

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**Sudan University of Science and Technology**  
**College of Graduate Studies**

**Assessment the causes of Vaginal Bleeding in First  
Trimester using Ultrasonography**

A thesis Submitted for Partial Fulfillment of the Requirements of  
MS.c Degree in Medical Diagnostic Ultrasound.

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# الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

(يَا أَيُّهَا النَّاسُ إِنَّ كُنْتُمْ فِي رَيْبٍ مِّنَ الْبَعْثِ فَإِنَّا خَلَقْنَاكُمْ مِّنْ تُرَابٍ ثُمَّ مِمِّنْ نُطْفَةٍ ثُمَّ مِمِّنْ عَلَقَةٍ ثُمَّ مِمِّنْ مُضْغَةٍ مُخَلَّقَةٍ وَغَيْرِ مُخَلَّقَةٍ لِّنُبَيِّنَ لَكُمْ وَنُقَرُّ فِي الْأَرْحَامِ مَا نَشَاءُ إِلَىٰ أَجَلٍ مُّسَمًّى ثُمَّ نُخْرِجُكُمْ طِفْلًا ثُمَّ لِتَبْلُغُوا أَشُدَّكُمْ وَمِمِّنْكُمْ مَّنْ يَمُوتُ وَمِمِّنْكُمْ مَّنْ يَرُدُّ إِلَىٰ أَرْذَلِ الْعُمُرِ لِكَيْلَا يَعْلَمَ مِنْ بَعْدِ عِلْمٍ شَيْئًا وَتَرَى الْأَرْضَ هَامِدَةً فَإِذَا أَنزَلْنَا عَلَيْهَا الْمَاءَ اهْتَزَّتْ وَرَبَتْ وَأُنبَتَتْ مِنْ كُلِّ

﴿٥﴾ زُوجٍ رَّابِحٍ

صدق الله العظيم

سورة الحج الآية (5)

# Dedication

*To my parents....*

*To my whole family....*

*To my friends....*

*To students and their teachers....*

*We can't tell you how thankful*

*we're for our little infinity...*

## Acknowledgement

*I would like to thank Allah for enabling us to undertake this graduate research programming.*

*I'm very Thankful to our Dr. Babiker Abd Alwahab for his guidance and mentorship during this research project, I totally sure that this work would have never become truth, without her guidance.*

*Thanks to my family for their generous support they provided me throughout my entire life.*

*Last but not least, deepest thanks go to all people who took part in making this thesis real.*

## **Abstract**

This was a retrospective cross sectional study which conducted in ultrasound department of Omdurman maternity hospital from August 2017 to January 2018, Khartoum- Sudan.

The study discussed assess of vaginal bleeding causes in first trimester and pregnancy outcome using Transabdominal and Transvaginal Ultrasonography.

A total of “50” patients were selected randomly; all those patients had age between twenty three and twenty seven years, had pregnancy in first trimester with bleeding, any single female and that had normal pregnancy or pregnancy in second and third trimester was excluded from this study.

All patients were subjected to be examined by U/S scanning using Eucup 7 and General Electric scanners with 3,5MHz probe.

Data was collected using a data collecting sheet and in data analysis the author uses the crsstabulation, linear regregation and discriminant analysis.

Study showed that the causes of vaginal bleeding in first trimester were incomplete abortion 32%, threated abortion 32%, complete abortion 22%, ectopic pregnancy 6%, inevitable abortion 2%, missed abortion 2% and molar pregnancy 2%.

Study concluded that vaginal bleeding in the first trimester was common occurs in gestational age between 5 to 8 week and affected age group was 23-27 years, mainly in the housewife.

Further studies should be carried out in this field on many aspects such as increasing the number of patients, to show the relation between vaginal bleeding and maternal diseases, comparing between the role of U/S scanning and other diagnostic tools, using color Doppler ultrasonography.

## مستخلص الدراسة

أقيمت هذه الدراسة المقطعية بأثر رجعي في قسم الموجات الصوتية بمستشفى امدرمان للولادة من أغسطس 2017 إلى يناير 2018 بولاية الخرطوم\_السودان.

هدفت الدراسة إلي تقييم أسباب النزيف المهبلي في الثلث الأول من الحمل، وحصيلة الحمل باستخدام تخطيط الصدى عبر البطن والمهبل.

أجريت الدراسة على 50 مريضة، تم اختيارهن عشوائيا، تراوحت أعمارهم بين (23\_27)، جميعهن في الثلث الأول من الحمل ولديهن نزيف مهبلي. تم استثناء كل أنثى ذات حمل طبيعي أو كانت في الثلث الثاني أو الثالث من الحمل من هذه الدراسة.

تم فحص كل المريضات بالأشعة فوق الصوتية باستخدام (Eurocup 7) و ماسح جنرال الكترك و مسبار بتردد 3.5 ميغاهيرتز.

جمعت البيانات باستخدام ورقة جمع البيانات، ولتحليل البيانات تم استخدام الجداول المتقاطعة والتجميع الخطي والتحليل التمييزي.

أوضحت الدراسة أن أسباب النزيف المهبلي في الثلث الأول من الحمل كانت: الإجهاض بنسبة 32%، حمل معرض للإجهاض بنسبة 32%، إجهاض تام بنسبة 22%، حمل خارج الرحم بنسبة 6%، الإجهاض المحتم بنسبة 2%، الإجهاض الصامت بنسبة 2%، الحمل العنقودي 2%.

خلصت الدراسة إلى أن النزيف المهبلي في الثلث الأول من الحمل شائع بين الأسبوع الخامس والثامن من الحمل، والمجموعة العمرية المتأثرة بالنزيف المهبلي تتراوح أعمارهن بين 23 و 27 عاما.

يوصي الباحث بإجراء المزيد من الدراسات في هذا الحقل. من المجالات التي يمكن ان تم فيها المزيد من الدراسات والأبحاث العلمية: العدد المتزايد للمرضى، دراسة العلاقة بينت النزيف المهبلي وأمراض الولادة، دراسة دور الموجات فوق الصوتية كأداة تشخيصية مقارنة بالأدوات التشخيصية الأخرى، استخدام تخطيط الصدى الملون.

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# **Chapter One**

Introduction

# **Introduction**

## **1.1 Introduction:**

Diagnostic ultra sound was first applied to obstetrics and gynecology in 1958 by Donald and associates, early diagnosis of normal intrauterine pregnancy is reassuring to the patient and diagnosis of miss abortion, ectopic pregnancy is reassuring to the patient and diagnosis of miss abortion, hydatidiform mole and ectopic pregnancy will reduce the stay in hospital.

Vaginal bleeding during pregnancy is very serious complication and it is the main cause of iron deficiency anemia.

The use of ultra sound machine in investigation very important because does not involve any risk to the mother or fetus and can be repeated without discomfort and also noninvasive.

Vaginal bleeding during pregnancy is any discharge of blood from the vagina, it can happen any time from conception (when the ovum is fertilized) to the end of pregnancy.

Bleeding during early pregnancy is most frequently due to abortion, ectopic pregnancy and hydatidiform mole. Ultrasound can determine with accuracy if the pregnancy is intrauterine or ectopic, if the fetus is alive or dead and if the gestational sac appears to be normal or abnormal.

The difference between bleeding and spotting: spotting is when you notice a few drops of blood every now and then on your underwear. It is not even enough to cover a panty liner. Bleeding is a heavier flow of blood. With bleeding you will need a liner or pad to keep the blood from soaking your clothes.

## **1.2 problem statement:**

Vaginal bleeding have high incidence in the first trimester all such causes need urgent diagnosis because of the severe outcome, if the problem is not detected early, ultrasound give accurate evaluation of early pregnancy complication.

### **1.3 objective of the study:**

#### **1.3.1 General objective:**

- To assess the cause of vaginal bleeding in the first trimester and pregnancy outcome.

#### **1.3.2 Specific objectives:**

- To evaluate accuracy of U/S in detection of vaginal bleeding.
- To show vaginal bleeding causes.
- To demonstrate the most causes of vaginal bleeding in first trimester.
- To show any association with other gynecological causes.

# **Chapter Two**

Literature Review

## **Literature review & previous studies**

### **2.1 Anatomy:**

The female pelvic organs are divided into two types: internal genital organs and external genital organs. The genital organs include:

#### **2.1.1 Uterus:**

##### **2.1.1.1 Location and Description:**

The uterus is a hollow, pear-shaped organ with thick muscular walls. In the young nulliparous adult, it measures 3 in. (8 cm) long, 2 in. (5 cm) wide, and 1 in. (2.5 cm) thick. It is divided into the fundus, body, and cervix. The fundus is the part of the uterus that lies above the entrance of the uterine tubes. The body is the part of the uterus that lies below the entrance of the uterine tubes. The cervix is the narrow part of the uterus. It pierces the anterior wall of the vagina and is divided into the supra vaginal and vaginal parts of the cervix. (Ric HARD.S.snell, 2009)

##### **2.1.1.2 Relations:**

In anteriorly the body of the uterus is related anteriorly to the utero vesical pouch and the superior surface of the bladder. The supra vaginal cervix is related to the superior surface of the bladder. The vaginal cervix is related to the anterior fornix of the vagina. In posteriorly the body of the uterus is related posteriorly to the recto uterine pouch (pouch of Douglas) with coils of ileum or sigmoid colon within it. In laterally the body of the uterus is related laterally to the broad ligament and the uterine artery and vein. The supra vaginal cervix is related to the ureter as it passes forward to enter the bladder. The vaginal cervix is related to the lateral fornix of the vagina. The uterine tubes enter the super lateral angles of the uterus and the round ligaments of the ovary and of the uterus are attached to the uterine wall just below this level. (Ric HARD.S.snell, 2009)

##### **2.1.1.3 Positions of the Uterus:**

In most women, the long axis of the uterus is bent forward on the long axis of the vagina. This position is referred to as ante version of the uterus.

Furthermore, the long axis of the body of the uterus is bent forward at the level of the internal os with the long axis of the cervix. This position is termed ante flexion of the uterus. Thus, in the erect position and with the bladder empty, the uterus lies in an almost horizontal plane. (Ric HARD.S.snell, 2009)

#### **2.1.1.4 Blood Supply:**

The arterial supply to the uterus is mainly from the uterine artery, a branch of the internal iliac artery. It reaches the uterus by running medially in the base of the broad ligament. It crosses above the ureter at right angles and reaches the cervix at the level of the internal os. The artery then ascends along the lateral margin of the uterus within the broad ligament and ends by anastomosing with the ovarian artery, which also assists in supplying the uterus. The uterine artery gives off a small descending branch that supplies the cervix and the vagina. The uterine vein follows the artery and drains into the internal iliac vein. The lymph vessels from the fundus of the uterus accompany the ovarian artery and drain into the Para-aortic nodes at the level of the first lumbar vertebra. The vessels from the body and cervix drain into the internal and external iliac lymph nodes. A few lymph vessels follow the round ligament of the uterus through the inguinal canal and drain into the superficial inguinal lymph nodes. Sympathetic and parasympathetic nerves from branches of the inferior hypo gastric plexuses. (Ric HARD.S.snell, 2009).

#### **2.1.1.5 Supports of the Uterus:**

The uterus is supported mainly by the tone of the levatores ani muscles and the condensations of pelvic fascia, which form three important ligaments.

#### **2.1.1.6 Uterus in the Child:**

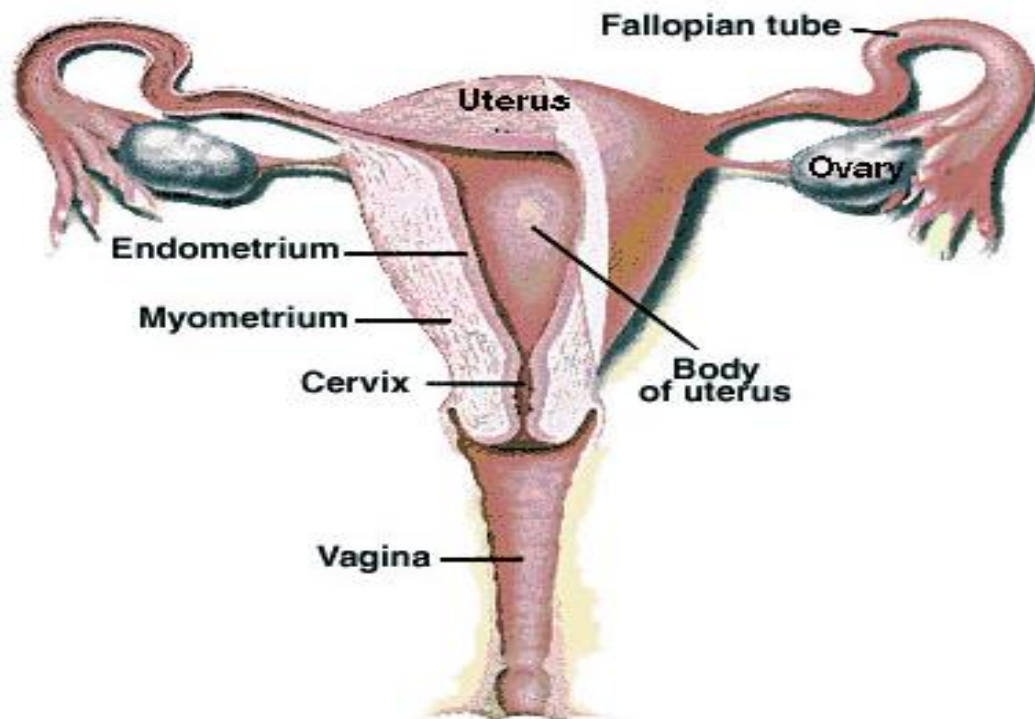
The fundus and body of the uterus remain small until puberty, when they enlarge greatly in response to the estrogens secreted by the ovaries. (Ric HARD.S.snell, 2009)

