ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 07 | July - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

TO ESTIMATE OF THE EFFECT OF ABNORMAL AMNIOTIC FLUID VOLUME ON MATERNAL AND FETAL OUTCOME

Obstetrics and Gynaecology

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ABSTRACT

Background: Liquor amnii plays important role both in the development of the fetus and antenatal assessment of the fetal wellbeing. Its cushioning effect protects the fetus from external trauma whereas a decrease in liquor may leads to flexion contracture in the fetus. A decrease in the liqor volume, with intact membranes, in the third trimester indicates decreased utero-placental flow and maybe the indication for early termination of pregnancy.

Methods: This prospective study was conducted in the department of Obstetrics and Gynecology at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from June 2019 to May 2020, where 100 expectant mothers with abnormal liqor volume were studied with an aim to evaluate AFI for the assessment of perinatal outcome after all required formalities.

Results: Out of 100 parturients studied 90 and 10 women had oligohydramnios and polyhydramnios respectively. 16(17.8%) women with oligohydramnios and 4(40%) women with polyhydramnios had preterm delivery. There were 20(22.2%) of women with PIH in the oligohydramnios group whereas none of the expectant mothers with polyhydramnios had PIH. Gestational diabetes mellitus was seen in polyhydramnios group women only and was present in 3(30%) women. In oligohydramnios group, NST was found to be non-reactive in 23(25.6 %) women and 58(64.4%) women required induction of labor. Meconium-stained liqor was found in 28(31.1%) women and CS was done in 59(65.6%) expectant mothers. 24(26.7%) neonates required NICU admissions as 12(12.3%) with respiratory distress, 5(5.5%) neonatal jaundice and 1 (1.1%) congenital pneumonia. There were 57(63.3%) neonates with LBW and 17(18%) neonates with VLBW. In polyhydramnios group, induction of labor was done in 3(30%) women. CS was done in 5(50%) women as 2(40%) for cord prolapse, 2(40%) for fetal distress and 1(20%) for NPOL. 2(20%) neonates were admitted to NICU with respiratory distress and one neonate had a congenital malformation in the form of tracheal stenosis. Two (20%) neonates had LBW and one (10%) had macrosomia.

Conclusion: Oligohydramnios was associated with an increased incidence of induction of labor, non- reactive NST, meconium-stained liquor and CS. Neonates born to women with oligohydramnios had increased incidence of a low Apgar score, respiratory distress, LBW and NICU admission. Parturients with polyhydramnios showed more association of gestational diabetes mellitus and neonatal congenital anomalies. Almost all the patients had spontaneous labor but 5 required cesarean section for cord prolapse and macrosomia.

KEYWORDS

Oligohydramnios, polyhydramnios, parturient, morbidity

INTRODUCTION

Modern obstetrics is the clinical practice concerned with the health and wellbeing of both mother and fetus. Identification and quantification of fetal risk, further balancing the fetal risk against the neonatal complications of premature birth, determining the optimal time of intervention and quantification of maternal morbidity associated with intervention are the basis of management in obstetrics.

Amniotic fluid provides a protected milieu for growing fetus, cushioning the fetus against mechanical and biological injury, supplying nutrients and facilitating growth and movement. The quantity of amniotic fluid at any time in gestation is the product of water exchange between the mother, fetus, and placenta. Disorders of this regulatory process can lead to either polyhydramnios or oligohydramnios. These disorders may also result from abnormal fetal or maternal conditions and may be responsible for alterations of fetal well-being as well. With the advent of real-time ultrasonography, assessment of amniotic fluid has been possible, resulting in earlier recognition of abnormal conditions and possible intervention.

AIMS AND OBJECTIVES

Primary Objective

- To find the association between AFI and perinatal outcome.

Secondary objectives

- To asses maternal morbidity associated with abnormal AFI.
- To find out causes associated with abnormal AFI

MATERIAL AND METHODS

This prospective observational study was carried out in the department of Obstetrics and Gynecology at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from June 2019 to May 2020. All pregnant women having singleton pregnancy with cephalic presentation at POG 34-40 weeks, presenting with abnormal AFI, were included in the present study. While parturients complicated with PROM, malpresentations, antepartum hemorrhage, previous CS, myomectomy, hysterotomy and the ante-natal mothers requiring elective CS for medical and obstetric conditions not related to amniotic fluid variations were excluded from the study. Informed written consent was obtained from all the patients before including them in the study.

