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MATERNAL HYDRATION FOR INCREASING AMNIOTIC FLUID VOLUME IN OLIGOHYDRAMNIOS

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Abstract

The aim of this study was to evaluate the effect of acute maternal hydration on amniotic fluid volume in pregnancies with third trimester olighydramnios. The study was done at Al-Basrah General and Al-Basrah Maternity and Child Hospitals. A prospective case control study in which amniotic fluid volume was evaluated in 100 pregnant women between (32-40) weeks of gestational age with oligohyramnios (Case) and normal amniotic fluid index (AFI) and normal AFI (Control). Fifty women of oligohydramnios and fifty of control were made to drink 2 litres of water over 2 hours before repeating AFI measurement. The pre & post-hydration AFI were compared between the two groups. The AFI in olighydramnios & control groups were increased significantly by mean of 1.91 ± 0.61, P< 0.001 and 2.57 ± 1.37, p< 0.001 respectively . The data were analyzed with paired t-test for statistical significance . In conclusion, maternal oral hydration could be of therapeutic value in women with oligohydramnios.

Introduction

Physiology of Amniotic Fluid

Amniotic fluid (AF) is derived from maternal plasma in very early pregnancy by the 10th week of pregnancy, it is mainly a transudation of foetal serum via the skin and umbilical cord[1].

From 16 weeks gestation the foetal skin becomes impermeable to water and the amniotic fluid is formed increasingly from the foetal urine and lung fluid[1]. At term the human foetus is estimated to secrete 600–700 ml of hypotonic urine into the amniotic cavity per day, accounting for the hypoosmolarity of the amniotic fluid. The foetal respiratory tract secretes up to 250 ml/day into the amniotic fluid cavity[2].

Foetal swallowing at term removes 50ml of fluid per day and the remainder is reabsorbed by a flow of water across the chorioamnion[2].

The volume of fluid continues to increase to a maximum at 34-36 weeks, then gradually decreases, the volume is approximately 50ml at 12 weeks and doubles by 16 weeks. By 34-36 weeks it reachs 1 liter[3] and by 40 weeks 800 ml and 42 weeks 350 ml. The reason for the late reduction in AF volume has not been explained[1]. Amniotic fluid is usually slightly turbid from mixture of solid particles composed of lanugo hairs, epithelial cells, sebaceous material from the foetal skin and cast off amniotic epithelial cells[3].

At term the amniotic fluid has a specific gravity of 1010 and contains 99% water and the fluid has organic, inorganic and cellular contents.

Concentrations of some of the important contents near term are as follow:

Sodium	130 mmol/L
Urea	3-4 mmol/L
Lecithin	30-100 mg/L

Protein	3 gm/L
Alpha fetoprotein	0.5-5 mg/L

In addition to hormones and enzymes[4].

Amniotic fluid have many functions; it allow freedom of movement and prevent limb contracture[4]. It is also a bacteriostatic providing some protection from infection[3]. Prevent adhesions between foetus and amnion[1]. Protect the foetus from mechanical injury[4]. Permit foetal lung development in which there is two-way movement of fluid into the foetal bronchioles and absence of AF in the second trimester is associated with pulmonary hypoplasia[1] allow transmitting sounds freely provide excellent view of the foetus by ultrasonic examination[3], and in labour the distribution of fluid allows for the force of uterine contractions to be applied to the cervix when the presenting part is high[3].

Oligohydramnios can be defined as reduced amniotic fluid or a pocket measuring less than 1 cm in vertical diameter, it is becoming more popular to use an amniotic fluid index of less than 5cm to define this condition[5].

Incidence is approximately 3.9% of all pregnancies[6]; however, it has been estimated to be 12% of pregnancies 41 weeks or greater[7].

Oligohydramnios can be caused by post term pregnancy**,** pre mature rupture of membrane, severe foetal intra uterine growth restriction, foetal renal anomalies, non renal foetal abnormalities and leaking fluid following amniocentesis or chorionic villus sampling,

Aim of the study

To evaluate the effect of acute maternal hydration on amniotic fluid volume in pregnancies with third trimester oligohydramnios.

Material Methods

Aprospective case-control study on which participants were recruited between March 2005 to June 2006 in the out-patient clinic, department of obstetric & gynaecology in Al-Basrah General and Al-Basrah Maternity and child Hospitals.

