Sudan University of Science and Technology

Faculty of Graduate Studies and Scientific Research

Study of Female Infertility in Sudanese using Ultrasonography

دراسة العقم عند النساء باستخدام التصوير بالموجات فوق الصوتية

A thesis Submitted for Partial Fulfillment of the Requirements of the M.Sc Degree in Medical Diagnostic Ultrasound

By:

Hasab-Elrasoul Awad-Alkarim Mustafa Abdallah

Supervisor:

Dr. Babiker Abdelwahab Awadallah Awadalseed

2019

Dedication

Every challenging work needs self efforts as well as guidance of elders especially those who were very close to our heart.

My humble effort I dedicate to my sweet and loving

Father & Mother

Whose affection, love & encouragement make me able to get such success and honor,

Acknowledgement

First of all I would to thank Allah for all his support.

Special thanks to **Dr. Babiker Abdelwahab** who provided guidance, encouragement, useful suggestion throughout the course of preparing for the research.

Abstract

This was a prospective cross sectional study population consisted of 125 female scanned using SIUI Apogee ultrasound machine endovaginally all female had infertility women who sought medical help in Wadmadani city, Sudan. From August 2019 to November 2019. Collection of data was performed by means of a specifically data sheet; It included questions concerning the causes of infertility.

The main results regarding type of infertility 68.8% primary infertility and 31.2% secondary infertility. Regarding age, 3.2 % were 15-20 years old, 54.4% were 21-30 years old, 42.2% were 31-40 years old. As to occupation status, 28% were employee and 72% were house wives.

Regarding socioeconomic status 39.2% were high, 50.4% were moderate and 10.4% were low. Concerning the causes of infertility, 76% were due to PCOD, 16.8% were due to fundal fibroid, 4% were due to hydrosalpenx, 1.6% were due to endometrioma and 1.6% were due to others (dermoid cyst, cervical polyp), 51.2% had menstrual disorders. Concerning the risk factors 80.8% had a positive risk factors (obesity 77.6%, psychological factor 28.8%).

The objective of this study to study the female infertility using ultrasound , to find the relationship between frequency of incidence and different risk factors.

Study concluded that the main causes of female infertility are problems in the ovaries, uterus and fallopian tubes.

Study recommend all mass must be seen by Doppler machine because the color Doppler playes an important role in diagnosis and differentiated benign from malignant masses by measuring the resistive index of the mass.

المستخلص

دراسة احتمالية لعينات مقطعية تتكون من 125 أنثى باستخدام جهاز الموجات فوق الصوتية SIUI عبر المهبل ، لكل النساء المصابات بالعقم وقابلن اطباء في مدينة ودمداني، جمهورية السودان، من شهر اغسطس 2019 الي شهر نوفمبر 2019 ، جمع البيانات أنجز بورقة رئيسية تحتوي علي اسئلة عن أسباب العقم .أدخلت البيانات وتم تحليلها باستخدام الحزمة الإحصائية للعلوم الإجتماعية.

النتائج كالاتي: معظم النساء لديهن عقم اساسي 68.8 % و 31.2 % عقم ثانوي.

الاعمار كالاتي: 3.2 %كانت أعمارهن بين 15 – 20 سنة و 2.42 %كانت اعمارهن بين 31 – 40 سنة .

بالنسبة للعمل 28 % عاملات 72 % , كن ربات منزل و بالنسبة للوضع الاجتماعي 39.2% عاليات الدخل 50.4 % متوسطات الدخل و 10.4 % محدودات الدخل.

الأسباب: 76 % تكييس المبايض ، 16.8 % لحمية الرحم، 4 % نتيجة وجود التهاب الانابيب، 1.6 % و امراض بطانة الرحم 6.1 % لأسباب متفرقة 2.51% الديهن اضطرابات في الدورة .اما بالنسبة لعوامل الخطر 80.8 % عوامل خطورة وهذه العوامل تشمل السمنه والتاريخ العائلي 77.6 % يعانين من و28.8 % عوامل نفسية

الغرض من الدراسة تحديد اسباب عقم النساءباستخدام الموجات فوق الصوتية ومعرفة نسبة الحدوث وعلامات الخطر.

الخلاصه :أسباب العقم عند النساء مشاكل في المبايض، الرحم، قناة فالوب.

الدراسة توصي باستخدام الدوبلر لمراجعة الاورام لانه يفرق بين الورم الحميد والخبيث بقياس مؤشر مقاومة الورم.

