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Indian Journal of Obstetrics and Gynecology Research

Journal homepage: [www.ijogr.org](http://www.ijogr.org)

## Original Research Article

## A study on obstetric and perinatal outcome in a pregnancy complicated with oligohydramnios

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## ARTICLE INFO

## Article history:

Received 21-05-2022

Accepted 10-09-2022

Available online 08-11-2022

## Keywords:

Oligohydramnios

AFI

LSCS

Perinatal outcome

## ABSTRACT

**Introduction:** Oligohydramnios, defined as when the AFI is less than 5. Definition of increased or decreased amniotic fluid volume are based on sonographic criteria. Oligohydramnios complicates approximately 1 to 2% of pregnancies. Amniotic fluid provides the cushion effect against the constricting confines of the gravid uterus. It creates space and helps in musculoskeletal development of foetus, helps in normal fetal lung development and prevents compression of umbilical cord, placenta and hence protects the foetus from vascular and nutritional compromises. Oligohydramnios is associated with high risk adverse perinatal outcome like fetal distress, meconium aspiration, low APGAR, joint contracture, pulmonary hypoplasia etc., and associated with maternal morbidity in the form of increased rates of induction and/or operative interference. This study is conducted to find out the effects of oligohydramnios in determining the obstetric and perinatal outcome.

**Objectives:** To study, 1) Primary outcome- Obstetric outcome in terms of mode of delivery, indication for operative interference. 2) Secondary outcome- Neonatal outcome in terms of birth weight, Apgar score, colour of liquor, admissions to NICU.

**Materials and Methods:** This is a prospective observational study conducted on 80 patients presenting to Department of Obstetrics and Gynecology at KIMS hospital, Bengaluru from January 2019 to June 2020 who were diagnosed with oligohydramnios with intact membranes with AFI<5cms using sonographic criteria.

**Results :** A total of 80 cases of Isolated Oligohydramnios were assessed. 38.7% cases delivered vaginally, 61.2% of cases underwent Cesarean section, 15% had meconium stained liquor, 15% had APGAR score of <7 at 1 minute, 42.5% had birth weight <2.5kgs and 37.5% of babies required NICU admissions.

**Conclusion :** The present study was conducted to know the fetomaternal outcome in pregnancies with oligohydramnios. The study showed oligohydramnios was associated with higher rates of induction and Cesarean section and associated with Low birth weight babies.

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## 1. Introduction

Oligohydramnios, if the amniotic fluid index is less than 5 or if the single deepest vertical pocket of liquor is less than 2 cm long. Description of the amniotic fluid volume as increased or decreased is based on sonographical criteria.<sup>1</sup> Oligohydramnios complicates 1% to 2% of pregnancies.<sup>2</sup>

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Normal index of amniotic fluid is 8.1-20 cms. Amniotic fluid index between 5.1 and 8cm is termed as Borderline oligohydramnios.

Amniotic fluid offers a low-resistance atmosphere for foetal development and growth. It creates the cushion impact against the limiting boundaries of the uterus. It provides adequate space for fetal musculoskeletal development, contributes to normal lung formation and

prevents umbilical cord compression, placental growth restriction and hence protects the foetus against vascular and nutritional compromises.<sup>3</sup>

The incidence of maternal and foetal complications is increased in Oligohydramnios. It may be related to uteroplacental insufficiency, preeclampsia, asthma, diabetes, coronary failure, congenital defects, idiopathic limitation of foetal development, foetal hypoxia. Oligohydramnios, is presumed to be because of chronic in utero stress, in absence of any foetal renal abnormality or genitourinary obstruction.<sup>4</sup>

Oligohydramnios may have a major effect on maternal and foetal outcomes.<sup>5</sup>

### 1.1. Fetal complications

Cord compression and fetal distress, Fetal pulmonary hypoplasia & stillbirth, Fetal growth restriction, Low Apgar score, NICU admissions, overall increased perinatal morbidity and mortality

### 1.2. Maternal complications

1. Prolonged labour due to inertia.
2. Induction of labour.
3. Increased operative interference and related morbidity and mortality. By diagnosing such cases and with early & timely intervention can prevent most of the complications. In case of irreversible complications having occurred, termination of pregnancy can be considered.

This clinical study was conducted in KIMS hospital and research centre, Bengaluru, on 80 cases of oligohydramnios to know the maternal and fetal outcome.