### **2.1.1.7 Uterus after Menopause:**

After menopause, the uterus atrophies and becomes smaller and less vascular. These changes occur because the ovaries no longer produce estrogens and progesterone. (Ric HARD.S.snell, 2009)

### **2.1.1.8 Uterus in Pregnancy:**

During pregnancy, the uterus becomes greatly enlarged as a result of the increasing production of estrogens and progesterone, first by the corpus luteum of the ovary and later by the placenta. At first it remains as a pelvic organ, but by the third month the fundus rises out of the pelvis, and by the ninth month it has reached the xiphoid process. The increase in size is largely a result of hypertrophy of the smooth muscle fibers of the myometrium, although some hyperplasia takes place. (Ric HARD.S.snell, 2009)



**Fig (2.1):** show the Anatomy of the uterus (Ric HARD.S.snell, 2009)



### **2.1.2 Uterine Tube:**

#### **2.1.2 Location and Description:**

The two uterine tubes are each about 4 in. (10 cm) long and lie in the upper border of the broad ligament. Each connects the peritoneal cavity in the region of the ovary with the cavity of the uterus. The uterine tube is divided into four parts: the infundibulum is the funnel-shaped lateral end that projects beyond the broad ligament and overlies the ovary. The free edge of the funnel has several fingerlike processes, known as fimbriae, which are draped over the ovary. The ampulla is the widest part of the tube. The isthmus is the narrowest part of the tube and lies just lateral to the uterus. The intramural part is the segment that pierces the uterine wall. (Ric HARD.S.snell, 2009)

#### **2.1.2.2 Blood Supply:**

The uterine artery from the internal iliac artery and the ovarian artery from the abdominal aorta. The veins correspond to the arteries. In lymph drainage the internal iliac and Para-aortic nodes. The nerve supply is Sympathetic and Para sympathetic nerves from the inferior hypo gastric plexuses. (Ric HARD.S.snell, 2009)

### **2.1.3 Ovary:**

#### **2.1.3.1 Location and Description:**

Each ovary is oval shaped, measuring 1.5 by 0.75 in. (4 by 2 cm), and is attached to the back of the broad ligament by the Mesovarium. That part of the broad ligament extending between the attachment of the mesovarium and the lateral wall of the pelvis is called the suspensory ligament of the ovary. The round ligament of the ovary, which represents the remains of the upper part of the gubernaculum, connects the lateral margin of the uterus to the ovary. The ovary usually lies against the lateral wall of the pelvis in a depression called the ovarian fossa, bounded by the external iliac vessels above and by the internal iliac vessels behind. The position of the ovary is, however, extremely variable and it is often found hanging down in the recto uterine pouch (pouch of Douglas). During pregnancy, the enlarging uterus pulls the ovary up into the

abdominal cavity. After childbirth, when the broad ligament is lax, the ovary takes up a variable position in the pelvis. The ovaries are surrounded by a thin fibrous capsule, the tunica albuginea. This capsule is covered externally by a modified area of peritoneum called the germinal epithelium. The term germinal epithelium is a misnomer because the layer does not give rise to ova. Oogonia develop before birth from primordial germ cells. Before puberty, the ovary is smooth, but after puberty, the ovary becomes progressively scarred as successive corpora lutea degenerate. After menopause, the ovary becomes shrunken and its surface is pitted with scars. (Ric HARD.S.snell, 2009)

### **2.1.3.2 Blood Supply:**

The ovarian artery arises from the abdominal aorta at the level of the first lumbar vertebra. The ovarian vein drains into the inferior vena cava on the right side and into the left renal vein on the left side. The lymph vessels of the ovary follow the ovarian artery and drain into the Para-aortic nodes at the level of the first lumbar vertebra. The nerve supply to the ovary is derived from the aortic plexus and accompanies the ovarian artery. (Ric HARD.S.snell, 2009)

### **2.1.4 Vagina:**

#### **2.1.4.1 Structure:**

The shape is somewhat variable, determined by the integrity of attachment to the pelvic wall, the anterior vaginal wall is short than the posterior wall by approximately 3 centimeters. The cervix fills the 3 centimeters difference in the anterior wall, the middle of the front and back wall is normally in opposition, resulting in an “H” shape in cross-section of the vagina, the lower portion of the vagina is constricted by the levator ani muscles. Thus, the upper portion has a greater diameter, fixation of the lower third of the vagina by the levator muscles result in a 120 degree angle between the axis of the lower third and the axis of the upper two thirds (posterior tilt), the vaginal rugal folds contribute to elasticity. There is a significant variation in size, based upon age, estrogen effect, parity and genetics, the vaginal length typically ranges from 7 to 10 cm.

#### **2.1.4.2 Landmarks:**

The cervix is in the upper portion of anterior vaginal wall. The middle ridge that extends the length of both walls is called the anterior or posterior column. The anterior column is identified as the urethral carina in the area of the bladder.

There is variation in how far externally the urethral meatus is located. Typically the urethral meatus is directed outward at the level of the hymen, but in possibly 40% of women the urethral meatus is directed into outermost of the vagina.

The space in front of or behind the cervix is the anterior or posterior fornix,

The longitudinal folds along the vaginal sidewalls are the anterior and posterior lateral vaginal sulci.

#### **2.1.4.3 Support:**

The lower third of the vagina is support by the levator muscles in the pelvic diaphragm and by the fibers of Luschka (fibers of the pubococcygeus muscle).

The middle third is supported laterally by a fibrous attachment to the arcuate line, or arcus tendineus that has importance in the paravaginal suspension surgical procedure. The rectum supports the middle of the posterior vaginal wall, upon which the middle of the anterior vaginal wall rests. The anterior vaginal wall supports the mid-portion of the bladder. Endo pelvic fascia in the adventitia layer of the upper third of the vagina is confluent with the fascia of the cervix, so the cardinal and uterosacarl ligaments that support the cervix provide significant support for the upper third of the vagina as well. This facial layer also blends with the rectal and vesical fascia. **(Ric HARD.S.snell, 2009)**

#### **2.1.4.4 Blood supply:**

The vaginal vascular supply courses laterally from the cardinal ligaments through the Para vaginal suspensory ligaments to the vagina. The main arterial supply (especially to the anterior vagina) is the vaginal branch of the internal pudendal artery, typically with anastomoses from the uterine, inferior vesical and middle rectal arteries. A second vaginal artery that mainly supplies the posterior vaginal wall may arise from the internal iliac artery, proximal to the uterine artery. A vaginal arterial plexus extends to a midline vaginal artery in the

anterior and in the posterior vaginal wall. The venous plexus of Santorin is present in the fibrous layer of the vagina and communicates through the cardinal ligaments with the venous system of the bladder, rectum and Para vaginal tissues (the vesico vaginal plexus). (Ric HARD.S.snell, 2009)

#### **2.1.4.5 Nerves:**

The vagina has several parallel nerve systems. The most important nerve groups are the pudenda nerve, which has chiefly S2-4 derivation and the inferior hypogastric plexus (also S2-4), There are two main categories of the nerves (i.e. somatic and visceral), both with afferent and efferent fibers:

Somatic supply is mainly to the lower portion of the vagina. Afferent or sensory supply to the skin and subcutaneous tissue of the lower 2/3 of the vagina is the pudenda nerve. This distribution corresponds with the embryology origin of this portion of the vagina from the urogenital sinus, Parietal peritoneum in the pouch of Douglas (cul-de-sac) is sensitive to trauma and inflammation in a manner characteristic of a peritoneal somatic afferent nerve response, but it is supplied by the visceral afferent nerves of the utero vaginal plexus and also demonstrates characteristic visceral sensitivity to stretch and spasm and afferent (motor) Somatic supply is not significant in the vaginal wall since there is no striated muscle but efferent supply largely from the pudenda nerve controls the levator muscles that provide support and influence function of the lower third of the vagina. (Ric HARD.S.snell, 2009)

Visceral nerve supply is significant for the upper vagina, musculature and gland. All pelvic visceral nerve fibers course in the end pelvic fascia beneath the pelvic parietal peritoneum. These nerves arise from the inferior hypogastric plexus, which gives rise to three other divisions. One division is the utero vaginal plexus (Frankenhausers plexus-mainly consisting of S2-4) around the ureter and uterine artery. Fibers from the utero vaginal plexus accompany the vaginal artery and vein to the vagina: Afferent fibers transmit interceptive, noxious stimuli from the peritoneum at the pouch of Douglas and from the cervix and upper 1/3 of the vagina to nerve roots S2-4, consistent with the Mullerian

embryologic origin of these structures, efferent fibers supply smooth muscle and glands. A autonomic Sympathetic nerves constrict smooth muscle of the arteries and arterioles. Sympathetic nerve fibers from T1-L2 accompany sacral nerves of the hypo gastric plexus, non-parasympathetic fibers have been described in association with the pelvic arteries and arterioles. The chief importance of vaginal parasympathetic efferent fibers (S2-4) is to mediate sexual response in the lower portion of the vagina. Parasympathetic fibers are found in the pudendal nerve and in the inferior hypo gastric plexus and visceral motor fibers control vaginal wall smooth muscle and glands.

#### **2.1.4.6 Lymphatic immune:**

Lymphatic drainage is to the Para-aortic nodes, Non intraepithelial immune cells are present in the normal state, but Langerhans's cells in the area of the basement membrane migrate to a site of inflammation.

#### **2.1.4.7 Epithelium:**

**Layers:** the mucosa consists of non-keratinized stratified squamous epithelium, the sub mucosa is equivalent to the dermis at other body sites, the muscular is somewhat interspersed with the sub mucosa and adventitia, the high content of elastin in the adventitia contributes to elasticity of vagina. This layer of variable thickness in an extension of the end pelvic fascia that provides some degree of support for all of the pelvic organs. A serosa (peritoneal layer) is only present in the cul-de-sac, or pouch of Douglas, behind the uterus.

**Glands:** bartholin's glands are identified at the 5 and 7 o'clock positions of the vestibule, skene's gland are in the per urethral area, epithelial glycoprotein coat is an apparent epithelial transudate, cervical mucus from end cervical secretory cells (columnar epithelium) contributes to the vaginal fluid, the vagina has no gland but these vestibular glands provide moisture for the vagina.

#### **2.1.4.8 Function:**

The vagina is an external access to a visceral organ (the uterine cavity) with reproductive and coital functions. As a microbial interface, the vagina is a barrier to a significant microbial load.

#### **2.1.4.9 Clinical correlation:**

The redundant countercurrent vaginal blood supply concentrates chemicals (antibiotics, potential irritants, etc.) in the vagina. Pain of the vagina origin is vague locally and can be referred elsewhere in the pelvic. This nerve signal overlap is due to close proximity of numerous poorly myelinated sensory nerve fibers in the extensive pelvic nerve plexus. Relative to other skin structures, the vagina is not well supplied with nerve endings. Thus, pain response to mechanical stimuli is somewhere blunted, but is intensified by inflammation.

A vaginal urethral meatus may increase the risk of post-coital UTI. Disruption of epithelium contributes to sympathetic microbial overgrowth, or increases susceptibility to infection by pathogens.

**The external genital organs include:**

#### **2.1.5 Mons pubis (Mons vineries):**

The Mons vineries, a round pad of fatty tissue overlying the symphysis pubis, develop from the genital tubercle. It is not an organ but a region or a landmark. Coarse, dark hair normally appears over the Mons early in puberty.

##### **2.1.5.1 Blood and lymph supply:**

The mons is supplied by the external pundental artery and vein. The lymphatic merge with those from other parts of the vulva and from the lower abdomen. The crossed lymphatic circulation of the labia within the mons is clinically importance because it permits metastatic spread of cancer from one side of the vulva to the inguinal glands of the opposite as well as to the affected side. (Benson and pernoll's, 2011)

#### **2.1.6 Labia major:**

In the adult female, these two raised, rounded, longitudinal folds of skin are the most prominent features of the external genital. They are homologous to the male scrotum. They originate from the genital swelling extending posteriorly and dorsally from the genital tubercle. From the perianal body, they extend anteriorly around the labia minora to merge with the mons. (Benson and pernoll's, 2011)

**Blood supply:**

The labia majora are supplied by the internal pudendal artery (derived from the anterior parietal division of the internal iliac or hypo gastric artery) and by the external pudendal artery (from the femoral artery). Drainage is via the internal and external pudendal veins. (Benson and Pernoll's, 2011)

**2.1.7 Labia minora:**

The labia minora are small, narrow, elongated folds of skin between the labia majora and the vaginal introitus. They are derived from the skin folds beneath the developing clitoris. Normally, the labia minora are in apposition in nulliparous, concealing the introitus. Posteriorly, the labia minora merge at the fourchette. The labia are separate from the hymen the structure marking the vaginal entrance or labia are separate from the hymen the structure marking the vaginal entrance or introitus. Each labium merges into a median ridge that fuses with its mate to form the clitoral frenulum, an anterior fold that becomes the prepuce of the clitoris. The lateral and anterior surfaces of the labia minora usually are pigmented. Their inner aspect is pink and moist, resembling the vaginal mucosa. (Benson and Pernoll's, 2011)

**Blood supply:** they are supplied by the external and internal pudendal and veins.

**2.1.8 Clitoris:**

This 2-3 cm long homology of the penis is found in the midline slightly anterior to the urethral meatus. It is composed of two small, erectile corpora, each attached to the periosteum of the symphysis pubis and a diminutive structure (glans clitoridis) that is generously supplied with sensory nerve endings. The glans is partially hooded by the labia minora.

