

الآية

قال تعالى:

(وعلمك ما لم تكن تعلم وكان

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صدق الله العظيم

سورة النساء الآية (113)

Dedication

This work is dedicated

To my Father

To my Mother

To my Wife

My brothers

To my sister

and for anyone who assisted to complete this work .

Acknowledgement

I would like to thank Dr. Asma Ibrahim Ahmed, my supervisor for his kind advice in my study.

My thank must go to the ultrasound department of Ribat Universal Hospital, thank them for their good support during collection of data I gratefully would like to pass my special thank to my friends and colleagues who help me.

And also my thanks extend to my colleague Mohammed Elhaj Babiker who helped me in the preparation and improvement of this thesis.

Abstract

The study was carried out to assess the amniotic fluid volume in pregnant women in second and third trimester.

The study was conducted on 50 pregnant women their second and third trimester over a period from September 2016 to November 2016 in universal Ribat Hospital, depended on the international study protocol in obstetrical scanning. All pregnant women were subjected to be examined by Ultrasound scanning using simense scanner with 3.5MHz convex probe Trans abdominal scanning were performed for all pregnant women and measure the amniotic fluid volume by using , the deepest pocket (large pocket) methods .The problem of study is that the difficult measurement of oligohydramnios by ultrasound.

The study found that most of the pregnant women have normal amniotic fluid (56%) and few others pregnant women have an abnormal amniotic fluid (44%).

Amniotic fluid must be assess by ultrasound method and not depend only on the observation of the sonographer to prevent missing amniotic fluid volume abnormality.

ملخص الدراسة

أجريت هذه الدراسة بغرض قياس حجم السائل الأمنيوسي حول الجنين للنساء الحوامل في الفترة الثانية والثالثة من الحمل باستخدام الموجات فوق الصوتية.

هدفت الدراسة لتحديد القيمة العادية لمؤشر السائل الأمنيوسي للنساء الحوامل في الفترة الثانية والثالثة من الحمل، ومعرفة الأسباب التي تؤدي إلى التغيرات غير الطبيعية (زيادة أو نقصان)، حيث تكمن مشكلة الدراسة في صعوبة قياس السائل الأمنيوسي حول الجنين بالموجات فوق الصوتية إذا كانت كميته بسيطة.

تم جمع البيانات وتصنيفها وتحليلها من عينة مكونة من خمسين امرأة في الفترة الثانية والثالثة من الحمل، باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية، وأجريت في مستشفى الرباط الجامعي بين سبتمبر 2016م ونوفمبر 2016م، وجميع النساء الحوامل فحصن بالموجات فوق الصوتية باستخدام جهاز سيمنس للكشف بالموجات فوق الصوتية مع محبس (أو مسبار) محذب 3.5 ميغاهيرتز.

أجري المسح عن طريق البطن لكل النساء الحوامل، وتم قياس حجم السائل الأمنيوسي باستخدام طريقة قياس أكبر عمق أو جيب.

خلصت الدراسة إلى أن معظم النساء الحوامل لهن كمية سائل طبيعية بنسبة (56%) وبقيّة النساء لهن كمية سائل غير طبيعية نسبة (44%)، وقد كانت الزيادة في حجم السائل الأمنيوي (42%) والنقصان في حجم السائل الأمنيوي (2%).

أوصت الدراسة بضرورة قياس حجم السائل الأمنيوي حول الجنين بواسطة الموجات فوق الصوتية أثناء فترة الحمل.

Abbreviations

3D	Three dimensions
A.A	Artery – Artery
A.V	Artery Vein
AC	Abdominal circumference
AFI	Amniotic fluid index
AFV	Amniotic fluid volume
BRA	Bilateral renal agenesis
CD	Color Doppler
DC	Dichorionic
DCDA	Dichorionic Diamniotic
EVS	Endo vaginal sonography
GU	Genito urinary
HC	Head circumference
IDDM	Insulin dependent diabetes mellitus
IPKD	Infantile polycystic kidney disease
IUGR	Intra uterine growth retardation
IVC	Inferior Vena Cava
KC	kidney circumference
Mc	Mono chorionic
MCDA	Mono chorionic diamniotic
MCDK	Multi cystic dysplastic kidney
NIDDM	Non insulin dependent diabetes mellitus
PROM	Premature rupture of membrane
PUV	Posterior urethral valve
SPSS	Statistical Package for the Social Sciences

TA	Trans abdominal
TTT	Twin-to-Twin transfusion syndrome
U/S	Ultrasound
UPJ	Utero pelvic junction
V.V	Vein –Vein

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Appendix

Chapter one

Introduction

1-1 Introduction:

The fluid in the amniotic cavity bathing the fetus is known as amniotic fluid or liquor amni. The amniotic fluid is water like, originates from maternal plasma and passes through the fetal membranes by osmotic and hydrostatic forces .The amniotic fluid is seen after 12 days of conception.

The amniotic fluid is vital to the well-being of the fetus .It cushions the fetus from injury , helps prevent compression of the umbilical cord ,and allows room for it move and grow. In addition, its bacteriostatic action helps prevent infection of the intra-amniotic environment .The quantity of amniotic fluid at any time in gestation, and is the product of water exchange between the mother, fetus, and placenta, and is maintained within a relatively narrow range. Disorders of this regulatory process can lead to either polyhydramnios or oligohydramnios, in which too much or too little fluid exists, respectively. These disorders may result from abnormal fetal or maternal conditions and, conversely ,may responsible for alteration fetal well-being as well .with the advent of real –time ultrasonography ,assessment of amniotic fluid has been possible ,resulting in earlier recognition of abnormal condition and possible intervention. (Richard,et al 2008)

Ultrasound is anon-invasive procedure, which makes it ideal for application on a very large scale: in practice, it can be used for routine monitoring of all pregnancies and, not infrequently, for repeat AFV determination in some cases where there is the suspect of amniotic fluid abnormalities. In ultrasound appears anechoic area, surrounding the fetus may be with internal echo (www.glow.com)

1-2 Problems of study:

The oligohydramnios can be difficult to confirm due to the questionable accuracy of AF measurement by ultrasound, when pocket of AF containing umbilical cord.

