SJMS | E-ISSN: 2833-3772 | Volume 2, Issue 3 | May-June 2023

The Scientific Journal of Medical Scholar

Publisher: Real-Publishers Limited (Realpub LLC)

30 N Gould St Ste R, Sheridan, WY 82801, USA

Co-Publisher: SSESD, Egypt

Website: https://realpublishers.us/index.php/sjms/index

The Scientific Journal of Medical Scholar

Available online at Journal Website
https://realpublishers.us/index.php/sjms/index
Subject (Obstetrics and Gynecology)

Original Article

Effect of Maternal Intravenous Hydration in Management of Oligohydramnios and The Changes in the Fetal Doppler

Magdy Hamed El-Sayed Hamed * | **Ahmed Mohammed Saeed** | **Fahd Abd Elal Alomda**

Department of Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

Article information

Submitted: May 4th, 2023

Revised: May 13, 2023

Accepted: May 30th, 2023

DOI: 10.55675/sjms.v2i3.52

Citation: Hamed MHE, Saeed AM, Alomda FA. Effect of Maternal Intravenous Hydration in Management of Oligohydramnios and The Changes in the Fetal Doppler. SJMS 2023; 2 (3): 83-87. DOI: 10.55675/sjms.v2i3.52

ABSTRACT

Background and Aim: Oligohydramnios is linked to different fetal and maternal conditions. Maternal hydration improves amniotic fluid content, as it promotes uteroplacental perfusion. The current work aimed to determine the results of intravenous hydration on the amniotic fluid index (AFI) and Doppler measurements of uteroplacental blood circulation during pregnancy with the third trimester oligohydramnios.

Methods: The current work included 50 pregnant women in their third trimester with oligohydramnios. They were selected from the outpatient clinic at Al-Azhar University Hospitals. All were submitted to clinical evaluation by history and examination, followed by abdominal ultrasound and intravenous hydration therapy. Values before and after hydration were compared, delivery mode and fetal outcome were documented.

Results: The mean maternal age was 30±2.28 years. Most of them were multigravida (58.0%) and higher percentage were multiparous (70.0%). The GA at delivery ranged between 32 and 37 weeks of gestation. There was a significant reduction of pulse, mean arterial pressure, temperature, hematocrit after hydration than before hydration. The birth weight ranged between 2765 and 3654 g. AF volume, AFI and uterine artery pulsatility index (PI) were significantly increased while umbilical artery PI was statistically decreased after hydration that corresponding values before hydration. The mode of delivery was normal vaginal delivery among 34% and cesarean section among 66.0% and the mean Apgar score was 7.8±1.9 and 8.9±0.87 at the first and fifth minutes, respectively.

Conclusions: Intravenous maternal hydration therapy was safe and effective in terms of improvement of AFI in pregnant females with isolated oligohydramnios in the third trimester.

Keywords: Oligohydramnios; Amniotic Fluid; Doppler Ultrasound.

* Corresponding author
Email: hamedmagdy012@gmail.com

INTRODUCTION

Amniotic fluid has crucial functions for the growing fetus. It's an ideal setting for the growth and development of a fetus. Because of its dampening and bacteriostatic qualities, it acts as a cushion against shocks and infections. Fetal movement is encouraged, which aids in the growth of the skeleton and muscles. It protects the fetus from vascular and nutritional damage by preventing umbilical cord and placental compression [1].

One of the most crucial measurements taken during fetal screening is the amount of amniotic fluid present in the uterus. When the volume of the amniotic fluid is < 500 mL, the condition is called oligohydramnios, and when it is > 2000 Ml, the condition is called polyhydramnios [2]. Phelan's definition of oligohydramnios called for an amniotic fluid index (AFI) of < 5cm or an SDP of < 2cm. Between 34 and 42 weeks of pregnancy, oligohydramnios affects 1-5% of pregnancies. High rates of postnatal morbidity and mortality as well as pregnancy difficulties have been linked to oligohydramnios [3, 4].

