

Effect of oral and intravenous hydration therapy on amniotic fluid index, maternal and perinatal outcome in borderline oligohydramnios¹Anjali Chaudhary, Consultant, Department of OBGYN, Aarogya, Hospital, Delhi, India-110092.²Umesh Varma, Consultant, Department of Medicine, Aarogya, Hospital, Delhi, India-110092.³Sandeep Goel, Consultant, Department of Radio Diagnosis, Aarogya Hospital, Delhi, India-110092.⁴Subhra Jaiswl, Consultant, Department of OBGYN, Aarogya, Hospital, Delhi, India-110092.⁵Aditya Varma, Medical Student, Sri Ramchandra Institute of Higher Education and Research, Chennai, India-600116.**Corresponding Author:** Anjali Chaudhary, Consultant, Department of OBGYN, Aarogya, Hospital, Delhi, India-110092.**How to citation this article:** Anjali Chaudhary, Umesh Varma, Sandeep Goel, Subhra Jaiswl, Aditya Varma, “Effect of oral and intravenous hydration therapy on amniotic fluid index, maternal and perinatal outcome in borderline oligohydramnios”, IJMACR- January – February - 2022, Vol – 5, Issue - 1, P. No. 138 – 147.**Copyright:** © 2022, Anjali Chaudhary, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License 4.0. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract****Aim:** To determine whether oral route of maternal hydration is advantageous over intravenous route in terms of increasing AFI and improving maternal and perinatal outcome in women having borderline oligohydramnios.**Material & Method:** 150 women in third trimester with borderline oligohydramnios (BO) AFI 5.1-8cm, were divided randomly into two groups, oral hydration group (OG) and intravenous hydration (IVG). Each case was studied on OPD basis. After 2 hours, 48 hours and 1 week of oral or iv hydration. AFI was reassessed by same sonographer. Pre-delivery AFI and various outcome measures were recorded for both groups.**Result:** There was an increase in AFI by 44.5% in OG from 0 hour till delivery as compared to 30.7% increase in IVG. MSL occurred in 8 (10.7%) women in OG

compared to 17 (22.6 %) in IVG. FD was found in 4 (5.3%) in OG requiring LSCS compared to 16 (21.3%) in IVG. Total of 59 (78.7 %) patients in OG has spontaneous vaginal delivery as compared to 42 (56%) in IVG. Perinatal outcome was better with OG than IVG 67 (89%) had APGAR at 1 min >8 in OG than 58 (77%) in IVG. APGAR score <8 at I min was seen in 8 (10.7%) in OG while 17 (22.7 %) in IVG. Overall 7 (9.3 %) required NICU admission in OG to 12 (16%) in IVG

Conclusion: AFI increment persisted longer in OG as compared to IVG. Maternal and perinatal outcome were better with oral hydration therapy than IV hydration.**Keywords:** AFI, Hydration, Oligohydramnios**Introduction**An adequate amniotic fluid volume is an essential requisite for adequate intrauterine development and a good neonatal outcome^{1,2}. An Amniotic Fluid Index

(AFI), first measured by Phelan's³ (1987) four quadrant technique, of '5' cm or less is consistent with most sonographic criteria of oligohydramnios and has been used as an indication for delivery of infants at or near term. Oligohydramnios has an incidence of 8.5% to 15.5%⁴ which increases at 40 weeks and beyond term and is invariably associated with increased rates of perinatal morbidity and mortality and a high rate of surgical delivery and maternal morbidity^{1,2}.

