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Effect of Desmopressin on increase of amniotic fluid volume in pregnancies with oligohydramnios

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A B S T R A C T

Oligohydramnios is considered as reduction in the volume of amniotic fluid and amniotic fluid index (AFI) level under 5 percent for gestational age. Desmopressin is an anti diuretic agonist causing increased reabsorption of water and increasing the urine osmolality along with decreased urine amount with a mechanism of effect on increasing the permeability of cell membrane. The aim of this study was to evaluate the effect of Desmopressin on increasing the volume of amniotic fluid in pregnant women with oligohydramnios. In a double blind clinical trial that performed on patients with Oligohydramnios in the Department of obstetrics and Gynecology of Tabriz University of medical sciences, we examined the effect of Desmopressin on increasing the volume of amniotic fluid in cases of pregnancies with oligohydramnios. In this study, 73 pregnant women with a single twin with oligohydramnios, aged 26 to 36 weeks of pregnancy, were studied. The results of our study demonstrated that maternal fluid therapy is also a proper method to increase the value of amniotic fluid index in the short run. Since maternal fluid therapy is a simple, non-aggressive method, it can be used in treatment to decrease maternal and fetal side effects in women with oligohydramnios and considering the results obtained, use can be made of Desmopressin for oligohydramnios treatment. Results of our finding show that, significantly difference was not found between mean AFI of two groups (Hydration & Desmopressin group) at base line, 48 hour later, one week later and two week late. Significant increase was observed in AFI of patients in both groups at during of treatment.

Introduction

Oligohydramnios is considered as reduction in the volume of amniotic fluid and amniotic

fluid index (AFI) level under 5 percent for gestational age (1).

Causes of oligohydramnios include fetal malformations, hypothyroidism and chromosome disorders, twin, IUGR, rupture of membranes, mother disease such as diabetes, hypertension and drug usage. Consequences of which include high pressure on the cord and fetal distress, fetal lung hypoplasia, increasing the risk of meconium aspiration syndrome, and increasing of the cesarean section (2).

Desmopressin is an anti diuretic agonist causing increased reabsorption of water and increasing the urine osmolality along with decreased urine amount with a mechanism of effect on increasing the permeability of cell membrane (3). With regard to the effects of this drug on plasma osmolality and volume, this drug is contraindicated in patients with cardiac-renal disease, and blood pressure disorder and allergy to this medicine and headaches.

The starting time of effects is an hour and time of reaching peak is 5-1 hour. This drug decrease fetal and maternal plasma osmolality and increase fetal urine excretion. Fetal urine is the main source of amniotic fluid and changes in the amount of production of urine affect the volume of amniotic fluid.

In a study done by Roberts et al. (4) on the fetus, theory was that the acute hypo tonicity and mother's plasma causes reduced osmotic gradient leading to increased water flow from the mother to the fetus; therefore, hyponatremia of plasma of mother leads to increased fetal plasma hyponatremia and urinary volume that would finally lead to the increase of the volume of the amniotic fluid. Therefore, these researchers injected pregnant Ewe with Desmopressin and measured plasma sodium concentrations of mother and fetus and fetal urine volume and they concluded that reducing plasma tonicity

lead to embryo plasma tonicity reduction in parallel manner causing increased urinary excretion.

In a study by Ross et al on pregnant women with Oligohydramnios the above theory considered that reduction of osmolality of plasma in mothers lead to increases of amniotic fluid. A study was carried out on 5 term pregnant woman with Oligohydramnios and daily administration of 2 mg/ml vasopressin was done for determining anti diuretic effects of that and urine and mother's plasma osmolality and daily production of and urine was measured as well as amniotic fluid index which was measured with ultrasonography before the experiment and then 8 and 24 hours after the initiation of treatment. Control group in this study also includes pregnant women with Oligohydramnios that were just under intravenous hydration; Women treated with vasopressin decreased urine volume and it was increased in patients who received fluid therapy. Plasma osmolality substantially reduced in the first group and amniotic fluid index increased and fluid did not change in hydrated patients. Therefore, this drug has been known as a very effective method of increasing amniotic volume (4).

