

Comparative study of amniotic fluid index in normal & high risk pregnancy complicated by PIH

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ABSTRACT

Background: Amniotic fluid is an indicator of placental function on the fetal development. The amniotic fluid index is the most commonly used method of measuring amniotic fluid.

Objective: The purpose of this study was to study amniotic fluid index in normal and high risk pregnancy (PIH) at term (37-40 weeks) and to correlate amniotic fluid index with foetal outcome.

Materials and Methods: The present study of assessment of Amniotic Fluid Index in high risk cases of pregnancy was carried out in the Department of Obstetrics and Gynaecology, Gajra Raja Medical College, Gwalior. The ultrasonic examination was performed in the radio diagnosis department of Gajra Raja Medical College, Gwalior. This comparative study was carried out on total 200 patients admitted to Kamla Raja Hospital from July 2006 to March 2007. Scans were performed from 37 weeks to 40 weeks earlier if indicated.

Results: This study showed that maximum numbers of cases admitted in both the groups were ranged between 37-39 weeks of gestational age. It was also seen that maximum patients in high risk (100) and control (100) groups were in 21-30 years age and minimum patients belong to age group > 37 years. Most of the patients were from antenatal clinic, 60 patients in control group and all 100 patients in PIH group attended antenatal clinic regularly. It was also seen in both groups that maximum patients were primigravida (40.5%). The amniotic fluid volume as measured by amniotic fluid index was within normal limits (86%) in low risk group patients. Incidence of congenital anomaly in high risk group was 20% and with oligohydramnios was 7.41%. We found one case of renal agenesis and one of multiple anomalies with oligohydramnios, also incidence of IUGR was very high in both groups.

Conclusion: This study showed that, amniotic fluid volume estimation by ultrasonography is a good method of estimation of foetal wellbeing. Amniotic fluid volume is altered in high risk (PIH) pregnancies; it reflects intrauterine growth retardation and congenital malformations in few cases.

Keywords: Amniotic fluid index, Perinatal outcome, High risk pregnancies, Pregnancy induced hypertension

INTRODUCTION

Descriptive and retrospective studies indicate that prolonged pregnancy is associated with increased perinatal morbidity and mortality.¹ The risk increases from the expected date of confinement (40 weeks of gestation) such that placental insufficiency and postmaturity (greater than 42 weeks of gestation) are associated with an increase in the risk of perinatal death.²

Hippocrates was the first to attribute the development of amniotic fluid to fetal urine. Fetal urination is the major source of amniotic fluid after fetal kidney function begins at 10 – 12 weeks, fetal lung fluid is a minor contributor to amniotic fluid.⁷ Amniotic fluid is an important part of pregnancy which plays a vital role in the normal growth of the fetus and, promotes muscular-skeletal development and allows for easier fetal movement.³

Amniotic fluid assessment³ by ultrasound⁴ is an essential part of evaluation of fetus health in terms of fetal distress, meconium aspiration, caesarean and fetal mortality.³ Though there are several ways to assess quantity of amniotic fluid ranging from clinical palpation to measurement of single deepest

vertical pocket, amniotic fluid index (AFI) by four-quadrant technique is most popular and reliable method of quantifying amniotic fluid till today.^{3,4} The assessment of amniotic fluid volume is very crucial for the survival of the fetus. Amniotic Fluid Index (AFI) is performed by ultrasound method.³

Amniotic fluid volume varies with gestational age^{5,7} it peaks at 32 to 34 weeks of gestation⁴, rising to a plateau between 22-39 weeks of gestation and reaching 700-800 ml, which correspond to an AFI of 14-15 cm.⁵ Any decrease or increase in the volume of amniotic fluid leads to pregnancy complications.³ A drastic reduction in its quantity may indicate underlying placental insufficiency, which has definite implications on growing fetus.⁴ In most studies oligohydramnios⁴ (defined as an AFI of 5 cm or less⁶), AFI values between 8 and 25 are considered to be normal, 5–8 low normal, and less than 5 oligoamnios.⁴ At values less than 5, there is higher incidence of perinatal morbidity and mortality and many a time immediate delivery is the only way out. AFI is the fifth parameter in traditional five-point biophysical profile and second parameter in rapid two-point modified BPP (the other one being NST)⁴.

