Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Study On Amniotic Fluid Index In Postdated Pregnancies And Its Perinatal Outcome.

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ABSTRACT

Amniotic fluid (AF) not only provides physical protection, space for movement and growth, and enhancement of lung development for the fetus but it also constitutes a vital sign for the evaluation of fetal well-being. The metabolism of AF is a fine dynamic balance between the fetus and the mother. Among its physical characteristics, its volume is the most important index utilized in ante-partum fetal surveillance to determine fetuses at high risk of compromise, and requiring interventions to improve perinatal outcome. To assess the importance of predicting amniotic fluid index in postdated pregnancies as early in the third trimester to avoid adverse perinatal outcomes and reduce the rate of instrumental and caesarean deliveries. The study conducted at government Thiruvarur, medical college & hospital in the year between 2021-2022, with a sample size of 300 patients who were postdated antenatal women. Patients fulfilled the selection criteria were evaluated, laboratory investigations done, amniotic fluid index calculated by four quadrant technique using ultrasonogram, monitored intrapartum and were followed up until 28 days postnatally. From this study, we understand the lack of education and awareness prevailing among rural women regarding the adverse effects of oligohydramnios in postdated pregnancies which increases the foetal complication Thus AFI helps in predicting the fetal tolerance in labour. Hence this study helped greatly in knowing that there is high significane of association between advanced gestational age, mode of induction and delivery, color of liquor, indication for LSCS in postdated and amniotic fluid index in postdated pregnancies.

Keywords: Two-diameter pocket, amniotic fluid index, oligohydramnios, high-risk pregnancies, adverse perinatal outcomes.

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INTRODUCTION

The aquatic environment of the fetus has long remained a mystery to the patient and obstetricians, and the precise origin of the amniotic fluid is still not completely understood [1]. The fluid is faintly alkaline with low specific gravity of 1.010, osmolarity of 250 mOsmol/litre-which is suggestive of fetal maturity [2]. In early pregnancy it is colourless but at term it is pale straw coloured due to presence of exfoliated lanugo and epidermal cells from the fetal skin. It provides a protective factor for the growing fetus [3]. It maintains body temperature and provides nutrients to the fetus. It gradually increases in volume with advancing gestational age followed by a significant decrease in volume after the estimated date of delivery [4]. Oligohydramnios is associated with increased maternal morbidity, increased rate of induction of labour and caesarean section [5]. It is also associated with adverse perinatal outcomes such as preterm delivery, low birth weight, fetal distress, meconium passage, low APGAR score, neonatal resuscitation and NICU admission [6]. Oligohydramnios can also be an idiopathic finding in a woman who had low risk pregnancies and no medical or fetal complication. The long term sequalae of oligohydramnios is pulmonary hypoplasia, potter's syndrome, club foot, club hand and dislocation of hip [7]. During labour, the predominant mechanical function of amniotic fluid is to provide a cushion for the umbilical cord, without which there would be compression of the cord during labour [8]. Decreased liquor are associated with increased incidence of meconium –stained liquor and abnormal fetal heart rate patterns during labour [9] thereby increasing operative deliveries. Thus this study was conducted to find the significance of amniotic fluid index in determining the maternal and perinatal outcome in pregnant women who came postdated to our department ,admitted, and evaluated to find out the maternal and fetal outcome with regards to amniotic fluid index in those patients. [10]

METHODS

The study conducted at government Thiruvarur, medical college & hospital in the year between 2021-2022, with a sample size of 300 patients who were postdated antenatal women. Patients fulfilled the selection criteria were evaluated, laboratory investigations done, amniotic fluid index calculated by four quadrant technique using ultrasonogram, monitored intrapartum and were followed up until 28 days postnatally

Inclusion Criteria

Pregnant woman in age group of 18-35 yrs with

- single live intrauterine gestation
- cephalic presentation
- gestational age >40 completed weeks
- intact membrane
- who have given written informed consent to participate in this study

Exclusion Criteria

- ruptured membranes
- amnioinfusion
- multiple gestation
- gestational age<40completed weeks
- associated fetal malformations
- high risk pregnancies like hypertension, diabetes, chronic renal disease, preeclampsia, connective tissuedisorders
- abruption
- PG synthetase inhibitors& ACE inhibitors therapy