AFI measurements may vary with the amount of pressure applied to the abdomen and with fetal position or movement. Serial measurements taken by ultrasound operator have been shown to differ from the true volume by 1cm.

1-3 Objectives:

1-3-1 General Objective:

To assessment of amniotic fluid volume in Sudanese pregnant women in second and third trimester by Ultrasound imaging.

1.3.2 Specific Objectives :

- To measure normal values of amniotic fluid index in Sudanese pregnant women.
- To detect common causes of polyhydramnios and oligohydramnios in pregnant women.
- To determine the types of amniotic fluid in Sudanese woman.

1-4 Significant of the study:

Evaluate amount of amniotic fluid so can select the best method to determine normal amount of amniotic fluid volume in pregnant women in their second and third trimester.

1.5 Overview of study:

This study well consists of five chapters:

Chapter one: well include (introduction, problem of study and objectives).

Chapter two: Literature review (anatomy, physiology and pathology) and previous study.

Chapter three: Material and Methods.

Chapter four: Methodology (Data collection, Analysis and Results).

Chapter five: Discussion, Conclusion and Recommendation.

Literature Review

2.1 Anatomy

2.1.1 Embryology of amniotic fluid:

Amniotic sac is the sac in which the fetus develops in amniotes it is taught but thin transparent pair of membranes, which hold developing embryo and fetus until later before birth. The inner membrane, the amnion, contains amniotic fluid and the fetus. The outer membrane, the chorion, contains the amnion and is part of the placenta, by 12 week of gestation the amnion comes into contact with the inner surface of the chorion (El- Rakhawy, 2008).

At the beginning of the second week, a cavity appears within the inner cell mass and when it enlarges it becomes the amniotic cavity.

The floor of amniotic cavity is formed by epiblast. Epiblast migrates between the epiblast disc and trophoblast, in this way the epiblastic cells migrate between the embryoblast and trophoblast. The epiblast transforms to ectoderm while the remaining cells which are present between embryoblast and trophoblast are called amnioblasts (flattened cell), these cells are also derived from epiblast which transform into ectoderm.

The amniotic cavity is surrounded by a membrane, called amnion. As the implantation of the blastocyst progresses, a small space appears in the embryoblast, which is the primordium of amniotic cavity. Soon amniogenic (amnion forming cells) amnioblasts separate from the epiblast and line the amnion, which encloses the amniotic cavity (El- Rakhawy, 2008).

Amniotic fluid in the amniotic cavity completely surrounds the embryo after the 4th week of pregnancy, this first water-like fluid originates from fetal plasma

and passes through membrane by osmotic and hydrostatic forces.
(www.wikipedia.org).

2.1.2 Important of amniotic fluid:

Amniotic fluid is vital to the well-being of the fetus, it cushions the fetus from injury, helps prevent compression of the umbilical cord, and allows room for it to move and grow.

In addition, its bacteriostatic action helps prevent infection of the intra-amniotic environment. The quantity of amniotic fluid at any time in gestation is the product of water exchange between the mother, fetus and placenta, and is maintained within a relatively narrow range. Disorders of this regulatory process can lead to either polyhydramnios or oligohydramnios, in which too much or too little fluid exists, respectively. These disorders may result from abnormal fetal or maternal conditions and, conversely, may be responsible for alterations of fetal well-being as well, with the advent of real-time ultrasonography, assessment of amniotic fluid has been possible, resulting in earlier recognition of abnormal conditions and possible intervention. Because precise quantification of amniotic fluid volume is not possible with ultrasonography, various techniques for both qualitative and semiquantitative assessment have been proposed (Journal of ultrasound in medicine, 2012).

2.2 Physiology of amniotic fluid

2.2.1 Amniotic fluid production:

In the first half of pregnancy, amniotic fluid is derived from fetal and possibly maternal compartments. Water and solutes freely traverse fetal skin and may diffuse through the amnion and chorion as well. Thus amniotic fluid in early gestation is a dialysate that is identical to the fetal and maternal plasma, but with a lower protein concentration. Active secretion of fluid from the amniotic epithelium had been previously suggested to play a role in early amniotic fluid formation, but this has not been demonstrated (Richard, et.al, 2008).

By the second trimester, the fetal skin becomes keratinized, making it impermeable to further diffusion. At this time, a fetus contributes to amniotic fluid volume and composition almost exclusively through urination. Urine has been observed in the fetal bladder as early as 11 weeks transabdominally. And 9 weeks trans vaginally. By term, a fetus produces on average from 500 to 700 ml/day with a slight decline in hourly fetal urine production after 40 weeks gestation (Fischer, 2008).

2.2.2 Amniotic fluid elimination:

Amniotic fluid is eliminated by at least three mechanisms. The primary source of elimination is through fetal swallowing, which has been observed as early as 16 weeks. A fetus swallows from 200 to 450 ml/day at term, removing 50% of the amniotic fluid produced through fetal urination. This fluid is absorbed through the fetal gastrointestinal system and is either recycled through the kidneys or is transferred to the maternal compartment through the placenta (Pritchard, 2008).

A second, more debatable means of amniotic fluid removal may be the respiratory tract. Fetal respiratory activity has been observed as early as 11 weeks gestation.

