Original Article

Assessment of Oligohydramnios in Pregnant Women: Outcome of Hydration Therapy

Oligohydramnios in Pregnant Women

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ABSTRACT

Objective: The study was designed to determine the role of ultrasound as a tool in assessing of low amniotic fluid index (AFI) or Oligohydramnios and perinatal outcomes. Determination of improvement in low AFI on Hydration therapy.

Study Design: Case-Control study

Place and Duration of Study: This study was conducted at the tertiary care hospitals from May 2019 to May 2020. Data was collected from Obstetrics & Gynecology and Sonology departments (Jinnah Medical and Dental College Hospital JMDCH and Medicare Cardiac & General Hospital) for period of one year. Four hundred pregnant women were included in the study.

Materials and Methods: Total two hundred pregnant women with oligohydramnios were included as cases and equal normal pregnant women as controls were included in study with no other medical issue. All those with any associate medical issue were excluded from this study. Amniotic fluid volume was measured by amniotic fluid index (AFI) or single deepest pocket (SDP)in pregnant women. Amniotic fluid index 5 cm was considered to be oligohydramnios and cause of number of complications such as preterm labour, low Apgar score , birth weight, infections and even cause fetal demise were recorded.

Results: Out of total, 200 pregnant women had the ultrasound finding of oligohydramnio. AFI less than 5 cm were oligohydramnios and between 5.1 to 7cms were borderline. Delivery before 37 weeks in 134 (69%) oligohydramnios cases and 30(15%) were normal controls. Birth weight less than 2.5 kg in 44 (22%) cases and 34 (17%) controls. Low APGAR scores calculated in cases both at 1 minute was 178(89%), at 5 min 22(11%) . NICU admission were done for 22(11%) neonates as compared to 14(7%) neonates o from normal pregnancies. Hydration therapy improved the amniotic fluid index (AFI) and outcome of pregnancies.

Conclusion: Oligohydramnios increases the risk of early delivery with low birth weight, APGAR score and increase risk of NICU admissions. Hydration therapy improved the amniotic fluid index (AFI)

Key Words: Amniotic fluid index, Oligohydramnios**,** Ultrasound, Hydration therapy. Amniotic fluid volume, Single deep pocket.

Citation of article: Rashid S, Khan SP, Izhar S, Kadri S, Ghafoor S, Ali N. Assessment of Oligohydramnios in Pregnant Women: Outcome of Hydration Therapy. Med Forum 2021;32(2):115-119.

INTRODUCTION

Amniotic fluid is not only necessary for the protection and movement of fetus but also most important for overall well being of fetus and normal delivery. The measurement of amniotic fluid index is most important in obstetrics evaluation for the perinatal outcomes and delivery.

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Received: August, 2020
Accepted: October, 2020
Printed: February, 2021

The key factors regulating the amniotic fluid volume (AFV) during the subsequent half of the pregnancy are foetal pulmonary excretion and development of fetal urine, fetal swallowing and intramembrane movement between fetal blood and placenta. The calculation of the amniotic fluid may take place ultrasoundwise using amniotic fluid index(AFI), amniotic fluid volume 2 by 2 scales, single deep baggage (SDP), amniotic fluid index and maximum vertical bag.[1] Normohydroamnios (range 7-20 cm), oligohydramnios (less than 5 cm), and polyhy adroamnios may be measured amniotic fluid index (25 cm and above). Low amniotic fluid volume may be idiopathic or idiopathic through underproduction. Underproduction can be the result of missing kidneys or failure, obstruction of the urinary tract, impaired placental activity, or maternal dehydration. Loss mostly due to membrane breakup. The work for this irregular sign of life in prenatal tests includes maternal history, ruptured membranes assessment, renal system evaluation and foetal bladder

evaluation, as well as the assessment of placental and foetal growth functions [1-5].

