Prospective Study Of Efficacy And Perinatal Outcome Of Hydrotherapy In Oligohydroamnios Patients

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Abstract: Background: Oligohydramnios means a low level of amniotic fluid during pregnancy. It is defined by an amniotic fluid index that is below 5th percentile for the gestational age. It may cause IUGR, fetal anomalies, mal presentations and fetal distress in labour. Oral or intravenous fluid therapy may increase the amount of amniotic fluid and may improve perinatal outcome. Aims And Objectives: To study efficacy and perinatal outcome of hydrotherapy in patients with oligohydamnios. Material & Methods: A prospective observational study was carried out at tertiary care centre for 6 months. 30 cases of oligohydramnios were enrolled in this study. Results: In present study, maximum (50%) patients admitted for oligohydramnios were between 28 – 32 weeks gestational age and 66% were having severe oligohydramnios. After giving hydration therapy, difference in AFI, was 2.57±0.13, which was statistically significant. 83.3% patients were delivered after 36 weeks and 80% were delivered by normal vaginal delivery. 53.3% babies were live healthy, whereas others needed resuscitation and admitted to NICU. Conclusion: Oligohydramnios has higher impact on perinalal outcome due to antenatal and intrapartum complication. Because of early diagnosis by ultrasonography or clinical analysis, fluid therapy is an option to increase amniotic fluid volume and so perinatal outcome may be improved. [Patel P Natl J Integr Res Med, 2021; 12(1):36-41]

Key Words: Oligohydramnios, Amniotic fluid, Amniotic Fluid Index, Hydration Therapy

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Introduction: Amniotic fluid serves several roles during pregnancy. It creates a physical space for fetal movement, which is necessary for normal musculoskeletal development. It permits fetal swallowing- essential for gastrointestinal tract development and fetal breathing- necessary for lung development. It guards against umbilical cord compression and protects the fetus from trauma. It also has even bacteriostatic properties.

Amniotic fluid volume abnormalities may reflect a problem with fluid production or its circulation, such as underlying fetal or placental pathology. These volume extremes may be associated with increased risks for adverse pregnancy outcome.

Normal Amniotic Fluid Volume at 10 weeks, 16weeks, 20weeks and 36 weeks are 30ml, 200ml, 400ml and 1000ml, respectively.[1] after that it decreases at term. Normal range is 500ml - 1500ml.

Physiology: In early pregnancy, amniotic cavity is filled with fluid that is similar in composition to extracellular fluid. During the first half of pregnancy transfer of water and other small molecules takes place across the amnion (transmembranous flow), across the fetal vessels on placental surface (intramembranous flow) and across the skin. Fetal urine production begins between 8 and 11 weeks, but it becomes major component of amniotic fluid only after the first trimester ends. Water transport across the fetal skin continues until keratinisation occurs at 22 to 25 weeks.

With advancing gestation, four pathways play a major role in amniotic fluid volume regulation.

First, fetal urination is the primary amniotic fluid source by second half of pregnancy. By term, fetal urine production may exceed 1 litre per day.

Fetal urine osmolarity is significantly hypotonic to that of maternal and fetal plasma and similar to that of amniotic fluid. This hypotonicity of fetal urine, and thus of amniotic fluid, accounts for significant intramembranous fluid transfer across and into the the fetal vessels on the placental surface.

This transfer reaches 400ml per day and is a second regulator of fluid volume.[2] An important third source is the respiratory tract.

Approximately 350ml of lung fluid is produced daily in late gestation and half of this is immediately absorbed. Last, fetal swallowing is the primary mechanism for amniotic fluid resorption and averages 500ml to 1000ml per day. The other pathways- transmembranous flow and flow across the fetal skin- account for a far smaller proportion of fluid transport in the second half of pregnancy.[3]

The actual volume of amniotic fluid is rarely measured outside of the research setting. Direct measurement and Dye-dilution methods of fluid quantification have contributed to an understanding of normal physiology. These measurements have further been used to validate sonographic fluid assessment techniques. The dye dilution method involves injection of a small quantity of a dye such as aminohippurate into the amniotic cavity under sonographic guidance. The amniotic fluid is then sampled to determine the dye concentration and to calculate the fluid volume in which it was diluted.[4]

Volume is typically assessed semiquantitatively, by measuring either a single pocket or the amniotic fluid index-AFI.[5] A qualitative or subjective estimate of amniotic fluid volume is also considered acceptable when performed by an experienced examiner.[6] One limitation of subjective estimation is that it does not permit a longitudinal assessment of trends in the amount or adequacy of fluid volume.

