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Original Research Article

Antioxidants containing selenium impact on unexplained oligohydramnios

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ABSTRACT

Background: Oligohydramnios is a significant morbidity during pregnancy that may affect fetal growth and functions and the presented work was an effort to test the addition of selenium for the correction and regaining normal liquor.
Methods: Cases recruited from those attending Zinat al-Hayat hospitals and diagnosed with unexplained oligohydramnios after exclusion of prom postdates pregnancy induced hypertension Then final 100 cases divided into two groups group one control: 50 controls that followed healthy diet and a positive mindset only group two cases: 50 who followed healthy lifestyle plus adding selenium ace tablets once daily. Cases and controls followed by ultrasound evaluation with calculation of AFI and fetal weight.
Results: Regarding improvement in amniotic index to be more than 5, there were 40 cases out of 50 in cases compared to 25 in controls with p=0.001 a high statistical difference that signified positive impact on the amount of amniotic fluid, regarding amniotic fluid particle diameter it was present in 22 out of 50 in controls compared to 8 only in cases with p=0.002,Regarding birth weight of, more than 2500 gm. there were 20 out of 50 in controls compared to 35 out of 50 in cases with intervention and p=0.002. Regarding APGAR score below 6 there were 15 in controls compared to only 3 in cases with p=0.001, regarding neonatal incubation there were 10 in controls compared to one in selenium group with p=0.004.
Conclusions: adding selenium ace tablets in cases of unexplained oligohydramnios had a promising result and a positive impact on amniotic fluid index and neonatal outcomes

Keywords: Selenium, Amniotic fluid index, Oligohydramnios, Fetal weight, APGAR score

INTRODUCTION

Amniotic fluid is a byproduct of placental perfusion and transudation in addition to fetal urine and intestinal fluid secretions into the amniotic cavity

Great part of the amniotic fluid produced from fetal kidneys after 16 weeks so bilateral renal anomalies can affect the amount of liquor.[1]

Amniotic fluid has a protective antibacterial effect and a very important shock absorbing capacity, it allows also for fetal movement and act like a physical therapy for the musculoskeletal system of the fetus and bone growth.

Amniotic fluid has a positive impact on the feral airways, swallowing of amniotic fluid into the bronchial tree allow growth and development of the airways and lungs, so in cases of early prolonged significant oligohydramnios the fetus develops broncho-pulmonary dysplasia and neonatal respiratory distress after labor that requires intubation with poor outcomes.[2]

Oligohydramnios can affect 3 percent of pregnancies and resulted from placental insufficiency, rupture of membrane, hypertensive disorders with pregnancy.

Oligohydramnios can have a negative effect on the fetal skeleton from prolonged pressure called Potter facies,

Potter facies include flat face, flat nose, recessed chin, prominent epicanthial folds, and also a club foot.

Ultrasonic evaluation of the amniotic fluid is important to assess adequacy and the common method is the amniotic fluid index which us calculated in the four quadrants of the abdomen and when summated score blow 5 this signifies oligohydramnios.[3,4]

One of the best methods is to localize the deepest pocket of liquor without umbilical cord then measuring the vertical diameter if the vertical diameter below two this means oligohydramnios.

Chronic placental insufficiency and pregnancy induced hypertension contribute to the causes of oligohydramnios because it leads to reduction of blood flow to the fetal kidneys with subsequent reduction of the fetal urine.[5]

Selenium is an important mineral and acts as immune-regulator with high antioxidant activity in the form of superoxide anion scavenging, selenium also involved in thyroxin biosynthesis

Selenium acts as cofactor for enzymes involved in mismatch repair in DNA so it is protective for the genes and perfect gene expression.

The average daily allowance is 100 ug and foods rich in selenium includes cabbage, onion, and garlic, Selenocysteine is the active domain in selenium containing proteins and carries the main antioxidant function.

Objectives

The objectives of the study were to study effect of antioxidants containing selenium in improving oligoyhdramnios of unknown cause.

METHODS

The study design was controlled clinical trial conducted at Zinat Alhayt hospital for delivery Benha from June 2019 to July 2020.

