

An Interventional Study Comparing the Effect of Oral and Intravenous Maternal Hydration on Third Trimester Idiopathic Oligohydroamnios (AFI Less or Equal to 5cm) and Perinatal Outcome at Umaid Hospital, A Tertiary Care Center of Western Rajasthan

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Abstract: *Background:* Liquor amni is the baby's "water of life" produced flawlessly from the time of first human being till today. Amniotic fluid is not a mere stagnant swimming pool but is in dynamic ever - changing state. It helps in fetal development. Aim of our study was to compare the effect of oral vs intravenous maternal hydration therapy in pregnancy complicated by oligohydroamnios. *Method* - It was prospective interventional trial conducted on 100 women. *Results:* Mean AFI in group 1 was 4.39+ - 0.71 cm before and 8.63+ - 1.87 cm after hydration therapy and similarly in group 2 was 4.19+ - 0.70 cm before and 7.85+ - 1.94 cm after hydration therapy. On comparing the two groups elevation in mean AFI was found statistically significant (p value 0.045). *Conclusion:* Both intravenous and oral hydration therapy increase amniotic fluid however consensus regarding ideal route, type of fluid is still loitering. Our study vividly shows that intravenous maternal hydration therapy with hypotonic solution is more advantageous than oral maternal hydration with glucose water.

Keywords: Maternal hydration therapy, Amniotic fluid.

1. Introduction

Oligohydroamnios refers to a clinical condition in which amniotic fluid volume is less than expected for the gestational age. It is defined as amniotic fluid volume less than 5 percentile for particular gestational age. (1) It is usually diagnosed sonologically and can be expressed qualitatively (reduced amniotic fluid volume) or quantitatively (amniotic fluid index ≤ 5 cm or Single deepest pocket of amniotic fluid < 2 CM). ACOG, 2016. (2)

Oligohydroamnios may be isolated (idiopathic) or have maternal, fetal or placental causes. Isolated oligohydroamnios (IO) refers to the presence of oligohydroamnios without fetal structural and chromosomal abnormalities, without intrauterine infections and absence of maternal disease. (3)

Incidence of oligohydroamnios varies from 0.5 - 5% at term pregnancy. After 40week incidence increase up to 12% as amniotic fluid volume decline after 40week. (4)

There are various factors affecting amniotic fluid volume. Mother, fetus and placenta work as a unit in regulation of amniotic fluid volume. Maternal hydration status, maternal plasma osmolality and maternal blood volume affect amniotic fluid production. On other hand placental insufficiency, decrease fetal urine production, congenital anomaly also impaired production of amniotic fluid. (5)

In early gestation of pregnancy, amniotic fluid is derived from fetal and probably maternal components. In the second trimester fetal skin become keratinized so fetal urination entirely play role in synthesis of amniotic fluid. (6) Regulation of amniotic fluid in later months of pregnancy is believed to maintain by these mechanism: (7)

- 1) Through fetal swallowing (as early as 16 week)
- 2) By respiratory tract - fetal lung fluid secretion (as early as 11 week)
- 3) Through hydrostatic and oncotic forces across chorionic plate.

In uncomplicated singleton pregnancy there is progressive increase in amniotic fluid volume up to 32 week of gestation and then plateaus near term and then starts decline to reach up to 400ml at 42 week. (8)

Isolated oligohydroamnios in third trimester is associated with maternal and fetal complications. Maternal complications such as increase rate of medical interventions, increase induction of labor and increase operative interventions. (9) Neonatal complications such as low APGAR score, MAS (Meconium aspiration syndrome), IUGR (intrauterine growth restriction), preterm birth, stillbirth, increase incidence of NICU admission and associated with various congenital anomalies like club foot, potters facies, limb reduction defect. (10)

Maternal hydration therapy act by lowering maternal plasma osmolality or by expansion of maternal intravascular volume.

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Both this mechanism results in increase in fetal urine production and ultimately results in increase in amniotic fluid volume and correction of oligohydroamnios.

Hydration therapy: Goodlin R, anderson J, 1983 first found that there is increase in amniotic fluid volume after maternal hydration therapy in a woman with Oligohydroamnios. (11)

Mechanism: increase in AFI after hydration therapy is believed to be due to one of these two mechanism:

- 1) Increase uteroplacental blood flow through plasma volume expansion, which causes increase fetal urine production
- 2) Maternal osmotic changes (change in plasma osmolality) – maternal hydration therapy with hypotonic solution such as 0.45% normal saline causes low plasma osmolality, this hypoosmolar plasma goes into fetus through placenta which causes fetal hypoosmolality, which ultimately results in increase fetal urine production to maintain homeostasis. (12)

Hydration therapy can be given by both oral and intravenous route.

