Sudan University of Science and Technology

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Evaluation of First trimester Vaginal bleeding Ultrasound Imaging

تقويم النزف المهبلي في فتره الحمل الأولي باستخدام ألموجات فوق ألصوتيه

A thesis submitted for Partial fulfillment of the Requirements of M.Sc in Medical Diagnostic Ultrasound

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الاية

بسم الله الرحمن الرحيم

قال تعالي:

((يَا أَيُّهَا النَّاسُ إِن كُنتُمْ فِي رَيْبٍ مِّنَ الْبَعْثِ فَإِنَّا خَلَقْنَاكُم مِّن تُرَابٍ ثُمَّ مِن نُّطْفَةٍ ثُمَّ مِنْ عَلَقَةٍ ثُمَّ مِن مُّضْغَةٍ مُّخَلَّقَةٍ وَغَيْرِ مُخَلَّقَةٍ لِّنُبَيِّنَ لَكُمْ ۚ وَنُقِرُّ فِي الْأَرْحَامِ مَا نَشَاءُ إِلَىٰ أَجَلٍ مُّسَمًّى ثُمَّ نُخْرِجُكُمْ طِفْلًا ثُمَّ لِتَبْلُغُوا أَشُدَّكُمْ ۖ وَمِنكُم مَّن يُتَوَفَّىٰ وَمِنكُم مَّن يُرَدُّ إِلَىٰ أَرْذَلِ الْعُمُرِ لِكَيْلَا يَعْلَمَ مِن بَعْدِ عِلْمٍ شَيْئًا ۚ وَتَرَى الْأَرْضَ هَامِدَةً فَإِذَا أَنزَلْنَا عَلَيْهَا الْمَاءَ اهْتَزَّتْ وَرَبَتْ وَأَنبَتَتْ مِن كُلِّ زَوْجٍ بَهِيجٍ))

صدق الله العظيم .

سورة الحج الاية (5)

Abstract

This study is analytic and descriptive study done in the Western Kordofan Town of Elnohud in the period from June 2016 to September 2016, to evaluate first trimester pregnancy with vaginal bleeding by using gray scale ultrasound.

The main purpose of this study is to determine the causes of first trimester vaginal bleeding and to correlate between patient age ,gravids and ultrasound findings.

This study used the Universal Protocol in the work of ultrasound for first trimester pregnancy, and sixty seven 67 patients with vaginal bleeding in first trimester were scanned with trans abdominal sonography .The is data collected from physician requests and from the patients (age, number of gravid and occupation) and ultrasound findings included. The data sheet was analyzed by using SPSS program and statistical method to detect relationship between different variables.

Regarding the ultrasound findings in 67patients complain vaginal bleeding in first trimester the most frequent ultrasound findings are abortion in 63 patients (93%), then anembryonic gestation sac in 2 patients (2.98%), and the least ectopic pregnancy (1.49%)and trophoplastic disease (1.49 %) .

The study recommends that routine early ultrasound scans for pregnant women are highly advisable in accordance to the international guidelines and protocols.

ملخص البحث

هذه دراسة تحليلية وصفية أجريت في مدينة النهود بولاية غرب كردفان في الفترة من يونيو 2016م إلى سبتمبر 2016م بغرض تقييم حالات النزف المهبلي في الثلاثة أشهر الأولى من الحمل بواسطة الموجات فوق الصوتية العادية .

الهدف الرئيسي لهذه الدراسة هو تحديد أسباب النزف المهبلي في أشهر الحمل الأولى وذلك مقارنة بعمر المريضة وعدد مرات الحمل والنتائج التي تم التوصل إليها عن طريق الموجات فوق الصوتية .

استخدمت هذه الدراسة البروتوكول العالمي في عمل الموجات فوق الصوتية للنساء الحوامل في الثلاث شهور الأولى من الحمل و قد تم جمع البيانات لعدد 67 مريضة من خلال إستمارات الفحص الصادرة من الطبيب وكذلك المعلومات العامة عن المريضة (العمر وعدد مرات الحمل والمهنة) بالإضافة إلى نتيجة فحص الموجات الصوتية. ثم حللت بعد ذلك نتائج البيانات باستخدام برنامج الحزم الإحصائية للعلوم الإجتماعية المعروف إختصاراً باسم SPSS في التحليل الإحصائي ،ومن ثم ايجاد العلاقات بين المتغيرات المختلفة .

وجدت الدراسة أن أكثر الحالات في المريضات اللائي تعرضن لنزيف مهبلي كانت حالاتهن كما يلي: الاجهاض في 63 حالة كان بنسبة 93 % وحالات كيس الحمل الفارغ في مريضتين كانت بنسبة 2.98% ثم حالات الحمل خارج الرحم كانت بنسبة 1.49% وداء الأورمة الغاذية كانت بنسبة 1.49%.

وتوصي الدراسة بضرورة إجراء فحص الموجات فوق الصوتية في وقت مبكر وذلك وفقاً التوجيهات والبروتوكولات العالمية

DEDICATION

I dedicate this work to my nuclear and extended families, for their tremendous support.

ACKNOWLEDGEMENT

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Chapter one

1-1Introduction:

The first trimester consists of a series of complex, sequential events that make up the early stage of embryonic development. Interruption in development may lead to complications in the embryonic period. (hagen2012)

Ultrasonography is the primary imaging modality in the evaluation of patients presenting with bleeding in the first trimester of pregnancy. US correlated with serum human chorionic gonadotrophin levels and clinical presentation, can differentiate causes of first-trimester bleeding. These include threatened abortion, ectopic pregnancy, failed intrauterine pregnancy, and gestational trophoblastic disease, which can all present with bleeding and pain.(ACR2012)

Patients benefit from early sonographic examination to carefully investigate the uterine cavity for the presence of an embryo, a fetal heart beat, a yolk sac, or retained products of conception.(L hagen 2012)

The combination of absent cardiac activity and vaginal bleeding was associated with 100% embryonic mortality,(Rumak2010)

Approximately 15% of clinically recognized pregnancies are spontaneously miscarried. The loss rate may be even higher for early pregnancies that are not clinically recognized. The most common presentation for complications is vaginal spotting or frank bleeding, which occurs in nearly 25% of patients during the early stage of pregnancy. In

many cases, bleeding is inconsequential, resulting from implantation of the conceptus into the decidualized endometrium. However, if bleeding is accompanied by severe pain, uterine contractions, or a dilated cervix, the pregnancy is unlikely to progress.(L hagen 2012)

 Ultrasound has a major role in diagnosis the cause of vaginal bleeding during the first trimester. In addition to that, the incidence of causes of vaginal bleeding during the first trimester higher in age 26-35 years, furthermore, the incomplete abortion is the most common causes. Increase age, gravity and parity are the most risk factors.(Monzer 2015)

   A threatened abortion covers a wide range of conditions based on the stage of development and the sonographic appearance of the products of conception. The diagnosis of threatened abortion is made when the cervix is long and closed in a patient with vaginal bleeding. At least 50% of pregnant women with these complications will go on to spontaneously lose or "abort" the pregnancy.(L hagen 2012)

   Specific terminology has been adopted to describe the complications of these pregnancies. Embryonic demise is used when there is clear evidence of a nonviable embryo. Blighted ovum, or an embryonic pregnancy, is used to describe a uterus containing a gestational sac but no visible embryo.(L hagen 2012)

   Other conditions that may present clinically as a threatened abortion are ectopic pregnancy and gestational trophoblastic disease. Knowledge of the quantitative level of serum human chorionic gonadotropin (hCG) is

necessary to make this diagnosis and should be correlated with the sonographic appearance.(L hagen 2012)

The sonographer needs to know if the patient is currently taking any medication or has experienced clinical problems with the pregnancy, such as bleeding, decreased fetal movement, or pelvic pain. If the patient has had problems with previous pregnancies, such as incompetent cervix, fibroids, fetal macrosomia or growth restriction, or congenital or chromosomal fetal anomalies, this information must be documented.(L hagen 2012)

1-2 Problem of the study:

Vaginal bleeding in pregnancy is a most causes of fetal death and may can complicated with mother, so early detection of this problem help to save mother and child.

1-3. Objectives:

1-3-1.general objective:

To assess first trimester pregnancy with vaginal bleeding by using gray scale ultrasound.

1-3-2. specific objectives:

To determine the causes of first trimester vaginal bleeding by ultrasound

To correlate between age and causes of vaginal bleeding in first trimester

To correlate between gravid and causes of first trimester vaginal bleeding

Chapter Tow

Literature review and previous studies

2-1. Anatomy:-

2-1-1.External genital organs (Vulva) :-

2-1-1-1.Vulva:-

The vulva is a composite name for the external genitalia, which includes the Mons veneris, the labia major and minora, the clitoris, the entrance to the vagina, the hymen and vestibule. It is defined and may regard as covering deeper structures such as the vestibular bulbs and bartholin's glands as well. For convenience the perineum is considered with the vulva. (Snell 1995)

2-1-1-2Monn veneris and labia majora:-

The mons is the hair-breaking skin and the fatty pad which overlie the upper part of the symphysis pubis and the lower abdominal muscles; it acts as a coital buffer. Extending backward from the mons, on either side of the vaginal orifice, are the labia majora which are folds of skin with underlying deposits of fat these are homologous to the scrotum. Posteriorly they merge into each other and into the perineal skin. Their outer aspects are covered with hair, their inners are smooth and moistened by secretions of sebaceous and other glands. Except where the labia minor intervene, the inner surfaces ordinarily lie in contact with each other, and thus close the entrance to the vagina. The mons and labia majora are covered with coarse skin, which contains hair follicles, sebaceous glands and sweat glands. Some of the latter are large, coiled and specialized and are known as a pocrine glands, these are only found in certain areas of the body such as axilla and vulva and their

secretions (when modified by bacteria) gives rise to characteristic odor which is sexual significance.(Snell 1995)

In view of their structure, the mons and labia majora are exposed to ordinary diseases of skin including conditions such as psoriasis, sebaceous cysts, boils and carbuncles and new growths. Because the underlying connective tissue is very loose, the labia readily become edematous.