Oligohydramnios is associated with fetal congenital anomalies and IUGR.⁷ a recent study has shown that unrecognized IUGR is the single largest risk factor to pregnancies that end in still birth. The severity of oligohydramnios is associated with degree of IUGR and it reflects the placental dysfunction.³ Oligohydramnios can cause asymmetrical fetal growth, contracture of joints and hypoplasia of fetal lungs by decreasing the lung expansion due to compression of fetal abdomen which limits the movements of fetal diaphragm and decreases the flow of amniotic fluid into and out of the fetal lung.⁷ In this study amniotic fluid assessment is done in which amniotic fluid volume assessment is helpful in optimizing pregnancy outcome.

MATERIALS AND METHODS

In present study assessment of AFI and ultrasonic examination was performed in Department of Obstetrics and Gynaecology and Radiodiagnosis Department of Gaja Raja Medical College, Gwalior respectively.

Case selection: A total 200 Patients were selected randomly from the sample attending antenatal clinic of Kamla Raja Hospital who were admitted from July 2006 to March 2007. All selected patients were divided in to two groups namely Normal Cases (100) and High Risk Cases (100).

Inclusion Criteria: The date of LMP was correctly known with previous three regular period and not using oral contraceptives in that period. The patient should deliver in Kamla Raja Hospital. In High risk group Pregnancy induced hypertension patients were included and in control both primigravida and multigravida without any pregnancy related and medical complications were included.

Ultrasound Examination: Shimadzu SDU 500 real time ultrasound scanners were used for ultrasound examination with frequency 3.5 MHz. Linear transducer was used for all cases. The images were displayed in gray scale presentation at a rate of 20 frames per seconds. Built in video monitor displayed 2D linear images and freeze frame images.

Amniotic Fluid Index method: Uterus was divided in to four quadrants using the maternal sagittal midline vertically and an arbitrary transverse line approximately half way between the symphysis pubis and the upper edge of the uterine fundus. The transducer was kept parallel to the maternal sagittal plane and perpendicular to maternal coronal plane throughout. The deepest unobstructed and clear pocket of amniotic fluid was visualized and the image was frozen, the ultrasound calipers were manipulated to measure the pocket in a strictly vertical direction. The process was repeated in each of the four quadrants and the pocket measurement was summed as amniotic fluid index and then was

compared with standard values. More than 25 cm value was recorded as polyhydramnios and value less than 5cm was as oligohydramnios. Statistical analysis: All the data were expressed in numbers (%).

RESULTS

Study found that maximum number of cases in both the groups was ranged between 37-39 weeks of gestation age. (Table 1)

Table 1: Distribution of cases according to gestation age

Gestation Age (weeks)	Cases	Percentage (%)	Control	Percentage (%)
37-38	48	48	42	42
38-39	34	34	36	36
39-40	18	18	22	22
Total	100	100	100	100

Table 2 Shows that maximum numbers of patients in both the groups were in 20-30 years of age and minimum patients belong to age group of > 35 years.

Table 2: Age distribution of cases

Age Group (years)	Control	PIH	Total	Percentage (%)
15-20	8	13	21	10.5
21-25	38	24	52	26
26-30	40	43	83	41.5
31-35	14	18	32	16
>35	0	2	2	1
Total	100	100	200	100

60 patients in control and 100 patients in PIH group attended antenatal clinic regularly. 35 patients in control group and 42 patients in PIH group attended clinic irregularly. 5 patients of control group and 3 patients of high risk group were emergency admission at term. (Table 3)

Table 3: Distribution of cases according to antenatal care

Antenatal visit	Control	Case (PIH)	Total	Percentage (%)
Regular	60	55	115	57.5
Irregular	35	42	77	38.5
No antenatal visit	5	3	8	4
Total	100	100	200	100

Table 4 shows distribution of cases according to gravidity, and it was found that maximum patients in both the group were primigravida (40.5%).

Table 4 : Distribution of cases according to gravidity

Gravidity	Control	Cases (PIH)	Total	Percentage (%)
G1	38	43	81	40.5
G2	22	19	41	20.5
G3	30	26	56	28
G4	10	6	16	8
G5	0	4	4	2
>G5	0	2	2	1
Total	100	100	200	100

Table 5 (A) shows distribution of cases according to amniotic fluid volume using amniotic fluid index (cm.)

