

Comparison of Hydration Therapy and Amino Acid Infusion in Oligohydramnios and its Effect on Prolongation of Pregnancy and Amniotic Fluid Index

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ABSTRACT

Objective: To compare intravenous hydration therapy (ringer lactate) with amino acid infusion in increasing amniotic fluid index (AFI) and its effect on prolongation of pregnancy.

Methodology: This quasi-experimental study was done in the Department of Gynaecology & Obstetrics, Sharif Medical City Hospital, Lahore from June 2021 to November 2022. Eighty patients were recruited from outpatient department (OPD), indoor, and emergency with idiopathic oligohydramnios fulfilling the inclusion criteria by convenience sampling technique. Informed consent was taken from the patients. Patients were divided into 2 groups; amino acid infusion group and ringer lactate therapy group. Patients were kept admitted for treatment and AFI was calculated at admission, 3rd day, and 7th day. All the information was collected on a proforma. Data was collected and statistical analysis was done on Statistical Package for the Social Sciences (SPSS) version 23.

Results: The mean gestational age in the ringer lactate group was 32.87±1.18 weeks, while in the amino acid infusion group it was 32.16±1.53 weeks. An increase in AFI on 3rd day was significant in the group which received ringer lactate as compared to the group which received amino acid infusion. Still, on the 7th day, this difference was not seen and the results were comparable. No difference in prolongation of pregnancy was seen in both groups.

Conclusion: Amniotic fluid index increase was seen with both the treatment modalities but significant change was seen on 3rd day with ringer lactate. On 7th day posttreatment, AFI increase was comparable between the two groups. Both treatment interventions led to pregnancy prolongation but no statistical difference was seen between the two groups.

Keywords: *Oligohydramnios. Amniotic fluid. Prolonged pregnancy.*

INTRODUCTION

Amniotic fluid is a cushion for fetus and it protects it from pressure, concussion, and also provides a medium for adequate fetal development and supply of nutrients. Amniotic fluid has bacteriostatic properties and it protects the fetus from infection.¹ Amniotic fluid production is initially regulated by flow across amnion and fetal vessels during early fetal life. Afterwards, amniotic fluid is produced by fetal skin up to 22-25 weeks of gestation, fetal lung secretions, and fetal urine after the second trimester. Fetal swallowing also plays a role in maintaining a balance.² There is a strong correlation between maternal plasma volume and amniotic fluid volume. Sonographic estimation of amniotic fluid volume was done for the first time in 1987. The deepest vertical pocket of liquor volume in four quadrants of the uterus and amniotic fluid index is calculated by summing all four measurements. Amniotic fluid volume increases gradually during pregnancy until 32

weeks of gestation. Amniotic fluid volume remains constant between 32-39 weeks. It decreases at the rate of 8% per week measuring 400 mL at 42 weeks.³

Oligohydramnios is defined as a single vertical pocket of 2 cm, or with an AFI of less than 5 cm. In many centers, AFI of 5-8 cm is considered as borderline AFI.⁴ Idiopathic oligohydramnios is decrease in amniotic fluid volume in the absence of growth restriction with normal umbilical artery Doppler and in the absence of any underlying pathology. Moderate oligohydramnios is liquor volume 5-7 cm and less than 5 cm is considered severe oligohydramnios.⁵ Oligohydramnios is associated with perinatal morbidity and mortality. It can lead to chronic placental insufficiency, cord compression, which in turn can lead to fetal hypoxia, poor lung development, intrauterine growth restriction, abnormal fetal heart patterns during labor, meconium aspiration syndrome, low Apgar score, neonatal intensive care unit admission, and stillbirth. Treatment options for oligohydramnios are hospitalization, bed rest, oral & intravenous (IV) hydration.⁶

Amino acid infusion is indicated for parenteral nutrition in patients with hypoproteinemia, malnutrition, and decreased intake. It increases AFI & fetal weight. So, it is beneficial for both mother & fetus in patients of oligohydramnios. Ringer lactate is a saline infusion which contains water and minerals. Idiopathic oligohydramnios is a common clinical

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Received: September 2, 2023; Accepted: December 5, 2023

presentation in Obstetrics. It can cause limb contractures, growth restriction, and delayed lung maturation.⁵ Most of the previous literature explored the efficacy of one treatment modality or its comparison with healthy control. The comparative data between amino acid infusion and ringer lactate was not available. Based upon this observation, this study was done to find out a better treatment for idiopathic oligohydramnios cases.

METHODOLOGY

It was a quasi-experimental study done from June 2021 to November 2022 in the Department of Gynaecology & Obstetrics, Sharif Medical City Hospital, Lahore. Eighty patients were taken and divided into 2 groups (40 in each group). Patients with singleton pregnancy, gestational age between 28-34 weeks, AFI <8 cm (idiopathic oligohydramnios), patient not in labor with intact membrane at the time of selection, and non-anomalous fetus were included.