The outcome of pregnancy with low Amniotic Fluid Index (AFI) /Oligohydramnios. Amniotic fluid index (AFI) is an estimate of amniotic fluid volume in pregnant uterus. Normal values of amniotic fluid index varies with gestational age. Amniotic fluid index range between 5-25 cm is considered normal, medial amniotic fluid index level is 9-14 cm from week 20 to 35. Amniotic fluid index 5 cm or less is considered oligohydramnios. Amniotic fluid index (AFI) is 7 cm for second and third trimester pregnancies, and amniotic fluid index of 5cm or less is diagnosed as oligohydramnios. AFI 25 cm or greater is considered to be polyhydramnios[1-] . Amniotic fluid has important functions during pregnancy and at the time of delivery. It forms a hydrostatic wedge pressure which facilitates dilatation of the cervix, prevents obstruction, maintains placental circulation during uterine contractions, antibacterial properties that protect against the risk of infections. Abnormalities associated with amniotic fluid like meconium staining, congenital malformations, growth restriction and fetal hypoxia. Thus, the ultrasound measurement of amniotic fluid volume is an important part of antenatal fetal investigations. It is also an important indicator of fetal well-being during pregnancy and delivery. Sufficient amount of amniotic fluid is most essential for normal pregnancy and delivery outcome[2,5] . Oligohydramnios (AFI< 5) was associated with more number of preterm deliveries, fetal distress and more NICU (neonatal intensive care unit) admissions. More studies are needed for defining threshold levels for measuring AFI.[2]

In a study[2], the measurement of AFV (amniotic fluid volume) was done by ultrasound, and then actual AFV was directly measured during the cesarean delivery to compare the subjective method (SM), amniotic fluid index (AFI), single deepest pocket (SDP), and 2-diameter pocket . Another study [5] including 235 pregnant women with normal AFI ≥10 and borderline AFI≤5 was done to evaluate risk of premature delivery and low Apgar scores.

The abnormalities associated with low amniotic fluid include growth restriction, preterm delivery, fetal hypoxia and demise .Thus it is essential to assess AFI during antenatal follow-ups. It is also an important indicator of fetal well-being during pregnancy and delivery. Study [5] has shown significance poor outcome of borderline oligohydramnios. The purpose of this study was to find out pregnancy outcome with low AFI /Oligohydramnios.. Amniotic fluid index between 7-25 cm is considered normal, medial amniotic fluid index level is 14 cm from week 20 to 35. Amniotic fluid index less than 5 cm are oligohydramnios and between 5.1 to 7 is considered to be borderline pregnancies with oligohydramnios and this may result in a of number of complications such as preterm labour, low Apgar score, birth weight, infections and may even cause fetal demise.

The study was designed to determine the role of ultrasound as a tool in assessing of low amniotic fluid index (AFI) or oligohydramnios and perinatal outcome. Effects of hydration therapy on low AFI.

MATERIALS AND METHODS

This study was conducted at Jinnah Medical and Dental College Hospital (JMDCH) and Medicare Cardiac & General Hospital from May 2019 to May 2020. Total two hundred pregnant women with oligohydramnios were included as cases and equal normal pregnant women as controls were included in study with no other medical issues and intact membranes. All those with any associate medical issue were excluded from this study. Transabdominal Ultrasound was done on Xario-100 machine. Measurement of AFI in four quadrants of abdomen and pelvis and single deep pocket methods for the calculation of amniotic fluid volume. AFI was calculated by four quadrant 2x2 (5-25 cms)and single deep pocket measurement SDP(2-8cms) . In this study pregnant woman with oligohydramnios was divided in two groups as AFI ≤ 5cm and AFI≤ 5.1 to 7cm was taken as a borderline.

