Original Article

Obstetrics and Neonatal Consequences in Polyhydramnios at a Tertiary Care Hospital

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Abstract

Objective: To investigate the obstetrics and fetal consequences were associated with polyhydramnios among cases presenting at the Tertiary Care Hospital/Nawabshah.

Methodology: The observational and prospective study was done from May 2021, April, 2022, at Gynae and OBS department of Peoples University of Medical and Health Sciences (PUMHS) for Women. Pregnant women with polyhydramnios between the ages of 18 and 40 who were either primiparous or multiparous and who had a gestational age of more than 28 weeks were included. After obtaining consent, all pregnant women were followed up with until they gave birth, and data on foetal and maternal outcomes such caesarean delivery, low birth weight, Apgar score at 1 minute 7, intrauterine growth restriction, and neonatal intensive care unit hospitalization were recorded.

Results: The mean age of the patients was 29.25 ± 4.41 years. Regarding obstetric and fetal outcomes, there were higher rates of cesarean section (90, 65.22%), congenital anomalies (9, 21.01%), low birth weight (82, 59.42%), macrosomia (38, 27.54%), APGAR scores <7 at 1 minute (89, 64.49%), NICU admissions (25, 18.12%), and intrauterine fetal demise (IUFD) (37, 26.81%). Congenital anomalies, NICU admissions, and IUFD were significantly more common in the older age group ($p > 0.05$). Additionally, IUFD was significantly higher in the pregnancy-induced hypertension (PIH) group (37.93% vs. 18.75%, $p = 0.012$), and NICU admissions were significantly higher in the gestational diabetes mellitus (GDM) group ($p = 0.028$).

Conclusion: Polyhydramnios was observed to be associated with increased obstetric and fetal morbidity and mortality, including higher rates of cesarean section, congenital anomalies, low birth weight, macrosomia, NICU admissions, and intrauterine fetal demise (IUFD).

Keywords**:** Polyhydramnios, Cesarean Delivery, Congenital anomalies, NICU admission, Mortality

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Introduction

Polyhydramnios is characterized by an excessive increase in amniotic fluid volume, as measured by ultrasound, and affects 1-2% of singleton pregnancies.[1] Some studies, however, report a higher prevalence, reaching up to 3.9%.[1,2] The amniotic fluid, which surrounds the fetus, is necessary for the fetus's continued development and safety during the pregnancy. During a normal pregnancy, the amount of amniotic fluid will increase from 35 milliliters at 12 weeks of gestation to 250 milliliters between 17 and 18 weeks, and then to 800 milliliters when the pregnancy is full-term. The volume of liquids gradually reduces beginning at week 38, reaching an average of 250 ml by week 42. The equilibrium of the amniotic fluid is the result of a complicated interplay between the systems of the foetus and the mother. The flow of amniotic fluid is critically important to the growth and development of the foetus. It creates an environment for the fetus that is conducive to growth and development that is also protective and low in resistance. It acts as a cushion against the restrictive boundaries of the pregnant uterus, giving the foetus freedom for mobility and growth while also shielding it from the effects of external stress.[3] It aids in foetal temperature regulation, contributes to fluid

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balance, and avoids joint contractures by allowing for the expansion of limbs. As a result, the foetus is shielded from vascular and nutritional impairment caused by the umbilical cord being compressed. Thus, anomalies in fluid volume may either be a direct cause of foetal development problems or an indirect symptom of another underlying condition, such as foetal hypoxia, neural tube malfunction, or gastrointestinal blockage. Oligohydramnios is defined as an amniotic fluid index (AFI) of 5 cm.[3-5]

Because of a disruption in the equilibrium between amniotic fluid production, foetal resorption, and secretion, polyhydramnios can occur. The presence of polyhydramnios is often indicated by an amniotic fluid volume of greater than 2,000 ml at term. Ultrasound criteria for this condition include a deepest vertical pocket of amniotic fluid that measures more than 8 cm, an amniotic fluid index (AFI) that measures more than 24, or a maternal age that is older than the 95th percentile for gestational age. An estimated 0.43–3.3% of pregnancies will experience polyhydramnios.[4-5]