**Blood supply:** the clitoris supplied by the hypo gastric and pudendal, pelvic sympathetic and by the internal pudendal artery and vein. (Benson and Pernoll's, 2011)

### **2.1.9 Vestibule and urethral meatus:**

The triangular area between the labia minora anteriorly onto which the urethra opens, bounded posteriorly by the vaginal orifice, is the vaginal vestibule. It is derived from the urogenital sinus and is covered by delicate stratified squamous epithelium. The urinary meatus is visible as an antero posterior slit or an inverted V. like the urethra, it is lined by transitional epithelium. The vascular mucosa of the meatus often pouts or averts. This makes it appears more red than the neighboring squamous vaginal. (Benson and pernell's, 2011)

The vestibule and terminal urethra are supplied by the pundental nerve and by the internal pundental artery and vein.

### **2.1.10 Para urethral glands:**

Immediately within the urethra, on its poster lateral aspect, are two small orifices leading to the shallow tubular ducts or gland of skene. Which are wolffian duct remnants. The ducts are lined by transitional cells and are the sparse equivalent of the numerous male prostate glands.

Like the vestibule and urethral meatus, Skene's glands are supplied by the pundental nerve and by the internal pundental artery vein. (Benson and Pernoll's, 2011)

### **2.1.11 the mature placenta:**

The mature placenta is a blue-red. Rounded, flattened, meaty organ about 15-20 cm in diameter and 3 cm thick. It weighs 400-600 g or about one-sixth the normal weight of the term newborn. The umbilical cord (funis) extends from the fetal surface of the placenta to the umbilicus of the fetus. Fetal membranes cover the placenta fetal surface and extend from the placental margins to create the space occupied by the fetus, amniotic fluid and umbilical cord in multiple pregnancy, one or more placentas may be present depending on the number of ova implanted and the type of segmentation that occurs. Placenta has no peripheral venous collecting system, collection of venous outflow is a function frequently ascribed to a marginal sinus. However, less than one third of the blood drains from the margin of the placental. A marginal sinus is not seen even



in the early placental and sub chorionic marginal lakes are not found commonly in the mature placental. Dilated maternal vessels are found beneath the periphery of the placental. These have been described as wreath vein or venous lakes. They may or may not communicate with the inter villous spaces. (Benson and Pernoll's, 2011)

#### **2.1.11.1 Arteries:**

In contrast to the veins, placental arteries are grouped closer to the decidua attachments of the inter cotyledinous septa. As the placenta matures, thrombosis decreases the number of the arterial openings into the basal plate. At term, the ratio of veins- arteries is 2:1, approximately that found in other mature organs. (Errol Rnorwitz, et al. 2011)

#### **2.1.11.2 Umbilical cord:**

The umbilical cord is a gray, soft, coiled, easily compressible structure that connects the fetus with its placenta. It averages 50 cm in length and 2 cm in diameter (limits of 30-100 cm in length). (Errol Rnorwitz, et al. 2011)

### **2.2 Reproductive physiologies:**

#### **2.2.1 The menstrual cycle:**

The menstrual cycle is a term used to describe the monthly cycle of physiological event which prepare the female for pregnancy. The cycle ends in menstruation if pregnancy does not occur. The duration of an average normal menstrual cycle is 28 days from the onset of one menses to the next with rang of 21-35 days. Each month a few primordial follicles start to grow in response to the vision level of pituitary follicle-stimulating hormone (FSH). Most will undergo Atresia, while usually only one follicle will continece development to be able to respond to LH and thereby progress to ovulation. Follicular development, the ovulatory process and the luteal phase. (Mr. Sukkar, et al, 2000)

##### **2.2.1.1 Follicular development:**

Follicular phase involves change in three components of primordial follicles: The oocyte, the granulose cell and the theca cell layers.

**The oocyte:** Enlarges and becomes surrounded by zone pellucid, monopoly saccharine layer and some layer of granulose cells

**The granulose cells:** The granulose cells proliferative to form several layers, with fluid spaces appearing between cells, the granulose cell responds to FSH by synthesizing estrogen hormone.

**The theca cell:** Differentiate in to a well, vascularized theca external. The theca cells respond to LH by synthesizing androgen. During the follicular phase, the rising level of estrogen exerts a negative feedback on FSH secretion. (Mr. Sukkar, et al, 2000)

### **2.2.1.2 The ovulatory process:**

The ovulatory process usually occurs about 24-36 hours following the LH peak between 12<sup>th</sup> and 15<sup>th</sup> days of 28 day cycle, this LH surge is produced only when one follicle has matured and is secreting large amounts of oestrogen. The oestrogen triggers the LH secreting through a positive feedback mechanist in LH cause ovulation by production of prostaglandins. (Mr. Sukkar, et al, 2000)

### **2.2.1.3 The Luteal phase:**

After ovulation LH acts on the follicular cells, which differentiate in to luteal cells and the corpus luteum is formed (luteinization) of these two hormones increase, they inhabit the secretion of gonadotropins. If no pregnancy takes place, the corpus lustrum reaches the end of its life and ostrigen and progesterone levels decline. (Mr. Sukkar, et al, 2000)

The most important target for estrogen and progesterone in response the ovarian hormones both myometrium and endometrial tissues undergo important changes:

Oestrogen increases the uterine blood flow ostrogen increase and progesterone decreases myometrium activity.

Within 48hours after period of menstruation, the surface of the endometrial is cover by epithelial out growth from the remnants of glands change in the endometrial can usually be described under, there are three phases: proliferative phase, secretary phase and menstrual phase.

The proliferative phase is start from the end of menstruation and last unit the time of ovulation, during this period the endometrial grous from approximately 5mm to ++mm in height, a 10-fold increase.

The secretary phase occupies the time from ovulation until menstruation during this phase progesterone is dominant hormone, further changes in the late luteal phase depend on wither implantation has taken place or not. (Mr. Sukkar, et al, 2000)

If pregnancy occurs, the early embryo secrets human chronic gonadotropins (HCG) and the secretion of estrogen and peogestrinl continue. Further changes in the endometrium will mainly involve the stromal cells, this called implantation.

In absence of implantation and chorionic gonadotropins support, the corpus luteum decline and ostrogen and progesterone level fall. This result in redaction in endometrium tissue height and more is coiling in spiral arteries with secondary stasis.

Initial hemorrhage occur as result of the breakdown of superficial arteries and capillaries this process continues until all the layer expect the deep layer of the endometrium are shed menstrual flow stop in 5-7 days are to formation of thrombin platelet plugs. (Mr. Sukkar, et al, 2000)

### **2.2.2 Placental physiology:**

The Placenta has two principle functions, it acts as a transfer organ for metabolic products and it produces or metabolizes the hormones and enzymes necessary for the maintenance of pregnancy. It thus acts as a lung. A gastrointestinal tract, a kidney and a complex of ductless glands for the concept us. The Placenta derives most, if not all of its nourishment from maternal blood. The metabolic activity of the Placenta may be measured by it oxygen consumption. Continued growth of the Placenta is feasible only to a point and its functional capacity and oxygen consumption decline in laic pregnancy. (Errol Rnorwitz, et al. 2011)

### **2.2.2.1 Placental hormones:**

With the onset of pregnancy, the patterns of circulating hormones change abruptly from that of the normal menstrual cycle. Complete sex steroid hormone (estrogen and progesterone) production by the placenta alone is impossible because the necessary enzymes are lacking, however, the fetal and maternal adrenal cortices produce the precursor needed for placental synthesis of the hormones. This is the basis for the concept and term maternal-fetal-placental unit. Estrogens are bound to serum albumin in the maternal circulation and are, therefore, metabolized slowly. Progesterone, on the other hand, is not bound and is metabolized rapidly. Thyroxin ( $T_4$ ) is bound to alpha-globulin and pre albumin, corticosteroids are held in relatively inactive form in plasma by transaction. Thus the titer of hydroxyl corticosteroids is high during pregnancy, although frank Cushing's syndrome is uncommon. (Errol Rnorwitz, et al. 2011)

### **2.2.2.2 Estrogens:**

Estrogens are produced in ever-increasing amounts by the syncytiotrophoblat. The Placental cannot produce the required estrogens precursor but synthesizes estrogens from those supplied by the mother and the fetus. The most potent estrogen, 17b- estradiol. (Errol Rnorwitz, ct al. 2011)

### **2.2.2.3 Progestogens:**

17a- hydroxyl Progesterone decline to very low levels afteran initial (about 2 weeks after the beginning of pregnancy) mild elevation. It in contrast, Progesterone, which is produced by the placenta. Increases daily after the beginning of pregnancy to more than double the pregnancy value. Progesterone is metabolized about equally by the maternal and the fetal liver and fetal adrenal cortex. The final metabolites are 20a-dihydro Progesterone and pregnanediol. Progesterone is the principle precursor of the glucocorticoids and mineral ocorttcotds of the fetus. Progesterone also can be synthesized in the placenta from acetates or cholesterol (estrogens cannot). (Errol Rnorwitz, et al. 2011)

#### **2.2.2.4 Human Chorionic Gonadotropin (HCG)**

The placental hormone HCG is produced by the syncytiotrophoblast. Its concentration rises sharply after implantation of the fertilized ovum and reaches a peak value of 100,000 mIU/ml about the eighth to tenth week. Chorionic gonadotropin then falls sharply to a lower level by about the 120<sup>th</sup> day and remains at this level to term. It disappears from the circulation at a known rate of approximately 50% per week. HCG is secreted directly into the maternal blood, with virtually none reaching the fetal circulation. HCG is luteotropic and like LH stimulates the production of Progesterone, 17 $\alpha$ -hydroxyl Progesterone and estrogens. The physiological role of HCG, particularly in later pregnancy. (Errol Rnorwitz, et al. 2011)

### **2.3 Embryology:**

#### **2.3.1 ovulation fertilization and implantation:**

**definitions:** Gestational age refers to the duration of pregnancy dated from the first day of the last menstrual period (LMP) which precedes ovulation and fertilization by around 2 weeks. From fertilization to 10 weeks of gestation (8 weeks post conception) the conceptus is called an embryo. From 10 weeks to birth, it is fetus. (Figure (2.2)) (Errol Rnorwitz, et al. 2011)

**Follicular development and ovulation:** Primitive germ cells are present in the female embryo by the end of the third week of the intrauterine life. The number of germ cells in the fetal ovary peaks at around 7 million at 5 months. Degeneration occurs thereafter, with only 2 million primary oocytes surviving in the ovary at birth and as few as 300,000-400,000 in the ovary of prepubertal women. Primary oocytes have a diploid number of chromosomes (46,XX) which are suspended in prophase of meiosis I. During the follicular phase of the menstrual cycle, several primary oocytes mature under the influence of follicle-stimulating hormone (FSH) with completion of meiosis I. This results in the formation of the secondary oocytes with a haploid number of chromosomes (23,X) and extrusion of the first polar body. The mature follicle is known as a Graafian follicle (described by de Graaf in 1677). Secondary oocytes enter meiosis II but become suspended

in metaphase. Election of a single dominant follicle occurs at this time. The mid cycle surge of luteinizing hormone (LH) result in ovulation and extrusion of the secondary oocytes into the abdominal cavil. (Errol Rnorwitz, et al. 2011)

### **2.3.1.1 Fertilization:**

Fertilization of a mature ovum by a single spermatozoon (23, X or 23.Y) occurs in the fallopian tube within the first few hour after ovulation. The genetic composition of the spermatozoon thus determines the gender of the conceptus.

Fertilization serves as a trigger for the secondary oocyte to complete meiosis II.

The male and female pronuclei (each haploid) fuse to form the zygote which has a diploid number of chromosomes (46, XX or 46, XX). (Errol Rnorwitz, et al. 2011)

### **2.3.1.2 Pre implantation embryo development:**

Mitotic division of the zygote (known as segmentation or cleavage) give rise to daughter cells called blastomeric. The initial division result in a “two-cell” stage followed by a “four-cell” stage and an “eight-cell” stage. Such division continues while the embryo is still in the fallopian tube. As the blastomeres continue to divide. A solid ball of cells is produced Known as the morula.