Patients having congenital anomalies of fetus, intrauterine death, multiple pregnancies, postdate pregnancy, preterm premature rupture of membranes, and pregnancy with medical disorders like pregnancy induced hypertension & diabetes, intake of diuretics, and non-steroidal anti-inflammatory drugs were excluded. Ethical approval was taken from the institutional ethical board. Patients were recruited from OPD, indoor, and emergency after fulfilling the inclusion & exclusion criteria. Detailed history and examination were done. The previous obstetrical record was reviewed. Any medical illness related to pregnancy was recorded. Obstetrical ultrasound was done to assess the liquor volume. Informed consent was taken from the patient before starting treatment. Ultrasonographic evidence of oligohydramnios was obtained. The amniotic fluid index was measured in all four quadrants of the uterus by sonologist. Single operator was selected to reduce the operator bias. Amniotic fluid index of less than 8 cm was taken as oligohydramnios. Patients were enrolled by convenience sampling technique. The amino acid group received amino acid infusion 500 mL and ringer lactate group received ringer lactate 1000 mL daily for one week. Liquor volume was assessed on day 3 and 7. After one week patient was discharged with further follow-up in OPD. Time from intervention till delivery & mode of delivery were recorded. Duration of prolongation of pregnancy (weeks) was also noted. All data obtained was entered on a predesigned proforma.

STATISTICAL ANALYSIS

Data was entered on Statistical Package for the Social Sciences (SPSS) version 23. Results were recorded and tabulated. Descriptive variables e.g., age & gravidity

were presented as numerical data. Gestational age was expressed as frequency with percentage. Inferential statistics like independent student t-test was applied for categorical variables like AFI at the time of admission, 3rd & 7th day of treatment, and prolongation of pregnancy. A p-value of less than or equal to 0.05 was taken as significant.

RESULTS

Gestational age in the ringer lactate group was between 29-35 weeks with a mean of 32.87±1.18 weeks. In the amino acid group, it was 28-35 weeks with a mean of 32.16±1.53 weeks. Maternal age, gravidity, and duration of treatment in patients receiving ringer lactate and amino acid infusion are shown in Table 1.

The difference in AFI of the two groups was significant on 3rd day of treatment in the ringer lactate group, whereas the difference was not significant between the two groups at 7th day of treatment (Table 2). Regarding the prolongation of pregnancy, statistical comparison between the two groups was not significant (p-value=0.586). The gestational age of the patients at the time of delivery was also compared in both groups and no significant difference was found (p-value=0.067) (Table 3).

DISCUSSION

Oligohydramnios during 3rd trimester is associated with premature delivery and adverse neonatal outcome.⁷ The treatment of idiopathic oligohydramnios is controversial in literature.⁸ Oral amino acid and its infusion was given for the treatment of idiopathic oligohydramnios to increase the liquor volume. It increases maternal nutrition and has effect on fetal growth.⁹ Maternal hydration by oral and intravenous route in different regimen is also linked with increased liquor volume.¹⁰

In this study, the age range of patients was between 20-36 years in both groups. This finding is comparable to a study by Vasanthamani et al.¹ Regarding gravidity, most of the patients in both groups were between 1st & 2nd gravida comparable to the finding of a study in which most of the patients were primigravida.¹ On contrary, another study reported that patients were 1st or 5th gravid.¹¹ Mean gestational age was 32 weeks in both groups in our study. These findings were comparable to a study done in Pakistan where the mean gestational age was 31.4±2 weeks.⁷ The findings are different from the study done in India in which the mean age was 30 weeks in the study and control group.¹ The reason for this disparity could be the difference in inclusion criteria as we recruited patients from 28-34 weeks and they recruited patients from 24-34 weeks of gestation. Regarding mode of delivery, most common mode of delivery in both groups was emergency lower segment

Table 1: Maternal Age, Gestational Age at Admission, Gravidity, and Duration of Treatment of Study Subjects

Study Variables	Ringer Lactate Group		Amino Acid Infusion Group	
	Range	Mean±SD	Range	Mean±SD
Maternal Age (Years)	20-35	27.6±4.56	20-36	28.3±3.73
Gestational Age at Admission (Weeks)	29-35	32.87±1.18	28-35	32.16±1.53
Gravidity	1-6	2.7±1.4	1-7	2.6±1.76
Duration of Treatment (Days)	3-38	22.53±8.78	2-40	21.33±10.77