Postdated pregnant patients fulfilling my inclusion and exclusion criteria were admitted. Detailed history were obtained from the patient about the socioeconomic status, booked / unbooked, the patient's age, obstetric code, gestational age, menstrual history, obstetric history. Obstetric examination carried out. Symphysio-fundal height 'measured. Fetal heart rates were recorded serially. It is reasonable to start antenatal surveillance between 41-42 weeks of gestation despite lack of evidences it improves the

outcome. No single method has been recommended as superior in making of fetomaternal outcome. Blood investigations – hemoglobin, blood grouping and typing, cell counts, blood sugar, urine analysis, VCTC, VDRL, USG, Doppler, CTG were done. Per Speculum and per vaginal examination was done to rule out draining per vaginum and confirmed intact membranes. After taking informed consent from the patients, AFI was measured ultrasonographically and for each case continuous CTG tracing was monitored. These women were followed till discharge.Ultrasound examination to monitor fetal wellbeing and assess amniotic fluid index is done by Phelan'stechnique in which a curvilinear transducer was used. The abdomen was divided into four equal quadrants through the maternal midline vertically and an arbitrary transverse line between symphysis pubis and upper edge of uterine fundus. Transducer placement was parallel to maternal sagittal plane and perpendicular to maternal coronal plane. Image is frozen at the clear deepest pocket of amniotic fluid. This pocket was measured in a vertical direction. It is repeated in each of the four quadrants and summation of the four values gives the AFI of that patient and they are grouped according to their AFI. Decision of delivery route was done as required. Somepatients were already in spontaneous labour, some were subjected to induction of labour. If delivery is by caesarean section, the indication was recorded. A study proforma was filled for each case. During delivery the colour of liquor was observed. APGAR of the baby was recorded at 1 minute and 5 minute. Birth weight of the baby recorded. The rate of NICU admission is recorded. The perinatal outcome is followed up for 28 days after delivery.

RESULTS

Table 1: Percentage Of Gestational Age In Weeks

GESTATIONAL AGE	FREQUENCY	PERCENTAGE
40-41 WEEKS	220	73.3
41-42 WEEKS	62	20.7
>42 WEEKS	18	6.0
TOTAL	300	100.0

In our study,maximum number of postdated women 73.3% falls between the gestational age of 40-41 weeks ,followed by 20.7% coming between gestational age of 41-42 weeks and 6% from the gestational age of >42 weeks.

Figure 1: Pie Chart Showing Afi Distribution In Our Study

Figure 1: Pie Chart Showing Afi Distribution In Our Study
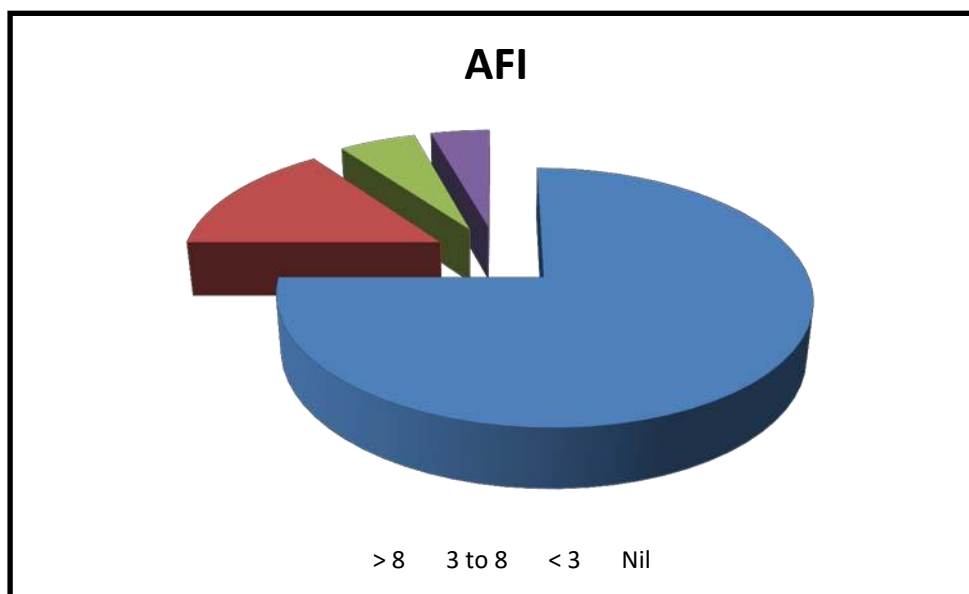
Table 2: Percentage Of AFI Distribution

AFI	FREQUENCY	PERCENTAGE
>8	225	75.0
3-8	45	15.0
<3	17	5.7
NIL	13	4.3
TOTAL	300	100

In the present study,AFI was measured using ultrasonogram by measuring the single vertical pocket in each quadrant and classifed into 4 groups:

- AFI >8
- AFI 3 TO 8
- AFI <3
- AFI-NIL

Out of 300 people, 225(75%) falls in AFI group > 8, and 45 (15%)women falls in AFI group between 3-8, 17 (5.7%)women falls in AFI group <3,while 13 women had anhydramnios which constituted 4.3%.