The morula enters the uterine cavity around 3-4 days after fertilization. The accumulation of fluid between blastomeres results in formation of a fluid-filled cavity. Converting the morula to a blastocyst. A compact mass of cell (the inner cell mass) collect, at one pole of the blastocust. These cells are destined to produce the embryo. The liter rim of trophectoderm cells is destined to become the trophoblastic (placenta). (Errol Rnorwitz, et al. 2011)

### **2.3.1.3 Implantation:**

Implantation usually occurs in the upper part of the uterus and more often on the posterior uterine wall. Prior or implantation, the collection of cells surrounding the blastocyst (known as the zona pellucid) disappears and the blastocyst adheres to the endometrium. This is known as apposition. The blastocyst then procedure to invade the endometrium. Implantation is usually completed by day. (24-25) of gestation (day 10-11 post conception). (Errol Rnorwitz, et al. 2011)

### 2.3.1.4 Embryonic development after implantation:

By day (24-25) of gestation, the embryonic disc bilaminar, consisting of embryonic ectoderm and endoderm. Cellular proliferate in the embryonic disc result in midline thickening known as the primitive streak. Cells then spread out laterally from the primitive streak between the endoderm and ectoderm to form the mesoderm. This result in a trilaminar embryonic embryonic disc (opposite). These three germ layers give rise to all the organ of the embryo. The nervous system and epidermis along with its derivative (lens of the eye, hair) are derived from ectoderm. The gastrointestinal tract and primitive (pancreas, liver and thyroid) arise from endoderm. The skeleton, dermis, muscles, vascular and urgently system are derived from mesoderm. (Errol Rnorwitz, et al. 2011)

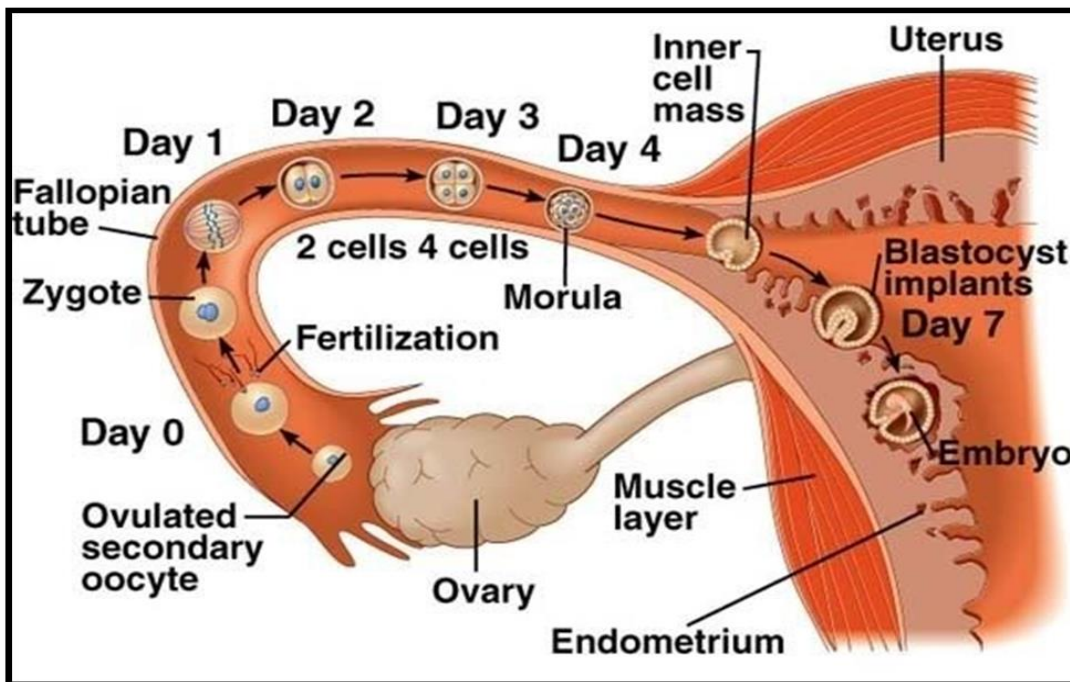


Fig (2.2): show ovulation and implantation(Errol Rnorwitz, et al. 2011)

## 2.4 Pathology:

### 2.4.1 Vaginal Bleeding in First Trimester:

**Structural (organic) causes:** Pregnancy-related conditions are the most common causes of abdominal vaginal bleeding in reproductive-age women (threatened incomplete and missed abortion ectopic pregnancy gestational trophoblastic diseases). Uterine lesions commonly produce excessive bleeding by increasing

endometrial vasculature. Cervical lesions cause irregular especially post coital bleeding due to erosion or direct trauma. (Errol Rnorwitz, et al. 2011)

#### **2.4.2 Abortion:**

Abortion is the termination of pregnancy before fetal viability. There are many words that define abortion including threatened, spontaneous, complete, incomplete, criminal, illegal, habitual, induced, elective, therapeutic, inevitable, missed, and septic. Abortion may be spontaneous (occurring naturally) or induced (elective or therapeutic). Many different variables apply to abortion and a number of definitions are required.

It is assumed that all definitions refer to spontaneous abortion, if not otherwise specified. (Errol Rnorwitz, et al. 2011)

Early abortion occurs 12th gestational week. Late abortion occurs between 12 and 20 weeks gestation.

Threatened abortion refers to intrauterine bleeding- 20th week of completed gestation, with or without uterine contraction, without cervical dilation and without expulsion of the products of conception (POC). Moreover, ultrasound must reveal the fetus to show signs of life (e.g, heartbeat or motion). In threatened abortion, the previable gestation is in jeopardy, but the pregnancy continues. (Errol Rnorwitz, et al. 2011)



Figure 2.3: show the threatened Miscarriage(Errol Rnorwitz, et al. 2011)

Inevitable abortion is intrauterine bleeding before the 20<sup>th</sup> completed gestational week, with continued cervical dilation but without expulsion of the POC. In



inevitable abortion, momentary evacuation of part or all of the conceptus is likely. Abortion is considered inevitable with two or more of the following: Moderate effacement of the cervix, cervical dilation- 3 cm, rupture of the membranes, bleeding for- 7 days, persistence of cramp despite narcotic analgesics and signs of termination of pregnancy (e.g, absent mastalgia). (Errol Rnorwitz, et al. 2011)

Incomplete abortion is the expulsion of some but not all of the POC- 20<sup>th</sup> completed gestational week. It refers to retention of products of conception (referred to as retained products), typically residual trophoblastic tissue (placenta). In most cases, the embryo or fetus is passed and there is retention of choriodecidual tissues. With incomplete abortion, the uterus continues to bleed and there is a risk of infection in the uterus (metritis). The uterus is usually evacuated (D&C) if bleeding is significant or prolonged. Retained products appear on ultrasound as echogenic tissues in the uterus without a recognizable gestational sac or embryonic structures. In most cases, the echogenic tissue is irregular. Colour Doppler may demonstrate numerous colour flow signals in the echogenic tissue with pulsed Doppler revealing a high velocity-low resistance waveform. In one report of patient assessed with sonohysterography, blood flow was detected within abnormal intrauterine tissue in one-third of patients (4 of 12) with proven residual trophoblastic tissue, whereas flow was not seen in any patient without retained tissue. Sonohysterography with the aid of colour Doppler appears to be both accurate and safe for the assessment of retained products. (**Errol Rnorwitz, et al. 2011**)

Complete abortion is the expulsion of all the POC- 20<sup>th</sup> completed gestational week. When the entire conceptus has been expelled, pain ceases, but spotting persists for a few days. (Errol Rnorwitz, et al. 2011)



**Figure (2.4)** complete abortion for pregnant women 20 year old with gestaional age 6week. (Errol Rnorwitz, et al. 2011)

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.

Missed abortion is death for the embryo or fetus- 20th completed gestational week, but the POC are retained in utero for – 8 weeks. Symptoms of pregnancy disappear and there may be a brownish vaginal discharge but not free bleeding. Pain and tenderness are absent, the cervix is semi firm and closed or only slightly patulous, the uterus becomes smaller and irregularly softened and the adnexa are normal. Fetal death at 18-26 weeks followed by missed labor and retention for- 6 weeks may be associated with maternal fibrinogen depletion (dead fetus syndrome). Consider administration of cryoprecipitate to prevent hemorrhage from hypo fibrinogenemia before evacuation of the uterus. (Errol Rnorwitz, et al. 2011)



Figure 2.5: show the missed abortion. (Errol Rnorwitz, et al. 2011)

In ectopic pregnancy a fertilized ovum implanted outside the uterine cavity is an ectopic pregnancy. Ectopic pregnancy usually results from conditions that delay or prevent the transit of a fertilized ovum through the fallopian tube. Over 50% are associated with tubal inflammatory change (previous or chronic salpingitis). Other important etiologic factors include zygote abnormalities, transmigration of the ovum, postmidcycle ovulation- fertilization, or exogenous hormones. The incidence of ectopic pregnancy has risen dramatically during the past two decades in the United states to at least 1:100 pregnancies (from- 1:500) and in some reports as high as 2% of all pregnancies. The increase, most notable among nonwhite women, is attributable to tubal infection, endometriosis and an enhanced chance of ectopic gestation after failed laparoscopic tubal ligation.

Unknown factors also are likely. Morbidity and mortality are directly related to tubal rupture. There are some associations with risk of rupture, including: never having used contraception, a history of tubal damage together with infertility, induction of ovulation and a high level of hCG when ectopic pregnancy is suspected. Unfortunately tubal rupture cannot be safely predicted by any known risk factor, serum hCG level or son graphic finding and occurs in approximately

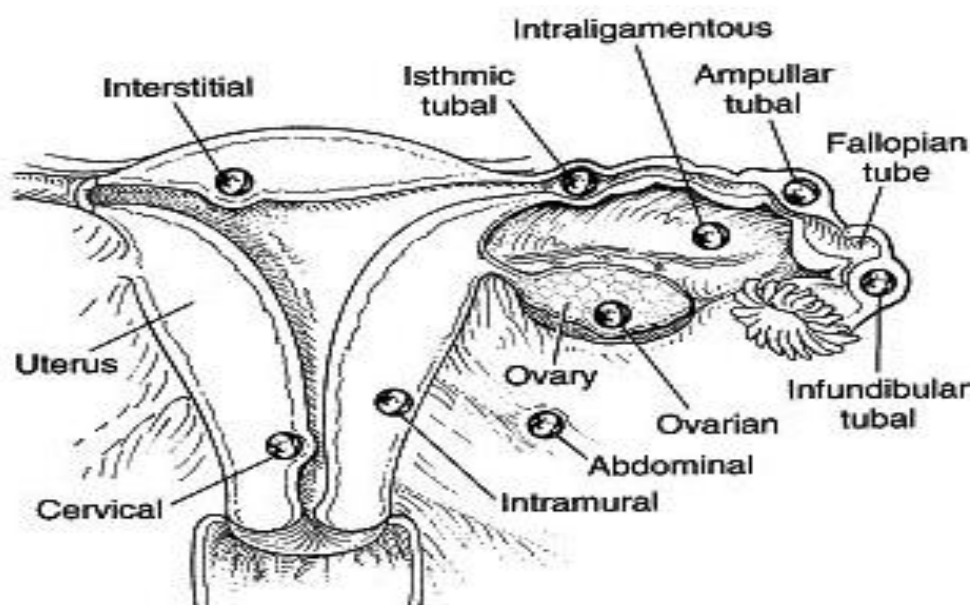
20% of patients in developed countries. Only early diagnosis and treatment will prevent the sequelae of tubal rupture. Ectopic pregnancy is a major cause of maternal mortality mainly because of uncontrolled hemorrhage and shock (0.1%-0.2% in the United States, but the rate is higher in developing countries). Fetal mortality in ectopic pregnancy is nearly universal. (Errol Rnorwitz, et al. 2011)

Gestational trophoblastic disease (GTD) often referred to as a molar pregnancy, is a group of disorders that are the result of an abnormal combination of male and female gametes (Table 23-5). The term trophoblast in the title of this disease relates to the cells that surround the developing gestation. As stated earlier, trophoblastic cells are those cells that produce hCG. GTD results in the excessive growth of the trophoblastic cells. Therefore, there are excessive amounts of hCG in the maternal circulation.

Clinical findings of GTD include hyperemesis gravidarum, a markedly elevated hCG level (typically over 100,000 mIU/mL), vaginal bleeding, hypertension, uterine enlargement, and even possible preeclampsia or eclampsia.<sup>5</sup> Sonographic findings of a complete molar pregnancy include a large complex mass within the uterus with a “vesicular, snowstorm appearance,” containing multiple cystic spaces representing hydropic chorionic villi.<sup>4,5</sup> The ovarian mass associated with a molar pregnancy and elevated hCG is the theca lutein cyst. These masses are typically bilateral and appear as large, multiloculated adnexal masses.

GTD includes hydatidiform mole, invasive mole, and choriocarcinoma. Because this disease has malignant potential, other imaging modalities and hCG monitoring is typically warranted. The most common sites of metastatic involvement are the lungs, liver, and vagina. However, other organs may be affected. Patients who present with the diagnosis of molar pregnancy are commonly referred for chest radiographs or other studies for further evaluation of metastasis. Treatment for GTD includes dilatation and curettage, hCG monitoring, hysterectomy, and chemotherapy.

Ectopic pregnancy is classified according to the site of implantation (the following is in decreasing order of occurrence. Tubal (98-99%) ectopic pregnancies are further subdivided into the anatomic section involved: ampullary (55%), isthmic (25%), fimbrial (17%), interstitial (angular, corneal)(2%) and bilaterai (very rare). Ovarian pregnancy (0.5%) may follow fertilization of UN extruded ovum. Abdominal (1/15,000 pregnancies) pregnancy may be primary, with the initial implantation of the zygote outside the tube (e.g. on the liver) or secondary expulsion or rupture of a tubal pregnancy. Cervical implantation (rare) is suggested by a greatly enlarged cervix (often as large as the no pregnant uterus, known as the “hourglass sign”. This is an enlarged, highly vascularized, bleeding cervix, with tight internal os and a gaping external os. (Fig (2.6)). (Errol Rnorwitz, et al. 2011)



**Fig (2.6): show the site of ectopic pregnancy (Errol Rnorwitz, et al. 2011)**

### 2.4.3 Uterine lesions:

Dysfunctional uterine bleeding (DUB) exclusion referring to abnormal vaginal bleeding which cannot be explained on the basis of a structural abnormality, the majority of cases represent irregularities. (Benson and Pernoll’s, 2011)

### **2.4.3.1 Fibroids (leiomyomas, Myomas):**

Fibroids are the most common neoplasm of the female pelvis. Occurring in 25% of reproductive -age -women. (Benson and Pernoll's, 2011)

uterine fibroids benign proliferation of smooth muscle and fibroids connective tissue that originate from a single cell. They are usually multiple range in diameter from 1 mm to >20 cm and are surrounded by pseudo capsule of compressed smooth muscle fibers. Fibroids typically arise after menarche and regress after menopause. Implicating estrogen as a growth promoter.

