Scholars International Journal of Obstetrics and Gynecology

Abbreviated key title: Sch. Int. J. Obstet. Gynec.
A Publication by "Scholars Middle East Publishers"
Dubai, United Arab Emirates

ISSN: 2616-8235 (Print)
ISSN: 2617-3492 (Online)

Clinical Study to Evaluate the Prevalence of Polyhydramnios and Associated Fetal Outcome in Singleton Pregnancy in North East Population of India

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Original Research Article

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Article History
Received: 02.11.2018
Accepted: 14.11.2018
Published: 30.11.2018

Abstract: Due to active involvement of fetal system in regulation of amniotic fluid volume it has been identified as an indicator of intrauterine fetal status. USG has revolutionized the process of assessment of amniotic fluid thus becoming an integral part of fetal surveillance. Polyhydramnios is an obstetrical condition associated with significant perinatal morbidity and mortality. In a low resource health facility as India with poor coverage of antenatal care and malnutrition it still becomes more important to screen pregnancies for such high risk factors. The objectives of the present study were: 1. To determine the incidence of polyhydramnios by ultrasonography. 2. To evaluate its relationship with neonatal outcome. A hospital based prospective study for duration of one year. All the patients identified as having polyhydramnios according to Largest pocket diameter method. The incidence of polyhydramnios in singleton pregnancy during the study period was 1.04 %. Majority of cases (76.61%) were mild, 14.03% moderate and 9.36 % severe polyhydramnios. Congenital anomalies were present in 34 (19.88%) fetus. The commonest malformations were central nervous system 17 cases (9.94%), gastrointestinal system anomalies 9 (5.3%) and musculoskeletal 7 cases (4.1%). Anencephaly was the commonest CNS malformations. Significant association existed between severity of polyhydramnios and chances of fetus having congenital anomaly. Other fetal complications include VLBW 4.09%, macrosomia 1.75%, SGA babies 8.77%, LGA babies 9.94%, still birth 7.59%, NICU admission 20.47% , Perinatal death 16.96% and early neonatal death 9.36%. The study gives us the understanding of the impact of polyhydramnios on the fetal outcome. Our study demonstrates that careful fetal examination has to be performed when polyhydramnios is diagnosed, as congenital malformations are often associated with this condition. These anomalies if detected early timely termination of pregnancy can be done hence less physical and psychological trauma to mother.

Keywords: Amniotic Fluid, Congenital Anomaly, Fetal, Polyhydramnios, Pregnancy.

INTRODUCTION

Polyhydramnios is defined as the accumulation of excess of amniotic fluid. Ultrasonographically, it is defined as the deepest vertical pool of 8cm or greater or an amniotic fluid index above 95th centile for gestational age [1] or AFI> 24cm. Clinically, it is defined as excessive accumulation of liquor amnii causing discomfort to the patient and/ or when an imaging help is needed to substantiate the clinical diagnosis of the lie and presentation of the fetus [2]. It complicates approximately 1-2% of pregnancies. Excessive accumulation of amniotic fluid is normally related to either decreased fetal swallowing/diminished absorption or increased fetal excretion. Therefore, changes in fetal urine production or absorption may result in significant changes in Amniotic fluid volume [3]. There is dominant role of anomalous fetal development in the production of polyhydramnios but discrepancy exists regarding the reported frequency of anomalies among fetuses in pregnancies complicated with polyhydramnios [4].

Perinatal morbidity and mortality are significantly increased when polyhydramnios is present at delivery. Congenital malformations are more likely in polyhydramnios and these malformations may occur in almost every organ system. But, commonly these malformations are associated with systems that involve absorption of fluids and swallowing in the fetus [5, 6]. Anencephaly, duodenal or esophageal atresia are the most frequent fetal malformations.

The widespread use of ultrasound imaging has revolutionized the evaluation of fetus associated with

polyhydramnios. The amount of amniotic fluid can be assessed more objectively and a targeted evaluation can be performed to identify any associated complication or abnormality [7]. The purpose of this study was to determine the incidence of polyhydramnios and its perinatal outcome

AIM AND OBJECTIVES

- To determine the incidence of polyhydramnios by ultrasonography.
- To evaluate its relationship with neonatal outcome.

MATERIALS AND METHODS

A prospective study was conducted to evaluate the incidence and fetal outcome of pregnancies with polyhydramnios in the department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital, Guwahati from 1st July 2017 to 30th June 2018 . All the cases of polyhydramnios in singleton pregnancy fulfilling inclusion and exclusion criteria were included in the study

Inclusion Criteria

- Pregnancy associated with excess of amniotic fluid ie. if the largest pocket diameter (LPD) greater than or equal to 8 cm or if the amniotic fluid index (AFI) is greater than the 95th percentile for the gestational age.
- Irrespective of age and parity.
- Second and third trimester pregnancy (from 16th weeks of gestation onwards).

