

# Effect of various antenatal factors on amniotic fluid index

Sarika Metkar<sup>1</sup>, Alka B Patil<sup>2\*</sup>, Shruti Singh<sup>3</sup>

<sup>1</sup>Junior Consultant, Yashvantrao Chavan Memorial Hospital, Pune, Maharashtra, INDIA.

<sup>2</sup>Professor and HOD, <sup>3</sup>Resident, Department of OBGY, ACPM Medical College, Dhule, Maharashtra, INDIA.

Email: [alkapatil@rediffmail.com](mailto:alkapatil@rediffmail.com)

## Abstract

**Introduction:** Amniotic fluid cushions the fetus from injury, allows movement, and helps to stabilize temperature. The composition of the fluid changes over the course of gestation. Initially, amniotic fluid is similar to maternal plasma. As the fetus develops, phospholipids originating from the lungs, fetal cells, lanugo, and urine are deposited in the fluid. **Aims and objectives:** To study the effect of various antenatal factors on amniotic fluid index. **Materials and Method:** The present study was conducted in the department of Obstetrics and Gynaecology, ACPM medical college, Dhule. Total 200 antenatal women were registered in the study. In each case detailed history was taken as per proforma at the time of admission. The General, systemic and obstetric Examination was performed in all patients. Amniotic fluid measurements were performed in all the study mothers by ultrasound on targeted patients and were divided in three groups (oligohydramnios, borderline and normal). The antenatal variables were compared with these three groups. **Results:** The mean age of the mothers in the study was 24.8±3.03, 26±3.6 and 25.4±3.6 in group I, II and III respectively. 20.8% mothers with in AFI Group I and 12.8% in AFI Group II while just 1% mothers in Group III were having the gestation age of 40 to 42 years. Percentage of primigravida in oligohydramnios group 60.4%, in borderline group 42.6% and in normal group 45.0%. anemia was most common complication diagnosed in all the three groups (20.8%, 2.1% and 1% in group I, II and III respectively). PIH was present in 7.5% mothers in group I and 2.1% mothers in group II whereas no mother was suffering from PIH in group III. **Conclusion:** Post dated pregnancies and Pregnancy induced hypertension were the commonest causes of reduced AFI during third trimester of pregnancy.

**Keywords:** Oligohydramnios, amniotic fluid index, antenatal factors

## \*Address for Correspondence:

Dr. Alka B Patil, Professor and HOD, Department of OBGY, ACPM Medical College, Dhule, Maharashtra, INDIA.

Email: [alkapatil@rediffmail.com](mailto:alkapatil@rediffmail.com)

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## INTRODUCTION

The amniotic fluid is part of the baby's life support system. Just as our ancestors crawled out of ocean to life on land, we too, until birth, float in amniotic fluid. It provides temperature stability, cushioning and a necessary presence in collapsed airways to help stimulate lung development.<sup>1</sup> Pregnancy is a unique experience in every woman's life. The thought of a growing fetus with

adequate amniotic fluid volume (according to gestational age) in the mother's womb, indeed is nature's way of expressing the attributes of motherhood, so adequate amniotic fluid volume is essential for the normal growth and well-being of the fetus.<sup>2</sup> Amniotic fluid cushions the fetus from injury, allows movement, and helps to stabilize temperature. The composition of the fluid changes over the course of gestation. Initially, amniotic fluid is similar to maternal plasma. As the fetus develops, phospholipids originating from the lungs, fetal cells, lanugo, and urine are deposited in the fluid.<sup>3</sup> The amniotic fluid index (AFI) measured by the four-quadrant ultrasonic technique was added to antepartum testing to better identify fetuses at higher risk of poor perinatal outcome. Oligohydramnios, or decreased amniotic fluid, has since been correlated with increased risk of intrauterine growth restriction, congenital abnormalities, postdates pregnancy, meconium passage, normal fetal heart rate patterns, and lower Apgar scores in multiple studies.<sup>4</sup> Actual AFVs can be measured by dye dilution techniques and directly measured at

cesarean delivery; however, these techniques are timeconsuming, are invasive, and require laboratory support, and direct measurement can only be done at cesarean delivery. As a result of these limitations, the AFV is estimated by the amniotic fluid index (AFI), the single deepest pocket, and subjective assessment of the AFV.<sup>3</sup> Various causative factors has been identified including chromosomal abnormality, intra uterine infections, Drugs, renal agenesis or obstruction of the urinary tract, IUGR associated with placental insufficiency in the causation of oligohydraminios. Also various antenatal factors such as maternal age, gestational age, parity and associated complication and risk factors has been associated with the low AFI i.e. oligohydramnios.

### AIMS AND OBJECTIVES

To study the effect of various antenatal factors on amniotoc fluid index.

### MATERIALS AND METHOD

The present study was conducted in the department of Obstetrics and Gynaecology, ACPM medical college, Dhule. The study was conducted from June 2012 to October 2013 after approval of institution ethical committee. Following inclusion and exclusion criteria used to select the study subjects to evaluate the amniotic fluid volume.