Preterm delivery, aneuploidy, caesarean section, foetal abnormalities, and perinatal and postnatal mortality are only some of the perinatal morbidities and mortality that have been linked to polyhydramnios in the past.[6-7] Obstetricians may have diagnostic and treatment challenges while dealing with a pregnant patient who has polyhydramnios. Many studies reported the polyhydramnios is an indicator of an elevated risk of pregnancy problems and advise thorough testing in these cases.[8-10] Polyhydramnios is a contentious issue in obstetric practice, with the literature presenting conflicting perinatal outcomes for idiopathic polyhydramnios, as a result, this matter remains unresolved. Like a study the caesarean section rate in polyhydramnios was 25.4%, macrosomia in 15%, NICU admission in 48.7% and IUFD in 10.4%.[11] However another study, found some different finding like caesarean section rate in polyhydramnios was 38.7%, low birth weight in 35.1%, macrosomia in 6.1%, APGAR score <7 at 1 minute was 36.0% and NICU admission as 38.6%.[12] Given the controversies and limited local data, we recognized the need for further research in this area.

Therefore, this study was conducted to evaluate the maternal and fetal outcomes associated with polyhydramnios. The goal is to ensure proper management and take all necessary measures to improve feto-maternal outcomes.

Methodology

An observational and prospective study was done during six months from October 2021 to April 2022, at gynaecology and obstetrics department of Peoples University of Medical and Health Sciences for Women /Nawabshah. All pregnant women diagnosed with polyhydramnios as per ultrasound, between the age range of 18 to 40 years, of either parity and who had a gestational age of more than 28 weeks as determined by last menstrual period (LMP) were included. women with antepartum hemorrhage (assessed on clinical examination), pregnant women with preterm rupture of membranes confirmed on speculum examination and hemolytic disease of fetus were excluded. A sample size of 138 polyhydramnios patients was calculated using the 95% confidence level, 4% margin of error, with proportion of (6.1% macrosomia proportion).[12] The study was done after obtaining the approval by the institutional ethics committee. Participants' confidentiality and privacy were strictly maintained throughout the study. A verbal informed consent was obtained from all the participants before enrollment in the study. Participants were monitored from the time of diagnosis of polyhydramnios until delivery. At delivery, the following fetal and maternal outcomes were evaluated and recorded in terms of: C-section decision by the attending obstetrician based on clinical indications, low birth weight was defined as weight less than 2500 grams, Apgar score was measured at 1 minute after birth, with a score of less than 7 indicating potential neonatal distress, newborn requiring NICU care immediately after birth and IUFD as per clinical and ultrasound diagnosis.

All the relevant data was collected and were systematically recorded on a specially designed proforma. This proforma included sections for demographic details, clinical characteristics, and each of the specified obstetrics and fetal consequences. The collected information was analyzed by computer software SPSS version 25.0

Results

Age range in this study was from 18 to 40 years with mean age of 29.25±4.41 years. Majority of the patients 73 (52.90%) were between 31 to 40 years of age. Mean gestational age was 33.40±2.51 weeks. Mean BMI was 28.30±2.60 kg/m^2. Most of the women 74.6% were unbooked, 42.1% cases had PIH and 23.2% had gestational diabetes. In terms to the maternal outcome, majority of the women 90(65.22%) underwent c-sections, while in accordance to the neonatal consequences, congenital anomalies were in

29(21.01%) cases, low birth weight in 82(59.42%) patients, macrosomia noted in 38(27.54%), APGAR score <7 at 1 minute was in 89(64.49%), NICU admission rate was 25(18.12%) and IUFD was noted in 37(26.81%) of the patients. **Figure I**