2-1-1-3.Perineum:-

The perineum comprises the less hairy skin and subcutaneous tissue, which lie between the vaginal orifice and the anus and cover the muscular perineal body. Its length from before backwards, which varies from 2 to 5cm or more, influences the resistance it offers protection against injuries during child birth. Unlike the rest of the vulva the perineum has very little subcutaneous fat so the skin is close to the underlying muscles.(Snell1995)

2-1-1-4Labia minora (Nymphae):-

Labia minora are delicate flaps of soft skin lying within the labia majora, one on each side of the vaginal orifice, and are homologous to the floor
 of the penile urethra in the male. They vary considerably in size and may be hidden by the labia majora or may be protected between them. Ordinarily their inner surfaces lie in contact with each other and their outer surface in contact with the labium majora on the same side. Anteriorly the labia minora join together and so doing split to provide the clitoris with a prepuce frenulum. They join to form a sharp fold of skin, the fourchette, and they also merge into the labia majora. The fourchette is nearly always injured during childbirth and sometimes suffers slight tearing during first attempts at coitus. The depression between the fourchette and hymen, which is found in

virgins, the fossa navicularis. The labia minora each consist of two layers of non-keratinized skin with some intervening loose connective tissue. The latter is devoid of fat but is so vascular that it enables the labia to become turgid under conditions of sexual excitement. They also contain sebaceous glands, especially near their bases but few, of any sweat gland.(Snell 1995)

2-1-1-5. Clitoris:-

The clitoris is homologue of penis and is a small structure lying on the front of the symphysis, it almost hidden by the foreparts of the labia majora. It has a glans, prepuce, body and two crura (corpora cavernosa) which attach it to the public bones. The clitoris consists of erectile tissue richly supplied with nerves, which make it the most erotically sensitive part of the vulva, smegma is secreted beneath the prepuce. Only the glans and prepuce are visible, but the body is palpable against symphysis pubis as a small cord-like structure approximately 2cm in length.(Snell 1995)

2-1-1-6.Vestibule:-

The definition of vestibule (from Latin vestibule meaning a forecourt or a hall next to the entrance) varies but generally the term is applied only to the area of smooth skin lying within the labia minora and in front the vaginal orifice. The urethra opens on to it. On either side of the urethral meatus are tiny depressions called paraurethral pouches which they are adjacent in significant folds – the urethral labia.(Snell 1995)

2-1-1-7.Vascular Connection:-

All the tissues of the vulva are extremely vascular, so even a minor operation in that area should not be attempted except in well equipped surroundings. The vulva is mainly supplied by branches of the internal

pudendal artery, which is one of the two terminal branches of the internal iliac artery, but its four parts are also served by superficial external pudendal artery.(snell1995).

Some veins accompany corresponding arteries to the internal pudendal vein, those of the clitoris and bulb link with the vesicle and vaginal plexuses. The long saphenous vein also takes a share of the venous return so its ligature can improve vulval caricosties. (Snell 1995)
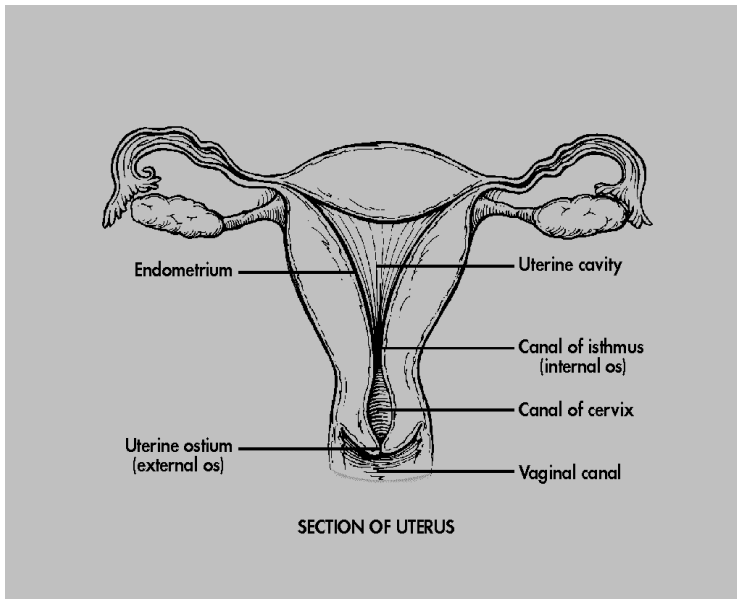
Figure(2-1) coronal section through the uterus(Snell 1995)

2-1-2 The internal organs:

2-1-2-1Uterus:-

The uterus is a thick walled, muscular, hollow organ shaped like a pear, its tapering end being the cervix, which projects into the upper vagina. The measurements were formerly given as 3x 2x1 inches. But this understates its size. Their dimensions varies but the nulliparous organ measure approximately 8-9cm (3.5inch) in overall length, 6cm (2.5in) across its widest part and 4cm (1.5inches) from before backwards in its thickest part. It

weight 45-55g. The wall is 1-2cm thick, so the length of normal uterine cavity, including the cervical canal, is not less than 7.5-8cm. The uterus is made up of a body or corpus, isthmus and cervix. The part of the body situated above the level of insertion of the fallopian tubes is described separately as the fundus, especially during pregnancy. The area of insertion of each fallopian tube is termed the cornu. The opening of the cervix into the vagina is the external os uteri. The cavity of the uterus is triangular in shape when seen from the front, but is no more than a slit when seen from the side. It communicates with the vagina through the cervical canal, and with the lumen of each fallopian tube at the cornua(Rumak 2010)

When viewed from the side, the adult uterus is bent forwards on itself in an attitude of anteflexion. The bendis situated about the level of internal os.

In addition the axis of the cervix is inclined forwards at an angle of approximately 90 degrees to the axis of the vagina, giving rise to a state of anteversion, when a woman is standing, the cavity of the uterus is therefore more horizontal than vertical. Version and flexion are not always in the forward direct and approximately 15 percent of women have uteri which are retroverted or retroflexed or both, such states are not usually pathological.

The uterus is normally moderately mobile, its most fixed part being the supravaginal cervix where the strong supporting ligaments are attached. The fundus can therefore rotate around this point and the degree of anteflexion and anteversion is influenced by the state of adjacent organs. A full bladder for example rotates the uterus backwards and also reduces anteflexion.

The height of the uterus in the pelvis varies with the posture and other factors e.g. filling of the bladder and rectum, and by increasing the intra-abdominal pressure through coughing, laughing and bearing-down effort,

but in the standing woman, the internal os is approximately level with the upper border of symphysis pubis and the external os is opposite the tip of the ischial spine. It follows that the body of the uterus lies normally above the level of the symphysis pubis so, in a thin woman with relaxed abdominal muscles and an empty bladder; it is possible to palpate it on abdominal examination (Rumak 2010)

The uterus is held in a position of anteflexion and anteversion by its weight and by the round ligaments, which hold the fundus forwards, and by the uterosacral ligaments, which keep the supravaginal cervix far back in the pelvis. The broad ligaments and their cellular tissues also have a steadying effect on the uterus.

The round and broad ligaments do not, however, have any significant action in preventing descent of the uterus. This function is performed almost entirely by the transverse cervical ligaments and their posterior extensions – the uterosacral ligaments. These ligaments also contribute to support the vaginal vault, which is also important in preventing uterine prolaps (hagen2012)

Uterine and ovarian arteries.

Pampiniform plexuses in broad ligament. Uterine and ovarian veins, Vaginal and vertebral plexuses (snell 1995)

2-1-2-2 Fallopian tube:

The two fallopian tubes are oviducts, which extend from the ovaries to the cornua of the uterus, one on either side. They are somewhat tortuous and their outer parts curve backwards. Each lines in the free upper border of the broad ligament and when straightened is 10cm in length. Its lumen

communicates with the uterine cavity at its inner end and with the peritoneum cavity at its outer, and thus provides the final section of an open, or potentially open, canal, which lead from the exterior to the abdominal cavity. The fallopian tube is divided into four parts(Rumak 2010)

This only 1-2cm in length and is the part which transverse the uterine wall. It was a very narrow lumen (1mm in diameter) and is different from the remainder of the tube in that it is without a peritoneal coat, and in that, the outer longitudinal muscle has disappeared to cover the uterus. (Rumak2010)

2-1-2-2-1 Isthmus:-

This is the straight and narrow portion adjacent to the uterus and measures 2-3cm. It has thick walls but the lumen is so narrow that it only admits the finest probe (1-2cm in diameter).(Rumak 2010)

2-1-2-2-2 Ampulla:-

This is the wider, thin-walled and tortuous outer portion approximately 5cm in length, which lead to the infundibulum. (Rumak2010).

