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Research Article

Relationship of decreased amniotic fluid and perinatal outcome: a comparative study

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ABSTRACT

Background: A decreased amniotic fluid volume is frequently one of the first clues to an underlying fetal abnormality or maternal diseased state. Isolated oligohydramnios may occur in late pregnancy in patients with no other high risk factors and diagnosed on routine ultrasound. This study was conducted to assess the effect of oligohydramnios on perinatal outcome at or beyond 34 weeks of gestation with amniotic fluid index (AFI) ≤ 5.
Methods: 50 cases and equal controls were taken in the study which fulfilled the inclusion criteria. A written and informed consent was taken from all the subjects entering into the study. An ultrasound examination was performed on all the subjects entering the study. Phelan method was used for measurement of AFI. Measurement of the deepest pool in each quadrant was summated and AFI was recorded in centimeters.
Results: Anthropometric variables were comparable in both the groups. The distribution of non-stress test (NST) and onset of labor was significantly different in both the groups. The presence of meconium stained liquor was non significantly same in both groups. Regarding neonatal outcome, birth weight less than 2.5 kg and APGAR score less than 7 was significantly higher in cases as compared to controls.
Conclusions: Oligohydramnios (AFI< 5) was associated with more number of preterm deliveries, non-reactive NST, fetal distress and more NICU admissions. More studies are needed for defining threshold levels for measuring AFI.

Keywords: Amniotic fluid index, Oligohydramnios, Liquor, Fetal distress, Neonatal intensive care unit

INTRODUCTION

Modern obstetrics is concerned with the health and wellbeing of both the mother and the unborn child. Recognition of a fetus at risk for death or damage in utero, quantifying the risk, balancing the fetal risk against neonatal complications from immaturity and determining the optimal time and mode of intervention are the cornerstones of modern perinatal medicine. Clinical estimation of amniotic fluid volume (AFV) is an important part of fetal assessment as variation in its amount has been related to a variety of pregnancy complications. Amniotic fluid provides a protective milieu for the growing fetus, cushioning it against mechanical and biological injury. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing, especially in the third trimester.[1]

There is a large variation of the amniotic fluid volume corresponding to gestational age. Amniotic fluid increases from about 25 ml at 10 weeks to about 400 ml at 20 weeks and by 28 weeks of gestation, it reaches 800 ml then it plateaus near term gestation and thereafter declines to about 400 ml at 42 weeks decreasing at a rate of 8% per week. It reduces further to a mean of 250 ml and 160 ml at 43 and 44 weeks respectively. Amniotic fluid at any time is the balance between production and consumption.[2,3]

A decreased amniotic fluid volume is frequently one of the first clues to an underlying fetal abnormality or maternal diseased state. Isolated oligohydroamnios may occur in late pregnancy in patients with no other high risk factors and diagnosed on routine ultrasound. This study was conducted to assess the effect of oligohydroamnios on perinatal outcome at or beyond 34 weeks of gestation with amniotic fluid index (AFI) ≤5.

Aims and Objectives

To compare the maternal and perinatal outcome in pregnant women at ≥ 34weeks having amniotic fluid index (AFI) ≤ 5cm to those having AFI > 5cm.

METHODS

The present study was conducted in the Department of Obstetrics and Gynecology of a private medical institute (Jaipur Golden hospital, New Delhi) on the women attending the department at or after 34 weeks of gestation.

Study design

Prospective observational study

Study duration and sample size

Since the study was time bound, all consecutive patients meeting the eligibility criteria during the study period were enrolled. It was observed from the previous experience that about 50 women with singleton pregnancies at ≥34 weeks AFI ≤5 were enrolled. Same number of Controls i.e. women with singleton pregnancies at ≥34weeks with AFI >5 were also taken.

1. Group A (study group) – 50 pregnant women with amniotic fluid index (AFI) ≤5 cms.
2. Group B (control group) – 50 pregnant women with AFI >5 cms.

Inclusion criteria

All women were included with singleton pregnancy with gestation ≥34weeks

- having cephalic presentation,
- intact membranes,
- sure about dates
- ultrasound done in first trimester of pregnancy and
- having AFI measurement within one week of delivery

Every woman coming next to the woman of the study group and fulfilling inclusion and exclusion criteria was taken in the study as control group.