Exclusion Criteria

- Pregnancy associated with over distended abdomen other than hydramnios.
- Pregnancy with huge ovarian cyst.
- Ascites.
- Cardiac and Renal disease.
- Multiple pregnancy.
- First trimester.

Period of follow up: From the first ANC to 7 days post-partum

In the present study ,amniotic fluid volume was measured by using *Largest Pocket Diameter (LPD)/ Single Deepest Pocket Diameter (SDP)* and the cases were divided into mild, moderate and severe [8, 9].

- Mild: single deepest pocket at 8- <12 cm
- Moderate: single deepest pocket at 12- <16 cm
- severe: single deepest pocket ≥16 cm

Standard fetal biometric data were obtained. The fetal lie, presentation, position, assessment of gestational age and placental site were determined. A systematic fetal organ review was performed in an attempt to detect any gross congenital abnormalities. Other necessary investigations also were carried out. Data thus collected was analyzed for results and compared with international as well as local studies. The Statistical Package for the Social Sciences (SPSS), software package was used for statistical analysis. The rate of each specific outcome measure was calculated. Statistical significance was calculated using chi-square test and defined as $P < 0.05$

RESULTS

In the present study, total number of deliveries in singleton pregnancy was 16507 of which total number of polyhydramnios fulfilling the inclusion and exclusion criteria was 171. The incidence of polyhydramnios in singleton pregnancy during the study period was 1.04 %.

Table-1: Percentage of cases with severity of polyhydramnios

Severity	No. of cases	% of cases
Mild	131	76.61
Moderate	24	14.03
Severe	16	9.36
TOTAL	171	100

It was observed from the above table that, majority of cases (76.61%) were mild polyhydramnios, 14.03% cases were moderate and 9.36 % cases were severe.

In the present study, 34 (19.88%) fetus had one or more anomalies. The commonest malformations were CNS 17 cases (9.94%), gastrointestinal system anomalies 9 (5.3%) and musculoskeletal 7 cases (4.1%).

Among the CNS malformations, Neural tube defects was the most common anomaly, of which, Anencephaly was the commonest, found in 10 cases (5.85%) occuring either singly or in combination with another neural tube defect. Hydrocephalous is the second most common neurological anomaly occurring in 4 (2.3%). All the anomalies were diagnosed by ultrasound except cleft palate, Harlequin ichthyosis, Limb defect with webbed neck with arched palate and one case of CDH which were missed during ultrasound examination.

Table-2: Severity of Polyhydramnios Associated With Congenital Anomalies

Congenital anomalies		Severity of polyhydramnios			Total N (%)
		Mild	Moderate	Severe	
1	Anencephaly	2	2	3	7 (4.1)
2	Anencephaly+Omphalocele			1	1 (0.6)
3	Anencephaly+spina bifida			2	2 (1.2)
4	Occipital Encephalocele		1		1 (0.6)
5	Spina Bifida		1		1 (0.6)
6	Meningomyelocele+Hydrocephalus			1	1 (0.6)
7	Hydrocephalus	2			2 (1.2)
8	Hydrocephalus+cleft lip+cleft palate		1		1 (0.6)
9	Dandy walker syndrome			1	1 (0.6)
10	Nonimmune hydrops foetalis		1		1 (0.6)
11	Ventricular Septal Defect+Polydactyly		1		1 (0.6)
12	Skeletal dysplasia			1	1 (0.6)
13	Oesophageal atresia+anal atresia			1	1 (0.6)
14	Harlequin ichthyosis congenita (HIC)		1		1 (0.6)
15	Gastrochisis	1			1 (0.6)
16	Congenital Diaphragmatic Hernia (CDH)	1		1	2 (1.2)
16	Omphalocele	2			2 (1.2)
17	Oesophageal atresia	1			1 (0.6)
18	Duodenal atresia	1	1		2 (1.2)
19	Cleft lip+Cleft palate		2		2 (1.2)
20	Cleft palate	1			1(0.6)
21	Limb defect + webbed neck + high arched palate			1	1 (0.6)
	Total	11	11	12	34

Table-3: Frequency of congenital anomalies associated with severity of polyhydramnios

Mild		Moderate		Severe		*P* value
No. of cases with anomaly N (%)	No. of cases without anomalyN (%)	No. of cases with anomaly N (%)	No. of cases without anomalyN (%)	Total No. of cases with anomalyN (%)	Total No. of cases without anomalyN (%)	
11(8.4)	120 (91.6)	11 (45.8)	13 (54.2)	12 (75)	4(25)	<0.001

$p < 0.001$, significant

The above table shows the association between the severity of polyhydramnios and the frequency of fetal congenital anomalies. More severe is the polyhydramnios, greater are the chances of fetus having congenital anomaly. This association was found to be statistically significant ($p < 0.001$).

