



A PROSPECTIVE STUDY OF AMNIOTIC FLUID INDEX AT TERM AND ITS PERINATAL OUTCOME

Obstetrics & Gynaecology

Dr. Sameera Pedada*

Postgraduate, Department of Obstetrics and Gynaecology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh 534005, India
*Corresponding Author

Dr. K. Vandana

Professor and HOD, Department of Obstetrics and Gynaecology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh 534005 India

ABSTRACT

Introduction: The fluid that collects within the amniotic cavity surrounding the embryo is called Amniotic Fluid or Liquor Amnii. Amniotic fluid that surrounds fetus in amniotic sac provides several benefits to the fetus [1]. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing, especially in the third trimester [2]. Oligohydramnios is defined by ultrasonography (USG) as an Amniotic Fluid Index (AFI) of 5cm or less or single deepest pocket of amniotic fluid less than 2 cm [4]. Polyhydramnios is defined by ultrasonography (USG) as an Amniotic Fluid Index (AFI) of more than 24cm or single deepest pocket of amniotic fluid more than 8cm [6]. Oligohydramnios is found to be associated with an increased risk of caesarean delivery, fetal distress, low APGAR score, high perinatal morbidity & mortality [7]. Association of polyhydramnios with adverse perinatal outcome has to be studied. **Materials and Methods:** This is a prospective analytical study carried out at ASRAM medical college, a Tertiary care hospital, Eluru over a period of 18 months between May 2022 to November 2023. 100 antenatal cases beyond 37 weeks of gestation with AFI less than 5 cm and more than 24 cm were taken into study. The objective of this study is to determine obstetric outcome in term low risk pregnancy with AFI less than 5cm or more than 24cms, to assess whether antepartum oligohydramnios or polyhydramnios is associated with adverse perinatal outcome and to study the association of perinatal outcome with respect to the severity of oligohydramnios. **Results:** In our study 100 antenatal cases with AFI < 5 cm or > 24 cm were taken. Among them 75 cases were of oligohydramnios and 25 cases were of polyhydramnios. Rate of caesarean delivery in oligohydramnios in our study was 33.3%, the rate of fetal distress is 28%, the occurrence of meconium stained amniotic fluid is 20%, the incidence of low APGAR score among oligohydramnios was 18.6%. The higher incidence of NICU admissions in these studies might be probably because of inclusion of high risk cases in their study. Neonatal deaths among oligohydramnios was 2.7%. Among oligohydramnios cases fetal distress, NICU admissions, low APGAR score, was significantly higher in severe oligohydramnios when compared to mild to moderate oligohydramnios indicating that these complications increase with increase in severity of oligohydramnios. Among polyhydramnios there was no increase in low birth weight, low APGAR score, NICU admissions and perinatal mortality in present study. **Conclusion:** Amniotic fluid volume is an important predictor of fetal tolerance during labour and its decrease is associated with increased risk of fetal distress and meconium staining of fluid. Determination of AFI can be used as an adjunct to other fetal surveillance methods. It helps to identify those infants at risk of adverse perinatal outcomes. In our study, the rates of fetal distress, MSL, LSCS were significantly high in case of AFI < 5cms and there was statistically significant association of adverse perinatal outcomes with increased severity of oligohydramnios. In case of AFI > 24 cm no significant increase in adverse perinatal outcomes were noted in our study

KEYWORDS

INTRODUCTION

The fluid that collects within the amniotic cavity surrounding the embryo is called Amniotic Fluid or Liquor Amnii. Amniotic fluid that surrounds fetus in amniotic sac provides several benefits to the fetus [1]. It provides a protected milieu for the growing fetus, cushioning the fetus against mechanical and biological injury, supplying nutrients and facilitating growth and movement. Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal wellbeing, especially in the third trimester [2].

Amniotic fluid volume varies with gestational age. Amniotic fluid volume increases up to 34 weeks of gestation which is then followed by a slow decline [3]. Abnormalities of volume may be associated with increased risks for adverse pregnancy outcome.

Oligohydramnios is defined by ultrasonography (USG) as an Amniotic Fluid

INDEX (AFI) of 5cm or less or single deepest pocket of amniotic fluid less than 2 cm [4].

Oligohydramnios is further classified [5] into

Mild – moderate oligohydramnios: 3.1 cm – 5 cm

Severe oligohydramnios: 0 - 3 cm

Polyhydramnios is defined by ultrasonography (USG) as an Amniotic Fluid Index (AFI) of more than 24cm or single deepest pocket of amniotic fluid more than 8cm [6].