Table 2: Mode of Delivery & AFI in Study Groups

Study Variables		Ringer Lactate Group	Amino Acid Infusion Group
Mode of Delivery	Spontaneous Vaginal Delivery	16(40%)	9(22.5%)
	Elective Lower Segment Caesarean Section	7(17.5%)	4(10%)
	Emergency Lower Segment Caesarean Section	17(42.5%)	27(67.5%)
AFI at Admission (cm)	4-5	25(62.5%)	27(67.5%)
	6-8	15(37.5%)	13(32.5%)
AFI at 3 rd Day (cm)	2-4	1(2.5%)	7(17.5%)
	5-6	20(50%)	23(57.5%)
	7-8	19(47.5%)	9(22.5%)
	9-10	0(0%)	1(2.5%)
AFI at 7 th Day (cm)	2-4	1(2.5%)	3(7.5%)
	5-6	4(10%)	5(12.5%)
	7-8	18(45%)	16(40%)
	9-10	17(42.5%)	16(40%)

Table 3: Comparison of AFI, Duration of Treatment, Gestational Age at Delivery, and Prolongation of Pregnancy in Study Groups

Study Variables	Groups	t-test for Equality of Means				
		Mean	t	p-value (Sig. 2-tailed)	95% Confidence Interval of the Difference	
					Lower	Upper
AFI at Admission (cm)	Ringer Lactate	1.63	-0.464	0.644	-0.265	0.165
	Amino Acid	1.68				
AFI at 3 rd Day (cm)	Ringer Lactate	40	2.507	0.014*	0.149	1.301
	Amino Acid	40				
AFI at 7 th Day (cm)	Ringer Lactate	40	1.258	0.212	-0.269	1.192
	Amino Acid	40				
Gestational Age at Delivery (Weeks)	Ringer Lactate	32.87	1.857	0.067	-0.0595	1.7145
	Amino Acid	32.16				
Prolongation of Pregnancy (Weeks)	Ringer Lactate	22.53	0.546	0.586	-3.173	5.573
	Amino Acid	21.33				

caesarean section (LSCS) and the rate of caesarean section was higher in the group receiving the amino acid infusion. This difference can be due to socioeconomic class and nutritional status of the female, which can affect the fetal condition leading to differences in the mode of delivery. These findings were supported by other studies in which study groups had rates of LSCS of 65% & 80%, respectively.^{1,2} It differs from the finding of a study conducted in Ethiopia in which the rate of emergency LSCS in the intervention group was 14.7% as compared to the non-intervention group, which was 42.6%.¹² Our results showed that an increase in AFI on 3rd day was significant in the group which received ringer lactate as compared to the group which received amino acid infusion, but on 7th day this difference was not significant and the results were comparable. Regarding the prolongation of pregnancy, no significant statistical difference was seen between the two groups. Comparable results were found in another study in which normal saline and IV amino acid infusion showed similar results after 6 days of therapy.² Intravenous and oral hydration were compared in a study & they found IV ringer lactate is better than oral hydration in increasing the AFI.⁹

A study conducted in India included 52 pregnant females. These patients were divided into two groups. Intravenous amino acid infusion was given to group A patients on alternate days, whereas IV hydration was given to pregnant females included in group B. The mean AFI at the time of admission was 4.93 ± 2.03 cm in the IV amino acid group and 4.22 ± 2.00 cm in the IV hydration group. On the 14th day of therapy, mean AFI was increased in the IV amino acid group with a statistically significant difference (p-value <0.001).¹³

A single-blinded randomized controlled trial was conducted to compare the efficacy of IV amino acid and hydration therapy in patients of oligohydramnios. They reported significantly higher mean AFI in the amino acid group as compared to the IV hydration group (p-value <0.001).¹⁴ Another study was conducted to evaluate the efficacy of IV hydration on AFI in patients of oligohydramnios. The study concluded that IV hydration therapy significantly increases AFI in pregnant females with oligohydramnios.¹⁵

In a comparative study, oral and intravenous amino acid therapy was compared. The study found more increase in amniotic fluid in the IV amino acid group as compared to oral therapy.¹⁶ Another study was conducted by Shinde et al. to evaluate the effect of amino acid infusion and IV hydration. They reported a significant difference (p <0.001) in the mean AFI of both groups. In the amino acid group, the mean AFI was 7.52 ± 2.04 cm and 5.89 ± 2.20 cm in the IV hydration group.¹³ A randomized clinical trial was conducted in

Iran to compare the efficacy of hydration therapy in oligohydramnios. After 48 hours, a statistically significant difference was observed in the mean AFI of the intervention group & control group.¹⁰

CONCLUSION

Amniotic fluid index increase was seen with both the treatment modalities but a significant change was seen on 3rd day with ringer lactate. On 7th day posttreatment, AFI increase was comparable between the two groups. Both treatment interventions led to pregnancy prolongation but no statistical difference was seen between the two groups. So, both treatment options can be considered for the treatment of idiopathic oligohydramnios.

LIMITATIONS & RECOMMENDATIONS

Small sample was a limitation of this study. Further studies with a larger sample size and randomized controlled trials are recommended to support this finding.

Conflict of Interest: None.

Source of Funding: None.

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