The study population consisted of 100 women with normal singleton pregnancies between 32-40 weeks of gestation in whom congenital abnormalities excluded.

Careful history was taken including their history of present pregnancy, past medical and obstetrical history. Women with diabetes Mellitus, hypertension, renal disease and ruptured membranes were excluded from the study.

Amniotic fluid index is currently the preferred method for quantitating liquor volume where the fluid is measured vertically in each of the four uterine quadrants and added together to obtain the AFI, the largest pocket is measured and care must be taken not to include segment of umbilical cord in the measurement. A sum of 5 cm or less indicates significant oligohydramnios regardless of the gestational age[5].

Control group are those women with normal AF volume API >5cm while case group are those women with third trimester oligohydramnios with API $\leq$5cm[5].

Pre hydration API of both control and oligohydramnios patients have been checked after which women in both groups were instructed to drink 2 liters of water in 2 hours. Women who vomited or intolerate to take oral water in 2 hours were excluded from the study.

Repeat API by the same observer has been done after 2 hours from finshing drinking water.

The difference between the post and pre-hydration API of both groups were evaluated. The data were analyzed with paired t- test for statistical significance P value < 0.001.

Results

Maternal oral hydration was associated with significant increase in API of both oligohydramnios and control. The API increase in oligohydramnios group by mean of 1.91±0.61, 95% confidence intervals (1.73 to 2.08), P<0.001 .

The API increase significantly in the control group by a mean of 2.57±1.37, 95% confidence intervals (2.18 to 2.96), P<0.001. Table I.

Discussion

Amniotic fluid is essential for the normal growth and wellbeing of the featus (Chamberlain etal 1984)[8].

Maternal oral hydration with 2 liters of water in women with normal amniotic fluid and oligohydramnios were associated with significant increase in API.

This finding suggests that maternal hydration status has an important role to play in normal regulation of amniotic fluid volume, beside other factors such as foetal urination and foetal swallowing. Amniotic fluid volume regulation and response to fluid in take or withdrawal has been studied in animal experiments, but very few studies have been carried in humans.

In our study maternal oral hydration of pregnant women with normal AFI associated with increased AF volume by mean of 2.57 cm, 95% confidence interval 2.18 to 2.96, p<0.001 while in oligohydramnios group the amniotic fluid volume increase by mean of 1.91 cm, 95%, confidence interval 1.73 to 2.08, p<0.001.

The results obtained in our study were found to be comparable to those reported by Cochrane review[9] who demonstrated that maternal hydration in women with and with out oligohydramnios was associated with an increase in amniotic fluid volume (weighted mean difference for women with oligohydramnios 2.01, 95% confidence interval 1.43 to 2.60 and weighted mean difference for women with normal amniotic fluid volume 4.5, 95% confidence interval 2.92 to 6.08). Similarly Flack etal[10] demonstrated a mean change in AFI in third trimester oligohydramnios group of 3.2 cm, 95% confidence interval 1.1 to 5.3, p<0.02. This is similar to study performed by Bhawna Malhotra India in 2002[11] on which fifty women were made to drink two liters of water before repeat AFI measurement and it show significant increament of AFI by mean of 2.01± 3.73 cm (p< 0.001).

Brace ST Moore 1991[12] demonstrated that two hours were necessary before direct amniotic fluid infusion in sheep was associated with a significant increase amniotic fluid volume, hence 2 hours was the time in our study to measure the effect of hydration on amniotic fluid volume.

In conclusion our study strongly suggests that maternal hydration status has a definite role in amniotic fluid regulation and oral hydration increases amniotic fluid volume in normal pregnant and oligohydramnios patients. Maternal hydration with hypotonic solution (water) causes osmotic changes, which relates to parallel decrease in foetal osmolarity, increase in foetal urine flow and formation of amniotic fluid. Controlled trials are needed to assess the clinical benefit and possible risks of maternal hydration for specific clinical purposes.

Table I: The effect of maternal hydration in women with oligohydramnios and control

	Oligohydramnios N= 50	**Control N=50**
Pre hydration AFI in cm	3.07 Range 1.0 to 4.7	11.05 Ranges 5.40 to 15.20
Post hydration AFI in cm	4.98 Range 2.25 to 7.00	13.2 Range 7.90 to 22.00
Mean increament AFI in cm Mean ± SD	1.91 ± 0.61	2.57 ± 1.37

Pv < 0.001 H.S.

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