List of contents

Chapter Three

Methodology

Chapter Four

Results

Chapter Five

Discussion, Conclusion and Recommendations

List of tables

List of Figures

List of abbreviations

EVS	Endovaginal Sonography
FSH	Follicular Stimulating Hormone
LH	luteinizing Hormone
Mm	Millimeter
MR	Magnatic Resonance
PCOD	Poly Cystic Ovarian Disease
PID	Pelvic Inflammatory Disease
TAS	Transabdominal Sonography
US	Ultrasound

Chapter One

Introduction

Chapter One

Introduction

1.1 Introduction

Infertility is not usually considered valid until after one year of engaging in sexual relations without contraception (unprotected sexual intercourse). About 40% of infertility cases are due to male factors, about 40% to female factors, and the remaining 20% to a combination of male and female factors. The cause of infertility include sperm problems, ovulatory failure, tubal damage, endometriosis, coital problems, abnormal cervical mucus, and other miscellaneous causes. Of note, the most common causes of infertility includes disorders unable to be diagnosed with diagnostic ultrasound (Devin Dean 2005).

Sonography contributes to the diagnosis and management of infertility in the following ways:evaluation of gynecologic diseases associated with infertility,timing of ovulation ,evaluation of tubal patency ,guidance of interventional procedures.

Following are conditions associated with infertility in which pelvic ultrasound generally plays a role in diagnosis or follow up evaluation:endometriosis (e.g. endometrial cysts) ,pelvic inflammatory disease (e.g. hydrosalpinx) ,congenital (mullerian) anomalies of the uterus (e.g. septate uterus), myomatous disease of the uterus ,polycystic ovarian disease

Infertility is divided into primary and secondary infertility. Definitions of primary infertility vary between studies, but the operational definition, put forth by the WHO, defines primary infertility as the "Inability to conceive within two years of exposure to pregnancy (i.e.-sexually active, non-contracepting, and non-lactating) among women 15 to 49 yr old". Secondary infertility refers to the inability to conceive following a previous pregnancy (Mittal A et al ,2015).

1.2 Problem statement:

A lot of women attended in gynecological departments complaining of infertility . the number increased recently. in appropriate investigation leading to delay in proper management.

1:3 Objectives of study:

1:3:1 General Objective:

Study of Female Infertility in Sudanese using Ultrasonography

1:3:2 Specific objectives:

To study female Infertility using ultrasound, to correlate the causes of female infertility with age , to correlate the causes of female infertility with risk factor, to correlate the causes of female infertility with psychological states and to evaluate the role of US in diagnosis infertility in women.

CHAPTER TWO

Literature review and previous Studies

CHAPTER TWO

Literature review and previous Studies

2.1 anatomy:

2.1.1 The ovaries:

The ovary is divided into an outer cortex, and a central medulla. The cortex contains ovarian follicles in different stages of development, the corpus luteum, stromal tissue, and remnants of "burnt out" secondary follicles (atretic follicles) and corpus luteal(corpus albicans).

The medulla contains the larger vascular elements (ovarian artery and vein, and lymphatic) and connective tissue .With both TAS and EVS, the ovaries typically appear as distinct adnexal ovoid structure, texture similar to myometrium. In the menstruating adult woman, a normal ovary is seen to contain follicles in different stages of development depending on the phase of the menstrual cycle. The ovaries prior to puberty and in postmenopausal patients are smaller and generally more difficult to visualize because they usually lack any detectable physiologic cystic components. Ovarian follicles vary in size and maturity. Primary (primordial) follicles are small cellular complexes without a fluid-filled antrum . Secondary follicles develop a fluid-filled antrum (cavity) which becomes sonographically detectable as small subcortical cysts when they reach a diameter of 12 mm. There is normally only one secondary follicle which grows to maturity and ovulation,this secondary follicle is known as the dominant(Graafian) follicle (Devin Dean 2005).

The position of the ovary is quite variable and dependent on the position and size of the uterus since the ovary is connected to the cornu of the uterus by the ovarian ligament. In the majority of women, the ovaries will be seen in the adnexa posterolateral to the body of the

uterus. Ovaries are quite mobile and may be seen anywhere in the pelvis or lower abdomen, especially in multiparous women(Devin Dean 2005).

Ovarian Volume (cc) = L x AP x W x 0.5

length (L), antero-posterior dimension (AP), width or transverse dimension (W).

The size of the normal ovary is most dependent on the age group of the patient (the ovary exhibits only minor changes in volume with the menstrual cycle). The ovary gradually increases in size during infancy and attains its largest volume during the reproductive years; after menopause, the ovary gradually atrophies.. The normal ovary may not be visualized for a variety of reasons but the most common reason is an ovary which lies beyond the range of the transducer's display or interference by gas containing bowel between the transducer and the ovary . Other factors include previous oophorectomy (history is important!), or an ovary which is relatively small and difficult to visualize (before puberty and after menopause) (Devin Dean 2005).