Fluid for oral hydration therapy include -

- 1) Plain water
- 2) Plain water with glucose powder
- 3) L - arginine sachet (13, 14)

Fluid for Intravenous hydration therapy include -

- 1) Isotonic fluid (0.9% NS, ringer lactate, 5% DW etc.)
- 2) Hypotonic fluid (0.45% NS)
- 3) Hypertonic fluid (25% dextrose)

2. Material and Methods

- **Type of study:** Prospective interventional study
- **Type of fluid:** - for oral hydration - 2 liter water over 2hr for 7 days
- for intravenous hydration - 1000ml of 0.45% NS IV in 4 hours daily for 7days
- **Duration of therapy for each case:** .1week

Inclusion Criteria:

- Pregnant women admit in Umaid Hospital with AFI \leq 5CM.
- Age 20 - 30 year
- Gestational age 34 - 36 week
- Singleton pregnancy
- Intact membranes at time of admission
- Not in labor
- Patient who will give written informed consent

Exclusion Criteria

- Gestational age <34 and >36 week
- Congenital anomalies
- Intrauterine death
- Multiple pregnancies
- PROM and PPROM
- Medical disorder (hematological disorders, renal disorders, anemia, GDM, hypertension)

Methodology

The present study was prospective interventional study. All pregnant women admitted in Umaid Hospital and who fulfilled inclusion criteria we enrolled for the study. AFI was measured sonologically using ultrasound machine ALOKA with 3.5 MHz probe. AFI before and after hydration therapy was measured by same person so as to avoid observer bias.

Patients were randomly divided into two groups by computer generated method, one group for oral hydration and another for intravenous hydration. In maternal oral hydration, pregnant women were instructed to drink 2 liter of water daily over 2 hours for 7 days. In Intravenous hydration group, maternal hydration in form of 1000ml of 0.45% normal saline (hypotonic solution) over a period of 4hours daily administered for 7 days.

Close monitoring was done to pickup signs and symptoms of fluid overload. AFI was measured after 7 days of hydration therapy. Patients with increase in AFI and reassuring NST were followed weekly till term and wait for spontaneous onset of labor and intervention was done if required.

3. Observations

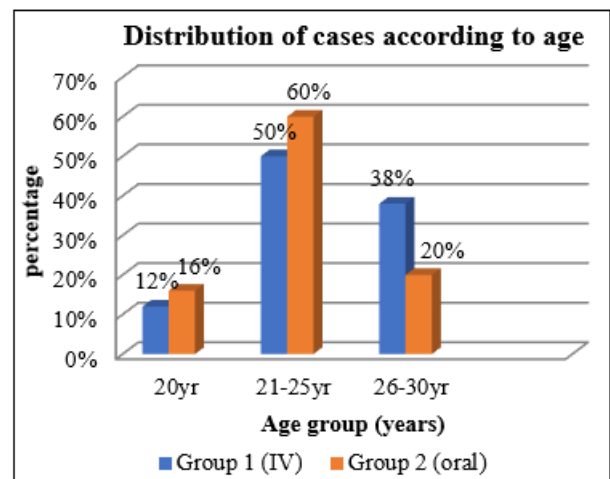


Chart 1: distribution of cases according

On applying chi square test the difference in both groups was not significant (p value 0.136).

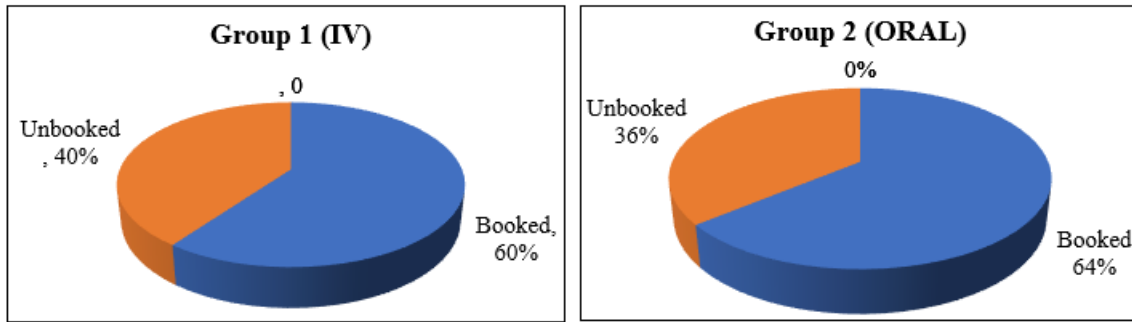


Chart 2: pie chart shows Distribution of cases according to booking status
Chi square 0.169, p value - 0.680 (NS)