1. To know the obstetric outcome in the form of mode of delivery, indication for operative interference.
2. To know about the neonatal outcome like birth weight, APGAR score, colour of liquor, admissions to NICU.

## 2. Materials and Methods

### 2.1. Source of data

This study was conducted on all singleton, non-anomalous, low risk pregnant women with AFI less than or equal to 5 with intact membranes and gestational age between 28-42 weeks at KIMS Hospital in the Department of Obstetrics and Gynecology after taking informed consent.

### 2.2. Methods of collection of data

1. Study design: prospective observational study
2. Study period: 18 months (JAN 2019 – JUN 2020)
3. Place of study : KIMS Hospital, Bangalore
4. Sampling method : consecutive sampling
5. Total sample size - 80

### 2.3. Inclusion criteria

1. Singleton pregnancy with gestational age 28-42 weeks.
2. Patients willing to give informed consent
3. With intact membranes.
4. AFI less than or equal to 5 measured by phelan's four quadrant technique.

### 2.4. Exclusion criteria

1. Patients not willing to give informed consent.
2. Women with premature rupture of membranes.
3. Multifetal gestation
4. Fetal malformations
5. Patients with major respiratory and cardiac diseases
6. Hypertensive disorders of pregnancy
7. GDM

### 2.5. Methodology

1. After obtaining approval and clearance from the institutional ethical committee, The pregnant woman meeting the inclusion and exclusion criteria were enrolled in the study after obtaining informed consent
2. Data was collected using a proforma by consecutive sampling method.
3. Detailed clinical history including obstetric, menstrual, past and personal history were taken and detailed examination was done. Basic routine blood investigations were done.
4. Liquor volume was estimated by ultrasonography by measuring the AFI by four quadrant technique of phelan or when the single deepest vertical pocket measures less than 2cms. Delivery was optimized depending on antepartum fetal surveillance.

## 3. Results

**Table 1:** Gravidity distribution

Gravida	Number	Percentage
Primi	50	62.5
2	14	17.5
3	11	13.8
4	5	6.2
<b>Total</b>	<b>80</b>	<b>100.0</b>

In this study, Out of 80 patients, antenatal scan of 16 patients (20%) showed doppler changes in the form of uteroplacental insufficiency (10 cases), decreased diastolic flow in umbilical artery (2 cases) absent flow (1 case) and reversed end diastolic flow in umbilical artery (2 cases), increased diastolic flow in MCA (1 case). Out of 16 babies, 9 (11.25%) babies had IUGR with doppler changes.

In this study, out of 80 cases, antenatal scan of 20 patients showed IUGR. 6 were preterm and 14 were term cases. Out

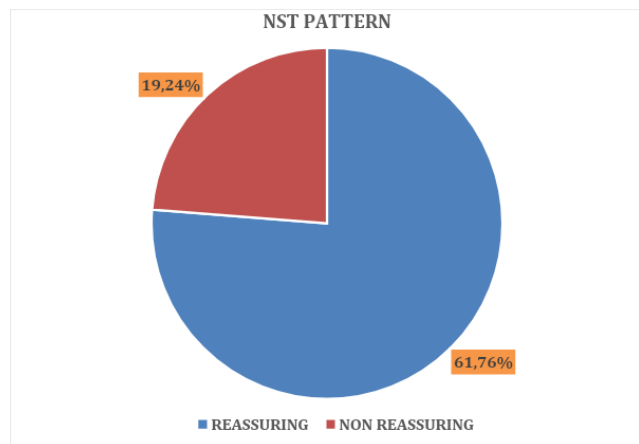
**Table 2:** Gestational age distribution - Gestational age was divided according to WHO and ACOG guidelines into 6 categories.

