

EFFECT OF INTRAVENOUS AMINO ACIDS ON AMNIOTIC FLUID INDEX (AFI) AND MATERNAL OUTCOME IN THIRD TRIMESTER ISOLATED OLIGOHYDRAMNIOS

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ABSTRACT

Background: Oligohydramnios is very low levels of amniotic fluid (the fluid in the womb) is a common obstetric problem and is associated with poor outcomes for mother and fetus. Increased intake of amino acids in the mother and other infusion therapies have been proposed as safe methods to increase the amount of amniotic fluid and prolong the pregnancy

Objective: To determine whether amino acid infusion in isolated oligohydramnios can improve amniotic fluid index (AFI) in pregnant women.

Methodology: A descriptive case series was performed at department of Obstetrics & Gynecology at Hameed Latif Hospital/Rashid Latif Medical College in Lahore during July 2025 to October 2025. Eighty women were included who fulfilled the inclusion criteria of a pregnancy. A total of 80 women with intact membranes, singleton pregnancies, gestational age 28-36 weeks and AFI ≤ 5 cm were eligible to participate. Participants were given an amino acid intravenous infusion alternate days for one week. Ultrasonography was used to assess AFI both before and after therapy. SPSS version 25 was used to analyze the data. Qualitative data were shown as percentages and frequencies while quantitative data were shown as mean and standard deviation. Wilcoxon Signed-Rank test was used to compare the AFI values before and after the therapy.

Results: The participants' mean age was 27.03 ± 6.41 years, and the mean gestational age was 31.95 ± 2.58 weeks. Of the participants, 60.0% were aged 18–29 years, and 73.8% had parity <3 . There was a significant increase in median AFI from 3.62 cm (IQR: 3.01–4.01) before infusion to 4.77 cm (IQR: 4.44–5.66) after treatment ($p < 0.001$). Improvement in AFI was observed across maternal age, gestational age, and parity categories; however, the magnitude of AFI change did not differ significantly according to maternal age ($p = 0.304$), gestational age ($p = 0.224$), or parity ($p = 0.189$).

Conclusion: Intravenous amino acid infusion was effective in significantly raising the AFI in pregnant women with isolated oligohydramnios. The response to treatment was the same, regardless of parity, gestational age or mother age. More extensive controlled trials are recommended to establish the effects of amino acid infusion on maternal and fetal outcomes, but may be useful as a conservative treatment for the augmentation of amniotic fluid volume.

Keywords: Amniotic Fluid Index (AFI); Amniotic fluid volume; Intravenous amino acid infusion; Maternal hydration therapy; Oligohydramnios; Pregnancy outcome; Third trimester.

INTRODUCTION:

Amniotic fluid is essential for the normal growth and development of the developing fetus during the miraculous process of pregnancy because it cushions the baby, allows for healthy lung development and provides mobility and growth ¹. As per Phelan's definition, oligohydramnios is defined as having a low level of amniotic fluid around the fetus, typically less than 5 cm amniotic fluid index (AFI) ².

The negative consequences associated with perinatal morbidity and mortality are intrauterine growth restriction, fetal anomalies, malpresentation, fetal distress during labor, abnormal fetal heart rate, meconium stained amniotic fluid and risk of cesarean section ³. Isolated oligohydramnios, or the absence of associated abnormalities, is seen in about 0.5-5% of patients ⁴.

It can have adverse neonatal outcomes and is associated with placental vascular malperfusion lesions, which are a milder type of placental insufficiency than preeclampsia and fetal growth limits ⁵. In the 3rd trimester, other ultrasound procedures,

fetal growth, fetal movement, amniotic fluid analysis, non-stress tests or biophysical profiles are typically performed to determine the cause and assess the baby's condition ⁶.

While there is no specific methodology, providing weekly non-stress tests and AFI assessments for all females and considering delivery at 36 to 38 weeks of gestation may be beneficial ⁷. Oral and intravenous amino acid infusion can provide the carbon and nitrogen for fetal growth, since they stimulate the production of growth hormone through their effect on growth hormone-releasing hormone ⁸.

Intravenous amino acid preparations are used to improve maternal nutritional status and improve the AFI, which ensures higher concentrations of amino acids in the fetus compared to the mother, thereby addressing the challenges of maternal malnutrition in limited resource countries where the mother's nutrition status is compromised due to non-compliance with dietary recommendations, socioeconomic constraints, and worm infestations ⁸.

