



ASSESSMENT OF AMNIOTIC FLUID VOLUME IN DIABETIC AND HYPERTENSIVE WOMEN USING ULTRASOUND

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ABSTRACT

Method: this prospective study was performed in a period from May 2017 to Dec 2018, one hundred pregnant women were scanned by ultrasound machine to assess the amniotic fluid volume, 50 pregnant women have diabetes mellitus and 50 have hypertension in the second and third trimester at Medical Corp Hospital, in Khartoum city, Sudan.

Data collection: the data was collected using data sheet which include (maternal age, history of diabetes or hypertension, gestational age, placenta site, intrauterine fetal death (IUFD), previous abortions due to diabetes or hypertension, amniotic fluid volume and fetal anomalies).

Data analysis: data was analyzed using SPSS to find the significant difference between the variables and the results presented in tables and graphs, significant correlation between the variables was represented in value ($p=0.005$).

Results: 9% of sample was with polyhydramnios, and 7% of sample has, 84% haven't undergone complications.

Conclusion: diabetes and hypertension can cause polyhydramnios or oligohydramnios in pregnant women which may lead to worse outcomes to mother, and even fetus.

KEYWORDS : Ultrasonography, Diabetes mellitus, Hypertension, Polyhydramnios, Oligohydramnios.

INTRODUCTION:

The amniotic fluid which fetus bathes is necessary for its proper growth and development. It cushions the fetus from physical trauma, permits fetal lung growth, and provides a barrier against infection. Normal amniotic fluid volume varies. The average volume increases with gestational age, peaking at 800-1000 mL, which coincides with 36-37 weeks' gestation. An abnormally high level of amniotic fluid, polyhydramnios, alerts the clinician to possible fetal anomalies. An inadequate volume of amniotic fluid, oligohydramnios, results in poor development of the lung tissue and can lead to fetal death [1]

Polyhydramnios is defined as a pathological increase of amniotic fluid volume in pregnancy and is associated with increased perinatal morbidity and mortality[2]. Also polyhydramnios is defined as an abnormally large level of amniotic fluid during pregnancy. It is defined by an amniotic fluid index that is above the 95th centile for gestational age[3]. Polyhydramnios occurs in 1% of pregnancies, whereas oligohydramnios occurs in about 11% of pregnancies.[1]

The diagnosis is obtained by ultrasound. The prognosis of polyhydramnios depends on its cause and severity. Typical symptoms of polyhydramnios include maternal dyspnea, preterm labor, and premature rupture of membranes, abnormal fetal presentation, cord prolapse and postpartum hemorrhage. Due to its common etiology with gestational diabetes, polyhydramnios is often associated with fetal macrosomia [1]

Polyhydramnios is idiopathic in 50-60% of cases [3]. Other causes are:

Maternal diabetes, fetal malformations, multiple gestation fetal anemia, other fetal disorders (eg, infections) or genetic abnormalities, any condition that prevents the fetus from swallowing – e.g. esophageal atresia, CNS abnormalities, muscular dystrophies, congenital diaphragmatic hernia obstructing the esophagus, duodenal atresia – 'double bubble' sign on ultrasound scan, anaemia – alloimmune disorders, viral infections, fetal hydrops, twin-to-twin transfusion syndrome, increased lung secretions – cystic adenomatoid malformation of lung, maternal

ingestion of lithium – leads to fetal diabetes insipidus, macrosomia – larger babies produce more urine[3].

The women may have severe breathing problems, bleeding from the vagina after delivery, labor may begin early before 37 weeks of pregnancy (preterm labor), membranes around the fetus may rupture too soon (called premature rupture of the membranes), also fetus may be in an abnormal position or presentation, sometimes requiring cesarean delivery. Also the umbilical cord may come out of the vagina before the baby (called a prolapsed umbilical cord). The placenta may detach from the wall of the vagina too soon (called placental abruption), and fetus may die. [4]

Oligohydramnios can be defined as amniotic fluid volume <5% for gestational age, AFI <5 cm or maximal deepest pocket <2 cm. MPD is the best method for diagnosing oligohydramnios; however, most studies evaluating adverse outcomes utilize AFI. Regardless of the method used, the finding of oligohydramnios is not normal. Oligohydramnios can be found in an otherwise uncomplicated pregnancy or as an additional finding in a complicated pregnancy (hypertensive disorders, decreased fetal movement). Many studies consider that oligohydramnios in the setting of a complicated pregnancy is associated with an increased risk of adverse outcome, including admission to the neonatal intensive care unit (NICU), meconium staining of amniotic fluid, meconium aspiration syndrome (MAS), Cesarean delivery, 5-min Apgar score <7, umbilical cord blood pH <7.10, low birth weight (small-for-gestational age) and respiratory distress syndrome. However, there are conflicting data on the significance of isolated oligohydramnios. The diagnosis of oligohydramnios alters pregnancy management and may be an indication for delivery. Depending on the gestational age, induction may increase the risk of Cesarean delivery and the risks associated with late preterm/early term deliveries. Therefore, it is important to delineate the risks of oligohydramnios and the benefits of prompt delivery [5].

