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Original Research Article

STUDY OF L-ARGININE AND MATERNAL HYDRATION IN IMPROVING AMNIOTIC FLUID INDEX IN OLIGOHYDRAMNIOS

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ABSTRACT

Background: Amniotic fluid is one of the essential requirements for appropriate foetal growth and good foetal outcome. Oligohydramnios is a common diagnosis in obstetrics with various complications to foetus such as intrauterine growth retardation, meconium aspiration syndrome, umbilical cord compression, severe birth asphyxia, congenital abnormalities, low APGAR scores and increased operative interferences to mother. Early detection of oligohydramnios and its management may help in reduction of prenatal morbidity and mortality one side and decreased caesarean deliveries on the other side. **Aims & Objectives:** To evaluate the effect of oral L-Arginine supplementation on the improvement of amniotic fluid index (AFI) in Pregnant women diagnosed with oligohydramnios.

Materials and Methods: This was a hospital based prospective observational study done in the department of obstetrics and Gynecology at Malla Reddy Institute of medical sciences, Suraram, Hyderabad. The women with oligohydramnios were given oral adequate oral hydration and l-arginine supplementation was given. The women were followed up by repeating the ultrasound weekly or biweekly depending on the initial amniotic fluid index. A total of 100 women selected for the study.

Results: There was mean increase in AFI by2.2cms in mean duration of 2.66 weeks and prolongation of pregnancy by an average of 2.95weeks. There was also increase in foetal birth weight by L-Arginine supplementation.

Conclusion: The study findings reveals that the cost of rearing preterm baby in NICU, maternal oral hydration And oral L-Arginine supplementation can be used as a cheap, easily available, non- Invasive and easily acceptable method in management of oligohydramnios in developing countries like India.

Keywords: Oligohydramnios, L-arginine, Supplementation, Maternal Hydration.

INTRODUCTION

Nature has made a floating bed in form of an amniotic fluid cavity filled with liquor amnii for requirement of the foetus, for its existence and growth in sterile environment, regulation of temperature, and reduction of impact of uterine contractions.[1]

Amniotic fluid is a clear yellow fluid, which provides a protected milieu for the growing foetus, cushioning the foetus against mechanical and biological injury, supplying the nutrients and facilitating the growth of the foetus. It also protects the foetus from mechanical jerks and shock.[2]

Amniotic fluid is one of the essential requirements for appropriate foetal growth and good foetal outcome. Oligohydramnios is a common diagnosis in obstetrics with various complications to foetus such as intrauterine growth retardation, meconium aspiration syndrome, umbilical cord compression, severe birth asphyxia, congenital abnormalities, low APGAR scores and increased operative interferences to mother.[3] The umbilical cord compression during labour is common with oligohydramnios which

increases the risk for caesarean delivery, because of foetal distress. Hence treatment of oligohydramnios is important for good foetal and maternal outcome. With the help of amniotic fluid estimation method by amniotic fluid index using four quadrant technique during trans-abdominal USG, as per described by Phelan et al in 1997, better identification of high risk can be done.[4] Early detection of oligohydramnios and its management may help in reduction of prenatal morbidity and mortality one side and decreased caesarean deliveries on the other side. Since oligohydramnios has got significant impact on neonatal outcome and maternal morbidity, early diagnosis and treatment of oligohydramnios is very important in improving feto-maternal outcome.

Multiple studies have proposed that maternal hydration leads to change in maternal osmolality. Thus, in turn leads to increased uterine perfusion, and thus increases placental perfusion, it increases foetal renal perfusion, which in turn increases foetal urine production and hence amniotic fluid volume.[5]

L-arginine, a semi-essential amino acid and a sole endogenous precursor of nitric oxide (NO), is involved in the regulation of blood flow in the vascular beds. It is an important regulator of placental perfusion. It causes vasodilation and shows aggregative effect on the platelets. This mechanism increases the volume and viscosity of blood in the feto-maternal circulation and thus increases the amniotic fluid volume.[6]

Objectives

1. To evaluate the effect of oral L-Arginine supplementation on the improvement of amniotic fluid index (AFI) in Pregnant women diagnosed with oligohydramnios.
2. To assess the impact of maternal hydration therapy on the amniotic fluid index.