Table 3: Percentage Of AFI In Relation With Maternal Age

AGE	AFI>8	AFI3-8	AFI<3	AFI-NIL
18-20 YRS	30.2%	24.4%	23.5%	7.7%
21-25 YRS	64.0%	68.9%	76.5%	76.9%
26-35 YRS	5.8%	6.7%	0.0%	15.4%

Table 4: Mean Maternal Age Calculation

	N	Minimum	Maximum	Mean	Standard Deviation
Age	300	18	35	23.21	3.762
Valid N(listwise)	300				

In our study, maximum number of antenatal women- 66% (198 out of 300 postdated women) were in the age group of 21-25 years indicating that postdated women were mostly in the younger age group and 76.9% of them had anhydramnios ,76.5% had AFI < 3, 68.9% with AFI 3 to 8, and 64% with AFI > 8. The mean maternal age was 23.21 years.

Table 5: Comparing The Percentage Of AFI In Relation To Maternal Age

					AFI		
			>8	3 TO 8	<3	NIL	TOTAL
AGE	18-20YRS	COUNT	68	11	4	1	84
		%	30.2%	24.4%	23.5%	7.7%	28.0%
	21-25 YRS	COUNT	144	31	13	10	198
		%	64.0%	68.9%	76.5%	76.9%	66.0%
	25-35YRS	COUNT	13	3	0	2	18
		%	5.8%	6.7%	0.0%	15.4%	6.0%
TOTAL		COUNT	225	45	17	13	300
		%WITHINAFI	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6: Significance Of Association Between Maternal Age And AFI

	Value	df	Asymp. sig. (2-sided)
Pearson chi-square	6.327[a]	6	0.388
Likelihood ratio	7.526	6	0.275
Liner by linear association	2.431	1	0.119
N of valid cases	300		

There was almost no significance noted in the association between age and amniotic fluid index in postdated pregnancies.

Figure 2: AFI In Relation To Parity
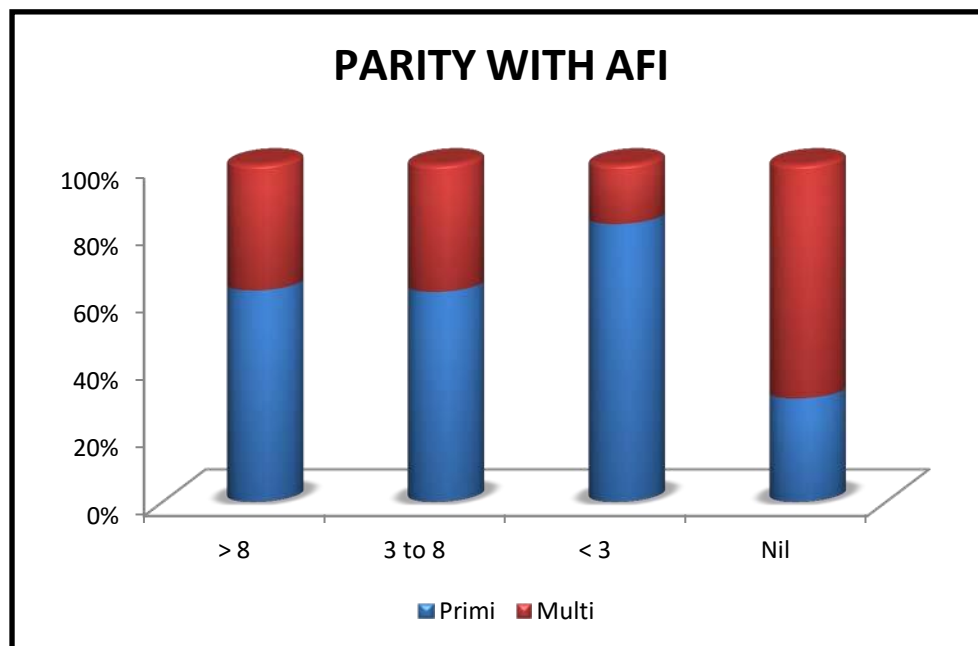
Table 7: Percentage Of AFI In Relation To Parity