All fibroids develop within the myometrium and begin as intramural fibroids. Continued growth in one direction will ultimately determine how the fibroid will be classified.

Uterine fibroids in most patients are symptomatic. The most common symptoms are abnormal vaginal bleeding (usually menorrhagia). Pelvic pain pressure and a variety of reproductive disorders (infertility, recurrent spontaneous abortion) may occur. (Benson and Pernoll's, 2011)

**2.4.1.2 Endometrial polyps:** endometrial polyps are localized overgrowths of endometrial glands and stroma usually arises at the uterine fundus. The majority are asymptomatic. But some present with abnormal vaginal bleeding. (Benson and Pernoll's, 2011)

### **2.4.1.3 Endometriosis:**

Is functional endometrial glands and stroma outside glands and stroma outside the uterine cavity. (Benson and Pernoll's, 2011)

The incidence is 5-10% of reproductive age women and 30% of infertile women are believed to have endometriosis. The true incidence in the population however is unknown. The average age at first diagnosis. The pathogenesis of endometriosis is unclear. Theories include retrograde menstruation, coelomic metaplasia and hematogenous or lymphatic spread. Endometriosis is usually not found prior to menarche and characteristically regresses after the menopause. (Benson and Pernoll's, 2011)

#### **2.4.1.4 Trauma:**

Trauma to the lower genital tract should also be considered as a cause for an acute presentation of abnormal bleeding.

#### **2.4.1.5 Neoplasm of genital tract:**

Vulval carcinoma account for approximately 5 percent of genital tract cancer in the UK. It most commonly seen in older women with a media age of over sixty years little is known about the etiology of vulval cancer, most invasive cancer (85%) are squamous, some 5 percent are melanoma and adenocarcinoma in underlying apocrine glands melanoma and paged disease any carry as especially poor prognosis. The most common malignant disease affecting the uterine body is adenocarcinoma. Squamous carcinomas are rare, but when it occurs it develop in a glandular which has undergone squamous metaplasia. Carcinomas occur much less frequently than adenocarcinoma and include leiomyosarcoma which can develop within the myometrium or within a leiomyo fibroma and the rare sarcomas developing from endometrial stroma. (Motaz Basher, 2009)

#### **2.4.4 Dysfunctional uterine bleeding:**

##### **2.4.4.1 An ovulatory DUB:**

Polycystic ovarian syndrome (PCOD) is a complex endocrine disorder characterized by chronic anovulation associated with elevated serum androgen levels (hyper androgenemia) and unbalance elevations of serum LH levels (PCOD is most common cause of chronic anovulation). The clinical and sonographer manifestation of PCOD are variable depending on the degree of hormonal imbalance. Patients may present with amenorrhea, oligomenorrhea or other menstrual irregularity, other symptoms include hirsutism, infertility and obesity. Stein-levelnthal syndrome is the clinical manifestation of PCOD associated with obesity, hirsutism and amenorrhea. Stein-levelnthal syndrome spans a wide array of clinical manifestation including anovulation and infertility in addition to the classic triad of obesity, hirsutism and amenorrhea. Women with stein-levelnthal syndrome represent only a small subset of all women with PCOD although the names are often used interchangeably. The subsequent

androgen elevations may cause hirsutism and because of the local effects of androgen on the ovarian follicle, premature regression of developing follicle. This results in the characteristic multifollicular (polycystic) ovary typically seen in women with PCOD. Women with PCOD are at risk for endometrial hyperplasia and endometrial carcinoma due to chronic unopposed estrogen stimulation. Hormonal finding of PCOD include a generalized increase in serum androgens (androstenedione, testosterone) as well as an elevation of serum LH in the presence of normal to low serum FSH levels, resulting in an increased LH/FSH ratio which in many cases approaches or exceeds. (Errol Rnorwitz, et al. 2011)

#### **2.4.4.2 Ovulatory DUB:**

Mid cycle bleeding, short follicular phase and long follicular phase.

#### **2.4.4.3 Underlying systemic disorders**

Thyroid disease, blood dyscrasias and severe organ disease.

#### **2.4.4.4 Latrogenic DUB**

Oral contraceptives. (Errol Rnorwitz, et al. 2011)

### **2.5 Ultrasound technique:**

#### **2.5.1 Preparation of patient:**

Full urinary bladder was required to obtain optimum view because it displaces the bowel and brings the pelvic organ into the field of view.

#### **2.5.2 Patient position and technique in to uterine scanning:**

- Subjective were scanned while they were in supine position.
- No special breathing technique required.
- Long axis image of the ovary measure the length (superior to inferior)
- Transverse image of the ovary measure the width (right to left)

#### **2.5.3 In transvaginal U/S:**

- Longitudinal image of the uterus (long axis) measure uterine length and height.
- Transverse image of the uterine fundus measure uterine width.
- Perion to examination history that taken from subject included.



- The age tribe and residence.

#### **2.5.4 In abdominal U/S:**

Long axis image of the uterine include the endometrial cavity measurement the uterine length (superior to inferior) and height (anterior to posterior).

- Transverse image of the uterine fundus measure uterine width (right to left).
- Long axis image of the ovary measure ovarian length and height.
- Transverse image of the ovary measure ovarian width (left to right).

## **2.6 Previous studies:**

There many studies carried on abnormal vaginal bleeding around the world. Reem Hasan was referring to abnormal vaginal bleeding. Most of the 4,539 women in this study were 25-34 years and self-identified as white, black or Hispanic.

Participants were generally of high educational attainment. About half were nulliparous. Pregnancy ended in miscarriage for 12% of women and about two-third them reported some bleeding during pregnancy.

A first-trimester bleeding episode may also occur due to premature onset of maternal-fetal circulation or abnormal formation of placental membranes. In early pregnancy, the maternal spiral arteries are blocked by a trophoblastic shell, maintaining a low oxygen environment for fetal development until the ninth or tenth week of gestation when maternal-fetal circulation begins.

Premature onset of maternal-fetal circulation may be associated with first-trimester bleeding episodes.

Such bleeding episodes may serve as a marker of an improperly developing placenta. Placenta dysfunction has been suggested to play a causal role in adverse pregnancy outcomes, including miscarriage and pre-eclampsia. <sup>(Reem Hasan, PhD, patterns and predictors of vaginal bleeding in the first-trimester of pregnancy, 2010, North Carolina)</sup>

Gold stein was refer to (abnormal uterine bleeding) up to in 20 women aged 30-49 visits here general practitioner because of menorrhagia and AUB accounts for 20% of visit to gynecological outpatient department. <sup>(Gold stein, 2004, Royal, college of obstetrician and gynecological, 2006)</sup>

In Sudan also there are many studies carried on this issue Motaz Bashir said that (most causes of abnormal vaginal bleeding was related pregnant and it is complication constitute 91%). <sup>(Motaz Bashir, ultrasound finding of abnormal vaginal bleeding in Elnohoud city, MSc research in diagnostic ultrasound, college of medical radiological science Sudan University 2010)</sup>

Singh K et al (2016) found most age affected of vaginal bleeding in first-trimester between 20-30 year pregnant women.

Vidya A et al (2016) found the vaginal bleeding in first-trimester common occur between gestational ages 6-8 weeks.

Elamen A (2011) found most causes of vaginal bleeding in first-trimester incomplete abortion (40%), missed abortion (26%), threatened abortion (15%), complete abortion (7%), blighted ovum (5%), and ectopic abortion (2%), sub serial fibroid (2%).

Fatima Mubark Ahmed (evaluation causes of vaginal bleeding in first-trimester at pregnancy outcome using ultrasound) in Kosti Hospital, MSc research in diagnostic ultrasound, the national Ribat University, 2017).

# **Chapter Three**

Materials and Methods

## **Research Methodology:**

### **3.1 Study Design:**

The study would be a descriptive, cross sectional study to evaluate the causes vaginal bleeding in first trimester and pregnancy outcome using ultrasound.

### **3.2 Study area:**

Ultrasound department in Omdurman maternity hospital (Sudan, Khartoum, Omdurman)

### **3.3 Study Duration:**

The study was conducted during the period from August 2017 to January 2018.

### **3.4 Study population:**

The study populations were consist of vaginal bleeding in first trimester women who sought medical assistance during the period of study.

### **3.5 Sample size:**

There were 50 cases Sudanese women would be selected randomly.

### **3.6 Inclusion criteria:**

All Sudanese women with vaginal bleeding in first trimester attending to the ultrasound department during the period of study

### **3.7 Exclusion criteria:**

Women with vaginal bleeding in second and third trimester and normal vaginal bleeding (menorrhagia)

### **3.8 Material:**

Real time Toshiba high quality ultrasound machine with probe (transvaginal and curvature probe) made in Japan.

### **3.9 variable of study:**

- Patient age
- Patient occupation
- Bleeding duration

- Gestational age by LMP
- History of bleeding
- Symptoms
- Pregnancy outcome
- No of pregnancy
- Past history of abortion

### **1.10 Method of data collection:**

Data was collected using a variety of tools to obtain the required information, a specially designed questionnaire using for the purpose of the research, the questionnaire included both the demographic characteristic of the population and question regarding the vaginal bleeding in first trimester by using ultrasound trans abdominal transducer 3.5 MHz and trans vaginal transducer 5MHz.

### **3.11 ultrasound technique:**

#### **Patient preparation:**

Full urinary bladder was required to obtain view because it displaces the bowel and bring the pelvic organ in it the field of view.

#### **Patient position and technique in to uterine scanning:**

- Subjective were scanned while they were in supine position.
- No special breathing technique required.
- Long axis image of the ovary measure length (superior to inferior).
- Transverse image of the over measure the width (right to left).

#### **In Trans vaginal U/S:**

- Longitudinal image of the uterus (long axis) measure uterine length and height.
- Transverse image of the uterine fundus measure uterine width.
- Perion to examination history that taken from subjects included the age tribe and residence.

### **In abdominal U/S:**

Long axis image of the uterus include the endometrial cavity measurement the uterine length (superior to inferior) and height (anterior to posterior).

- Transverse image of the uterine fundus measure uterine width (right to left).
- Long axis image of the ovary measure ovarian length and height.
- Transverse image of the ovary measure ovarian width (left to right).

### **1. Transvaginal method (TVS):**

Patient should be empty urinary bladder.

Ideally, a TVS study is performed with the patient on a gynecological examination table and the patient in a lithotomy position (flat on her back, legs flexed on the thighs, thighs flexed on the abdomen and abducted with stirrups used to support the feet and legs. This setup enables free, unobstructed movement of the probe in both vertical and horizontal directions by the operator. If a regular, flat examination table is used, the patient lies flat on her back with legs bent (approximately shoulder width apart) and feet flat on the table. This setup limits the vertical and horizontal movement of the probe but usually permits complete evaluation of the pelvis.

To allow for maximum pooling of small amount of intraperitoneal free fluid, a minor reversed trendelen burg position desirable.

If tilting of the examination table is not possible, a sponge block or other convenient objects (pillow, rolled sheet) can be placed behind the patient lower back to tilt the pelvis forward. Tilting the pelvis in this fashion may also be helpful to better visualize the fundus of an anteverted uterus. Elevating the pelvis provides extra space for the transducer handle and makes it easier for transducer tilting in the coronal plane.

### **2. Trans abdominal method:**

The entire TAS study is generally performed with the patient in a supine or recumbent position.

A reasonably full urinary bladder is essential for TAS when it is used as the primary technique. Patients are instructed to arrive with a full bladder by

drinking 20 to 30 ounces of water or other liquids about one hour before the scheduled examination. This is a general guideline and some patients will be overfilled and unable to hold on until the examination starts. A full bladder indicates bladder distention just to the point of mild patient discomfort. On a midline scan, the optimal bladder volume is evident when the bladder has a triangular shape and the fundus of the normal, no gravid anteverted uterus is covered by the bladder. If the roof of the bladder appears rounded and extends significantly beyond the fundus of a normal size uterus, the bladder is probably too full. The bladder is likely under distended if the normal uterus is difficult to visualize due to interference from overlying bowel gas. If a patient is restricted from drinking fluid (potential surgical candidate) or is incontinent, the bladder can be filled in a retrograde fashion with a Foley catheter by a qualified individual however this is rarely done since the advent of TVS. Re-evaluation of the pelvis and lower abdominal following complete or partial voiding may be helpful in certain situations, e.g. when it is uncertain that a central pelvic cyst represents the bladder or a cyst of other origin.

### **3.12 Ethical consideration:**

The research is approved by the faculty of medicine , Sudan university of science and technology, Ethical clearance is obtained from the department of the research in Khartoum State, ministry of health research department and from Bahri hospital, Research purpose would be explained to participant in clear simple words, participant had right to voluntary informed consent and right to withdraw at any time without any deprivation, It also had the right to no harm and it also had the right to benefit from the research knowledge and skills, All approached respondents agreed to participate in the study.