MATERIALS AND METHODS

- **Study Design:** Hospital based prospective observational study.
- **Study population**: All pregnant women between 28-37weeks gestation
- **Study area**: Obstetrics & Gynaecology OPD & Ward at Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad
- **Study Duration:** The study period was for period of 18months (January 2021-June 2022)
- **Sample size:** A total of 100 pregnant women who were diagnosed with oligohydramnios were included in the present study.

Inclusion Criteria

- Pregnant women aged between 18-35 years
- Gestational age between 28-37weeks
- Singleton pregnancies
- In the presence of intact membranes

Exclusion Criteria

- History of Smoking
- Pre labour rupture of membranes
- Diagnosed with major congenital anomalies
- Hypertensive disorders in pregnancy
- Severe Intra Uterine Growth Restriction-where urgent delivery was required

Methodology

This was a hospital based prospective observational study done in the department of obstetrics and Gynecology at Malla Reddy Institute of medical sciences, Suraram, Hyderabad. After taking permission from the institutional Scientific committee and Institutional Ethics Committee the study was conducted. Based on the inclusion criteria the pregnant women were enrolled in the study.

The pregnant women were informed about the purpose and procedure of the study. Informed consent was taken from the pregnant women in their own understandable language. Detailed history of the pregnant women was taken and previous USG reports were reviewed This hospital based study included 100 antenatal women aged between 18-35 years and gestational age between 28-37 weeks of gestation and AFI between 5-8cms.These women were prescribed L-Arginine (one sachet 3g, twice daily) and advised to drink 3-3.5liters of water per day.

Weekly or biweekly USG (depending on initial AFI) was done to check for improvement
in AFI. The treatment was continued until there is significant improvement in AFI.AFI is measured by dividing the uterus into four imaginary quadrants with the Linea Nigra and a mediolateral line running through the umbilicus acting as the vertical and the horizontal axis respectively. The deepest pocket devoid of an umbilical cord and foetal parts was Measured in the vertical dimensions. The sum of all the four quadrants Measurements is AFI

Statistical Analysis: Statistical analysis was carried out utilizing SPSS software. P values < 0.05 were considered statistic ally significant. All outcomes were presented using descriptive statistics; normally distributed data by the mean and standard deviation (SD) and skewed distributions by the median and interquartile range (IQR). Binary and categorical variables were presented using counts and percentages. Statistical test was used are paired t – test.

RESULTS

About 100 pregnant women of gestational age between 28-37 weeks with AFI between 5- 8cms were supplemented with oral maternal hydration and L-Arginine supplementation

Table 1: Distribution of study participants with Age

Age	Frequency	Percent
18-20	10	10.0
21-25	43	43.0
26-30	27	27.0
31-35	20	20.0
Total	100	100.0

Table 1 shows distribution of women according to age group. Majority of women were between 21 to 25 years of age. Median age of the women in the study was 25.9 years.

Table 2: Distribution of Parity

Parity	Frequency	Percent
Nullipara	33	33.0
One Para	31	31.0
Two Para	31	31.0
Third Para	4	4.0
Fourth Para	1	1.0
Total	100	100.0

Table 2 shows majority of the women in the study were primigravida's

Table 3: Measurement of AFI before and after supplementation of L-Arginine

Variable	Pre L- Arginine Supplementation	Post L- Arginine Supplementation	P-Value
AFI (CMS)	7.11±0.7	9.67±0.79	<0.01

Table 3 shows pre - treatment and post treatment AFI. Mean Pre- treatment AFI was 7.11cms and mean post treatment AFI was 9.67cms. Mean increase in AFI was 2.5cms. Paired t test was used. P-value is highly significant.

Table 4: Distribution of Duration of treatment with L-Arginine

Statistics	Duration of treatment (in weeks)
Mean	2.699
Median	2.500
Std. Deviation	.9924
Minimum	1.0
Maximum	5.0

Table 4 shows duration of treatment in weeks. The maximum duration of treatment was 5 weeks and minimum duration of treatment was 1 week. Mean duration of treatment was 2.69 weeks.

Table 5: Distribution of Prolongation of pregnancy (in weeks)

Statistics	Prolongation of Pregnancy (in weeks)
Mean	2.955
Median	3.000
Std. Deviation	1.0276
Minimum	1.0
Maximum	6.0

Table 6 shows prolongation of pregnancy in weeks. Maximum prolongation by 6 weeks and minimum prolongation by 1 week. Mean prolongation of pregnancy was by 2.95weeks.