At term, inspiratory flow in the fetus is approximately 200 ml/kg/ day, up to 600-800 ml/day. Because amniotic fluid is more hypotonic than fetal plasma, it is postulated that exposure of amniotic fluid to the fetal alveolar capillary bed results

in net movement of water from the amniotic cavity into the fetus. Although radioisotopes have been discovered in fetal lungs after intra- amniotic instillation, this quantity has been small and inconsistent. Leading investigators to question the actual contribution of fetal respiration to amniotic fluid removal. In fact, surface active phospholipids originating from the fetal alveoli are found in the amniotic cavity, leading to suggestions that the fetal lungs may actually be a net contributor to amniotic fluid volume (Boddely, 2008)

Amniotic fluid may also potentially be removed by continuous bulk flow (i.e via hydrostatic and oncotic forces). Exchange at fluid may take place at the chorionic plate, where exposure of the relatively hypotonic amniotic fluid to the fetal surface of the placenta may lead to net reabsorption of water by fetus (up to 80 ml/day).

Transport across the amnion may occur through intercellular channel between amniotic epithelial cells and may be modulated by amniotic fluid prolactin levels. Hebertson and colleagues provided presumptive evidence for the regulatory role of the amniotic epithelium in the transport of fluid. They observed ultra structural changes in the amnion of pregnancies complicated by disorders of amniotic fluid volume. Whether these changes reflect a causative role in these disorders or rather a response to long – standing fluid imbalance remains to be determined (www.glown.com)

A final, perhaps underestimated, pathway for volume regulation may occur within the placenta itself. The large surface area of the fetal capillary/ intervillous interface could magnify small osmolar gradients between a mother and fetus, resulting in large volume of net water transfer (Richard, et al 2008)

Exchange of water at this level would influence fetal intravascular volume and potentially affect renal blood flow and urine production.

In addition to bulk flow of fluid, which occurs through pathways that are both phasic (micturition and swallowing) and nonphasic (mediated by hydro static and oncotic gradients), there is also bidirectional flow of water between the amniotic and maternal compartments (Richard, et al 2008).

This process occurs by diffusion, but with net change in fluid volume. At term may leave the amniotic cavity at rate of 400 -500 ml/ hour by diffusion plus flow (Wikipedia, 2013).

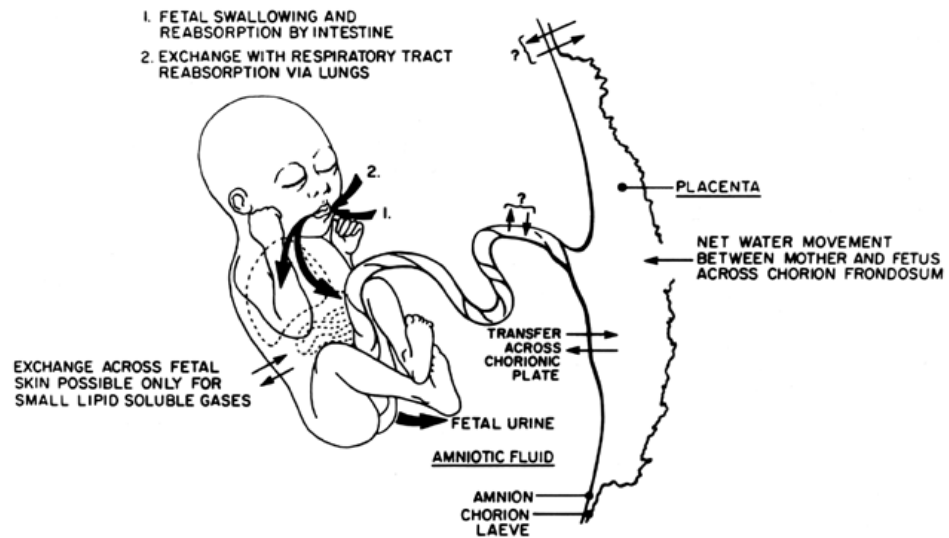


Fig. 2-1. Amniotic fluid dynamics. (Seeds AE: Amniotic fluid physiology. In Sciarra JJ (ed): Gynecology and Obstetrics, Vol 3. New York, Harper & Row, 1989).

2.2.3 Normal amniotic fluid volume:

Amniotic fluid volume is most predictable in the first half of pregnancy, when it correlates with fetal weight. This may relate to the predominant contribution of fetal skin dialysis to amniotic fluid volume between 8 and 20 weeks. At 12 weeks gestation, the average volume is 60 ml.

By 16 weeks, when genetic amniocentesis is often performed, the mean volume is 175 ml. From 20 weeks on, there is greater variance of amniotic fluid volume

increases steadily throughout pregnancy to maximum of 400 – 1200 ml at 34 -38 weeks; however, wide variation does exist (Trish, et al 2004)

Despite large fluxes of fluid between the various compartments near term (500–700 ml/day through urine; 200–450 ml/day through deglutition), the net increase of amniotic fluid is only 5–10 ml/day in the third trimester. After 38 weeks, fluid volume declines by approximately 125 ml/week, to an average volume of 800 ml at 40 weeks.^{15, 16, 17} After 43 weeks, this volume is reduced to 250 ml.¹⁶ In some instances, this reduction may possibly reflect a shift of cardiac output away from the kidneys as a result of a relative uteroplacental insufficiency. Figure 2 provides approximate volumes at various gestational ages, based on a compilation of 12 published studies of amniotic fluid volumes.(Moa Dinaael, 2004).