Due to the remarkable side effects of oligohydramnios we decided to assess the effects of this drug on amniotic fluid volume. Since oligohydramnios has significant consequences for the fetus in lower ages of pregnancy we considered 26 to 36 weeks pregnant women (because fetus is alive in these ages) and if this technique be effective could be used for the treatment of patients with the oligohydramnios.

The aim of this study was to evaluate the effect of Desmopressin on increasing the volume of amniotic fluid in pregnant women with oligohydramnios.

Materials and methods

In a double blind clinical trial that performed on patients with Oligohydramnios in the Department of obstetrics and Gynecology of Tabriz University of medical sciences, we examined the effect of Desmopressin on increasing the volume of amniotic fluid in cases of pregnancies with oligohydramnios.

Considering the earlier conducted studies and taking into consideration that the numbers of cases of the disease are scarce, the number of sample size within 5 years was considered and finally numbers of 73 patients were studied.

The study sample and the sampling method: The study sample consisted of all pregnant women with a single twin with oligohydramnios, aged 26 to 36 weeks of pregnancy and they have been laid rupture of water bags and IUGR and fetal malformations and after confirmation of oligohydramnios by ultrasound diagnostic, the patients were divided randomly into two groups, the first group was treated just with fluid therapy (with 20 ml/kg/day dose for oral) and the second one under liquid therapy accompanied by the administration of Desmopressin with the daily dose of IV 2µg.

In this study, the women with sensitivity to Desmopressin, renal and cardiac pathology, hypertension, cystic fibrosis and migraine headache were laid out from the study.

Amniotic fluid index was measured initially for baseline, 48 hours later and 1 & 2 week later. Drug treatment continues until the volume of the fluid reach the normal value and then the results will be compared.

The data obtained from the study were analyzed statistically by means of descriptive statistical methods and one sample mean difference comparison (one sample t-test) using SPSS14 software.

Result and Discussion

In this study, 35 patients underwent oral hydration and 35 patients underwent oral hydration & Desmopressin. Mean age of patients in oral hydration group was 26.88 ± 7.43 and in Desmopressin group was 24.91 ± 7.37 year and other demographic finding were shown in table I. Significantly difference was not found between mean age of patients in two groups ($P=0.274$).

Preterm labor and congenital anomalies wasn't founds in studied patients. Mean gestational age of patients by LMP and ultrasonography in oral hydration group was 33.76 ± 2.17 and 33.26 ± 2.19 and in Desmopressin group was 32.31 ± 2.41 and 31.61 ± 2.55 week, respectively. Mean gestational age by LMP and ultrasonography in oral hydration group was higher than Desmopressin group ($P=0.036$ and $P=0.006$). Mean of gravidity, parity and abortion count of patients in two groups was shown in table I.

Mean AFI of patients in oral hydration group and Desmopressin group at base line and during treatment was shown in table II. Results of our finding show that, significantly difference was not found between mean AFI of two groups (Hydration & Desmopressin group) at base line, 48 hour later, one week later and two week late. Significant increase was observed in AFI of patients in both groups at during of treatment.

Mean of AFI and changes of both groups was shown in figure I.

Table.I Demographic Findings of patients in two Groups

	Group		P
	Oral hydration	Desmopressin	
Gravidity	1.83 ± 1.03	1.78 ± 1.16	0.847
Parity	0.64 ± 0.64	0.57 ± 0.96	0.710
Abortion Count	0.23 ± 0.49	0.24 ± 0.60	0.910

Table.II AFI of patients in two groups at base and length of treatment

	Group		P Between Group
	Oral hydration	Desmopressin	
AFI at before of Study	5.25 ± 1.17	5.29 ± .93	0.875
AFI at 48 hour later	5.94 ± 1.75	5.59 ± 1.47	0.369
AFI at 7 day later	6.40 ± 1.63	6.02 ± 1.60	0.427
AFI at 14 day later	7.14 ± 2.80	6.71 ± 1.72	0.440
P Within Group	<0.001	<0.001	