Premature membrane rupture, fetal abnormalities, intrauterine growth retardation, postmaturity, hypertension, diabetes, autoimmunity, hypovolemia, and iatrogenic causes are common causes of oligohydramnios. Almost 7 percent of all cases of oligohydramnios are idiopathic. Around 4% to 5.5% of all pregnancies experience complications due to this, and these complications are often connected with negative results for the fetus. In oligohydramnios, the perinatal morbidity and death rates may rise to 56.5%. It also raises cesarean section (CS) rates by five to seven times. Furthermore, oligohydramnios is more likely in late-term pregnancies, as the AFV typically declines at term. It complicates up to 12% of pregnancies that last longer than 41 weeks [5].

Amniotic fluid (AF) volume is the sum of fluids entering the amniotic space (from fetal urine and lung fluid) and fluids leaving the amniotic space (from fetal swallowing and intramembranous absorption) [6]. The condition of maternal hydration and maternal plasma osmolality influence amniotic fluid volume. Ruptured membranes can cause acute oligohydramnios. Chronic oligohydramnios develops in the fetus because of persistent fluid leakage, prerenal, renal, and post renal causes [7]. The umbilical artery of the fetus Doppler velocimetry evaluates the downward resistance to blood flow in the umbilical arteries. Umbilical artery anomaly Doppler velocimetry is correlated with increased perinatal problems because it is a marker of fetal peripheral vasoconstriction [8]. Doppler flowmetry of the umbilical artery in oligohydramnios revealed better sensitivity, specificity, and accuracy in diagnosing infant death when compared to assessing oligohydramnios and the Apgar score. Maternal hydration increases amniotic fluid volume in oligohydramnios patients by increasing uteroplacental perfusion, as evaluated by Doppler ultrasonography [9].

PATIENTS AND METHODS

This was an interventional study on 50 pregnant women in their third trimester (from more than 32 weeks to 37 weeks) who were diagnosed with oligohydramnios via ultrasound and attended the outpatient clinic at Al-Azhar University Hospitals. It was completed from January 2022 till January 2023.

The **Inclusion criteria** were singleton pregnancy, viable fetus, gestational age > 32 week, AFI <5 cm, no cause for immediate delivery and intact membranes.

The **Exclusion criteria** were patients with ruptured amniotic membranes, multiple pregnancies, post-term pregnancy, maternal medical diseases (heart disease, renal disease, moderate or severe preeclampsia), gestational age < 32-week, dead fetus and fetal structural malformations.

All included cases were put through the following: Complete history taking, Clinical examination, Maternal Body Mass Index (BMI) was calculated, Abdominal Ultrasound examination, Intravenous hydration therapy. The following was done at baseline and after intravenous hydration: Amniotic fluid index Evaluation, Doppler velocimetry (Doppler velocimetry for the umbilical artery and Doppler velocimetry for Uterine artery), Hematocrit value (Macro-hematocrit method and Microhematocrit method) and Urine analysis for specific gravity. Evaluation of the pregnancy outcome as regards: Apgar score at the first and fifth minutes, Number of viable fetal births and still birth, Gestation age at delivery by New Ballard Score, Neonatal birth weight was measured using digital weight scale, Admission to (NICU) and any maternal or fetal complication.

Statistical Analysis: Statistical package for social sciences (SPSS) version 23 (IBM®, Armonk, USA) was used for data processing and was used to examine, enter, and analyze the data. Data were expressed as a number and a percentage for qualitative factors and as a mean ± standard deviation (SD) for quantitative variables. Paired quantitative variables were compared by paired samples "*t*" test. P value < 0.05 was set as the markers of significance.

RESULTS

In the current work, fifty females with oligohydramnios were included. Their age ranged between 25 and 34 years, most of them were multigravida (58.0%) and higher percentage were multiparous (70.0%). The GA at delivery

ranged between 32 and 37 weeks of gestation (Table 1).