Gestational Age	Number	Percentage
Very Preterm (28-31+6)	1	1.3
Moderate preterm (32-33+6)	2	2.5
Late preterm (34-36+6)	10	12.5
Early term (37-38+6)	35	43.7
Full term (39-40+6)	32	40
Late term (41-41+6)	0	0
<b>Total</b>	<b>80</b>	<b>100.0</b>

**Table 3:** Gestational age distribution and AFI categories

Gestational Age	AFI categories											
	0		1-2		2.1-3		3.1-4		4.1-5		Total	
		%		%		%		%		%	%	
Very Preterm	-	-	1	1.3	-	-	-	-	-	-	1	1.3
Moderate preterm	-	-	-	-	-	-	1	1.3	1	1.3	2	2.5
Late preterm	-	-	3	3.8	2	2.5	2	2.5	3	3.8	10	12.5
Early Term	2	2.5	3	3.8	5	6.3	4	5.1	21	26.3	35	44
Full term	-	-	3	3.8	8	10	4	5	17	21.3	32	40
<b>Total</b>	<b>2</b>	<b>2.5</b>	<b>10</b>	<b>12.5</b>	<b>15</b>	<b>18.8</b>	<b>11</b>	<b>13.8</b>	<b>42</b>	<b>52.5</b>	<b>80</b>	<b>100</b>

Chi square p value=0.097 (Not significant)



**Fig. 1:** Admission NST pattern

**Table 4:** Gestational age and Doppler changes

Gestational Age	Total	Doppler changes	
		N	Percentage
Very Preterm (28-31+6)	1	1	1.3
Moderate preterm (32-33+6)	2	2	2.5
Late preterm (34-36+6)	10	4	5.1
Early Term (37-38+6)	35	6	7.5
Full term (39-40+6)	32	3	3.8
Late term (41-41+6)	0	0	0
<b>Total</b>	<b>80</b>	<b>16</b>	<b>20.0</b>

**Table 5:** Gestational age and IUGR

Gestational Age	Total	IUGR	
	N	N	Percentage
Very Preterm (28-31+6)	1	-	-
Moderate preterm (32-33+6)	2	1	1.3
Late preterm (34-36+6)	10	5	6.3
Early Term (37-38+6)	35	12	15.1
Full term (39-40+6)	32	2	2.5
Late term (41-41+6)	0	0	0
<b>Total</b>	<b>80</b>	<b>20</b>	<b>25.0</b>

of 20 cases whose scan showed IUGR, 9 cases had IUGR with doppler changes.

**Table 6:** Mode of delivery

Mode of delivery	Number	Percentage
Vaginal	31	38.75
LSCS	49	61.25
<b>Total</b>	<b>80</b>	<b>100</b>

#### 4. Discussion

This study was carried out to observe the effect of isolated oligohydramnios on Obstetric and perinatal outcome.

In this study, maximum women i.e, 33 cases(41%) were in the age group between 21-25 years. In the study by Ghike et al. mean age of women was 24.65<sup>6</sup> which is comparable to the present study with a mean age of 24.8 years. A study by Biradar et al. showed mean age of 22.4 years.<sup>7</sup> Minimum age in the study was 19 years and maximum age

**Table 7:** Gestational age and mode of onset of labour and mode of delivery

Gestational Age	Spontaneous								Induced				Directly went to LSCS		
	Total		Vaginal		LSCS		Total		Vaginal		LSCS				
		%		%		%		%		%		%		%	
Very Preterm	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1.3
Moderate preterm	2	-	-	-	-	-	-	-	-	-	-	-	-	2	2.5
Late preterm	10	2	2.5	1	1.3	1	1.3	3	3.8	1	1.3	2	2.6	5	6.3
Early Term	35	5	6.3	4	5.1	1	1.3	22	27.5	7	8.8	15	18.8	8	10.1
Full term	32	7	8.8	3	3.8	4	5.1	24	30	15	18.8	9	11.3	1	1.3
Late term	0	-	-	-	0	-	0	0	-	0	-	-	-	0	0
<b>Total</b>	<b>80</b>	<b>14</b>	<b>17.5</b>	<b>8</b>	<b>10</b>	<b>6</b>	<b>7.5</b>	<b>49</b>	<b>61.3</b>	<b>23</b>	<b>28.8</b>	<b>26</b>	<b>32.5</b>	<b>17</b>	<b>21.3</b>

**Table 8:** Indication for LSCS

Indication	Number	Percentage
Fetal distress	18	36.7
Non-progression of labour	6	12.2
CPD	3	6.1
Failed induction	5	10.2
IUGR with doppler changes	7	14.4
Previous LSCS	5	10.2
MSAF	5	10.2
<b>Total</b>	<b>49</b>	<b>100.0</b>

