Research Journal of Obstetrics & Gynecology

ISSN 1994-7925

science alert

ANSInet
an open access publisher
http://ansinet.com

Research Journal of Obstetrics and Gynecology 1 (1): 25-29, 2008
ISSN 1994-7925

Comparison of the Effect of Oral and Intravenous Fluid Therapy on Women with Oligohydramnios

[1,2]Nahid Lorzadeh, [1]Sirous Kazemirad, [1]Mina Lorzadeh and [1]Sahid Najafi
[1]Hospital (University of Teaching), Iran
[2]Faculty of Medical Sciences, Lorestan University, Iran

Abstract: The aim of this study was to determine the impact of maternal hydration with intravenous fluid or oral fluid on amniotic fluid volume and to compare the outcomes with other studies. This clinical trial Carried out on patients with low AFI and gestational age over 35 weeks without maternal complications were randomized into four groups 2 L/2 oral water 2 L/2 h IV isotonic Fluid 2 L/2 h IV hypotonic Fluid control. Maternal AFI were measured before and after hydration. All group were matched consider of mother age gestational age gravid and parity. Data were analyzed by SPSS version 13 and compared by paired t-test with in each group. The comparison between the groups analyzed with one way analysis and Tokay test. The mean increase in AFI after hydration was significantly greater than in the oral water hydration group ($p<0.0001$), but not in IV isotonic, IV hypotonic group compared with the control group. Maternal hydration with oral water was more effective than other groups.

Key words: Oligohydramnios, amniotic fluid index, maternal hydration

INTRODUCTION

Several studies have shown that Oligohydramnios is more common in post term pregnancies and Fetal Growth Restriction (FGR). Maternal causes of this phenomenon in clued maternal dehydration due to loss of intra-vascular fluid (Magann *et al*., 2000) and even an increase in insensible fluid loss (Sciscione *et al*., 1997). Recent studies on pregnant women with oligohydraminos (Deka, 2004; Homfener and Gulmeziglu, 2002) demonstrated that oral maternal hydration seems to increase amniotic fluid volume. The mechanism that produce this amniotic fluid volume change is through reduction in maternal plasma amorality which in turn leads to a rise in Amniotic Fluid Index (AFI) (Deka, 2004; Fait *et al*., 2003). Alternative method of intravenous hypotonic hydration in women with or without oligohydramnios was associated with an increase in amniotic fluid volume (Magann *et al*., 2000; Homfener and Gulmeziglu, 2002). However, in one randomized blinded trial, isotonic intravenous hydration in women with olighhydramnios had no measurable impact on amniotic fluid volume (Magann *et al*., 2000).

In addition, maternal hydration with isotonic fluid increases maternal plasma volume but could not be associated with fetal urination (Oosterhof *et al*., 2000; Flaek *et al*., 1995). In contrast, intravenously infusion of hypotonic solution in pregnant sheep demonstrated acute decrease in maternal osmolality result in a small shift of fluid onto the fetus as evidenced by an increase in fetal urine flow (Powers and Brace, 1991).

To our knowledge, only one study (Doi *et al*., 1998) compared the effect of maternal hydration with intravenous or oral fluids on AFV in women with oligoydramnios. The authors reported no correlation between isotonic fluid hydration with amniotic fluid volume change.

The aim of this study was to determine the impact of maternal hydration with intravenous fluid or oral fluid on amniotic fluid volume and to compare the outcomes with other studies.

Corresponding Author: Nahid Lorzadeh, Hospital (University of Teaching), Iran

Table 1: Characteristics of the patients regarding maternal age, gestational, gravid and parity

Variables	IV isotonic (n = 20)	IV hypotonic (n = 20)	Oral water (n = 20)	Control (n = 20)	F-value	p-value
Maternal age (year)	24.9±4.24 (19-34)	27.25±5.6 (15-38)	25.25±4.27 (19-33)	24.9±5.73 (16-38)	1.00	NS
Gestational age (week)	38.9±1.41 (35-41)	39±1.3 (36-41)	38.9±1.27 (36-41)	38.9±1.27 (35-41)	0.18	NS
Gravid (n)	1.5±1.14 (35-41)	1.8±1.24 (1-5)	2.1±2.83 (1-7)	1.35±0.81 (1-4)	2.10	NS
Parity (n)	0.5±1.14 (1-4)	0.75±1.25 (0-4)	0.9±1.25 (1-3)	0.5±0.89 (0-3)	0.52	NS

