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Meenakshi Chauahan
Professor,
Department of Obstetrics and Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

Jyotsna Yadav
Junior Resident,
Department of Obstetrics and Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

Sarika Gautam
Associate Professor,
Department of Obstetrics and Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

Corresponding Author:
Jyotsna Yadav
Junior Resident,
Department of Obstetrics and Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

Effect of oral hydration therapy in isolated Oligohydramnios: A randomized controlled study

Meenakshi Chauahan, Jyotsna Yadav and Sarika Gautam

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Abstract
Purpose: To evaluate maternal *oral hydration therapy* for improving AFI in cases of isolated oligohydramnios and their fetomaternal outcome.
Methods: A *randomized controlled study* was carried out on 100 antenatal women with singleton pregnancy and gestational age ≥32 weeks with isolated oligohydramnios (AFI ≤ 5). Subjects were divided into two equal groups A and B. Subjects in group A acted as controls. Subjects in study group B were asked to drink two litres of water over six hours for seven days, apart from their daily fluid intake. AFI measurement was carried out on day zero and day seven. All the subjects were followed up till delivery for maternal and fetal outcome.
Results: A significant improvement in AFI was observed after 7 days in the oral hydration group as compared to controls (7.08 ± 0.21cm vs. 5.0 ± 0.20 cm, *p >0.001*) which helped in prolongation of pregnancy till term. The mean AFI at the time of termination in control group was 2.72 ±1.88 cm as compared to 5.6 ±2.14 cm in study group. A significantly greater number of women went into spontaneous labour (68.1% vs. 39.1% in the study and control group respectively, p=*0.007*) after hydration therapy and the incidence of meconium staining of liqour and fetal distress during labour was also significantly lesser.
Conclusion: Oral hydration therapy improves the AFI as well as the fetomaternal outcome.

Keywords: Isolated oligohydramnios, oral hydration therapy, amniotic fluid index

Introduction

Oligohydramnios is an obstetric complication that means an abnormally reduced amount of AF. The sonographic diagnosis of oligohydramnios is usually based on an AFI less than or equal to 5 cm or on a single deepest pocket of AF less than or equal to 2 cm [1]. Oligohydramnios complicates around 1 to 5% of pregnancies at term [2]. In cases of oligohydramnios, there is an increased risk for still-birth, spontaneous or medically indicated preterm birth, heart rate pattern abnormalities and growth restriction [3]. Women with oligohydramnios also have a twofold increased risk for caesarean delivery for fetal distress and a fivefold risk for an Apgar score <7 at 5 minutes compared with pregnancies with normal AFI [4]. This eventually has led to a rise in maternal morbidity especially in terms of operative delivery for failed inductions of labour [2].

Oligohyramnios is seen in cases with fetal urinary tract abnormalities, uteroplacental insufficiency and fetal growth restriction, exposure to drugs (like ACE inhibitors, NSAIDS), and premature rupture of membranes. In less than half of the cases, oligohydramnios may be diagnosed even in the absence of any of the causes mentioned above known as *isolated oligohydramnios (IO)* i.e. in the presence of an appropriate-for-gestational age, non-compromised fetus in the absence of maternal disease [2]. Occasionally IO may be diagnosed in pregnant women with a personal history of insufficient fluid intake. This led to investigation regarding the potential role of maternal dehydration in contributing to the development of this condition [5]. Multiple studies have proposed that hydration leads to change in maternal osmolality. This, in turn leads to increased uterine perfusion and thus increases placental perfusion. Thus it increases fetal renal perfusion, fetal urine production and hence amniotic fluid volume.

A cost effective and non-invasive treatment modality such as maternal oral hydration therapy may have far reaching implications for obstetric care especially in the bid to reduce the rate of unnecessary caesarean sections and to facilitate vaginal deliveries. However, there are still doubts over the most effective strategy of maternal hydration and whether such *forced hydration* leads to sustained results and affects maternal and perinatal outcome in a positive manner.

The present study was undertaken to evaluate maternal oral hydration therapy for improving AFI in cases of isolated oligohydramnios and to study the maternal and perinatal outcome in the above cases.

