Original Research Article

Effect of maternal oral hydration in oligohydramnios

Salomi Singh[1], Shaifali K Patil[1], Tanya Vijan[1],*

[1]*Dept. of Obstetrics & Gynecology, MGM Medical College and Institute of Health Sciences, Navi Mumbai, Maharashtra, India*

A B S T R A C T

Background: The study is to compare the effect of oral hydration in pregnant women with moderate isolated oligohydramnios (AFI 5-8 cm) over 28 weeks of gestation.

Materials and Methods: The study was conducted on 50 pregnant women, randomized into two groups, each group having 25 women. Study group comprising 25 pregnant women with moderate oligohydramnios from study group were given 2 litres of water in 2 hours for 7 days apart from their routine water intake and ultrasound was done after 2 hours after completion of water intake, 24 hours and then after 7 days. While 25 pregnant women with moderate oligohydramnios from control group were give routine medications as per the Institute protocol and was explained to have routine water intake. Ultrasound was done after 2 hours after registering the case as control, 24 hours and 7 days.

Results: Amniotic fluid index improved in 19 cases as compared to pretreatment levels in study group. Amniotic fluid index worsened in 21 pregnant women from control group. The difference was statistically significant (p<0.05). In this study, there is significant rise in AFI after oral hydration of pregnant women (p<0.05)

Conclusions: Oral maternal hydration therapy with water improves the level of amniotic fluid index significantly in third trimester of pregnancy. Hydration with water is not associated with any adverse maternal outcomes.

1. Introduction

Oligohydramnios is considered as a potential sign of fetal compromise and is associated with increased perinatal morbidity and mortality. Amniotic fluid is needed for maintaining fetal well-being; therefore, oligohydramnios can impact on outcome of pregnancy.

It is universally accepted now that an adequate amniotic fluid volume is an essential requirement for apposite intrauterine development and better outcome during neonatal phase.[1,2] Amniotic fluid helps in development of fetal lungs, musculoskeletal and gastrointestinal systems normally and prevents umbilical cord compression. The liquor amnii rises from 25ml at 10 weeks to around 400-500ml at 20 weeks. This volume increases at 28 weeks to approximately 800-1000ml. Liquor amnii plateaus at around term and decreases further to reach 400ml at 42 weeks.[3]

Oligohydramnios is reduction in volume of amniotic fluid to less than 5cm which affects 3-5% of pregnancies. Amniotic fluid index helps to measure amniotic fluid semi-quantitatively. It is a better and more objective method to estimate amniotic fluid volume as it measures fluid in all 4 quadrants. Amniotic fluid index of 5-18cm is taken as normal. Oligohydramnios in last trimester often leads to non-reassuring fetal heart, need for induction of labor, meconium aspiration syndrome and increased incidence of still birth and perinatal death.[4] It is also associated with

 * *Corresponding author.*
    E-mail address: tanyasvijan@gmail.com (T. Vijan).

malpresentations and umbilical cord compression.

Since maternal dehydration increases chances of oligohydramnios, simple oral hydration of pregnant women has been suggested to increase amniotic fluid volume. In literature, maternal hydration therapy is known to restore amniotic fluid volume and therefore, reducing incident of perinatal morbidity and mortality. Sherer et al. in 1990[5] confirmed that there is significant increase in amniotic fluid after giving oral hydration therapy in patient with oligohydramnios. This study is conducted for assessment of effect of maternal oral hydration on amniotic fluid index in cases diagnosed as isolated oligohydramnios in third trimester of pregnancy and its influence on perinatal outcome. Hydration of patients with oligohydramnios in 3rd trimester of pregnancy caused increase in amniotic fluid volume with mean change of approximately 4.5cm.[6]

2. Materials and Methods

The study is prospective, randomized, comparative study conducted at Department of Obstetrics and Gynecology, MGM Hospital, Navi Mumbai. Written, valid and informed consent was obtained from all women who participated in the study. Pregnant women of more than 28 weeks of gestation with moderate oligohydramnios of amniotic fluid index between 5-8 cm.

A total of 50 pregnant women were included in the study after taking informed consent. The patients were divided into two groups (25 each). Sample size was not based on any statistical calculations and assumptions and it is planned to use 25 samples for each of the two groups. Thus, a total of 50 patients were included in the study with 25 in study group and 25 in control group.