Single Deepest Pocket: This is also called the maximum vertical pocket. The ultrasound transducer is held perpendicular to the floor and parallel to the long axis of the pregnant woman. In the sagital plane, the longest vertical pocket of fluid is identified. The fluid pockets containing fetal parts or loop of umbilical cord, are not included in the measurement. Normal range is 2 to 8 cm.[7] The fetal biophysical profile uses a 2 cm single deepest vertical pocket threshold to indicate a normal amniotic fluid volume.[8] During evaluationof multifetal gestation, a single deepest pocket of is assessed in each gestational sac.[9]

Amniotic Fluid Index(AFI):It is most commonly used method of volume assessment. In this method, the uterus is divided in to four equal quadrants- the right and left- upper and lower quadrants, respectively. And AFI is the sum of the single deepest pocket from each quadrant.

Color Doppler is generally used to verify that no umbilical cord is included in the measurement. This may result in greater consistency and in reduction of intra-observer variation.[10]

It has been reported that color Doppler use results in a lower AFI measurement, thus leading to overdiagnosis of oligohydramnios.[11]
The intra-observer variability of the AFI is approximately 1 cm and the inter-observer is 2 cm. There are larger variations when fluid volumes are above the normal range.[12] A useful guideline is that the AFI is approximately three times the single deepest pocket of fluid encountered.[13] Normal range of AFI that is most commonly used is 5 to 24 cm.

Oligohydramnios: This is an abnormally decreased amount of amniotic fluid. Oligohydramnios complicates approximately 1 to 2 percent of all pregnancies.[14,15] When no measurable pocket of amniotic fluid is identified, the term anhydramnios may be used. AFI between 5 and 8 is termped as borderline AFI or borderline oligohydramnios.[15]

The sonographic diagnosis of oligohydramnios is usually based on an AFI<= 5 cm or on a single deepest pocket <= 2 cm.[8] The diagnosis also may be based on an AFI below the 5th or 2.5th percentile determined by a gestational age specific nomogram.

Etiology:

A) Fetal complications: Fetal chromosomal or stucturalanomalies[16] .Renal agenesis.Obstructed uropathy.Spontaneous rupture of membrane. Intrauterine infection. Drugs: NSAIDS[17], ACE inhibitors[18].Postmaturity[19]. IUGR. Amnion nodosum (failure of secretion by the cells of the amnion covering the placenta).

B) Maternal Conditions:_Hypertensive disorders. Uteroplacental insuffieciency. Dehydratio. Idiopathic

Diagnosis: Uterine size is much smaller than the period of amenorrhoea. Less fetal movements. Uterus is 'full of fetus'. Malpresentation (breech) is common. Ultrasonography.

Complications:

A) Fetal: Abortion. Deformity (due to intra-amniotic adhesions or compression). Fetal pulmonary hypoplasia(may be the cause or effect).Cord compression.Non reactive NST. High fetal mortality. Low APGAR score.

B) Maternal: Prolonged labour due to inertia
Increased operative interference leading to increased maternal morbidity.

Management: It targets the underlying etiology when feasible. Initially, an evaluation for fetal anomalies and growth is essential. Presence of fetal congenital malformations needs referral to a fetal medicine unit. In a pregnancy complicated by fetal growth restriction, close fetal surveillance is mandatory. Isolated oligohy dramnios detected before 36 week in presence of normal fetal anatomy and growth may be managed expectantly by oral or intravenous hydration therapy along with fetal surveillance.

Hydration Therapy: A number of interventions that have been tried to improve the amniotic fluid volume are[20]: Bed rest. High protein diet. Alanine infusion. L-Arginine. Vasopressin. Aminoinfusion. Vesicoamniotic shunt. 10% maltose infusion.Oral and intravenous hydration therapy.

Among all of them, that is cost effective, simple to accomplish, with less side effects, which do not require special techniques and successful outcome, is the Hydration therapy.