Material and Methods

The study was a randomized controlled study carried out on 100 antenatal women with singleton pregnancy and gestational age ≥32 weeks with isolated oligohydramnios with four quadrant estimation of amniotic fluid index (AFI) ≤ 5, admitted in the Department of Obstetrics and Gynaecology, Pt. B.D. Sharma PGIMS, Rohtak from January 2018 to December 2018. Oligohydramnios was diagnosed sonographically, and an AFI ≤ 5 was considered as oligohydramnios.

Exclusion Criteria: Multiple pregnancy, premature rupture of membranes (PROM), hypertensive disorders of pregnancy, systemic infections, intra-uterine growth retardation (IUGR), gross congenital malformations (GCMF), severe anaemia, any obvious placental or cord anomaly detected on sonography, renal disorders, any other medical complications and a non-reactive non stress test (NST).

The participants were divided into two arms according to a computer generated table i.e. Group A and Group B. Group A consisted of 50 patients who acted as controls. Group B was the study group comprising of 50 patients, to whom oral hydration therapy was given. Informed and written consent was obtained from all individual participants included in the study. A detailed history was taken and clinical examination was performed. Gestational age was calculated from last menstrual period (LMP) or dating scan and women with gestational age ≥ 32 weeks were included in the study. A non-stress test (NST) was done in every participant. Estimation of AFI was carried out sonographically using the four quadrant technique described by Phelan *et al.* [6] Subjects in Group A i.e control group were kept under observation as per hospital protocol which includes close antepartum surveillance, steroid cover for lung maturity and termination of pregnancy according to clinical and biophysical markers. Fetal surveillance was done using fetal heart rate monitoring, daily fetal movement count chart and non-stress test twice a week.

In addition to the above, subjects in study Group B were asked to drink two litres of water over six hrs for seven days, apart from their daily fluid intake. Two litres fluid was kept at bedside at the initiation of therapy. Women were encouraged to drink at least 300 ml water every hour. This was ensured by checking with them every two hrs. AFI measurement was carried out on day zero and day seven. The women were encouraged to maintain increased fluid intake till the time of delivery. All the subjects were followed up till delivery in order to find out maternal and fetal outcome. In both groups, during one week of the therapy, if fetal surveillance showed any adverse pattern, in terms of reduced fetal movements, non-reassuring NST or fetal distress, the pregnancy was terminated.

Statistical Tests: Statistical testing was conducted with the statistical package for social sciences system version SPSS 20.0. Continuous variables were presented as mean ± SD. Categorical variables were expressed as frequencies and percentages. The comparison of continuous variables between the groups was be performed using student's t test and pre –post treatment change was assessed using paired t test. Nominal categorical data between the groups were compared using Chi-squared test.

For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

Results

The cases and controls were similar in respect to age, parity & period of gestation (Table 1).

Table 1: Demographic and clinical profile of women with isolated oligohydramnios

Age (Years)	Group A		Group B		P Value
	N(50)	%	N(50)	%	
<20	3	6%	2	4%	0.49
20 - 25	24	48%	27	54%	
25 - 30	14	28%	15	30%	
30 - 35	7	14%	5	10%	
>35	2	4%	1	2%	
	Mean	SD	Mean	SD	
	24.78	4.04	24.22	4.05	
Parity					
Primigravida	30	60.00%	28	56.00%	0.84
Multigravida	20	40.00%	22	44.00%	
Period of Gestation at Admission (weeks)					
32 - 34	13	26%	13	26%	0.816
34 – 36	15	30%	20	40%	
36 - 38	22	44%	16	32%	
>38	0	0%	1	2%	
	Mean	SD	Mean	SD	
	35.11	1.8	35.03	1.6	

The mean AFI of the two groups at the time of recruitment was similar (p = 0.946). A significant difference was observed between the in the mean AFI of the two groups after 7 days of oral hydration therapy (p < 0.001) (Table 2).