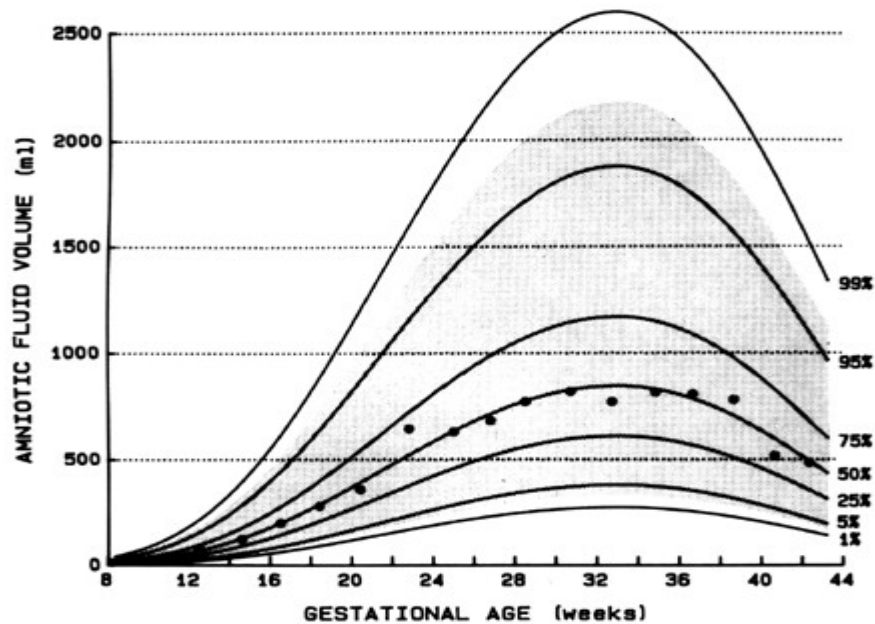


Fig. 2-2. Amniotic fluid volumes as a function of gestational age. Shaded area covers 95% confidence interval (Brace RA, Wolf EJ: Normal amniotic fluid volume changes throughout pregnancy. Am J Obstet Gynecol 161:382, 1989).

2.2.4. Amniotic fluid function:

Allow room for fetal growth, movement and development, Ingestion in to GIT growth and maturation, Fetal pulmonary development (20 weeks), Protects the fetus from trauma, Maintains temperature, and Contains anti bacterial activity prevent intra amniotic environment from infection and Aid dilatation of cervix during labour (Cunningham, 2005).

2.2.5: Methods and technique for assessment of AFV by Ultrasound:

The tow most popular ultrasound measurement protocols for the semi quantitative determination of amniotic fluid volume are the Chamberlain and Phelan methods .For either method the patient should be supine and vertical is defined as perpendicular to the transducer head, brief appearance of cord or an extremity is ignored, but aggregation of either one, to the exclusion of fluid, is not considered part of a fluid pocket (Chauhan, et al 2004).

2.2.6: Subjective assessment:

The fetus occupies less than half of the intrauterine volume until approximately 22 weeks in the pregnancy .There after the fetus progressively occupies a larger portion of intra uterine volume.

This is a qualitative assessment of AFV and is therefore not standardized (Goldstein, 1988).

2.2.7: Quantities Assessment

Single Deepest Pocket Measurement:



Figure (2-3) measure the dimension of the largest vertical pocket of AF
Manning et .al.1981: Pocket of fluid

< 1cm = oligohydramnios.

1-2cm = decreased fluid.

2-8 cm = normal

> 8 = ployhydramnios (Chamberlain, et.al .1985)

Many authors question the 1cm rule as being too restrictive (Hoddick WK.1984).

Controversies in cut- off criteria for oligoydramnios (Sherer .2001):

< 0.5 mm (Mercer,1984), < I cm (Chamberlain .1984) , < 2cm (Manning .
1990) and < 3 cm (Halperin.1985)

2.2.8 Chamberlain method single vertical pocket measurement:

- > 1 cm is severe oligohydramnios.
- 1- 2 cm is significant oligohydramnios.
- 2- 8 cm is normal.
- 8- 11 cm is mild polyhydramnios.
- 12- 16 cm is moderate polyhydramnios.
- < 16 cm is severe polyhydramnios.

2.2.9 Amniotic Fluid Echogenicity:

In general, amniotic fluid appears anechoic throughout pregnancy in the majority of patients at normal gain settings and transducer frequencies. Echogenic amniotic fluid at different stages of gestation can occur and is associated with different etiologies, some physiological and others pathological.

In the first trimester of pregnancy, normal amniotic fluid should appear echo free. In contrast, chorionic fluid frequently appears to have dispersed low amplitude echoes which is especially evident at higher transducer frequencies and gain settings. Echogenic amniotic fluid in the first trimester is rare and has been associated as an indirect sign of acrania-anencephaly sequence (A A S) secondary to exfoliation (sloughing) of fetal brain tissue in the amniotic fluid and related bleeding (Cafici '03).

In the second and third trimesters of pregnancy, amniotic fluid echoes may be seen in normal pregnancies or may be associated with underlying pathological causes including anencephaly and intra-amniotic bleeding. The source of amniotic fluid debris echoes in normal pregnancies is mainly related to desquamated or exfoliated fetal skin cells and vernix caseosa. Vernix caseosa is the normal oily

substance produced by fetal skin and covering the fetal skin to protect it in its aqueous environment.(Danel-moafi,2002)

Near term, meconium released into the amniotic fluid by the fetus may be another source of amniotic fluid debris echoes. Under ordinary circumstances, meconium is usually not released in utero although it may be a normal event that occurs with progressive fetal maturation, without evidence of fetal distress or poor outcome. Other causes associated with meconium passage in utero include hypoxia-induced peristalsis and sphincter relaxation, and umbilical cord compression-induced vagal stimulation in mature fetuses. There appears to be a link between gestational age and meconium passage after the 38th week. The cause of the meconium passage may vary from patient to patient, and in some patients may result from a combination of causes which may explain why there has not been a clear relationship demonstrated between its passage in utero and fetal outcome. (Danel-moafi,2002)

Other potential causes of amniotic fluid debris echoes include fetal bleeding associated with percutaneous umbilical cord sampling, rupture of an umbilical vessel associated with velamentous insertion of the umbilical cord, chorioamnionitis, and idiopathic causes. (Devin,2005).