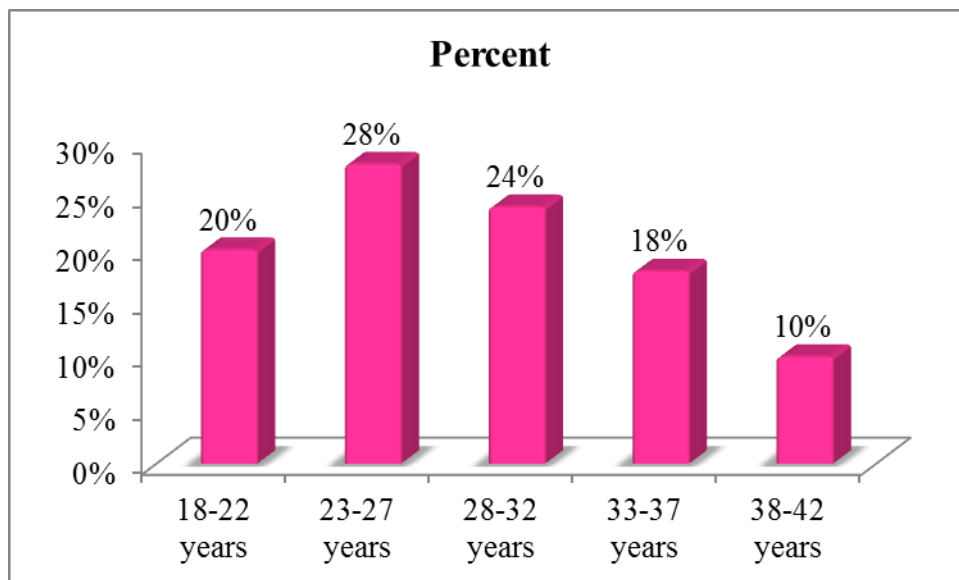
# **Chapter Four**

## **Results**

## Results

**Table 4.1:** Age distribution among the cases presented with vaginal bleeding in first trimester:

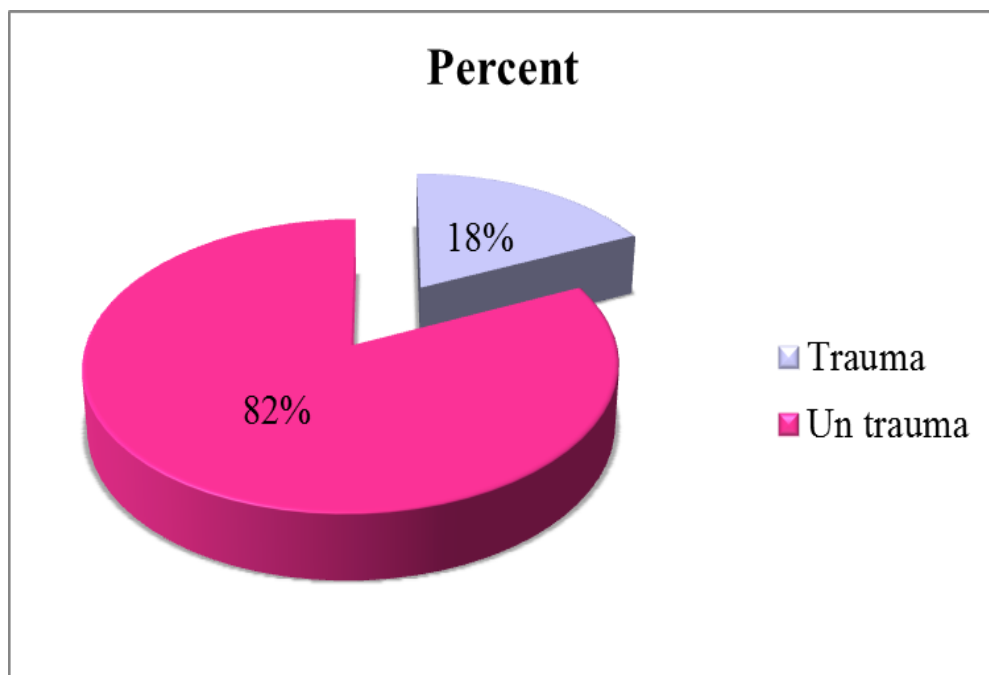
	Frequency	Percent
18-22	10	20%
23-27	14	28%
28-32	12	24%
33-37	9	18%
38-42	5	10%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.1:** Age distribution among the cases presented with vaginal bleeding in first trimester

**Table 4.2:** Distribution causes of vaginal bleeding in 50 cases

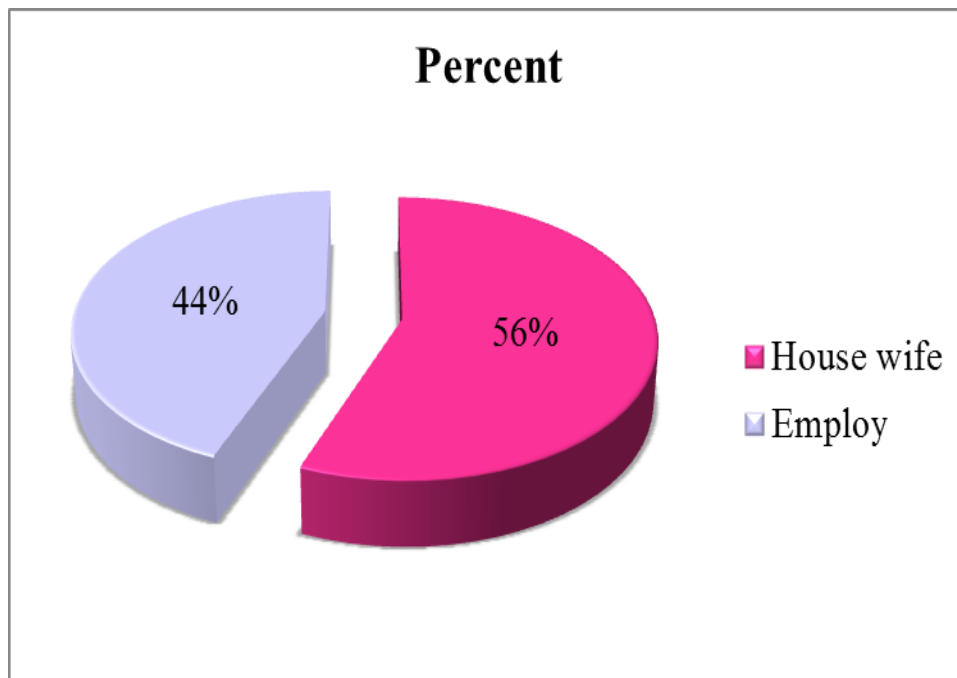
	Frequency	Percent
Trauma	9	18%
Un trauma	41	82%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.2:** Distribution causes of vaginal bleeding in 50 cases

**Table 4.3:** Occupation distribution in 50 cases in this study

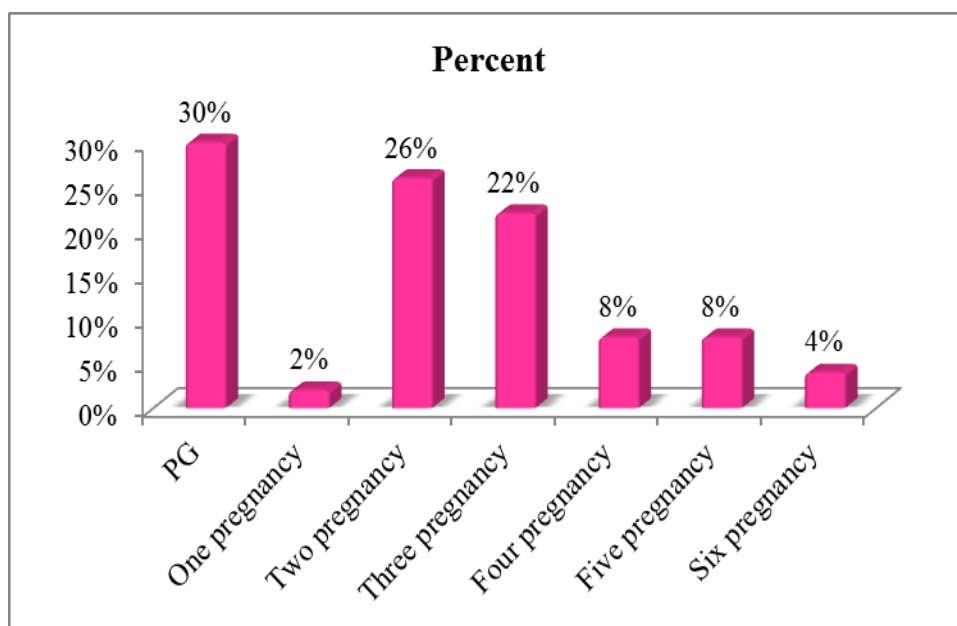
	Frequency	Percent
House wife	28	56%
Employ	22	44%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.3:** occupation distributions in 50 cases in this study

**Table 4.4:** Number of pregnancy distribution in 50 cases in this study:

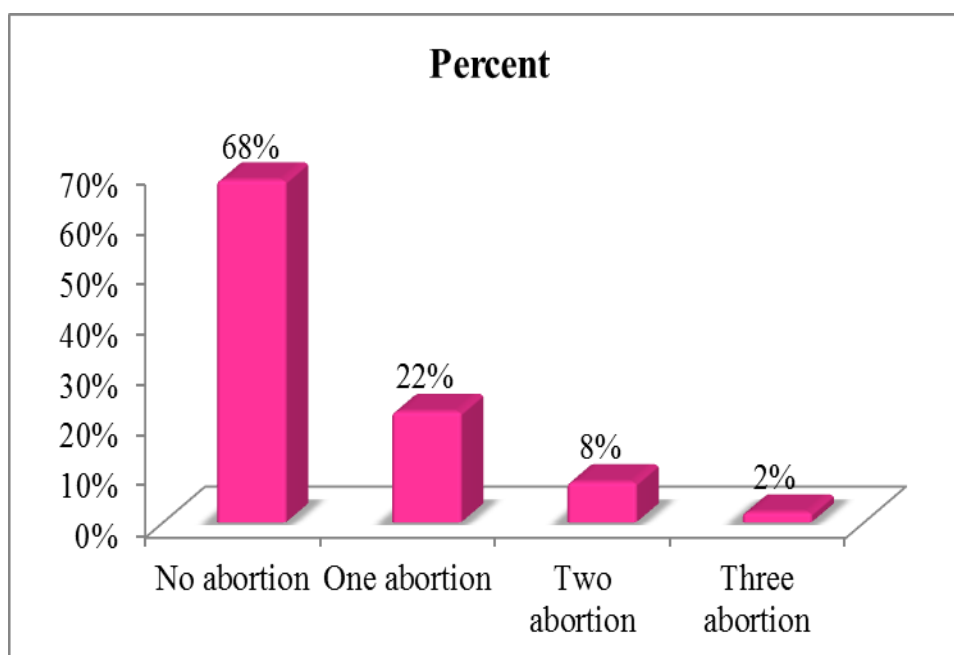
No pregnancy	Frequency	Percent
PG	15	30%
One pregnancy	1	2%
Two pregnancy	13	26%
Three pregnancy	11	22%
Four pregnancy	4	8%
Five pregnancy	4	8%
Six pregnancy	2	4%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.4:** Number of pregnancy distribution in 50 cases in this study:

**Table 4.5:** Distributions number of abortion in 50 cases:

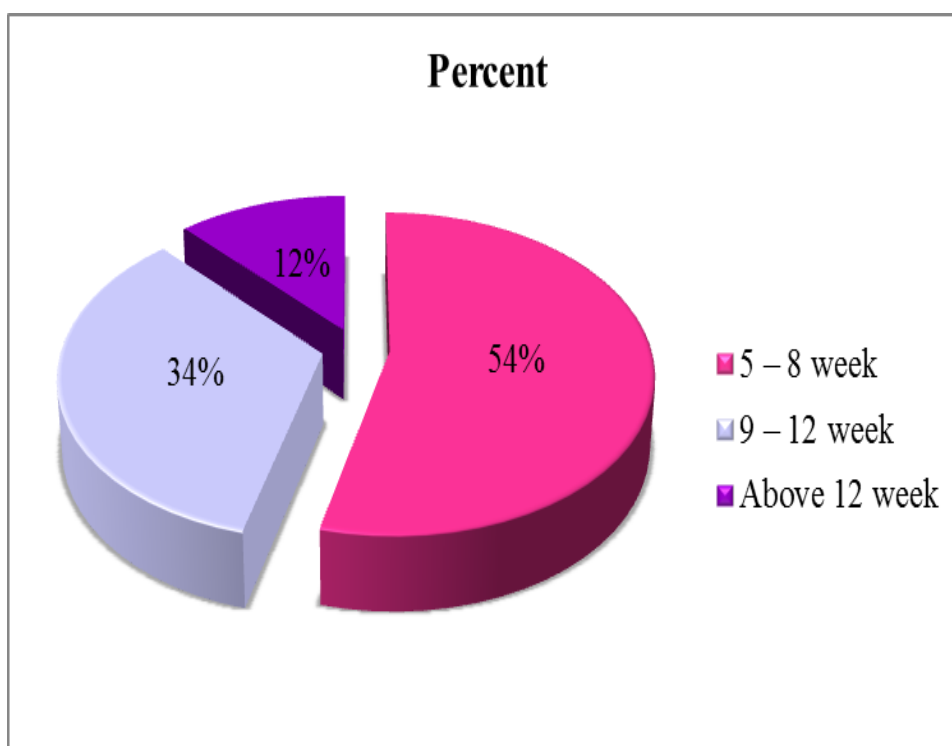
Number of abortion	Frequency	Percent
No abortion	34	68%
One abortion	11	22%
Two abortion	4	8%
Three abortion	1	2%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.5:** Distributions number of abortion in 50 cases:

**Table 4.6:** Gestational age distribution in cases in this study

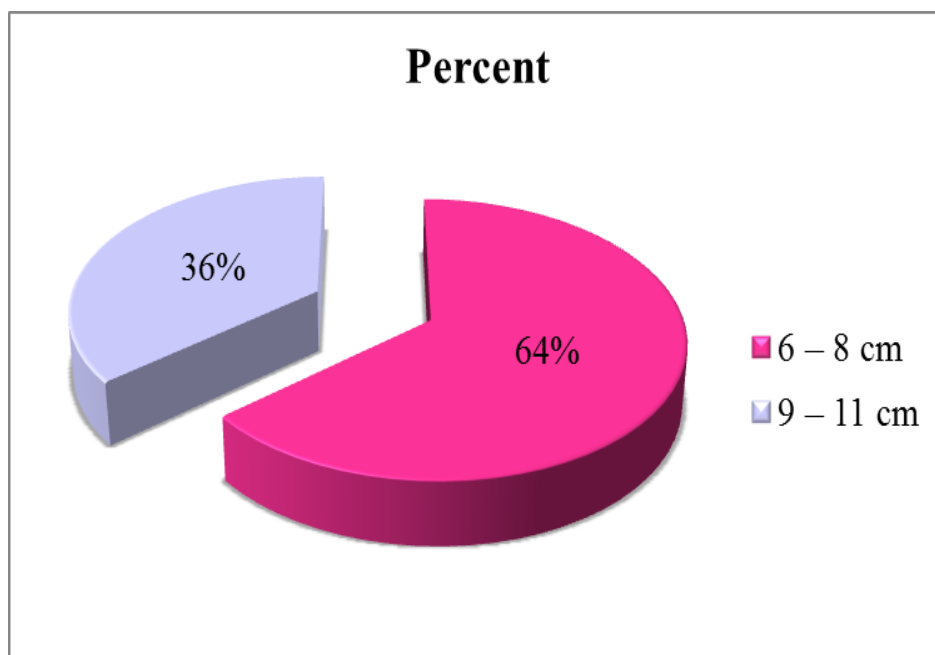
No of weeks	Frequency	Percent
5 – 8 week	27	54%
9 – 12 week	17	34%
Above 12 week	6	12%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.6:** Gestational age distribution in cases in this study

**Table 4.7:** distribution measurement of anteroposterior diameter of uterus in cases in this study

	Frequency	Percent
6 – 8 cm	32	64%
9 – 11 cm	18	36%
<b>Total</b>	<b>50</b>	<b>100.0</b>

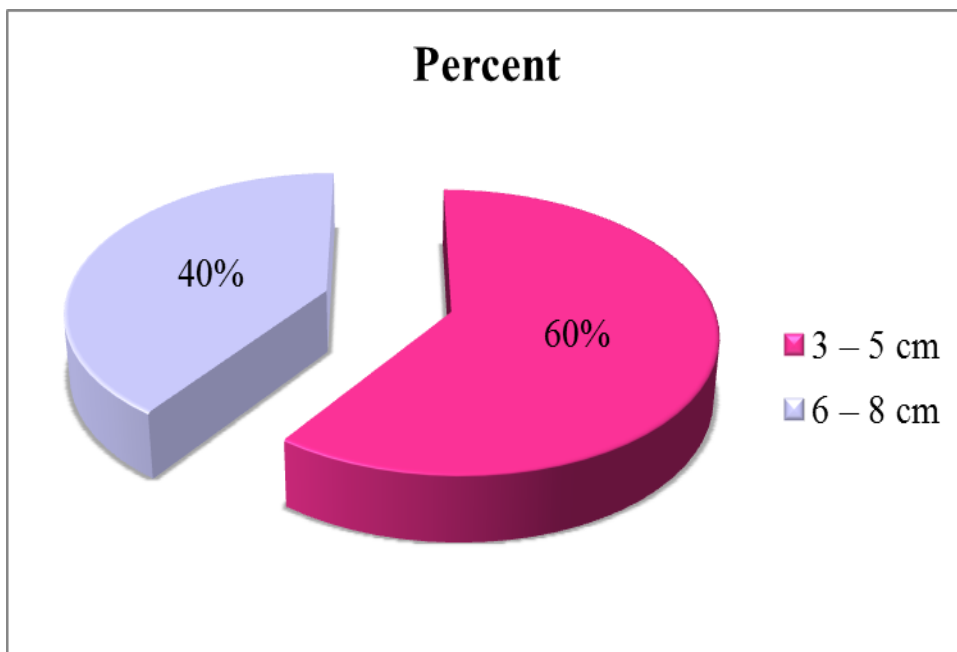


**Figure 4.7:** distribution measurement of anteroposterior diameter of uterus in cases in this study



**Table 4.8:** distribution measurement of transverse diameter of uterus in cases in this study

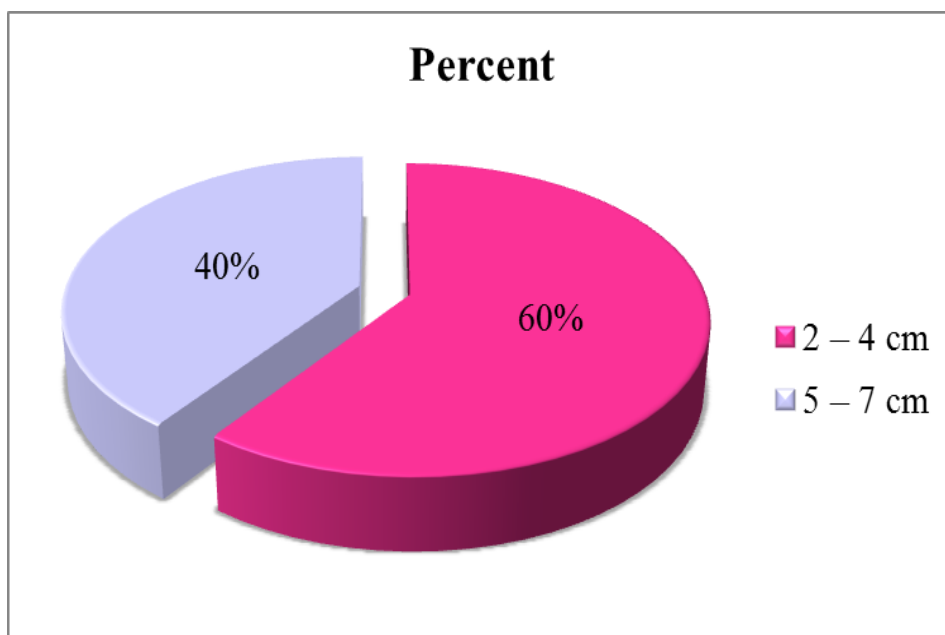
	Frequency	Percent
3 – 5 cm	30	60%
6 – 8 cm	20	40%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.8:** distribution measurement of transverse diameter of uterus in cases in this study

**Table 4.9:** distribution measurement of thickness diameter of uterus in cases in this study

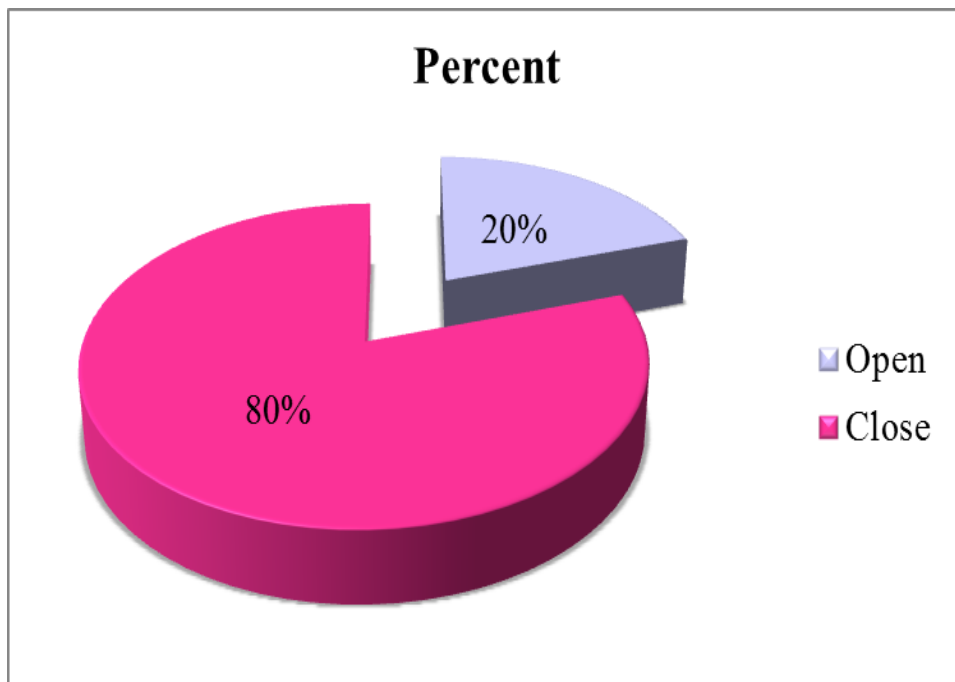
	Frequency	Percent
2 – 4 cm	30	60%
5 – 7 cm	20	40%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.9:** distribution measurement of thickness diameter of uterus in cases in this study

**Table 4.10:** distribution of internal cervical os in cases in this study

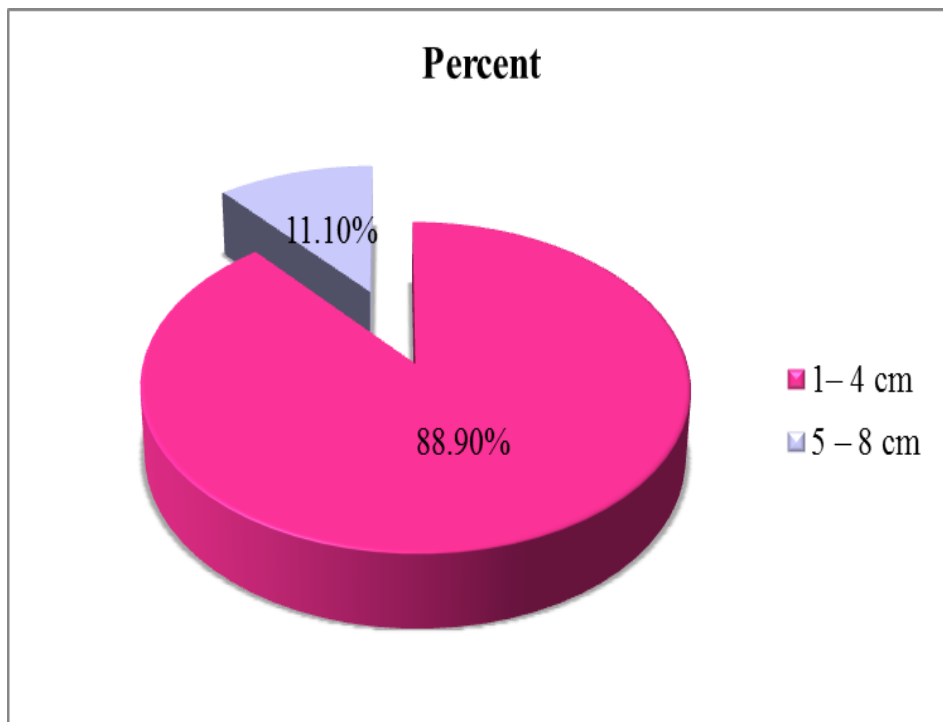
	<b>Frequency</b>	<b>Percent</b>
Open	10	20%
Close	40	80%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.10:** distribution of internal cervical os in cases in this study

**Table 4.11:** Distribution measurements of cervical dilatation in cases in this study

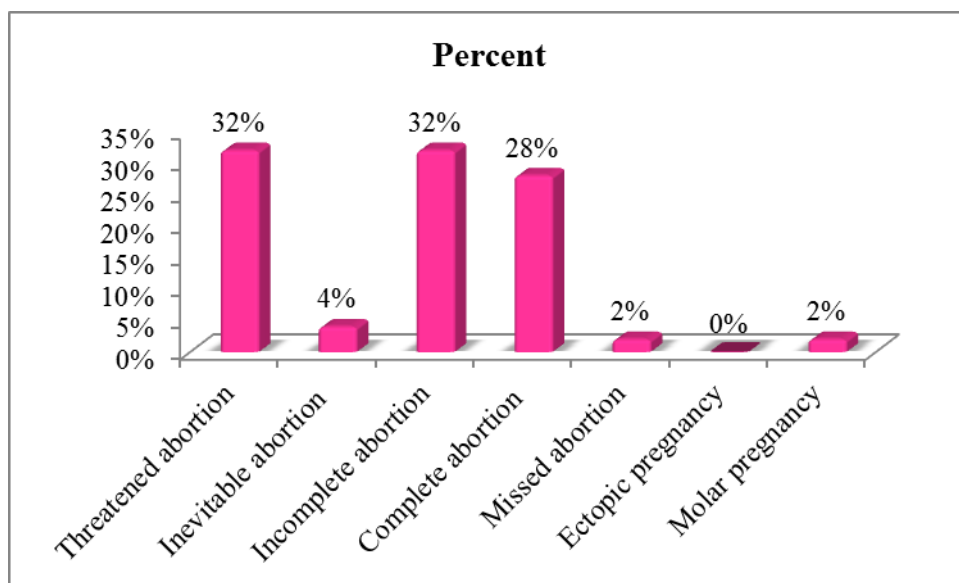
	Frequency	Percent
1 – 4 cm	8	88.9%
5 – 8 cm	1	11.1%
<b>Total</b>	<b>9</b>	<b>100.0</b>



