# EFFECTS OF ORAL FLUIDS AND INTRAVENOUS FLUIDS IN THE IMPROVEMENT OF AMNIOTIC FLUID INDEX DURING THIRD TRIMESTER OF PREGNANCY

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## ABSTRACT

***Objective***: To assess the effects of oral fluids and intravenous fluids in terms of frequency of improving Amniotic Fluid Index during third trimester of pregnancy having oligohydramnios.

***Study Design***: Comparative prospective survey.

***Place and Duration of Study***: Obstetrics and Gynaecological Department of Fauji Foundation Hospital Rawalpindi, from Apr 2018 to Oct 2018.

***Methodology***: A total of 100 patients with singleton pregnancy (50 in each group) at gestational age of 28-37 weeks and AFI of 5cm or less than 5cm were included. Non probability consecutive sampling technique was used. Ethics approval from hospital ethical committee and research board was taken. Patients were randomized into 2 groups (50 patients each) by lottery method. Group A was instructed to drink 2 liters of water per day for a time period of seven days and patients in group B was given 2 liters of 5% D/W which was in addition to their normal fluids intake. Amniotic fluid index was measured pre hydration and post hydration in both groups. Data was analyzed using SPSS-21.

***Results***: Mean age of the patients was 33.62 ± 5.45 years and 34.70 ± 4.76 years for groups A and B respectively. In group A and group B mean gestational age was 34.28 ± 1.85 weeks vs 34.32 ± 1.82 weeks. In group A, 44 (88%) while in group B, 37 (74.0%) patients were of para 0-3 while para 4-7 were 6 (12.0%) in group A and 13 (26%) in group B. In group A 36 (72%) patients although in group B, 34 (68%) were of gravida 1-4. In group A and group B, 14 (28%) vs 16 (32%) were of gravida 5-8. Improvement was observed in 39 (78%) patients of group A while 22 (44%) patients of group B ($p$<0.001). In group A pre-hydration, mean amniotic fluid index level was 4.79 ± 0.53 and in group B 4.87 ± 0.36 ($p$=0.383). Post-hydration mean amniotic fluid index level was 6.79 ± 1.22 and 5.97 ± 1.37 in group A and B, respectively ($p$=0.002).

***Conclusion***: Oral hydration of gestational women is more effective as compare to intravenous hydration in terms of frequency of improving Amniotic Fluid level during third trimester of pregnancy having oligohydramnios.

**Keywords**: Amniotic fluid index, Gravida, Intravenous fluids, Oligohydramnios, Oral fluids.



## INTRODUCTION

Amniotic fluid (AF) is marvelously dynamic milieu constantly in a transformation as pregnancy progresses[1]. Amniotic fluid present around the fetus and is derived from mothers directly across the amnion, fetal body surface and fetal surface of placenta in early period of gestation. By the middle of gestation fetal urine starts entering into the sac and form amniotic fluid[2].

During antenatal scan Amniotic fluid index <5cm is considered as oligohydramnios[3,4]. It has an incidence of 8.5-15.5%[5]. The adverse outcome due to oligohydramnios are found to be fetal distress, induction of labor, operative delivery and poor APGAR score at birth[6].

Seven to eight percentage of normal pregnancies get affected by oligohydramnios. Oligohydramnios is associated with birth defects during first half of gestation while in second half it causes malpresentation poor fetal growth, fetal suicidal syndrome, fetal distress and increase caesarean section rate[7]. It is observed that increase in plasma volume in mother causes improvement in uterine placental perfusion, increase in renal blood flow and also improvement in oxygena-

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*Received: 29 Apr 2019; revised received: 16 Jan 2020; accepted: 21 Jan 2020*

tion, moreover the vasopressin activity is suppressed and fetal urine output increases[7].

Literature shows that alterations in maternal osmolality cause changes in the fetal urine output[7]. The effects of both types of hydration showed 48.6% in intravenous hydration group and 88.5% in oral hydration group i.e. oral hydration is more effective[5].

A study by Brizot *et al*, investigated the effects of oral hydration therapy on AFI in those pregnancies which have complication of fetal gastroschisis. They did it for four consecutive days on a short sample of nine women at average gestational age of 31.6 weeks[8]. There is still controversy that which route is better as one of the study conducted locally, concluded that percentage increase in amniotic fluid index (AFI) in intravenous hydration group was 58.6% where as in oral hydration group it was 58.2%[8].