Exclusion criteria

Women with following were excluded from the study

- Any congenital malformation in foetus,
- Antepartum hemorrhage,
- Medical disorder like thyroid dysfunction and cardiac disease.
- Bad Obstetric History.
- Severe pre-eclampsia
- Diabetes mellitus/Gestational diabetes.
- Severe anemia

Study protocol

A written and informed consent was taken from all the subjects entering into the study. All the patients were examined during the antenatal visit. They were subjected to a detailed history and clinical examination. An ultrasound examination was performed on all the subjects entering the study. Phelan method was used for measurement of AFI. The uterus was divided by using the umbilicus and the linea nigra as reference points for the upper and lower halves and for the left and right halves, respectively. The ultrasound transducer was in a perpendicular plane to the patient table and in a sagittal plane to the woman herself, but was never angled to follow the curvature of maternal abdomen. Measurements of the deepest pool in each quadrant was summated and AFI was recorded in centimeters. If the woman did not deliver within 7 days of ultrasound, a repeat ultrasound for measuring AFI was done.

Statistical methods

Continuous variables were presented as mean±SD or median if the data was unevenly distributed. Categorical variables were expressed as frequencies and percentages. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

RESULTS

Both the groups were comparable for age, height, weight and BMI with no statistical difference between two groups (Table 1).

Table 1: Anthropometric variables among study subjects.

Characteristics	Group A (n=50)	Group B (n=50)	P value
Age (years)	25.98 ±3.06	26.16±2.81	0.761
Weight (kgs)	59.78±3.6	60.88±5.22	0.227
Height (cms)	151.24±6.15	152.66±6.39	0.261
BMI	26.21±2.18	26.17±2.27	0.927

The proportion of patients having AFI 2 cm, 3 cm and 4 cm was 26%, 34% and 32% respectively. In group B

(controls), 48% and 28% of patients had AFI 11-15 cm and 6-10 cm respectively. Mean of AFI in group A (cases) was 3.06±0.956 cm whereas in group B (controls) the range of AFI was 6-20 cm and mean AFI was 13.00±3.36 cm.

Non-stress test (NST) and onset of labor distribution was significantly different among cases and controls (Table 2).

Table 2: Non-stress test and onset of labor among study groups.

Variable	Type	Group A	Group B
NST	Reactive	32 (64%)	43 (86%)
	Non-reactive	18 (36%)	7 (14%)
Onset of labor	Spontaneous	19 (38%)	43 (86%)
	Induced	31 (62%)	7 (14%)

p- <0.001 for both NST and onset of labor.

Thirty two percent (32%) of cases in group A and 14% in group B had fetal distress and this finding was statistically significant. Color of amniotic fluid was non-significantly different in both the groups which are shown in Table 3.

Table 3: Fetal distress and amniotic fluid colour among study groups.

Variable	Type	Group A	Group B
Fetal distress	Yes	18 (36%)	7 (14%)
	No	32 (64%)	43 (86%)
Amniotic fluid	Meconium stained	6 (12%)	7 (14%)
	Clear	44 (88%)	43 (86%)

p-value-<0.05 for Fetal distress, p-value-0.766 for Amniotic fluid

Neonatal outcome is shown in Table 4 which depicts that the birth weight and APGAR score at 1 minute was significantly different among the groups, cases and controls. APGAR score at 5 minutes was not significant with 12% patients in cases and 1% in control group. NICU admission was 20% in cases and 6% among controls which significant.

Table 4: Neonatal outcome among study groups, cases and controls.

Parameters	Group A (n=50)	Group B (n=50)	P Value
Birth weight< 2.5 kgs	18 (36%)	7 (14%)	0.011
Apgar Score< 7, at 1 min	13 (26%)	5 (10%)	0.0373
Apgar Score< 7 at 5 min	6 (12%)	1 (2%)	0.050
NICU admission	10 (20%)	3 (6%)	0.037
Still Birth	0	0	-

DISCUSSION

Amniotic fluid provides a protective milieu for the growing fetus, cushioning it against mechanical and biological injury. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing, especially in the third trimester. Antenatal tests use amniotic fluid volume as a fundamental assessment of chronic in utero stress. Ultrasound being a non-invasive test is ideal for application on a large scale and can be used frequently for repeat AFV determination in the case of suspected abnormalities.