Oligohydramnios may be caused by fetal urinary tract abnormalities, conditions of uteroplacental insufficiency and fetal growth restriction, drugs, and rupture of membranes, or can be diagnosed without the presence of any of the causes described above when it is called isolated oligohydramnios.²

Several studies have addressed the relationship between maternal intravascular volume and AF volume and have suggested that oral and intravenous hydration can increase the AFI in normal pregnancies and in pregnancies with oligohydramnios.⁵⁻¹⁷ Several management options have been

Perinatal outcome was better with OG than IVG 89% had apgar at 1 min >8 in OG than 77% in IVG 9.3 % required NICU admission in OG compared to 16% in IVG

suggested in third trimester oligohydramnios to restore AFV to its normal range namely serial trans-abdominal amnioinfusion, intra-amniotic sealing techniques, desmopressin use and fetal cystoscopy, but all these modalities are costly, need hospitalisation and are associated with serious side effects. Hence, maternal hydration is an economic and effective intervention to treat oligohydramnios in the resource poor settings like our country.

Aims and objectives

To study and compare the effect of oral and intravenous hydration therapy on the increase in AFI and maternal and perinatal outcome in cases with borderline oligohydramnios.

Material and methods

This prospective interventional comparative study was carried out in Department of Obstetrics & Gynecology on 150 women with third trimester borderline oligohydramnios (5.1-8cm) who refused for admission and opted for OPD treatment. They were divided randomly into two groups i.e. oral hydration group (OG) and intravenous hydration group (IVG). The study was carried out during a period of 1 year from 1st April 2018 to 31st March 2019.

Eligibility was determined by inclusion criteria- well established dates at 28-36 weeks gestational age, 20 to 38 years old with 1 to 5 gravidity, AFI of 5.1-8 cm, intact membranes and singleton pregnancy with cephalic presentation. The women at risk of fluid overload such as those with severe anemia (Hb < 7 g/dl), cardiac disease, hyperthyroidism, renal impairment, and those with severe pre-eclampsia or hypertension, diabetes, ruptured membranes, multiple pregnancy, receiving prostaglandin synthetase inhibitors and congenital anomaly in fetus were excluded.

Method

All the pregnant females in our study diagnosed with borderline oligohydramnios during third trimester were advised admission for fetomaternal surveillance but when they refused for admission, they were offered OPD treatment with hydration therapy after informed written consent. With the help of USG, AFI was measured immediately before the hydration therapy by technique of Phelan et al³ by dividing the uterus into four

quadrants and summing all four vertical diameters. All the AFI values were recorded on printed proformas. Maternal vital signs were monitored strictly during the fluid therapy. Each case was given oral or intravenous hydration for 2 hrs during OPD between 9am to 12 noon. Once basal AFI was taken, every woman in the OG was instructed to drink 250 ml of water every 15 minutes for total of 2L in 2hours and every woman in the IVG was infused 2 liter of hypotonic fluid (ringer lactate) in the same 2-hour duration. After 2 hours, 48 hours and 1 week of oral or iv hydration, the AFI was reassessed by the same sonographer. Throughout the study, the cases were advised to have routine oral intake of fluids, Argipreg sachet daily and to have rest, DFMC, high protein diet and regular check-up for fetal wellbeing. They were advised to get re-admitted at their expected date of delivery or the appearance of labour symptoms, whichever was earlier.

Management protocol was similar in both the groups and was individualized based on factors such as parity, cervical ripeness, and patient's preference. All patients were monitored by periodic or intermittent auscultation of fetal heart rate in labour. The nature of amniotic fluid was noted at artificial rupture of membranes. Non-reassuring fetal status with or without meconium-stained liquor which persisted inspite of corrective measures like change in maternal position, hydration, oxygen inhalation and stopping oxytocin, was managed by LSCS or forceps delivery. All newborns were attended by neonatologists. Various outcome measures recorded for both the groups were: induced vs spontaneous labor, gestational age at delivery, nature of amniotic fluid, FHR changes, mode of delivery, indication for cesarean section or instrumental delivery, Apgar score at one minute and five minutes, birth weight, admission to

neonatal ward, perinatal morbidity and perinatal mortality.

All data including demographic data, characteristics of the women with oligohydramnios and sonographic indices, before and after the hydration therapy were recorded on prepared data collection forms.