2.1.2 The Fallopian tubes:

The two uterine (Fallopian) tubes lie on each side of the uterus in the upper margin of the broad ligament (mesosalpinx) ,they are 10cm(4 in) long, consists of four main parts intramural isthmus ampulla and fimbria(Devin Dean 2005).

Each tube continuous laterally with the **isthmus**, which is 1 to 5mm wide and 3 cm long, and is rounded, muscular and firm. Its lumen is narrow and exhibits three to five longitudinal major folds with a variable degree of relatively simple secondary folding. The isthmus is continuous laterally with the **ampulla**, the widest portion of the tube with a maximum luminal diameter of 1cm. The ampulla is 5cm long and has a thin wall and a tortuously folded luminal surface

marked by 4 to 5 major longitudinal ridges on which lie secondary folds, creating an extensive, labyrinthine surface area Typically, fertilization takes place in its lumen. The ampulla opens into the funnel-shaped **infundibulum** at the abdominal ostium.Numerous mucosal finger-like folds, 1mm wide, the **fimbriae**, are attached to the ends of the infundibulu(Devin Dean 2005).

2.1.3 The uterus:

The uterus is anatomically divided into three parts - fundus, body, and cervix(Devin Dean 2005).

2.1.3.1 The Fundus:

Is the roof of the uterus. It is the part of the body which extends above the insertion of the fallopian tubes in the uterine wall. The cornu of the fundus is the lateral part which contains the interstitial portion of the fallopian tube. The fundus is the widest and thickest part of the uterus (DevinDean2005).

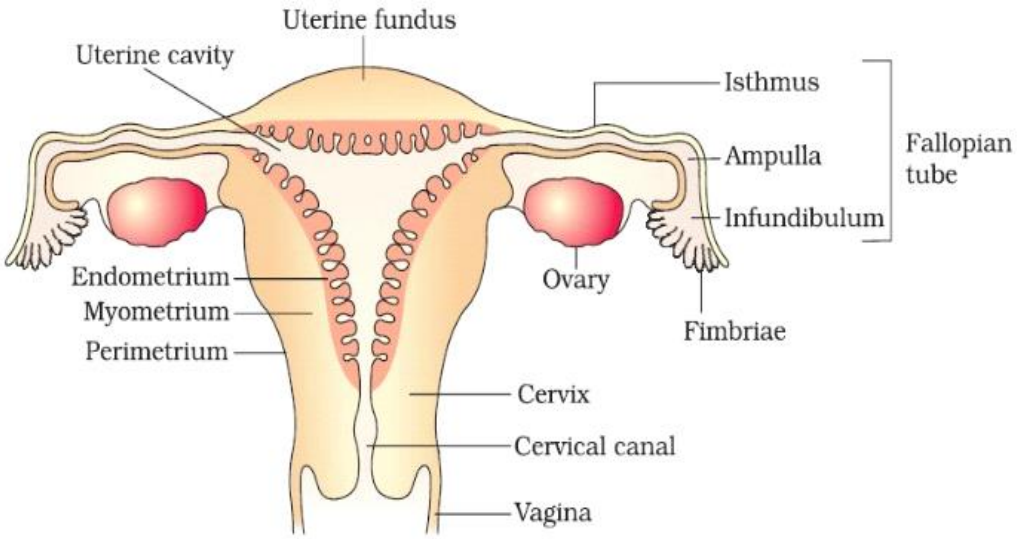

Figure No (2-1) Anatomy of female reproductive system (Steinkeler et al, 2009)

2.1.3.2 The Body :

The body is the uterus above the cervix. The body consists of the bulk of the uterus. In an adult uterus the body is wider and longer than the cervix.

About two third of uterine fundal to cervical length is attributable to the body (Devin Dean 2005).

2.1.3.3 The Cervix:

The cervix is the lower one-third of the uterus. It is composed mainly of fibroelastic tissues rather than smooth muscle. The transition point between the corpus and cervix is known as the internal os and the other end of the cervix is known as the external os. isthmus is the upper few millimeters of the cervix below the internal os, an area to which the specific function of developing into the "lower segment" of the gravid uterus has been discribed. The opening in the cervix is known as the endocervical canal. It is contiguous with and freely communicates with the uterine cavity at one end, and the vaginal cavity at the other. When the bladder distends and drapes the uterus, the cervix is identified on transabdominal scans by its location immediately behind the posterior angle of the bladder. On trans abdominal scans, the external os is roughly located at the level of the superior border of the symphysis pubis (Devin Dean 2005).