Sample size

The 100 women screened at the hospital exceeding 24-34 weeks gestations and diagnosed with oligohydrmanios unexplained

To calculate the sample size, we used the formula for clinical trials by considering type one error (α) of 0.05 and type two error (β) of 0.20 (power = 80% $p<0.05$ were considered statistically significant.

Ethical approval

A written consent signed by participants after explanation and counseling.

McNemar's test

$$n_{pairs} = \frac{\left[Z_{\frac{\alpha}{2}} + 2 * Z_{1-\beta} * \sqrt{P_A(1-P_A)}\right]^2}{4 * (P_A - 0.5)^2 * P_D}$$

α= The probability of type I error (significance level) is the probability of rejecting the true null hypothesis. β= The probability of type II error (1-power of the test) is the probability of failing to reject the false null hypothesis. P_A =Proportion of discordant pairs of type A among discordant pairs. P_D=Proportion of discordant pairs among all pairs. N_{pairs}=required sample size pair.

Inclusion criteria

Patients with gestational age between 30-34 weeks with oligohydramnios unexplained were included in the study.

Exclusion criteria

Patients who had premature rupture of membranes, chronic chest disease like asthma, postdates pregnancy (>41 weeks), fetal anomalies, IUGR, non-steroidal anti-inflammatory drugs users and pregnancy induced hypertension were excluded from the study.

Procedure

Assessment of the patients

History; obstetric history in full details and the history of current pregnancy specially interventions or certain drug intake that can affect liquor; like endomethacine, history of rupture of membrane especially important for exclusion, history of chest disease like COPD, bronchial asthma or asthmatic bronchitis, history of domestic violence and illicit drug intake.

Examination

General

Abdominal and regional examination including symphysio-fundal height and estimation of the maternal body mass index including also the vital signs.

Laboratory investigations

Lab investigation to all cases in the form of CBC fasting blood sugar, Hba1c, S. creatinine and urea, SGOT, SGPT, bilirubin, vitamin D3, S. calcium and TSH, T4, T3.

Ultrasonography evaluation

All patients' cases and controls undergone complete ultrasound examination. Initial sweep to document feral viability, situs, number and placental localization. Then complete ultrasound advanced fetal scan.

Brain (frontal horns, cavum septum pellucidum, callosal sulcus, corpus callosum, thalami, posterior fossa, cerebellum, vermis, cisterna magna and 4th ventricle.

Complete skeletal evaluation with obtaining chest circumference and complete abdominal wall evaluation also done, this is to exclude congenital anomalies.

Estimation of the fetal weight obtained automatically with taking BPD, FL, HC and AC.

Doppler evaluation of the umbilical artery and ductus venosus to ensure that there is no revered flow or absent end diastolic flow.

Amniotic fluid particle diameter also done.

If there were a meconium turbidity amniotic fluid particle diameter taken if reached 2.5 mm.

AFI

Calculated in the 4 quadrants of the pregnant uterus with measuring the vertical length on 4 quadrants and when only 2 pockets present less than 2 cm then total index <5 oligohydramnios diagnosed and cases enrolled in the study.

After diagnosing oligohydramnios cases divided into two groups-Group one: 50 controls with modification of life style and improvement of nutritional status only without the use of selenium ace and group two: The intervention group includes 50 cases. In thus group life style modification include healthy mindset and nutritional intake plus antioxidant named selenium ace contains vitamin a1500 u +vitamin E 30 mg+vitamin C 90 mg +100ug selenium given one tablet after dinner

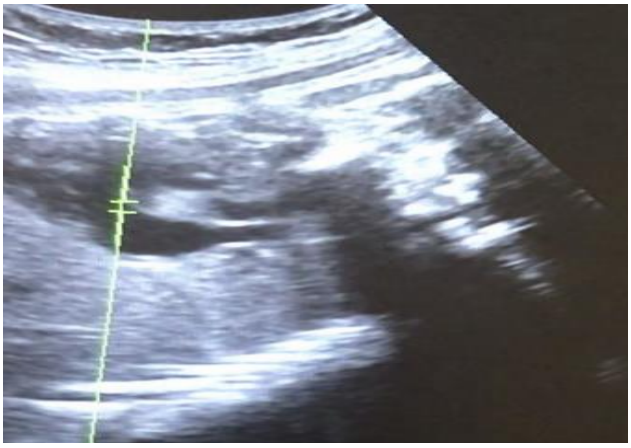

Figure 1: Oligohydramnios a pocket less than 2 cm.