#### Inclusion Criteria

- Singleton Pregnancy
- Gestational age more than 37 weeks
- Presence of intact membrane

#### Exclusion Criteria

- Multifetal Gestation
- Associated fetal anomalies
- Polyhydramnios

Thus by using above mentioned inclusion and exclusion criteria total 200 antenatal women were registered in the study. In each case detailed history was taken as per proforma at the time of admission. The General Physical

Examination of patients was done. Obstetric examination of the patient was done thereafter by examination of the fundal height, abdominal girth, fundal grip, lateral grip both pelvic grip, to know the lie, attitude, presentation and the fetal heart was auscultated. Amniotic fluid measurements were performed in all the study mothers by ultrasound on targeted patients. Equipment used in this study included TOSHIBA nemio XG model machine which was equipped with 3.75 and 7.5 MHz curvilinear transducers. EFW Calculated by Hadlock 1 formula. Then a four quadrant amniotic fluid was assessed by placing a linear ultrasound transducer perpendicular to the wall of uterus and parallel to mother’s spine in four abdominal quadrants and measuring the largest vertical amniotic fluid pocket. Pockets consisting primarily of umbilical cord are disregarded. A four quadrant sum of less than or equal to 5 cms, or more than or equal to 25 cms was considered as abnormal.

#### Grouping of patients is as follows

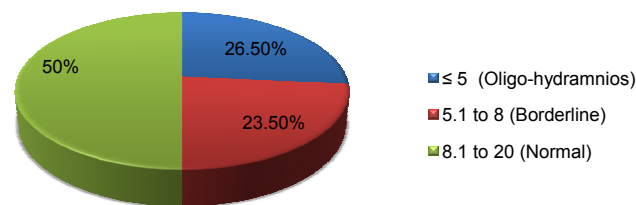
1. Group I AFI ≤ 5 cms – oligohydramnios
2. Group II AFI 5.1 – 8 cms borderline
3. Group III AFI 8.1 – 20 cms – normal

The collected information was grouped in the above mentioned three groups and was compared with each other. The data was analysed using Statistical Product and service solution V 16, SPSS software. Parameters were presented in frequency and percentage distribution form.

**Table 1:** Grouping of mothers according to amniotic fluid index (AFI)

Group	Amniotic fluid Index (AFI)	Frequency	Percent
I	≤ 5 (Oligo-hydramnios)	53	26.5
II	5.1 to 8 (Borderline)	47	23.5
III	8.1 to 20 (Normal)	100	50.0
<b>Total</b>		<b>200</b>	<b>100.0</b>

In the present study total 200 ANC were enrolled and AFI was calculated in all the mothers. It was observed that 50% mothers were having normal AFI, whereas 26.5% mothers were having AFI less than 5 thus were diagnosed as Oligo-hydramnios.



**Figure 1:** Grouping of mothers according to amniotic fluid index (AFI)

**Table 2:** Distribution of Amniotic fluid Index according to ANC mothers age, gestational age and parity

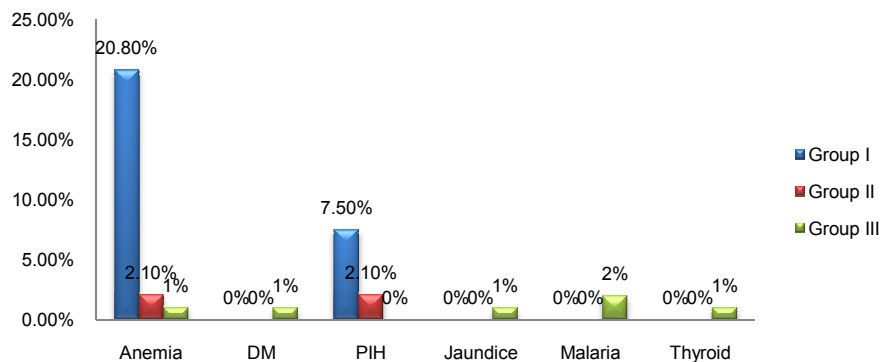
Variable	Group			Significance	
	I	II	III		
Age Group (years)	≤20	4 (7.5%)	1 (2.1%)	8 (8%)	X <sup>2</sup> = 5.953, p> 0.01 (not significant)
	21 to 25	31 (58.5%)	24 (51.1%)	42 (42%)	
	26 to 30	15 (28.3%)	19 (40.4%)	42 (42%)	
	> 30	3 (5.7%)	3 (6.4%)	8 (8%)	
Gestational Age (weeks)	37 to 40	42(79.2%)	41 (87.2%)	99 (99.0%)	X <sup>2</sup> = 17.570, p< 0.01 (significant)
	40 to 42	11(20.8%)	6 (12.8%)	1 (1.0%)	
Parity	Primi	32 (60.4%)	20 (42.6%)	45 (45.0%)	X <sup>2</sup> = 4.149, p> 0.01 (not significant)
	Multi	21 (39.6%)	27 (57.4%)	55 (55.0%)	

Majority of the mothers in the study were between 21 to 30 years of age. Similar distribution was observed in all the three groups and the difference of age groups of the mothers in the three AFI groups was not statistically significant. The mean age of the mothers in the study was 24.8±3.03, 26±3.6 and 25.4±3.6 in group I, II and III respectively. It was seen that 20.8% mothers with in AFI Group I and 12.8% in AFI Group II while just 1% mothers in Group III were having the gestation age of 40 to 42 years. The difference of gestation age within the three AFI index groups was statistically highly significant (p<0.01). In Group I 39.6% mothers were multigravida and 60.4% were primi, in Group II AFI index 57.4% were multi and 42.6% were primigravida and in group III 55% were multigravida and 45% were primi mothers. There was statistically no significant (p>0.05) difference of the gravida status of the mothers in the three AFI groups.