In our study the mean maternal age was 25.98±3.06 years in group A and 26.16±2.81 years in group B having p value >0.05, hence both the groups were comparable for maternal age. Similar to our study, Bhagat et al conducted a study on 200 women and they found that the mean maternal age was 27.04 and 27.95 years for study and control groups respectively and which was comparable for both the groups.[1]

In the present study amniotic fluid index (AFI) ≤5 cms was taken to define oligohydroamnios and mean AFI was 3.09±1.02 cm in group A. The studies done by Tripathi et al, Bhagat et al and Casey et al, the AFI <5 cm was taken as oligohydroamnios at GA >34 weeks.[1,4,5]

Regarding Non-stress test (NST), our study was similar to a study conducted by Bhagat et al in which they found that 32% women had non-reactive NST in oligohydramnios group compared to 9.7 % women in normal AFI group (AFI>5) with a p value of 0.002 which was statistically significant.[1] Similarly, in studies done by Sriya et al and Umber et al they found that 41.55% and 52.7% women had non-reactive NST respectively.[6,7]

In our study we observed that in group A, 31 (62%) women had induced labour compared to 7 (14%) women in group B, having p value <0.05 which was statistically significant. Similar to our study Jandial et al in their study found that 58 % women with oligohydramnios had induction of labour.[8] Bhagat et al conducted a study on 200 pregnant women and they found that women with AFI ≤5 had induction of labour in 72% women compared to 50.9% women in control group with p value 0.043.[1]

Regarding color of liquor, Locatelli et al identified no significant difference between the two groups in rates of meconium stained amniotic liquor which was similar to our study.[9] In contrast, Magann et al observed that the incidence of meconium stained amniotic fluid was greater in the women with an AFI >5cm.

Nargis et al found meconium stained liquor in 44% of the women with low AFI suggesting that there is high incidence of meconium stained liquor and poor placental reserve in oligohydramnios patient.[10,11]

In neonatal outcome, group A, 18 (36%) neonates had birth weight less than 2.5 kg as compared to 7 (14%) neonates in group B (p-<0.05). Bhagat et al in their study found that 56% neonate in low AFI group had birth weight less than 2.5 kg as compared to 21.7% in control group.[1] In contrast to our study, Sultana et al in their study observed that the difference in low birth weight was not significant between the two groups of AFI (p=0.4).[12]

In our study we observed that significantly more number of neonates had Apgar score <7 at 1 minute in group A as compared to group B (26% versus 10 %, p<0.05). Similar to our study Bhagat et al found significant difference in Apgar score at 1 minute (36% versus 10.9%).[1] In the present study, six neonates had Apgar score <7 at 5 minutes which was not significant when compared with the control group (p=0.05). Similarly to our study, Bhagat et al, Ahmed et al and Locatelli et al found no difference in the low Apgar score at 5 minutes in the two groups.[1,9,13]

In the present study, NICU admissions in group A were 10 (20%) as compared to group B in which 3 (6%) had NICU admissions (p value 0.037). There was no stillbirth in both groups. Casey et al observed oligohydramnios was associated with increase admission to the NICU (7% of neonates of low AFI group versus 2% of neonates of normal AFI group; p<0.001) and neonatal death (5% of neonates of oligohydramnios group and 2% of neonates in normal AFI group; p<0.001).[5]

In a study by Nargis et al, 15 (19%) neonates delivered with oligohydramnios were admitted in neonatal intensive care unit, out of which one expired and one was still birth.[11] In contrast to our study, William found that there was no strong relationship between AFI and neonatal complications or length of stay in the neonatal intensive care unit.[14]

CONCLUSION

In the present study, we concluded that oligohydramnios (AFI< 5) was associated with more number of preterm deliveries, non-reactive NST, fetal distress and more NICU admissions. Hence we concluded that there is a significant correlation between oligohydramnios and low birth weight babies. A multicentre randomized controlled trial is needed to better define whether there are threshold levels of AFI that can be used to predict adverse perinatal outcome and guide management accordingly.

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