2.1. Study group

25 pregnant women with moderate oligohydramnios from study group were given 2 litres of water in 2 hours for 7 days apart from their routine water intake and ultrasound was done after 2 hours after completion of water intake, 24 hours and then after 7 days.

2.2. Control group

25 pregnant women with moderate oligohydramnios from control group were give routine medications as per the Institute protocol and was explained to have routine water intake. Ultrasound was done after 2 hours after registering the case as control, 24 hours and 7 days.

All pregnant women with singleton pregnancy of gestational age more than 28 weeks with cephalic presentation with amniotic fluid index of 5-8 cm were included in study. Gestational age of less than 28 weeks, Multiple pregnancy, Post term pregnancy, Heart disease in pregnancy, Renal disease in pregnancy, Pregnancy induced hypertension and Gestational Diabetes, Abruptio placenta, Placenta previa, Preterm rupture of membranes, Ultrasound suggestive of anomalous fetus and patients in labor with ruptured amniotic membranes were excluded from study.

Detailed analysis was carried out with respect to:

1. Pre-treatment AFI
2. AFI after 2 hours of hydration therapy
3. AFI after 24 hours of hydration therapy
4. AFI after 7 days of hydration therapy
5. Mode of delivery
6. Indication for LSCS
7. Birth weight of baby
8. APGAR score at 1 minute and 5 minutes
9. NICU Admission

3. Results

3.1. Study hypothesis

Null hypothesis (H_0): Oral rehydration therapy does not have any effect on the AFI after 7 days.

Alternate hypothesis (H_1): Oral rehydration therapy improves the AFI after 7 days.

3.2. Data expression

Measurement data for gestational age (GA), birthweight and scores for AFI and APGAR are expressed as means with median and standard deviation (SD). Change in AFI at 2 hours, 24 hours and 7 days are calculated and expressed as means with median and SD. Discrete and nominal data is presented as numbers with percentages. 95% confidence intervals are presented as appropriate.

3.3. Data analysis

Baseline GA at enrollment, GA at delivery and birth weight is compared for differences using unpaired sample t-test.

The AFI scores are compared between the two groups at baseline (pre-treatment), 2 hours, 24 hours and 7 days using the Mann-Whitney 'U' test. Similarly, the change in AFI scores from baseline after 2 hours, 24 hours and 7 days are compared between the two groups using the Mann-Whitney 'U' test.

Within group changes in AFI scores are analysed using the Freidman test with time as independent variable.

The improvement in AFI (improved, not improved) is compared between the two groups after 2 hours, 24 hours and 7 days using Fischer's chi-square test. Similarly, the need for NICU admission and need for LSCS is compared between the two groups after 2 hours, 24 hours and 7 days using Fischer's chi-square test. The mode of delivery is compared between the two groups using chi-square test. Odds ratio are calculated for number of patients with improved AFI score at 2 hours, 24 hours and 7 days.

The APGAR scores at 1 hour and 5 hours is compared between the two groups using the Mann-Whitney 'U' test.

All testing was done using two-sided tests at alpha 0.05. Thus, the criteria for rejecting the null hypothesis was be a 'p' value of <0.05.

4. Discussion

4.1. Improvement in amniotic fluid index after 2 hours of hydration therapy

The mean pre-treatment AFI at baseline was comparable between both groups.

There was no significant improvement in 14 pregnant women in both groups in AFI two hours after the hydration therapy in both study and control groups. Improvement was seen in 5 pregnant women in study group and 2 pregnant women in control group after 2 hours of hydration therapy. While AFI reduced further in 6 pregnant women in study group and 9 in control group after two hours. The difference was however, statistically non-significant (p>0.05).

4.2. Improvement in amniotic fluid index after 24 hours of hydration therapy

In our study, no improvement in amniotic fluid index after 24 hours of hydration therapy was seen in 8 pregnant women in study group and 6 pregnant women in control group. Amniotic fluid index increased in 13 pregnant women in study group while only 2 pregnant women showed improvement in amniotic fluid index from the control group. Reduction of amniotic fluid index was seen in 4 and 17 from cases and control groups respectively. The difference was statistically significant (p<0.05).