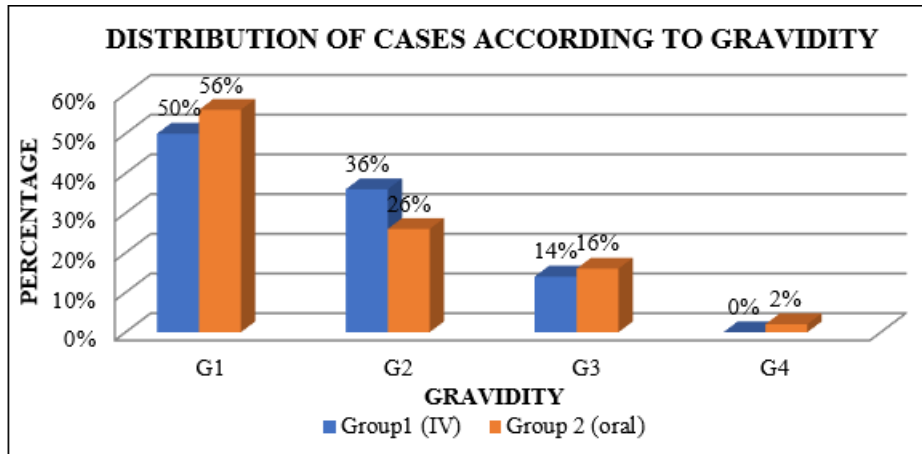


Chart 3: Distribution of cases according to gravidity

Chi square 2.043, p value 0.563 (NS)

Table 1: Distribution of cases according to period of gestation (POG)

POG (wks)	Group1 (IV)		Group 2 (Oral)	
	N	%	N	%
34	4	8.00	3	6.00
35	27	54.00	22	44.00
36	19	38.00	25	50.00
Total	50	100.00	50	100.00

Chi square 1.471, p value 0.479 (NS)

Table 2: Distribution of cases according to AFI before hydration therapy

AFI before Therapy	Group 1 (IV)		Group 2 (Oral)	
	N	%	N	%
<3	2	4.00	1	2.00
3 - 5	48	96.00	49	98.00
>5	0	0.00	0	0.00
Total	50	100.00	50	100.00

Chi square 0.161, p value 1.000 (NS)

Table 3: Distribution of cases according to AFI after hydration therapy

AFI after therapy	Group 1 (IV)		Group 2 (Oral)	
	N	%	N	%
<3	0	0.00	0	0.00
3 - 5	4	8.00	11	22.00
>5	46	92.00	39	78.00
Total	50	100.00	50	100.00
Chi square	3.843			
P value	0.049			

Chi square 3.843, p value 0.049 (significant)

Table 4: Comparison between group IV and oral on the basis of mode of delivery

Mode of delivery	Group 1 (IV)		Group 2 (Oral)	
	N	%	N	%
NVD	45	90.00	44	88.00
LSCS	5	10.00	6	12.00
Instrumental	0	0.00	0	0.00
Total	50	100.00	50	100.00
Chi square	0.102			
p value	0.749			

Table 5: Comparison between IV and oral group on the basis of fetal complications

Fetal complications	Group IV		Group Oral		P value
	N	%	N	%	
Asphyxia	0	0.00	0	0.00	-
IUGR	1	2.00	0	0.00	1.000
MAS	0	0.00	1	2.00	1.000
IUD	0	0.00	0	0.00	-
STILLBIRTH	0	0.00	0	0.00	-
LBW	2	4.00	3	6.00	
NICU admission	3	6.00	4	8.00	1.000

Table 6: Comparison between group 1 and 2 on the basis of APGAR score at 1 minute

APGAR score at 1 min	Group 1 (IV)		Group 2 (Oral)	
	N	%	N	%
6	3	6.00	4	8.00
7	7	14.00	7	14.00
8	40	80.00	39	78.00
9	0	0.00	0	0.00
Total	50	100.00	50	100.00
P value	>0.05			