Table-4: Frequency of Fetal Anomalies with Period of Gestation at Diagnosis

Period of Gestation (weeks)	No. of cases	Cases with Fetal congenital Anomalies N (%)	Cases not associated fetal congenital with Anomalies N (%)
16 - <24	7	6 (85.7)	1 (14.3)
24 – < 28	5	4 (80)	1 (20)
28 - < 33	23	6 (26.09)	17 (73.91)
33 - < 37	35	11 (31.42)	24 (68.58)
≥ 37	101	7 (6.93)	94 (93.07)
TOTAL	171	34 (19.88)	137 (80.12)

p-value = <0.00001, Significant

It was seen that the maximum number of cases of fetal congenital anomaly were associated with cases of polyhydramnios diagnosed between 16 - <28 weeks of gestation and minimum number of cases of fetal congenital anomaly were associated with cases of polyhydramnios diagnosed at term pregnancy (≥ 37 weeks).

There was a statistically significant correlation between gestational age at diagnosis and foetal congenital anamoly in cases of polyhydramnios. Earlier

the onset of polyhydramnios more is the chances of fetal congenital anomaly.

PERINATAL OUTCOME

Table-5: Perinatal outcome associated with polyhydramnios in singleton pregnancy

Variables		No. of cases	Percentage (%)
Birth Weight	<1500 g	7	4.09
	1500– <2500 g	26	15.20
	>4000g (Macrosomia)	3	1.75
SGA babies		15	8.77
LGA babies		17	9.94
Still birth	Macerated	6	3.5
	Fresh	7	4.09
Admission to NICU		35	20.47
Early Neonatal death		16	9.36

From the above table it is seen that, 7 babies were having VLBW (<1500 g) and 26 babies were having birth weight between 1500 - <2500 g. Fetal macrosomia was found in 3 cases.

Based on gestational age and birth weight, small for gestational age (SGA) babies were present in 15 cases and large for gestational age (LGA) babies were present in 17 cases.Still birth occurred in 13 cases and Early neonatal death in 16 cases respectively.35 babies required admission in neonatal intensive care unit (NICU) after delivery.

FETAL OUTCOME

Table-6: Fetal outcome in singleton pregnancy complicated with polyhydramnios

Foetal outcome		No. Of cases	Percentage (%)
Alive		133	77.78
Perinatal death		29	16.96
Abortion	Spontaneous	1	0.58
	Induced	8	4.67
Total		171	100

The above table shows, 133 babies were alive. Perinatal deaths occurred in 29 cases because of fetal congenital anomalies, prematurities and birth asphyxia.

Out of 29 cases of perinatal death, still born babies were 13 (because of Prematurity, congenital anomalies and intrapartum asphyxia) and neonatal death occurred in 16 cases (because of prematurities, intrapartum asphyxia and fetal congenital anomalies and sepsis). Out of 9 cases of abortion, 8 cases were induced (MTP) due to fetal congenital anomalies, and 1 case had spontaneous abortion.

Table-7: Fetal outcome associated with severity of polyhydramnios

Foetal outcome		Severity of polyhydramnios		
	Total	Mild	Moderate	Severe
Alive	133	117	14	2
Perinatal death	29	13	6	10
Abortion	9	1	4	4
Total	171	131	24	16

P value < 0.0001, significant

The above table shows the association between fetal outcome and severity of polyhydramnios. There is a statistically significant correlation between the the severity of polyhydramnios and adverse fetal outcome. Out of 131 cases of mild polyhydramnios 117 cases delivered live babies, perinatal death occurred in 13 cases and abortion in 1 case. In contrast significantly higher proportion of cases of moderate and severe polyhydramnios had abortion and perinatal death of fetus.

DISCUSSION

Polyhydramnios is one of the common disorders among pregnancies. Recognition of polyhydramnios is of benefit as it allows identification of pregnancies that may be at increased risk of adverse outcomes. Once polyhydramnios is identified, patients need a thorough evaluation as it is associated with an increased frequency of both maternal and fetal complications [10]. Polyhydramnios of mild to moderate degree usually associated with good perinatal

outcome especially where there is no cause found in the mother or in the fetus.

In the present study, the incidence of polyhydramnios in singleton pregnancy during the study period was 1.04 %. Comparable to our study, Biggio J. R *et al*., [11] studied 370 patients with singleton pregnancies and found the incidence of polyhydramnios to be 1%. Rajgire A. A *et al*., [12] and Tashfeen K *et al*., [13] found the incidence of to be 1.5% and 1.8% respectively.

