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Original Research Article

A prospective clinical study of foetomaternal outcome in relation to amniotic fluid index in pregnant females beyond 36 weeks of gestation at tertiary centre

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ABSTRACT

Background: Amniotic fluid plays a vital role during foetal life. The main purpose of this study was to evaluate the foetomaternal outcome in relation to amniotic fluid index in pregnant females beyond 36 weeks of gestation.

Methods: This prospective type of study was conducted for one-year duration from May 2018 to May 2019 in 350 pregnant females beyond 36 weeks of gestation with clinically significant abnormal liquor volume. Clinical diagnosis was later on confirmed with ultrasonography and patients were categorized in three categories as patients with Amniotic fluid index (AFI) 5 to 24, AFI <5 and AFI > or = 25. Complete labour record was made and fetomaternal outcome was assessed.

Results: In this study, incidence of oligohydramnios was found to be more than polyhydramnios at term. No significant differences were found in relation to age, parity, religion, residence and booking status in all the study groups. Mostly patients 119 (52%) delivered by caesarean section in oligohydramnios group whereas vaginal delivery was commonly seen in patients with normal AFI (80%) and polyhydramnios (55%). Growth restriction 59 (26%) and malpresentation 18 (8%) were commonly seen with oligohydramnios. In the polyhydramnios group, 14 (35%) babies had malformations whereas only 6 (3%) babies had malformations in patients with oligohydramnios. Significant differences were found in the foetal outcome between the patients with oligohydramnios and polyhydramnios in comparison to patients with normal AFI.

Conclusions: In pregnant females with abnormal liquor volume increases the chances of maternal morbidity and perinatal morbidity and mortality.

Keywords: Amniotic fluid index, Oligohydramnios, Polyhydramnios, Single vertical pocket

INTRODUCTION

Amniotic fluid plays a vital role for the development of foetus. It is of both maternal and foetal origin.¹ Its volume is controlled by the dynamic interactions among the foetal, placental and maternal compartments.² It consists of both organic and inorganic compounds. It is alkaline in nature with specific gravity of 1.010.³ Standard method used to measure amniotic fluid is dye dilution method but not being practiced as it is an invasive one. Therefore, other methods like the single

deepest vertical pocket (SVP) method by Chamberlain and amniotic fluid index (AFI) by Phelan are commonly used.^{4,5} Oligohydramnios is defined as AFI less than 5 or SVP less than 2. Its incidence is 1 to 5% of total pregnancies.⁶ It is caused by maternal conditions like hypertension, post-term pregnancy, drugs like ACE inhibitors, NSAIDs and foetal malformations like hydronephrosis, renal agenesis, polycystic kidney, chromosomal abnormalities. Growth restricted babies increase their blood supply to the brain and thus decrease flow towards kidneys ultimately leads to decrease in

urine production.⁷ This condition increases maternal morbidity by increasing operative interference and perinatal morbidity by causing cord compression leading to passage of meconium and meconium aspiration syndrome, lower Apgar scores, intensive care unit admission and neonatal mortality.⁸⁻⁹

The management of these pregnancies depends on the period of gestation. When diagnosed before 36 weeks of gestation in the presence of normal anatomy and growth, then it can be managed expectantly by increasing maternal hydration ultimately increasing utero-placental perfusion. Drugs like L-arginine increases release of nitric oxide and thus causes vasodilation. Amnioinfusion is done to decrease the cord compression during pregnancy. After completion of 36 weeks, delivery is being conducted according to maternal and foetal indications. Polyhydramnios is defined as AFI of $>$ or $=$ to 25 or SVP of >8 cm.^{10,11} Its incidence is 0.2 to 1.6% of all pregnancies. On the basis of SVP, it is classified as mild polyhydramnios with SVP of 8-11 cm, moderate polyhydramnios with SVP of 12-15 cm and severe polyhydramnios with SVP $>$ or $=16$ cm.¹² Based on AFI values, it is divided as mild polyhydramnios with AFI of 25-30 cm, moderate polyhydramnios with AFI of 30.1-35 cm and severe polyhydramnios with AFI of ≥ 35.1 cm.¹³