4.3. Improvement in amniotic fluid index after 7 days of hydration therapy

Amniotic fluid index improved in 19 cases as compared to pretreatment levels in study group. Amniotic fluid index worsened in 21 pregnant women from control group. The difference was statistically significant (p<0.05).

In this study, there is significant rise in AFI after oral hydration of pregnant women (p<0.05).

In a study by Ghafarnejad[7] reported that with maternal oral hydration, mean AFI improved from 50.8 to 67.8mm (p<0.001) which correlated with our present study.

Fait et al[8] published similar results and document that short term increase in AFI continues in long term if maternal hydration is continued by drinking 2 litres of water every day for 1 week which is similar to results in present study where mean AFI has increased up to 7.72 +/- 2.64 cm after 7 days of hydration.

4.4. Comparison to type of delivery

In our study, 72% cases from study group had full term vaginal delivery with 12% instrumental delivery and only 16% caesarean delivery which were done in view of fetal distress.

However, 52% cases underwent caesarean delivery and 32% had full term vaginal delivery in control group. This difference is statistically non-significant (p>0.05).

In control group, caesarean delivery was done for fetal distress in 7 cases (28%), 4 cases (16%) for meconium stained amniotic fluid and 2 cases (8%) in view of failure of induction.

In a study by Brain S Cater et al[9] documented 20-30% increase in AFI and a reduction in rate of caesarean section after oral maternal hydration with pregnancies with isolated oligohydramnios which correlates with our study.

In a study by Mahnaz Shahnazi et al[10] reported significant rise in amniotic fluid index in group which was hydrated from 4.7 to 6.25 cm. Meconium stained liquor was seen in 20% cases and 36% in control group which was statistically non-significant.

4.5. Neonatal parameters

In our study, the mean birth weight and APGAR score at 1 minute among the newborns was compared in both groups.

The mean birth weight in study group was 2.78kg +/- 0.34 and 2.29kg +/- 0.57 in control group. This difference was statistically significant (p<0.05).

In study group, the mean APGAR score at 1 minute was 6.52 +/-0.71 and in control group it was 5.72 +/- 0.84. This difference was statistically significant (p<0.05).

In a randomized control trial by Akter MD et al,[11] fetal outcome was healthy in 87.1% in study group and 59.4% in control group, asphyxiated in 12.9% in study group and 50% in control group and perinatal death was 3.22% in intervention group and 21.8% in control group.

The study group cases in which AFI has increased to 7 or above has increased rate of vaginal delivery and better APGAR score at birth. Similar results were documented by Golan et al.[12] and Charu et al.[13]

4.6. NICU admission

In our study, 2 babies were admitted in NICU in view of low birth weight. While in control group, 12 cases (48%) had NICU admission. 3 cases (12%) for low birth weight, 5 cases (20%) due to respiratory distress and 4 cases (16%) were taken to NICU for observation due to minor ailments. However, there were no intrapartum deaths in this study but one baby expired in the first week of life due to grade 4 respiratory distress.

Bangal VB et al[14] documented still births of 8% and 16% neonatal deaths in a study on perinatal outcome in 100 cases of oligohydramnios.

Table 1: Age (yrs.) and gestational age (wks.)

	Study (n=25)			Control (n=25)			Paired sample t-test			
	Mean	SD	SEM	Mean	SD	SEM	Mean diff.	95% C.I. for diff.	T	p
Age (yrs.)	26.44	3.37	0.67	24.88	2.55	0.51	1.56	-0.14 to 3.26	1.845	0.071
GA before study	34.08	1.50	0.30	34.28	1.37	0.27	-0.20	-1.02 to 0.62	-0.493	0.624
GA before Delivery	37.40	1.47	0.29	36.04	1.81	0.36	1.36	0.42 to 2.30	2.911	0.005

Table 2: Parity

	Study (n=25)		Control (n=25)		Chi-square test	
	No.	%	No.	%	c^2	p
Primi	13	52.0%	15	60.0%	0.569	0.776
Multi	12	48.0%	10	40.0%		

Table 3: AFI score (ultrasound)