On admission, detailed menstrual and obstetrical history of the patient was taken and clinical examination was performed. Dating of pregnancy was done by the last menstrual period if the patient is sure of dates. If a pregnant woman was not sure of dates then it was calculated from first-trimester ultrasound or early second-trimester ultrasound. An ultrasound at 34-36 weeks for various fetal parameters including AFI was done as a routine and repeat ultrasound for AFI was done if indicated. In patients with abnormal AFI, AFI assessed within one week prior to spontaneous/induced labor between 34 weeks to 40 weeks of pregnancy was taken into consideration. AFI was calculated by using the four-quadrant technique as described by Phelan *et al*.

Women were divided into 2 groups as per her AFI:

1. Group 1: AFI <5cm (oligohydramnios)
2. Group 2: AFI >24 cm (polyhydramnios)

Pregnant women with oligohydramnios and polyhydramnios are further evaluated for fetal wellbeing by NST and fetal doppler studies if indicated. The NST result was considered reactive if 2 accelerations of >15 beats/min from baseline and lasting >15 seconds were present during a 20-minute period. NST was considered abnormal if baseline variability was less than 5 beats/min or absent accelerations or presence of late decelerations with spontaneous uterine contractions. If NST was normal, close fetal surveillance was done by 48 hourly NST and weekly doppler studies if indicated until the 37 weeks of gestation. Patients with abnormal NST and/or doppler studies at the time of diagnosis or any time during fetal surveillance were considered for termination of pregnancy. Termination of pregnancy in oligohydramnios and polyhydramnios was done according to standard institutional labor room protocol. The labor was monitored partographically.

The maternal morbidity was assessed in terms of:
CS, Preterm labor, Abruption, Induction of labor, Instrumental delivery, Macrosomia

The perinatal outcome was assessed in terms of:
Perinatal mortality, Gestational age at birth, Birth weight, APGAR scores at 1 and 5 min, Admission in NICU, Condition at discharge/referral

Statistical analysis
Data was presented as frequency and percentages.

RESULTS

This study was carried on all the parturients having singleton pregnancy with cephalic presentation, presenting with abnormal AFI at POG 34-40 weeks, in the department of Obstetrics and Gynecology at SKMCH, Muzaffarpur, Bihar from June 2019 to May 2020.

Table 1: Patient profile

	Parity		Age		
	Primigravida n (%)	Multigravida n (%)	20 – 24 Yrs n (%)	25 – 29 Yrs n (%)	>30 Yrs n (%)
Oligohydramnios	61 (67.8)	29 (32.2)	29 (32.1)	46 (51.1)	15 (16.7)
Polyhydramnios	4 (40)	6 (60)	3 (30)	4 (40)	3 (30)

Table 2: Associated Complications

	Associated Medical Complications		NST		Color of Liquor	
	PIH n(%)	GDM n(%)	Non-reactive n(%)	Reactive n(%)	Muconium stained n(%)	Clear n(%)
Oligohydramnios	20(22.2)	Nil	23(25.6)	67(74.4)	28(31.1)	62(68.9)
Polyhydramnios	Nil	3(30)	Nil	10(100)	Nil	10(100)

Table 3: Labor Events

	Induction of labor		Timing of delivery		Mode of delivery	
	Required n(%)	Non-required n(%)	Pre-term n(%)	Term n(%)	Vaginal n(%)	CS n(%)
Oligohydramnios	58(64.4)	32(35.5)	16(17.8)	74(82.2)	31(34.4)	59(65.6)
Polyhydramnios	3(30)	7(70)	4(40)	6(60)	5(50)	5(50)

Table 4: Indications for Caesarean Section

Indications of CS	Oligohydramnios n (%)	Polyhydramnios n (%)
Fetal distress	51(86.4)	2 (40)
Failed induction	2 (3.4)	Nil
Non progress of labor (NPOL)	6 (10.2)	1(20)
Cord Prolapse	Nil	2 (40)