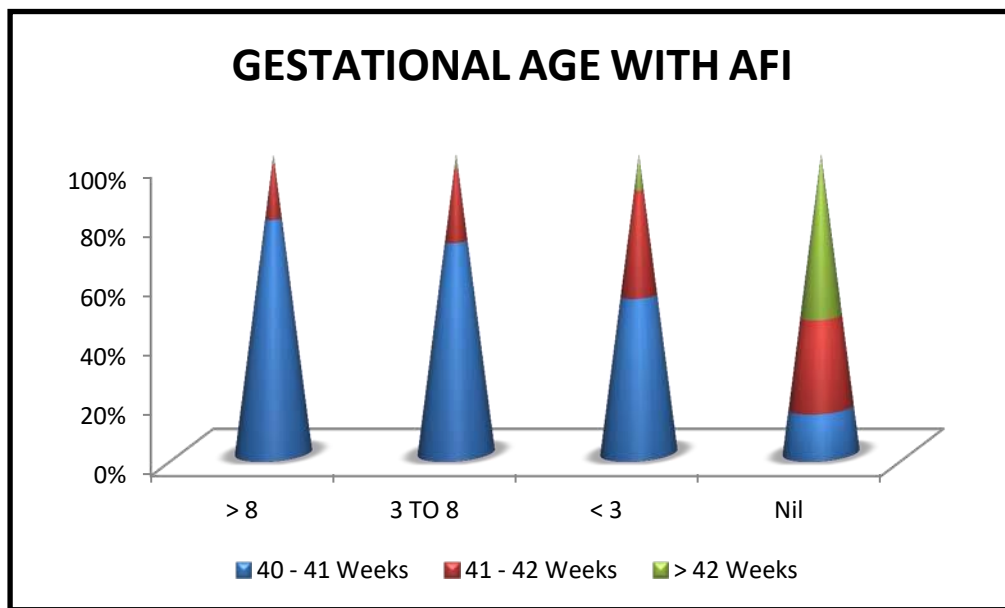|	>8	3 TO 8	<3	NIL
PRIMI	62.7%	62.2%	82.4%	30.8%
MULTI	37.3%	37.8%	17.6%	69.2%

225/300 women had AFI > 8, 45 women had AFI 3 TO 8, 17 women had AFI < 3, and only 13 women had nil liquor (anhydramnios).

In our study, 62.3% of postdated women fell under the primigravida group, while only 37.7% comes under the multigravida group .

Maximum number of postdated primigravida (82.4%) had AFI < 3, and maximum of postdated multigravida women (69.25%) had AFI-NIL.

Table 8-Comparison Of AFI Percentage With Parity

			AFI				
			>8	3 TO 8	<3	NIL	TOTAL
PARITY	PRIMI	COUNT	141	28	14	4	187
		%	62.7%	62.2%	82.4%	30.8%	62.3%
	MULTI	COUNT	84	17	3	9	113
		%	37.3%	37.8%	17.6%	69.25%	37.7%
TOTAL		COUNT	225	45	17	13	300
		% WITHIN AFI	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 3: Percentage Of Afi With Gestational Age

Table 9: Comparing Percentage Of AFI With Gestational Age

	>8	3 TO 8	<3	NIL
40-41 WKS	78.7%	71.1%	52.9%	15.4%
41-42 WKS	18.2%	24.4%	35.3%	30.8%
>42 WKS	3.1%	4.4%	11.8%	53.8%

Those women who presented to us from 40-41 weeks,majority of them had AFI >8 and they constituted 78.7% (177). In 41-42 weeks group, AFI < 3 constituted 35.3%. In > 42 weeks group,anhydramnios is seen in almost 53.8%.