In many cases, the cause is of oligohydramnios is unknown.[5]. In other hand oligohydramnios may occur if the fetus has birth defects in the urinary tract, particularly in the kidneys, also when fetus has

not grown as much as expected, when fetus has died, or has a chromosomal abnormality, if the placenta is not functioning normally (as a result, the fetus may not grow as much as expected), if pregnancy has lasted too long (40 weeks or more, called postterm pregnancy), when membranes around the fetus may rupture too soon (called premature rupture of the membranes).[2] Also taking certain drugs such as angiotensin-converting enzyme (ACE) inhibitors (including enalapril or captopril) during the 2nd and 3rd trimesters can result in too little amniotic fluid. These drugs are usually avoided during pregnancy. However, rarely, they are used to treat severe heart failure. Taking nonsteroidal anti-inflammatory drugs (NSAIDs, such as aspirin or ibuprofen) late in pregnancy can also reduce the amount of amniotic fluid.[5]

In many cases, the cause of oligohydramnios is unknown. If the amount of fluid is greatly reduced, the fetus may be compressed, resulting in deformities in the limbs, a flattened nose, a recessed chin, and other problems. Also the fetus's lungs may not mature normally (the combination of immature lungs and deformities is called Potter syndrome.). The fetus also may not be able to tolerate labor, making cesarean delivery necessary. The fetus may die. The fetus may not grow as much as expected (called small for gestational age).[5]

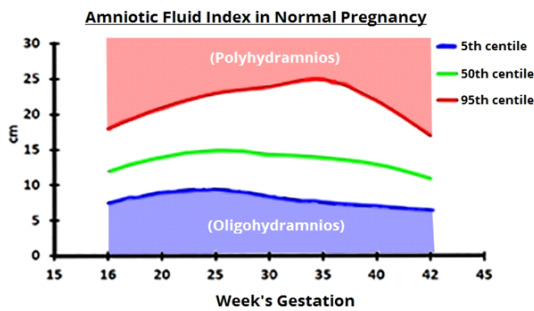


Fig (1) Amniotic fluid centiles during pregnancy. Polyhydramnios is over the 95th centile, oligohydramnios is below the 5th centile [3]

Material: This study was prospective study carried out in Medical Corp Hospital in Khartoum city, Sudan, in a period from May 2017 till December 2018.

Study sample: In which a group of (100) diabetic, and hypertensive pregnant women underwent U/S examination for antenatal care. Another group of (20) healthy volunteers were selected as a control group and gray scale procedure was done for them in order to establish some preliminary data of the population.

Data collection: The data was collected using data sheet which include (age, history of diabetes or hypertension, gestational age, placenta site, IUFD, previous abortions due to diabetes or hypertension, amniotic fluid volume and fetal anomalies.)

Methods: 2Dimention Mindary ultrasound machine using gray scale type was used.

Protocol: The examination began with patient supine. First a fast

Table (2) explains the correlation between age groups and the amount of amniotic fluid

Age group	Normal AF in of total in Percentage & no	Oligohydramnios of total In percentage & no	Polyhydramnios of total In percentage & no	Percentage of patient in the age group Of Total no of patients
20-25	96.4% 27	0.0% 0	3.6% 1	28
26-40	81.2% 56	7.2% 5	11.6% 8	69
41...and above	33.3% 1	66.7% 2	0.0% 0	3
Total	84	7	9	100

*This table explains the correlation between age groups and the amount of amniotic fluid The normal AF in the age group (20 -25) and (26 – 40) represented higher percentage (96.4%) and (97.2%) respectively, the oligohydramnios represented higher percentage in age group (40 and above) with high significant relationship N=.000.

DISCUSSION:

100 diabetic and hypertensive pregnant women had been

survey is done to scan all uterus and its content, then a scan with details is done to evaluate and asses the heartbeat, gestational age, placenta site, amniotic fluid volume, presentation and asses fetal weight and finally if there is any fetal anomalies is detected.

Measurements: There are two ways of measuring amniotic fluid, the first way is amniotic fluid index (AFI), second is the maximum pool depth (MPD). They have similar diagnostic accuracy; however (AFI) is commonly used. [6]

AFI is calculated by measuring maximum cord-free vertical pocket of amniotic fluid in four quadrants of uterus and adding then together. [6]

Maximum Pool Depth is the maximum vertical measurement in any area. [6]

Data analyzed using SPSS to find the significant difference between the variables and the results presented in tables and graphs, significant correlation between the variables was represented in value(p=0.005).