Intravenous amino acid preparations have shown promising results in managing isolated oligohydramnios. Studies have reported increased amniotic fluid levels after intravenous amino acid infusions, with a mean increase in amniotic fluid index (AFI) of 3.09 ± 0.70 cm as seen by Habib et al. in their study ⁹. Furthermore, there have been observations of a higher number of vaginal deliveries in patients who received amino acid infusions for isolated oligohydramnios.

Intravenous (IV) amino acid solutions have shown promising results for isolated oligohydramnios. Following intravenous amino acid infusions, studies have shown elevated levels of amniotic fluid; Habib et al.'s research ⁹ found a mean rise in amniotic fluid index (AFI) of 3.09 ± 0.70 cm. Additionally, individuals who got amino acid infusions for isolated oligohydramnios were shown to have more vaginal births. These results imply that in situations with isolated oligohydramnios, amino acid supplementation might enhance amniotic fluid levels and improve delivery outcomes ⁹. However, one study found that the intravenous amino acid infusion group's post-treatment AFI was significantly lower than that of the control group (6.32 ± 4.6 cm vs. 5.56 ± 2.3 cm), indicating that amino acid therapy might not always be more effective than standard care ¹⁰.

Therefore, despite encouraging findings for amino acid infusion, there is still ambiguity about its consistent efficacy in treating AFI. This discrepancy emphasizes the need for more research to assess how intravenous amino acid infusion affects isolated oligohydramnios. Additionally, there is a scarcity of noteworthy literature on this subject, which strengthens the case for carrying out this investigation.

MATERIAL AND METHODS

This was descriptive case series. The study was carried out at the Hameed Latif Hospital/Rashid Latif Medical College in Lahore's Department of Obstetrics & Gynecology. After the approval of synopsis, the research was complete in 6 months, from July 4, 2025, to January 4, 2026. With a 80% confidence interval, a 6% margin of error, and an anticipated increase in AFI of $2.32 \text{ cm} + 0.67 \text{ cm}$, a sample size of 80 was determined ¹¹. Non-probability sequential sampling was the sampling method employed. Singular pregnancy, an ultrasound result of $\text{AFI} < 5 \text{ cm}$, a gestational age of 28–36 weeks, intact membrane, and isolated oligohydramnios were the requirements for admission. Pre-labor rupture of membranes, post-term pregnancy, multiple gestations, pregnancies before 28 weeks, and any medical condition aggravating pregnancy were among the exclusion criteria.

DATA COLLECTION and DATA ANALYSIS PROCEDURE

After receiving a letter of consent from the Rashid Latif Medical Complex's ethics committee, this study was conducted at the Department of Obstetrics & Gynecology at Arif Memorial Teaching Hospital. After providing written informed permission, 80 pregnant women who met the inclusion and exclusion criteria were added to the research.

AMNIOTIC FLUID INDEX (AFI): The amniotic fluid index is measured by the Phelan's technique. In this technique, the uterus is divided into four quadrants by an imaginary line drawn through the linea nigra and the umbilicus. The maximum deepest vertical pocket from each quadrant is measured and the sum of the four measurements gives the value of AFI.

Oligohydramnios was defined as an AFI of ≤ 5 is defined as oligohydramnios. Isolated Oligohydramnios was defined as oligohydramnios not associated with any abnormalities like preeclampsia, fetal renal anomalies, and drugs. Moreover, improvement in AFI from before to 1 week after treatment was considered as the difference between baseline and 1-week post-treatment AFI values. Mode of delivery was recorded as vaginal delivery or cesarean section. Cesarean section was decided by the attending obstetrician based on clinical indications such as fetal distress or failed induction. A curvilinear 3.5 MHz transducer on a Canon Xario 100 ultrasound machine was used to measure AFI. Participants' age, parity, and gestational age were recorded. For a week, the research participants received an intravenous infusion of amino acids on alternate days. Following weekly ultrasounds to measure the difference between pre- and post-infusion AFI, they were tracked until birth to evaluate if their liquor volume had improved. The manner of delivery was identified as the maternal outcome variable. The collected data were entered and analyzed using SPSS version 25. Quantitative variables such as age, parity, gestational age, and increase in AFI were presented as mean and standard deviation. Qualitative variables such as mode of delivery were presented as frequencies and percentages. Stratification for age, parity, and gestational age was