Follow up

Cases followed every two weeks and, in each visit, we recorded- 1-fetal viability, 2-fetal weight, 3-fetal biometry, 4-AMF amniotic fluid index, 5-amniotic fluid particles diameter specially those exceeding 2.5 mm, patient given antenatal cards with all records inside.

Cases followed thereafter until delivery in Zinat al-Hayat hospital with neonatal resuscitation, APGAR score recorded and any neonatal incubation informed to follow the neonatal status**.**

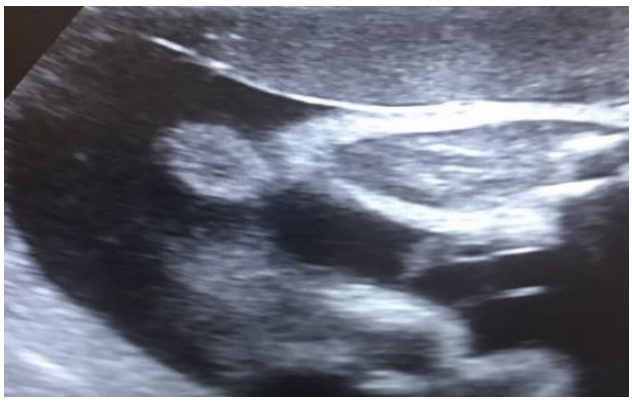

Figure 2: Same case after 3 weeks with abundant liquor.

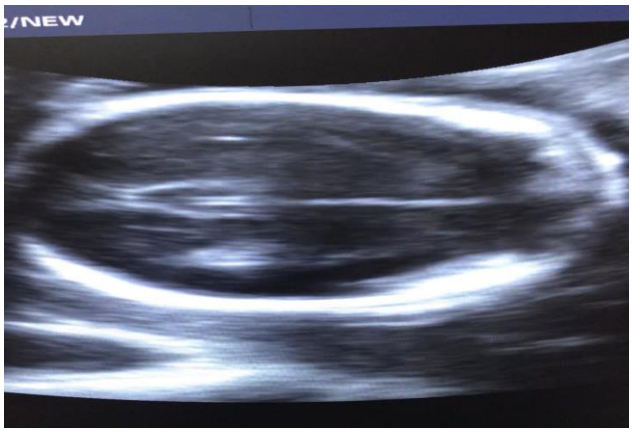

Figure 3: No liquor around head 26 weeks.

Figure 4: Same case after 3 weeks with abundant liquor around head.

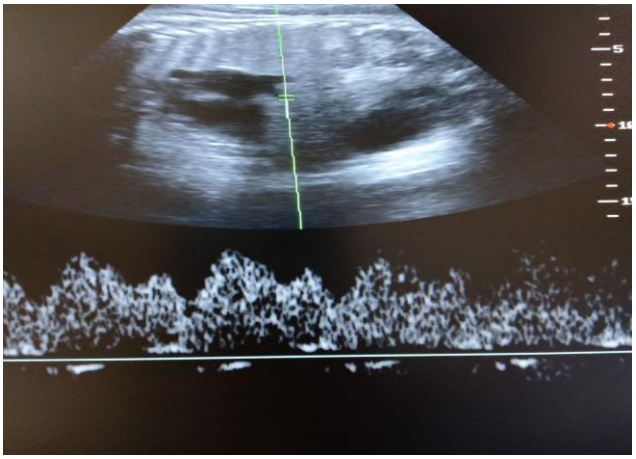

Figure 5: Ductus venosus Doppler in regular follow up.