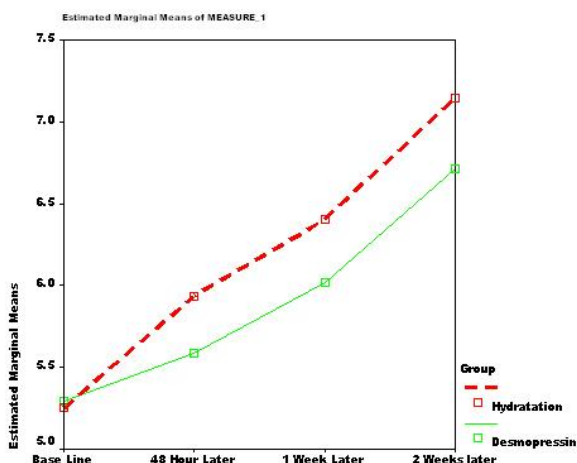


Figure. I Mean AFI of patient in both group

Sufficient amniotic fluid allows the fetus to move and develop normally, and provides the fetus and the umbilical cord with a proper situation (5). Oligohydramnios while the membrane is intact occurs in 3-5% of term pregnancies (6), and is a frequent phenomenon in post-term pregnancies and those with fetus uterine development delays (7). Oligohydramnios refers to amniotic fluid volume being lower than the expected

limit for the pregnancy age, and is diagnosed through ultrasonography (5). In the past decades, a number of ultrasonography methods have been used for amnion fluid value evaluation, including vertical pocket technique, amniotic fluid index, and theoretical estimation (8).

Use of amniotic fluid index is obtained calculating the sum of vertical depths of the

largest amnion fluid packets in each of the four quarters of the uterine, and is superior to the deepest fluid packet method (6). Decrease in amnion fluid volume is called oligohydramnios, which has been defined as amniotic fluid index being 5 cm or less (5). When acute, it can lead to fetus distress increase, abnormal presentation, Caesarian section, fetus deformation, umbilical cord compression and consequently fetus death (5-6, 9).

In studies performed on women with oligohydramnios, it was found that maternal oral rehydration therapy can cause amniotic fluid volume increase. Its mechanism is through osmolality decrease in maternal plasma, causing amniotic fluid index increase (10-12).

Studies have demonstrated different results about effects of oral rehydration and intravenous fluid therapy on amniotic fluid volume increase (7,13,14). The results of this study demonstrate that both hydration and Desmopressin injection cause amniotic fluid index increase in women with decreased amniotic fluid volumes, and this increase is more when injection is used. Maternal hypo-osmolality plasma due to rehydration may be the major reason for amniotic fluid index hypo-osmolality (15-16). Doi et al. in Japan and Lorzadeh et al. in Iran demonstrated that effects of maternal fluid therapy with intravenous hypotonic fluids and oral fluids on mothers with oligohydramnios leads to amniotic fluid index increase (7, 15).

In our study, significantly increase was found in AFI of patient by treatment (Hydratation or Desmopressin). Oosterhof et al. examined effects of fluid therapy on urine production value in 21 fetuses at the pregnancy ages of 37-40 weeks. In this investigation, after hypotonic fluid therapy,

a remarkable increase was observed in urine production within an hour (13).

Flack and et al demonstrate that, Short-term maternal oral hydration increases the amniotic fluid index in women with third-trimester oligohydramnios (17). Umber show that maternal (intravenous) hydration increased the amniotic fluid volume (AFV) in women with oligohydramnios as well as in those with normal AFV and may be beneficial in the management of oligohydramnios (18).

In agreement with many authors, our experience also showed that the AFI in patient's oral hydration significantly increased. Schwartz and their et al shown that the overall response rate was 35% in women whit oligohydramnios (19).

