

Sonographic Evaluation of Amniotic Fluid Volume in Diabetic Pregnant Women among Sudanese Population

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Abstract

Introduction: Amniotic fluid is the fluid in amniotic cavity bathing the fetus and is solution in which undissolved material is suspended, normal amount of amniotic fluid is important for normal fetal growth and development.

Objectives: The aim of this study is to evaluate amniotic fluid volume in diabetic pregnant Sudanese women to show the effect of diabetes on amniotic fluid volume, fetus and mother.

Materials & Methods: This study was practical, Observational, descriptive, analytical, cross sectional study deal with Sonographic Evaluation of Amniotic Fluid Volume in Diabetic Pregnant Women among Sudanese Population in Alshaikh Fadol teaching hospital and Omdurman military hospital, from February 2014 till July 2014. Hundred diabetic pregnant women were scanned.

Results: The data was collected, classified, analyzed by using Specific package for statistical science (SPSS) and the study found that the most patients had polyhydraminous by 54%, and 46% for normal amniotic fluid measurement, and the greatest value of polyhydraminous 75.8% was in gestational diabetes type, followed by 18.6% of polyhydraminous in insulin dependent type, and the lowest value of polyhydraminous 5.6% was in non-insulin dependent type.

Conclusion: There was positive correlation between diabetic and polyhydraminous 54% especially in gestational diabetes 75.8%. There was no correlation between polyhydraminous and fetal macrosomia 22.2%. Also there was no correlation between polyhydramnios and premature rupture of membrane 1.9% and maternal respiratory distress 22.2%. And there was no correlation between polyhydraminous and duration of diabetes (<5years which was least duration was 83.3%)

Recommendation: Special care must be done in every antenatal visit which includes measurements of amniotic fluid volume by both single vertical pocket method and four –quadrant amniotic fluid index method, estimate fetal weight to exclude macrosomia and assesses maternal conditions for premature rupture of membrane and maternal respiratory distress to avoid these complications.

Keywords: Sonographic Evaluation, Amniotic Fluid etc.

1. Introduction

Amniotic fluid is the fluid in amniotic cavity bathing the fetus and is solution in which undissolved material is suspended, normal amount of amniotic fluid is important for normal fetal growth and development.⁽¹⁾

It provides medium in which fetus can move, grow, and helps to maintain environment temperature for fetus. Adequate amount of amniotic fluid helps to promote maturation of fetal lung and allow fetus to exercise its limb freely.

Amniotic fluid volume increases relatively slow as pregnancy progress and normally peaks at about 36 weeks then decrease to term.⁽¹⁾

In early pregnancy the primary source of fluid is amniotic membrane. The fetal kidney begins to function in second trimester and contribute fluid volume to amniotic fluid. Fetal urinary output as source of fluid becomes increasingly important as pregnancy advanced; fetal swallowing fluid begins at about 11-13 weeks.⁽¹⁾

There are three methods for assessing amniotic fluid volume which are subjective method, single vertical method and four quadrants method. Subjective method has proved impossible to standardize in clinical and research term because it depends on sonographer experience.⁽²⁾ Single vertical pocket consist of searching for and measuring the largest vertical pocket, if measuring between 2 and 8 cm are considered normal.

Four quadrant method consists of dividing uterus into four quadrants and measuring the largest vertical pocket in each quadrant, the four values obtained are added together to produce values between 8.1 and 18 cm. ⁽¹⁾

Polyhydramnios is defined as an excessive volume of amniotic fluid relative to gestational age. ⁽³⁾ The risk factors for polyhydramnios are diabetes mellitus, twin to twin transfusion syndrome (TTTs), anencephaly, hydrocephalus and other fetal anomalies. Diabetes is most common maternal factor. ⁽⁴⁾