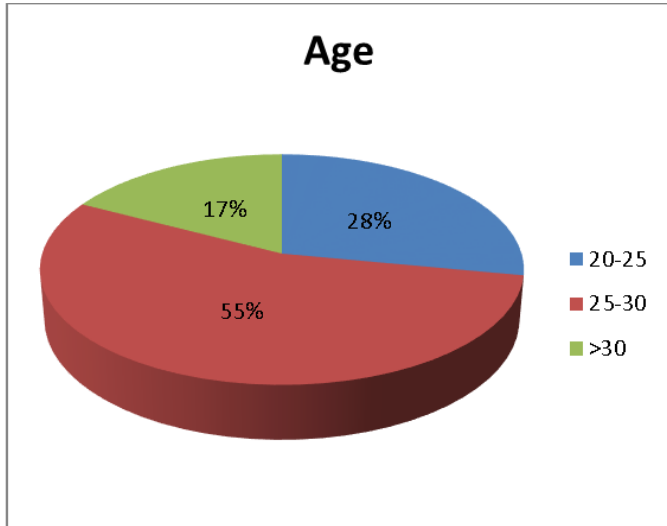
Statistical analysis: The data was entered in Statistical Package for Social Science (SPSS) software programme and analyzed using chi square test.

Results: The two groups were similar with regards to antepartum variables i.e., maternal age, gravidity, parity, gestational age and antenatal complications.

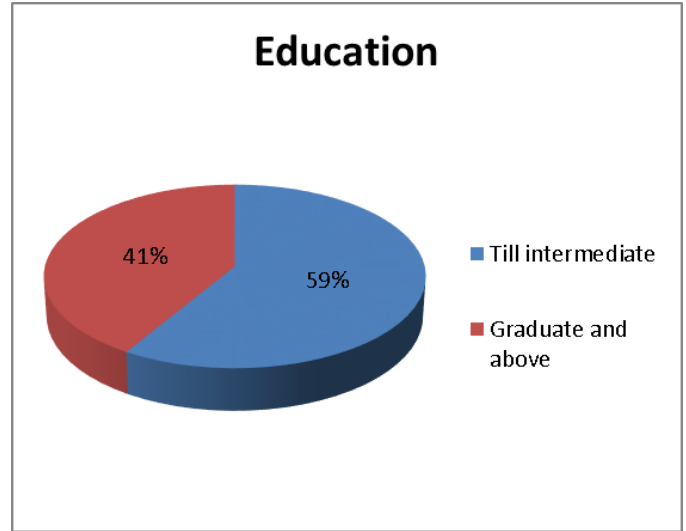
Table 1: Demographic profile of isolated oligohydramnios cases

Parameter	Classes	No. of cases (n=150)	Percentage
Age	20-25	42	28.0%
	25-30	82	54.7%
	>30	26	17.3%
Gravidity	1	76	50.7%
	2	41	27.3%
	3	25	16.7%
	4	6	4%
	5	2	1.3%
Education status	Till intermediate	88	58.7%
	Graduate and above	62	41.3%
Socioeconomic status	Low middle	49	32.7%
	Middle	71	47.3%
	High	30	20.0%