2.2 Tissue layers of the Uterus:

The endometrium (mucosa) is the inner most layer of the uterus which lines the uterine cavity. The endometrium is a mucous membrane which serves as the normal implantation zone for the human blastocyst. The endometrium lines the body of the uterus, including the funds however it does not line the cervix. The endometrium consists of two layers, namely the functional layer and the basal layer. The functional layer or stratum functionalis consists of endothelium, glands and stroma. This is the superficial layer of the endometrium (adjacent to the uterine cavity) .The basal layer is very thin and contains the closed or blind ends of the glands. This basal

layer is supplied and drained by the basal arterioles(Devin Dean 2005).

The sonographic appearance of the normal endometrium varies with the phase of the menstrual cycle and is strongly dependent on the effects of estrogen and progesterone. The two parameters that can be seen to vary significantly are thickness and the appearance of the functional layer, the basal layer is relatively constant in thickness and texture throughout the cycle. The endometrium appears thinnest during the menstrual and early proliferative phases; there is gradual thickening during the proliferative and early secretory phases, with maximum thickness achieved around the mid secretory phase (Devin Dean 2005).

The Myometrium: The myometrium is the middle and thickest tissue layer of the uterus. It is made up of smooth muscle arranged in three zones to optimize uterine contractility during labour and delivery.The three zones are referred to as inner, middle, and outer. The inner or internal zone of myometrium consists largely of longitudinal and circular fibres. The outer or external zone consists mainly of longitudinal fibres that pass over the fundus and converge at the cornua.The middle or intermediate zone is the thickest, consisting of two principal groups of symmetric smooth muscle, each arising in each uterine cornu(Devin Dean 2005).

In general, the myometrium appears as a tissue with a uniform echo texture consisting of low to moderate echo amplitude. Myometrial inhomogeneity is a sign of abnormal tissue and may be associated with several diseases (Devin Dean 2005).

The Perimetrium: The peri is the outer tissue layer covering the body of the uterus. This layer is a thin serous lining which represents the visceral layer of the peritoneum. The perimetrium is continuous with

the broad ligament which stretches laterally on both sides towards the pelvic side walls. The perimetrium only covers the vesicular (bladder) surface of the uterus up to about the level of the internal os, however it reflects over the entire rectal surface of the uterus including the cervix. The perimetrial surfaces of the uterus should appear smooth. Irregularity of the perimetrium is an abnormal finding and associated with several uterine diseases) (Devin Dean 2005).

The Uterine Cavity: The endometrium lines the central cavity of the uterus known as the uterine or endometrial cavity. The normal uterine cavity is usually empty and appears on TAS and EVS as a central echoes. This stripe should always be seen when the uterus is empty however it may be difficult To visualize for technical reasons. The empty uterine cavity is a specular reflector which means display of the echo is very dependent on the angle of incidence (Devin Dean 2005)

Uterine Position: Several ligaments support and maintain the uterus in a midline position The broad ligament is a double fold of peritoneum attaching the uterus to the right and Left pelvic side walls .Uterine blood vessels, the ureters, and nerves pass between the Tow leaves of the broad ligament . The uterine tubes course in the cranial "free" margins of the broad ligaments ,The round ligament (of the uterus) arises from the anterior cornual region of the uterus and courses forward and downward to pass in the inguinal canal and insert in the labia major; it is the key ligament maintaining the normal uterus in an anteverted position .The uterosacral ligament courses from the posterior surface of the cervix to the front of the sacrum. The transverse cervical or Cardinal ligament courses laterally from the uterus and vagina to a wide insertion in the lateral pelvic wall .The ovarian ligament attaches the ovary to the cornual region of the uterus; consequently changes in uterine position and size have a direct affect on the position of the ovary . The

normal, non gravid uterus is located in the midline posterior to the urinary bladder and small bowel, and anterior to the rectum. In the majority of women, the fundus is directed anteriorly and the cervix posteriorly with a slight bend between the axis of then body and cervix (i.e. anteverted and slightly anteflexed). When describing uterine position, version and flexion are used (Devin Dean 2005).

Uterine Measurements: Potential uterine measurements include uterine and cervical length, anteroposterior (AP) and transverse diameters of the body and cervix, AP and transverse diameters of the cervix, endometrial thickness, and uterine volume. Most practitioners routinely measure only uterine length.

Endometrial thickness should be measured. it is usually measured in postmenopausal women and infertility patients (Devin Dean 2005).

Uterine length: Should be measured from the external os to the serosal surface of the fundus in an appropriate image through the centre of the uterus. This measurement is more difficult to perform with EVS since the image display area is smaller than accorded with TAS transducers. The mean length of the normal, non gravid, nulliparous uterus in a patient of reproductive age is about 7.5 cm. Parity status has the greatest effect on the size of the non gravid, non diseased uterus, e.g. woman who has given birth to four children (multiparous will have a uterus which is significantly larger than a nulliparous uterus). The postpartum uterus takes approximately four to six weeks to return to a pregravid size after parturition (delivery). The AP diameter of the uterus may be measured on an appropriate sagittal or transverse TAS image and on an appropriate sagittal or coronal EVS image of the body near the fundus. Calipers are placed on the near and far side perimetrial surfaces of the uterus

for the AP measurement and on the right and left uterine surfaces for the transverse measurement(Devin Dean 2005).