A meta analysis and systematic review by Gizzo *et al*, done in 2015 to gather all the available evidences regarding management for increasing amniotic fluid volume, mentioned that improvement in AFI can be time dependent in addition to dose dependent, this has to be further investigated[9].

Rationale of study was to assess patients after giving oral fluids and intravenous fluids and compare the difference in AFI in patients having idiopathic oligohydramnios. In our routine practice intravenous fluids are found to be beneficial in improving AFI. In this study we have focused on effect of oral hydration as literature showed variability in its effect. Results of our study may help in choosing better treatment option.

## METHODOLOGY

This comparative prospective study was carried out in Obstetrics and Gynaecological department of Fauji Foundation Hospital, Rawalpindi, from April 2018 to October 2018. Consecutive non probability sampling technique was used. A total of 100 partici-pants were included in this study (50 in each group) by using Raosoft software. Patients with singleton pregnancy at 28-37 weeks gestational age (last trimester) and AFI of 5cm or less than 5cm were included in study while women with Hemoglobin <10 g/d, ruptured membranes, cardiac disease, severe preeclampsia, renal impairment, diabetes and twin pregnancy (Diagnosed on history and investigations) were excluded from the study. Approval from hospital ethics committee and research board was taken. All patients according to inclusion criteria having oligohydramnios were included in the study after taking informed consent. Patients were allocated into 2 groups via sealed envelope method. Group A was instructed to drink 2 liters of water daily for 7 days and group B was given 2 liters of 5% D/W which was in addition to their normal fluid intake. AFI was measured on 8$^{th}$ day by the person who was kept blinded regarding the assigned groups of the study. The AFI was measured by ultrasound machine and the technique of Phelan *et al*, was used it divided the uterus into 4 quadrants, measured the deepest pool in each and calculated as sum of all four measurements. The amniotic fluid index was recorded on printed Performa before and after hydration.

Statistical test was done by using SPSS-21. Mean with standard deviations were calculated for patients' age, parity, gestational age and AFI before and after hydration. Frequency and percentages were calculated for improvement in AFI. Comparison between two groups was measures by Independent t-test. *p*-value ≥0.05 was taken as significant value. Effect modifiers like age, gestational age and parity were controlled by stratification and also Post-stratification test was applied.

## RESULTS

Group A received oral fluids while group B was given intravenous fluids. Patients ranged between 20-45 years of age. Mean age of the patients was 33.62 ± 5.45 and 34.70 ± 4.76 in both groups respectively. In group. A mean gestational age was 34.28 ± 1.85 weeks vs 34.32 ± 1.82 weeks in group A and B. In group A, 44 (88%) patients while in group B 37 (74%) patients were of para 0-3 while para 4-7 were 6 (12%) vs 13

(26%) in group A and B. In group A, 36 (72%) patients and in group B 34 (68%) patients were of gravida 1-4. In group A and B, 14 (28%) vs 16 (32%) patients had gravida[5-8]. Improvement was observed in 39 (78%) patients of group A and 22 (44%) of group B. Statistically significant difference was seen ($p$<0.001) (table-I).

In group A pre-hydration mean value for amniotic fluid index was 4.79 ± 0.53 vs 4.87 ± 0.36 ($p$=0.383) in group B. Post-hydration mean amniotic fluid index level was 6.79 ± 1.22 vs 5.97 ± 1.37 in groups A and B ($p$=0.002) (table-II).

**Table-I: Improvement in two groups after experiment.**

| Improvement | Group-B (Intravenous Fluids) | |
|---|---|---|
| | n (%) | n (%) |
| Yes | 39 (78.0) | 22 (44.0) |
| No | 11 (22.0) | 28 (56.0) |

**Table-II: Amniotic fluid index-pre and post hydration.**

| Amniotic Fluid Index (cm) | Group-A Mean ± SD | Group-B Mean ± SD | $p$-value |
|---|---|---|---|
| Pre-hydration | 4.79 ± 0.53 | 4.87 ± 0.36 | 0.383 |
| Post-hydration | 6.79 ± 1.22 | 5.97 ± 1.37 | 0.002 |