**Table 3:** Distribution of Amniotic fluid Index according to ANC complications

ANC Complication	Group			Total
	I	II	III	
Anemia	11 (20.8%)	1 (2.1%)	1 (1.0%)	13 (6.5%)
DM	0	0	1 (1.0%)	1 (0.5%)
PIH	4 (7.5%)	1 (2.1%)	0	5 (2.5%)
Jaundice	0	0	1 (1.0%)	1 (0.5%)
Malaria	0	0	2 (2.0%)	2 (1.0%)
Thyroid	0	0	1 (1.0%)	1 (0.5%)
No complication	38 (71.7%)	45 (95.7%)	94 (94.0%)	177 (88.5%)
<b>Total</b>	<b>53 (100.0%)</b>	<b>47 (100.0%)</b>	<b>100 (100.0%)</b>	<b>200 (100.0%)</b>

While studying the complication present during the antenatal period it was observe that anemia was most common complication diagnosed in all the three groups (20.8%, 2.1% and 1% in group I, II and III respectively). PIH was present in 7.5% mothers in group I and 2.1% mothers in group II whereas no mother was suffering from PIH in group III.



**Figure 2:** Distribution of Amniotic fluid Index according to ANC complications

**DISCUSSION**

The present study was conducted in the department of Obstetrics and Gynaecology of ACPM medical college, Dhule. Total 200 singleton pregnancies were enrolled in the present study. All the patients had cephalic

presentation and were of more than 37 weeks of period of gestation these cases were divided into 3 groups. Group I included patients with AFI< 5 and Group II included patients with AFI 5-8, Group III AFI 8-20. Majority of the mothers in the study were between 21 to 30 years of

age. The mean age of the mothers in the study was  $24.8 \pm 3.03$ ,  $26 \pm 3.6$  and  $25.4 \pm 3.6$  in group I, II and III respectively. Distribution was observed in all the three groups was not statistically significant. Similar age distribution was also observed by Chauhan P *et al*<sup>5</sup> ( $23.6 \pm 6.5$  years), Jun Zhang *et al*<sup>6</sup> ( $28.4 \pm 3.4$  years) and Everett F *et al*<sup>7</sup> ( $23.8 \pm 5.7$  years). It was seen that 20.8% mothers with in AFI Group I and 12.8% in AFI Group II while just 1% mothers in Group III were having the gestation age of 40 to 42 years. The difference of gestation age within the three AFI index groups was statistically highly significant ( $p < 0.01$ ) Similar findings were also reported by Jun Zhang *et al*<sup>6</sup>, Casey B *et al*<sup>8</sup>, Everett F *et al*<sup>7</sup> and Iffath A *et al*.<sup>9</sup> There is a large variation of the amniotic fluid within the same subject as it is a dynamic reservoir. It increases rapidly in the first half of pregnancy with close correlation with fetal weight reaching a mean of 60 ml at the end of first trimester, 100-150ml by 16 weeks, 700 ml by 32 weeks. Then it increases slowly to maximum volume of 800-1000 ml at 37 weeks, thereafter declines gradually to 700-800ml at 40 weeks. After 40 weeks amniotic fluid decreases at a rate of 8% per week and averages only 400-450ml at the end of the 42 weeks. It reduces further to a mean of 250ml and 160ml at 43 and 44 weeks respectively<sup>10</sup>. These findings indicate that the problem of oligohydramnios was more common in the later part of pregnancy. It is mainly due to physiological or pathological causes of reduced placental perfusion near term. In Group I 39.6% mothers were multigravida and 60.4% were primi, in Group II AFI index 57.4% were multi and 42.6% were primigravida and in group III 55% were multigravida and 45% were primi mothers. There was statistically no significant ( $p > 0.05$ ) difference of the gravida status of the mothers in the three AFI groups. While studying the complication present during the antenatal period it was observe that anemia was most common complication diagnosed in all the three groups (20.8%, 2.1% and 1% in group I, II and III respectively). PIH was present in 7.5% mothers in group I and 2.1% mothers in group II whereas no mother was suffering from PIH in group III.

## CONCLUSION

Thus from the above results and discussion we conclude that oligohydramnios diagnosed by using AFI on ultrasonography easily. Post dated pregnancies and Pregnancy induced hypertension were the commonest causes of reduced AFI during third trimester of pregnancy.

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