Table 2: Effect of oral hydration therapy on AFI in the short term and long term

AFI (cm)	Day 0				Day 7				At Termination			
	Group A		Group B		Group A		Group B		Group A		Group B	
	N(50)	%	N(50)	%	N(44)	%	N(48)	%	N(49)	%	N(50)	%
0 - 2	7	14%	10	20%	9	20.40%	0	0%	12	24.48%	1	2.04%
2 - 4	23	46%	19	38%	20	45.40%	5	10.40%	20	40.81%	5	10.20%
4 – 6	20	40%	21	42%	13	36.36%	15	31.25%	13	26.53%	15	30.61%
6 - 8	0	0%	0	0%	2	29.50%	25	52.10%	4	8.16%	23	40.93%
8 - 10	-	-	-	-	0	0%	3	6.25%	0	0%	4	8.16%
>10	-	-	-	-	-	-	-	-	0	0%	2	2.04%
Mean ± SD	3.04 ± 1.31		3.06 ± 1.61		3.07 ± 1.70		5.79 ± 1.65		2.72 ± 1.88		5.6 ± 2.44	
P Value	0.946				<0.001				<0.001			

The mean change in AFI from day 0 to day 7 of group A was -0.61% ± 61.87% while that of study group (B) was 123.66 ± 122.44% (p < 0.001). Thus a significant difference was observed between the two groups (t = -6.115, p<0.001) in terms of change in AFI. A significant difference was also recorded in the mean AFI at termination of the two groups (p<0.001).

The mean period of gestation at termination of control group A was 37.24 ± 1.39 weeks and that of the study group (B) was 38.34 ± 1.34 weeks which was significant higher (p = 0).
A significantly greater proportion of women went into spontaneous labour in the oral hydration group as compared to the study group (p = 0.007). However, there was no statistical difference in the mode of delivery between the groups (p = 0.786). (Table 3)

Table 3: Comparision of maternal outcome between the two groups

	Group A		Group B		P Value
	N	%	N	%	
Gestation at delivery (weeks)					
Term (> 37)	34	68%	44	88%	<0.001
Preterm (< 37)	16	32%	6	12%	
Onset of labour					
Spontaneous	18	39.10%	32	68.10%	0.007
Induced	28	60.90%	15	31.90%	
Mode of delivery					
Normal vaginal delivery	41	82%	43	86%	–
LSCS	9	18%	7	14%	

There was a significant difference between the number of women with MSL (p = 0.029), baby weight (p = 0.001) and mean APGAR at 5 mins (p = 0.032) in the two groups (Table 4). But, no statistically significant difference was recorded in the ultimate perinatal outcome (p = 0.331) and in terms of ICU stay (p = 0.078).

Table 4: Comparison of perinatal outcome between the two groups

	Group A		Group B		P value
	N	%	N	%	
Birth weight (kgs)					
> 2.5	18	36%	34	68%	0.001
< 2.5	32	64%	16	32%	
Mean ± SD	2.29 ± 0.51		2.6 ± 0.42		
APGAR at 5 mins					
< 7	3	6%	0	0%	0.032
> 7	47	94%	50	100%	
MSL	12	24%	4	8%	0.29

Discussion

The demographic profile of women in our study correlated well with other studies [7, 10]. The AFI was measured at Day 0 and 7 according to our protocol. But, six women in the group A (controls) and two women in the group B (cases) delivered before this. One woman passed into spontaneous labour while seven pregnancies were terminated either due to non reassuring fetal heart rate or a non reactive NST. Thus, AFI was calculated in 44 women in the control group and 48 women in the study group. No significant change was observed in the AFI of the control group as compared to that at the time of admission (Table 2). The AFI of the study group increased significantly to 5.79 ± 1.65 cm after seven days of oral hydration. (t = -7.787, p < 0.001, CI= -3.418 to -2.029). Significant improvement in AFI was observed in 92% of the study population as compared to a minimal increase in AFI in 26% amongst the controls. This increase in AFI in the control group could be attributed to bed rest in left lateral position during the hospital stay.[12] Our findings were consistent with the studies conducted by Ghafarnejad *et al.* and Akter *et al.* [9, 11] Similarly, in a study by Patrelli *et al.* there was a significant increase in AFI in the hydration group as compared to physiologically normal pregnant women (controls) [7].