performed to control for potential effect modifiers. Post-stratification, the chi-square test was applied to compare the proportions of categorical outcomes (mode of delivery) across different strata of age, gestational age, and parity groups. For comparison of continuous outcomes (AFI levels), the t-test was applied. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 80 pregnant women were included in the study. The mean age of the participants was 27.03 ± 6.41 years, while the mean gestational age was 31.95 ± 2.58 weeks. Most participants were aged 18–29 years (60.0%), whereas 40.0% belonged to the 30–40 years age group. The majority of women had a parity of less than three (73.8%), while 26.3% had a parity of three or more (Table 1). The effectiveness of infusion therapy was assessed by comparing Amniotic Fluid Index (AFI) measurements before and after treatment. The median AFI increased from 3.62 (IQR: 3.01–4.01) before infusion to 4.77 (IQR: 4.44–5.66) after infusion. The Wilcoxon signed-rank test demonstrated a statistically significant increase in AFI following infusion therapy ($Z = -7.772$, $p < 0.001$) (Table 2).

The association between maternal characteristics and change in AFI was further explored using the Mann–Whitney U test. Women aged 18–29 years had a median AFI change of 1.41 (IQR: 0.82–2.01), compared with 1.30 (IQR: 0.71–1.90) among those aged 30–40 years. No statistically significant difference in AFI change was observed between the two age groups ($U = 873.0$, $p = 0.304$). Similarly, gestational age was not significantly associated with AFI change. Participants with a gestational age of 28–30 weeks demonstrated a median AFI change of 1.19 (IQR: 0.76–1.84), whereas those with a gestational age of 31–36 weeks showed a median change of 1.43 (IQR: 1.11–2.40). The difference between the gestational age groups was not statistically significant ($U = 607.0$, $p = 0.224$).

Parity also showed no statistically significant association with the change in AFI. Women with parity less than three had a median AFI change of 1.45 (IQR: 0.82–2.01), compared with 1.11 (IQR: 0.93–1.90) among women with parity of three or more ($U = 740.0$, $p = 0.189$). Overall, infusion therapy was associated with a statistically significant increase in AFI. However, the magnitude of AFI change did not differ significantly according to maternal age group, gestational age category, or parity (Table 3).

Table 1. Baseline Characteristics of the Study Participants (n = 80)

Variable	Statistic
Age (years), Mean $\pm$ SD	27.03 $\pm$ 6.41
Gestational age (weeks), Mean $\pm$ SD	31.95 $\pm$ 2.58
Age group, n (%)	
18–29 years	48 (60.0%)
30–40 years	32 (40.0%)
Parity, n (%)	
<3	59 (73.8%)
≥ 3	21 (26.3%)

Table 2. Comparison of Amniotic Fluid Index (AFI) Before and After Infusion (n = 80)

Variable	Median (IQR)	Min–Max	Z-value	p-value
AFI before infusion	3.62 (3.01–4.01)	2.35–4.47	-7.772	<0.001
AFI after infusion	4.77 (4.44–5.66)	3.81–6.00		

Wilcoxon signed-rank test.

There was a statistically significant increase in AFI following infusion, with the median AFI increasing from 3.62 (IQR: 3.01–4.01) before infusion to 4.77 (IQR: 4.44–5.66) after infusion ($Z = -7.772$, $p < 0.001$).

Table 3. Comparison of Change in AFI According to Maternal Characteristics (n = 80)

Variable	Group	n	Median (IQR)	Mean Rank	Test Statistic	p-value
Age group (years)	18–29	48	1.41 (0.82–2.01)	42.69	U = 873.0	0.304
	30–40	32	1.30 (0.71–1.90)	37.22		
Gestational age (weeks)	28–30	28	1.19 (0.76–1.84)	36.18	U = 607.0	0.224
	31–36	52	1.43 (1.11–2.40)	42.83		
Parity	<3	59	1.45 (0.82–2.01)	42.54	U = 740.0	0.189
	≥ 3	21	1.11 (0.93–1.90)	34.76		

U = Mann–Whitney U test; IQR = interquartile range.

Discussion

Amniotic fluid is in the amniotic cavity around the developing fetus during pregnancy. At 20 weeks of gestation, the amniotic fluid index (AFI) can be determined by dividing the largest vertical pocket in each of the four parts of the uterus by the umbilicus¹². Oligohydramnios is amniotic fluid less than the lowest expected level for the gestational age and can happen at any time during the pregnancy but is most frequently seen in the third trimester¹³.