This study is conducted to find out the role of oligohydramnios and polyhydramnios in caesarean section rates in uncomplicated pregnancies beyond 37 weeks of gestational age. Oligohydramnios is found to be associated with an increased risk of caesarean delivery, fetal distress, low APGAR score, high perinatal morbidity & mortality

[7]. Association of polyhydramnios with adverse perinatal outcome has to be studied.

Amniotic fluid is very crucial for the survival of the fetus and Amniotic Fluid Index (AFI) is the most common way for the estimation of amniotic fluid volume which is performed by ultrasonography method. Any decrease or increase in volume of amniotic fluid leads to pregnancy complications.

AIMS AND OBJECTIVES:

- To determine obstetric outcome in term low risk pregnancy with AFI less than 5cm or more than 24cms.
- To assess whether antepartum oligohydramnios or polyhydramnios is associated with adverse perinatal outcome.
- To study the association of perinatal outcome with respect to the severity of oligohydramnios.

MATERIALS AND METHODS:

This is a prospective analytical study carried out at ASRAM medical college, a Tertiary care hospital, Eluru over a period of 18 months between May 2022 to November 2023. 100 antenatal cases beyond 37 weeks of gestation with AFI less than 5 cm and more than 24 cm were taken into study.

Written informed consent taken and required routine investigations are done.

Ultrasound done to determine fetal growth parameters, placental position, amniotic fluid index.

Inclusion Criteria:

- Singleton pregnancy with cephalic presentation
- >37 weeks of gestation

- Intact membranes
- AFI assessed by ultrasound of <5 cm OR >24 cm
- Patient should have delivered during same hospitalization when AFI was determined.

Exclusion Criteria:

- Gestational age less than 37 weeks or more than 40 weeks of gestational age.
- Multiple gestations and malpresentations
- Ruptured membranes
- Associated fetal malformations
- High risk pregnancy
- Previous Uterine scar
- Intra uterine death of the fetus

These patients will be observed regarding

- Mode of delivery
- Color of liquor
- Fetal distress
- Fetal birth weight
- APGAR score
- NICU admissions
- Neonatal deaths

Statistical Analysis:

Data entry and analysis done using SPSS Software version 28.0.1.0. Data was presented in frequency and percentages. Numerical data was expressed as the mean ± SD (Standard Deviation). Association between categorical variables was done using Chi-square test with p value less than 0.05 considered statistically significant.

RESULTS AND ANALYSIS:

In the present study, 100 antenatal cases with AFI <5 cms or >24 cms were taken. Among them, 75 cases were of oligohydramnios and 25 cases were of polyhydramnios.

MATERNAL AND FETAL OUTCOME IN OLIGOHYDRAMNIOS

In our study, among oligohydramnios group, 25 (33.3%) cases undergone LSCS, 21 (28%) had fetal distress, 15 (20%) cases demonstrated meconium stained liquor, 14 (18.6%) newborns had low APGAR scores, 17 (22.7%) neonates had NICU admissions, 2 (2.7%) neonatal deaths noted. The findings are depicted in below table.

Table 1: Maternal And Fetal Outcome In Oligohydramnios

	MILD TO MODERATE OLIGOHYDRAMNIOS	SEVERE OLIGOHYDRAMNIOS	P VALUE
MODE OF DELIVERY			
LSCS	3(0.7%)	22(68.8%)	0.001
VAGINAL	40(93%)	10(31.3%)	
FETAL DISTRESS			
PRESENT	8(18.6%)	13(40.6%)	0.036
ABSENT	35(81.4%)	19(59.4%)	
COLOUR OF AMNIOTIC FLUID			
CLEAR	39(90.7%)	21(65.6%)	
MSL	4(9.3%)	11(34.4%)	0.007
APGAR SCORE			
GOOD	39(90.7%)	22(68.7%)	
LOW	4(9.3%)	10(31.3%)	0.016
NICU ADMISSIONS			
YES	6(14%)	11(34.4%)	0.037
NO	37(86%)	21(65.6%)	
PERINATAL MORTALITY			
YES	1(2.3%)	1(3.1%)	0.832
NO	42(97.7%)	31(96.8%)	

MATERNAL AND FETAL OUTCOME IN OLIGOHYDRAMNIOS WITH RESPECT TO SEVERITY OF OLIGOHYDRAMNIOS

With respect to severity of oligohydramnios, 22 (68.8%) cases undergone LSCS in severe oligohydramnios compared to 3 (0.7%) in mild to moderate oligohydramnios with a p value of 0.001 which is significant.

8 (18.6%) cases had fetal distress in mild to moderate oligohydramnios compared to 13 (40.6%) cases of severe oligohydramnios with a p value of 0.036 which is statistically significant.

