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Original Research Article

## Study of amniotic fluid index and its pregnancy outcome

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### ABSTRACT

**Background:** Amniotic fluid is vital to the well-being of the fetus. Severe oligohydramnios and polyhydramnios are associated with increased maternal morbidity and perinatal morbidity and mortality.

**Methods:** This was prospective observational study conducted at tertiary teaching institute from July 2012 to July 2013. Total 200 patients were included in the study. On the basis of amniotic fluid index (AFI), patients were categorized in 3 groups, Normal AFI (8-24 cm), oligohydramnios (AFI <5cm) and polyhydramnios (AFI >= 25 cm). Results were analysed in the form of incidence, mode of delivery and perinatal outcome which includes preterm, low birth weight, still births, NICU admissions and neonatal deaths in all the 3 groups.

**Results:** Out of 200 patients, there was 150 cases of normal AFI, 39 cases of oligohydramnios and 11 cases of polyhydramnios. Incidence of oligohydramnios was 4.1% and polyhydramnios was 1.1%. PIH was the most common etiological factor found in oligohydramnios (30.7%) and in polyhydramnios congenital anomalies (36.3%) followed by idiopathic cause (27.2%) was most common. Incidence of caesarean section was 58.9% in oligohydramnios and 17.3% in normal AFI group. Incidence of NICU admission was 25.6% in oligohydramnios and 50% in polyhydramnios group in comparison to 9.3% in normal AFI group.

**Conclusions:** Amniotic fluid index is an important part of antepartum fetal surveillance. Abnormalities of AFI are associated with high perinatal morbidity and mortality and maternal morbidity.

**Keywords:** Amniotic fluid index, Oligohydramnios, Polyhydramnios

### INTRODUCTION

Amniotic fluid is vital to the well-being of the fetus. It cushions the fetus from injury, helps to prevent compression of the umbilical cord, and allows room for it to move and grow.

In addition, its bacteriostatic action helps to prevent infection of the intra-amniotic environment. The quantity of amniotic fluid at any time in gestation is the product of water exchange between the mother, fetus, and placenta, and is maintained within a relatively narrow range. Disorders of this regulatory process can lead to either

polyhydramnios or oligohydramnios, in which too much or too little fluid exists, respectively. These disorders may result from abnormal fetal or maternal conditions and, conversely, 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.

Since, these disorders of liquor amnii has a significant impact on pregnancy and fetus, it prompted us to carry out this study with sincere efforts to find out its effect on pregnancy outcome.<sup>1,2</sup>

The objective of this study were;

- To find out incidence of oligohydramnios and polyhydramnios in our setup
- To study possible etiological factors for abnormal AFI
- To find out mode of delivery
- To study perinatal outcome in the form of live birth, still birth, NICU admission and neonatal deaths.

**METHODS**

The present study is a prospective observational study done at tertiary teaching institute. From July 2012 to July 2013. During this study period, 200 patients were selected at our tertiary care centre. A detailed history was taken and thorough clinical examination was done. All routine antenatal investigations were done. AFI was measured by four quadrant technique by USG and patients were grouped as normal (AFI 8-24 cm), oligohydramnios (AFI < 5 cm) and polyhydramnios (AFI > 25 cm). Cases were managed accordingly. Data were analysed in terms of incidence, etiology, mode of delivery, and perinatal outcome in the form of live births, still births, NICU admissions and neonatal mortality in all the three groups. The rate of each outcome was calculated in all the three groups and then the two groups that is oligohydramnios and polyhydramnios are compared with normal AFI group with chi square test. p value < 0.05 was considered significant.