Table 10: Comparison Of AFI Percentage With Gestational Age

					AFI		
			>8	3 TO 8	<3	NIL	TOTAL
GESTATIONAL AGE	40-41 WKS	COUNT	177	32	9	2	220
		%	78.7%	71.1%	52.9%	15.4%	73.3%
	41-42 WKS	COUNT	41	11	6	4	62
		%	18.2%	24.4%	35.3%	30.8%	20.7%
	>42 WKS	COUNT	7	2	2	7	18

		%	3.1%	4.4%	11.8%	53.8%	6.0%
TOTAL		COUNT	225	45	17	13	300
		% WITHIN AFI	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 5-Percentage Of Onset Of Labour With Gestational Age
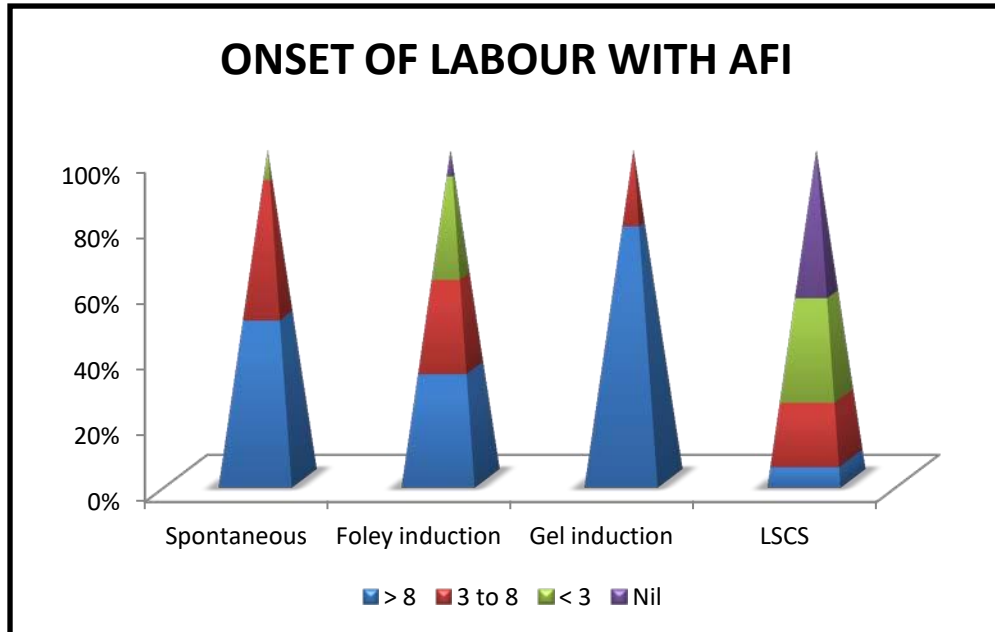
Table 11- Percentage Of Onset Of Labour With AFI

	>8	3 TO 8	<3	NIL
SPONTANEOUS	32.0%	26.7%	5.9%	0.0%
FOLEY INDUCTION	32.4%	26.7%	29.4%	7.7%
PGE2 GEL INDUCTION	22.7%	6.7%	0.0%	0.0%
LSCS	12.9%	40.0%	64.7%	92.3%

Many patients almost 85 cases presented during admission with spontaneous onset of labour while the other group were assessed using modified bishop's score and induction of labour was done.

Mainly two methods of induction were tried in our tertiary care unit:Foley catheter induction and PGE2 Gel induction

Totally 91 cases underwent foley induction out of which 32.4% cases (73) had AFI >8 PGE2 Gel induction was done mostly in the AFI group > 8 (51 out of 54 cases) After a trial of induction of labour, many progressed to active labour and delivered.