**Figure 4.11:** Distribution measurements of cervical dilatation in cases in this study

**Table 4.12:** Distribution of ultrasound finding among cases presented in this study

	Frequency	Percent
Threatened abortion	16	32%
Inevitable abortion	2	4%
Incomplete abortion	16	32%
Complete abortion	11	22%
Missed abortion	1	2%
Ectopic pregnancy	3	6%
Molar pregnancy	1	2%
<b>Total</b>	<b>50</b>	<b>100.0</b>



**Figure 4.12:** Distribution of ultrasound finding among cases presented in this study

Table 4.13: Distribution of pregnancy outcome in cases under this study

	Frequency	Percent
Continue	16	32%
Not continue	34	68%
<b>Total</b>	<b>50</b>	<b>100.0</b>

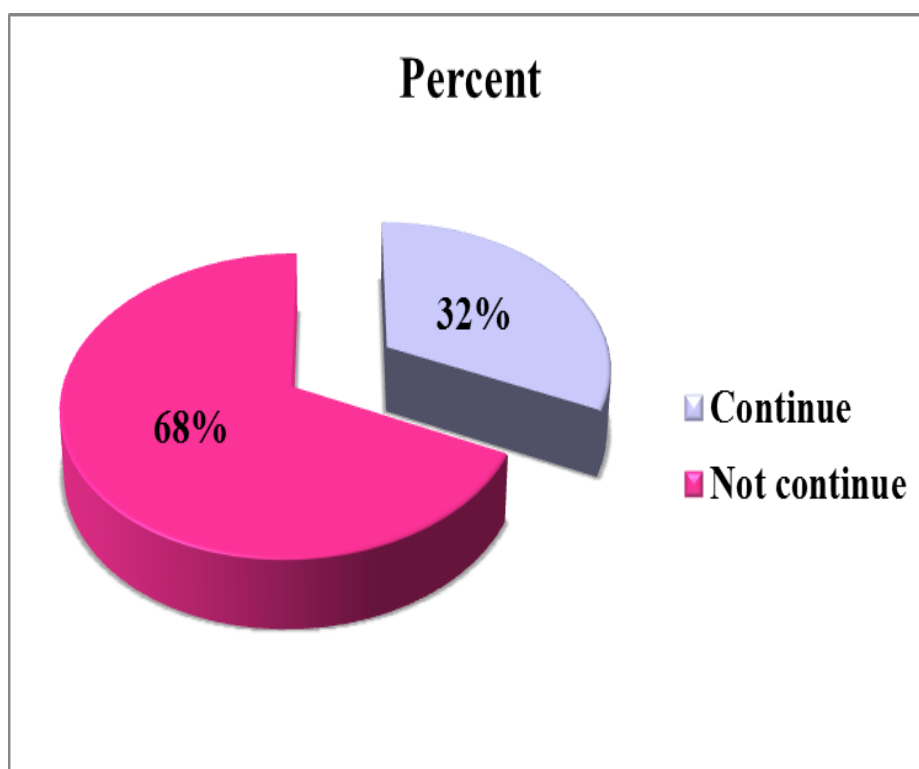


Figure 4.13: Distribution of pregnancy outcome in cases under this study

**Table 4.14:** relationship between ultrasounds finding and pregnancy outcome among this cases in this study

Ultrasound finding	Number	Continue pregnancy	Not continue pregnancy	Percentage
Threatened abortion	16	15	1	32%
Inevitable abortion	2	1	1	4%
Incomplete abortion	16	0	16	32%
Complete abortion	11	0	11	22%
Missed abortion	1	0	1	2%
Ectopic pregnancy	3	0	3	6%
Molar pregnancy	1	0	1	2%

Statistics							
	age	Number of pregnancy	Past history	gestation	AP	Transvers	TH
N	50	50	50	50	50	50	50
Mean	28.4000	2.1600	.4400	9.4000	8.0400	5.1600	4.2200
Std. Deviation	6.88980	1.77695	.73290	4.30946	1.59028	1.26749	1.11190
Minimum	15.00	.00	.00	4.00	6.00	3.00	3.00
Maximum	43.00	6.00	3.00	24.00	12.00	8.00	7.00

# **Chapter Five**

## **Discussion, Conclusion and Recommendations**



## 5.1 Discussion

Table 4.1 show age group distribution for all patients as frequency and percentage, where the patients with 23-27 years was higher frequency 14 were represent 28% over all patients, then 28-32 years repeated 12 times with 24% while the patients from 38 to 42 years was just 5 patients represent 10% from all patients. As shown in figure 4.1.

The vagina bleeding distributions for all patients were trauma and un trauma were the percent was 18% and 82% with frequency 9 and 41 times respectively in table 4.2 and figure 4.2.

Patients occupation was just two category house wives and employ with frequency 28 (56 %) and 22 (44%) respectively as shown in table 4.3 and fig 4.3.

Table 4.4 show the number of pregnancy for all patients were the patients with PG was higher frequency 15 times with 30% over all patients, then two pregnancy 13 times with 26%, while the lowest frequency was for the first pregnancy with one patient and it was represent 2%. As shown in figure 4.4.

The case of abortion between all patients was 34 patients with no abortion with 68%, one abortion for patients with 22%, two abortions for patients and patients with three abortions was just for one patients with 2% as shown in table 4.5 and figure 4.5.

Table 4.6 show gestational age for all patients were numbers 5-8 weeks was higher frequency 27 with 54%, then 9-12 with 17 weeks and age above 12 weeks was 6 with 12% as shown in fig 4.6.

Table 4.7 show measurement of anteroposterior diameter for uterus was all measurement ranged from 6-11 cm, were the diameter 6-8 cm for 32 patients with 64% and 9-11 cm for 18 patients with 36%. As shown in figure 4.7.

Table 4.8 show the measurement of transverse diameter of uterus were the range was from 3-8 cm, divided to two group 3-5 cm for 30 patients and 6-8 cm for 20 patients, as shown in figure 4.8.

Table 4.9 show measurement of thickness diameter of uterus were the range was from 2-7 cm, divided to two group 2-4 cm for 30 patients with 60% and 5-7 cm for 20 patients with 40 %, as shown in figure 4.9.

distribution of internal cervical was with two options open and close were the patients with open was 10 with 80% and patients with close 40 patients with 80% as shown in table 4.10 and fig 4.10.

Table 4.11 show measurements of cervical were the range was from 1-8 cm, divided to two groups 1-4 cm for 8 patients with 88.9% and 5-8 cm for one patient with 11.1%, as shown in figure 4.11.

Table 4.12 show ultrasound finding for all patients were the threatened abortion was higher frequency 16 with 32%, then incomplete abortion for 16 patients, while the missed abortion and molar pregnancy was lower frequency just one patient with 2% for each. As shown in figure 4.12.

Distribution of pregnancy outcome was with two continue and not were the patients with continue was 16 with 32% and patients with not continue 34 patients with 68% as shown in table 4.13 and fig 4.13.

## **5.2 Conclusion**

Ultrasound provided good diagnosis in complication of early pregnancy

The data show that the common problems in age between 23-27 years in house wife.

The vaginal bleeding in first trimester common occurs in gestation age between 5 to 8 weeks.

From this study the most cause of vaginal bleeding in first trimester of the patients were had Incomplete abortion and threatened abortion, where the least common complete abortion, inevitable abortion, missed abortion, ectopic pregnancy, molar pregnancy.

Threatened abortion associated with good outcome while in other causes of vaginal bleeding the pregnancy was failed.

Not continue pregnancy affected with incomplete abortion, missed abortion, inevitable abortion, ectopic pregnancy, molar pregnancy but continue pregnancy affected with threatened abortion.

### **5.3 Recommendations:**

- The routine early ultrasound seen for pregnant women is highly recommended following the international guide lines and protocols.
- The health care should offer the facilities to encourage the establishing of ultrasound machine over all obstetrical clinical centers for earlier detection of vaginal bleeding cause.
- TVs should be used in first trimester to provided good information and reduce the false positive and false negative result.
- The serologist and obstetrician should make continues follow up in cases of threatened abortion because it may have good outcome.
- Another research studies should be done with expanding environmental and include more sample data for precise and accurate results.

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# Appendices

**Sudan University**  
**Data collection sheet**

**Evaluation the Vaginal Bleeding causes in the First Trimester using  
ultrasonography**

**PT DATA:**

**1) Age:**

18-23 years ( )      24-30 years ( )      more than 30 years ( )

**2) Occupation distribution:**

House wife ( )      employee ( )

**3) Gestational age by LMP: .....**

**4) Number of pregnancy: .....**

**5) Past history of abortion: .....**

**Ultrasound finding:**

**6) Gestational age.....**

**7) Uterus.....**

**8) Uterine size:**

AP ( )      Transverse ( )      Th ( )      texture ( )

**9) Presence of mass:      yes ( )      No ( )**

**10) If yes:      solid ( )      soft ( )      cystic ( )**

**11) Cervical os canal internal:      open ( )      close ( )**

**12) Cervical dilation: .....**

**13) Threatened abortion ( )      Inevitable abortion ( )**

    Incomplete abortion ( )      Complete abortion ( )

    Missed abortion ( )      Ectopic pregnancy ( )

**14) Ovaries: .....**

**15) Pregnancy outcome:**

Continue ( )      not continue ( )



## Appendices



Image (1) Incomplete abortion for pregnancy woman 27years old with 10week pregnancy and intrauterine gestational sac with bleeding

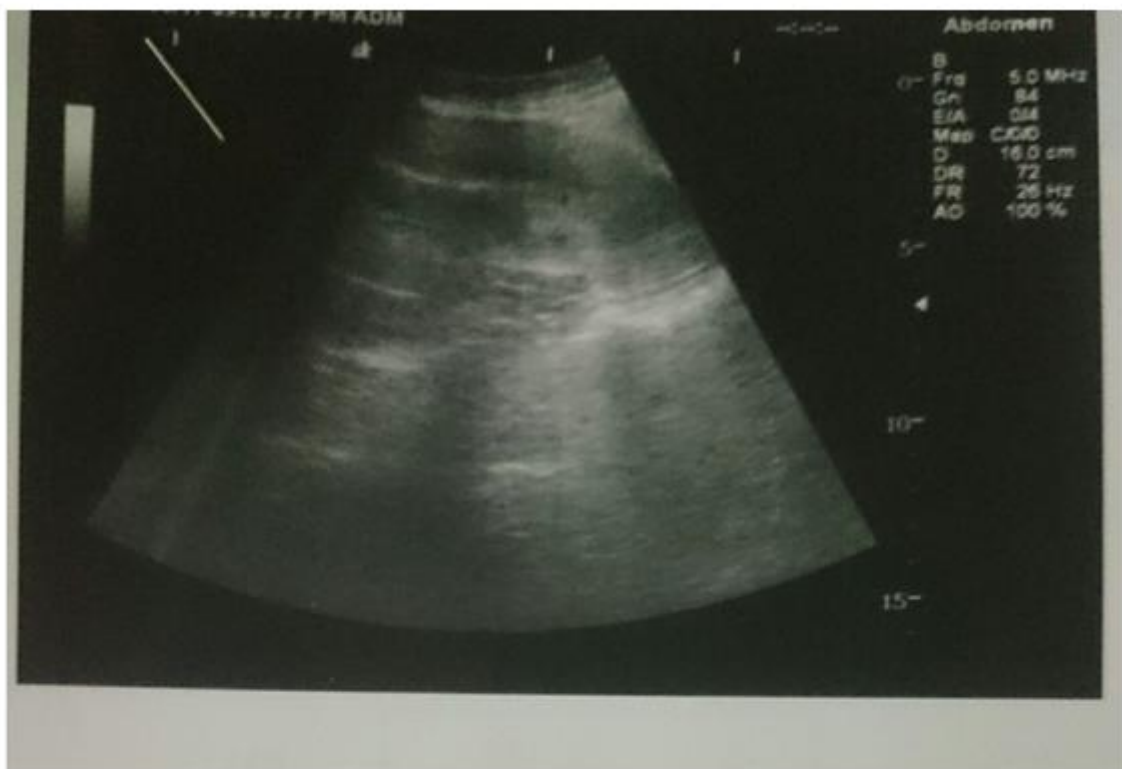


Image (2) Complete abortion for pregnancy woman 18 year old with 7 week pregnancy



Image (3) Threatened abortion for pregnant woman 27 year old with gestational age 9week



Image (4) Complete abortion for pregnant woman 20year old with gestational age 6week



Image (5) Ectopic pregnancy of 35 year old female ,8 week pregnancy complain of bleeding and cramping