2.3 Pathology of amniotic fluid:

2.3.1 Oligohydramnios:

Oligohydramnios is defined as decreased amount of amniotic fluid. Anhydramnios is defined as severe oligohydramnios it may be either acute or chronic, acute is most commonly result of membrane rupture and chronic may result from abnormality of the fetal urinary tract and fetal hypoxia, and is indicated when there is no detectable amniotic fluid pockets on ultrasound examination.

There are no associated maternal risk oligohydramnios may be suspected clinically if the measured uterine fundal height is small- for dates with the Chamberlain method oligohydramnios is indicated if the single largest pocket of amniotic fluid measure is less than 2cm with the Phelan method, oligohydramnios is indicated if the sum of the four measured pocked of amniotic is 8 cm or less.

2.3.1.1 Visual ultrasound features of oligohydramnios:

Lack of an amniotic fluid space between the anterior uterine wall and the fetal body, relative crowding of fetal parts and difficulty outlining the umbilical cord.

2.3.1.2.1 Most Common Causes of Oligohydramnios

- Premature rupture of membranes
- Chronic fetal death
- postterm pregnancy
- advanced intrauterine growth retardation
- Fetal genitourinary (GU) tract anomalies associated with decreased renal function and diminished urinary output or anomalies compromising the flow of urine into the ureters, bladder, or urethra:
 - o bilateral renal agenesis (Potter's syndrome)
 - o B. bilateral uroteropelvic junction obstruction
 - o bilateral multicystic dysplastic kidneys
 - o infantile polycystic kidneys

- o posterior urethral valves
- o urethral agenesis -
- o Chromosome defects (especially triploidy)
- o twin-to-twin transfusion syndrome (associated with the growth-retarded donor twin).(Devi,2005)

2.3.1.2.2 Post term pregnancy:

Post term pregnancy is a gestation of 42 weeks or more. Symptoms include prolonged pregnancy, post dates pregnancy and post term pregnancy is problem because at this gestation the baby is at it is maximum size, and placenta is becoming more calcified, less efficient and more prone to failure. (Devin,2005).

2.3.1.3 Causes of IUGR:

- o There are numerous causes of IUGR which can be divided into maternal, placental and fetal factor, most common causes is:
- o hypertensive disease.
- o Smoking and alcohol abuse.
- o Collagen vascular disease.
- o Poor nutrition.
- o Family history.
- o Abnormal placentation.
- o Infections.

- o Genetic disorder.
- o Multiple gestation.
- o And common uterine factors are fibroid and mullerian anomaly (bicornate uterus) (Devin, 2005).

2.4.1 Type of polyhydramnios:

- o Mild polyhydramnios (80%).
 - o A pocket of amniotic fluid measuring 8-11 cm or four pocket measuring 25 – 30 cm.
- o Moderate polyhydramnios:
 - o A pocket of amniotic fluid measuring 12-15 cm or four pocket measuring 30.1 – 35 cm
- o Severe polyhydromnios:
 - o A pocket of amniotic fluid measuring 16 cm or more or four pocket measuring < 35.1 cm(Devin(2005))

2.4.2 Maternal complication of polyhydramnios:

The major symptoms accompanying polyhydramnios arise from purely mechanical causes and result chiefly from the pressure exerted from the overdistended uterus upon adjacent organs. Polyhydramnios may cause maternal respiratory distress. When uterine distention is excessive, the mother may suffer from severe dyspnea and in extreme cases she may be able to breathe only in the upright position. Edema, especially of the lower extremities, is the consequence of compression of major venous systems by the very large uterus. Rarely, severe

maternal oliguria may also result from obstruction of the maternal urinary tract by the very large uterus (Devin, 2005).

2.4.3 Most Common Causes of Polyhydramnios:

- o Diabetes mellitus.
- o Fetal anomalies
 - o central nervous system, e.g. anencephaly
 - o cardiovascular, e.g. arrhythmias
 - o thoracic, e p. congenital diaphragmatic hernia
 - o upper GI tract obstruction, e.g. duodenal atresia
 - o lethal skeletal dysplasias, e.g. thanatophoric dwarfism
 - o chromosome defects
- o Immune and nonimmune fetal hydrops
- o twin-to-twin transfusion syndrome (associated with the recipient twin)
- o Placental choroangioma
- o The various clinical and sonographic causes of polyhydramnios are covered in other sections of the course. In general, the greater the degree of polyhydramnios, the greater the likelihood of finding a major fetal anomaly and an accompanying chromosome abnormality. The combination of polyhydramnios and early onset IUGR has been reported as a sign of trisomy 18 (although oligohydramnios may also be seen with trisomy 18).

With gross polyhydramnios, the placenta may appear thin on ultrasound examination owing to excessive uterine distention (Devin,2005)

2.4.3.1 Diabetes mellitus:

Diabetes mellitus is a medical disease that leads to hyperglycemia (an abnormal elevation of blood glucose level) and glycosuria (glucose in urine) as the hyperglycemia increases. Diabetes is made worse by pregnancy and that increases the risks of pregnancy complication.(Philip N.Baker,2000)

2.4.3.2 Diabetes mellitus (DM) classified into:

- o Associated with certain known condition and symptoms (pancreatic disease changes in hormones beside insulin, the administration of various drugs Insulin dependent diabetes (IDDM).
- o Non- insulin dependent diabetes (NIDDM).
- o Gestational diabetes (GDM).
- o Diabetes and chemical agents, insulin receptor abnormalities, genetic syndrome Impaired glucose tolerance (IGT)
- o And malnutrition (Devin,2005).