Hofmeyr and et al demonstrate that the Simple maternal hydration appears to increase amniotic fluid volume and may be beneficial in the management of oligohydramnios and prevention of oligohydramnios during labour or prior to external cephalic version(20).

In Rosenberg (21) and Umber (6), effects of intravenous fluid therapy on amniotic fluid index and in Kilpatrick (6), Flack (6), Malhorta (23), and Fait et al. (24), effects of oral rehydration therapy on amniotic fluid index had been examined, and the results of these studies are consonant with ours.

An investigation was conducted in London in 2002 on mothers suffering from oligohydramnios to examine effects of fluid therapy on these mothers as well as mothers with normal volumes of amniotic fluid. The results of this study demonstrated that fluid therapy in women suffering from oligohydramnios and ones who did not causes amniotic fluid volume increase (26).

Moreover, amniotic fluid value increase has been reported in women with normal amniotic fluid volumes (16).

Specific factors may be involved in amniotic fluid volume adjustment. Women with kidney diseases, diabetes, or congenital anomalies were excluded from our study, because these conditions could disturb amniotic fluid volume adjustment. Diabetes and kidney disease also cause changes in plasma and urine osmolality of the mother and fetus. Congenital anomalies of the fetus can also cause changes in production or absorption of amniotic fluid. The considerable point about our study is that making use of a sonographer at the beginning and end of the study to determine the AFI has decreased the error concerned as far as possible.

The mean age and pregnancy age of the mothers with oligohydramnios in this study are similar to those in Malhotra (27). In this investigation, there were not significant differences between mean age of mothers, pregnancy age, and gravidity and parity in the three groups, and neither have significant differences been observed in Lorzadeh et al. (7).

Conclusion

The results of this study demonstrated that maternal fluid therapy is also a proper method to increase the value of amniotic fluid index in the short run. Since maternal fluid therapy is a simple, non-aggressive method, it can be used in treatment to decrease maternal and fetal side effects in women with oligohydramnios and considering the results obtained, use can be made of Desmopressin for oligohydramnios treatment. Results of these study findings show that, significantly difference was not found between mean AFI of two groups

(Hydratation & Desmopressin group) at base line, 48 hour later, one week later and two week late. Significant increase was observed in AFI of patients in both groups at during of treatment.

References

1. Rutherford SE, Smith CV, Phelan JP, Kawakami K, Ahn MO. Four-quadrant assessment of amniotic fluid volume. Interobserver and intraobserver variation. *J Reprod Med.* 1987 Aug; 32(8):587-9.
2. Callen pw ultra sonography in obstetrics and gynecology. Fifth edition p:767 pgrph 3 satre 12.
3. Petrozella LN, Dashe JS, McIntire DD, Leveno KJ. Clinical significance of borderline amniotic fluid index and oligohydramnios in preterm-pregnancy. *Obstet Gynecol.* 2011 Feb;117 (2 Pt 1): 338-42.
4. Ross MG, Nijland MJ, Kullama LK. 1-Deamino-[8-D-arginine] vasopressin-induced maternal plasma hypoosmolality increases ovine amniotic fluid volume. *Am J Obstet Gynecol.* 1996 Apr;174(4):1118-25; discussion 1125-7.
5. Scott JR, Gibbs RS, Karlan BY, Haney AF, Danforth DN, Danforth's Obstetrics and Gynecology, New York (NY) Lippincott Williams & Wilkins Publishers 2008; p. 93, 124.
6. Flack NJ, Sepulveda W, Bower S, Fisk NM, 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* 1995 Oct; 173(4):1186-91.
7. A- Lorzade N, Najafi S, Verdizade H, Parsa M, Effect of Oral and Intravenous Fluid Therapy on Maternal Oligohydramnios Treatment, *Iranina Journal of Obstetrics Gynecology and Infertility* 2007;17(1):61-66.