Statistical analysis

Student's t test was used to find the statistical significance of the observations. The differences were considered significant if the p<0.05 and highly significant if it was <0.01.

RESULTS

Regarding demographic data like age, body mass index, and average gestational age at diagnosis there were no statistically significant difference see Table 1.

Regarding improvement in amniotic index to be more than 5, there were 40 cases out of 50 in cases compared to 25 in controls with p=0.001 a high statistical difference that signified positive impact on the amount of amniotic fluid.

Regarding amniotic fluid particle diameter, it was present in 22 out of 50 in controls compared to 8 only in cases with p=0.002

Regarding birth weight of, more than 2500 gm. there were 20 out of 50 in controls compared to 35 out of 50 in cases with intervention and p=0.002.

Regarding APGAR score below 6 there were 15 in controls compared to only 3 in cases with p=0.001.

Regarding neonatal incubation there were 10 in controls compared to one in selenium group with p=0.004 (Table 2).

Table 1: Demographic data.

Variables	Group one controls	Group two cases	P value
Age (Years)	28.2	28.8	0.8
Body mass index (Kg/m^2)	27.8	28.3	0.7
Gestational age at diagnosis (Weeks)	24.5	24	0.9

Table 2: Major clinical and sonographic outcomes.

Variables	Group one lifestyle modification only	Group two lifestyle modification + selenium ACE	P value
AFI >5	25	40	0.001
Birth weight >2500 gm	20	35	0.002
APGAR score <6	15	3	0.001
Neonatal admission	10	1	0.004
Amniotic fluid particle diameter >2.5 mm	22	8	0.002

DISCUSSION

Amniotic fluid is a hood indicator of feral wellbeing, and included with other parameters of nonstress test to assess fetal conditions.

Amniotic fluid has important functions like antiseptic, lubricant, shock absorbing agent, and most important is the skeletal development of limbs in normal way.

Amniotic fluid also is very important for the lung development and good ventilation after birth, so oligohydramnios has a negative impact on lung development leading to bronchopulmonary dysplasia and neonatal respiratory distress syndrome.[6]

Evaluation of the amniotic fluid is done through ultrasound measuring of pockets in the four quadrant of abdomen and by summating the distance a score is obtained any AFI below five is considered as oligohydramnios, also if there is only a single pocket vertical diameter less than the two cm.

The presented work found a solution for unexplained oligohydramnios, through daily intake of selenium ace after dinner once daily.

Cases recruited from cases attending jam clinic in Benha after exclusion of PROM, PIH, postdates, and examined by ultrasound than 199 cases of unexplained oligohydramnios divided into two groups, group one the control followed a good nutritional and positive mindset only and 50 cases in whom we added the selenium ace tablet per day as an antioxidant to improve the liquor quantity.

All followed every two weeks until delivery with follow up and evaluation of AFI and fetal weight.

Regarding improvement in amniotic index to be more than 5, there were 40 cases out of 50 in cases compared to 25 in controls with p=0.001 a high statistical difference that signified positive impact on the amount of the amniotic fluid.

Regarding amniotic fluid particle diameter, it was present in 22 out of 50 in controls compared to 8 only in cases with p=0.002.

Regarding birth weight of, more than 2500 gm. there were 20 out of 50 in controls compared to 35 out of 50 in cases with intervention and p=0.002.

Regarding APGAR score below 6 there were 15 in controls compared to only 3 in cases with p=0.001.

Regarding neonatal incubation there were 10 in controls compared to one in selenium group with p=0.004.

Study by Soni et al with the use of l arginine with promising results.[7]

Several studies investigated l arginine in cases of oligohydramnios and intrauterine growth restrictions with good results, but no study in literature tested selenium in oligohydramnios.[8-14]

The presented study limited by the small number and may be tested in the future on a large scale of population and also the unexplained oligohydramnios accidently discovered at 26 weeks.

CONCLUSION

Addition of selenium had good positive results in cases of unexplained oligohydramnios reflected upon amniotic fluid adequate volume and neonatal outcomes.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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