Studies have found that AFI returns to pre-treatment values over time. It was observed that correct daily and sustained fluid intake helps to maintain normal AFI levels till delivery [12]. Women in our study were also encouraged to continue oral hydration till the time of delivery. The mean AFI at the time of termination in the case of controls was 2.72 ± 1.88 cm, while that of oral hydration group was 5.6 ± 2.14 cm. There was a significant difference between the two groups (t = -7.145, p < 0.001, CI = -3.680 to -2.080). In the study by Patrelli *et al.* AFI at the time of birth in the 2.5 Litres oral hydration group was 11.24 ± 1.49 cm [7]. Similarly, Aggarwal P also observed that the mean AFI at the time of termination was 9.8 ± 0.43 cm [8]. The AFI at termination in our study was much lower in comparison to the above two studies. This finding could be due to non compliance of our patients towards increased fluid intake after discharge from the hospital.
In the present study, the mean gestational age at the termination of pregnancy in control population was 37.24 ± 1.39 weeks and that of the study population was 38.34 ± 1.34 weeks. A significant difference was observed between the two groups (t = -4.032, p<0.001, CI = -1.642 to -0.559). In the oral hydration group 44% (22/50) pregnancies were terminated at term (39-40 weeks). However, in the control group only 10% (5/50) delivered at term gestation. In the study group only in 12% (6/50) of pregnancies, termination was done at < 37 weeks as compared to 32% (16/50) in the control group. 18% and 26% women in the study group as compared to 30% and 28% in the control group delivered between 37-38 and 38-39 weeks respectively. Our findings were consistent with Aggarwal P *et al*. Akter *et al.* and Kansaria J *et al.* [8, 11, 13]. On the contrary, Patrelli *et al.* did not report a significant difference in the mean gestational age at birth [7]. This might be due to the fact that in their study, the control group comprised of physiologically normal pregnancies.
In our study, there was a significantly greater proportion of women who had spontaneous onset of labour after oral hydration therapy (p = 0.007) (Table 3). Amongst the study subjects, 68.1% had spontaneous onset of labour as compared to 39.1% of the controls. Similar results have been reported by other researchers [14]. This shows the effect of oral hydration therapy in decreasing the incidence of induction of labour. In the terms of mode of delivery, 86% had vaginal delivery while 14% had a caesarean section in the oral hydration group compared to 82% and 18% respectively in the control group, though the difference was not statistically significant. These findings were consistent with Patrelli *et al.* [7]. However, Aggarwal P *et al.* and Akter *et al.* observed a significant difference in their study [8, 11].
Oligohydramnios is associated with higher incidence of meconium stained liquor due to cord compression and fetal distress. In our study meconium stained liqour during labour was observed in a significantly greater proportion of control population as compared to the study population, 24% vs. 8% respectively (p = 0.029). Meconium staining of liquor was observed more in cases with AFI less than 3-4. Similar findings were documented by Seth S al and Shahnazi M *et al.* [15, 16]. The mean birth weight was significantly higher in the study group was 2.6 ± 0.42 kgs (t = -3.349, p = 0.001, CI = -0.494 to -0.126) (Table 3). This difference was largely due to induction of labour for non-reassuring NST or persistent oligohydramnios/ anhydramnios. Similar results were observed in studies by Aggarwal P *et al.* and Bhagat *et al.* [8, 17]. On the contrary, Patrelli *et al.* did not report any significant difference in birth weight among the two groups [7]. This difference could be attributed to the fact that they compared the cases with

physiologically normal pregnancies. The mean APGAR at 5 mins of control and study group was 8.26 ± 2.16 and 8.94 ± 0.31 respectively. There was a significant difference between the two groups (t = -2.208, p = 0.032). Our findings were consistent with other studies [8, 18]. There was one intrauterine death in the control group. Four neonatal deaths in the control group as compared to one in the study group were observed either due to resuscitation failure or other neonatal complications. However, there was no statistically significant difference in the ultimate perinatal outcome in terms of ICU stay. Our findings were consistent with Patrelli *et al.* and Gafardejenad *et al.* [7, 9].

Conclusion

It has been observed by the present study that oral hydration therapy brings about a significant increase in AFV which helps in prolongation of pregnancy till term and reduces the need for induction of labour. A significantly greater number of women went into spontaneous labour after hydration therapy and the incidence of meconium staining of liqour and fetal distress during labour was significantly lesser. Oral hydration therapy also improves the APGAR score, weight at birth and thus reduces the incidence of low birth weight. Though, there was no statistically significant difference in the mode of delivery, with respect to vaginal deliveries or Caesarean sections, as well as in the ultimate perinatal outcome. Oral hydration therapy can be recommended in cases of isolated oligohydramnios to improve fetomaternal outcome. Studies with larger number of subjects may be taken up for further authentication.

Ethical approval: The study was approved by the Institutional Ethics Committee.

Conflict of Interest: The authors declare that they have no conflict of interest.

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