Total two hundred cases and equal control pregnant women were included in study with no other medical issue. All those with any associate medical issue were excluded from this study (ruptured membranes, hypertension, diabetes, preeclampsia, birth defects etc). Abdominal and pelvic ultrasound examination was done in patient in supine position. After the exposure, the abdomen gel was applied and abdomen was divided into four quadrants. By using umbilicus as the reference point in each quadrant, the measurement in the deepest pool of amniotic fluid avoiding the fetal parts calculated. Sum up of four measurements of all four quadrants done to calculate AFI.the anteroposterior diameters of the largest empty fluid pocket (no umbilical cord or fetal parts) in each quadrant are added together. The normal AFI range between 7 to 25 cm. In addition, Single deep pocket method was also performed by measurement of the largest vertical pocket of amniotic fluid, free from fetal parts or umbilical cord. Each individual pocket of fluid was 2 to 8 cm in normal pregnancies.

All the participants filled consent form and ethical approval was taking from the ERC, Jinnah Medical and Dental College. Data were collected from the Obstetrics and Gynecology and Sonology departments. In this study oligohydramnios cases were divided into two groups as low AFI ≥ 5 and borderline AFI≥ 5.1 - 7cm. Hydration therapy was recommended in cases of oligohydroamnious by Obstetrician and measurement of AFI were repeated.

The pregnancies with low AFI were divided into two groups with one group less than 5 cm and one group 5-7 cm as only pregnant women with 7 cm AFI fulfill the requirement for being eligible for Cesarean-section. The ultrasound examinations were on pregnant women in third trimester of pregnancy with no known obstetric on medical complication with only reported low amniotic fluid index in previous ultrasounds.

The results were statistically analyzed and students't-test compared the four quadrants values of amniotic fluid were summarized to get AFI. Students t-test was applied to compare characteristic p-value 0.05 was considered significant. Categorical variables were given as percentages. The data was collected using SPSS 20.0 and comparisons was done between oligohydramnios (cases) and normohydroamnious (controls) perinatal outcome by applying students t- test. Women having 20-35 weeks single pregnancy were included in the study. All those with twin or multiple pregnancies or any other fetal defects were excluded from the study. Study was approved by Ethical Review Committee.

RESULTS

In a study done on four hundred pregnant women visiting the obstetrics and gynecology department and Sonology department JMCH and Medicare cardiac and general hospital. Out of total of 400 pregnant women the ultrasound finding of pregnant women with oligohydramnios were two hundred over a period of one year. Age range was between 18 - 40 years. AFI was (less than 5cm) booked oligohydramnios cases 138(69%) and in normal control 182 (91%). Un - booked oligohydramnios cases were 62 (31%) and normal controls were 18(9%). Primigravida with oligohydramnios were 158 (79%) and controls were 168 (84%) whereas multipara cases were 42 (21%) and 32 (16%). Gestational age at delivery below 37 weeks in cases 134 (69%) and controls 30(15%). Gestational age above 37 weeks in cases was 66(33%) and a control was 170 (85%) and p-value was highly significant (table-1).

Table No.1: Characteristics of pregnanices with oligohydroamnious & controls.

Maternal characteristics		**Oligohydramnios** (AFI less than 5 cm)	**Control** (AFI 5-25 cm)	**p-value**
Age (18-40yrs) Amniotic fluid index		200 pregnancies Amniotic fluid index (AFI)	200 normal pregnancies Amniotic fluid index (AFI)	-
Booking status	Booked patients	138 (69%)	182 (91%)	0.001
	Un booked Patients	62 (31%)	18 (9%)	0.065
Parity	Primary	158(79%)	168(84%)	0.246
	Multipara	42(21%)	32(16%)	0.589
Gestation age at delivery	Before 37wks	134(69%)	30(15%)	0.001
	After 37wks	66(33%)	170(85%)	0.001

Table No.2: Perinatal outcome of pregnancy with oligohydroamnious.