4 (9.3%) cases had meconium stained liquor in mild to moderate oligohydramnios compared to 11 (34.4%) cases of severe oligohydramnios with a p value of 0.007 which is significant statistically.

4 (9.3%) newborns had low APGAR scores in mild to moderate oligohydramnios compared to 11 (34.4%) newborns of severe oligohydramnios with a p value of 0.016 which is significant. 6 (14%) NICU admissions were noted in mild to moderate oligohydramnios compared to 11 (34.4%) of severe oligohydramnios with a p value of 0.037 which is statistically significant. 1 (2.3%) neonatal death noted in mild to moderate oligohydramnios and 1 (3.1%) in severe oligohydramnios with a p value of 0.832 which is not significant.

The findings are depicted in below table.

Table 2: Maternal And Fetal Outcome In Oligohydramnios With Respect To Severity Of Oligohydramnios

	MILD TO MODERATE OLIGOHYDRAMNIOS	SEVERE OLIGOHYDRAMNIOS	P VALUE
MODE OF DELIVERY			
LSCS	3(0.7%)	22(68.8%)	0.001
VAGINAL	40(93%)	10(31.3%)	
FETAL DISTRESS			
PRESENT	8(18.6%)	13(40.6%)	0.036
ABSENT	35(81.4%)	19(59.4%)	
COLOUR OF AMNIOTIC FLUID			
CLEAR	39(90.7%)	21(65.6%)	
MSL	4(9.3%)	11(34.4%)	0.007
APGAR SCORE			
GOOD	39(90.7%)	22(68.7%)	
LOW	4(9.3%)	10(31.3%)	0.016
NICU ADMISSIONS			
YES	6(14%)	11(34.4%)	0.037
NO	37(86%)	21(65.6%)	
PERINATAL MORTALITY			
YES	1(2.3%)	1(3.1%)	0.832
NO	42(97.7%)	31(96.8%)	

Maternal And Fetal Outcome In Polyhydramnios

In our study with respect to maternal and fetal outcome in polyhydramnios, 24 (96%) cases delivered vaginally, 1 (4%) case had fetal distress, 1 (4%) case had meconium stained liquor. There are no NICU admissions, LOW APGAR score, no perinatal mortality in our study in cases of polyhydramnios.

The findings are depicted in below table.

Table 3: Maternal And Fetal Outcome In Polyhydramnios

	NUMBER	PERCENTAGE
MODE OF DELIVERY		
LSCS	01	45%
VAGINAL	24	96%
FETAL DISTRESS		

YES	01	4%
NO	24	96%
COLOUR OF AMNIOTIC FLUID		
CLEAR	24	96%
MSL	01	4%

DISCUSSION:

In our study 100 antenatal cases with AFI < 5 cm or > 24 cm were taken. Among them 75 cases were of oligohydramnios and 25 cases were of polyhydramnios.

Rate of caesarean delivery in oligohydramnios in our study was 33.3%, this correlated with study done by Umber A [8]. where caesarean delivery rate was 32%. However other studies by Chandra P et al [9] showed 76.92% of caesarean delivery. The higher rates of caesarean delivery in these studies might be probably because of inclusion of high risk cases.

The overall rate of fetal distress is 28% in oligohydramnios in present study. However the rate of fetal distress in a study conducted by Sriya R et al [10] was 36.11%, Chate P et al [11] was 42%. The higher rates of fetal distress in these studies might probably because of association of possible causes of placental insufficiency along with oligohydramnios.

The overall occurrence of meconium stained amniotic fluid is 20% in present study which is comparable to the study conducted by Chandra P et al [9] which was 23.7%. However, studies like Sriya R et al [10] (38.9%), Chate P et al [11] (46%) showed increased occurrence of meconium stained amniotic fluid probably because of inclusion of high risk cases in their study.

The overall incidence of low APGAR score among oligohydramnios was 18.6% which is comparable to the study conducted Chandra P et al [9] which was 23.07%. The overall NICU admissions among oligohydramnios was 22.7% which is comparable to the study conducted by Sandhya Sri Panda et al [12] which was 24%. However other studies like Chandra P et al [9] showed 46.15%. The higher incidence of NICU admissions in these studies might be probably because of inclusion of high risk cases in their study. Neonatal deaths among oligohydramnios was 2.7% which is comparable to the study conducted by Chate P et al [11] which was 2%. Among oligohydramnios cases fetal distress, NICU admissions, low APGAR score, was significantly higher in severe oligohydramnios when compared to mild to moderate oligohydramnios indicating that these complications increase with increase in severity of oligohydramnios.

Among polyhydramnios there was no increase in low birth weight, low APGAR score, NICU admissions and perinatal mortality in present study. This is comparable to the study conducted by A Panting-Kemp et al [13] and study conducted by Sarwat Khan et al [14].