Table 12-Comparing Percentage Of Onset Of Labour With AFI

			AFI				
			>8	3 to 8	<3	NIL	Total
ONSET OF LABOUR	SPONTANEOUS	COUNT	72	12	1	0	85
		%	32.0%	26.7%	5.9%	0.0%	28.3%
	FOLEY INDUCTION	COUNT	73	12	5	1	91
		%	32.4%	26.7%	29.4%	7.7%	30.3%
	PGE2 GEL INDUCTION	COUNT	51	3	0	0	54
		%	22.7%	6.7%	0.0%	0.0%	18.0%
	LSCS	COUNT	29	18	11	12	70
		%	12.9%	40.0%	64.7%	92.3%	23.3%
TOTAL		COUNT	225	45	17	13	300
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 6-Relation Between Colour Of Liquor With AFI
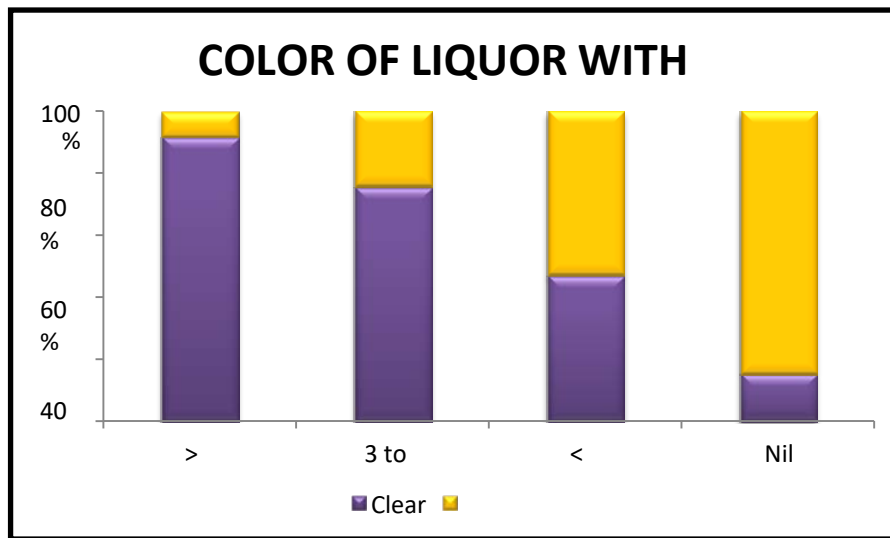
Out of 300 antenatal cases in our study,50 cases (16.6%) were having meconium stained liquor.The color of liquor is meconium stained as the gestational age increases and the amount of liquor decreases.Thus incidence of meconium staining is greater (84.6%) with anhydramnios, 53% in AFI < 3 group,24.4% in AFI 3 to 8 group,and very less (8.4%) in the AFI group > 8.

Table 13: Percentage Of Colour Of Liquor With AFI

	>8	3 TO 8	<3	NIL
CLEAR	91.6%	75.6%	47.1%	15.4%
MECONIUM	8.4%	24.4%	53.0%	84.6%

Table 14: Comparing Percentage Of Colour Of Liquor With AFI

			AFI				
			>8	3 TO 8	<3	NIL	TOTAL
COLOUR OF LIQUOR	CLEAR	COUNT	206	34	8	2	250
		%	91.6%	75.6%	47.1%	15.4%	83.4%
	MECONIUM	COUNT	19	11	9	11	50
		%	8.4%	24.4%	53.0%	84.6%	16.6%
TOTAL		COUNT	225	45	17	13	300
		%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 7: Relation Between AFI And Mode Of Delivery
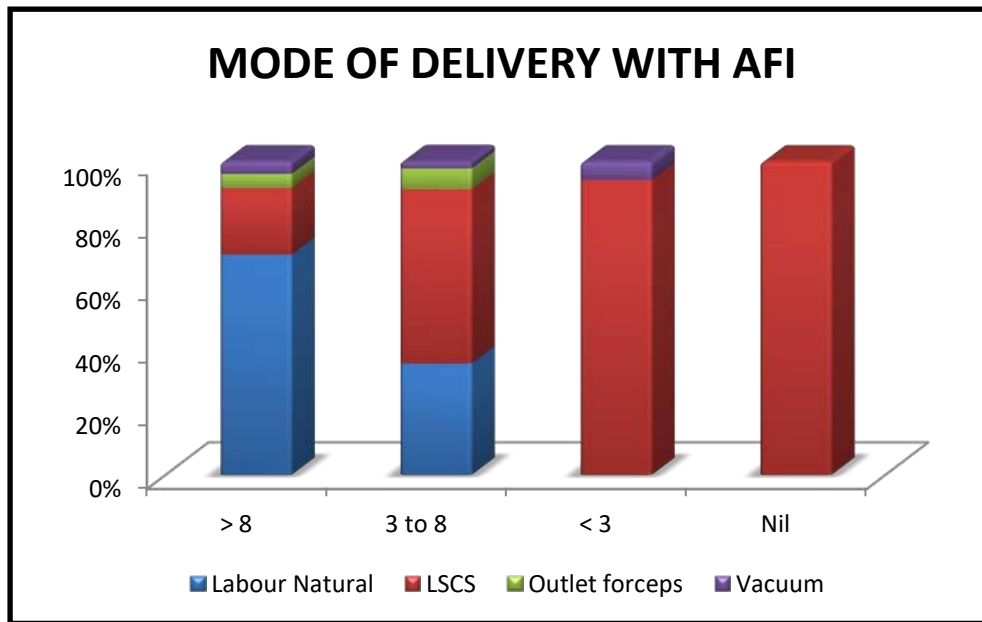
Table 15: Percentage Of Mode Of Delivery With AFI