Table 5: Apgar score

Apgar score		Oligohydramnios [n (%)]	Polyhydramnios [n (%)]
Apgar score at 1 minute	<7	28 (31.1)	2 (20)
	>7	65 (72.2)	8 (80)
Apgar score at 5 minute	<7	8 (8.9)	2 (20)
	>7	82 (91.1)	8 (80)

Table 6: Neonatal complications

Neonatal Complications	Oligohydramnios [n (%)]	Polyhydramnios [n (%)]
Congenital pneumonia	1 (1.1%)	Nil
Neonatal jaundice	5 (5.5%)	Nil
Respiratory distress	12 (12.3%)	2 (20%)
CMF	Nil	1 (10%)
Normal	72 (80%)	7 (70%)

Table 7: Birth weight

Birth weight (Kg)	Oligohydramnios [n (%)]	Polyhydramnios [n (%)]
Normal	16 (17.8)	8(80.)
LBW (1.5-2.49)	70 (77.8)	2(20.)
VLBW (<1.5)	4 (4.4)	Nil
Macrosomia (>4)	Nil	1(10)

Table 8: NICU admission

NICU Admission	Oligohydramnios [n (%)]	Polyhydramnios [n (%)]
Yes	24 (26.7)	3 (30)
No	66 (73.3)	7 (70)

Table 9: Causes of oligohydramnios

Causes	N	%
PIH	20	22.2
IUGR	12	13.3
Unknown	58	64.4

Table 10: Causes of polyhydramnios

Causes	N	Percentage
Gestational diabetes mellitus	3	30
Congenital malformation	1	10
Unknown	6	60

DISCUSSION

This study was done with an aim to evaluate the AFI for the assessment of perinatal outcome. It was carried out among 100 women with pregnancy complicated with oligohydramnios or polyhydramnios. An ultrasound at 34-36 weeks for various fetal parameters including AFI was done as a routine and repeated if indicated.

In the present study, the mean age of the mothers in the oligohydramnios group was 26.2 years and in the polyhydramnios group, it was 26.8 years. While it was 24 and 23 years in the oligohydramnios group and polyhydramnios group respectively in a similar study conducted by Magann *et al*.

Similarly in study conducted by Kaur T *et al*. mean maternal age for oligohydramnios was 25.8 years and in the polyhydramnios group, the mean maternal age was 27 years.

In the present study, of all women with oligohydramnios 67.8% were primigravidae. Similarly, in study conducted by Asgharnia M *et al*. and Jagatia K *et al*., 64% and 52% were primigravidae respectively. Polyhydramnios was found to be in a higher percentage among multigravidas (60%) in the present study. Similarly, in study done by Tashfeen K *et al*. and Guin G *et al*. incidence of polyhydramnios was 81.1% and 86.7% respectively in multigravidae.

Maternal morbidity was noted in the form of pregnancy induced hypertension and gestational diabetes mellitus.

In our study, in the oligohydramnios group, 20 (22.2%) out of 90 were reported to be hypertensive. None of the patients in the polyhydramnios group had PIH. In a study conducted by Bansal D *et al*., 21% had PIH associated with oligohydramnios. In another study conducted by Many A *et al*., polyhydramnios was associated with PIH in 1.4% cases. While in the study conducted by Magann *et al*. PIH was associated with 6% cases in the polyhydramnios group and 3% cases in the oligohydramnios group. In a study conducted by Kaur T *et al*., oligohydramnios was associated with PIH in 17.5% cases. This observation is in accordance with available standard literature that PIH is associated with poor placental perfusion and hence causing oligohydramnios. So, oligohydramnios group had a much higher association of PIH as compared to polyhydramnios.

In our study, 30% (3 out of 10) women in the polyhydramnios group had gestational diabetes mellitus but none in the oligohydramnios group had gestational diabetes mellitus. Similarly, Kaur T *et al*. reported gestational diabetes incidence of 14.3% in polyhydramnios group and none in the oligohydramnios group. A similar observation was made by Guin G *et al*. with an incidence of gestational diabetes as 20% in polyhydramnios group while no women had gestational diabetes in the oligohydramnios group. While in the study conducted by Magann *et al*. gestational diabetes mellitus was found to be associated in 7% cases in polyhydramnios group whereas no women had gestational diabetes mellitus in the oligohydramnios group.