Table 5 (A): Distribution of cases according to amniotic fluid volume

Amniotic Fluid index (cm.)	Control		PIH (cases)	
	Frequency	%	Frequenc y	%
0-4.9	2	2	7	7
5-7.9	8	8	20	20
8-15	86	86	68	68
>15	4	4	5	5
Total	100	100	100	100

Table 5 (B): Distribution of cases according to severity of PIH

	Mild	Moderate	Severe	Total
No of cases	55	42	3	100
%	55	42	3	100

According to table 5 (A) amniotic fluid index was within normal limits in 86% of in low risk group. 8 patients (6%) showed marginal decrease in amniotic fluid volume. Amniotic fluid volume was in normal limits in 68% in high risk group.

Table 5 (B) shows distribution of cases according to severity of pregnancy induced hypertension. In PIH group maximum patients had mild disease. According to Table 6 (A) none of the patients in both groups with normal amniotic fluid volume was associated with congenital anomaly. In high risk group with polyhydramnios, incidence of congenital anomaly was 20% and with oligohydramnios was 7.41%.

Table 6 (A): Correlation of congenital anomalies with amniotic fluid volume

	Low Risk-Control (AFI in cms)			High risk- cases (PIH) (AFI in cms)		
	<8	8-15	>15	<8	8-15	>15
Total no. of cases	10	86	4	27	68	5
Congenital anomalies no.	00	00	00	2	00	1
%	0	0	0	7.41	0	20

According to table 6 (B), with oligohydramnios, study found 1 case of renal agenesis, 1 case of multiple anomalies.

Table 6 (B): Correlation of congenital anomaly with oligohydramnios

Total no of cases of oligohydramnios	Cases with congenital anomaly	Types of congenital anomaly	Association with high risk factor
27	1	Renal agenesis	PIH
	1	Multiple Anomaly	IUGR

Study also showed that perinatal outcome was good in both the groups with adequate amount of liquor. (Table 7)

Table 7: Perinatal outcome with patients with normal AFI (cms)

	Control		PIH Cases	
	Frequency	%	Frequency	%
Full Term Normal baby	84	97.67	58	85.29
IUGR	1	2.33	8	11.76
Still Birth	0	0	0	0
Neonatal Death	0	0	2	2.94
Total	85	100	68	100

Study also showed that in patients with oligohydramnios incidence of IUGR was very high in both the groups (Table 7 (A)). There were no still birth and neonatal death in low risk group compared and three neonatal deaths (11.11%) in high risk group.

Table 7 (A): Perinatal outcome with patients with normal AFI (<8 cms)

	Control		PIH Cases	
	Frequency	%	Frequency	%
Full Term Normal baby	7	70	11	40.75
IUGR	3	30	13	48.15
Still Birth	0	0	0	0
Neonatal Death	0	0	3	11.11
Total	10	100	27	100

According to table 7(B), with polyhydramnios risk of prematurity increases considerably e.g. 2 patients (40%) in high risk and one case (25%) of low risk group delivered IUGR baby. Perinatal mortality was also significantly high with polyhydramnios because of both IUGR and congenital anomalies.

Table 7 (B): Perinatal outcome with patients with normal AFI (<15 cms)

	Control		PIH Cases	
	Frequency	%	Frequency	%
Full Term Normal baby	3	75	2	40
IUGR	1	25	2	40
Still Birth	0	0	0	0
Neonatal Death	0	0	1	20
Total	4	100	5	100

DISCUSSION

Prolonged pregnancy is a subject of interest because of its presumed association with increased fetal morbidity and mortality. Placental insufficiency is postulated to be the cause of the adverse obstetric outcomes associated with prolonged pregnancy.⁸

The failing placenta has been demonstrated to be accompanied by a reduction in the volume of amniotic fluid.¹ In our study we found that amniotic fluid volume estimation by ultrasonography is a good method of estimation of foetal well being. We also found that if amniotic fluid is altered in high risk (PIH) pregnancies, it reflects intrauterine growth retardation and congenital malformation in a few cases. Alteration in amniotic fluid volume also has adverse effect on mode of delivery with increased operative interference. Pregnancy outcome is also often very poor with decreased or increased amniotic fluid index values. It is suggested that AFI estimation should be included as an integral part of antepartum foetal surveillance in high risk pregnancies.

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