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Original Research Article

A prospective observational study of maternal outcomes in patients with oligohydramnios

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ABSTRACT

Background: Amniotic fluid around the fetus serves purposes like normal fetal growth, neuro-musculoskeletal development and is responsible for better fetal outcomes. Oligohydramnios is a decreased amount of amniotic fluid with an amniotic fluid index (AFI) <5 cm. Borderline oligohydramnios is an amniotic fluid index between 5.1 to 8 cm. L-arginine, a semi-essential amino acid used in oligohydramnios, has been suggested to be beneficial in improving the amniotic fluid index. Hence, this study was planned to evaluate maternal outcomes in patients of oligohydramnios who received L-arginine as well as those who came to emergency delivery and were not administered L-arginine.

Materials and Methods: This was a prospective observational study undertaken in a tertiary care teaching hospital which included 70 patients diagnosed with oligohydramnios from 1st January 2023 to 31st December 2023. Institutional ethics committee permission (PUIECHR/PIMSR/00/081734/5306) was obtained before the data collection. All pregnant women with singleton pregnancies diagnosed with oligohydramnios, satisfying inclusion criteria were included and data was recorded for those who received L-arginine as well as for those patients with oligohydramnios directly coming for delivery and not administered L-arginine.

Results: Out of 70 patients diagnosed with oligohydramnios, 24 patients received L-arginine and 46 patients came directly for delivery and did not receive L-arginine. Out of those receiving L-arginine, the average gestational age of starting L-arginine therapy was 34.6 ± 3.3 weeks while at delivery the gestational age was 35.7 ± 2.9. Hence, there was an increase of 1.1 ± 0.4 weeks of gestational age at an average. The rise in AFI after treatment with L-arginine was 0.1 to 1.9 cm with a mean of 0.475 cm.

Conclusion: Our study showed an increase in gestational age as well as an increase in AFI with the administration of L-arginine. A larger sample size and more such studies may help in establishing the beneficial role of L-arginine in oligohydramnios.

1. Introduction

Oligohydramnios is a decreased amount of amniotic fluid with an amniotic fluid index (AFI) <5 cm[1] and affects around 4.4% of all pregnancies at term.[1] Borderline AFI refers to AFI between 5 to 8 cm.[2]

The amniotic fluid surrounding the fetus serves to protect the fetus and umbilical cord from compression and is important for adequate fetal growth and good fetal outcomes.[3] It helps in neuro-musculoskeletal maturation by creating physical space for fetal movement. The amnionic fluid volume reaches 800 ml by the mid-third trimester.[2]

In case of less amniotic fluid, the fetus tries to acclimatize by reducing urine output by redirecting blood flow towards vital organs.[3] Also, fetal movement may

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decrease and the fetus may assume a peculiar appearance with musculoskeletal deformities.[3]

Maternal complications like prolonged labor due to inertia and increased incidence of operative intervention can occur due to oligohydramnios.[4]

L-arginine, a semi-essential amino acid, an endogenous precursor of nitric oxide is an important regulator of placental perfusion and has been suggested to improve amniotic fluid index in oligohydramnios.[3] It also promotes fetal growth by improving blood flow through the umbilical artery, especially in pregnant women with pregnancy-induced hypertension and fetal growth restriction.[3] Hence, this study was planned to assess maternal outcomes in patients of oligohydramnios in the presence and absence of L-arginine.

2. Materials and Methods

This was a prospective observational study undertaken in a tertiary care teaching hospital with 70 patients diagnosed with oligohydramnios within the study duration (12 months-from 1st January 2023 to 31st December 2023).

Institutional ethics committee permission (PUIECHR/PIMSR/00/081734/5306) was taken before the collection of the data.

2.1. Inclusion criteria

Pregnant women with a single pregnancy between 24-36 weeks of gestation with oligohydramnios as well as borderline AFI, consenting to take part in the study and coming to the Department of Obstetrics and Gynecology between 1st January 2023 to 31st December 2023. Pregnant women not receiving l-arginine and coming for emergency delivery due to oligohydramnios to the Department of Obstetrics and Gynecology within the study period will also be included.

2.2. Exclusion criteria

Congenital anomalies, pregnancy with multiple pregnancies, diagnosed with oligohydramnios in 1st trimester, premature rupture of membrane, and those who do not consent to take part in the study were excluded.

Patients who received L-arginine sachets (3-4 sachets a day) and/or tablets (3 times a day) were observed and a case record form was filled. Treatment with L-arginine continued till improvement in liquor or need for emergency cesarean section by the Department of Obstetrics and Gynecology. Similarly, data of those patients who came directly for emergency delivery due to oligohydramnios and were not prescribed L-arginine was also recorded in case record form. Amniotic fluid volume was calculated by ultrasound technique using the four-quadrant method by the Department of Obstetrics and Gynecology and was recorded in the case record form.