Conditions associated with polyhydramnios are foetal malformations like neural tube defects, hydrops fetalis, cleft lip and cleft palate, chromosomal aneuploidies and genetic anomalies, maternal diabetes mellitus (5-26%), multiple pregnancies (8-10%), foetal anaemia (1-11%). Others are viral infections, Bartter syndrome, neuromuscular disorders, maternal hypercalcemia, viral infections include parvovirus B19, rubella, and cytomegalovirus, toxoplasmosis and syphilis. It can lead to maternal complications like dyspnoea due to over-expansion of the uterus, edema, varicosities of vulva and legs, haemorrhoids. Foetal complications like preterm deliveries, malpresentation, cord prolapse, macrosomia due to diabetes mellitus lead to increased operative deliveries, NICU admission and neonatal death.¹⁴ Its management depends on the aetiology, gestational age and tolerance of the patient. If the pregnancy is to be continued for foetal maturation, controlled removal of amniotic fluid is the treatment of choice.¹⁵ Active intervention is generally recommended in cases with severe maternal discomfort or obstetric complications, e.g. premature labor.

METHODS

This prospective type of study was conducted in the department of obstetrics and gynecology of SMS Medical College and attached hospitals, Jaipur for one-year duration from May 2018 to May 2019.

A total 350 pregnant females with clinically significant abnormal liquor volume were included in the study.

Inclusion criteria

- Pregnant females with clinically significant abnormal liquor volume and beyond 36 weeks of gestation with intact membranes were included.

Exclusion criteria

- Females with leaking per vaginam
- Intrauterine death
- Patient who did not give consent.

After applying inclusion and exclusion criteria, 350 clinically detected abnormal liquor volume pregnant females beyond 36 weeks of gestation and intact membranes were selected. Informed and written consents were taken. Clinical assessment was confirmed with ultrasonography. Patients were grouped in three categories as follows: AFI <5 , AFI 5 to 24, AFI $>$ or $=$ 25. Patients with normal liquor volume were sent back home and asked to come for follow up or if there was any complaint. Patients with oligohydramnios were admitted and delivered according to maternal and foetal condition. Patients with polyhydramnios with maternal and foetal complication were admitted and remaining were sent back home for follow up. Complete labor record was made. Complete physical examination of mother by obstetrician and baby by paediatrician was done. Assessment of maternal outcome in terms of mode of delivery and foetal outcome in terms of birth weight, Apgar score at one and five-minute, respiratory distress, meconium aspiration, seizures in first 24 hours of life, congenital malformations, neonatal intensive care unit admission and death of baby.

Statistical analysis

Linear variables were summarized as mean and standard deviation whereas nominal/categorical variables were presented as proportions (%). Unpaired t test was used for analysis of linear variables and chi-square test and fisher exact test were used for nominal/categorical variables. P value <0.05 was taken as significant. Medcalc 16.4 version software was used for statistical calculations.

RESULTS

In this one year of study, there were 350 pregnant females who fulfilled the criteria for the study. Out of these, there were 230 females who had oligohydramnios, 40 had polyhydramnios and 80 females had normal amniotic fluid volume. In this study, it was found that incidence of oligohydramnios was more than polyhydramnios at term.

As per Table 1 and Table 2, almost equal distribution was found in relation to age, parity, religion, residence and booking status in all the study groups. p-value was insignificant. Most of the subjects were in between 21 to 30 years of age group and were primigravida. Most of the

subjects were Hindu, belonged to urban areas and were booked in all the study groups.

As shown in Table 3, mostly patients 119 (52%) delivered by caesarean section in oligohydramnios group whereas vaginal delivery was commonly seen in patients with normal AFI (80%) and polyhydramnios (55%). Most

common indication of caesarean section in all the study groups was foetal distress.