Outcomes	**Oligohydramnios (n=200)**	**Control (n=200)**	**P-value**
Birth Weight ≤ 2.5kg ≥2.5kg	44 (22%) 156(78%)	34(17%) 174(87%)	0.002 0.51
APGAR score at 1 min (normal range 7-10)	178(89%) (Range 0-6)	16(8%) (Range of 7-10)	0.05
APGAR score at 5 min (normal range 9-10)	22(11%) (Range of 0-5)	14(7%) (Range of 9-10)	0.05
NICU admission	22(11%)	14(7%)	0.05

Table No.3: AFI* before and after hydration therapy in oligohydroamnious cases.

AFI*	**Oligohydramnios (n=100)**	**Control (n=100)**
Before treatment	4.1 (4-5 cm)	14 (7-20cm)
After Hydration therapy	7.1 (7- 9cm)	14 (7 -20cm)
Improvement in AFI	3.0 (+ 3-5)	0.02 (+0.00-0.02)

***AFI-** Amniotic Fluid Index.

Outcome of pregnancy was determined by birth weight less than 2.5 kg in 44 (22%) cases and 34 (17%) controls. Birth weight 2.5kg was found in 156(78%) case and 174(87%) control. Low APGAR score at 1 min (range of 5-7) 178(89%) and 186(93%) controls (range 7-10). APGAR score at 5 min in 22(11%) cases (range of 5-6) and 14(7%) controls (range was 7-10). NICU admission was required for 22(11%) cases and 14(7%) controls (table -2). Before hydration therapy the oligohydramnios and after hydration therapy shown improvement in amniotic fluid index above 7 (+3-5cm) (table-3).

DISCUSSION

Amniotic fluid index was found to be an essential biomarker in determining the mode of delivery and perinatal outcome of pregnancy, was by assessed by measurement of AFI 2x2 and single deep pocket methods in the study. Studies [2-7] has shown that in assessment of amniotic fluid volume by AFI and single deep pocket was the methodology most commonly used and have positive correlation. Sonographic estimation of amniotic fluid can be done by AFI measurement or single deep pocket (SDP). Amniotic fluid index was helpful in determining the delivery method and the outcome of pregnancy (the birth weight, Apgar score, NICU admission etc). In this study it has shown the outcome of two hundred pregnancies with oligohydramnios has shown 134(69%) deliveries before 37 week of gestation as compare to 30(15%). In addition, the delivery after 37 weeks was in 44 (22%) pregnancies with oligohydramnios as compared to 170(85%) with normal volume of AFI. .Study shown to be Oligohydramnios is a condition of abnormally low amniotic fluid volume that has been associated with poor pregnancy outcomes[7-8]. In study it seen that oligohydramnios (AFI< 5) was associated with more number of preterm deliveries, fetal distress and higher NICU admissions. [7]

This study shown high frequency of oligohydramnios in pregnant women in population of Karachi is a one of common problem in low socioeconomic populations and developing countries[8-11]. The prevalence of this disorder and its findings have not been well described in low-middle-income countries with a restricted use of ultrasound for pregnancy diagnosis. Low income antenatal treatment was conducted to determine the prevalence and adverse maternal, foetal and neonatal effects of oligohydramnios[11].

In the study we used AFI measured in four quadrants and single deepest pool . Multiple studies and trials[12-16], have shown that no single sonographic method (AFI, SDP) has emerged superior to the others. Randomized trials in difficult pregnancies showed no difference to delivery, NICU intake, umbilical artery pH or APGAR score relative to the use of SDP (single deep pocket) against amniotic fluid index (AFI). The only significant result has been that AFI has found more pregnancies than deep pockets as oligohydramnios (SDP) [17-18].

Our study has shown increase in preterm deliveries, low Apgar scores (1 minute and 5 minutes), more frequent ICU admission of neonate in pregnancies with oligohydroamnious . Management depends on the gestational age when diagnosed in pregnancy with oligohydramnios. If after 37 weeks of gestational age and membranes rupture is removed, labour induction will be an option. A retrospective cohort study found that 206 pregnancies of oligohydramnios had labour induction outcomes as compared with 206 spontaneous work with normal AFV, thereby raising the likelihood of operational delivery (forceps, vacuum and caesarean)[19].