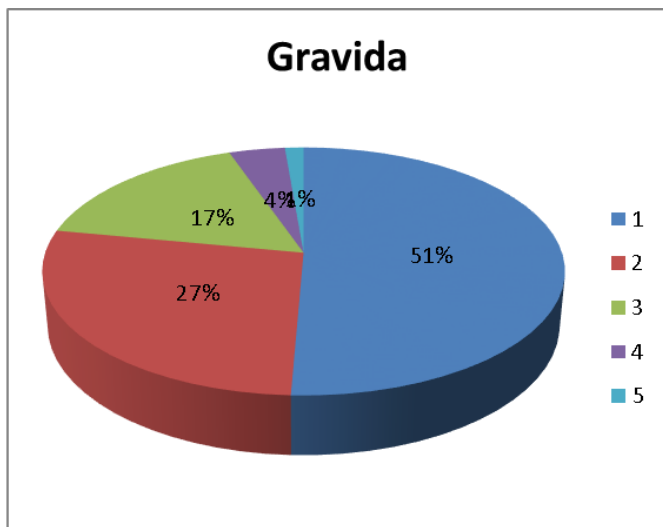
Graph 1



Graph 3



Graph 2



Graph 4

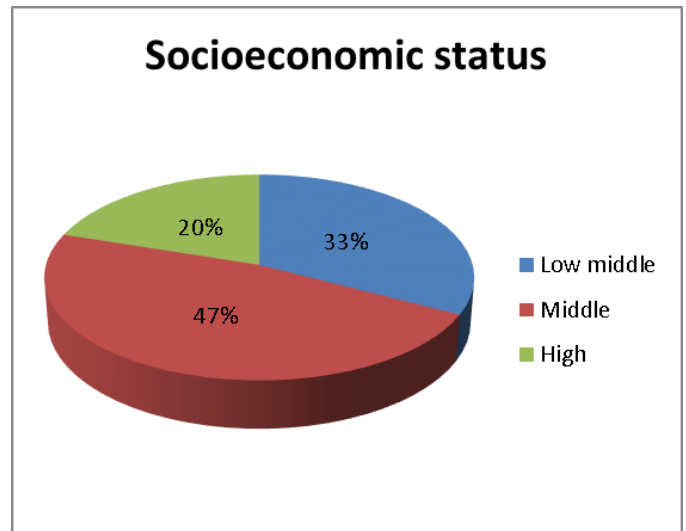
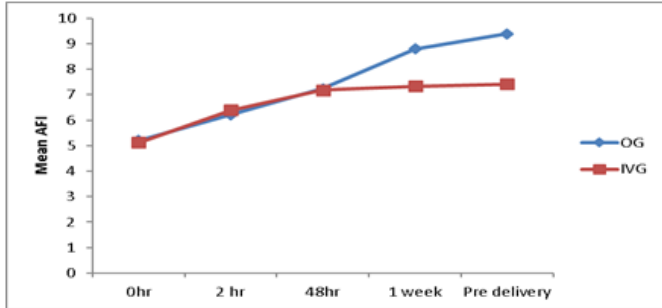


Table 2: Post-hydration AFI changes in two groups

OG						
Mean 0hr AFI	Mean 2 hr AFI	Mean 48hr AFI	Mean 1 week AFI	Mean Pre-delivery AFI	Δ AFI ₁ (48hr-0hr)	Δ AFI ₂ (Pre-delivery-0hr)
5.21±0.74	6.21±1.17	7.24±1.09	8.79± 1.03	9.39±0.96	2.03	4.18
IVG						
Mean 0hr AFI	Mean 2 hr AFI	Mean 48hr AFI	Mean 1 week AFI	Mean Pre-delivery AFI	Δ AFI ₁ (48hr-0hr)	Δ AFI ₂ (Pre-delivery-0hr)
5.13±0.83	6.4±1.04	7.18±1.09	7.33 ±1.12	7.41±1.20	2.05	2.28

Graph 5



Graph 6

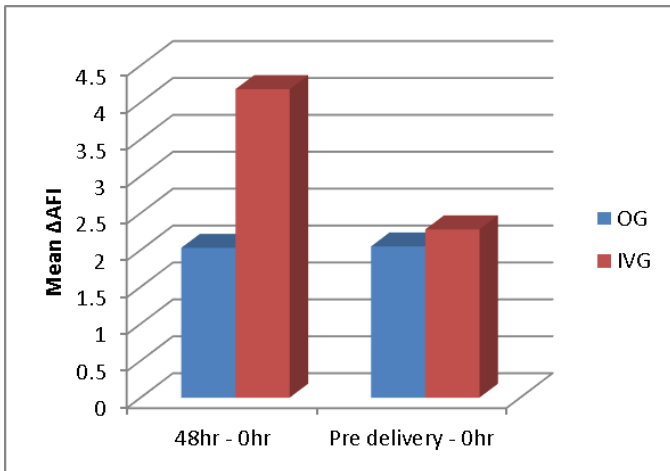


Table 3: Intrapartum complications in two groups

Intrapartum complications	OG		IVG	
	No. of cases	%	No. of cases	%
MSL*	8	10.7	17	22.6
FD†	4	5.3	16	21.3
NPOL‡	4	5.3	6	8
Abruption	0	0	1	1.3
None	59	78.7	35	46.6
Total	75	100	75	100