2.5 Previous studies:

The AFI is semiquantative analysis of AFV described first by Phelan in 1987 (Phelan. et.al, 1987), The technique is simple acceptable reproducible and also readily usable even by people with limited experience of U/S technique .

Using Moore and Cayle technique the AFI is obtained with the patient in supine position. The abdomen is divided in to four quadrants are defined sagittaly by

linear nigra for right and left, and the umbilicus for upper and lower. The U/S probe is positioned parallel to the patients sagittal plane

Measurement in each pocket should be clear of umbilical cord and fetal small parts. AFI is the sum of these four quadrants (Phelan,et.al ,1987)

Several studies on AFI has demonstrated serial change of mean AFI values weekly with the threshold for oligohydramnios and polyhydramnios during pregnancy.

The values described by Moore and Cayle are used worldwide. The cut off valuable for the AFI commonly used are on AFI of 0-5cm labeled as low fluid , 5.1 to 8cm as normal fluid and greater than 8cm as high fluid value (Moore,1990).

Study of 400 Pakistanie women the antenatal clinic at Kharadar General Hospital, from March 2004 August 2005; these women came for routine check ups Obstetric history of all women was taken on a prescribed form, Gestation age was estimated , on the basis of last menstrual period and U/S scan ,inclusion criteria were singleton gestation with no fetal anomalies and gestational age between 20-41 weeks, no women with medical (chronic hypertension, diabetes mellitus, collagen vascular disease, twin hemoglobinopathy) or obstetric (preterm labour, preterm rupture of membrane, gestational diabetes, preeclampsia, intra-uterine growth retardation , gestational age less than 60 week) each patients underwent a single ultrasonic examination, all AFI estimation was done by the same ultrasonologist and a single obstetrician to eliminate inter-observational error(Habiba,2005).

The technique of Moore and Cayle were used to measured AFI , patients were examined in supine positional, the uterus was divided in to four quadrants , the U/S probe kept perpendicular to the plan of floor and longitudinally with maternal spine , vertical depth of the largest clear AF pool was taken which was `free of

umbilical cord or foetal limbs , the pool measurement was done in cm from each quadrant of uterus , AFI estimated by adding four quadrant depth ultrasonic examination was performed using ultrasonic with 3.5 MHz linear transducer (Habiba,2005).

The study shows that 134 were primigravida and 266 were multigravida. Age of women ranged from 18 to 40 years, and in patients with preterm and term gestation. The AFI values were higher in the preterm gestations compared to those obtained in term gestation ($p < 0.0001$), the mean AFI was 12.8cm. The data was normally distributed with mean and median almost the same, the 5th percentile was taken as lowered limit and 95th percentile was taken as upper limit of normal AFI, 7cm AFI as lower limit of normal and 18cm AFI as upper limit of normal at term. For preterm gestational period the upper and lower limit of normal AFI were 10cm to 20cm respective by higher than that in the term gestational (Habiba,2005).

Done by Rutherford et al and Phelan et al proposed a range of normal AFI of 8 to 18cm .However as AFI values may be affected by the difference of race and environment, care should be taken when previously established . AFI values are applied to pregnant women with different racial and environmental back grounds. The objectives of the present study were to establish the normal range of gestation specific (Mowda, 2014).

Other study of uncomplicated pregnant Pakistani women in gestational age between 20-40 weeks, the study shows that AFI rises to peak at 27 week, other studies , shows another peak at 30-31 week. The values then begin gradual fall to 40 weeks gestation (Habiba, 2005)

Done by Phelan and Moore in GA (week) 18, 21 ,23 , 25 ,27 ,29 ,31 ,33 ,35 ,37,39 in normal Pakistani women ,founded plateau between 27 and 38 week gestation

before declining . Our results suggest that we could define mild oligohydramnios or alarm point at 40weeks, when AFI is less than 7cm .This is similar to as described by Moore and Calye. The alarming values is 6cm in a study done on Indian women while, in Chinese population the lower limit is described as 5 -6 cm (Phelan, et.al 1987).

Salahuddin, et .al. reported peak at30 week in their study from Japan , the study on Indian woman suggests peak at 27 week. Other investigators found the same rise in AFI to peak at 26weeks gestation followed by a progressive decline to 42 weeks. The similarity of this study to previous ones is only in the trend but the absolute values differ from the established reference ranges in other populations (Mowada, 2014).

The result of study of Pakistanis women are similar to those for described for Caucasian but slightly higher than those for Indian and Chinese women. The study of India and Chinese shows 7cm as lower limit of normal .For preterm gestation the upper and lower limits normal were 9 and 19cm respectively and are higher than at termgestation (Mowada, 2014).

Done by khadikar, et al study group of Indian women in GA between 24 – 40 week with normal pregnancy study show that an initial peak at the 26th week gestation and gradually falls until term .(Kevin ,2003

Chapter three

Material and Methods

3.1 Material

3.1.1 Machine used:

SIMENS G00S, Germany, 2004, model 7674532 transabd. Convex probe 3.5MHz.

3.1.2 Study Population:

The study population was composed of 50 pregnant women in their second and third trimester presented to the ultrasound section in Ribat Universal hospital, during the period from first of september to thirty of November 2016.

3-1.3 Included criteria:

The patients were scanned in second and third trimester with normal and abnormal AFV. (Amniotic fluid volume)

3-1.4 Excluded criteria:

All pregnant women in first trimester and multiple pregnancies were excluded.