**Table 9:** Gestational age and Fetal weight distribution

Gestational age	1000-1499g		1500-1999g		2000-2499g		2500-2999g		3000-3500g		Total	
	n	%	n	%	n	%	n	%	n	%	N	%
Very Preterm	1	1.3	-	-	-	-	-	-	-	-	1	1.3
Moderate preterm	-	-	1	1.3	1	1.3	-	-	-	-	2	2.5
Late preterm	-	-	4	5	5	6.25	1	1.3	-	-	10	12.5
Early term	-	-	3	3.7	13	16.25	13	16.25	6	7.5	35	43.75
Full term	-	-	-	-	6	7.5	16	20	10	12.5	32	40
<b>Total</b>	<b>1</b>	<b>1.3%</b>	<b>8</b>	<b>10%</b>	<b>25</b>	<b>31.2%</b>	<b>30</b>	<b>37.5%</b>	<b>16</b>	<b>20%</b>	<b>80</b>	<b>100%</b>

**Table 10:** Nature of amniotic fluid

Liquor	Number	Percentage
Absent	3	3.7
Clear	65	81.3
MSAF I	2	2.5
MSAF II	4	5.0
MSAF III	6	7.5
<b>Total</b>	<b>80</b>	<b>100.0</b>

**Table 11:** Gestational age and APGAR at 1 minute and 5 minutes

Gestational Age	Total	0-4 APGAR		5-7 APGAR		>7	
		n	%	N	%	n	%
Very Preterm	1	-	-	1	1.3		
Moderate preterm	2	-	-	1	1.3	1	1.3
Late preterm	10	-	-	1	1.3	9	11.3
Early Term	35	-	-	3	3.8	32	40.1
Full term	32	-	-	6	7.6	26	32.6
Late term	0	0	0	0	0	0	0
<b>Total</b>	<b>80</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>15.0</b>	<b>68</b>	<b>85.0</b>

Chi square p value=0.008 (Significant)

APGAR at 5 minutes was >7 for all 80 babies

**Table 12:** Indication for NICU admission

Indication	Number	Percentage
Birth Asphyxia	1	3.3
IUGR	1	3.3
Meconium aspiration syndrome	9	30
Perinatal depression	1	3.3
Prematurity	9	30
TTNB	9	30
<b>Total</b>	<b>30</b>	<b>100.0</b>

was 37 years. Study showed there was no significant relation between maternal age and incidence of oligohydramnios.

Out of 80 cases, 50 cases (62.5%) were primigravida, 14 cases were 2<sup>nd</sup> gravida, 11 cases were 3<sup>rd</sup> gravida and 5 cases were 4<sup>th</sup> gravida, indicating that incidence of oligohydramnios is more in primigravidae. A study of Chetani et al<sup>8</sup> observed that 63% of women were primigravida which is comparable to the present study with 62.5% of women who were primigravida.

Study shows, maximum number of cases were in the early term gestation, i.e., between 37-38+6 weeks, a total of 35 cases (44%). Gestational age was divided according to WHO and ACOG guidelines<sup>8</sup> into 5 categories. There were a total of 13 preterm cases and 67 term cases.

There were a total of 2 cases with AFI = 0, 10 cases with AFI ranging between 1-2, 15 cases with AFI ranging between 2.1-3, 11 cases with AFI between 3.1-4, and 42 cases with AFI ranging between 4.1 to 5.

Out of 80 cases, 61 patients (76.25%) had reassuring NST on admission and 19(23.75%) of them had non reassuring pattern.

In this study, out of 80 patients, antenatal scan of 16 patients (20%) showed doppler changes in the form of uteroplacental insufficiency (10 cases). Decreased diastolic flow in umbilical artery (2 cases), absent flow (1 case) and reversed end diastolic flow (2 cases), increased diastolic flow in MCA(1 case). Out of 16 babies, 9 (11.25%) babies had IUGR with doppler changes.

Out of 80 deliveries in the study, 20 babies (25%) had IUGR. Out of 20 babies, 9 babies(11.25%) had doppler changes. 6 preterm and 14 term babies were diagnosed with

IUGR. 11 babies (55%) were shifted to NICU. Maximum number of babies who had IUGR were in the early term group(37-38+6 weeks).

Out of 14 term cases, 10 cases underwent LSCS for various reasons like fetal distress (5 cases), failed induction (2 cases), IUGR with doppler changes (2 cases), previous LSCS with IUGR 1 case and 4 cases delivered vaginally. The weight of the babies diagnosed with IUGR were between 1.6 kgs to 2.4 kgs.