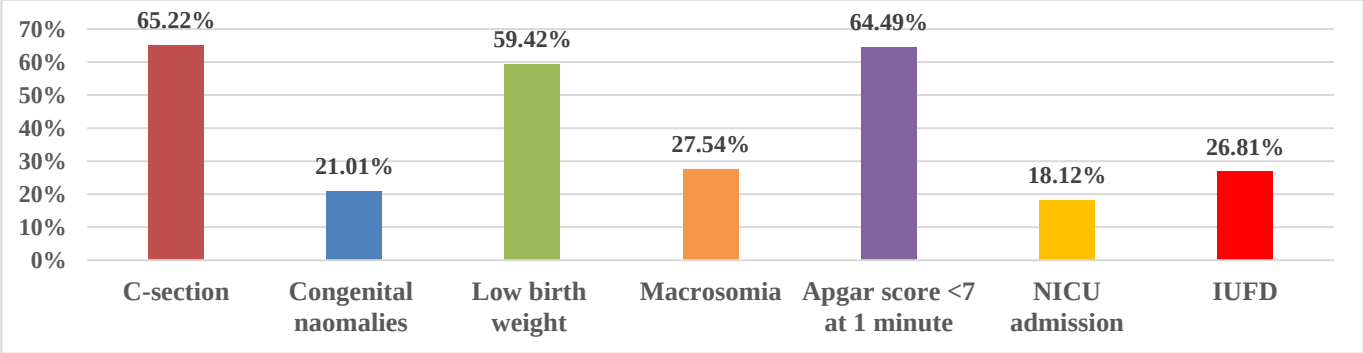

Figure I. Frequency of obstetrics and fetal outcome in polyhydramnios.

age group (31.51% vs. 9.23%, p = 0.001), (27.40% vs. 7.69%, p = 0.003) and (34.25% vs. 18.46% p = 0.037) respectively but are not significantly influenced by gestational age (p = >0.05). However low birth weight, Macrosomia and APGAR score <7 at 1 minute were statistically insignificant across the age and gestational age (p= >0.05). **Table I**

Table I: Obstetrics and fetal consequences with respect to age and gestational age.

Feto-maternal outcome		Age group		p-value	Gestational age		p-value
		18-30 years	31-40 years		29-32 weeks	>32 weeks	
C-section	Yes	44 (67.69%)	46 (63.01%)	0.023	38 (65.52%)	52 (65.0%)	0.949
	No	21 (32.31%)	27 (36.99%)		20 (34.48%)	28 (35.0%)	
Congenital anomalies	Yes	06 (9.23%)	23 (31.51%)	0.001	14 (24.14%)	15 (18.75%)	0.443
	No	59 (90.77%)	50 (8.49%)		44 (75.86%)	65 (81.25%)	
Low birth weight	Yes	40 (61.54%)	42 (57.53%)	0.633	32 (55.17%)	50 (62.50%)	0.387
	No	25 (38.46%)	31 (42.47%)		26 (44.83%)	30 (37.50%)	
Macrosomia	Yes	16 (24.62%)	22 (30.14%)	0.469	18 (31.03%)	20 (25.0%)	0.433
	No	49 (75.38%)	51 (69.86%)		40 (68.97%)	60 (75.0%)	
APGAR score <7 at 1 minute	Yes	43 (66.15%)	46 (63.01%)	0.700	40 (58.97%)	49 (61.25%)	0.349
	No	22 (33.85%)	27 (36.99%)		18 (31.03%)	31 (38.75%)	
NICU admission	Yes	05 (7.69%)	20 (27.40%)	0.003	13 (22.41%)	12 (15.0%)	0.264
	No	60 (92.31%)	53 (72.60%)		45 (77.59%)	68 (85.0%)	
IUFD	Yes	12 (18.46%)	25 (34.25%)	0.037	18 (31.03%)	19 (23.75%)	0.34
	No	53 (81.54%)	48 (65.75%)		40 (68.97%)	61 (76.25%)	

Table II: Obstetrics and fetal consequences with respect to booking status and BMI.