Data is presented as mean ± standard deviation. Fischer's exact test was used to find out the statistical significance of the observations. Paired t-test was used to find significance in the increase of AFI after treatment with L-arginine. Analysis of the data was done by using SPSS software version 25.

3. Results

A total of 70 pregnant females diagnosed with oligohydramnios from 1st January 2023 to 31st December 2023 were included in this study. Out of these, 24 patients received L-arginine and 46 patients came directly for delivery and were not prescribed L-arginine.

The mean age, parity and weight of pregnant females of both these groups are given below in Table 1.

Table 1: Mean age, parity and weight of pregnant females of both groups

Characteristic	With arginine (24)	Without arginine (46)
Mean Age	25.95 ± 4.66 years	24.43 ± 4.70 years
Parity		
Primigravida	11 (45.8%)	28 (60.86%)
Multigravida	13 (54.16%)	18 (39.13%)
Weight		
<50 kg	11 (45.8%)	9 (19.56%)
>50 kg	13 (54.16%)	37 (80.43%)

Out of 70 pregnant females, 39 were primigravida while 31 were multigravida. BMI amongst these ranged from 17 to 42.5 where the highest number (36/70, 51.4%) of pregnant females belonged to a normal range of BMI (18.5 to 24.9). Figure 1 gives details about BMI in both the groups of patients. The age of the females ranged from 19 years to 39 years.

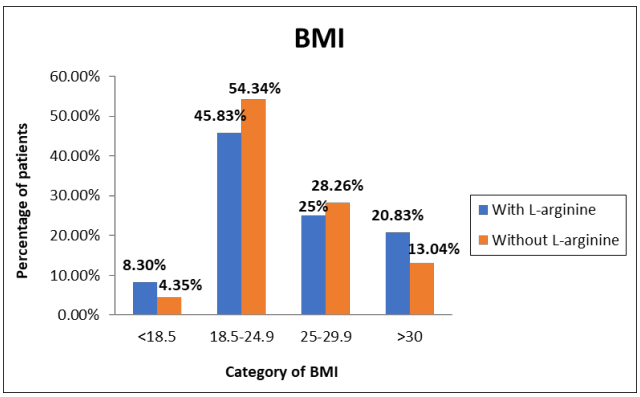

Figure 1: BMI amongst pregnant females receiving as well as not receiving L-arginine

Amongst the patients receiving L-arginine, the maximum number of women (11/24) belonged to the O-positive blood group. The duration of treatment varied from 1 to 40 days

with a mean of 7.41 ± 6.41 days. Amniotic fluid index (AFI) was between 3.1 cm to 7.35 cm with a mean AFI of 4.98 ± 1.21 cm before intervention.

The rise in AFI after treatment with L-arginine was 0.1 to 1.9 cm with a mean of 0.475 cm. The mean AFI post-treatment was 5.45 ± 1.5 cm. Table 2 depicts that the rise in AFI was highly significant (p<0.001) according to the student's t-test.

Table 2: Changes in AFI in patients receiving L-arginine

Pre-treatment AFI	4.98 ± 1.21 cm	
Post treatment AFI	5.45 ± 1.5 cm	*p<0.001
Increase in AFI	0.475 ± 0.3 cm	

*Student's t-test was done to find statistical significance

Amongst those who received L-arginine, the average gestational age of starting the therapy was 34.6 ± 3.3 weeks while at delivery gestational age was 35.7 ± 2.9 weeks. Hence there was an increase of 1.1 ± 0.4 weeks of gestational age at an average. While amongst those patients who were not prescribed L-arginine and came directly for delivery with oligohydramnios, the maximum number of women (24/46) belonged to the B-positive blood group. The average gestational age at delivery was 37.75 ± 2.48 weeks. AFI at delivery ranged from 2 cm to 7.8 cm.

As shown in Figure 2, the frequency of cesarean delivery in L-arginine-treated patients was 75% (18/24), and in those not prescribed L-arginine was 97.82% which was very high (45/46). There was a significant statistical difference (P<0.05) between both groups concerning the mode of delivery according to Fischer's exact test.