**Inclusion criteria**

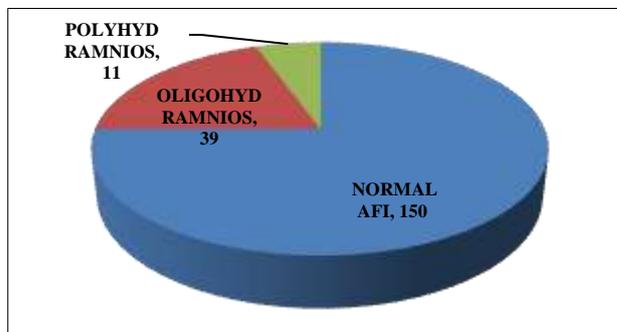
- Antenatal patients in third trimester.

**Exclusion criteria**

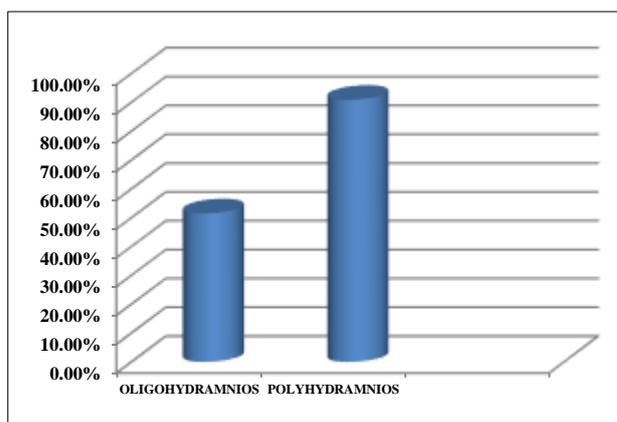
- Antenatal patients having premature rupture of membranes.

**RESULTS**

Total 7948 deliveries were conducted during 1 year, of which 451 cases of abnormal AFI in our institute, so the Incidence of oligohydramnios were 4.1% and polyhydramnios were 1.1%.



**Figure 1: Incidence of oligohydramnios and polyhydramnios.**



**Figure 2: Preterm labour and its association with AFI.**

**Table 1: Associated conditions (etiology).**

Associated conditions	Normal AFI No. (%)	Oligohydramnios No. (%)	Polyhydramnios No. (%)
Pregnancy induced hypertension	21 (14%)	12 (30.7%)	1 (9%)
Intrauterine growth restriction	11 (7.3%)	10 (25.6%)	-
Postdatism	10 (6.6%)	6 (15.4%)	-
Congenital anomaly	7 (4.6%)	-	4 (36.3%)
Fever	1 (0.6%)	4 (10.2%)	-
Diabetes	3 (2%)	-	2 (18.1%)
RH incompatibility	-	-	1 (9%)
Idiopathic	-	7 (17.9%)	3 (27.2%)

Total 200 patients were included in the study from July 2012 to July 2013. Out of 200 patients, 150 patients were

with normal AFI, 39 patients were with oligohydramnios and 11 patients were with polyhydramnios (Figure 1).

In oligohydramnios, main etiological factor found was PIH (30.7%), whereas in polyhydramnios, congenital anomalies (36.3%) were the most common associated factor followed by idiopathic etiology (27.2%) (Table 1).

Preterm delivery seen in 20 cases (51.2%) in oligohydramnios, 10 cases (90.9%) in polyhydramnios and 45 cases (30%) in normal AFI group (Figure 2).

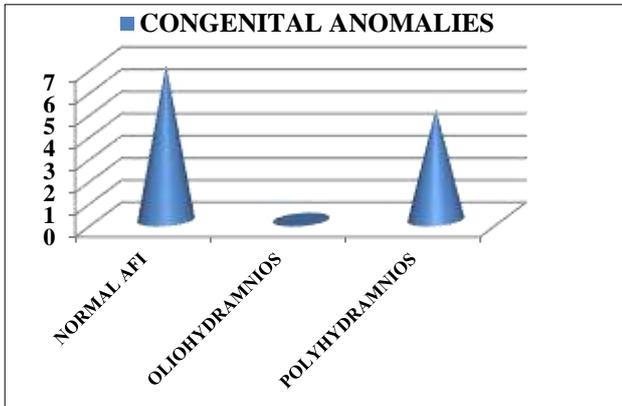


Figure 3: Incidence of congenital anomalies.