The pregnant women on diagnosis of oligohydramnios were provided oral / intravenous hydration therapy which improved AFI to above 7 thus increased overall outcome of pregnancies and reduced risk of preterm cesarian sections or stillbirths. Studies done on providing hydration therapy in pregnancies with oligohydramnios in third trimester and this management reduced the risk of adverse outcomes due to reduced amniotic fluid volume Study[20] done with isolated oligohydramnios and itsmanagement of the pregnant women by oral hydration. Studies[21-22] done reporting improvement in outcome by hydration. Studies[23-24] have shown intravenous hydration increased amniotic fluid index and overall outcome of pregnancies without causing any complications. A questionnaire based study was conducted on management of isolated oligohydroamnious (without maternal or fetal abnormality) , participants were from Korean Society of maternal and fetal medicine. Although 47.2% reported that oral and intravenous hydration have found to be useful in management of isolated oligohydroamnious but further studies were recommended[25] Similarly this study reported improvement in AFI after oral or intravenous hydration therapy.

CONCLUSION

Amniotic fluid index (AFI) was found to be most important biomarker for the diagnosis of oligohydroamnious. As normal amniotic fluid volume is required for perinatal well being and outcome of pregnancy including term delivery, intrauterine growth and prevention of post-delivery NICU admission of neonate. This study has shown that oligohydramnios is high frequency in developing countries like Pakistan and it is essential to do follow-ups by ultrasound measurement of AFI in order to have safe and healthy outcome of pregnancy and reducing the risk of adverse outcomes. Study also supports management by hydration therapy, especially beneficial in borderline.

Author's Contribution:

Concept & Design of Study:	Sadia Rashid
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Revisiting Critically:	Sadia Rashid, Samia Perwaiz Khan
Final Approval of version:	Sadia Rashid