	>8	3 to 8	<3	NIL
LABOUR NATURAL	70.2%	35.6%	0.0%	
LSCS	21.3%	55.6%	94.1%	100.0%
OUTLET FORCEPS	4.4%	6.7%		
VACUUM	4.0%	2.2%	5.9%	

174 out of 300 antenatal women (58%) delivered by labour natural while 102 out of 300 (34%) women delivered by LSCS. In AFI > 8 , almost 70.2% delivered by labour natural, In AFI < 3 nearly 94.1% delivered by Lower segment caesarean section.

13 out of 300 (4.3%) antenatal women delivered by outlet forceps, while 11 out of 300 (3.7%)antenatal women delivered by ventouse/vacuum delivery.

Table 16: Comparison Between Percentage Of AFI And Mode Of Delivery

					AFI		
			>8	3 TO 8	<3	NIL	TOTAL
MODE OF DELIVERY	LABOUR NATURAL	COUNT	158	16	0	0	174
		%	70.2%	35.6%	0.0%	0.0%	58.0%
	LSCS	COUNT	48	25	16	13	102
		%	21.3%	55.6%	94.1%	100.0%	34.0%
	OUTLET FORCEPS	COUNT	10	3	0	0	13
		%	4.4%	6.7%	0.0%	0.0%	4.3%
	VACUUM	COUNT	9	1	1	0	11
		%	4.0%	2.2%	5.9%	0.0%	3.7%
TOTAL		COUNT	225	45	17	13	300
		% WITHIN AFI	100.0%	100.0%	100.0%	100.0%	100.0%