3-2 Methods:

3-2-1 Patient preparation:

This procedure requires little to no special preparation .Since only lower abdominal area needs to be exposed for this exam, the patient may want to wear a loose-fitting, the piece of outfit. The case examined while reclining with the abdomen exposed particularly late in pregnancy, this may not be a comfortable position for the client who can experience, symptoms from IVC compression by gravid uterus. Woman in this position should be watched carefully for agitation shortness of breath, dizziness or faintness. Should any of these symptoms occurs role the patient on to her side and the symptoms will usually disappear within a few seconds .Once she feels better you can have her rule back ,or partially back to continue the scan . Scanning is usually done in dim light room; minimize the reflected glare off the screen.

3.2.2 Technique and Method of assessment:

The U/S image had been obtained for all pregnant women in second and third trimester come to obstetric and gynecological department.

Patient position supine.

Apply coupling agent(gel) .

Use high frequency 3.5 MHz transducer.

Ultrasound procedure used to assess the amount of amniotic fluid .The AFV is measured by DVP (Deepest vertical pocket) Normal AFV values ranges from 2-8 cm.

3.2.3 Data analysis:

The data we analyzed using SPSS statistics.

3.2.4 Ethical issue:

- No identification or individual details were published.

-No information or patient details will be disclosed or used for reasons other than the study.

Chapter Four

4.1 Results:

This chapter consists the results of the study done to assessment of Amniotic Fluid Volume in Second and Third Trimester by ultrasound in Pregnant Women.

Table (4.1) Frequency distribution of maternal age:

<i>Age period</i>	<i>Frequency</i>	<i>Percentage</i>
<20	1	2 %
20-30	29	58 %
31-40	20	40 %

Figure (4.1) Frequency distribution of maternal age

Table (4.2) Frequency distribution of maternal occupation group:

<i>Occupation</i>	<i>Frequency</i>	<i>Percentage</i>
House Wife	35	70 %
Employee	15	30 %

Figure (4.2) Frequency distribution of maternal occupation group

Table (4.3) Frequency distribution of amniotic fluid volume:

<i>Amniotic Fluid</i>	<i>Frequency</i>	<i>Percentage</i>
Normal	28	56 %
Increase	21	42 %
Decrease	1	2 %

Figure (4.3) Frequency distribution of amniotic fluid volume

Table (4-4) Frequency distribution of maternal cause of polyhydromnios:

<i>Maternal</i>	<i>Frequency</i>	<i>Percentage</i>
Diabetic Mother	7	14 %
Unknown Reasons	15	30 %

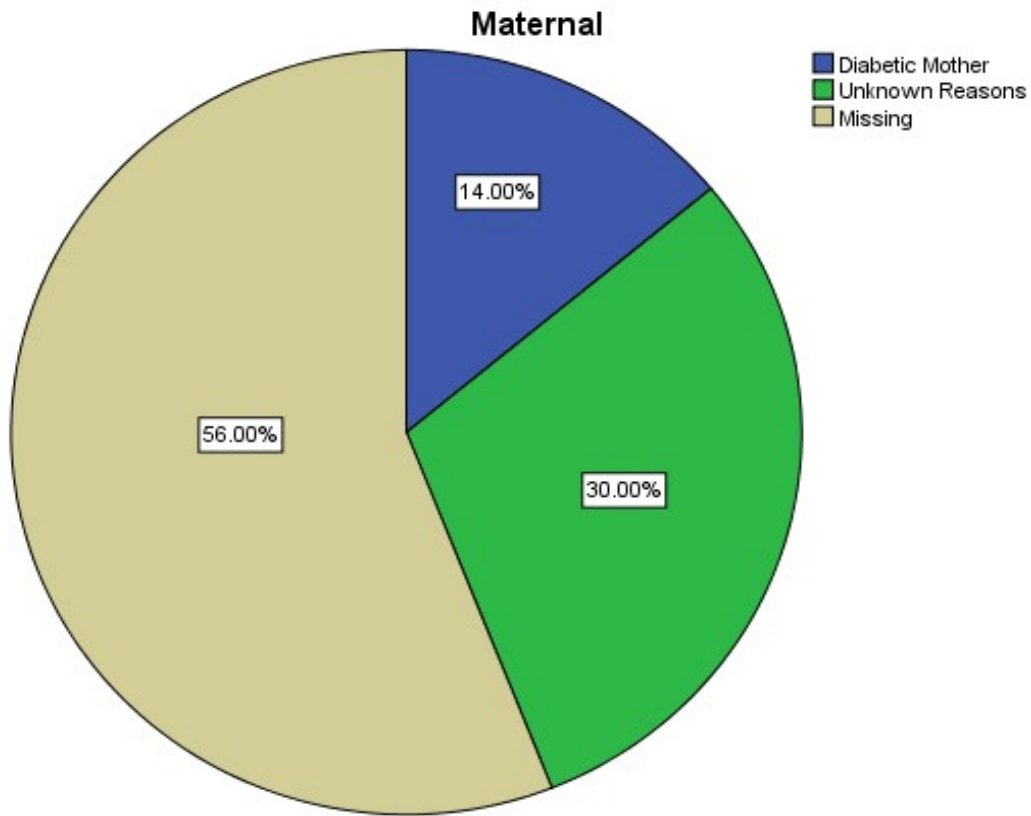


Figure (4-4) Frequency distribution of maternal cause of polyhydromnios

Table (4-5) Frequency distribution of types of polyhydromnios:

<i>Type of Poly Hydromons</i>	<i>Frequency</i>	<i>Percentage</i>
Mild	19	38 %
Moderate	3	6 %