Table 4: COMPARISON OF MATERNAL AND PERINATAL OUTCOMES IN OLIGOHYDRAMNIOS IN DIFFERENT STUDIES

STUDIES	LSCS	FETAL DISTRESS	MSL	APGAR SCORE <7	NICU ADMISSIONS	NEONATAL DEATH
Chate P et al	64	42	46	-	42	02
Chandra P et al	76.92	-	23.7	23.07	46.15	-
Sriya R et al	43.05	36.11	38.9	-	88.9	-
Umber A	32%	-	-	-	-	-
Sandhya Sri Panda et al	64.8%	-	-	-	24%	-
Present study	33.3	28	20	18.6	22.7	2.7

CONCLUSION:

Amniotic fluid volume is an important predictor of fetal tolerance during labour and its decrease is associated with increased risk of fetal distress and meconium staining of fluid. Determination of AFI can be used as an adjunct to other fetal surveillance methods. It helps to

identify those infants at risk of adverse perinatal outcomes.

In our study, the rates of fetal distress, MSL, LSCS were significantly high in case of AFI < 5cms and there was statistically significant association of adverse perinatal outcomes with increased severity of oligohydramnios.

In case of AFI > 24 cm no significant increase in adverse perinatal outcomes were noted in our study

REFERENCES:

- Tong XL, Wang L, Gao TB, Qin YG, Qi YQ, Xu YP. Potential function of amniotic fluid in fetal development---novel insights by comparing the composition of human amniotic fluid with umbilical cord and maternal serum at mid and late gestation. *J Chin Med Assoc.* 2009 Jul;72(7):368-73. [PubMed]
- Kofinas A, Kofinas G. Differences in amniotic fluid patterns and fetal biometric parameters in third trimester pregnancies with and without diabetes. *J Matern Fetal Neonatal Med.* 2006;19(10):633-638. doi: 10.1080/14767050600822547.
- Brace RA. Physiology of amniotic fluid volume regulation. *Clin Obstet Gynecol* 1997; 40:280.
- Phelan JP, Ahn MO, Smith CV, Rutherford SE, Anderson E. Amniotic fluid index measurements during pregnancy. *J Reprod Med.* 1987 Aug;32(8):601-4. PMID: 3309290.
- Souza AS, de Andrade LR, da Silva FL, Cavalcanti AN, Guerra GV. Desfechos maternos e perinatais em gestantes com líquido amniótico diminuído [Maternal and perinatal outcomes in women with decreased amniotic fluid]. *Rev Bras Ginecol Obstet.* 2013 Aug;35(8):342-8. Portuguese. doi: 10.1590/s0100-72032013000800002. PMID: 24126352.
- Arias Fernando practical guide to high risk pregnancy and delivery .2nd edition, Mosby – Year Book Inc 1993:3-20,150-159.
- Casey BM. Pregnancy outcomes after antepartum diagnosis of oligohydramnios at or beyond 34 weeks' gestation. *Am J Obstet Gynecol* 2000;182:909-12
- Umber A. Perinatal Outcome in Pregnancies Complicated by Isolated Oligohydramnios at Term. *Annals* 2009;15:35-7
- Chandra P, Kaur SP, Hans DK, Kapila AK. The impact of amniotic fluid volume assessed intrapartum on perinatal outcome. *Obstet and Gynaec Today.* 2000;5(8):478-81.
- Sriya R, Singhai S. Perinatal outcome in patients with amniotic fluid index <5 cm. *J Obstet and Gynaecol of India.* 2001;51(5):98-100.
- Chate, Preshit & Khatri, Meena & Hariharan, C. (2013). Pregnancy outcome after diagnosis of oligohydramnios at term. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology.* 2. 23. 10.5455/2320-1770.ijrcog20130204.
- Panda S, Jayalakshmi M, Shashi Kumari G, Mahalakshmi G, Srujan Y, Anusha V. Oligoamnios and Perinatal Outcome. *J Obstet Gynaecol India.* 2017;67(2):104-108. doi:10.1007/s13224-016-0938-3
- Panting-Kemp A, Nguyen T, Chang E, Quillen E, Castro L. Idiopathic polyhydramnios and perinatal outcome. *Am J Obstet Gynecol.* 1999 Nov;181(5 Pt 1):1079-82. doi: 10.1016/s0002-9378(99)70084-0. PMID: 10561621.
- Khan S, Donnelly J. Outcome of pregnancy in women diagnosed with idiopathic polyhydramnios. *Aust N Z J Obstet Gynaecol.* 2017 Feb;57(1):57-62. doi: 10.1111/ajog.12578. PMID: 28251633.