MATERIALS AND METHODS

This study was approved by Ethics committees of Lorestan medical science at September 2003. Patients with ultrasonographic diagnosis of olighydraminos were evaluated for participation in a randomized clinical trial after admission for induction of labor at the division of Obstetrics and Gynecology of Asali Clinic in Khoramabad city between October 2003 and march 2004. Including criteria were an Amniotic Fluid Index (AFI) of less than or equal to 5.0 cm, well-established gestational age over 35 weeks with intact membranes, maternal age ranging 15 to 38 years, women with 1 to 4 parity (Table 1). Exclusion criteria were maternal complications such as hypertension, diabetes mellitus, cardiovascular disease and hyperthyroidism; any evidence of pre-eclampsia; any evidence of fetal structural abnormality of ultrasonographic study; and rupture of the membranes. A power calculation ($\alpha = 5\%$ and $\beta = 20\%$) indicated that approximately 20 subjects in each group would be required as the sample size.

After obtaining written informed consent as well as evaluation for inclusion and exclusion criteria and matching for confounding factors, Patients were randomly selected into four groups as follows:

- Control group receiving no suggestion in regards to fluid intake and during the study AFI changes, were evaluated in this group.
- Oral intake of 2 L/2 h water; Ultrasonography for measuring AFI was performed twice, one before oral rehydration therapy and the second, one hour after oral rehydration therapy.
- IV infusion of 2 L/2 h isotonic fluid (normal saline).
- IV infusion of 2 L/2 h hypotonic fluid (Ringer's solution).

In all groups under fluid therapy patients were admitted and ultrasonography for measuring AFI was performed twice, ond before oral or IV rehydration therapy and the second, 1 h after rehyrdation therapy. We also monitored maternal vital sign and any sign of overhydration during fluid therapy.

All measurements of AFI were performed by single ultrasonographer who was blinded to the randomization of the study groups. After completing the study, at term (37-41 weeks of gestation), depending on AFI, labor was induced by applying oxytocin. All data including demographic data, characteristics of the women with Oligohydramnios and sonographic indexes, before and after ultrasonography, were recorded on prepared data collection forms.

Data were analyzed using SPSS statistical software version 13. Within each group data were compared by paired t-test. For comparing AFI measures within different groups, we used one-way analysis of variance and also post hoc Tokay Test. p-values less than 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

During hydration therapy, we found no changes in maternal vital sign and peripheral venous pressure. No patients discontinued the study because of adverse effects. In oral water group, mean AFI

Table 2: Comparing the amniotic fluid index in women with oligohydramnios prior and following hydration

Groups	Before hydration	After hydration	df	p-value
Oral water (n = 20)	1.00±3.600	1.09±6.00	19	<0.0001
IV hypotonic (n = 20)	0.83±4.20	0.94±5.98	19	<0.0001
IV isotonic n = 20)	0.49±4.42	0.70±5.300	19	<0.0001
Control (n = 20)	0.83±4.20	0.94±5.98	19	<0.0001

Data are presented as means±SD, IV : Intravenous, df: degrees of freedom

Table 3: Differences in amniotic fluid index in mother with oligohydramnios before and after hydration

Variables	IV isotonic (n = 20)	IV hypotonic (n = 20)	Oral water (n = 20)	Control (n = 20)	F-value	p-value
mean±SD	5.3±0.7	5.9±0.94	6.0±1.99	4.8±0.6	22.2	<0.0001

Data are presented as means±SD, IV: Intravenous, AFI: Amniotic Fluid Index

before and after intervention was 3.6±1.0 and 6.0±1.09, respectively ($p<0.01$). In the IV isotonic group mean AFI before intervention was 4.42±0.49 and after that changed to 5.3±0.7. In the IV hypotonic group mean AFI was 4.02±0.83 before intervention which following that reached to 5.98±0.94. Statistical t-test among mean AFI difference in 3 groups-oral water, IV isotonic and IV hypotonic-before and after intervention was significant ($p<0.0001$) but in control group this difference was not statistically significant (Table 2). Regarding to comparing AFI changes among the groups after fluid therapy, one-way Analysis of variance showed a significant relation ($F = 22.2$, $p<0.0001$).

Tokay test detected that mean AFI changes was statistically greater in oral water group, in comparison with IV isotonic and IV hypotonic groups ($p<0.0001$). Although after intervention, AFI changes between IV isotonic and IV hypo- tonic groups was slightly different. This difference did not reach significance. In addition, IV isotonic and IV hypotonic groups compared to control group demonstrated no significant difference in AFI before and after intervention (Table 3).