2-1-2-2-3Infundibulum:-

This is the trumpet-shaped outer end with an opening into the peritoneal cavity (abdominal ostium). The latter is surrounded by fronds or fimbriae, one of which is longer than the others and is directed towards the ovary.(Rumak 2010)

2-1-3 Ovaries:-

The two ovaries are mainly solid ovoid structures, approximately 3.5cm in length and 1.5-2.5cm in thickness. Each weights 4-8g, the right tending to be larger than the left. They are attached to the back of the broad ligament by

the mesovarium, one on either side of the uterus. Each is suspended from the cornu of the uterus by an ovarian ligament. The surface of an adult active ovary is corrugated, and is pale except where there happens to be some structure such as a corpus luteum. The ovary is the only organ in the abdomen, which is not covered by peritoneum. The part of the ovary attached to the mesovarium is the hilum and all nerves and vessels enter and leave at this point. In the hilum and adjacent mesovarium are small collections of hilus cells, which may be homologous to the interstitial cells of the testis.(Rumak 2010)
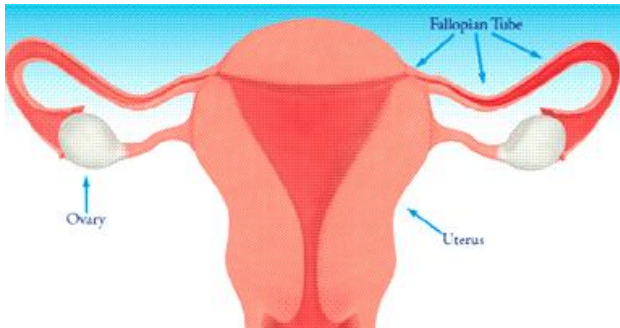
Figure(2-2)Uterous , ovaries and fallopian tubes(Dr Rams 2012)

2-2 Reproductive Physiology*:-*

In the normal female between the age of 9 and 16, cyclic changes occur in the ovaries and uterus in response to endocrinological effects. These cyclic changes are known as the menstrual cycle and represent the reproductive phase of a female's life cycle. The changes associated with the endometrium are known as the endometrial cycle. The purpose of the ovarian cycle is to provide a suitable ovum for fertilization, whereas that of the endometrial

cycle is to provide a suitable site for blastocyst implantation . (Mr sukkar2000)

Since the endometrial changes are regulated by the ovarian hormones, the two cycles are intimately related. The typical menstrual cycle is 28 days however variations are very common and normal. For the purpose of description, the 28 day "idealized" cycle is used. The cycle is divided into four or five phase. It is customary to assign the first day of menstruation as the first day of the cycle(Mr sukkar2000)

2-2-1 Ovarian Cycle:-

Throughout the reproductive years, at the onset of each menstrual cycle, a number of small, immature follicles known as primary or primordial follicles undergo growth and development. The hormonal stimulus that activates the follicular process is mediated by follicle-stimulating hormone or FSH which is secreted by the anterior pituitary gland. With each menstrual cycle, there is usually only one mature follicle, known as the dominant or Graffian follicle, which makes its way to the surface of the ovary where it appears as a transparent cyst. The mature preovulatory follicle contains the ovum at one end and a cystic cavity or antrum at the other. There are several layers of specialized cells known as theca and granulosa cells which secrete estrogen, progesterone and luteinizing substances(Mr Sukkar2000)

The ovum is released from the mature follicle during ovulation. Ovulation normally occurs on day 14 which is the mid-point of the idealized cycle.

Following ovulation, the ruptured dominant follicle becomes the corpus hemorrhagicum which is then followed by the corpus luteum. The corpus

luteum (CL) secrets progesterone (as well as estrogen) which is absolutely necessary to maintain the endometrium for successful implantation.

If fertilization does not occur, the corpus luteum undergoes regressive, progesterone output is diminished, and by the end of the cycle complete regression occur. The failing corpus luteum triggers endometrial sloughing and menstrual bleeding ensues. The end point of the regressing corpus luteum is the corpus albicans, which is a small fibrous area in the cortex of the ovary(MR .Sukkar 2000)

2-2-2Endometrial Cycle:-

With each menstrual cycle and in step with ovarian, the functional layer of the endometrium undergoes changes characterized by regeneration, proliferation, secretory activity, necrosis, and sloughing. During menstruation, the functional layer of the endometrium is sloughed off and a long with blood, passes into the vagina. Following menstruation, a new functional layer begins to form from the basal layer. Primed by estrogen secreted by the ovary, the endometrium progressively thickness throughout the proliferative and secretory phases. .(MR .Sukkar 2000)

Following ovulation and the formation of the corpus luteum, the endometrial glands exhibit secretory activity. If fertilization does not occur, the corpus luteum undergoes regressive changes, and the endometrium, supported by the hormonal output of the ovary, beings to "shrink". The shrinking is due to the loss of tissue fluids and secretions which occurs secondary to the drop in estrogen. Estrogen has a "water-retaining" effect on tissues whereas progesterone is a factor in the secretory activity of the gland. As the endometrium shrinks, the spiral arteries kink resulting in vascular stasis followed by ischemia, necrosis, sloughing and bleeding.

The menstrual cycle is a continuous ongoing cycle but for descriptive purpose it is divided into specific phases based on hormonal levels, and events occurring in the ovary and endometrium. The hormonal relationships and the effects of these hormones on the receptor tissues and organs are considered with these phases in mind. The "ideal" 28 day cycle will be considered although in relating the length of the normal menstrual cycle may vary considerable.(MR .Sukkar 2000)

2-2-2-1 Phases of the Menstrual Cycle:-

Characterized by uterine bleeding and endometrial sloughing. The serum level of estrogen is low at the beginning menstrual cycle. A low estrogen level signals the hypothalamus to release Gonadotropin-releasing hormone (GnRH). The hypothalamus is considered the biological clock which primes the cycle. When the neurohormonal axis is functioning properly, there are pulsatiles which induce regular monthly cyclical secretions from the pituitary in the form of FSH and LH. The pituitary output of FSH and LH act directly on the ovary to produce a mature follicle in one ovary and to cause ovulation(Mr sukker2000)

GnRH induces the anterior pituitary to secrete FSH and luteinizing hormone (LH). Under the influence of FSH, numerous primordial follicles begin to develop and grow, and secrete estrogen (Mr sukkar 2000)

2-2-2-2 Sonographical Features:-

There is typically few or no visible developing, cystic follicles in the ovaries. The endometrium is very thin and about all that can be appreciated is the endometrial cavity echo. There may be evidence of fluid and tissue

debris in the endometrial cavity, endocervical canal and vagina representing menstrual blood and sloughed endometrium((Rumak 2010)

2-2-2-3 Follicular/ Proliferative Phase (Day 6 to 13):-

Characterized by development and growth of primordial follicles (process of folliculogensis) and by recognization of proliferation of the functional of the functional layer of the endometrium.

The developing follicles secrete increasing amounts estrogen. For reasons largely unknown, a single dominant follicle emerges and the other developing follicles regress and become atretic. The dominant follicle continues to grow towards the surface of the ovary. There is negative feedback loop in the hormonal axis such that increasing serum levels of ovarian hormones cause decreasing secretions from the hypothalamus and pituitary. Just prior to ovulation, the rising serum levels of estrogen induce surge in the pituitary output of LH. This "extra production" of LH is very important for ovulation. LH also induce the dominant follicle and corpus luteum to secrete progesterone .(Mr   sukkar 2000)

2-2-2-4 Sonographical Features:-

The ovaries contain numerous growing cystic follicles which enlarge to a diameter of about 10 to 15mm. Near the end of the follicular phase, a single dominant follicle emerges and the other developing follicles begin to regress. The mean diameter of the dominant follicle prior to ovulation is 20mm (range 18 to 25mm). With oral contraceptive, folliculogensis is suppressed and developing follicles remain small.(Rumak2010)

The endometrium is thin at the beginning of the proliferative phase and thickens progressively. It is seen as an echogenic band surrounding the

brighter central cavity echo. In the late stages of the proliferative phase, the endometrium typically has a multilayered echo pattern with the basal region of endometrium appearing more echogenic than more superficial functional zone)(Rumak2010)

2-2-3 Ovulation (Day 14):-

Characterized by the release of the mature oocyte of ovum.   Ruptured, dominant follicle becomes the corpus hemorragicum, and then the corpus luteum. Suppression of ovulation is the primary mechanism of action of oral contraceptives. A dominant follicle fails to emerge, ovulation is suppressed and there is no corpus luteum formation.

  A practical method of detecting ovulation is the shift in basal body temperature from a relatively constant lower during the preovulatory phase to a slightly higher level early in the postovulatory phase. The typical upward shift is 0.3 degrees Celsius and is measured by a special thermometer with 0.1 degree gradations. The increase in the basal body temperature is caused by the thermogenic action of progesterone. The rise in basal body temperature may provide evidence for the development of a corpus luteum and the secretion of progesterone and is therefore considered a clinical sign of ovulation(MR .Sukkar 2000)

2-2-3-1.Sonographical Features of Ovulations:

  The Sonographical manifestations of ovulation are best observed in the serially scanned patient participating in a follicle monitoring/ ovulation induction program (a single ultrasound study in a spontaneous or induced cycle cannot accurately determine the presence or absence ovulation). The most direct Sonographical evidence of ovulation, the dominant follicle in the

active ovary appears as a simple, dominant follicle becomes the corpus homorrhagicum/ corpus luteum which appear more irregular (crenated), thick-walled and contain low amplitude internal echoes secondary to hemorrhage. Another feature of ovulation is a during the cycle and is not an indication ovulation but in a serially monitored patient, a measurable increase in the volume of pelvic fluid at mid cycles is an indirect sign of ovulation. There are no reliable, detectable uterine, cervical, or vaginal changes associated with ovulation. A secretory endometrium is achieved, by circulating progesterone levels therefore sonographical evidence of secretory endometrium (thick, uniformly echogenic) is indirect evidence of ovulation. Indirect clinical evidence of ovulation on a normal healthy woman includes a documented rise in the basal body temperature (as a result of progesterone secretion, which has a thermogenic effect), measures elevated serum progesterone levels (exceeding 3ng/ml), indicating corpus luteum formation and function, and a secretory endometrial pattern demonstrated by endometrial biopsy histological analysis(Rumak2010)