The Endometrial Thickness: Endometrial thickness should be measured on a sagittal (long axis) TAS or EVS image of the uterus. the standard endometrium thickness measurement is the widest anteroposterior diameter of the double thickness of endometrium (near the fundus). The measurement cursors should be positioned at the myometrium-endometrium boundary perpendicular to the axis of the uterine cavity.

Pitfall :The inner myometrium (hypoechoic myometrial halo) should not be included in the endometrial measurement.

Normal post pubertal endometrial thickness is very dependent on the phase of the menstrual cycle. During the proliferative phase, the normal endometrium typically measures 2-8 mm. During the secretory phase, the endometrium gradually thickens and measures 8-14 mm. In postmenopausal women, the normal, un stimulated endometrium should be thin and typically measures less than 5 mm. Uterine Size and Body-to-Cervix Proportions uterine size and shape vary with the age, parity, and the patient's endocrinologic status(Devin Dean 2005). Neonatal Uterus - The uterus may appear relatively large in a neonate due to the influence of maternal and placental estrogen on the fetus. At birth, the uterus begins to gradually atrophy to an infantile size. Infantile Uterus – The mean length of the infantile uterus is about 3 cm. The cervix to body ratio is approximately two to one (2/3 of the uterine length consists of cervix). At about 7 years of age, the uterus begins to gradually increase in size and attains adult proportions at puberty. The endometrium is thin throughout infancy. Post pubertal Uterus - at puberty, with the full production of estrogen, the uterus grows and attains adult size and body-to-cervix proportions. The body gains the most bulk and is longer and wider than the cervix. The cervixto-body ratio is

approximately one-to-two (1/3 of the uterine length consists of the cervix; these proportions are inverse of the infantile uterus(Devin Dean 2005).

The endometrium undergoes cyclic thinning and thickening during the menstrual cycle. Postmenopausal Uterus - Menopause typically occurs at the beginning of the fifth decade of life although it may occasionally occur before this or be delayed. At menopause, the uterus begins to atrophy gradually due hypoestrogenism. Most of the`seventh and eighth decade, the cervix typically appears larger than the body (Devin Dean 2005).

Effects of Parity - Normal uterine size in the reproductive years is significantly affected by parity. In general, the greater the parity, the larger the size of the normal, non gravid uterus (Devin Dean 2005).

2.3 The vagina:

The vagina is a tubular structure lined with a mucous membrane. The opening of the vagina is called the introitus. The vagina extends from the introitus to the cervix, the canal of the vagina is normally collapsed. It is situated between the urinary bladder and the rectum. It is directed superiorly and posteriorly, where it attaches to the cervix ,the vagina surrounds approximately the outer two thirds of the cervix ,the vaginal canal between the cervix and the vaginal wall is known as a fornix , including anterior, posterior, right and left lateral components. The posterior fornix extends more cranially (deeper) than the anterior and two lateral fornices. The posterior fornix is intimately related to the posterior cul-de-sac which extends behind it. The anterior cul-de sac is smaller than its posterior counterpart and does not as closely related to the anterior fornix.. The vagina is anchored in the midline between the lower aspect of the urinary

bladder anteriorly and rectum posteriorly. Although the position of the vagina is unaffected by bladder distention, it may be elongated by a filled bladder.

The long axis of the vagina is approximately perpendicular to the long axis of the anteverted uterus when the bladder is empty (Devin Dean 2005).

2.4 Reproductive physiology:

In the normal female between the age of 9 and 16, cyclic changes occur in the ovaries and the uterus in response to endocrinologic activities. 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 ovary are known as the ovarian cycle whereas those 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 in which the blastocyst can implant and develop properly. 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 phases. It is customary to assign the first day of menstruation as the first day of the cycle. (Devin Dean 2005).

2.4.1 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.