Present study demonstrated that in pregnant women with oligohydramnios, a significant increase in the AFI was seen by both IV hypotonic and isotonic fluid infusion as well as oral hydration. However, we found that, with regard to IV hydration, oral hydration was more effective for increasing the AFI. Doi *et al*. (1998) in their study investigated the effect of maternal hydration with IV isotonic fluid, IV hypotonic fluid and oral water on AFI in women with oligohydramnios. They concluded that maternal hydration with either IV hypotonic fluid of oral water increases AFI in oligohydramnios, or that maternal osmotic change rather than maternal volume expansion had a more direct impact on increasing amniotic fluid Volume with short-term acute hydration. This is in line with present results, but they did not find a significant increase in the AFI by IV isotonic fluid loading (Mlhotra and Deka, 2004) assessed the AFI of 25 pregnant women (ten women with normal AFI and 15 with decreased AFI) at 3, 24 and 48 h after maternal oral hydration with 2 L of water over 1 h. Post-hydration AFI at 3 h was significantly higher than pre-hydration one. However, AFI at 24 and 48 h were not significantly different from pre-hydration AFI. Therefore, they concluded that maternal hydration increases AFI in women with normal and reduced amniotic fluid, but the rise in the AFI lasts for less than 24 h.

In another study, Homfener and Gulmeziglu (2002) evaluated the effects of maternal hydration on amniotic fluid volume and measures of pregnancy outcome in 77 pregnant women with and without olighydraminos. The women were asked to drink two liters of water before having a repeat ultrasound examination. Maternal hydration in women with and without oligohydramnios was associated with an increase in amniotic fluid volume. The authors concluded that simple maternal hydration appears to increase amniotic fluid volume and may be beneficial in the management and prevention of oligohydramnios during labor, particularly before external cephalic version. Present results were similar in the way that maternal oral hydration therapy had a more profound impact on increase of AFI (Oosterhof *et al*., 2000) investigated the effect of maternal rehydration on the fetus urine production rate in normal near-term human fetus. Twenty one healthy pregnant women attending the clinic for antenatal care, were studied between 37 and 40 weeks' gestation.

The fetal urine production rate was assessed by serial measurements of 3 diameters of the fetal bladder. Successful recordings were achieved in 10 of the 21 women. The hourly fetal urine production rate increased significantly after hypotonic rehydration. The current findings show that the near-term human fetus can manage such acute changes in fluid osmolality by increasing the urine production rate to maintain its fluid homeostasis. This mechanism indicates that changes in maternal plasma osmolality and volume may play a crucial role in determining amniotic fluid volume (Oosterhof *et al*., 2000). Flaek *et al*. (1995) planned a study to determine whether acute maternal hydration in pregnancies with third-trimester oligohydramnios increases AFI and hourly fetal urine production rate and whether it alters uteroplacental perfusion and fetal blood flow. Results showed a significant reduction in maternal plasma and urine osmolality in both groups after short-term oral hydration. Hydration increased amniotic fluid volume in women with oligohydramnios, but not in those with normal amniotic fluid volume.

Hydration was also associated with an increase in uterine artery mean velocity in the oligohydramnios group but not in controls. The authors concluded that short-term maternal oral hydration increases the amniotic fluid index in women with third trimester oligohydramnios. Although the mechanism for this effect remains unclear, it could not be accounted for by fetal urination but instead was associated with improved uteroplacental perfusion. To investigate whether oral or IV hydration affects oligohydramnios in cases with normal biophysical profile scores, Chandra *et al*. (2000) designed a study in which one hundred twenty-four gravid as with singleton pregnancies at or near term were identified during a 16-month period retrospectively as having oligohydramnios. A total of 50 subjects with normal biophysical profiles (Flaek *et al*., 1995; Powers and Brace, 1991; Doi *et al*., 1998). whose labor was induced at once fell into two random, Convenience sample groups: (1) 20 who were advised to drink fluids and (2) 30 given IV fluid. The remaining 74 cases with oligohydramnios consisted of 60 gravid as with normal biophysical profile scores and another 14 with low scores, all of whom had labor induced promptly. Overall, 62.5 and 44.0% demonstrated improved indices after oral and IV hydration, respectively (Chandra *et al*., 2000). This results are in consistent with present results. However, several studies as Nihjland and Ross (1995), Nisell *et al*. (1992) and Ross *et al*. (1996) demonstrated that IV rehydration therapy with water and Arginine Vasopressin Agonist (AVP) induces a sustained reduction in fetal swallowing activity and an increase in fetal urine production, which in turn results in a marked increase in amniotic fluid volume.