In the present study, majority of the cases (76.61%) had mild polyhydramnios, 14.03% had moderate polyhydramnios while 9.36% had severe polyhydramnios. Comparable to our study, other studies too reported majority of the cases as mild polyhydramnios.

Table-8: Comparison of fetal congenital anomalies among various studies

Study	Incidence of congenital malformation
Dashe JS *et al*., (2002) [14]	11%
Fawad A *et al*., (2008) [15]	37.1%
Tariq S *et al*., (2010) [16]	31.7%
Chourasia S *et al*., (2013) [17]	18.8%
Gaur S *et al*., (2016) [18]	58%
Samyukta G *et al*., (2017) [19]	19%
Present study	19.88%

Incidence of fetal anomalies in present study was 19.88% which is comparable to incidence reported by Chourasia S *et al*., [17] and Samyukta G *et al*., [19]. Gaur S *et al*., [18] found a very high incidence of fetal anomalies in their study.

In the present study commonest malformations were central nervous system 17 cases (9.94%), followed by gastrointestinal system anomalies 9 (5.3%) and musculoskeletal 7 cases (4.1%). Among the CNS malformations, Neural tube defects was the most common anomaly, of which, Anencephaly was the commonest, found in 10 cases (5.85%). Hydrocephalous is the second most common neurological anomaly occurring in 4 (2.3%) cases. Cleft palate was found in 4 (2.3%) cases.

Similar to our study Chourasia S *et al*., [17] reported majority of Congenital Anomaly were of Central Nervous System. They reported 11% Anencephaly, 1.8% Hydrocephalus, 1.8% multiple Congenital Anomaly, 0.9% Spina Bifida, 0.9% Meningomyelocele, 0.9% Oesophageal Atresia, 0.9% Diaphragmatic Hernia, 0.9% Cleft lip and palate and 0.9% Cleft lip. Desmedt EJ *et al*., [5] also reported CNS malformations as commonest (31%), followed by musculoskeletal (12%) and gastrointestinal system anomalies (10%). Gaur S *et al*., [18] reported Anencephaly as the most common congenital anomaly (12%) followed by meningomyelocele (11%), hydrocephalous (5%) and occipital encephalocele (4%). In contrast to other studies, Rajgire A. A *et al*., [12] reported commonest congenital anomaly as congenital heart defect and cleft lip and cleft palate (5% cases each), followed by anencephaly, spina bifida, duodenal atresia, oesophageal atresia (3.3% cases each).

In the present study the association between the severity of polyhydramnios and congenital anomalies was statistically significant ($p < 0.00001$). More severe is the polyhydramnios, greater are the chances of fetuses having congenital anomaly. Similar to our study Samyukta G *et al*., [19] and Shetty A *et al*., [20] also reported a higher percentage of cases of moderate and severe polyhydramnios having fetal congenital anomalies.

In the present study we found, VLBW babies in 4.09% cases and babies of 1500 - <2500 g in 15.20% cases and fetal macrosomia (>4000g) in 1.75% cases. Comparatively Taskin S *et al*., [21] found higher percentage of fetal macrosomia and lesser percentage of VLBW babies.In the present study small for gestational age (SGA) babies were present in 8.77% cases and large for gestational age (LGA) babies 9.94% cases. Lazebnik M *et al*., [22] found significantly higher prevalence of large-for-gestational-age neonates (27%).

Still birth occured in 7.59% cases, early neonatal death in 9.36% cases and the total perinatal death was 16.96%. In comparison to our study, Chourasia S *et al*., [17] reported a higher incidence, 20% of still born and 17.9% of neonatal deaths. Akram H *et al*., [23] also reported similar outcome. In the present study 35 (20.47%) babies required admission in *neonatal intensive care unit (NICU)* after delivery. Akhter S *et al*., [24] reported presence of polyhydramnios significantly increases the rate of preterm delivery, fetal distress during labor, NICU transfer and neonatal death.

In the present study live babies were 77.78%. Perinatal deaths occurred in 16.96% cases and abortion in 5.25% cases. Meena N *et al*., [25] reported incidence of of perinatal deaths and abortion to be 31% and 8%

respectively, while Samyukta G *et al*., [19] reported it be 20% and 1.25% respectively.

There was a significant correlation between the severity of polyhydramnios and adverse fetal outcome (p value <0.0001) in our study. Similarly, Meena N *et al*., [25] and Samyukta G *et al*., [19] also reported similar significant correlation.

CONCLUSION

Polyhydramnios is a common obstetric condition with a high incidence of perinatal morbidity and mortality. It significantly increases the rate of preterm birth, fetal macrosomia, perinatal death, NICU transfer and neonatal death. Pregnancies with severe polyhydramnios have a poorer outcome and fetuses have a significantly higher incidence of congenital anomalies.These anomalies if detected early timely termination of pregnancy can be done hence less physical and psychological trauma to mother.

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