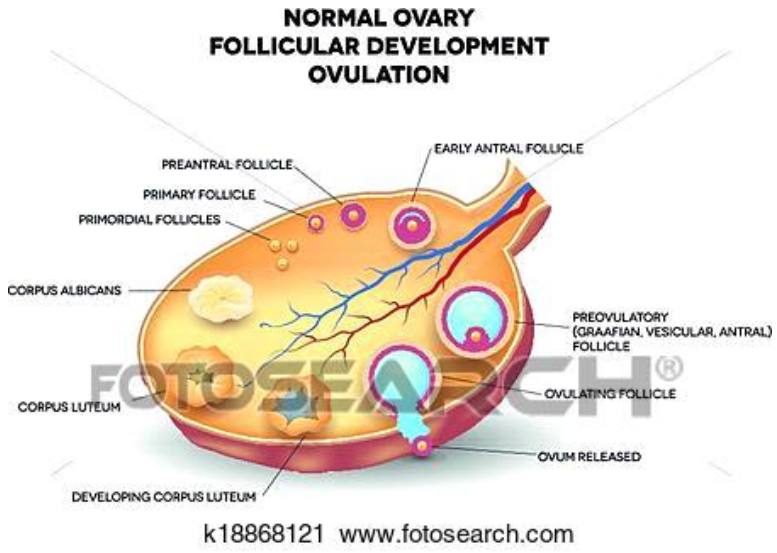

Figure No (2-2) Normal ovary follicular development ovulation (Steinkeler, 2009)

With each menstrual cycle, there is usually only one mature follicle, known as the dominantor Graafian 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.

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

If fertilization does not occur, the CL undergoes regressive changes, progesterone output is diminished, and by the end of the cycle complete regression occurs. The failing CL triggers endometrial sloughing, and menstrual bleeding ensues. The end point of the regressing CL is the

corpus albicans, which is a small fibrous area in the cortex of the ovary (Devin Dean 2005).

2.4.2Endometrial Cycle

With each menstrual cycle, and in step with ovarian activity, 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 along with blood, passes into the vagina. Following menstruation, new functional layer begins to form from the basal layer. Primed by estrogen secreted by the ovary, the endometrium progressively thickens throughout the proliferative and secretory phases.

Following ovulation and the formation of the CL, 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, begins 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 purposes 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 reality the length of the normal menstrual cycle may vary (Devin Dean 2005).

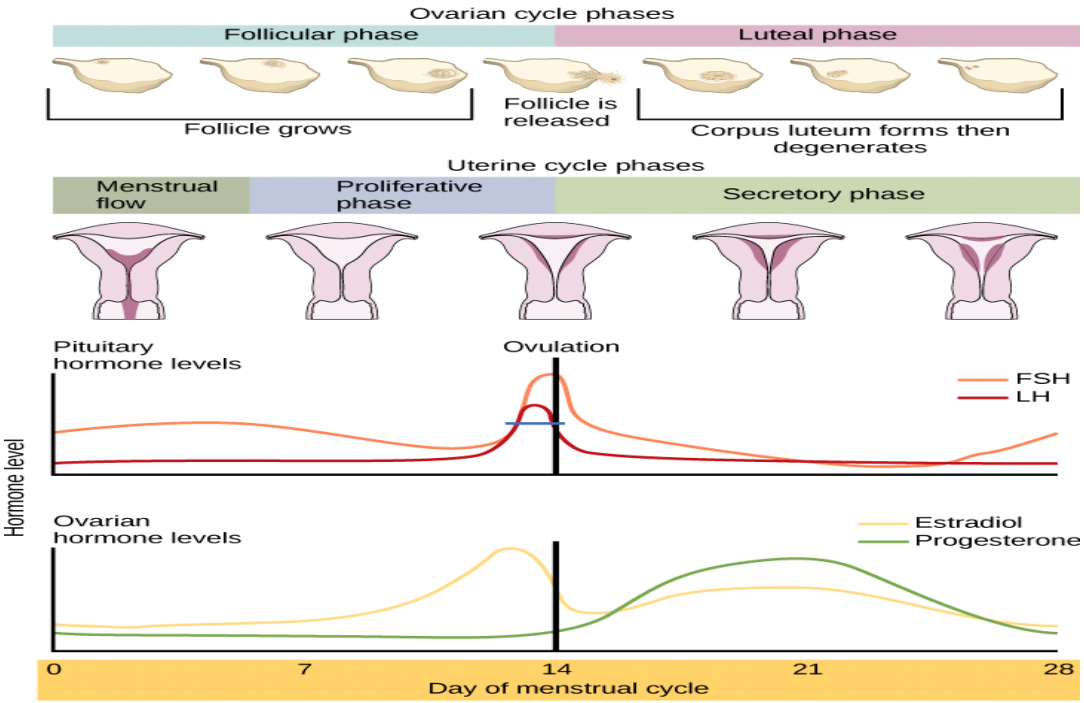

Figure No (2-3) Ovarian cycle phase and uterine cycle phase (Steinkeler et al, 2009)

2.5 Pathology:

2.5.1 causes of infertility:

Fallopian Tube Abnormalities: Fallopian tube abnormalities are the most common cause of female infertility, accounting for 30%–40% of cases (Steinkeler et al, 2009)

Tubal Occlusion, Tubal Irregularity, Peritubal Abnormalities (Steinkeler et al, 2009)

Hydrosalpinx is an obstructed, non tender, fluid-distended, fallopian tube most commonly associated with chronic PID. Other causes of hydrosalpinx that have been reported in the absence of a known history of pelvic infection include previous tubal sterilization and hysterectomy (Devin Dean 2005).