Table 6: Distribution of Gestational Age at Delivery (in weeks)

Statistics	Gestational Age at Delivery (in weeks)
Mean	37.576
Median	38.000
Std. Deviation	1.2725
Minimum	33.5
Maximum	40.0

Table 6 shows gestational age at delivery. The maximum gestational age at delivery was 40weeks and minimum gestational age at delivery was 33.5weeks. Mean gestational age at delivery was 37.5weeks.

Table 7: Distribution of mode of delivery

Mode of Delivery	Frequency	Percent
Caesarean section	47	47.0
Vaginal Delivery	53	53.0
Total	100	100.0

Table 7 shows 53% women delivered vaginally and 47% women delivered by caesarean section.

Table 8: Distribution of Birth Weight (in Kgs)

Statistics	Birth Weight (in Kgs)
Mean	2.783800
Median	2.760000
Std. Deviation	.2974633
Minimum	1.9000
Maximum	3.5200

Table 8 shows birth weight at the time of delivery. The maximum birth weight at delivery was 3.52kgs and minimum birth weight at delivery was 1.9kgs. Mean birth weight at delivery was 2.78kgs.

DISCUSSION

In the present study study the age groups were distributed from 18 to 35 years of age maximum percentage of patients belong to 21-25 years of age group of which is 43%. The mean gestational age is 25.90 years.

In a study conducted by Begum MA et al,[7] in 2019 the mean maternal age was 23.3years where as in one study conducted the mean age in the study group was 23.25 years. In a study conducted by the mean maternal age was 23.9 years.[8]

The mean age of the women was 25.5 years in another study.[9]

In the present study, the mean gestational age at entry was 34.6 weeks minimum gestational age at entry was 29 weeks and maximum gestational age at entry was 37 weeks within standard deviation 1.63. In a study conducted by Vandana Bansal et. al the mean gestational age at entry was 31.5+/-2.63 weeks. In a study conducted by M D Amirunnisa Begum et.al the mean gestational age at entry was 34.61 weeks. In Vinita Sahay et.al study the mean gestational age at entry was 32.4 weeks

In the present study 33% were primigrarida, 31% were 2nd gravid and 3rd gravid each, 4% in 4th gravid, 1%in 5th gravid. In a study conducted by Priya sondhya oligohydramnios was seen in 28%primigravidas. In a study conducted by MD Amirunnisa Begum the majority of the women were primigravida's.

In the present study pre-treatment AFI was 7.11cms and mean post treatment AFI was 9.67 with mean increase of 2.56cms and p value of <0.01.

In a study conducted the mean increase in AFI was 2.82cms which is comparable to the present study. 7

In another study conducted by Hebbar s et al. pre-treatment AFI was 6.9cms and post treatment AFI was 9.3cms with mean increase of 2.4cms with p value <0.03 of the mean duration of treatment was 2.9.[6]

In a study mean pre-treatment AFI was 5.42cms and mean post treatment AFI was 8.75cms with mean increase of 3.33cms. The mean duration of treatment was 2.4 weeks.[10]

In a study conducted by with maternal oral hydration therapy. Pre-treatment AFI was 6.23 and post treatment AFI was 7.47cms with mean increase of 0.58cms at 24hrs after treatment and mean increase of 1.47 cms at 48 hours of treatment.[11]

In one study there was an increase in AFI by 2cms, prolonging the pregnancy by 2 weeks thus improving the maternal and perinatal outcome.

In a study conducted by Vinita Sahay et.al the mean pre-treatment AFI was 5.6cms and mean post-treatment AFI was 8.8cms with mean increase of 2.2 cms.[12]

In the present study, with oral maternal hydration and L-Arginine supplementation in oligohydramnios, there was prolongation of pregnancy by maximum six weeks and minimum of one week. The mean prolongation of duration of pregnancy was 2.95 weeks. By prolongation of duration of pregnancy, there was sufficient time to administer steroids and improving the maturation of lungs. There was also, decrease in pre-term deliveries, low birth weight, NICU admission and improving the perinatal outcome. In a study conducted by Hebbar S et al. there was prolongation of pregnancy by 2.9 weeks with maternal hydration and L- Arginine supplementation they concluded that prolongation of pregnancy enabled to administer steroids for lungs maturation, thus improving the foetal outcome in pregnancies complicated by decreased liquor.[6]