Overall, $X^2=39.776$, $p<0.0001$, Significant
 For MSL, $X^2=10.169$, $p=0.0014$, Significant
 For FD, $X^2=29.329$, $p=0.0001$, Significant
 For NPOL and Abruption, $X^2=0.434$, $p=0.58$, Not Significant

*MSL-meconium stained liquor; †- fetal distress;
 ‡NPOL- non progress of labour.

Graph 7

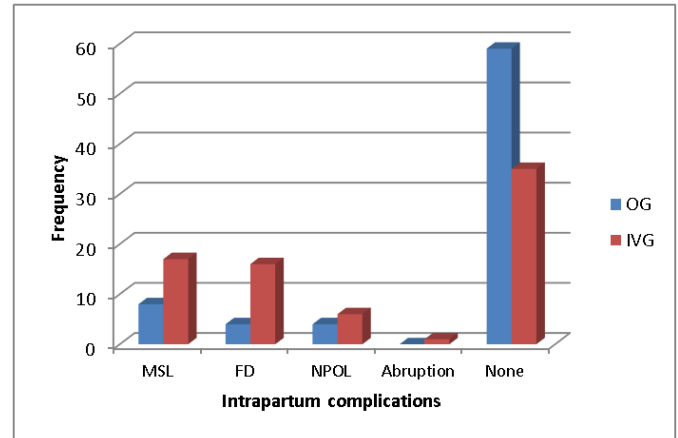


Table 4: Mode of delivery in two groups

Mode of delivery	OG		IVG	
	No. of cases	%	No. of cases	%
Spontaneous vaginal	59	78.7	42	56.0
Forceps	03	4.0	08	10.7
LSCS for FD	04	5.3	16	21.3
LSCS for other indications	09	12	09	12
Total	75	100	75	100

$X^2: 14.29$, $P 0.002$, Significant

Graph 8

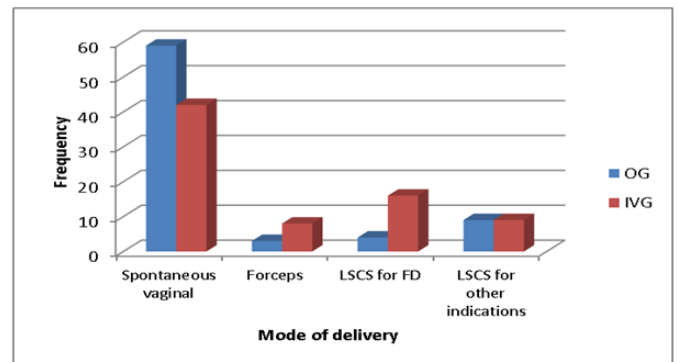
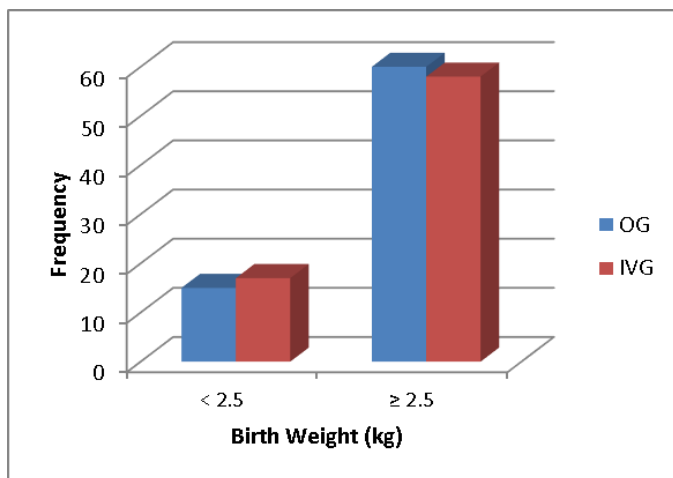