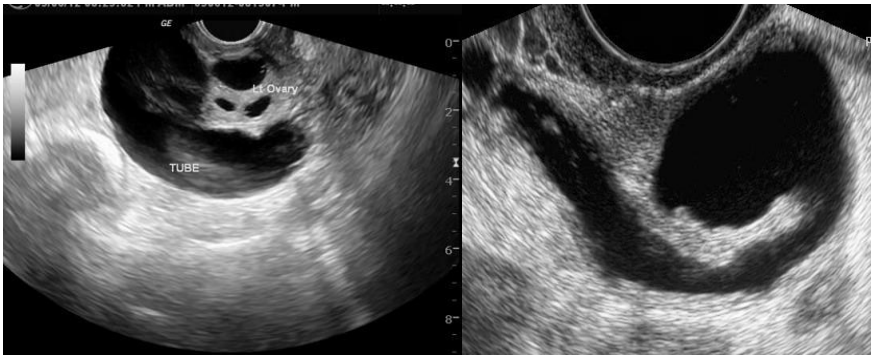

Figure No (2-4) Ultrasound image for hydrosalpinx (Steinkeler et al, 2009)

1. The patient does not present with symptom etiology referable to acute PID. Patient may present with infertility.

2. Wall Structure:

Incomplete septum/septa (same as pyosalpinx).

"Beads-on-a-string" sign: defined as small echogenic mural nodules(measuring about 2-3 mm) seen on the crosssectional view of a hydrosalpinx. The "beads" represent degenerated and flattened endosalpingeal fold remnants outlined by the luminal fluid. This pattern is only evident with mildly or moderately fluid-distended tubes because with gross tubal distension, the endosalpingeal folds are too compressed to be detected as mural nodules.Wall thickness: usually thin, measuring less than 5 mm. Extent of ovarian involvement: None; if visualized, the ovary appears normal.

Pitfall: A hydrosalpinx may be so grossly distended that it appears as a spherical adnexal cyst rather than a more recognizable tubular structure. In such cases, a definitive diagnosis is unlikely since shape is an important distinguishing criterion (Devin Dean 2005).

Endometriosis: An estimated 30%–50% of women with endometriosis are infertile, and 20% of infertile women have endometriosis, a condition defined by the presence of endometrial glands and stroma outside the uterus (Steinkeleret al, 2009)

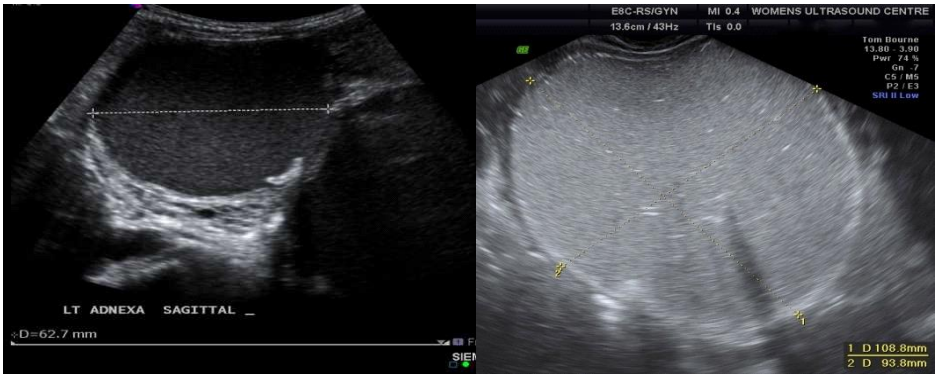

Figure No(2-5) Ultrasound image for Endometriosis (Steinkeler et al, 2009)

This condition almost exclusively affects women during their reproductive years. It may be asymptomatic or may cause multiple symptoms, including pelvic pain and infertility. Imaging tests for endometriosis include pelvic US and MR imaging. Endometriosis take the form of either small implants or cysts that change in size and appearance during the menstrual cycle and that may initiate an inflammatory response leading to fibrosis and adhesions. Endometriotic cysts, referred to as endometriomas, result from repeated hemorrhage within an implant (Steinkeler et al, 2009)

Leiomyoma: Leiomyomas (fibroids) are the most common neoplasms of the uterus. They occur in 20% to 30% of females over age 30 years40 and are more common in black women.