The laboratory data showed a significant decrease of pulse, mean arterial pressure, temperature, hematocrit after hydration than before hydration. The birth weight ranged between 2765 and 3654 g (Table 2).

AF volume, AFI and uterine artery PI were significantly increased while umbilical artery PI was statistically decreased after hydration that corresponding values before hydration (Table 3). The mode of delivery was normal vaginal delivery among 34% and cesarean section among 66.0% and the mean Apgar score was 7.8±1.9 and 8.9±0.87 at the first and fifth minutes, respectively (Table 4).

Table (1): Maternal Characteristics

Variable		Statistics
Maternal age (years)	Mean±SD	30.0±2.28
	Min. – max.	25 - 34
Gravidity	Primigravida/secondigravid	21 (42.0%)
	Multigarvida	29 (58.0%)
Parity	Nulliparous	15 (30.0%)
	Multiparous	35 (70.0%)
Gestational age (week)	Mean±SD	35.0±0.544
	Min. – max.	32-37

Table (2): Laboratory finding among study population before and after hydration.

Variables		Pre-hydration	Post-hydration	P-value
Pulse (bpm)	Mean ± SD	92 ± 17.9196	85.34±13.48	0.034*
	Min - Max	58- 127	67- 95	
Mean arterial pressure (mmHg)	Mean ± SD	90 ± 23.6561	82.14 ± 12.76	0.041*
	Min - Max	54-148	65 - 120	
Temperature	Mean ± SD	37.4± 1.0812	36.97 ± 0.87	0.030*
	Min - Max	35-39	36 - 38	
Hemoglobin (gm/dl)	Mean ± SD	11±1.5524	10.97 ± 1.473	0.974
	Min - Max	7-15	7 - 15	
Hematocrit%	Mean ± SD	32± 2.7698	30.85 ± 2.865	0.043*
	Min - Max	27-41	26 - 38	
Fetal birth weight (g)	Mean ± SD	3021.65±654.87		
	Min - Max	2765 – 3654		

Table (3). Amniotic Fluid Volume and Doppler Indices Before and After the Hydration Procedure

	Pre-hydration	Post-hydration	Change	Change (%)	P values
AF volume	450 (395–670)	700 (583–872)	188 (60–277)	41 (11–62)	<0.001*
AFI	8.6 (7.2–11.1)	10.1 (8.5–14.7)	1.7 (0.9–3.3)	24 (11–27)	<0.001*
Umbilical artery PI	0.847±0.072	0.787±0.066	0.13 (0.04 – 0.19)	21 (8 – 28)	<0.001*
Uterine artery PI	0.956 ± 0.062	0.841 ± 0.032	0.11 (0.02–0.18)	22 (15 – 29)	<0.001*

Table (4). Mode of delivery and Apgar score among study population

	Parameters	Value (N = 50)
Mode of delivery	**CS**	33 (66%)
	NVD	17 (34%)
Apgar score	**1m.**	7.8 ± 1.9
	5m.	8.9 ± 0.87

DISCUSSION

Amniotic fluid protects the fetus from harm and allows for the development of the skeleton and muscles. It serves as a thermal regulator and provides some nutrition, albeit not much. Ingesting or inhaling amniotic fluid may stimulate development and differentiation of gastrointestinal and pulmonary tissues [10]. With a prevalence of 2.3%, oligohydramnios is one of the most common disorders endangering fetal health. Chronic fetal hypoxia, fetal growth limitation, recurrent preterm birth, and respiratory distress syndrome are all linked to oligohydramnios. Fetal malpresentation, compressed cord, meconium staining, increased perinatal mortality, and surgical deliveries may all result from this syndrome [11].