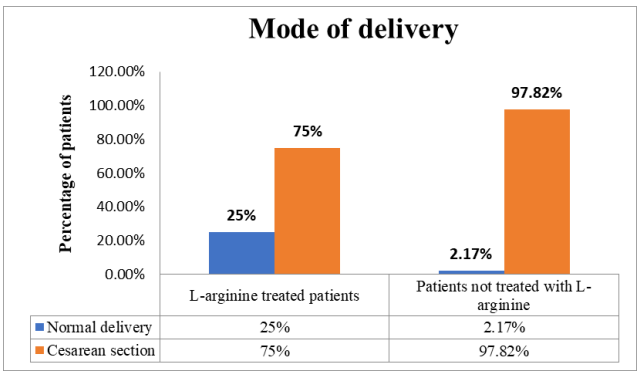

Figure 2: Mode of delivery

In patients treated with L-arginine, the reasons for cesarean delivery were intrauterine growth retardation, pregnancy-induced hypertension, fetal distress, and Doppler changes. In those patients who did not receive L-arginine, the main reason was fetal distress.

4. Discussion

Oligohydramnios can have adverse feto-maternal outcomes like chances of stillbirth,[5] increased cesarean section rates,[6] growth retardation in fetus,[7] meconium staining,[8] and congenital anomalies. L-arginine helps in fetal development, plays an important role in intrauterine growth retardation,[9] and preeclampsia, and also helps improve placental perfusion by its vasodilatation action. In some studies,[3,10,11] it has been shown to increase the AFI index and gestational age, leading to better fetal and maternal outcomes.

In our study, 24 patients received L-arginine and showed an increase in gestational age by 1.1 ± 0.4 weeks which was similar to a study conducted by Soni A et al.[3] where an increase in gestational age was noted to be 2.4 weeks. However, in their study, the mean age of recruitment and administering L-arginine was 32.3 weeks, and in ours, it was 34.6 weeks, hence the duration of administration of L-arginine in our study was lesser compared to their study.[3] Due to the early initiation of therapy, their study may have shown higher rise in AFI (3.332 cm) as compared to ours (0.475 cm).

A similar study conducted by Hebbar S et al.[10] showed an increase in AFI by 1.8 cm in 11 patients with a mean duration of treatment of 21.6 days while in our study, the mean duration of treatment with L-arginine was 7.41 days with 24 patients and showed an increase of 0.475 cm in AFI.

A study conducted by Shreedharan R et al.,[12] showed an average increase of AFI to be 2.03± 0.39 cm for an average duration of treatment with L-arginine for 23.99 days. Our study showed a lesser increase in AFI as the average treatment duration was less. Diagnosis of oligohydramnios with the initiation of treatment with L-arginine was earlier in this study compared to ours.

The rate of cesarean section in our study was 75% in patients treated with L-arginine but, at the same time, the number of patients receiving L-arginine was also much less (24/70) as compared to a study conducted by Soni A et al.[3] where the number of patients receiving L-arginine was 100 and rate of cesarean section was 72%. This may be due to fewer patients receiving L-arginine and the short duration of therapy in our study. In our study, oligohydramnios was more common in primigravida patients (39/70), which was similar to a study conducted by Soni A et al.[3]

Iqbal S et al.[11] conducted a similar study showing a mean increase in gestational age by 5.93 weeks and a mean increase in AFI by 1.55 cm after treatment with L-arginine which was in accordance with our study, which showed an increase in gestational age as well as AFI but not as high as this study. In his study, only 18% of patients underwent cesarean section after treatment with L-arginine while in our study, L-arginine-treated patients showed a 75% rate of cesarean section.

The mean increase in AFI was 2.19 ±0.36 cm with an average treatment duration with L-arginine of 20.70 ±5.47 days according to a study conducted by Hatem R et al.[13] Another study conducted by MA Begum et al.[14] showed a mean increase in AFI of 2.6 cm with 3.23 weeks of treatment with L-arginine. In our study, the duration of treatment ranged from 1 to 40 days with a mean of 7.41 ± 6.41 days, and may be due to that the increase in AFI was also less (0.475 cm).

A similar study conducted by Sahay V[15] showed an increase in AFI of 3.2 cm and an increase in gestational age of about 3.1 weeks and was in accordance with our study which also showed an increase in both.

Though our study showed an increase in the amniotic fluid index as well as the gestational age with the use of L-arginine, a major limitation of our study included a smaller sample size as well as less duration of therapy with L-arginine.

5. Conclusion

From the findings of our study, we observed that L-arginine therapy showed a mean increase in amniotic fluid index of 0.475 cm for an average duration of treatment of 7.41 days. Also, an increase in gestational age by 1.1 ± 0.4 weeks was noted. This can be a reason for fewer cesarean deliveries in patients receiving L-arginine as compared to those who did not receive L-arginine.

However, more such studies with L-arginine in oligohydramnios with a larger sample size are needed to reach a more specific conclusion about the beneficial role of L-arginine in oligohydramnios.

6. Source of Funding

None.

7. Conflict of Interest

None.

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