2-2-3-2 Luteal/secretory phase (Day 15 to 25):-

Characterized by formation of the corpus hemorragicum and corpus luteum, and secretory activity of the endometrial glands. The CL secretes progesterone and estrogen. The functional layer of the endometrium thickness and secretes large amounts of lubricating mucous. If fertilization does not occur, the corpus luteum begins to regress after day 20-21 and the levels of estrogen and progesterone gradually decrease. If fertilization occurs, the conceptus moves into the uterus and implantation occurs between day 21 and 25. The trophoblastic cells of the blastocyst secrete human

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chorionic Gonadotropin (HCG) which signals the corpus luteum to maintain its hormonal output of progesterone. HCG is necessary to maintain, the hormonal output of the corpus luteum which in turn is necessary at this stage to maintain the decidua reaction of the endometrium. Later in pregnancy (at about 3 months), the placenta secretes sufficient amounts of estrogen and progesterone to maintain the decidua and the CL atrophies to become the corpus albicans (small area of scar tissue in the cortex of the ovary)(MR .Sukkar 2000)

2-2-3-3Sonographical Features:-

The corpus luteum appears as an irregular cystic structure (-20mm in diameter) which generally contains debris echoes. The endometrium is thick and appears uniformly echogenic (the tortuous structure of the endometrial glands and the secretion of large amounts of mucin during the secretory phase produces many more interfaces than the shallow, straight, non-secretive glands seen in the proliferative phase). Endometrial thickness peaks around day 21 implantation period of the blastocyst.(Rumak2010)

2-2-3-4.Ischemic Phase (Day 26 to 28):-

Characterized by further regression of the corpus luteum and shrinking of the endometrium accompanied by vascular stasis and ischemia in the last few days. Estrogen and progesterone levels rapidly diminish resulting in the loss of tissue fluids and of secretory activity. The endometrium consequently shrinks resulting in kinking of the spiral arteries. This leads to vascular stasis, ischemia and necrosis. With tissue necrosis and associated hemorrhaging, the process of menstrual bleeding begins and a new menstrual cycle is under way(MR .Sukkar 2000)

2-2-3-5 Sonographical Features:-

In the serially or longitudinally assessed patient, the corpus luteum and endometrium may be seen to regress. Numerous studies have been published correlating blood flow pattern in the normal uterine and ovarian arteries during the menstrual cycle of women with normal spontaneous cycles. In general, Doppler indicates of both uterine arteries tend to decrease after ovulation (end-diastolic velocities are commonly absent or low during the early proliferative phase and higher during the secretory phase). The decrease in the Doppler indices of the active. (Ovulation site) and non active ovarian arteries are relatively high although the ovary destined to ovulate tends to have lower values. After ovulation, the Doppler index in the active ovary decreases and remains relatively constant in the non ovulating ovary. Colour Doppler has been used to demonstrate increased vascularity in the dominant follicle at or around the time of the LH elevation, and in the corpus luteum following ovulation. The increased vascularity has been attributed to neoaniogensis (formation of new blood vessels) that takes place in the ovary as a part of luteinization. The term "ring of fire" has been used to describe the rich color Doppler vascular pattern associated with the normal functioning corpus luteum.(MR .Sukkar 2000)

2-2-4 Gynecological Endocrinology:-

The structure directly involved in the regulation of the menstrual cycle and in reproductive physiology are the hypothalamus, pituitary gland, ovary, and trophoblast of the early blastocyst if the patient is pregnant.
There are many hormones secreted by these structures such as :-

2-2-4-1Gonadotropin- Releasing Hormone:-

The hypothalmus secretes Gonadotropin releasing (GnRH) that control Gonadotropin release (FSH and LH). GnRH is secreted in a pulsatile manner; the amplitude and frequency of the secretions vary throughout the cycle. One pulse every hour is typical of the follicular phase; one pulse every 2-3 hours is typical of the Luteal phase. The amplitude and frequency are regulated by feedback of estrogen and progesterone and neurotransmitters within the brain.

GnRH stimulates the synthesis and release of both FSH and LH from the same cell in the anterior pituitary. With GnRH stimulation, there is a rapid (30mintue) increase in serum FSH and LH with a later (90 minute) release of LH. Improper amplitude or frequency of GnRH may be a factor in infertility.(Mr sukkar2000)

2-2-4-2Follicle Stimulating Hormone and Luteinizing Hormone:-

The anterior pituitary secretes follicle stimulating hormone (FSH) and luteinizing hormone (LH). There are FSH receptors primarily in the cell membrane of the granulosa cells which line the walls (single layer) of the ovarian follicles. FSH acts primarily on the granulosa cells to simulate follicular growth and also stimulates formation of LH receptors. FSH stimulates follicular growth and also stimulates formation of LH receptors. FSH stimulates follicular growth by increasing both FSH and LH receptor content in granulose cells. This action is enhanced by the estrogen being produced by the granulosa cells.

LH receptors exist in theca cells at all stages of the cycle and on granulosa cells after the follicle matures under the influence of FSH and estrogen. With

sufficient number of LH receptors on the granulosa cells, LH acts directly on the granulosa cells to cause luteinization (i.e. formation of the corpus luteum) and the formation of progesterone. LH increases steadily until mid cycle when there is a surge, which is accompanied by a lesser surge of FSH. LH initiates luteinization and progesterone production in the granulosa cells. The preovulatory rise is induce the mid cycle FSH peak.(MR sukkar 2000)

2-2-4-3 Estrogen:-

All least six different estrogen levels has been isolated from the plasma of human females. However, only three are present in significant quantities. These are beta-estrodiol, estrone, and estriol. Of these, beta-estrodiol (or simply, estradiol) exerts the major effect. As reference is made to estrogens in subsequent discussions, keep in mind that estradiol is the principle estrogen. Estrogen is secreted by the granulosa cells of the ovarian follicles and the corpus luteum. Estrogen stimulates follicle growth and increases FSH action on the granulosa cells. The follicle destined to become dominant secretes the greatest amount of estrogen, which, in turn, increases the density of the FSH receptors on the granulosa cell membrane. Rising estrogen levels result in negative feedback on FSH secretion levels; this halt the development of other follicles, which then become atretic. The follicular rise of estrogen exerts a positive feedback on LH secretion. LH levels rise steadily during the late follicular phase. FSH induces the appearance of LH receptors on granulosa cells. Estrogens rise rapidly, reaching a peak approximately 24-26 hours before ovulation.(MR .Sukkar 2000)

Major physiological effects of estrogen **development and maintenance of female reproductive structures.Development of female secondary sex**

characteristics and development of breast. Control of fluid and electrolyte balance, increase protein anabolism(MR Sukkar 2000)

2-2-4-4 Progesterone:-

Progesterone is secreted by the maturing follicle just prior to ovulation and by the corpus luteum following ovulation. Peak levels of progesterone are attained 8-9 days after ovulation, which approximates the time of implantation of the blastocyst. Progesterone is also synthesized by the placenta around the end of the first trimester to term. Prepares the endometrium for implantation and maintains the deciduas during pregnancy. Prepares breasts to secrete milk for lactation.(MR .Sukkar 2000)

2-2-4-5 Human Chorionic Gonadotropin (hCG):-

HCG is biochemically similar to LH. It is secreted in early pregnancy by the trophoblast of the blastocyst (the trophoblast forms the chorion which differentiates into the villous chorion frondosum (which becomes the placenta) and the smooth chroion or chorion leave (which joins with the amnion to form the amniochorionic membrane). HCG maintains corpus Luteal function until the placenta is established and begins to manufacture estrogen and progesterone.(MR .Sukkar 2000)

Prenatal Evaluation of Growth by Ultrasound: Prenatal evaluation is usually possible 3 weeks after fertilization. Evaluation by ultrasound is dated from the first day of the last menstrual period, which is termed "gestational age" (2 weeks longer than embryonic age). A gestational sac can usually be identified at 5 weeks and is an early indication of an intrauterine pregnancy. Ultrasound evaluation of the embryo reveals the following:

At 6 weeks, gestational age, embryonic structures and heart activity are almost always visible. At 7 weeks, the embryo is 10 mm at a minimum and fetal heart activity should be visible in 100% of viable pregnancies. At 8 week, fetal structures are visible and the yolk sac is identified as a circula structure measuring in diameter. The detection of yolk sac excludes the diagnosis of a blighted ovum because a viable embryo is necessary for yolk sac development. An empty gestational sac with a mean diameter greater than 30 mm with no visible embryonic structures means that a nonviable pregnancy (blighted ovum) exists. At 9–11 weeks, progressive ossification occurs with major centers in the calvaria and ilium .(L hagen 2012)

2-2-4-6.Visualization of Early Gestation:

During the 5th week of embryonic development, the intrauterine pregnancy (IUP) can be visualized sonographically. It appears as a 1- to 2-mm sac with an echogenic ring having a sonolucent center. The anechoic center represents the chorionic cavity. The circumferential echogenic rim seen surrounding the gestational sac represents trophoblastic tissue and the associated decidual reaction. The portion on the myometrial or burrowing side of the conceptus is known as the decidua basalis. The villi covering the developing embryo are referred to as the decidua capsularis (L hagen2012).
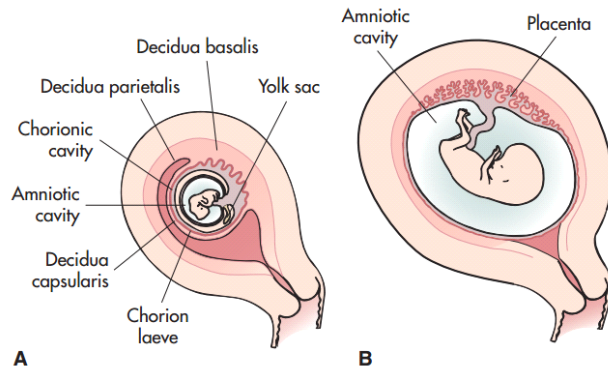
Figure 2-3 Schema showing the relation of the fetal membranes and the wall of the uterus. **A,** End of the second month. Note the yolk sac in the chorionic cavity between the amnion and chorion. At the abembryonic pole, the villi have disappeared (chorion laeve). **B,** End of the third month. The amnion and chorion have fused and the uterine cavity is obliterated by fusion of the chorion laeve and the decidua parietalis(L hagen2012)

The interface between the decidua capsularis and the echogenic, highly vascularized decidua on the opposite wall of the endometrial cavity forms the double decidual sac sign, which has been reported to be a reliable sign of an early intrauterine gestation. The gestational sac eccentrically placed in relation to the endometrial cavity, secondary to implantation. Typically, a fundal location is noted. (L hagen2012)

The normal sonographic features of a gestational sac include a round or oval shape; a fundal position in the uterus, or an eccentrically placed position in the middle portion of the uterus; smooth contours; and a decidual wall thickness greater than 3 mm a yolk sac should be seen when the MSD is greater than 12 mm. An embryo should be seen when the MSD is greater than 18 mm aged, rapid growth and development occur. The gestational sac size grows at a predictable rate of 1 mm/day in early pregnancy.(L hagen2012)

Visualization of the yolk sac predicts a viable pregnancy in more than 90% of cases. Conversely, failure to visualize the yolk sac, with a minimum of 12 mm MSD, using transvaginal sonography, should provoke suspicion of abnormal pregnancy. Transabdominal studies have shown that the yolk sac should be seen within MSDs of 10 to 15 mm and should always be visualized with an MSD of 20 mm . (L hagen2012)

Embryo. At the beginning of the 5th week, the bilaminar embryonic disk undergoes gastrulation and is converted into the trilaminar (three germ layer) embryonic disk. It is at this point that organogenesis begins. The early embryo often is not identified until heart motion is detected at approximately 5.5 weeks, when the CRL is approximately 3 mm. The embryonic heartbeat must be seen in a viable embryo when the CRL is greater than 4 mm. (L hagen2012)
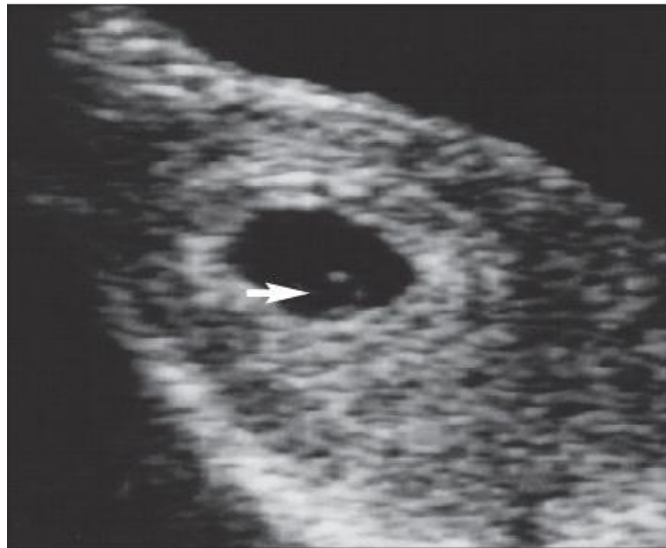
Figure 2-4.An approximate 6-week gestational sac with normal-appearing secondary or sonographic yolk sac *(arrow)*.

2-3 Pathology:-

2-3-1 abnormal vaginal bleeding includes:-

Pregnant related complications, in women of reproductive age, the possibility of pregnant related bleeding must always be considered in any patient with abnormal uterine bleeding. Conditions such as miscarriage, ectopic pregnancy and gestational trophoblastic disease may present as complaint related to abnormal menstruation

2-3-1-1Placental Hematomas and Subchorionic Hemorrhage:

The embryonic placenta, or frondosum, may become detached, resulting in the formation of a hematoma, which typically causes vaginal bleeding. Most of thesehemorrhages are contiguous with a placental edge. Although no risk factors have been associated with first trimester placental separation, it has been reported to have a 50% or greater fetal loss rate. Although the prognosis seems to depend on the size of the hematoma, no specific volumes have been correlated in the first trimester with fetal outcomes. That said, improved outcomes do seem to consistent with smaller hematomas. Sonographically, placental hematomas may be diffcult to distinguish from subchorionic hemorrhages. Placental hematomas do not cause symptoms, bleeding, or spotting because they are within the chorionic sac and have no communication with the endometrium.(L Hagen 2012)

2-3-2.Subchorionic Hemorrhage:

The most common occurrence of bleeding in the first trimester is from subchorionic hemorrhage. These low-pressure bleeds result from the process of implantation of the fertilized ovum into the endometrial cavity and

myometrial wall. The hemorrhage is found between the myometrium and the margins of the gestational sac and may or may not be associated with the placenta. This finding can help distinguish a subchorionic hemorrhage from abruptio placentae, which generally occurs in the second trimester and may present as a lucency posterior to the placenta. Clinical findings may include bleeding, spotting, or uterine cramping. If the hemorrhage becomes large enough, this can lead to spontaneous pregnancy loss (SPL).(L Hagen 2012)

Sonographic Findings. The appearance of bleeding varies with the stage of its organization. An early bleed may appear slightly echogenic as the red blood cells

actively fill the area of hemorrhage. With time, the hemorrhage becomes more anechoic and may be seen between the uterine wall and the fetal membrane Patients may present with active vaginal bleeding, and the subchorionic bleed is easily seen by ultrasound adjacent to the gestational sac(L Hagen 2012)

2-3-3. Abortion:-

Abortion is generally defined as delivery or loss of the products of conception before the 20th wk of pregnancy (which corresponds to a fetal weight of about 500g).delivery b/w 20and 37wk is considered preterm Birth.(penny2011)

There are many words that define abortion including, spontaneous (threatened ,inevitable, complete, incomplete, , habitual ,missed, septic ,embryonic) or induced (criminal or therapeutic).Missed abortion is fetal demise for a period of more than 8 weeks without the onset of labour or the expulsion of products of conception. From the clinical standpoint, inevitable

abortion describes a patient who presents with profuse vaginal bleeding and cramping, rupture of membranes, and a dilated cervix. Habitual abortion is three consecutive spontaneous abortions and requires detailed medical evaluation for causes; incompetence of the cervix is the most common cause of habitual abortion occurring in the second trimester. Induce is termination of pregnancy for medical or elective reasons

(therapeutic or criminal).

2-3-4.Spontaneous abortion:-

Loss of fetus without induction or instrumentation.

2-3-4-1Complete spontaneous abortion:-

Refers to complete passage of conception

2-3-4-1-1Sonographical Finding:-

Empty uterus with clean endometrial stripe. Moderate to bright endometrial echoes. Presence of trophoblastic Doppler waveforms surrounding the endometrium normally persist for 3days post abortion.

2-3-4-2 Incomplete abortion:-

Refers to retention of products of conception, typically residual trophoblastic tissue.

2-3-4-2-1 Sonographical Finding:-

Presence of complex collection of echoes within endometrium duo to air bubbles or retained bony fragments.

Persistence of trophoblastic waveforms near the endometrial cavity after 5 days post abortion.(penny 2011)

2-3-4-3 Missed abortion:-

The Presence of an embryo within the uterus without evidence of cardiac activity. May be retained for months following the embryonic demise.

A calcified fetus associated with a missed abortion is known as a lithopedion. Occurs more commonly in the second trimester.(Rumak2010)

2-3-4-3-1 Sonographical Finding:-

Presence of gestational sac with or without fetal component, absence of fetal cardiac activity or limb motion, Acoustic shadowing arising from the endometrium indicating the presence of air bubbles or calcified fetal parts, Fetal size less than expected for dates, and Uterus smaller than expected for dates.(rumak2010).

2-3-4-4.Threatened abortion:-

A condition in which the future of the pregnancy may be in jeopardy but the pregnancy 50% may be continue and rest 50% may go into inevitable or missed abortion .

2-3-4-4-1 Sonographical Finding:-

In the most groups of patients presenting with threatened abortion who subsequently abort, the embryo is usually already alive at the time of ultrasound evaluation.(penny2011)

2-3-4-5. Inevitable a abortion:-

is imminent when two or more of the following :-

When abortion is pending, there may be increased bleeding, intensely painful uterine cramps, and a dilated cervix. The gestational tissue can often be felt or visualized through the internal cervical os.(weintraub 2011)

2-3-4-5-1Sonographical Finding:-

Gestational sac identified in the cervix or lower uterine segment, andsonolucent crescent surrounding the gestational sac.

2-3-4-6.An embryonic pregnancy:-

The presence of a gestational sac in the uterus in which an embryo has failed to develop or died at a stage too early to be visualized.

Also known as blighted ovum.(Rumak2010)

2-3-4-6-1 Sonographical finding:-

No identifiable embryo in a gestational sac of 25mm or larger.
Absence of double sac sign.(Rumak 2010)

2-3-4-7-Induce abortion:-

Induce is termination of pregnancy for medical or elective reasons (therapeutic or criminal).