Out of 80 patients, 31 patients(38.7%) delivered vaginally and 49 patients (61.25%) underwent LSCS. A study Biradar KD et al<sup>7</sup> which observed a caesarean section rate of 62% is comparable to our study which had a caesarean section rate of 61%.

In this study, Out of 80 cases, 49 cases (61%) were induced. 3 preterm cases and 46 term cases were induced. Out of 49 induced cases, 23 cases (47%) delivered vaginally and 26 cases(53%) underwent LSCS. 17 cases (21.4%) out of 80 cases directly underwent LSCS.

Out of 80 cases, 49 cases underwent LSCS and the most common indication was Fetal distress with 18 cases (36.7%). IUGR with doppler changes with 7 cases (14.4%), non progression of labour 6 cases (12%), failed induction, previous lscs and MSAF were 5 cases each (10.2%) and CPD with 3 cases (6.1%). A study conducted Sunanda KM et al. showed a LSCS rate<sup>9</sup> of 38% for fetal distress which is comparable to present study with LSCS rate of 36% for fetal distress.

Out of 80 deliveries, fetal weight distribution is as follows, between 1000-1499 gms, there was 1 baby with birth weight of 1 kg. Between 1500-1999g, there

were 8 babies(10%). Between 2000-2499g, there were 25 babies(31%). Between 2500-2999g, there were 30 babies(37.5%). Between 3000-3500g, there were 16 babies(20%). According to study conducted by Chetani M et al.<sup>10</sup> babies who weighed less than 2.5kgs in study group constituted 42% which is comparable to the present study with 42.5% of babies weighing less than 2.5kgs.

Nature of amniotic fluid – clear liquor was found in 65 cases, (81% cases), meconium stained liquor was found in 12 cases (15%) and liquor was absent in 3 cases (4%). Although meconium stained liquor was found in less number of cases, 8 out of 12 babies were admitted to for meconium aspiration syndrome.

Out of 80 babies, APGAR score of  $\leq 7$  at 1 minute was seen in 12 babies (15%) and more than 7 was seen in 68 babies (85%). APGAR score of all the neonates at 5 minutes was more than 7/10. In study by Sowmya K et al,<sup>11</sup> APGAR score  $< 7$  at 1 minute was seen in 14%. Similar studies done by Biradar et al,<sup>7</sup> Patel PK et al,<sup>12</sup> Vidyasagar V et al,<sup>13</sup> Casey B et al, Sriya V et al<sup>14</sup> and Zhang J et al<sup>15</sup> found APGAR score  $< 7$  at 1 minute in 26%, 34.6%, 35%, 6%, 38.8%, 13.3% respectively.<sup>7,12-15</sup>

After delivery, 50 babies (62%) were given mother's side and 30 babies (37%) were admitted to NICU. In study by Biradar K et al,<sup>7</sup> NICU admission was required for 40% of newborns. In another study by Madhavi K et al,<sup>16</sup> NICU admission was required for 34% of newborns. The indication for NICU admission in this study were, Transient tachypnoea of newborn – 9 cases (33%), Meconium aspiration syndrome 8 cases (30%), prematurity 7 cases (26%), followed by birth asphyxia, perinatal depression and IUGR 1 case each.

## 5. Summary

Out of 80 cases, in terms of gravidity distribution, the incidence of oligohydramnios was more in primigravidae.

Gestational age was divided according to WHO and ACOG guidelines into 5 categories. There were a total of 13 preterm cases and 67 term cases.

There were 2 cases with AFI = 0, 10 cases with AFI between 1-2, 15 cases with AFI between 2.1-3, 11 cases with AFI between 3.1 – 4, and 42 cases with AFI between 4.1 to 5.

Out of 80 cases, 61 patients(76.25%) had reassuring NST on admission and 19(23.75%) of them had non reassuring pattern.

In this study, Out of 80 patients, antenatal scan of 16 patients (20%) showed doppler changes. Uteroplacental insufficiency in 10 cases, Decreased diastolic flow in umbilical artery in 2 cases, absent flow in 1 case and reversed end diastolic flow in 2 cases, increased diastolic flow in MCA in 1 case.