	Study (n=25)			Control (n=25)			Mann-Whitney 'U' test			
	Mean	SD	SEM	Mean	SD	SEM	Mean diff.	95% C.I. for diff.	Z	P
AFI										
Pre-Treatment	6.36	0.86	0.17	6.36	0.86	0.17	0.00	-0.49 to 0.49	0.000	1.000
After 2 hours	6.30	0.84	0.17	6.08	0.95	0.19	0.22	-0.29 to 0.73	-0.816	0.414
After 24 hours	6.72	1.06	0.21	5.68	0.95	0.19	1.04	0.47 to 1.61	-3.178	0.001
After 7 days	7.72	2.64	0.53	4.40	1.53	0.31	3.32	2.09 to 4.55	-4.174	<0.0001
Change in AFI										
After 2 hours	-0.06	0.65	0.13	-0.28	0.61	0.12	1.230	-0.14 to 0.58	1.230	0.225
After 24 hours	0.36	0.91	0.18	-0.68	0.75	0.15	4.421	0.57 to 1.51	4.421	<0.0001
After 7 days	1.36	2.53	0.51	-1.96	1.24	0.25	5.889	2.19 to 4.45	7.516	<0.0001

Table 4: Improvement in AFI score from pre-treatment

	Study (n=25)		Control (n=25)		Chi-square test	
	No.	%	No.	%	c^2	p
2 hours						
No improvement	14	50.0%	14	50.0%	1.886	0.390
Improvement	5	71.4%	2	28.6%		
Worsening	6	40.0%	9	60.0%		
24 hours.						
No improvement	8	57.1%	6	42.9%	16.400	<0.0001
Improvement	13	86.7%	2	13.3%		
Worsening	4	19.0%	17	81.0%		
7 days						
No improvement	1	20.0%	4	80.0%	30.646	<0.0001
Improvement	19	100.0%	0	0.0%		
Worsening	5	19.2%	21	80.8%		

Table 5: Amnioticfluid status after 7 days

	Study (n=25)		Control (n=25)			
	No.	%	No.	%	O.R.	
No oligohydramnios	17	68.0%	0	0.0%	25.769	<0.0001
Moderate oligohydramnios	3	12.0%	10	40.0%		
Severe oligohydramnios	5	20.0%	15	60.0%		

Table 6: Odds ratio for improvement in AFI score

	Study (n=25)		Control (n=25)				
	No.	%	No.	%	O.R.	95% C.I. for O.R.	
2 hours	5	20.0%	2	8.0%	2.875	0.502 to 16.447	0.221
24 hours	13	52.0%	2	8.0%	12.458	2.407 to 64.495	0.001
7 days	19	76.0%	0	0.0%	-	-	<0.0001

Table 7: Delivery type

	Study (n=25)		Control (n=25)		Chi-square test	
	No.	%	No.	%	c^2	p
FTND	18	72.0%	8	32.0%	8.754	0.013
LSCS	4	16.0%	13	52.0%		
Outlet	3	12.0%	4	16.0%		

Table 8: LSCS

	Study (n=25)		Control (n=25)		Chi-square test	
	No.	%	No.	%	c^2	p
No LSCS	21	84.0%	12	48.0%	9.273	0.026
FD	4	16.0%	7	28.0%		
MSAF	0	0.0%	4	16.0%		
FI	0	0.0%	2	8.0%		

Table 9: Neonatal parameters

	Study (n=25)			Control (n=25)			Mann-Whitney 'U' test			
	Mean	SD	SEM	Mean	SD	SEM	Mean diff.	95% C.I. for diff.	Z	P
Pregnancy outcomes										
Birth weight (kg)	2.78	0.34	0.07	2.29	0.57	0.11	0.49	0.22 to 0.76	3.690	0.001
APGAR - 1 min.	6.52	0.71	0.14	5.72	0.84	0.17	0.80	0.36 to 1.24	-3.275	0.001
APGAR - 5 min.	7.96	0.84	0.17	7.28	1.10	0.22	0.68	0.12 to 1.24	-2.297	0.022

Table 10: Need for NICU admission

	Study (n=25)		Control (n=25)		Chi-square test	
	No.	%	No.	%	c^2	p
Need for NICU	2	8.0%	12	48.0%	9.921	0.002
Reason for NICU admission						
LBW	2	8.0%	3	12.0%	12.514	0.014
Observation	0	0.0%	4	16.0%		
RD	0	0.0%	5	20.0%		

5. Conclusion

Oral maternal hydration therapy with water improves the level of amniotic fluid index significantly in third trimester of pregnancy. Hydration with water is not associated with any adverse maternal outcomes.