2-3-5-Ectopic Pregnancy:-

An ectopic pregnancy is defined as implantation of the fertilized ovum outside the uterine cavity. A total of 93% of ectopic pregnancies are tubal Ectopic pregnancies can present with abdominal pain with or without vaginal bleeding. Particular groups of patients are at high risk and include those with previous tubal pathology or surgery, and those with an intrauterine contraceptive .device. The possibility of an ectopic pregnancy

should be considered in high-risk patients with a positive pregnancy, even in the absence of symptoms (weintraub 2011)

2-3-5-1 Ultrasound findings of ectopic pregnancy:-

Traditionally, the findings of a positive pregnancy test and an empty uterus seen at the time of ultrasound scan have been synonymous with the presence of an ectopic pregnancy. However, with the use of trans-vaginal ultrasound around 85% of ectopic can be directly visualized at the initial ultrasound scan.

A pseudo-sac is visible within the uterus in10–29% of ectopic pregnancies, and this finding should not be mistaken for an early gestational sac. The pseudo-sac represents the accumulation of non-clotted blood within the uterine cavity. A single rim of thin endometrium surrounds it and the shape of the sac reflects the shape of the uterine cavity. In longitudinal section, the pseudo-sac will appear elongated and thin, whereas a gestational sac appears more circular. However, the presence of chorionic tissue, which forms an echogenic rim around the gestation sac, helps to establish the correct diagnosis of intrauterine pregnancy. On Doppler examination, a pseudo-sac will typically appear a vascular, whereas high velocity peri-trophoblastic flow surrounds an early gestational sac.(Rumak 2010)

Visualization of the corpus luteum can aid detection of an ectopic pregnancy because around 78% of ectopic pregnancies will be ipsilateral to the corpus luteum. It can sometimes be difficult to differentiate the corpus luteum from the ectopic pregnancy. The 'sliding organs sign' can be used to distinguish a bulging corpus luteum from an ectopic pregnancy. Using this technique, gentle pressure with the tip of the probe is used to observe

whether the mass moves separately from the ovary. The presence of fluid in the pouch of Douglas is associated with 20–25% of ectopic pregnancies.(hagen 2012)

Blood and clots appear as hyper echoic fluid on ultrasound, the presence of which is suggestive of tubal abortion or a ruptured ectopic. However, blood in the pouch of Douglas can also be seen in a woman with a ruptured corpus luteum cyst. False-positive diagnosis of an ectopic can result from a static loop of bowel, hydrosalpinx, adhesions or an endometrioma. Direct ultrasonic visualization of the ectopic pregnancy is essential not only to facilitate diagnosis but also to decide upon the best management option. Morphology of ectopic pregnancies varies and the relative frequency of different morphological features will depend on accessibility of the ultrasound service, quality of the equipment and the experience of the sonographers.(hagen 2012)

2-3-6.Gestational Trophoblastic Disease:-

Gestational trophoblastic disease is the general term for a spectrum of proliferative trophoblastic abnormalities originating from placental trophoblasts. The clinical classification of Gestational trophoblastic disease includes hydatidiform mole and gestational trophoblastic neoplasia . Placental-site trophoblastic neoplasia is the rarest and most fatal form of trophoblastic neoplasia.

hydatidiform mole may be complete (true or classical), or incomplete (partial). Complete hydatidiform mole is characterized mainly by proliferation of the trophoblast, absence of villous blood vessels, absence of fetus, cord, or amniotic membrane, and normal karyotype (all the

chromosomes are paternally derived). Very rarely, a true HM may coexist with a normal fetus and placenta. As one of the pathologic criteria of true hydatidiform mole is absence of fetal tissues (fetus, cord, or amniotic membrane), it is presumed the mechanism for this situation is development of a dizygotic twin pregnancy with normal development of one zygote and molar development of the other.(Rumak 2010)

2-3-6-1 Ultrasound finding:-

Ultrasound is important for the diagnosis of HM because signs and symptoms are nonspecific however less than 60% of cases exhibit the classic sonographical appearance of "bunch of grapes or the "snowstorm" appearance.

Early HM (<10 weeks LMP) may exhibit a spectrum of sonographical appearances Which indicate a nonviable pregnancy but are otherwise nonspecific for molar pregnancy. An empty gestational sac having an abnormally thickened trophoblastic ring or a homogeneous, echogenic intrauterine soft tissue mass with or without visible cysts are highly suggestive of complete HM. The classic sonographical appearance of hydatidiform mole applies to pregnancies diagnosed in the late first trimester and early second trimester. TAS will typically show an enlarged uterus. filled with echogenic tissue of relatively low attenuation. TAS transducers with sufficient resolution will be able to resolve the vesicular nature of the molar tissue and show its multicystic nature. EVS with its inherent high resolution is able to show with high definition the vesicular tissue. (Rumack 2010)

The multicystic appearance of hydatidiform mole has been coined the "bunch of grapes" appearance whereas the more echogenic TAS appearance of the molar tissue has been dubbed the "snowstorm appearance". The snowstorm description was initially based on the appearance of the molar tissue imaged with higher technology. The use of this terminology persists today however the application of the term is less relevant. Larger, irregular sonolucent areas may also be seen and represent areas of hemorrhage or maternal lakes in the surrounding decidua.(Rumak 2010)
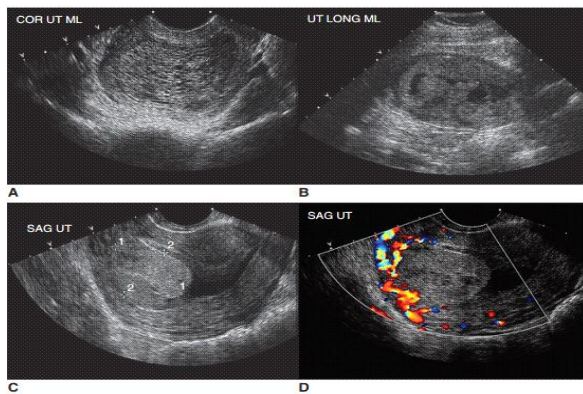
Figure(2-8) A through **D,** Transvaginal coronal and sagittal image of the pregnant uterus in a patient who presented larger than appropriate for dates and with bleeding. The uterus is filed with tiny grapelike clusters of tissue, which represent a hydatidiform mole\(Rumak 2010)

2-5.previous studies:

study done in Sudan in period from October 2015 to January 2016,by Monzir Abdelrahman Ahmed Ali to assess first trimester pregnancy with vaginal bleeding by using gray scale ultrasound to determine which type of abnormality associated with vaginal bleeding and to correlate between the patient history with ultrasound finding. The study found that the most of patient have abortion (84.68%) followed an embryonic gestation sac (7.21%), followed by an ectopic pregnancy (5.41%) and least common is the trophoplastic diseases (2.7%).The most women age group complains of

vaginal bleeding are between 25to 35years of age followed by that less than 25year then that more than 35year. The most group complains of vaginal bleeding is multipara followed by grand multipara and least group is primigravida. Pelvic pain presented in all patients with ectopic pregnancy, then in more than halve cases of abortion then in anembryonic gestational sac and least common in trophoplatic diseases. Past history of abortion and cesarean section haven't diagnostic relationship to the first trimester vaginal bleeding.

Another study done by Manal Alnour Osman in 2007, the role of ultrasound in diagnosis of vaginal bleeding during pregnancy, found that ,the ultrasound has a high accuracy in finding the cause of vaginal bleeding in first trimester where the abortion is the commonest cause and ectopic pregnancy is the least one. The range of group accumulation for vaginal bleeding is (20-40 years)

Another paper done by Adi Y. Weintraub and Eyal Sheiner, Early Pregnancy Loss, in janary2011 they reported that the Spontaneous abortions are among the most common complications of pregnancy .Many risk factors for spontaneous abortion, including advanced maternal age and a previous spontaneous abortion, have been reported. Most spontaneous abortions are attributed to structural or chromosomal abnormalities in the embryo there are various stages and types of spontaneous abortions. Women usually present with a history of amenorrhea, vaginal bleeding, and pelvic pain.

Chapter Three

Materials and Method

3-1. Materials:

3-1-1Machine:

The study was conducted in enhud town in western kordofan state government hospitals and private clinics in which pregnant women patients came for obstetrical ultrasound complains of vaginal bleeding in first trimester. The duration of the study from june2016 to September 2016.

Different marks of ultrasound machines was used in this study which are Sonoscape portable ultrasound machine model 20 made in China in 2014, with multiple frequencies endovaginal and curvilinear probes with frequency 2.8-6 mega hertz,6-15mega hertz as well as Mind ray –20made in 2012 ultrasound machine made in china with multiple frequency four probes which has variable focal zone and frequency capability and ,all the previous machines have capability of Doppler.

3-1-2. Population of the study:

Any women with positive hCG referred for obstetric ultrasound complain of vaginal bleeding in the first trimester. The target population of this study had 67 pregnant patients with vaginal bleeding in the first trimester. Any pregnant women in first trimester of pregnancy complain of vaginal bleeding..Exclusive criteria, any pregnant woman in second and third trimester, any woman with vaginal bleeding and negative hCG.