This observation is in accordance with standard literature as diabetes mellitus in pregnancy has been found to be associated with polyhydramnios in 18% of women.

In our study induction of labor was done in 64.4% cases in the oligohydramnios group and 30% cases in polyhydramnios group

indicating that oligohydramnios is associated with an increased incidence of labor induction. Similarly, in study conducted by Magann *et al*., labor induction rate was 18% in the oligohydramnios group and 6% in polyhydramnios group also indicating more incidence of labor induction in the oligohydramnios group. Kumar A *et al*., Bawa R *et al*. and Casey *et al*. reported a labor induction rate of 54%, 72.1%, and 42% respectively in oligohydramnios cases in their study. Guin *et al*. in their study found an incidence of labor induction to be 56.5% in the oligohydramnios group and 13.3% in polyhydramnios group.

Our study confirms the standard established protocol that *women with oligohydramnios have a higher incidence of induction of labor*. This observation is in agreement with standard literature that women with oligohydramnios has twice the higher incidence of induction of labor.

In our study out of a total of 100 patients, 64 had an emergency CS and 36 had a normal vaginal delivery. In the CS group, 59 (92.2%) were done in the oligohydramnios group and 5(7.8%) were done in the polyhydramnios group. In the oligohydramnios group, 86.4% (n=51) CS were done for fetal distress followed by non-progress of labor and failed induction in 10.5%(n=6) and 3.4%(n=2) respectively. In the polyhydramnios group, out of five CS 40%(n=2) were done for fetal distress, 40% for cord prolapse (n=2) and 20%(n=1) for NPOL. Chate P *et al*., Kumar A *et al*., and Bansal *et al*. found the incidence of CS to be 65%, 44%, and 47% respectively in oligohydramnios complicated pregnancies in their studies. But in a study conducted by Kaur T *et al*. CS was done in 38.1% cases in the oligohydramnios group and 28.6% in the polyhydramnios group. Magann *et al*. found a higher incidence of CS in the polyhydramnios group (36%) than in the oligohydramnios group (21%).

Oligohydramnios is significantly associated with cord compression during labor hence these women had a higher incidence of acute fetal distress and consequently higher chance of emergency CS. This observation is well established in standard literature that women with oligohydramnios have a two-fold greater risk of CS for fetal distress. In women with polyhydramnios it is in accordance with well-established standard literature that cord prolapse is associated with higher frequency in women with polyhydramnios leading to CS.

Non-reactive NST was found in 25.6 % of cases in the oligohydramnios group. None patient in the polyhydramnios group had non-reactive NST. Chate P *et al*. and Kumar A *et al*. also observed a 38% occurrence of non-reactive NST in their studies. Magann *et al*. found 29% of cases with NST traces influencing delivery in polyhydramnios group while 18% cases with similar traces in the oligohydramnios group. Jagatia K *et al*. found similar observations as in our study of 32% cases with non-reactive NST in oligohydramnios group.

According to available standard literature, oligohydramnios is associated with non-reactive NST and subsequently pathological NST influencing the decision of termination.

In our study, no significant difference was found between the occurrence of AFI abnormalities and low Apgar score at 1 min but the occurrence low Apgar score at 5 min was statistically significant. Apgar score below 7 at 5 minutes was found in 8.9% neonates in the oligohydramnios group and 20% in polyhydramnios group in our study. A similar observation was made by Sriya *et al*. in their study of 9.72% cases with a low Apgar score in the oligohydramnios group. Kaur T *et al* also observed a greater number of cases in the polyhydramnios group with the low Apgar score at 5 min. as compare to the oligohydramnios group. In a study conducted by Magann *et al*. there were 8% cases with Apgar less than 7 in polyhydramnios group and 4% cases in the oligohydramnios group.

It is well established in available standard literature that oligohydramnios is associated with cord compression during labor leading to acute fetal distress and subsequent fivefold higher risk of low Apgar score.

In our study meconium stained liqor was found in 31.1% cases in the oligohydramnios group while 68.9% had clear liqor, whereas in polyhydramnios group none had meconium staine liqor. In a study conducted by Locatelli *et al*. meconium stained liqor was found in 36% cases with oligohydramnios. Kumar A *et al*. observed the incidence of meconium stained liqor to be 48%. In contrary to our study Bhagat *et al*. found meconium stained liqor only in 16% cases in the oligohydramnios group.