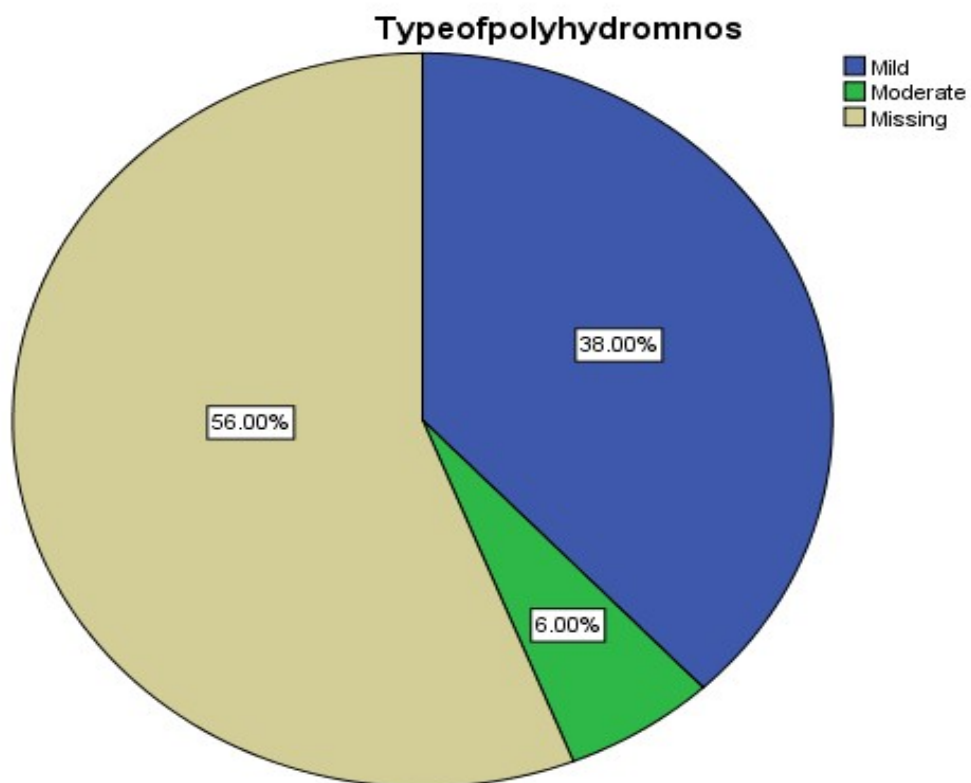


Figure (4-5) Frequency distribution of types of polyhydromnios

Chapter five

Discussion, Conclusion and Recommendation

5.1 Discussion:

Amniotic fluid is the product of complex and dynamic fetal and placental physiologic process. Disruption of the fine balance may result in over production or under production of fluid. Therefore, alterations in AFV serve as important markers of in utero developmental defect as well as physiological responses to fetal hypoxemia and other metabolic disturbances such as maternal/fetal hyperglycemia. Both ployhydromnios and oligohydromnios may be associated with congenital anomalies. Although the ultrasonographic diagnostic criteria have yet to be firmly established, it is apparent that both subjective and objective criteria have been used successfully to identify these condition. Polyhydramnios, particularly when severe and detected early in gestation, can be treated and antenatally with serial amniocenteses. Olighydramnios with intact membranes, especially when severe and in the absence of anomalies, it usually managed by delivery, however, further research is indicated to delineate management guidelines.

AFV remains an important component of any obstetric ultrasonographic examination (Moaz, 2011).

Assessment of AFV is an essential part of antenatal care. Fluid volume can also vary in every pregnant of different population and large variation are noted to occur within the same pregnancy on serial measurements with the greatest variation occurring in the third trimester (Moaz, 2011).

The main objective of this study was to evaluate the AFV by U/S in pregnant women in second and third trimester. Total of 50 pregnant women were studied from first of September to November 2016, amniotic fluid indices were measure by routine ultrasound scan. The range of maternal age from <20 to 50 years with gestational age from 24 – 40 weeks .Data analysis was performed with SPSS.

As shown in table (4-1) out of 50 cases in this study 1 case (2%) their age is less than 20 years, 29 cases (58%) their age group between (20-30) years , 20 cases(40%) their age group between (31-40) years, Figure(4-1) . Table (4-2) , shows that 35 pregnant women (70%) were house wife , 15 pregnant women (30%) were employee cases. Figure. Table (4-3) indicates that out of 50 pregnant women in this study 28 pregnant women were normal AFV (56%), 21 pregnant were increase in AFV (42%) , 1 pregnant woman is decrease in amniotic fluid (2%). Table (4-3).

The study shows that Polyhydramnios occurs in (42%) and Oligohydramnios occurs in (2%) out of 50 pregnant women. In this study unknown reason of polyhydramnios is the most common cause (14%) ,however diabetes (maternal causes) is (30%)

Table (4-5).

In this study out of 21 pregnant, 19 have mild polyhydramnios(38%) ,3 have moderate (6%)

5.2

Conclusion:

This study shows that most pregnant women have normal amniotic fluid volume and abnormal amniotic fluid volume. The study shows that the normal AFV is 56%, and abnormal is (44%) the increase is 42% and 2% is decrease AFV is.

In abnormal amniotic fluid Polyhydramnios occurs in 42% and oligohydramnios occurs in 2% of 50 pregnant women. The study shows that most causes of Polyhydramnios are of unknown reason and diabetic mother most causes of oligohydramnios are due to Preterm Premature Rupture of Membranes. Mild and moderate types of Polyhydramnios are common types and severe form is the common type of oligohydramnios.

5.3 Recommendation:

With reference to the results and conclusion concerning this research ,it is to be recommended that:

- 1- Amniotic fluid must be assess by ultrasound method and not depend only on the observation of the sonographer to prevent missing amniotic fluid volume abnormality.
- 2- A single deepest pocket method should be at least used, as it is simpler to perform and less time consuming.
- 3- Further studies are recommended for providing more accurate estimates of the normal range of amniotic fluid index in Sudanese pregnant women.

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