Out of 80 deliveries in the study, 20 babies (25%) had IUGR (6 preterm and 14 term babies). Out of 20 babies, 9

babies(11.5%) had IUGR with doppler changes. 11 babies (55%) were shifted to NICU. Out of 6 preterm cases, 5 cases underwent emergency LSCS i/v/o IUGR with doppler changes. 1 case underwent LSCS for failed induction. Out of 14 term cases, 10 cases underwent LSCS for various reasons like fetal distress (5 cases), failed induction (2 cases), IUGR with doppler changes (2 cases), previous lscs with IUGR 1 case and 4 cases delivered vaginally. The weight of the babies diagnosed with IUGR were between 1.6 kgs to 2.4 kgs.

Out of 80 patients, 31 patients(38.7%) delivered vaginally and 49 patients (61.25%) underwent LSCS. Out of 80 cases, 14 cases (17%), (2 preterm cases and 12 term cases) had spontaneous onset of labour, out of which 8 cases delivered vaginally and 6 cases underwent LSCS. 49 out of 80 cases (61%) were induced. (3 preterm cases and 46 term cases) out of 49 induced cases, 23 cases (47%) delivered vaginally and 26 cases(53%) underwent LSCS.

Out of 80 cases, 49 cases underwent LSCS and the most common indication was fetal distress with 18 cases (36.7%). Followed by IUGR with doppler changes with 7 cases (14.4%), non progression of labour 6 cases (12%), followed by failed induction, previous lscs and MSAF were 5 cases each (10.2%) and CPD with 3 cases (6.1%).

Out of 80 deliveries, between 1000-1499 gms, there was 1 baby with birth weight of 1 kg. Between 1500-1999g, there were 8 babies(10%). Between 2000-2499g, there were 25 babies(31%). Between 2500-2999g, there were 30 babies (37.5%). Between 3000-3500g, there were 16 babies(20%).

Clear liquor was found in 65 cases, (81% cases), meconium stained liquor was found in 12 cases (15%) and liquor was absent in 3 cases (4%). Although meconium stained liquor was found in less number of cases, 8 out of 12 babies were admitted to NICU for meconium aspiration syndrome.

Out of 80 babies, APGAR score of  $\leq 7$  at 1 minute was seen in 12 babies (15%) and more than 7 was seen in 68 babies (85%). APGAR score of all the neonates at 5 minutes was more than 7/10.

After delivery, 50 babies (62%) were given mother's side and 30 babies (37%) were admitted to NICU. The indication for NICU admission in this study were, Transient tachypnoea of newborn – 9 cases (33%), Meconium aspiration syndrome 8 cases (30%), prematurity 7 cases (26%), followed by birth asphyxia, perinatal depression and IUGR 1 case each.

Although there was lesser incidence of poor APGAR score, Meconium stained liquor, admissions to NICU in cases of Oligohydramnios, but in almost 43% of cases, Oligohydramnios was associated with Low Birth Weight and there was higher rates of induction and increased number of caesarean deliveries. However long term effects were not studied.

**Table 13:** Summarizing the obstetric and perinatal outcome in the present study

Induction rate	61%
LSCS	61%
Meconium stained liquor	15%
Birth weight <2.5 kgs	42.5%
1 minute APGAR < /=7	15%
NICU admissions	37.5%
Mortality(maternal and perinatal)	0%

In this study, isolated oligohydramnios was associated with Low birth weight babies and increased rates of induction and caesarean deliveries.

## 6. Conclusion

Determination of AFI is one of the important methods in antepartum fetal surveillance. It helps to identify fetuses at risk of poor perinatal outcome.

AFI determination is a valuable screening test that has got a sensitivity of 71%, specificity of 58% and negative predictive value of 82% and positive predictive value of 43%.

Oligohydramnios in obstetrics is a frequent occurrence and it points towards intensive surveillance and proper antenatal and postnatal care. Due to associated perinatal morbidity and mortality, incidence of induction and Caesarean section increase. However vaginal delivery has similar outcome, but strict vigilance in labour is mandatory. The long term outcomes have not been studied in this study. Oligohydramnios is significantly associated with IUGR and Low birth weight. So timely intervention by an obstetrician will be of help in improving the perinatal outcome.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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**Cite this article:** Madhurya R M, Gowda SH. A study on obstetric and perinatal outcome in a pregnancy complicated with oligohydramnios. *Indian J Obstet Gynecol Res* 2022;9(4):541-547.