Maternal hydration therapy is used to restore amniotic fluid volume to its normal range and thereby to reduce associated perinatal morbidity and mortality.[21]

Maternal hydration may increase amniotic fluid volume by causing fetal diuresis and by improving placental perfusion. Intravenous hypotonic solution significantly increases fetal urine production[22].

Hydration increases amniotic fluid in oligomnios but not in patients with normal AFI, and is associated with increase in mean uterine artery velocity.[23]

Types of Hydration Therapy:

Oral: Coconut water. Glucose water. L-linoleic acid. L-arginine granules.

Intravenous: Essential amino acids.Intravenous infusion given on alternate days along with oral hydration which is given daily. Repeat ultrasonography is done after 7 days of hydration therapy.

Monitoring During Therapy: FHS monitoring 8 hourly. Vitals monitoring 12 hourly. NST monitoring twice a week.

Aims & Objectives: To determine the impact of hydration therapy in patients complicated by oligohydramnios. To study the perinatal outcome in patients receiving hydration therapy for oligohydramnios.

Material And Methods: A prospective observational study was carried out at tertiary care centre for 6 months from November 2019 to April 2020. Among all the patients taking regular antenatal visits in outdoor patient department of our hospital, 30 cases of isolated oligohydramnios were enrolled in our study.

A written, informed consent was taken. All of them were admitted, all routine investigations were sent. Other causes of oligohydramnios were ruled out and fetal ultrasonography was done. Then they were given oral and intravenous hydration therapy.

Post-hydration therapy ultrasonography was done after 1 week to determine the effect of hydration therapy. Perinatal outcome in view of gestational age at birth, baby resuscitation, requirement of NICU admission, stillbirth, postnatal morbidity and mortality were analysed.

Inclusion Criteria: Singleton pregnancy. 2nd or 3rd trimester with AFI: 5 – 8 cm (Borderline oligohydramnios).<5cm (Severe oligohydramnios) Non-anomalous fetus. Intact membrane at the time of selection.

Exclusion Criteria: Congenital anomalies. Multifetal gestation. Medical disorders: hypertensive disorders, GDM, thyroid disease and anemia. APH. Preterm labour. IUGR.

Data Analysis: Statistical analysis.

Software To Be Used: Microsoft Excel

Results: Among all the 30 patients, maximum patients (63.3%) were from 21 – 25 year age

group followed by 26.6% patients in 26 – 30 years age group.

Table 1: Distribution Of Patients According To Age

Age(Year)	No. Of Patients (N=30)(%)
≤ 20	02(6.6%)
21-25	19(63.3%)
26-30	08(26.6%)
≥30	01(3.3%)

Table 2: Distribution According To Parity Of Patients

Parity	No. Of Patients(N=30)(%)
Primi	24(80%)
Second	04(13.3%)
Third	02(6.6%)

In present study, maximum patients enrolled were primigravida patients.

Table 3: Distribution According To Gestational Age At The Time Of Admission

Gestational Age(Week)	No. Of Patients(N=30)(%)
<24 week	00
24-28 week	02(6.6%)
28-32 week	15(50%)
32-36 week	12(40%)
>36 week	01(3.3%)

In present study, maximum (50%) patients admitted were between 28 – 32 week gestational age followed by other 40% patients, who were between 32 – 36 week gestational age.

Table 4: Distribution According To AFI At The Time Of Admission

AFI (cm)	No. Of patients(N=30)(%)
5 – 8 (borderline oligo)	10(33.3%)
< 5 cm (severe oligo)	20(66.6%)

Among all the admitted patients 66.6% were having severe oligohydration whearas 33.3% were having borderline oligohydramnios.

Table 5: Distribution According To Post-Hydration Therapy Change In AFI

	Before Hydration Therapy AFI	After Hydration Therapy AFI	Difference In AFI
Mean	4.3	6.86	2.57
SD	1.79	1.66	0.13
T-value	-	-	22.45
p-value	-	-	<0.00001

In present study, mean improvement in AFI after one week of hydration therapy was 2.57±0.13.