In a study conducted by Anita et .al with L- Arginine supplementation in oligohydramnios there was prolongation of pregnancy by 2.4 weeks allowing foetal lung maturation thus benefiting the neonatal outcome. In a study with L-Arginine supplementation in oligohydramnios there was increase in duration of pregnancy by 2-4 weeks with prolongation of pregnancy there was better neonatal outcomes by reducing pre-term deliveries and operative interventions.[7]

In a study conducted by Vinita Sahay et.al with L-Arginine supplementation, there was prolongation of pregnancy by a mean of 3.1 weeks, allowing better foetal maturation and neonatal outcome.[12]

In the present study, the maximum gestational age at delivery was 40 weeks and minimum gestational age at delivery was 33.5 weeks and mean gestational age at delivery was 37.5 weeks in oligohydramnios with maternal oral hydration and l-Arginine supplementation.

In a study the mean gestational age at delivery was 35.5 weeks.[12] In one study conducted by. with oral l-Arginine supplementation the mean gestational age at delivery was 38.25 weeks.[7] In one study

conducted. with maternal hydration and l-Arginine supplementation the mean gestational age at delivery was 36.3 weeks.[6] In one study with isolated oral hydration therapy, the mean gestational age at delivery was 37.24 weeks, thus improving the feto-maternal outcome.[11]

In the present study, the indications for caesarean sections are 29% women had non- 47 reassuring NST, 6% women were delivered by caesarean section in view of non- Progression of labour, 5% women had cephalo-pelvic disproportion, 6% women had meconium stained liquor, 1% women had Doppler changes. In a study conducted by Krishna Jagatia et al. 59% women with oligohydramnios delivered vaginally and 41% by caesarean section. The main indication for caesarean section was non- reassuring NST and 25% women delivered vaginally inspite of non- reassuring NST.[13]

In a study conducted by Manzanares et al in oligohydramnios 84% delivered vaginally

And 16% by caesarean section. In a study conducted by Meenakshi Chauhan et al. with oral hydration therapy in Oligohydramnios 86% women delivered vaginally and 14% by caesarean section. In a study conducted by Krishna Jagatia et al,[13] 59% women with oligohydramnios

Delivered vaginally and 41% by caesarean section. In one study with oral l-Arginine supplementation in Oligohydramnios, 63% women delivered by vaginal route and 37% by caesarean section, which was comparable to the present study. Most common indication for Operative vaginal delivery was foetal distress apart from meconium stained liquor (MSL) 48 and cord compression.

In a study conducted by Hebbar s et al. with maternal oral hydration and l-Arginine supplementation in oligohydramnios, 62% of patients had caesarean deliveries and 38% had vaginal deliveries. The main indication for caesarean section is foetal distress in 52%. This can be attributed to the fact that foetuses with decrease liquor are likely to experience cord compression and variable deceleration.[6]

In the present study with l-Arginine supplementation the maximum birth weight was 3.52kgs and minimum birth weight was 1.9kgs. L-Arginine, nitric oxide donor prevents IUGR by reducing the resistance in feto-placental circulation. Apart from the routine foetal surveillance in IUGR, umbilical artery S/D ratio done by Doppler ultrasonography helps in detecting increased resistance and monitoring compromised foetus. There was reduction in complications and need for NICU admissions.

The results were similar to the study done by Hajee Arshiya Bareen in 2018, the study demonstrated that l-Arginine supplementation to pregnant women with IUGR improved foetal condition and neonatal outcome after delivery by prolonging the pregnancy and delivering a child with higher birth weight, better Apgar score and decrease the rate of caesarean sections.[14]

CONCLUSION

The present study finding revealed that there was mean increase in AFI by2.2cms in mean duration of 2.66 weeks and prolongation of pregnancy by an average of 2.95weeks. There was also increase in foetal birth weight by L-Arginine supplementation.

Oligohydramnios is a common diagnosis in obstetrics, with increased chances of operative interferences and perinatal mortality and morbidity. Hence, during antenatal visits all pregnant women and highrisk cases should be screened to detect Oligohydramnios in earlier stages to decrease peri-natal mortality and morbidity. Keeping in mind the cost of rearing preterm baby in NICU, maternal oral hydration and oral L-Arginine supplementation can be used as a cheap, easily available, non-Invasive and easily acceptable method in management of oligohydramnios in developing countries like India.

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