Feto-maternal outcome		Booking status		p-value	BMI		p-value
		Un-booked	Booked		≤30 kg/m^2	>30 kg/m^2	
C-section	Yes	24 (68.57%)	66 (64.08%)	0.629	63 (63.0%)	27 (71.05%)	0.375
	No	11 (31.43%)	37 (35.92%)		37 (37.0%)	11 (28.95%)	
Congenital anomalies	Yes	09 (25.71%)	20 (19.42%)	0.429	23 (23.0%)	06 (15.79%)	0.353
	No	26 (74.29%)	83 (80.58%)		77 (77.0%)	32 (84.21%)	
Low birth weight	Yes	20 (57.14%)	62 (60.19%)	0.751	60 (60.0%)	22 (57.89%)	0.822
	No	15 (42.86%)	41 (39.81%)		40 (40.0%)	16 (42.11%)	
Macrosomia	Yes	08 (22.86%)	30 (29.13%)	0.473	29 (29.0%)	09 (23.68%)	0.532
	No	27 (77.14%)	73 (70.87%)		71 (71.0%)	29 (76.32%)	
APGAR score <7 at 1 minute	Yes	21 (60.0%)	68 (66.02%)	0.52	63 (63.0%)	26 (68.42%)	0.552
	No	14 (40.0%)	35 (33.98%)		37 (37.0%)	12 (31.58%)	
NICU admission	Yes	04 (11.43%)	21 (20.39%)	0.234	21 (21.0%)	04 (10.53%)	0.154
	No	31 (88.57%)	82 (79.61%)		79 (79.0%)	34 (89.47%)	
IUFD	Yes	07 (20.0%)	30 (29.13%)	0.292	28 (28.0%)	09 (23.68%)	0.609
	No	28 (80.0%)	73 (70.87%)		72 (72.0%)	29 (76.32%)	

The cesarean sections rate was relatively high in both age groups. Congenital anomalies, NICU admissions and IUFD were significantly more common in the older

The rate of C-sections, congenital anomalies, Low birth weight, macrosomia, and APGAR scores less than 7 at

Table III: Obstetrics and fetal consequences with respect to PIH and GDM

Feto-maternal outcome		PIH		p-value	Gestational DM		p-value
		Yes	No		Yes	No	
C-section	Yes	34 (58.62%)	56 (70.0%)	0.166	20 (62.50%)	70 (66.04%)	0.713
	No	24 (41.38%)	24 (30.0%)		12 (37.50%)	36 (33.96%)	
Congenital anomalies	Yes	10 (17.24%)	19 (23.75%)	0.354	03 (9.38%)	26 (24.53%)	0.065
	No	48 (82.76%)	61 (76.25%)		29 (90.62%)	80 (75.47%)	
Low birth weight	Yes	31 (53.45%)	51 (63.75%)	0.224	23 (71.88%)	59 (55.66%)	0.102
	No	27 (46.55%)	29 (36.25%)		09 (28.13%)	47 (44.34%)	
Macrosomia	Yes	21 (36.21%)	17 (21.25%)	0.052	11 (34.38%)	27 (25.47%)	0.323
	No	37 (63.79%)	63 (78.75%)		21 (65.62%)	79 (74.53%)	
APGAR score <7 at 1 minute	Yes	42 (&2.41%)	47 (78.75%)	0.098	18 (56.25%)	71 (66.98%)	0.266
	No	16 (27.59%)	33 (41.25%)		14 (43.75%)	35 (33.02%)	
NICU admission	Yes	07 (12.07%)	18 (22.50%)	0.116	10 (31.25%)	15 (14.15%)	0.028
	No	51 (87.93%)	62 (77.50%)		22 (68.75%)	91 (85.85%)	
IUFD	Yes	22 (37.93%)	15 (18.75%)	0.012	11 (34.38%)	26 (24.53%)	0.27
	No	36 (62.07%)	65 (81.25%)		21 (65.62%)	80 (75.47%)	

one minute, NICU admissions and intrauterine fetal demise (IUFD) were statistically insignificant across the booking status and BMI categories (p= >0.05). **Table II**

For PIH, the data show no significant differences in C-section rates, congenital anomalies, low birth weight, macrosomia, APGAR scores less than 7 at one minute, and NICU admissions. However, IUFD was significantly higher in the PIH group (37.93% vs. 18.75%, p = 0.012). For GDM, there are no significant differences in C-section rates (62.50% for GDM vs. 66.04% without GDM, p = 0.713), congenital anomalies (9.38% vs. 24.53%, p = 0.065), low birth weight (71.88% vs. 55.66%, p = 0.102), macrosomia (34.38% vs. 25.47%, p = 0.323), APGAR scores less than 7 at one minute (56.25% vs. 66.98%, p = 0.266), and IUFD (34.38% vs. 24.53%, p = 0.27). While, NICU admissions are significantly higher in the GDM group (p = 0.028). **Table III**