Table 7: Comparison between group 1 and 2 on the basis of APGAR score at 5 minute

APGAR score at 5 min	Group 1 (IV)		Group 2 (Oral)	
	N	%	N	%
6	0	0.00	0	0.00
7	0	0.00	2	4.00
8	1	2.00	4	8.00
9	49	98.00	44	88.00
Total	50	100.00	50	100.00
P value	>0.05			

4. Discussion

In our study most common age group was 21 - 25 years in both groups. In our study mean maternal age in IV group was 24.28±2.91yrs and in oral group it was 23.78±2.99 yrs. The difference in age group was statistically insignificant and comparable with the studies done in past. (chart 1)

In the present study majority of the cases were booked. In our study 30 cases in IV and 32 cases in oral were booked. In our study majority of the cases were booked. In group 1 60% were booked and 40% were unbooked. In group 2 64% were booked and 36% were unbooked. The difference was not significant (p value 0.680). (chart 2)

In our study, maximum no of cases were primigravida, 50% in IV group and 56% in oral group. Similar observation was found by Garmel et al, where maximum no of cases (67%) were primigravida. This shows that isolated oligohydroamnios is more common in primigravida. The difference was found statistically not significant (p value 0.563). (chart 3)

In our study mean gestational age in IV group was 34.82±0.61 wks and in oral group mean GA was 34.91±0.65 wks. Our results were comparable with study done by Cicily et al, where mean GA in IV group was 35.2 weeks (Table 1). Similar results were found in study done by Patil N et al, Flack N J et al, Lorzadeh N et al.

Mean AFI in group 1 before hydration therapy was 4.39±0.71cm and after therapy was 8.63±1.87cm. Mean AFI in group 2 before therapy was 4.19±0.70cm and after therapy was 7.85±1.94cm. On comparing the two groups elevation in mean AFI was found statistically significant (p value 0.045) (table 2, 3). In our study, 92% cases achieved of AFI >5cm after IV hydration and 78% cases achieved of AFI >5 after oral hydration. In our study mean AFI improvement after IV MHT was 4.24±1.87cm and after oral MHT was 3.66±1.87cm.

In present study majority of cases delivered vaginally (table 4). None of case went through instrumental delivery. In our study maximum number of newborn had normal birth weight. 92% cases had normal birth weight (2.5 - 3.5kg). Mean birth weight in IV and oral group was 2.97±0.39cm and 2.92±0.35cm respectively.

In our study NICU admission were low. In our study 6% in group 1 had NICU admission and 8% in group 2 had NICU admission. (p value >0.05) which was comparable with the study done by Cicily et al, Mean APGAR score in group 1 at 1min was 7.74 and in group 2 was 7. Mean APGAR score in group 1 at 5min was 8.98 and in group 2 was 8.84. Mean birth

weight in group 1 was 2.97±0.39kg and in group 2 was 2.92±0.35kg (p value 0.504) (table 6, 7).

5. Summary and Conclusion

The present study was conducted in the department of Obstetrics and Gynecology, DR S N medical college, Jodhpur, Rajasthan during a period of 9 months from 1 February 2021 to 31 October 2021. Study design was prospective interventional study which include 100 pregnant women with isolated oligohydroamnios (AFI ≤ 5cm) and gestational age between 34 - 36 weeks admitted in Umaid hospital, Jodhpur and were followed till delivery for fetomaternal outcome. Women were divided into two groups by computer generated random allocation method as group 1 (intravenous hydration) and group 2 (oral hydration)

Maternal hydration has emerged as novel modality in management of isolated oligohydroamnios. Both IV and oral hydration therapy increase amniotic fluid however consensus regarding ideal route, type of fluid is still loitering.

Our study vividly shows that IV maternal hydration therapy with hypotonic solutions more advantageous than oral maternal hydration therapy with glucose water.

6. Study Strength

- 1) Our study strongly suggests that maternal hydration with either IV hypotonic fluid or oral glucose water have definitive role in increasing AFI in third trimester isolated oligohydroamnios but IV hypotonic fluid (0.45% NS) is more advantageous over oral glucose water.
- 2) Fetomaternal outcome improved after hydration therapy.

7. Study Limitation

Further studies that include intervention group (IV hypotonic fluid) and control group (no treatment, only observation) in a women with third trimester IO and with large sample size and wide range of gestational age needed for more definitive role of hypotonic fluid.

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