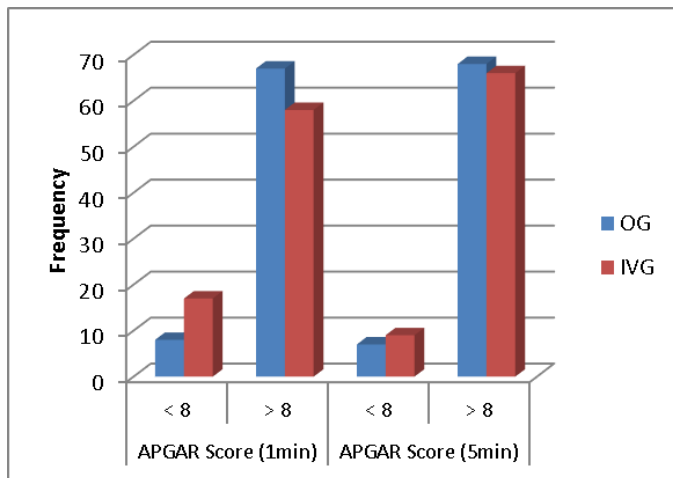
Table 5: Perinatal outcome in two groups

Parameter	OG	IVG	p value
Birth weight <2.5 kg	15 (20%)	17 (22.7%)	0.2315
Apgar score at 1 min	<8	17 (22.7%)	0.048
	>8	67 (89.3%)	
Apgar score at 5 min	<8	9 (12%)	0.596
	>8	68 (90.7%)	
NICU admissions	7 (9.3%)	12 (16%)	0.1908
C PAP/Ventilatory support	4 (5.3%)	7 (9.3%)	0.347

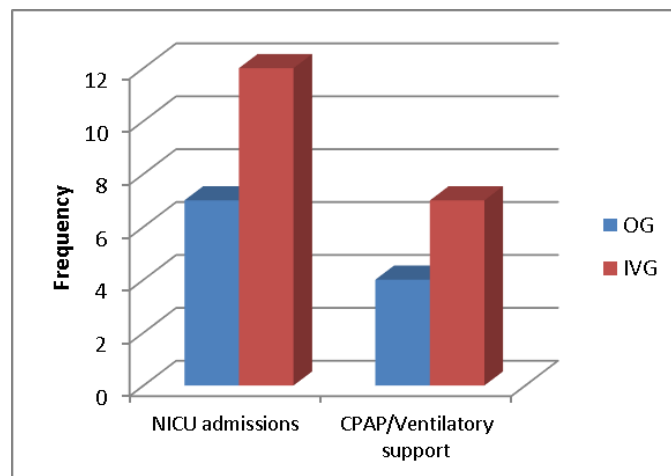
Graph 9



Graph 10



Graph 11



Discussion

Amniotic fluid is essential for the normal growth and wellbeing of the fetus. Various studies have assessed and compared the effect of oral and intravenous maternal hydration on amniotic fluid volume in cases with oligohydramnios, but none have compared the maternal and perinatal outcome in the two groups. This study is unique in this regards.