It is associated with similar perinatal outcomes as it is observed in patients with normal amniotic fluid index in third trimester. Maternal hydration therapy orally is simple, easy, non-invasive and probably a very effective way to increase the liquor in cases of isolated oligohydramnios.

Although a continuous hydration therapy for a long term will help to improve the perinatal and neonatal outcome.

Our data presents that pregnancy with isolated oligohydramnios, oral hydration therapy significantly increases the amount of amniotic fluid.

6. Source of Funding

7. Conflict of Interest

The authors declare no conflict of interest

References

1. Nabhan AF, Abdelmoula YA. Amniotic fluid index versus single deepest pocket as a screening for preventing adverse pregnancy outcome. *Cochrane Database Syst Rev*. 2008;3:CD006593.
2. Sherer DM. A review of amniotic fluid dynamics and the enigma of isolated oligohydramnios. *Am J Perinatol*. 2002;19(5):253–66.
3. Wood MU, Gilbert WM, Sherman MP. Amniotic fluid not just fetal urine anymore. *J Perinatol*. 2005;25(5):341–8.
4. Casey BM, Lenovo KJ.   Pregnancy outcomes after antepartum diagnosis of oligohydramnios at or beyond 34 weeks' gestation. *Am J Obstet Gynecol*. 2000;182(4):909–12.
5. Sherer DM, Cullen J, Thompson HO, Woods JR.   Transient oligohydramnios in a severely hypovolemic gravid woman at 35 weeks' gestation, with fluid reaccumulating immediately after intravenous maternal hydration.   *Am J Obstet Gynecol*. 1990;162(3):770–1.
6. Umber A, Chohan M.   Intravenous maternal hydration in third trimester oligohydramnios: effect on amniotic fluid volume. *J Coll Physicians Surg Pak*. 2007;17(6):336–9.
7. Ghafarnejad M, Tehrani MB, Anaraki FB, Mood NI, Nasehi L. Oral hydration therapy in oligohydramnios. *J Obstet Gynaecol Res*. 2009;35(5):895–900.
8. Fait G, Pauzner D, Gulll I, Lessing JB, Jaffa AJ, Wolman I. Effect of 1 week of oral hydration on the amniotic fluid index. *J Reprod Med*. 2003;48(3):187–90.
9. Carter BS, Boyd RL. Polyhydramnios and oligohydramnios treatment and management; 2015. Available from: https://reference.medscape. com/article/975821-treatment.
10. Patrelli TS, Gizzo S, Cosmi E, Carpano MG, Gangi SD, Pedrazzi G, et al.   The effects of intravenous hydration on amniotic fluid volume and pregnancy outcomes in women with term pregnancy and oligohydramnios: a randomized clinical trial.   *J Ultrasound Med*. 2012;31(2):239–44.
11. Akter MD, Kabir N, Shah MS, Islam F, Tasnim S. Effect of maternal oral hydration therapy in oligohydramnios. *Mymensingh Med J*. 2012;21(4):723–8.
12. Golan A, Lin G, Evron S, Arieli S, Niv D, David MP. Oligohydramnios: Maternal complications and fetal outcome in 145 cases. *Gynecol Obstet Invest*. 1994;37(2):91–5.
13. Jandial C, Gupta S, Sharma S, Gupta M.   Perinatal outcome after antepartum diagnosis of oligohydramnios at or beyond 34 weeks of gestation. *JK Sci*. 2007;9(4):213–4.
14. Bangal VB, Giri PA, Sali BM. Incidence of oligohydramnios during pregnancy and its effect on maternal and perinatal outcome.   *J Pharmac Biomed SCI*. 2011;12(12):1–5.

Author biography

Salomi Singh, Assistant Professor

Shaifali K Patil, Associate Professor

Tanya Vijan, Resident