The choice of probe frequency is dependent on the fact that higher frequencies give greater resolution in the near field , but their depth range is limited. For example ,a7.5 MHZ probe give high resolution image within range up to 5 cm, where as a 5MHZprobe give image structure range 3-10 cm. So the selection of the transducer depend on the depth of the be examined. the   higher probe frequency used to examine the superficial structure ,where the low frequency probe used to examine the deep part under examination.
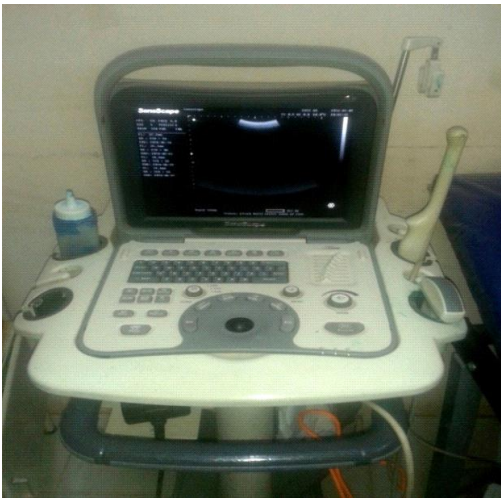

Fig.(3-1): Sonoscape portable ultrasound machine model 20.

3-2Method:

3-2-1. Sonographic Technique:

The scanning of   early pregnancy   performed using transvaginal or abdominal probes.

3-2-1-1Transvaginal method (TVS):

This is the preferred method for imaging an early pregnant uterus. The preparations required for a transvaginal examination are, empty bladder ,Apply a small amount of gel to the transducer tip and cover the tip and shaft of the probe with a (non-spermicidal) condom embryo and/or sac are recorded. The presence or absence of cardiac activity is documented. Fetal number is documented and chorionicity is assessed in multiple pregnancies. The uterus, adnexal structures, and cul-de-sac are evaluated.

Apply a small amount of gel.

3-2.1-2Transabdominal method (TAS):

The woman must have a full bladder. This has three effects: first, it pushes the uterus out of the pelvis, thus removing it from the acoustic shadow caused by the symphysis pubis; second, it provides an acoustic window through which the pelvic organs can be visualized; third, it displaces the bowel superiorly, so preventing gas from the bowel scattering the ultrasound beam.

3-2-2. Method of data analysis:

The data was analyzed by using Statistical Packaged for Social Studies (SPSS) by using the various statistics computerize methods.

3-2-3 Data presentation:

The data presented in shape of tables and figures of columns.

3-2-4. Ethical clearance:

The procedures of the scanning with ultrasound are explained to the patient and the purpose of incorporating her data in the study, with verbal consent was taken before scanning. No individual patient information should be at this study

Chapter Four

Results

Table (4-1) Shows distribution of patients with respect to age:

	Frequency	Percent
Less than 20 Years	4	6.0
20-25 Years	16	23.9
26-30 Years	17	25.4
31-35 Years	21	31.3
36-40 Years	6	9.0
More than 40 Years	3	4.5
Total	67	100.0
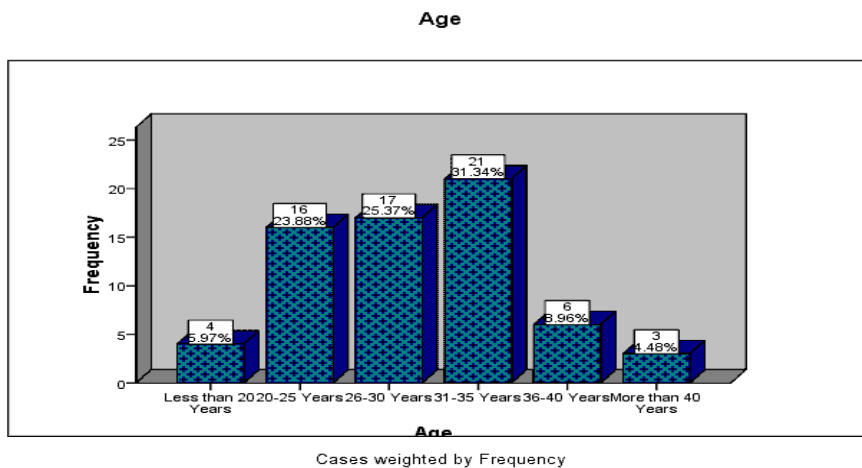
Figure (4-1) **distribution of participants with respect to age**

Table (4-2) distribution of patients with respect to occupation:

		Frequency	Percent
	House Wife	45	67.2
	Employed Wife	22	32.8
	Total	67	100.0

:
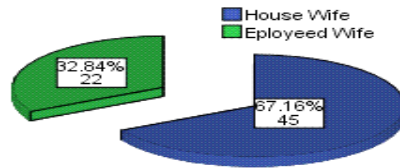
Cases weighted by Frequency

figure (4.2) distribution of patients with respect to occupation

Table (4-4): Frequency distribution of patient according type of U\S finding

Type of abortion	Frequency	Percent
Incomplete abortion	32	47.68%
Threatened abortion	11	16.39%
Missed abortion	20	29.8%
Blighted ovum	2	2.98%
Trophoblastic disease	1	1.49%
Ectopic pregnancy	1	1.49%
Total	67	100

Table (4-5) distribution of patients with respect to Number of Gravid

		Frequency	Percent
	Primigravida	14	20.9
	Multipara	27	40.3
	Grand multipara	26	38.8
	Total	67	100.0
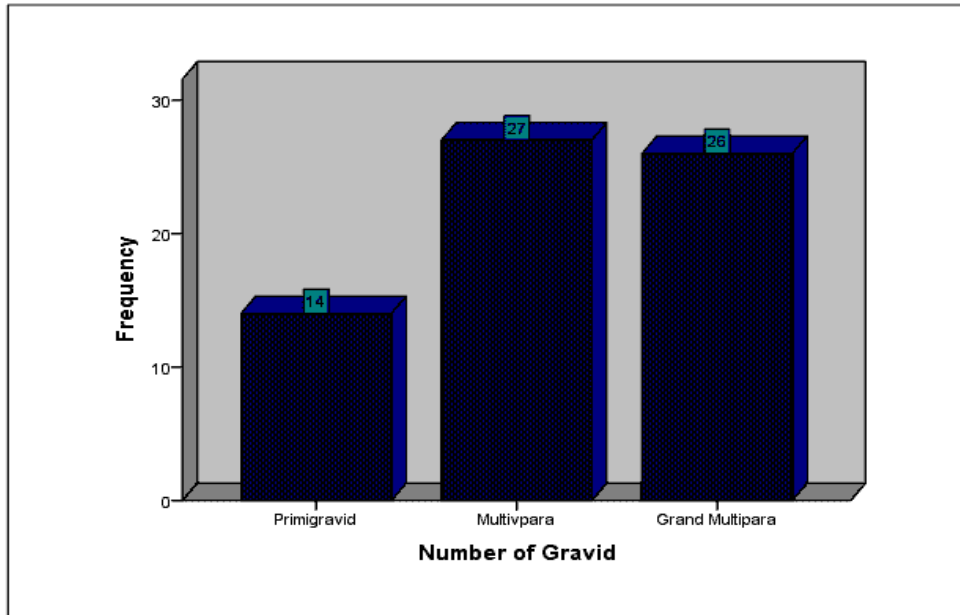
Cases weighted by Frequency

figure (4-3) distribution of patients with respect to Gravid:

Table (4-6) Association between Bleeding and Number Gravid:

			Number of Gravid			Total
			Primigravida	Multipara	Grand multipara	
Bleeding	Incomplete Abortion	Count	5	13	14	32
		%within Abortion	15.6%	40.6%	43.8%	100.0%
	Threatened	Count	3	5	3	11
		% within Abortion	27.3%	45.5%	27.3%	100.0%
	Missed Abortion	Count	6	7	7	20
		% within Abortion	30.0%	35.0%	35.0%	100.0%
	Blighted Ovum	Count	0	2	0	2
		% within Abortion	.0%	100.0%	.0%	100.0%
	Trophoblastic Disease	Count	0	0	1	1
		% within Abortion	.0%	.0%	100.0%	100.0%
	Ectopic Pregnancy	Count	0	0	1	1
		% within Abortion	.0%	.0%	100.0%	100.0%
Total		Count	14	27	26	67
		% within Abortion	20.9%	40.3%	38.8%	100.0%

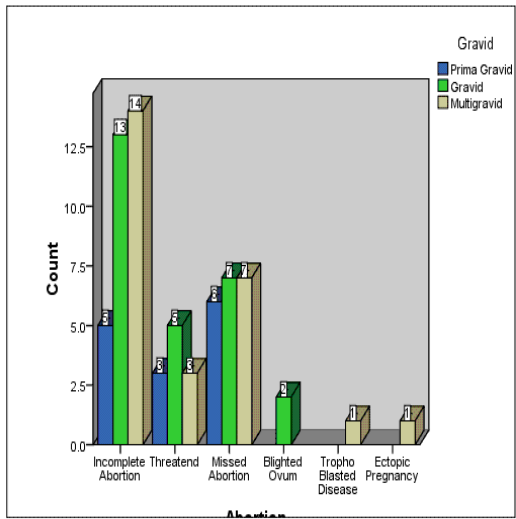|	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.416	10	.588
Likelihood Ratio	9.690	10	.468
a. 13 cells (72.2%) have expected count less than 5. The minimum expected count is .21.			