Growth restricted babies 59 (26%) and malpresentation 18 (8%) were commonly seen with oligohydramnios group. Most common malpresentation was breech presentation.

Table 1: Distribution of subjects according to age and parity.

Characteristics	AFI <5		AFI 5 to 24		AFI > OR =25	
	No.	%	No.	%	No.	%
Age (in years)						
<20	12	5%	5	6%	2	5%
21 to 30	189	82%	64	80%	34	85%
<30	29	13%	11	14%	4	10%
Total	230	100%	80	100%	40	100%
Gravidity						
Primi	121	53%	44	55%	24	60%
Multi	109	47%	36	45%	16	40%
Total	230	100%	80	100%	40	100%

Table 2: Distribution of subjects according to religion, residence and booking status.

Characteristics	AFI <5		AFI 5 to 24		AFI > OR =25	
	No.	%	No.	%	No.	%
Religion						
Hindu	202	88%	70	87%	34	85%
Muslim	28	12%	10	13%	6	15%
Total	230	100%	80	100%	40	100%
Residence						
Rural	98	43%	28	35%	15	38%
Urban	132	57%	52	65%	25	62%
Total	230	100%	80	100%	40	100%
Booking status						
Booked	129	56%	55	69%	22	55%
Unbooked	101	44%	25	31%	18	45%
Total	230	100%	80	100%	40	100%



Figure 1: New-born with spina bifida in a patient with AFI 30.



Figure 2: New-born with limb deformity in a patient with AFI 3.

A total 14 (35%) babies were having malformations in the polyhydramnios group whereas only 6 (3%) babies in patients with oligohydramnios. Most common malformation in the polyhydramnios group was

gastrointestinal atresia and urinary tract obstruction in oligohydramnios group as shown in Table 4 and 5. Figure 1 and Figure 2 show the congenital malformations in both polyhydramnios and oligohydramnios respectively.

Table 3: Maternal outcome associated with amniotic fluid index.

Mode of delivery	AFI <5		AFI 5 to 24		AFI > OR =25	
	No.	%	No.	%	No.	%
VD	111	48%	64	80%	22	55%
LSCS	119	52%	16	20%	18	45%
Total	230	100%	80	100%	40	100%

Table 4: Distribution of subjects according to different foetal conditions.

Foetal condition	AFI <5		AFI 5 to 24		AFI > OR =25	
	No.	%	No.	%	No.	%
Growth restriction	59	26%	6	8%	2	5%
Malpresentation	18	8%	4	5%	1	3%
Congenital malformations	6	3%	0	0%	14	35%

Table 5: Distribution of subjects according to foetal outcome.

Foetal outcome	AFI <5		AFI 5 to 24		AFI > OR =25	
	No.	%	No.	%	No.	%
Apgar score <7 at 1minute	97	42%	10	13%	18	45%
Apgar score <7 after 5 minutes	93	40%	10	13%	17	42%
Meconium aspiration syndrome	52	23%	7	18%	5	13%
Respiratory distress	92	40%	12	15%	17	42%
Seizures	2	1%	1	1%	0	0%
NICU admission	93	40%	13	16%	17	42%
Death	11	5%	0	0%	10	25%

Table 6: Congenital anomalies in oligohydramnios and polyhydramnios group.

Congenital anomalies	Oligohydramnios		Polyhydramnios	
	No.	%	No.	%
Cleft lip and palate	-	-	1	3%
Club foot	-	-	1	3%
Oesophageal atresia	-	-	4	10%
Hydrocephaly	-	-	2	5%
Hydronephrosis	4	2%	-	-
Hydrops foetalis	-	-	1	3%
Omphalocele	-	-	1	3%
Polycystic kidney	2	1%	-	-
Skeletal dysplasia	-	-	2	5%
TOF	-	-	2	5%

As shown in Table 6, significant differences were found in the foetal outcome between oligohydramnios and polyhydramnios group in comparison to patients with normal AFI. Perinatal mortality was higher in babies of polyhydramnios groups.