Oligohydramnios is defined as decrease in volume of amniotic fluid relative to gestational age. ⁽⁵⁾ The risk factors for it are fetal anomalies, fetal restriction and post term pregnancy. ⁽⁴⁾ Gestational diabetes mellitus describes a woman who provides diabetes during pregnancy which may adversely affect both fetus and mother, therefore optimal care and management benefits both. ⁽¹⁾ The maternal risks are preeclampsia, infection, fetal microsomal, vaginal trauma and cesarean section. The fetal risks are intrauterine demise, prenatal morbidity and polyhydramnios. ⁽¹⁾

2. Objectives

To evaluate amniotic fluid volume in diabetic pregnant patients among Sudanese population by ultrasound

3. Materials and Methods

This was cross sectional, analytic, descriptive study, performed during the period from February 2014 till July 2014. This study was conducted on hundred Sudanese diabetic pregnant women their age ranged between 15 and 45 years. The equipment by which ultrasound exams were performed was Sonoscape portable ultrasound diagnostic system, Model: A5, made in china, in January 2012 and Alpinion ultrasound diagnosis system, model: E-CUBE, made in Korea, in 2012.

4. Results and Discussion

The age of the patients ranged between (15-45years), the most patients age ranged between (25-35years) with frequency about 50 out of 100 (50%), followed by (35-45years) with frequency about 33out of 100(33%), and the lowest value was 17% for age ranged between (15-25years).

The relationship between polyhydramnios and patients age was greatest in age ranged between 25-35 with percent about 44.4%, and normal amniotic fluid value in this group was 56.2%, the polyhydraminous in age ranged 35-45 was 37.1%, and normal amniotic fluid value in this group was 28.3%, the lowest value of polyhydraminous was 18.2% in age ranged between 15-25, and the lowest value of normal amniotic fluid was 15.2% in this group.

The most of patients had duration of diabetes less than 5 years with frequency about 82 out of 100 (82%), followed by (5-10years) with frequency about 14out Of 100 (14%),

and the lowest value was 4% for duration more than 10 years.

The value of polyhydraminous was greatest 83.3% in patients that had diabetes for duration less than 5 years, followed by 9.3% in patients that had diabetes for duration ranged between 5-10 and the lowest value 7.4% in patient that had diabetes for duration more than 10 years.

The most patients had gestational diabetes with frequency about 75 out of 100 (75%), followed by insulin dependent diabetes with lowest value was 5% for non-insulin dependent diabetes and this was disagree with previous study of (Rian O. M, 2012) ⁽⁶⁾ who found that the commonest type of frequency about 20 out of 100 (20%) and the diabetic was Insulin dependent (38.8%), followed by non-insulin dependent (36.7%), then gestational diabetes (24.5%), this because his study was focused on controlled diabetes and she took small sample size (49women their age ranged between 15-45), I took large sample size (100 women their age ranged between 15-45) and I did not focus on controlled diabetes.

The greatest value of polyhydraminous 75.8% was in gestational diabetes type and normal amniotic fluid value in this type was 74%, followed by 18.6% of polyhydraminous in insulin dependent type and normal amniotic fluid value in this type was 21.7%, the lowest value of polyhydraminous 5.6% was in non-insulin dependent type and normal amniotic fluid value in this group was 4.3%.

From results, the most patients had polyhydraminous with frequency 54 out of 100 (54%) and 46% for normal amniotic fluid measurement, this disagree with (Rian O. M, 2012) who found that the amniotic fluid index in millimeters in all patient with diabetes mellitus 26% of patients have increasing amniotic fluid volume, and this because in her study the commonest type of diabetic was insulin dependent (38.8%) (Controlled diabetes which has less affect on amniotic fluid volume and in my study the greatest value of polyhydraminous 75.8% was in gestational diabetes type which non controlled diabetes and have more effect on amniotic fluid volume).

But it is agree with study of (Brooklyn, New York.) ⁽⁷⁾ who found that the amniotic fluid index in normal pregnancies was less than that in diabetic pregnancies. Also this agrees with (Perinatal research laboratory, university of Alabama in Birmingham) ⁽⁸⁾ which found that hydraminous was common in diabetic patients.