In present series of cases, congenital anomalies were more common in patients of polyhydramnios (45.4%) as compared to normal AFI (4.6%). No association was found in patients of normal AFI and oligohydramnios with congenital anomalies in our study (Figure 3).

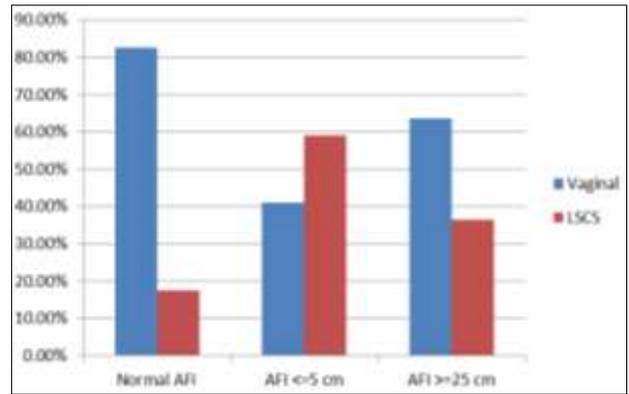


Figure 4: AFI and maternal outcome of labour.

Caesarean section was done in 23 cases (58.9%) in oligohydramnios, 4 cases (36.3%) in polyhydramnios in comparison to 26 cases (17.3%) in normal AFI group (Figure 4).

Majority of LSCS were done for fetal distress, preeclampsia and malpresentation. Fetal distress in the form of meconium stained liquor, fetal bradycardia or tachycardia were more in patients with abnormal liquor that is 91.3% in oligohydramnios and 50% in polyhydramnios as compared to normal liquor (46.1%).

It can be due to cord compression or IUGR in patients with oligohydramnios. In polyhydramnios group, caesarean section was done in one patient for prolonged labour and in another one patient for cord prolapse (Table 2).

Table 2: Indications of caesarean section.

Indications	Normal AFI	Oligohydramnios	Polyhydramnios
Fetal distress	12 (46.1%)	21 (91.3%)	2 (50%)
Pre-eclampsia	4 (15.3%)	1 (4.3%)	-
IUGR	-	1 (4.3%)	-
Malpresentation	5 (19.2%)	-	-
Prolonged labour	-	-	1 (25%)
Cephalopelvic disproportion (CPD)	1 (3.8%)	-	-
Antepartum haemorrhage (APH)	4 (15.3%)	-	-
Cord prolapse	-	-	1 (25%)
<b>Total</b>	<b>26</b>	<b>23</b>	<b>4</b>

Table 3: Perinatal outcome.

Perinatal outcome	Live birth	Still birth	Neonatal death
Normal AFI	147	3	5
Oligohydramnios	34	5	4
Polyhydramnios	9	2	2

A total 5 neonatal deaths occurred in normal AFI group, 4 in oligohydramnios group and 2 in polyhydramnios group (Table 3).

A total 66.6% babies in oligohydramnios group and 81.8% in polyhydramnios group were of LBW (<2.5 kg) (Table 4).

APGAR score was low (< 7 at 5 min) in 20.5% of patients with oligohydramnios and 27.2% in polyhydramnios in comparison to 1.3% in normal AFI

group (Table 4). NICU admission seen in 25.6% in oligohydramnios and 50% in polyhydramnios group in comparison to 9.3% in normal AFI group (Table 4).

**Table 4: Perinatal morbidity.**

Outcome	Low birth weight			Low APGAR			NICU admission		
	Normal	Oligo	Poly	Normal	Oligo	Poly	Normal	Oligo	Poly
Present study	39.3%	66.6%	81.8%	1.39%	20.5%	27.2%	9.3%	25.6%	50%

No maternal deaths occurred in this study.