The current work was designed to assess the value of maternal hydration of pregnancy outcome for women with oligohydramnios. Overall, the maternal hydration yielded a significant difference in laboratory data, AFI and AF volume, with associated doppler indices. The pregnancy outcome showed premature delivery and increased cesarean deliveries. However, neonates were in good health condition, and none need admission to NICU.

Azarkish *et al*. [1] wanted to see how much of an impact intravenous (IV) hydration had on the amniotic fluid index in cases of oligohydramnios. An overall sample size of 61 women (31 in the experimental group and 30 in the placebo group) participated in the research. Maternal characteristics were comparable between the two groups. There were no reported shifts in blood pressure despite significant fluid intake. However, there were no statistically significant variations in the mean AFI between the intervention and control groups before the introduction of maternal IV hydration (P = 0.128). The mean AFI was significantly different between the groups 48 hours after fluid therapy were stopped. They concluded that AFI in women with oligohydramnios is greatly improved after maternal IV hydration.

Habib *et al*. [12] evaluated the results of intravenous hydration and amino-acid infusion for the treatment of isolated oligohydramnios, finding that the latter was more effective. In summary, 104 pregnant women with isolated oligohydramnios were participated, and half were given a saline infusion (Group-A) while the other half were given an amino-acid infusion (Group-B). In group-A vs group-B, the mean maternal age was 32.1±4.4 vs 31.0±5.5 years, mean GA was 29.1±2.9 vs 29.0±3.1 wks, Multigravida was the norm in both sample groups. The initial mean AFI was similar between the two groups (3.78±0.56 vs 3.73±0.36). By comparing groups, A and B, group B had a significantly higher mean AFI after six infusions (4.79 ±0.65 vs 6.82± 0.62 in A and B respectively). Group-B also had a significantly higher increase in AFI over group-A (3.09±0.70 vs 1.0±031). Therefore, they reasoned, intravenous amino acid treatment is useful in the management of isolated oligohydramnios and is effective at reducing AFI. Unfortunately, we did not include amino acids in the current work.

Malik *et al*. [13] confirmed our findings by investigating the impact of oral and intravenous fluids on the frequency with which oligohydramnios improved in the 3rd trimester of pregnancy. The study involved 100 singleton pregnancy patients (50 in each group). The average age of the individuals in the oral and intravenous groups was 33.62 ± 5.45 years and 34.70 ± 4.76 years, respectively. Improvement was seen in 39 (78%) of the oral group and 22 (44%) of the intravenous group. Pre-hydration mean amniotic fluid index levels were 4.79 ±0.53 in the oral group and 4.87 ±0.36 in the intravenous group. The mean amniotic fluid index level after hydration was 6.79 ±1.22 and 5.97 ± 1.37 in the oral and intravenous groups, respectively. So, the concluded that oral hydration of pregnant women is more beneficial than intravenous hydration. The results are surprising for us. Oral rehydration may be better associated with stimulation of internal mechanisms to combat oligohydramnios than the intravenous route which usually overloads the circulation.