**Table-III: Stratification of age with regard to AFI.**

| Group | 20-35 (Year) | | 36-45 (Year) | |
|---|---|---|---|---|
| | Improvement | | Improvement | |
| | Yes | No | Yes | No |
| Group-A (Oral Fluids) | 23 | 08 | 16 | 3 |
| Group-B (Intravenous Fluids) | 10 | 13 | 12 | 15 |
| $p$-value | $p$=0.022 | | $p$=0.007 | |

**Table-IV: Stratification of gestational age (week) with regard to improvement in AFI.**

| Group | 28-32 (Week) | | 33-37 (Week) | |
|---|---|---|---|---|
| | Improvement | | Improvement | |
| | Yes | No | Yes | No |
| Group-A (Oral Fluids) | 7 | 2 | 32 | 9 |
| Group-B (Intravenous Fluids) | 1 | 5 | 21 | 23 |
| $p$-value | $p$=0.020 | | $p$=0.004 | |

**Table-V: Stratification of parity with regard to improvement in AFI.**

| Group | Para 0-3 | | Para 4-7 | |
|---|---|---|---|---|
| | Improvement | | Improvement | |
| | Yes | No | Yes | No |
| Group-A (Oral Fluids) | 34 | 10 | 5 | 1 |
| Group-B (Intravenous Fluids) | 18 | 19 | 4 | 9 |
| $p$-value | $p$=0.007 | | $p$=0.033 | |

## DISCUSSION

Adequate volume of amniotic fluid is considered to be important for fetal well-being[10]. A systematic review by Shrem *et al*, found high rates of maternal morbidity, mortality, induction of labor, caesarean section and early neonatal complications[11]. A study by Kozinszky *et al*, focused on mid trimester of gestational age with oligohydramnios and recommended clinical trials on its management whereas this study found more improvement in third trimester after hydration therapy as compare to second trimester[12]. Mousavi *et al*, mentioned that amniotic fluid index <5cm should be taken as a warning sign for expecting preterm premature rupture of membrane[13].

Akhter *et al*, conducted RCT in which the interventional group was taking 2 litres of water within 2 hours and 2 litres of water daily from next day till 7th day while control group was taking routine water they found maternal hydration therapy positively increases AFI ($p$<0.05) although this study compared the oral therapy and intravenous hydration therapy and found similarly more significant effects of oral hydration therapy ($p$<0.001)[14].

This study depicted that oral hydration caused a marked increase in amniotic fluid index ($p$<0.001) as compare to intravenous hydration. This increase might have been caused by acute changes in the maternal plasma osmolality or amniotic volume. Similarly another study by Umber and Chohan recommended that oral form of hydration of mothers with term pregnancy along with oligohydramnios resulted in the increase of amniotic fluid volume (mean change 6 of amniotic fluid 4 index: 4.5cm; 95% 2CI: 4.02-5.06; 5 $p$<0.1)[15].

Another RCT by Patrelli *et al* in 2012 compared oral and intravenous infusion between two groups. One group was in hospital while another was at home treatment. Their time duration was also 7 days as in the present study. They found improvement in the AFI in both groups but

no significant difference although we have found significant difference between two 3 groups ($p$<0.001)[3].

The current study reveals a significant 5 increase in1amniotic fluid index after having maternal hydration in both groups, but it was found that oral hydration was the more effective method as it was 78% in oral hydration group while 44% in intravenous group. These results are in favor with a study conducted by Lorzadeh and Gizzo[16-17]. They carried out a study with a view to determine the impact of maternal hydration with both intravenous fluid and oral fluid on amniotic fluid volume and to compare the results with other literature and found oral hydration more 3 effective than intravenous hydration. Oral hydration therapy should be offered to the eligible women as it is safe, inexpensive, does not require admission[18].

The results of this study are not in agreement with the results of another study conducted by Umber as they concluded maternal intravenous as well as oral hydration increases Amniotic Fluid Volume in patients with oligohydramnios but neither 8 appears to be more effective over the other to increase amniotic fluid volume[19].

The present study results are also comparable to those given by Malhotra *et al*, in which 50 women were advised to drink 2 liters of water before and repeat AFI measurement and it showed significant improvement of AFI ($p$<0.001)[20].

## CONCLUSION

Oral hydration of gestational women is more effective as compare to intravenous hydration in terms of frequency of improving Amniotic Fluid level during third trimester of pregnancy having oligohydramnios. Present study strongly suggests that maternal hydration status has a significant role in amniotic fluid regulation and oral hydration causes increase in amniotic fluid volume in patients with oligohydramnios.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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