Also this matches with (Zamlynksi, 2011) ⁽⁹⁾, who found statistically significant higher values of amniotic fluid index in diabetic patients compared with healthy women. The study found that the fetal macrosomia frequency about 15 out of 100 (15%), the relationship between fetal macrosomia and polyhydraminous was 22.2% and relationship between normal amniotic fluid value and fetal macrosomia was 6.5%.

The maternal respiratory distress with frequency about 12 out of 100 (12%), the relationship between polyhydraminous and maternal respiratory distress was 22.2%.

Table 1: Frequency distribution and chi-square of patients according to age

Age	Amniotic fluid volume			
	Normal		Poly	
	No	%	No	%
15-25	7	15.2	10	18.2
25-35	26	56.2	24	44.4
35-45	13	28.3	20	37.1
Total	46	100	54	100
p-value	0.481			

Table 2: Frequency distribution and chi-square of patients according to parity

Parity	Amniotic fluid volume			
	Normal		Poly	
	No	%	No	%
0	6	13	8	14.8
1	12	26.1	11	20.4
2	13	28.3	16	29.6
3	5	10.9	9	16.7
4	8	17.4	5	9.3
5	1	2.2	3	5.6
6	0	0	1	1.9
7	1	2.2	1	1.9
Total	46	100	54	100
p-value	0.729			

Table 3: Frequency distribution and chi-square of patients according to gravidity

Gravidity	Amniotic fluid volume			
	Normal		Poly	
	No	%	No	%
1	7	15.2	8	14.8
2	11	23.9	10	18.5
3	12	26.1	16	29.6
4	5	10.9	18	33.3
5	8	17.4	6	11
6	2	4.3	3	5.6
7	0	0	1	1.9
8	1	2.2	1	1.9
10	0	0	1	1.9
Total	46	100	54	100
p-value	0.918			

Table 4: Frequency distribution and chi-square of patients according to gestational age

gestational age	Amniotic fluid volume			
	Normal		Poly	
	No	%	No	%
17weeks+1day-17weeks+4days	2	4.3	0	0
18weeks-18weeks+1day	2	4.3	0	0
19weeks+1day	1	15.2	0	0
21weeks+3days	1	15.2	0	0
26weeks-26weeks+5days	1	15.2	1	1.9
27weeks	1	15.2	0	0
28weeks+2days-28weeks+4days	0	0	2	9.3
29weeks+4days	1	15.2	0	0
30weeks+1days-30weeks+6days	3	6.5	3	5.6
31weeks+4days-31weeks+6days	1	15.2	1	1.9
32weeks+6days	5	10.9	5	9.3
33weeks+3days-33weeks+6days	3	6.5	2	3.7
34weeks-34weeks+5days	6	13	2	3.7
35weeks-35weeks+6days	4	8.7	4	7.4
36weeks-36weeks+6days	7	15.2	14	25.9
37weeks-37weeks+6days	3	6.5	7	13
38weeks-38weeks+6days	3	6.5	6	11
39weeks-39weeks+6days	2	4.3	7	13
Total	46	100	54	100
p-value	0.306			



Figure 1 Normal amniotic fluid (3.7cm), gestational age 33weeks +6days



Figure 2 Polyhydramnios (9.3cm), gestational age 26weeks +5days



Figure 3: Polyhydramnios (8.4cm), gestational age 34weeks+2days

Conclusion

There was positive correlation between diabetic and polyhydramnios 54% especially in gestational diabetes 75.8%. There no was correlation between polyhydramnios and fetal macrosomia 22.2%. Also there was no correlation between polyhydramnios and premature rupture of membrane 1.9% and maternal respiratory distress 22.2%. There was no correlation between polyhydramnios and duration of diabetes (<5years which was least duration was 83.3%)

Recommendations

Diabetes is a common causes of many maternal and fetal complications during pregnancy so; special care must be done in every antenatal visit which includes measurements of amniotic fluid volume by both single vertical pocket method and four –quadrant amniotic fluid index method, estimate fetal weight to exclude macrosomia, and assesses maternal conditions for premature rupture of membrane and maternal respiratory distress to avoid these complications.

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