Also, **Deshmukh *et al.*** [14] performed a comparison of oral and intravenous hydration therapy on maternal and fetal outcome in oligohydramnios patients. The study enrolled 180 patients who received oral hydration and 120 patients received IV hydration therapy. Both groups were well matched as regards baseline data. Patients receiving oral hydration therapy had a mean AFI on admission of 4.86 cm, while those receiving intravenous hydration therapy had a mean AFI of 5.11 cm. The mean AFI in the oral and IV groups, 48 hours after hydration, was 6.02 and 5.70 cm, respectively. Researchers found that patients with oligohydramnios benefited from both oral and IV hydration therapies. A comparison of two treatments reveals no significant differences in mother and fetal outcome. Yet, in cases of low AFI and oligohydramnios, a simple, effective, cost-free, side-effect-free, readily available method of hydration therapy can serve both a therapeutic and preventative purpose. Furthermore, **Khajotia *et al.*** [15] aimed to determine the effects of hydration therapy on patients with oligohydramnios. The study enrolled 200 women, equally assigned to receive oral or intravenous hydration. All baseline data were well matched between the studied groups. The mean AFI in the IV group was 4.47±0.90 cm before hydration therapy and 7.16±1.57 cm after hydration therapy, representing a 60.18% rise in the oral group, the figures were 4.52±0.83 cm before hydration therapy and 7.48±1.56 cm after hydration therapy, representing a 65.48% increase in IV group. When the 2 groups are compared, however, the increases in mean AFI were not significant (p > 0.05). **Nagina** [16] sought to ascertain the percentage rise in mean amniotic fluid index in pregnant women following IV maternal hydration in third trimester oligohydramnios. There were 156 women with oligohydramnios in their third trimester who participated in the trial. Researchers found that cases of oligohydramnios saw an increase in amniotic fluid volume when mothers were given intravenous hydration. (Mean difference in AFI 2.9 cm, 95% CI). The typical increase in AFI was 87%±33.5. **Kiran *et al.*** [17] also reported that the acute maternal IV hydration increased the amniotic fluid volume. **Lorzadeh *et al.*** [18] found that maternal IV fluid therapy more significantly increased AFI when compared to oral therapy. **Ali and Hebbar** [19] reported a significant increase in AFI after IV infusion of one liter of fluid in amniorrhexis, although they were unable to explain the cause of the hydration-associated increase in AFI.

The heterogeneity in results of the previous studies may

be related to different sample size, inclusion, and exclusion criteria.

Conclusion: In the 3rd trimester, IV maternal hydration therapy was found to be safe and effective (it increased the AFI) in pregnant cases with isolated oligohydramnios. The limiting steps of the current work include a small number of patients and absence of the comparison group. Thus, our findings need to be confirmed in larger studies with longer follow-up periods so that risk factors for negative outcomes may be identified.