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Dubil E. A. Amniotic fluid as a vital sign for fetal wellbeing. AJUM 2013;16(2):62–70.
2. Magann EF, Sandlin AT, Ounpraseuth ST. Amniotic fluid and the clinical relevance of the sonographically estimated amniotic fluid volume: oligohydramnios. J Ultrasound Med 2011;30: 1573–85.
3. Nash P. Amniotic fluid index. Neonatal Network 2013;32(1):46–49.
4. Huges DS, Magaan EF. Antenatal fetal surveillance "Assessment of the AFV". Best Pract Res Clin Obstet Gynaecol 2017;38:12-23.
5. Asgharnia M, Faraji R, Salamat F, Ashrafkhani B, Heirati SFD, Naimian S. Perinatal outcomes of pregnancies with borderline versus normal amniotic fluid index. Iranian J Reproductive Med 2013;11(9):705-10.
6. Dubil EA, Maagan EF. Amniotic fluid as a vital sign for fetal wellbeing. Australasian J Ultrasound in Med 2013;16 (2) 62-70.
7. Luntsi G, Burabe FA, Ogenyi PA, Zira JD, Chigozie NI, Nkubli FB, et al. Sonographic estimation of amniotic fluid volume using the amniotic fluid index and the single deepest pocket in a resource-limited setting. J Med Ultrasound 2019;27:6.
8. Sultana S, Khan AMN, Akhtar KKA, Aslam M. Low amniotic fluid index in high-risk pregnancy and poor apgar score at birth. J Coll Physicians Surg Pak 2008;18:630-4.
9. Verma M, Gupta S, Ahuja MV, Pratap C. Relationship of decreased amniotic fluid and perinatal outcome:a comparative study. Int J Research in Medical Sci 2016;4(9):4093-4096.
10. Madendag Y, Madendag IC, Sahin E, Aydin E, Sahin MS, Acmaz G. How Well Do the Popular Ultrasonic Techniques Estimate Amniotic Fluid Volume and Diagnose Oligohydramnios, in Fact? Ultrasound Quarterly 2019;35(1):35-38.
11. Figueroa L, McClure EM , Swanson J, Nathan R, Ana L. Garces1, et al. Oligohydramnios: a prospective study of fetal, neonatal and maternal outcomes in low-middle income countries. Reproductive Health 2020;17:19.
12. Ozgu-Erdinc AS, Cavkaytar S, Aktulay A, Buyukkagnici U, Erkaya S, Danisman N. Mid-trimester maternal serum and amniotic fluid biomarkers for the prediction of preterm delivery and intrauterine growth retardation. J Obstet Gynaecol Res 2014;40(6):1540–6.
13. Umber A, Chohan MA. Intravenous maternal hydration in third trimester oligohydramnios: effect on amniotic fluid volume. J Coll Physicians Surg Pak 2007;17:336–9.
14. Haws RA, Yakoob MY, Soomro T, Menezes EV, Darmstadt GL, BhuttaZA. Reducing stillbirths: screening and monitoring during pregnancy and labour. BMC Pregnancy Childbirth 2009;9(Suppl 1):S5.
15. Verma M, Gupta S, Ahuja MV, Pratap P. Relationship of decreased amniotic fluid and perinatal outcome: a comparative study. Int J Res Med Sci 2016;4:4093-6.
16. Dubil EA, Magann EF. Amniotic fluid as a vital sign for fetal wellbeing. AJUM 2013;16(2).
17. Chauhan SP, Doherty DD, Magann EF, Cahanding F, Moreno F, Klausen JH. Amniotic fluid index vs single deepest pocket technique during modified biophysical profile: a randomized clinical trial. Am J Obstet Gynecol 2004;191:661–67.
18. Magann EF, Chauhan SP, Doherty DA, Magann MI, Morrison JC. The evidence for abandoning the amniotic fluid index in favor of the single deepest pocket. Am J Perinatol 2007; 24: 549–55.
19. Nabhan AF, Abdelmoula YA. Amniotic fluid index versus single deepest vertical pocket: a meta-analysis of randomized controlled trials. Int J Gynaecol Obstet 2009;104:184–88.
20. Manzanares S, Carrillo MP, Gonzalez-Peran E, Puertas A, Montoya F. Isolated oligohydramnios in term pregnancy as an indication for induction of labor. J Matern Fetal Neonatal Med 2007;20: 221–24.
21. Ülker K. Maternal hydration therapy improves the quantity of amniotic fluid and the pregnancy outcome in third-trimester isolated oligohy dramnios. J Ultrasound Med 2014;33(5):922.
22. Gizzo S, Noventa M, Vitagliano A, Dall'Asta A, Antona DD, Aldrich CJ, et al. An Update on Maternal Hydration Strategies for Amniotic Fluid Improvement in isolated Oligohydramnios and normohydramnios: Evidence from a Systematic Review of Literature and Meta-Analysis. PLOS ONE 2015.
23. Shahnazi M, Meli MS, Hamoony F, Sadrimehr F, Samani FG, Koshavar H. The Effects of Intravenous Hydration on Amniotic Fluid Volume and Pregnancy Outcomes in Women with Term Pregnancy and Oligohydramnios: A Randomized Clinical Trial. J Caring Sci 2012;1(3): 123–128.
24. Umber A, Chohan MA. Intravenous maternal hydration in third trimester oligohydramnios: effect on amniotic fluid volume. J Coll Physicians Surg Pak 2007;17:336–9.
25. Yang SW, Jin Y, Jang EB, Kim HS, Sohn IS, Kwon HS, et al. Management of isolated oligohydramnios in Korea: a questionnaire-based study of clinical practice patterns among the members of the Korean Society of Maternal Fetal Medicine Obstet Gynecol Sci 2020;63(5):586-593.