Figure (4-4) Association between Bleeding and number of Gravid:

Table (4-7) Association between Bleeding and Age

			Age						
			Less than 20 Years	20-25 Years	26-30 Years	31-35 Years	36-40 Years	More than 40 Years	Total
Bleeding	Incomplete Abortion	Count	1	10	9	10	2	0	32
		% within Abortion	3.1%	31.2%	28.1%	31.2%	6.2%	.0%	100.0%
	Threatened	Count	1	2	1	3	3	1	11
		% within Abortion	9.1%	18.2%	9.1%	27.3%	27.3%	9.1%	100.0%
	Missed Abortion	Count	2	4	7	5	0	1	19
		% within Abortion	10.5%	21.1%	36.8%	26.3%	.0%	5.3%	100.0%
	Blighted Ovum	Count	0	0	0	1	1	0	2
		% within Abortion	.0%	.0%	.0%	50.0%	50.0%	.0%	100.0%
	Trophoblastic Disease	Count	0	0	0	1	0	1	2
		% within Abortion	.0%	.0%	.0%	50.0%	.0%	50.0%	100.0%
	Ectopic Pregnancy	Count	0	0	0	1	0	0	1
		% within Abortion	.0%	.0%	.0%	100.0%	.0%	.0%	100.0%
Total		Count	4	16	17	21	6	3	67
		% within Abortion	6.0%	23.9%	25.4%	31.3%	9.0%	4.5%	100.0%

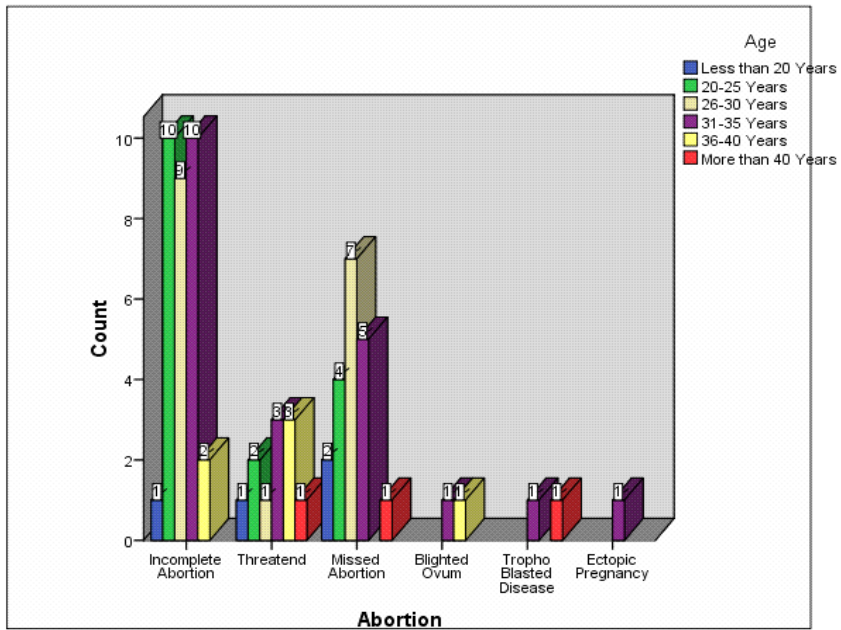|	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	30.853	25	.194
Likelihood Ratio	26.911	25	.360
a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .04.			

Figure (4-5) Association between Bleeding and Age

Table (4-8) Association between Bleeding and Occupation:

|			Occupation		
			House Wife	Employed Wife	Total
Bleeding	Incomplete Abortion	Count	25	7	32
		% within Abortion	78.1%	21.9%	100.0%
	Threatened	Count	5	6	11
		% within Abortion	45.5%	54.5%	100.0%
	Missed Abortion	Count	13	7	20
		% within Abortion	65.0%	35.0%	100.0%
	Blighted Ovum	Count	0	1	1
		% within Abortion	.0%	100.0%	100.0%
	Trophoblastic Disease	Count	1	1	2
		% within Abortion	50.0%	50.0%	100.0%
	Ectopic Pregnancy	Count	1	0	1
		% within Abortion	100.0%	.0%	100.0%
Total		Count	45	22	67
		% within Abortion	67.2%	32.8%	100.0%
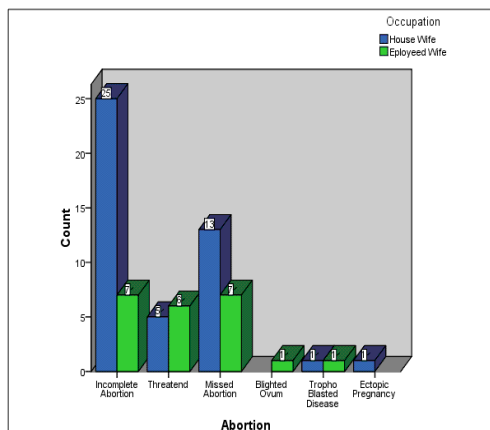
Figure (4-6) Association between Bleeding and number of Gravid:

Chapter Five

Discussion ,Conclusions, and Recommendations

5-1Discussion:

This   is analytic, descriptive and practical study   includes 67 pregnant women attended to ultrasound clinic at area of study in southern kordofan in Elnhud town, during period extended from June to September2016 and total of 67 patient with vaginal bleeding in first trimester was scanned by ultrasound to evaluate the causes of vaginal bleeding.

Regarding table (4-1)distribution of patient with respect to age ,the study found most of pregnant women with vaginal bleeding (31.3 %)of age between 31-35 years, and least one(4.5 %) aged over 40 years.

Regarding table (4-4) of frequency distribution of patient according the type of ultrasound finding the study shows the most type of vaginal bleeding is spontaneous abortion(93%)followed by blighted ovum (2.98%) and least one were   trophoblastic disease and ectopic pregnancy (2.98%),also the most type of spontaneous abortion was incomplete abortion (47%)and least missed abortion (16.39%) .

Regarding table (4-5) and figure(4-3) distribution of patient with respect to number of gravid the study found most patient with vaginal bleeding were multipara (40.3%) followed by grand multipara (38.8 %)and least were primigravida (20.9%)

Regarding table(4-2) and figure(4-2) distribution of patient with respect to occupation   the study found   most of pregnant women with vaginal bleeding were house wife (67%) while employed women (33%).

Notes from the table (4-7) and figure (4-5) Association between Bleeding and number of Gravid, that (15.6%) of incomplete abortions cases were Primigravida, since (40.6%) of them were Multipara and (43.8%) of them were Grand multipara.(27.3%) of Threatened abortions cases were Primigravida, since (45.5%) of them were Multipara and (27.3%) of them were Grand multipara.(30%) of Missed Abortion cases were Primigravida, since (35%) of them were Multipara and (35%) of them were Grand multipara. all(100%) of Blighted Ovum cases were Multipara. all(100%) of Trophoblastic Disease and Ectopic Pregnancy cases were Grand multipara. The significance of the test statistics were (0.588, 0.468) respectively for Chi-Square and Likelihood Ratio, Greater than the level of significance of 0.05.

Notes from the table (4-6) and figure (4-4) Association between Bleeding and Age above, that only (3.1%) of incomplete first trimester Bleeding cases were less than 20 years, since the most (31.2%) of them were 20-25 years old or 31-35 and (28.1%) of them were 26-30 years old, while only (6.2%) of them were 36-40 years old.(9.1%) of Threatened cases were less than 20 , 26-30 or more than 40 years old , since (18.2%) of them were 20-25 years old, while the most (27.3%) of them were 31-35 or 36-40 years old.(10.5%) of Missed Abortion cases were less than 20 years old , since (21.1%) of them were 20-25 years old, while the most (36.8%) of them were 26-30 years old, (26.3%) of them were 31-35 and only (5.3%) of them more than 40 years old.(50%) of Trophoblastic Disease cases were 31-35 years old and (50%) of them 36-40 years old.(50%) of Blighted Ovum cases were 31-35 years old and (50%) of them more than 40 years old . All (100%) of Ectopic Pregnancy cases were 31-35 years old.

The significance of the test statistics were (0.194, 0.364) respectively for Chi-Square and Likelihood Ratio, Greater than the level of significance of 0.05.

The hypothesis that differences in "First Trimester Bleeding" is related to differences in "Age" is not supported and First Trimester Bleeding is independent on age.

The hypothesis that differences in "First Trimester Bleeding" is related to differences in "number of gravid" is not supported and First Trimester Bleeding is independent on number of gravid.

Notes from the table (4-8) and figure (4-6) Association between Bleeding and Occupation the most (78.1%) of incomplete abortions cases were House Wives, while (21.9%) of them were Employed Wives.(45.5%) of Threatened cases were House Wives, while (54.5%) of them were Employed wives . The most (65%) of Missed Abortion cases were House Wives, while (35%) of them were Employed Wifes.All (100%) of Blighted Ovum were house wifes. (50%) ofTrophoblastic Disease cases were House Wifes, while (50%) of them were Employed Wives. All (100%) of Ectopic Pregnancy cases were House Wives. Regarding the table and figure of data analysis chi-square and likely hood ratio conclude there is no association between the vaginal bleeding and number of gravid or ,age or occupation.

From these point above I can saw my study agree with Manal Alnour , adiY & ayl and monzer abdelrahman in their previous studies.

5-2 Conclusion

Regarding the table of data analysis we can observe that:

In incomplete abortion case 43% were grand multipara and lesst cases in primigravida 15%, higher in age 20-25 and least in age 36-40 years In threatened   abortion 45% of case were house wife multi para ,while 27% primigravida ,aged 31-35yrsand least 20-25yrs 9.1%.

In missed abortion higher were multipara, and least primigravida 30%with aged 26-30 yrs and least aged less than 20 yrs 5.3%.

In blighted ovum ,trophoblastic disease higher in grand multipara aged 31-35 yrs ,and least in 40yrs.

The most incomplete ,missed abortion, blighted ovum and ectopic pregnancy were house wife ,while 54% of threatened abortion were employed.

5-3 Recommendation:

The Routine early ultrasound scan for pregnant women is highly recommended following the international guidelines and protocols.

The government should offer the facilities to encourage the establishing of ultrasound machines over all obstetrical clinical centers for earlier detection of vaginal bleeding cause.

More advanced ultrasound equipment's (high frequency transvaginal probe and Doppler facilities) should be used to reduce the false positive and false negative result.

Another research studies should be done with expanding period of time and include more sample data for precise and accurate results.

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