**DISCUSSION**

In present study, incidence of oligohydramnios was 4.1% and polyhydramnios was 1.1%. Casey B et al, study on oligohydramnios showed 2.3% and Fawad A et al study on polyhydramnios showed 2% incidence.<sup>3,4</sup>

In present study, in majority of cases, the cause of oligohydramnios was PIH accounting for 30.7% cases, and idiopathic 17.9% cases. The most common cause for polyhydramnios was congenital anomalies (36.3%) followed by idiopathic cause (27.2%). Study by Akhter et al and Rajsriya et al, on oligohydramnios also showed the results comparable with our study while the study on polyhydramnios by Queenan and gandow and Fawad A et al showed that Idiopathic cause was more common (56% and 50%) followed by congenital anomalies (20% and 28%).<sup>4,7</sup>

In the patients with normal AFI, 45 (30%) patients were delivered preterm. 10 (90.9%) patients with polyhydramnios were delivered preterm. The incidence is much higher than study by Chen KC et al, which showed 25% preterm deliveries in polyhydramnios.<sup>8</sup>

Preterm delivery was seen in 20 (51.2%) patients with oligohydramnios which is comparable with the study by Garmel and co-workers showing oligohydramnios prior to 37 weeks due to PIH, IUGR had a threefold increase in preterm births.<sup>9</sup>

In present series of cases, congenital anomalies were more common in patients of polyhydramnios (45.4%) as compared to normal AFI (4.6%). Study done by Kale A et al, on polyhydramnios showed a significant large association between polyhydramnios and congenital anomalies.<sup>10</sup>

In present study, out of 39 patients of oligo 23 (58.9%) cases underwent LSCS, 16 (41%) cases had vaginal delivery. Out of 23 cases who underwent LSCS 21 (91.3%) cases were due to fetal distress. Out of 11 cases of polyhydramnios 4 (36.3%) had LSCS and 7 (63.6%) had vaginal delivery.

Rate of caesarean section was found to be significantly higher in oligohydramnios (58.9%) in comparison to normal AFI group (17.3%). No association between polyhydramnios and higher rate of LSCS can be found in our study in comparison to normal AFI group.

Incidence of Low birth weight was higher in patients with oligohydramnios and polyhydramnios that is 66.6% and 81.8% respectively as compared to normal AFI (39.3%). Akhter et al, showed 40% LBW babies in patients with normal liquor while 60% babies with LBW in patients with oligohydramnios.<sup>5</sup> Chen KC et al, showed 22.6% babies with LBW in polyhydramnios compared to 6.1% in patients with normal liquor.<sup>8</sup>

Low APGAR score was significantly higher in patients with oligohydramnios and polyhydramnios that is 20.5% and 27.2% respectively compared to normal liquor (1.3%). In a study on oligohydramnios by Jandial C et al, showed 12% babies with low APGAR score while Chen KC et al study on polyhydramnios showed 11.1% babies with Low APGAR score which is also comparable with our study.<sup>8,11</sup>

There was 25.6% and 50% NICU admissions in oligohydramnios and polyhydramnios respectively as compared to 9.3% in patients with normal AFI. Sadovsky et al, study on oligohydramnios showed 17% NICU admissions and Chen KC et al study on polyhydramnios showed 18.6% NICU admissions.<sup>8,12</sup>

Out of 39 cases of oligo, still birth was 5 and neonatal deaths occurred in 4 while out of 11 cases of polyhydramnios 2 were still born and 2 were neonatal deaths.

**CONCLUSION**

Abnormalities of AFI both reduced and excess liquor are associated with high maternal morbidity and perinatal morbidity and mortality. Ultrasonography proved to be an important tool for early and accurate diagnosis of oligo and polyhydramnios and also to rule out congenital malformations and hence to improve maternal and fetal outcome. Oligohydramnios is frequent finding in pregnancies involving IUGR, PIH and post-datism. Polyhydramnios is associated with congenital malformations. AFI abnormalities demands intensive

fetal surveillance and proper antepartum and intrapartum care. Timely decision for intervention is helpful in reducing perinatal morbidity and mortality.

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

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