8. Cunningham FG, Lenovo KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY, Williams Obstetrics, New York MC GraW –HILL 2010; p.490-492.
9. Hofmeyr GJ, Gulmezoglu AM, Maternal hydration for increasing amniotic fluid volume in oligohydramnios and normal amniotic fluid volume, *Cochrane Database Syst Rev* 2000;(2): 134.
10. Kilpatrick SJ, Safford KL, Pomeroy T, Hoedt L, Scheerer L, Laros RK, Maternal hydration increases amniotic fluid index, *Obstet Gynecol* 1991;78:1098–1102.
11. Lorzadeh N, Najafi S, Parsa M, Kasemirad C. Effect of maternal hydration on amniotic fluid index. *Ultrasound in Obstetrics & Gynecology*. 2005;26(4):370.
12. Goodlin RC, Anderson JC, Gallagher TF, Relationship between amniotic fluid volume and maternal plasma volume expansion, *Am J Obstet Gynecol* 1983; 146: 505–11.
13. Oosterhof H, Aak MC, Aranoudse J G, Acute maternal rehydration increases the urine production rate in the near term human fetus, *Am J Obstet Gynecol* 2000 Jul; 183(1):226-9.
14. Doi S, Osada H, Seki K, Sekiya AS, Effect of maternal hydration on oligo-hydramnios, A comparison of three volume expansion methods *Am J Obstet Gynecol* 1998 Oct 92, 525-9.
15. Doi S, Osada H, Seki K, Sekiya S, Effect of maternal hydration on oligohydramnios: a comparison of three volume expansion methods, *Obstet Gynecol* 1998 Oct; 92(4 Pt 1):525-9.
16. Locatelli A, Zagarella A, Toso L, Assi F, Ghidini A, Biffi A, Serial assessment of amniotic fluid index in uncomplicated term pregnancies: prognostic value of amniotic fluid reduction, *J Matern Fetal Neonatal Med* 2004 Apr;15(4):233-6.
17. Flack NJ, Sepulveda W, Bower S, Fisk NM. 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*. 1995 Oct; 173(4): 1186-91.
18. Umber A, Chohan MA. Intravenous maternal hydration in third trimester oligohydramnios: effect on amniotic fluid volume. *J Coll Physicians Surg Pak*. 2007 Jun;17(6):336-9.
19. Schwartz N, Sweeting R, Young BK. Practice patterns in the management of isolated oligohydramnios: a survey of perinatologists. *J Matern Fetal Neonatal Med*. 2009 Apr;22(4):357-61.
20. Hofmeyr GJ, Gülmezoglu AM. Maternal hydration for increasing amniotic fluid volume in oligohydramnios and normal amniotic fluid volume. *Cochrane Database Syst Rev*. 2002;(1):CD000134.
21. Yan-Rosenberg L, Burt B, Bombard AT, Callado-Khoury F, Sharett L, Julliard K, Weiner Z, A randomized clinical trial comparing the effect of maternal intravenous hydration and placebo on the amniotic fluid index in oligohydramnios, *J Matern Fetal Neonatal Med* 2007 Oct; 20(10):715-8.
22. Umber A, Chohan MA, Intravenous maternal hydration in third trimester oligohydramnios: effect on amniotic fluid volume, *J Coll Physicians Surg Pak* 2007 Jun;17(6):336-9.
23. Malhotra B, Deka D, Effect of maternal oral hydration on amniotic fluid index in women with pregnancy-induced hypertension, *J Obstet Gynaecol Res* 2002 Aug;28(4):194-8.
24. Fait G, Pauzner D, Gull I, Lessing JB, Jaffa AJ, Wolman I, Effect of 1 week of oral hydration on the amniotic fluid index, *J Reprod Med* 2003 Mar;48(3):187-90.
25. Hom fener G J, Gulmezoglu Am, Maternal hydration for increasing amniotic fluid volume, *Cochrane database sys trg* 2002 (1) Cd 00/36
26. Malhotra B, Deka D, Duration of the increase in amniotic fluid index (AFI) after acute maternal hydration, *Arch Gynecol Obstet* 2004 Mar; 269(3):173-5.