Discussion

During pregnancy, the cause is unknown in around half to two-thirds of all instances. Pregnancies with polyhydramnios without foetal abnormalities have an increased risk of preterm labour, big for gestational age (LGA) and small for gestational age babies, poor Apgar scores, foetal distress during labour, and an increased rate of caesarean delivery (CD). In studies, infants whose mothers experienced complications during pregnancy due to idiopathic polyhydramnios had a perinatal death rate that was 2-5 times greater than the national average.[13-15] In this study, frequency of fetal and maternal outcome in high-risk pregnancy with oligohydramnios was as follows; cesarean section was found in 90 (65.22%), congenital anomalies in 29(21.01%), low birth weight in 82(59.42%) patients, macrosomia in 38(27.54%), APGAR score <7 at 1 minute in 89 (64.49%), NICU admission in 25 (18.12%) and IUFD in 37 (26.81%) patients. In a study, the caesarean section rate in polyhydramnios was 25.4%, macrosomia in 15%, NICU admission in 48.7% and IUFD in 10.4%.[11] In another study, the caesarean section rate in polyhydramnios was 38.7%, low birth weight in 35.1%, macrosomia in 6.1%, Apgar score <7 at 1 minute was 36.0% and NICU admission as 38.6%.[12] Idiopathic polyhydramnios has not been shown to be substantially linked to an increased risk of preterm birth and worse newborn outcome, according to research published by Kemp et al. in 1999. However, they did discover a statistically significant rise in macrosomia as well as an increase in the frequency of caesarean sections.[16] In 2005, a team led by Malas examined perinatal outcomes in 69 women with idiopathic polyhydramnios. This study demonstrated that idiopathic polyhydramnios does not appear to have a detrimental neonatal outcome, except from the higher occurrences of macrosomia, malpresentations, and caesarean delivery.[17] Idiopathic polyhydramnios was found to carry a greater prevalence of unfavorable perinatal outcomes in a research that was conducted in 2005 by Chen et al.

These outcomes included low Apgar scores, foetal mortality, foetal discomfort in labour, transfer to the NICU, and newborn death.[18] About forty percent of pregnancies have polyhydramnios that cannot be explained during the course of the pregnancy, according to the findings of a research that was published in 2012 by Abele H et al., and ten percent of these instances have a defect that is not discovered until after the baby is born.[19] In the study by Kouamé et al.[20] observed that 76.4% of cases of polyhydramnios were linked to foetal abnormalities. Most of the foetal abnormalities were severe (60%), while others were mild (40%). Neural tube anomalies such anencephaly, spina bifida, hydrocephalus, etc. were the most often encountered

types of foetal malformations. Congenital malformations were discovered at a rate of 31.1% in research by Gita Guin et al.[31] the most prevalent defects were hydrocephalus (5/14), anencephaly (3/14), spina bifida (2/14) and duodenal atresia (2/14). Abele H et al.[22] observed that polyhydramnios had no known cause during pregnancy in around 40% of pregnancies, and that in 10% of these cases, an abnormality is not discovered until after birth. In aligns to this study Asadi N et al[12] it was found that the case group had higher incidences of low birth weight, macrosomia, NICU admissions, fetal distress, fetal death, lower 1-minute and 5-minute APGAR scores, preterm delivery, and neonatal death. However Wax JR et al[23] reported that the chronic polyhydramnios is linked to negative outcomes for both the mother and the newborn. This study has several limitations, including a small sample size, the absence of a control group, and the lack of data on the duration of polyhydramnios. Consequently, further comprehensive longitudinal studies are recommended to validate these findings.

Conclusion

The study revealed that the polyhydramnios is linked to the increased obstetric and fetal morbidity and mortality, including higher rates of cesarean section, congenital anomalies, low birth weight, macrosomia, NICU admissions, and IUFD. Consequently, we recommend rigorous prenatal monitoring and care for these high-risk individuals to reduce the likelihood of maternal and infant morbidity and mortality.

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