In this study, the effectiveness of intravenous amino acid infusion was evaluated in pregnant women with isolated oligohydramnios. Following therapy, a significant improvement in AFI was observed. The median AFI increased significantly from 3.62 cm (IQR: 3.01–4.01) before infusion to 4.77 cm (IQR: 4.44–5.66) after infusion ($p < 0.001$). These findings indicated that intravenous amino acid infusion was associated with a significant increase in amniotic fluid volume among the study participants.

The findings obtained from the present study are comparable to the findings obtained by Shinde et al. in pregnant women with IUGR and oligohydramnios who were administered intravenous amino acid infusion. Intravenous hydration and amino acid infusion both caused an increase in AFI; the amino acid group had a greater increase from 4.93 ± 2.03 cm to 7.52 ± 2.04 cm after 14 days ($p < 0.0001$)⁸.

Similarly, 60 women with oligohydramnios were evaluated who were managed by IV infusion of amino acid in a local study. After therapy, the mean AFI was found to be increased by 2.30 ± 0.65 cm and 70% of the births were vaginal and 25% were cesarean. The results of the current study were consistent with the results of previous studies, which showed that parenteral amino acid infusion increased amniotic fluid volume and improved pregnancy outcomes¹⁴.

Habib et al. compared IV hydration with amino acid infusion in isolated oligohydramnios and found that the amino acid treatment had a greater effect. After six infusions, the AFI of 104 pregnant women in the amino acid group was considerably higher (6.82 ± 0.62 vs. 4.79 ± 0.65) and increased more (3.09 ± 0.70 vs. 1.0 ± 0.31). They came to the conclusion that IV amino acid treatment works in improving AFI⁹. A non-randomized controlled trial of 90 women with third-trimester oligohydramnios showed that the infusion with amino acid group significantly increased AFI, compared to the controls ($p = 0.001$), in addition to improving infant outcomes such as birth weight and Apgar scores¹⁵.

In the present study maternal age ($p = 0.0304$), gestational age ($p = 0.224$) and parity ($p = 0.0189$) were not significantly related to improvement in AFI. Mumtaz et al. and other researchers observed similar results, indicating that amino acid infusion is still beneficial at various gestational ages and maternal features. In the randomized controlled trial at Hayat Memorial Teaching Hospital in Lahore, the group of amino acids showed a significantly greater increase in AFI (2.66 ± 1.87 cm vs 0.56 ± 1.73 cm; $p < 0.001$). This improvement was observed in all age groups, all gestational age groups, all gravida groups and all parity groups¹⁶.

Hydration has also been shown to improve maternal circulation and uteroplacental perfusion, ultimately improving the AFI as well. Azarkish et al. reported that women with oligohydramnios who were treated with intravenous hydration had significantly lower AFI levels compared to those who were not treated with intravenous hydration¹. Likewise, Anant et al. demonstrated improvement in AFI with maternal hydration and suggested that it may help to prolong pregnancy in isolated oligohydramnios^{17, 18}.

At Al-Azhar University Hospitals, a trial of 50 women suffering from oligohydramnios at 34–36 weeks of gestation found hydration therapy was safe and effective, with a significant improvement in AFI and uteroplacental Doppler parameters after hydration therapy³. However, Yan-Rosenberg et al. observed a variable response; after an intravenous hydration, the AFI was increased but there was no significant difference from controls. This discrepancy could be due to baseline AFI differences, duration of treatment, sample size, and procedure, which is the intervention procedure¹⁹.

The results of the present study are consistent with the increasing body of evidence that suggests maternal infusion therapy is a beneficial conservative therapy for isolated oligohydramnios. A significant overall improvement in AFI was observed following infusion, indicating that IVAA infusion may be beneficial in improving AFI regardless of age, GA, or parity. Long-term clinical benefits of this intervention must be confirmed in larger RCTs with longer follow up and evaluation of neonatal outcomes, however.

Despite the significant findings, this study had some limitations. The primary limitation of the study was the small sample size (80 participants), which could restrict the findings' generalizability to a larger sample. Further, the study was a single hospital-based study and the results may not be generalizable to other hospital populations or settings. A further drawback was the lack of a control group, which would have allowed a comparison to be made as to the efficacy of the infusion of amino acids with the standard management or other treatment.

CONCLUSION

Based on the results of the present study, intravenous amino acid infusion can be considered as a useful conservative therapy for women with isolated oligohydramnios especially in pregnancies in which prolongation of gestation is desired. Infusion therapy may allow more time for fetal maturation after improvement in AFI, and may help minimize early delivery requirement in certain patients.

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