Conflict of interest: None

Financial disclosure: none

REFERENCES

1. Azarkish F, Janghorban R, Bozorgzadeh S, Arzani A, Balouchi R, Didehvar M. The effect of maternal intravenous hydration on amniotic fluid index in oligohydramnios. BMC Res Notes. 2022 Mar 7;15(1):95. doi: 10.1186/s13104-022-05985-6.
2. Benzer N, Pekin AT, Yılmaz SA, Kerimoğlu ÖS, Doğan NU, Çelik Ç. Predictive value of second and third trimester fetal renal artery Doppler indices in idiopathic oligohydramnios and polyhydramnios in low-risk pregnancies: a longitudinal study. J Obstet Gynaecol Res. 2015;41(4):523-8. doi: 10.1111/jog.12601.
3. Singh BB, Devika C, Kuamari CS. Obstetric and perinatal outcome & usefulness of umbilical artery doppler velocimetry in cases of oligohydramnios diagnosed after 34 weeks of gestation. Int J Curr Res 2015;7(9):20090-20092.
4. Ahmed AW, Abdul-Qaderkhuder H, Mudhafar AD. Evaluation of Amniotic Fluid by Ultrasound in Oligohydramnios Managed by Oral Maternal Rehydration in 2nd And 3rd trimesters In Mosul City. Syst Rev Pharm, 2020, 11.12: 1944-1949.
5. Bhat S, Kulkarni V. Study of effect of Oligohydramnios on maternal and fetal outcome. Int J Med Dental Sci 2015; 582–588. doi:10.18311/ijmds/2015/19779.
6. Yang SW, Jin Y, Jang EB, Kim HS, Sohn IS, Kwon HS, Hwang HS. 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 Sep;63(5):586-593. doi: 10.5468/ogs.20061.
7. Cicily TJ, Sherin S, Gopal AK. Effect of hydration therapy on oligohydramnios. Int J Reprod, Contracept, Obstetr Gynecol 2017; 6(5): 1800-1806. doi: 10.18203/2320-1770.ijrcog20171538
8. Mathur M, Gupta S, Sibia PK, Kaur V. The Role of Umbilical Artery Doppler Velocimetry in Oligohydramnios ator Beyond 34 Weeks and Its Correlation with Fetal Outcome. IOSR-JDMS*;* 2017; 16 (2): 45. DOI: 10.9790/0853-1602024548
9. Zakaria AM, Sedek AA, Abohassan NA. Amniotic fluid changes and doppler studies in unexplained oligohydramnios before and after intravenous maternal hydration. The Egy J Hospital Med 2018; 73 (2): 6052-6063. DOI: 10.21608/ejhm.2018.12502
10. Rabie N, Magann E, Steelman S, Ounpraseuth S. Oligohydramnios in complicated and uncomplicated pregnancy: a systematic review and meta-analysis. Ultrasound Obstet Gynecol. 2017 Apr;49(4):442-449. doi: 10.1002/uog.15929.
11. Rabinovich A, Holtzman K, Shoham-Vardi I, Mazor M, Erez O. Oligohydramnios is an independent risk factor for perinatal morbidity among women with pre-eclampsia who delivered preterm. J Matern Fetal Neonatal Med. 2019 Jun;32(11):1776-1782. doi: 10.1080/14767058.2017.1417377.
12. Habib N, Syed S, Khurshid N, Habib A. Efficacy of intravenous hydration versus amino acid infusion in idiopathic oligohydramnios. Annals of PIMS-Shaheed Zulfiqar Ali Bhutto Medical University 2021; 17 (1): 23-27. DOI: 10.48036/apims. v17i1.375
13. Malik M, Irshaad S, Bokhari NA, Qazi WA, Raza A, Bashir K. Effects of oral fluids and intravenous fluids in the improvement of amniotic fluid index during third trimester of pregnancy. Pak Armed Forces Med J 2021, 71 (1): 179-83. doi: 10.51253/ pafmj.v71i1.2790.
14. Deshmukh A, Sambarey PW, Gaikwad B. Comparison of oral and iv hydration therapy on maternal and fetal outcome in oligohydramnios patients. Int J Clin Obstetr Gynaecol 2021; 5(3): 217-221. DOI: 10.33545/gynae.2021.v5.i3d.928
15. Khajotia S, Naraniya D, Meena S. Comparative study of the efficacy of oral and intravenous maternal hydration in the management of third trimester oligohydramnios and its effect on maternal and fetal outcome. Int J Reprod Contracep Obstetr Gynecol 2020; 9 (5): 2077-2081. doi: 10.18203/2320-1770.ijrcog20201808
16. Nagina RS. Mean Increase in Amniotic Fluid Index in Pregnant Women after Intravenous Maternal Hydration in 3rd Trimester Oligohydramnios. Pak J Med Health Sci 2017; 11 (1): 419-422.
17. Kiran S, Ameen A, Akram A, Jamil M. Comparison of effects of oral maternal hydration and intravenous infusions on amniotic fluid index in third trimester isolated oligohydramnios. Prof Med J. 2019;26(12):2064–9.
18. Lorzadeh N, Kazemirad S, Lorzadeh M, Najafi S. Comparison of the effect of oral and intravenous fluid therapy on women with oligohydramnios. Res J Obs Gynecol. 2008; 1(1):25–9. DOI: 10.3923/rjog.2008.25.29.
19. Ali J, Hebbar S. Ultrasound Assessment of fetal head-perineum distance prior to induction of labour as a predictor of successful vaginal delivery. J Obstet Gynaecol India. 2019;69(2):129–35.

The Scientific Journal of Medical Scholar

SJMS | E-ISSN: 2833-3772 | Volume 2, Issue 3 | May-June 2023

Publisher: Real-Publishers Limited (Realpub LLC)

30 N Gould St Ste R, Sheridan, WY 82801, USA

Co-Publisher: SSESD, Egypt

Website: https://realpublishers.us/index.php/sjms/index