RESULTS:

Table (1) shows the distribution of age among u/s reports, N = 100

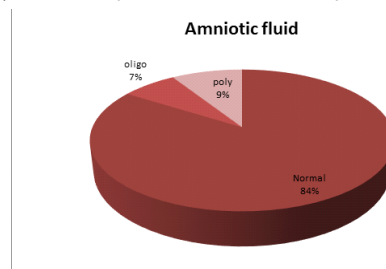
Age	Frequency	Percentage
20-25	28	28%
26-40	69	69%
41...and above	3	3%
Total	100	100%

*This table show the age group (20-25) represented (28%) and the age group (26-40) represented (69%) as a highest percentage, age group (41 and above) represented (3%) as lowest percentage

Table (2) shows the incidence of poly, and oligohydramnios, N = 100

Amniotic Fluid Volume (AFV)	Frequency	Percentage
Normal AF	84	84%
Oligohydramnios	7	7%
Polyhydramnios	9	9%
Total	100	100

*This table shown the normal amniotic fluid represented (84%) as a highest percentage, polyhydramnios represented (9%) and oligohydramnios represented (7%) as lowest percentage



Figure(2) Pie graphs shows the percentage distribution of amniotic fluid volume

examined using ultrasonography for assessing the pregnancy stats. The heart beat, gestational age, placenta site, intrauterine fetal

death, fetal anomalies and amniotic fluid volume to detect any volume abnormalities.

Table (1) demonstrate the distribution of age group among 100 ultrasound reports, the age group (26 – 40) represented highest percentage (69%) and the age group (41 and above) represented lowest percentage (3%).

Table (2) and figure (2) show the incidence of polyhydramnios, and oligohydramnios, 9 of patients of the study sample have a polyhydramnios (9%), 7 patients of sample have an oligohydramnios (7%), (84%) of sample have normal amniotic fluid volume.

Table (3) explains the correlation between age groups and the amount of amniotic fluid. The normal AF in the age group (20 -25) and (26 – 40) represented higher percentage (96.4%) and (97.2%) respectively, the oligohydramnios represented higher percentage in age group (41 and above) with high significant relationship $N=0.000$.

These results agree with a study reported by (N. RABI, 2017) [7] they said that: polyhydramnios is the term used to describe an excess accumulation of amniotic fluid. This clinical condition is associated with a high risk of poor pregnancy outcomes. The reported prevalence of polyhydramnios ranges from 0.2 to 1.6% of all pregnancies. The causes of polyhydramnios are fetal malformations and genetic anomalies (8–45%), maternal diabetes mellitus (5–26%), multiple pregnancies (8–10%), fetal anemia (1–11%).

Also agree with a study reported by (Lisa, 2017) [8] they said: the Amount of polyhydramnios attributable to diabetes may be less than previously reported that the rate of polyhydramnios is 8.5%. Patients with diabetes most commonly have mild polyhydramnios between 26 and 35.9 cm of fluid on a four-quadrant AFI.

A study written by (N. Idris, 2010)[9], they reported that: the Influence of polyhydramnios on perinatal outcome in pregestational diabetic pregnancies reported that the incidence of polyhydramnios was 18.8%. Women with polyhydramnios had increased hemoglobin A1C (HbA1c) levels throughout the pregnancy.

Another study reported by (R.Scott, 2001)[10], they said: Hanson Diabetes insipidus in pregnancy: A treatable cause of oligohydramnios mentioned that although rare, diabetes insipidus may present initially in pregnancy and should be considered in patients with oligohydramnios. Simple diagnosis with determination of 24-hour urine volume and serum electrolytes can identify this potentially reversible cause of oligohydramnios and poor obstetric outcome. Other study reported by (Joung, 2004) [11] they reported: Early-Onset Oligohydramnios Complicated with Hypertension, reported that oligohydramnios is associated with increased perinatal morbidity and mortality. It may be due to a variety of conditions, including rupture of membranes, fetal urinary tract abnormalities such as posterior urethral valve, and prenatal abnormalities involving uteroplacental insufficiency may be due to hypertension and hyperthyroidism.

CONCLUSION:

Majority of women who have DM/HT undergo normal pregnancy and outcomes, but some of them might encounter complications with polyhydramnios, oligohydramnios, intrauterine fetal death, fetal congenital malformations and anomalies, and stillbirth. The incidence rate of these problems is increased with increasing maternal age.

Recommendation:

Pre-existing hypertension and diabetes must be control to normal or closely to normal pre-conceptional to avoid the worse complications of them and consistently the worse outcome to mother or even to fetus.

Regular investigations should be done to detect any abnormal rates of high blood glucose or high blood pressure to avoid complications of induced hypertension and gestational diabetes.

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