As mentioned in standard literature, meconium stained liqor is found in higher frequency in women with oligohydramnios as oligohydramnios leads to cord compression and further to fetal distress and passage of meconium.

In our study polyhydramnios was associated with high incidence of preterm deliveries as compared to oligohydramnios (20% vs 8.9%). In a study conducted by Many A *et al*., prematurity was observed in 18.9% cases of polyhydramnios. Whereas prematurity was found in 43.7 % cases in oligohydramnios and 42.8% cases in polyhydramnios group in a study conducted by Kaur T *et al*. In another study conducted by Magann *et al*. 15 % had preterm delivery in polyhydramnios group and 29% in the oligohydramnios group had preterm delivery.

Above observation is in accordance with available standard literature that polyhydramnios leads to excessive uterine distension which can result in preterm labor. Also women with oligohydramnios had higher chances of induction of labor leading to iatrogenic preterm delivery.

In our study, in the oligohydramnios group, 77.8% had LBW and 4.4% had VLBW. In the polyhydramnios group, only 20%(n=2) had low birth weight and 10% (1) had macrosomia. Kumar A *et al*. and Bhagat *et al*. observed an incidence of LBW of 64% and 56 % respectively in their study. Kaur T reported incidence of 62% and 16.6% in oligohydramnios and polyhydramnios group respectively. Similarly in a study conducted by Bawa R *et al*. incidence of LBW was found to be in 55.9% of the study group.

Women with oligohydramnios have associated IUGR hence significantly higher number of neonates in oligohydramnios group were LBW. Also, these women require termination of pregnancy at earlier gestation hence preterm delivery is also a contributing factor for LBW. In women with polyhydramnios birth weight more than 4000 gm has been found to be associated in nearly 10%.

A higher proportion of mothers with oligohydramnios had neonatal complications as compared to that of mothers with polyhydramnios. Neonates born to mothers having oligohydramnios were found to have respiratory distress (n=12), neonatal jaundice (n=5), and congenital pneumonia (n=1). Out of 10 cases of polyhydramnios group, 2(20%) neonates had respiratory distress while one (10%) had a CMF in the form of tracheal stenosis which was found after the birth of the baby. Kaur T *et al*. reported a 7.9% incidence of CMF in their study in the polyhydramnios group. Out of 90 neonates, NICU admissions were reported in 26.7% (n=24) neonates in the oligohydramnios group and out of 10, 30% (n=3) neonates in the polyhydramnios group. Jagatia K *et al*., Bansal *et al*. and Bhagat *et al*. reported 22%, 36% and 36% NICU admissions respectively in their study. Magann *et al*. reported an incidence of 18% in the oligohydramnios group and 10% in polyhydramnios group. Kaur T *et al*. in their study reported 58.8% and 50% NICU admissions in oligohydramnios and polyhydramnios groups respectively.

Oligohydramnios is associated with adverse perinatal outcome in the IUGR, fetal distress and meconium aspiration leading to higher NICU admission. This observation is in concordance with standard literature available.

Polyhydramnios is known to be associated with a higher rate of CMF. As per standard literature, neonates born to mothers with polyhydramnios have 2-10% incidence of CMF to be found after birth. In our study a neonate with tracheal stenosis was missed on standard ultrasound for CMF. Hence there is always a possibility of unforeseen CMF in women with polyhydramnios.

CONCLUSION

This study demonstrates that an increased or decreased liqor volume is associated with high perinatal morbidity. Oligohydramnios is associated with increased risk fetal distress, meconium aspiration, LBW, respiratory distress, and NICU admission whereas polyhydramnios is specifically associated with increased risk of preterm delivery, cord prolapse, CMF and large for gestation age baby. Women with abnormal amniotic fluid volume have more association with medical disorders like hypertension and diabetes mellitus depending upon the type of abnormality and also increased rate of CS. Pregnancy with abnormal liqor volume may needs specialized and individualized management necessitating early induction and delivery. Every case of abnormal liqor volume needs careful antenatal evaluation, parental

counseling regarding perinatal morbidity and unforeseen congenital malformations, and individualized decision regarding timing and mode of delivery for a better perinatal outcome.

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