis by Kechagias et al., which analyzed data from 31 studies and showed a higher incidence of cesarean section in the polyhydramnios group compared with controls [9]. Cesarean section in the context of polyhydramnios may be indicated for several reasons [9, 10, 15], including prolongation of the first stage of labor and placental abruption due to uterine over-distention (which may cause atony and reduced responsiveness to oxytocin), abnormal fetal heart rate tracings necessitating cesarean or instrumental delivery, and unfavorable outcomes such as shoulder dystocia.

In the current study, cesarean sections in the polyhydramnios group were mainly due to previous cesarean history, malpresentation, and placental abruption, whereas in the control group, they were primarily due to previous cesarean section only. A recent meta-analysis reported that the odds of malpresentation in the polyhydramnios group were 2.73 times higher than in the normal group (95% CI 2.06–3.61) [8]. Another meta-analysis of 10 studies involving 198,359 participants demonstrated a significant association between polyhydramnios and placental abruption (OR 1.93, 95% CI 1.23–2.63) [26]. Also, in the present study, idiopathic polyhydramnios was associated with an

increased risk of Apgar score < 7 at 5 minutes, significantly higher respiratory distress ($p < 0.05$), and increased NICU admission. These findings were consistent with recent literature showing that polyhydramnios correlates with adverse neonatal outcomes, including higher rates of NICU admission and lower Apgar scores [9, 10]. Unfavorable neonatal outcomes may result from insufficient feto-placental circulation, as suggested by abnormal fetal heart rate tracings observed in women with polyhydramnios [15]. Placental insufficiency in the presence of polyhydramnios may arise from several pathophysiological processes [10,15], including membrane rupture and partial subtle placental abruption leading to fetal hypoxemia, suboptimal umbilical cord position, increased amniotic fluid pressure impairing oxygen transfer (with rising umbilical circulation acidity), and shunting of fetal blood to vital organs.

This study had some limitations. First, the sample size (n=60) was relatively small and, therefore, contributes to limited statistical power for rare neonatal outcomes and subgroup analyses. Second, the study was conducted in a single center at Al-Diwaniyah, Iraq, and therefore, the findings may not be generalizable to other populations. Third, the multivariable regression analysis adjusted for gestational age and cervical length, but there may still be potential residual confounding due to unmeasured variables such as the socioeconomic status of mothers, severity grading of polyhydramnios, and/or maternal intrapartum management. Also, long-term neonatal outcomes were not evaluated, nor were different severity degrees of polyhydramnios. There is a need for larger multicenter studies to replicate these findings.

4- CONCLUSION

Evidence from this prospective case-control study demonstrates that idiopathic polyhydramnios is related to reduce cervical length, premature delivery, high rate of cesarean section, and poor neonatal outcome (lower Apgar scores and increased risk of respiratory distress and NICU admission). Multivariable analysis has supported the relationship between idiopathic polyhydramnios and cesarean delivery and lower Apgar scores after controlling for gestational age and cervical length. Therefore, an increased level of antenatal surveillance and timely intervention is mandatory in these types of pregnancies to decrease the risk for both the mother and their infants.

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