In the present study, the mean age for all the oligohydramnios cases was 25.96 years comparable to the study by Casey et al⁵ (23.9 years) and Krishna Jagatia et al⁶ (23.6 years). Maximum number of cases (82%) in this study were in 21-30 year age group comparable to the study by Seth et al⁷ (77.3%). Maximum patients in this study were primigravidae (50.7%) similar to the study of Garmelet al⁸ (67%) and Jandial et al⁹(60%). Majority (58.7%) of the cases in our study belonged to the less educated group, comparable to the study of Seth et al⁷ (60%).(Table 1)

In the present study, mean pre-hydration AFI for OG was 5.21 ± 0.74 at ‘0’ Hour which increased to mean post-hydration AFI of 6.21 ± 1.17 at 2 hour and 7.24 ± 1.09 cm at 48 hours suggesting that oral hydration increases the amniotic fluid very fast starting within 2

hours and is maintained till 48 hours. Similarly, mean pre-hydration AFI for IVG was 5.13 ± 0.83 at '0' Hour which increased to mean post-hydration AFI of 6.4 ± 1.04 at 2 hour and 7.18 ± 1.09 cm at 48 hours. This increase in AFI in 48 hours was similar in both the groups.

These findings are very much similar to those of Seth et al⁷ (2014) in which a total of 9% women had severe oligohydramnios before hydration while at 24 hours later, no woman was having AFI < 5 with maximum number of cases (31%) being in AFI range 7-8. Mean pre-hydration AFI was 5.75 ± 1.59 at '0' Hour which increased to mean post-hydration AFI of 6.09 ± 1.65 cm at 3 hour and 7.41 ± 1.46 cm at 24 hours. Continuation of therapy further increased the AFV and at 48 hours, mean AFI was 8.06 ± 1.55 cm. Except for the 3 hour change ($p=0.0836$), both 24 hour and 48 hour mean AFI was significantly improved ($p<0.0001$) from base line AFI with 95% confidence.

In our study, the ΔAFI_1 (mean AFI at 48hr – mean AFI at 0hr) for OG and IVG is 2.03 and 2.05 cm respectively which is nearly same. The ΔAFI_2 (mean AFI pre-delivery – mean AFI at 0hr) for OG and IVG is 4.18 and 2.28 cm respectively suggesting that **change in AFI from pre treatment to post treatment persisted till delivery to a greater extent for OG.** (Table 2)

The amniotic fluid was meconium stained in 8 (10.7%) in OG compared to 17 (22.6%) women in IVG. Similarly, fetal distress was found in only 4(5.3%) cases in OG compared to 16 cases (21.3 %) in IVG, the difference being statistically significant. Meconium stained liquor was seen in 48% of women by Jandial et al¹⁸ (2007), 40% by Yousseff et al (1993) in their studies on oligohydramnios cases while we found it in 23.3% of all our cases, 11.3% being thick & 12% thin

meconium stained during labour. This signifies the reduction in the incidence of MSL after hydration therapy. In the present study, in IVG, 83.3% cases having AFI ≤ 5 had FD while none with normal AFI had FD. (Table 3) These figures are similar to those found in the study by Rashid et al¹⁷ (2014) who showed that out of 100 patients only 12% patients developed FD with AFI score ≥ 5 after Oral Hydration Therapy (OHT) while 83% developed fetal distress with AFI score < 5 ($p=0.0001$).

In the present study 59 cases (78.7%) patients in OG had spontaneous vaginal delivery and hence better maternal outcome compared to 42 cases (56%) patients in IVG. More interventions including LSCS (17.3%) -OG& (33.3 %) IVG, and forceps delivery 4% -OG& 10.7 % were required in IVG. Compared to the OG and the relation between the two methods was found to be statistically significant. About 16 cases (21.6 %) of cases underwent LSCS for fetal distress in IVG compared to a mere 4 cases (5.3%) cases in OG. (Table 4) In another study by Seth et al⁷ (2014) women with AFI < 7 required caesarean in 26/35 cases (74%) compared to 29/75 (38.6%) in AFI > 7 category. Similarly, Rashid M et al¹⁷ (2014) observed that there were significantly higher number of vaginal deliveries in patients with ≥ 5 AFI after OHT as compared to patients with < 5 AFI.