Apgar score <7 at 1 minute and after 5 minutes, respiratory distress, NICU admissions and neonatal death were more in the polyhydramnios group while meconium aspiration syndrome was more in the oligohydramnios group.

DISCUSSION

In this study, most of the study subjects were in between 21 to 30 years of age group in all the groups. Similar results were found in a study done by Gita G et al.¹⁶ Most of the pregnant females were primigravida in all my study groups. Tajinder K et al, study showed similar results.¹⁶ Study done by Gita G et al, showed similar results with oligohydramnios group but multiparity was more common in polyhydramnios group.¹⁷ In a this study, 52% underwent for caesarean section in the oligohydramnios group, 45% in the polyhydramnios group whereas only 20% in patients with normal AFI. In study done by Ghimire et al, there were 80% females who went for caesarean section in oligo group and 40% in a study by Ahmer R et al.^{18,19} In a study by Gita G et al, 42.8% and 22.2% underwent for caesarean delivery in oligo and poly group respectively.¹⁶ Growth restriction was significantly present in 26% of the oligo group, 8% in normal AFI group and 5% in poly group. Similar results were seen in the study by Tajinder K et al.¹⁷ No significant difference in birth weight was seen in the oligo group in Ghimire et al study.¹⁸ Casey BM et al and Manning et al reported IUGR in 24% and 36% babies in oligo group respectively.^{9,20} Malpresentation was present in 8% and 3% patients in oligohydramnios and polyhydramnios groups respectively. In a study done by Gita G et al, it was 27.8% in the oligo group and 13.3% in the poly group.¹⁶ There was congenital malformation in 3% babies of oligo group and 35% babies of poly group in the present study. It was 8.5% in the oligo group and 31% in the poly group in Gita G et al study.¹⁶ Similarly, 8% in the oligo group and 57% in the poly group in a study done by Kaur Tajinder et al.¹⁷ Most common congenital anomaly in all the studies in the oligo group was of the genitourinary system. Esophageal atresia was most common in poly groups in this study. Foetal outcome in oligohydramnios group was assessed in terms of Apgar score <7 at 1 minute which was 42%, Apgar score at 5 minute which was 40%, meconium aspiration syndrome in 23% babies, respiratory distress in 40% of the babies and 1% babies had seizures. In study by Ghimire et al, low Apgar score was seen in 20% babies and meconium aspiration syndrome in 9% babies.¹⁸ In Ahmer R et al study, 25% babies had low Apgar scores.¹⁹ Similarly in the polyhydramnios group, Apgar score <7 at 1 minute was seen in 42% subjects, Apgar score <7 after 5 minutes in 42% subjects, meconium aspiration syndrome in 13% and respiratory distress in 42% subjects. Similar results were seen in Kaur T et al study.¹⁷ Perinatal outcome was much better in patients with normal AFI. In this study, 40% babies in the oligo group and 42% in the poly group got admitted in neonatal ICU respectively. NICU admission was required in 58.8% of babies in oligohydramnios group and 50% of babies in polyhydramnios group in Kaur T et al study.¹⁷ In this study, perinatal mortality was higher in the poly group (25%) in comparison to oligo group (5%). Similar results were seen in Gita G et al study.¹⁶ Likewise, there were 12% neonatal deaths in

oligohydramnios group in Ghimire et al study, 9.9% in Chamberlain et al study, 6.4% in Casey et al study.^{4,9,18} 10% subjects died in a study by Lallar M et al.²¹