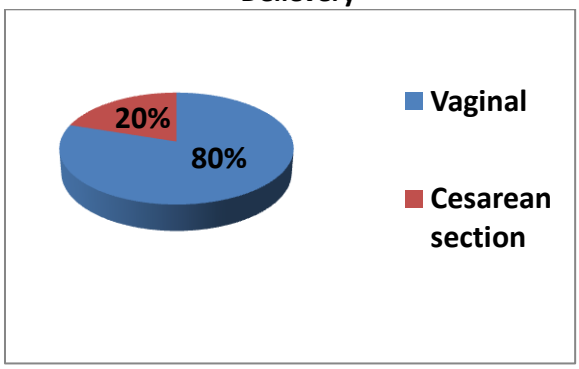
From the data collected, analysis was done by paired T test, which showed t value of 22.45 and p value of 0.00001, which is statistically significant. Hydration therapy therefore is proven to improve AFI in oligohydramnios.

Table 6: Distribution According To Gestational Age At The Time Of Delivery

Gestational Age (Week)	No. Of Patients(N=30)(%)
≤36 week	05(16.6%)
36-40 week	25(83.3%)

83.3 % were delivered at term whereas 16.6% were delivered before 36 weeks of gestational age.

Table 7: Distribution According To Mode Of Delievery



80% patients were delivered by normal vaginal delivery whereas 20% were delivered by caesarean section.

Table 8: Distribution According To Perinatal Outcome

Perinatal Outcome	No. Of Patients (N=30)(%)
Live healthy	16(53.3%)
Resuscitation needed	13(43.3%)
NICU admission	08(26.6%)
Stillbirth	01(3.3%)
Perinatal death	02(6.6%)

Among all patients delivered, only one was delivered stillborn whereas 16(53.3%) delivered were live healthy foetuses. 13(3.3%) foetuses needed resuscitation and among them 8 fetuses were admitted to NICU and 2 were died in perinatal period.

Discussion: In the present study, at the time of admission, AFI was 4.3 ± 1.79 (mean ± SD). All these patients were given hydration therapy, both oral and intravenous. Then after 7 dyas of therapy, ultrasonography was done for improvement in AFI. Mean AFI improved after therapy was 6.86 ± 1.66.

In another study, done by Cicily TJ et al[24] in 2017, change in AFI after hydration therapy was 4.00 ± 2.52 was also statistically significant with t-value of 13.86 suggesting an impact of hydration therapy in oligohydramnios patiets.

In a study done by Umber A et al[25] in 2017, which was a comparative study suggested mean change in AFI was 4.5 cm in oligohydramnios group and 2.7 cm in control group. The percentage increase in mean AFI was 58.6% in intervention group which was statistically significant than percentage increase of 28.4% in control group.

Among all these 30 patients in present study, 5 patients were delivered before 36 week. Among them one was delivered with stillborn fetus and other 25 were delivered after 36 weeks of gestation. 24(80%) were delivered vaginally, among them 13 patients went into spontaneous labour and 11 were delivered after induction of labour after 37 completed weeks. From all these patients 2 patients were delivered by caesarean section for non-reactive non-stress test, 2 were taken for emergency caesarean section for mrconium stained liquor and other 2 were were taken for elective as for indication of previous caesarean section.

In Cicily TJ et al[24], 66.2% patients went into spontaneous labour and in 33.8%, induction was needed. 70.6% were delivered vaginally and 14.7% patients were delivered by emergency caesarean section and only one (1.5%) patient was complicated by meconium stained liquor.

When compared to a study Akter MD et al[26], delivery at 37 – 40 week was 53.1%, normal vaginal delivery in 71%, caesarean section in 29%.

In present study, 53.3% patients gave birth to live healthy foetuses, who did not require resuscitation. Among them, 43.3% foetuses needed immediate resuscitation and 26.6% were admitted in NICU. Perinatal death was 6.6%.

In a study done by Ahmed SR et al[27], 53% were normal healthy foetuses, 20% were admitted to NICU and 6.7% were stillborn foetuses.

According to Akter MD et al,[26] fetal outcome was hwalthy in 87.1%, asphyxiated in 12.9% and perinatal deathwas 3.22% and stillborn were 6.3% cases.

When compared to Cicily TJ et al[24], 8.8% were having non-reactive fetal heart rate pattern, 1.5% cases with meconium aspiration syndrome, 8.8% were having NICU admission and perinatal death was 4.4%.

Conclusion: To From this study, we concluded that Maternal Hydration Therapy significantly increases the AFI, reduces the caesarean section rate and improves the fetal outcome.

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