In our study, APGAR score < 8 at 1 min was seen in 8 cases (10.7 %) in OG while 17 (22.7 % in IVG) of women which was statistically significant (Table 5), consistent with the findings of Seth et al⁷ (2014) who found that 96% of babies had APGAR < 7 in severe oligohydramnios group (AFI ≤ 5) while only 32% in cases with decreased liquor group (AFI 6-8). Similar results were shown by Jandial et al¹⁸. A study by Grubb et al¹⁹ found the 1 min Apgar score < 7 in 84% patients with

AFI \leq 5 as compared to 14% in the normal AFI group, which was highly significant (p = 0.01).

In IVG, 12 neonates (16%) were admitted to NICU while only 7 (9.3%) in OG. (Table 5) However, the difference in the two groups was not statistically significant. The overall incidence of NICU admission was found to be 18.5% by **Garmelet al⁸ (1997)** which is almost comparable to our study (12.7%).

There were 11 neonatal admission requiring C-PAP or ventilatory support. OG had 4(5.3%) while IVG had 7(9.3%). However, the difference in the two groups was not statistically significant. The various causes for ventilatory support included moderate and severe birth asphyxia and hypoxic ischaemic encephalopathy. The overall incidence of 11/150 is almost similar to the study by **Seth et al⁷** who found no intrapartum deaths but 10/110 (9.1%) ventilatory support due to different perinatal complications in NICU in first week of birth. The incidence is almost comparable with 10% of **Jandialet al¹⁸** and 6.4% of **Casey et al⁵**.

Conclusion

Our results have demonstrated that women with post-hydration (oral/ intravenous) improved to AFI 8-9 and above had higher vaginal delivery rate, better Apgar score at birth at 1 minute and lesser NICU admissions. The AFI increment persisted longer in oral as compared to IV group. The maternal and perinatal outcome were better with oral hydration therapy than IV route. Additional benefits of preferring oral hydration over intravenous method are: Water is cheaper, easily available, patient can be easily managed at home on OPD basis, treatment is non-invasive, has no contra-indications and no complications like that of fluid overload or thrombophlebitis, therefore better

compliance. Oral hydration is therefore recommended for treatment of oligohydramnios

Following studies done in the past show results consistent with our study :

Author	Year	Method	Result
Kilpatrick et al ⁹	1991	maternal hydration with 2 litres of water	increase in the AFI by approximately 30% in women with decreased AFV
Nicola J Flack et al ¹⁰	1995	Short term (2 hours) oral hydration	Significant reduction in maternal plasma (p<0.05) and urine osmolality (p<0.0001)
DoiS et al ¹¹	1998	maternal hydration with IV isotonic fluid, IV hypotonic fluid, and oral water	Mean increase in AFI was 0.5 ± 1.1, 2.8 ± 1.9; 3.8 ± 1.9 respectively
Al-Salami et al ¹²	2007	Fifty women of oligohydramnios and fifty of control were made to drink 2 litres of water over 2 hours	AFI increased significantly by mean of 1.91 ± 0.61, P< 0.001 and 2.57 ± 1.37, p< 0.001 respectively
Lorzadeh et al ¹³	2008	maternal hydration with IV isotonic fluid, IV hypotonic fluid, and oral water	oral hydration was more effective than IV hydration for increasing the AFI

GafarnejadM et al ¹⁴	2009	effect of acute oral hydration on maternal amniotic fluid index	Mean AFI increased significantly (p<0.001)
Shehzad B et al ¹⁵	2012	maternal hydration in iv and oral groups	increase in AFV was 88.5% in oral hydration group while 48.67% in intravenous group.
Akter MD et al ¹⁶	2012	Effect of maternal oral hydration. AFI was done after 2 hours, 24 hours and 7 days of oral hydration therapy	significantly increases the AFI, reduces the caesarean section rate and improves the foetal outcome.
Rashid M. et al ¹⁷	2014	effect of acute oral hydration on maternal AFI and its pregnancy outcome	significant increase in AFI score and significant improvement in CTG reactivity, vaginal delivery and perinatal outcome.

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