CONCLUSION

With this study, authors conclude that pregnancies with abnormal liquor volume is associated with increased incidence of maternal morbidity and perinatal morbidity and mortality.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Queeran JT, Gadow EC. Polyhydramnios: chronic versus acute. *Am J Obstet Gynecol.* 1970;108:349-52
2. Magann EF, Doherty DA, Chauhan SP, Busch FW, Mecacci F, Morrison JC. How well do the amniotic fluid index and single deepest pocket indices (below the 3rd and 5th and above the 95th and 97th percentile) predict oligohydramnios and hydramnios? *Am J Obstet Gynecol.* 2004;190:164-9.
3. Sowmya K, Varghese B, Borkar YB. Effect of isolated oligohydramnios in otherwise normal term pregnancy. *Int J Biomed Res.* 2014;5(2):98-101.
4. Chamberlain PF, Manning FA, Morrison I, Harman CR, Lange IR. Ultrasound evaluation of amniotic fluid volume: I. The relationship of marginal and decreased amniotic fluid volumes to perinatal outcome. *Am J Obstet Gynecol.* 1984;150(3):245-9.
5. Phelan JP, Ahn MO, Smith CU, Rutherford SE. Amniotic fluid index in normal human pregnancy. *J Reprod Med.* 1987;32:601-4.
6. Moore TR. Clinical assessment of amniotic fluid. *Clin Obstet Gynaecol.* 1997;40(2):303-13.
7. Yoshimura S, Masuzaki H, Gotoh H, Ishimara T. Fetal redistribution of blood flow and amniotic fluid volume in growth retarded fetuses. *Early Hum Dev.* 1997;47:297.
8. Voxman EG, Tran S, Wing DA. Low amniotic fluid index as a predictor of adverse fetal outcome. *J Perinatol.* 2000;22(4):282-5.
9. Casey BM, McIntire DD, Bloom SL, Lucas MJ, Santos R. Pregnancy outcome after antepartum diagnosis of oligohydramnios at or beyond 34weeks gestation. *Am J Obstet Gynecol.* 2001;82(4):909-12.
10. Brady K, Polzin WJ, Kopelman JN, Read JA. Risk of chromosomal abnormalities in patients with idiopathic polyhydramnios. *Obstet Gynecol.* 1992;79:234-8.
11. Bundagard A, Anderson BR, Rode L, Lebech M, Tabor A. Prevalence of polyhydramnios at a Danish hospital—a population-based study. *Acta Obstet Gynecol Scand.* 2007;86(12):1427-31.

12. Chen M, Chen CP. Invasive fetal therapy, global status and local development. *Taiwanese J Obstet Gynecol.* 2004;439:185-92.
13. Magann EF, Chauhan SP, Doherty DA, Lutgendorf MA, Magann MI, Morrison JC. A review of idiopathic hydramnios and pregnancy outcomes. *Obstet Gynecol Surv.* 2007;62:795-802.
14. Magann EF, Doherty DA, Lutgendorf MA, Magann MI, Chauhan SP, Morrison JC. Peripartum outcomes of high-risk pregnancies complicated by oligo- and polyhydramnios: a prospective longitudinal study. *J Obstet Gynaecol Res.* 2010;36:268.
15. Queenan JT. Recurrent acute polyhydramnios. *Am J Obstet Gynaecol.* 1970;106:625.
16. Guin G, Puneekar S, Lele A, Khare S. A prospective clinical study of fetomaternal outcome in pregnancies with abnormal liquor volume. *J Obstet Gynecol India.* 2011;61(6):652-5.
17. Kaur T, Sood R. Fetomaternal outcome in pregnancies with abnormal AFI. *IOSR J Dent Med Sci.* 2016;15(4):31-5.
18. Ghimire S, Ghimire A, Chapagain S, Paudel S. Pregnancy cases in patients with oligohydramnios after 28 weeks of gestation. *Int J Adv Med Health Res.* 2016;3:68-72.
19. Ahmar R, Parween S, Kumari S, Kumar M. Neonatal and maternal outcome in oligohydramnios: a prospective study. *Int J Contemp Pediatr.* 2018;5(4):1409-13.
20. Manning FA, Hill LM, Platt LD. Qualitative amniotic fluid volume determination by ultrasound: Antepartum detection of intrauterine growth retardation. *Am J Obstet Gynecol.* 1981;139(3):254-8.
21. Lallar M, ul Haq A, Nandal R. Perinatal outcome in idiopathic polyhydramnios. *J Obstet Gynecol India.* 2015;65(5):310-4.

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