In contrast to present study, Chelmow *et al*. (1996) demonstrated that an IV fluid bolus with 1 L of normal saline administered over 30 min could cause a 5.1 cm decrease of AFI in patients with preterm ruptured membranes.

CONCLUSION

In summary, with regards to oligohydramnios and the fetal and maternal risks associated with its complications, on one hand and the fact that maternal oral rehydration therapy is a cheap and feasible method and devoid of serous side effects, on the other hand, thus, we suggest this method of maternal hydration in women with oligohydramnios as our results demonstrated it is the most effective method for oral maternal rehydration. Several studies have previously conducted to determine the effect of maternal hydration of AFI in women with oligohydramnios. However, most of these studies were limited by sample sizes and examined pregnant women at near-term (>35 W gestational age).

Therefore, more studies with large sample size and wide range of gestational age are needed in order to verify the validity of this method in pregnant women with gestational age < 35 W suffering from oligohydramnios, to avoid preterm labor induction and to prevent its serious consequences for mother and new borne baby.

REFERENCES

Chandra, P.C., H.J. Schiavelli and M.A. Lewandowski, 2000. Effect of oral and intravenous hydration on oligohydramnios. J. Rep. Med., 45 (4): 337-340.

Chelmow, D., E.R. Baker and L. Jones, 1996. Maternal intravenous hydration and amniotic fluid index in patients with preterm ruptured membranes. J. Soc. Gynecol. Invest., 3: 127-130.

Deka, M.B., 2004. Duration of the increase in amino tic fluid index after acute maternal hydration. Am. J. Obstet. Ggnecol., 269: 173-175.

Doi, S., H. Osada, K. Sekl and A.S. Sekly, 1998. Effect of maternal hydration on oligohydramnios: A comparison of three volume expansion methods. Am. J. Obstet. Gynecol., 92: 525-529.

Fait, G., D. Paauzner, I. Gull, J.B. Lessing, A.J. Juffo and I. Wolman, 2003. Effect of 1 week of oral hydration on the amniotic fluid index. J. Reprod. Med., 48 (3): 187-190.

Flaek, N.J., W. Sepulvada, S. Bower and N.M. Fisk, 1995. Acute maternal hydration in third-trimester oligohydramnios: Effects on amniotic fluid volume, uteroplacental perfusion and fetal blood flow and urine output. Am. J. Obstet. Gynecol., 173 (4): 1186-1191.

Hornfener, G.J. and A.M. Gulmeziglu, 2002. Maternal hydration for increasing amniotic fluid volume. Cochrane Database Syst. Rey, 1: Cd0 00/134.

Magann, E.F., S.P. Ghauhan, P.S. Barrilleaux, N.S. Whitworth and J.N. Martin Jr, 2000. Amniotic fluid volume index and single deepest pocket: Weak indicators of abnormal amniotic volumes. Obstet. Gynecol., 96 (4): 737-740.

Mlhotra, B. and D. Deka, 2004. Duration of the increase in amniotic fluid index after acute maternal hydration. Arch. Gynecol. Obstet., 269 (3): 173-175.

Nihjland, M.J. and M.G. Ross, 1995. DDAVP-induced maternal hypoosmolality increases ovine fetal urine flow. Am. J. Physiol., 268 (4): 358-365.

Nisell, H., K. Carlstrom, J.S. Cizinsk, C. Grunewald, L. Nylund and I. Randmaa, 1992. Atrial natriuretic peptide concentrations and hemodynamic effects of acute plasma volume expansion in normal pregnancy and preeclampsia. Obstet. Gynecol., 79 (2): 902-907.

Oosterhof, H., M.C. Haak and J.G. Aranoudse, 2000. Acute maternal rehydration increases the urine production rate in the near term human fetus. Am. J. Obstet. Gynecol., 183 (1): 226-229.

Powers, D.R. and R.A. Brace, 1991. Fetal cardiovascular and fluid responses to maternal volume loading with lactated Ringers or hypotonic solution. Am. J. Obstet. Gynecol., 165 (3): 1504-1515.

Ross, M.G., M.J. Nijland and L.K. Kullama, 1996. 1-Deamino-(8-D-argenine) Vasopressin-induced maternal plasma hypoosmolality increases ovine amniotic fluid volume. Am. J. Obstet. Gynecol., 174 (3): 1118-1127.

Sciscione, A.C., K.A. Costigan and T.R.B. Johnson, 1997. Increase in ambient temperature may explain decrease in amniotic fluid index. Am. J. Perinatol., 14 (1): 249-251.