DISCUSSION

Postdated pregnancy is a high risk obstetric condition. Oligohydramnios was defined as Amniotic fluid index (AFI) ≤5 (or less than the 5th percentile) or the absence of a pocket measuring at least 2 × 1 cm3. It is most commonly associated with post term pregnancies [11]. The perinatal mortality and morbidity are increased in several folds when pregnancy is advanced beyond term i.e. 40 weeks. The actual physiologic mechanism responsible for a prolonged pregnancy has not been known and remains obscure.In India 20 to 25 yrs is the reproductive age group [12.]Many studies agreed that advancing maternal age does not appear to influence the incidence of postdated pregnancy. In our study,maximum postdated women lie in the age group of 21-25 yrs andthe P-value is 0.388 by Chi square test .Similar to maternal age, parity does not appear to influence postdated pregnancy With maternal age held constant, prolonged pregnancies were encountered more frequently among primigravidas and women of high parity (>4). In present study maximum number of patients were primigravida (62.3%). Oligohydramnios can develop in any trimester, although it is more common in third trimester [13]. In our study, 94% of the antenatal women falls between 40 to 42 weeks which is comparable with the study by Akhter et al 2014 where 91% of postdated women falls between 40 to 42 weeks. Induction of labour should maximize the number of women progressing to the active phase of labour while maintaining a low incidence of adverse maternal and neonatal outcomes. Bishop's score helps in identifying adverse perinatal outcome [14]. Failed induction is defined as the inability to achieve cervical dilatation >4 cm after 12 ± 3 h of oxytocin administration (with a goal of 200–225 Monte Video Units or 3 contractions/10 min). A higher incidence of maternal and fetal morbidity especially with an increased risk of cesarean section has been associated with induction of labour .[15]Perinatal mortality and morbidity was increased in postdated pregnancy which could be reduced by timely and judicious induction of labour. Among 300 patients in our study, 85 patients (28.3%) went in for spontaneous labour [16]. 145 patients (48.3%) went in for induction of labour and 70 patients (20.3%) weretaken up for LSCS.ACOG concludes that "Induction of labor between 41 0/7 and 42 0/7 weeks *canbe* considered" and "Induction of labor after 42 0/7 weeks and by 42 6/7 weeks of gestation is recommended, given evidence of an increase in perinatal morbidity andmortality. It is a safe and simple procedure with low risk of infection, where the foley bulb is inflated with 30-60 ml of sterile water to dilate the cervix increasing tissue response to prostaglandins and oxytocin [17]. It is a well-accepted method to ripen the cervix (preferably unfavourable cervix) by inserting the gel into the posterior fornix or the intracervical region using a plunger. Fetal heart rate monitoring is done prior and after the procedure. A maximum of 3 doses (1.5 mg) is permitted for induction of labour with 6 hours interval.There were 174 cases (58%)who delivered by labour naturalis ,and nearly 102 cases (34%) were taken up for Caesarean section,13 (4.3%) cases delivered by outlet forceps and 11 (3.75 %)cases delivered by ventouse. The P value by Chi square test in present study is 0.0005 which is highly significant. In another study conducted by Bansal et al 2015,47% cases of oligohydramnios delivered by caesarean section and 53% cases delivered by labour naturalis.In another study conducted by Akhter et al in 2014,51% of postdated cases delivered by labour naturalis, 40% by LSCS,9% by ventouse,0% by outlet forceps. The most important constrain to influence the decision to proceed with caesarean delivery is objective interpretation of fetal heart rate tracing. Similarly, the caesarean delivery for fetal distress would be preferable only after a fetal scalp pH value is obtained. However, because of non-trained personnel, non-availability of the machine, cervical dilatation, or other constraints, the fetal pH may not be attainable before emergency caesarean delivery. Similarly, a low Apgar score may be the result of use of narcotics in labor, pre-term birth, or vigorous suctioning of the neonate. One of the greatest challenges an obstetrician faces is to deliver an active and neurologically well baby. When the neonatal outcome is poor,a clear evaluation of the intrapartum fetal monitoring is done to find out what is missed. Fetal distress is said to occur when FHR is below 100 bpm or more than 160 bpm. Until 20th century, fetal monitoring was done by intermittent auscultation. Then came the continuous electronic fetal heart monitoring which resulted in many unwanted interventions and increased rate of caesarean sections due to early interventions.The parameters monitored in cardiotocography are baseline fetal heart rate, beat to beat variability, accelerations, decelerations. The most sensitive indicator of these is the beat to beat variability. The limited efficacy of intrapartum fetal monitoring , as discussedby Parer and King in their paper are lack of standard definitions of FHR, high expectations, poor reliability in the interpretation of the trace, and no validity in detectingfetal hypoxia. This has led to increased rates of caesarean sections [18]. The ACOG guidelines are as follows: level A recommendation: the false positive rates of detecting fetal distress is very high with continuous Electronic fetal heart rate monitoring which leads to increased unnecessary interventions. Amnioinfusion may be tried in severe variable decelerations which may be useful and reduce caesarean section rates [19]. There is no proven benefit in electronic fetal heart rate monitoring in reducing cerebral palsy rates.

Level B recommendations: Electronic fetal heart rate monitoring should be used only in high risk pregnancies for monitoring in labour.Thus oligohydramnios in postdated prgenancy is associated with increased maternal morbidity in terms of increase rate of induction of labour and caesarean section. It is also associated with adverse perinatal outcomes such as preterm delivery, low birth weight, fetal distress in labour, meconium passage, low APGAR score, neonatal resuscitation and NICU admission. All these necessitates the importance of this study to help in improving the perinatal as well as maternal outcome of these cases [20].

CONCLUSION

Oligohydramnios is being most often detected earlier these days due to early assessment of AFI by ultrasonogram. Postdated pregnancies are an exception to this, as the patients turn out late to tertiary care centres from rural outreach areas due to lack of education and awareness regarding the adverse effects of perinatal outcomes due tooligohydramnios in postdated pregnancies. It increases the foetal complication in the form of foetal distress, meconium aspiration syndrome, birth trauma etc. It also increases rate of instrumental delivery and operative delivery.AFI is a predictor of fetal tolerance in labour and its decrease is associated with increased risk of abnormal heart rate and meconium-stained fluid. This is overcome by assessing AFI through ultrasonogram at the earliest in third trimester, biophysical profile scoring, and proper intrapartum fetal heart rate monitoring. Hence this study helped greatly in knowing the significant association between advanced gestational age and oligohydramnios.

Thus, the time and mode of induction and delivery in these cases depends on the severity of oligohydramnios and the status of fetal wellbeing which is best assessed by ultrasonogram and fetal heart rate monitoring . This helps in decreasing the perinatal morbidity and mortality due to oligohydramnios in postdated pregnancies.

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