Fibroids are usually multiple and are the most common cause of enlargement of the nonpregnant uterus. Although frequently asymptomatic, women with leiomyomas can experience pain and uterine bleeding. Leiomyomas may be classified as intramural, confined to the myometrium; submucosal, projecting into the uterine cavity and displacing or distorting the endometrium; or subserosal, projecting from the peritoneal surface of the uterus (Rumak,c.et al 2011)

Leiomyoma sonographic features: Variable appearance. Hypoechoic or heterogeneous mass. Distortion of external uterine contour. Attenuation

or shadowing without discrete mass. Calcification. Degeneration or necrosis.

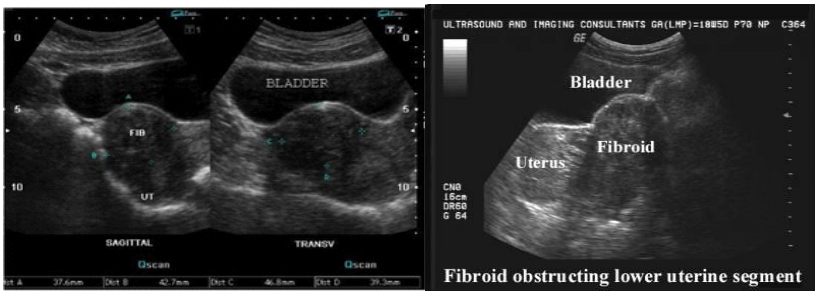

Figure No (2-6) ultrasound images for leiomyoma(fibroid) (Rumak,c.et al 2011)

Cervical Abnormalities: Cervical Factor Infertility The phrase cervical factor infertility connotes an inadequate quality or volume of cervical mucus, a condition that accounts for approximately 10% of cases of female infertility. Patients in whom the presence of this condition is suspected may be assessed with a postcoital test that does not involve imaging (Steinkeler et al, 2009)

Cervical Stenosis: Consequences of cervical stenosis include obstruction of menstrual flow with resulting amenorrhea, dysmenorrhea, and potential infertility due to inability of sperm to enter the upper genital tract . Cervical stenosis also may be a serious impediment to assisted fertility techniques including embryo transfer and intrauterine insemination (Steinkeler et al, 2009)

Ovarian Abnormalities: Ovarian causes of infertility include primary conditions such as nonfunctional ovaries, premature ovarian failure, and absence of ovaries (gonadal dysgenesis). These conditions are usually diagnosed on the basis of clinical and biochemical findings. Imaging is more valuable for diagnosing the secondary ovarian causes of infertility, which include polycystic ovary syndrome, endometriosis, and ovarian cancer. Pelvic US is usually performed for initial evaluation of the ovaries. Polycystic ovary syndrome reportedly affects approximately 8%

of women and may be one of the most common causes of female infertility (Steinkeler et al, 2009)

Polycystic Ovarian Disease (PCOD): PCOD is a complex endocrine disorder characterized by chronic anovulation associated with elevated serum androgen levels (hyperandrogenemia) and unbalanced elevations of serum LH levels (PCOD is the most common cause of chronic anovulation).

The clinical and sonographi cmanifestations 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-Leventhal syndrome is the clinical manifestation of PCOD associated with obesity, hirsutism, and amenorrhea. Stein-Leventhal syndrome spans a wide array of clinical manifestations including anovulation and infertility in addition to the classic triad of obesity, hirsutism, and amenorrhea.

Women with Stein-Leventhal syndrome represent only a small subset of all women with PCOD although the names are often used interchangeably. At the root of this disorder is inappropriate development of ovarian follicles with over activity of the thecal layerproducing androgens that fail to be converted by granulosa cells to estrogens. The subsequent androgen elevations may cause hirsutism and, because of the local effects of androgen on the ovarian follicle, premature regression of developing follicles. This results in the characteristic multi follicular (polycystic) ovary typically seen in women with PCOD(Devin Dean 2005).

Figure No (2-7) Ultrasound Image of PCOD (Rumak,c.et al 2011)

Women with PCOD are at risk for endometrial hyperplasia and endometrialcarcinoma due to chronic unopposed estrogen stimulation.

Hormonal findings 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 2.5:1(Devin Dean 2005).

Ultrasound/Doppler- Patients with PCOD typically have bilateral ovarian enlargement,numerous immature follicles without evidence of dominance (cysts <15 mm), and stromal hypertrophy with increased echogenicity. "An increase in the amount and echogenicity of the ovarian stroma distinguishes PC ovaries from the multifollicular ovary characteristic of normal puberty and hypothalamic anovulation." Ovarian volume in the diagnosis of PCOD has lessened in importance because various groups have reported demonstrating normal ovarian volumes in approximately one-third of patients(Devin Dean 2005).

There are two morphological patterns of polycystic ovaries including peripheral and generalized distribution of cysts. The peripheral pattern is referred to as the "necklace" or "string of pearls" pattern. Of note, the endometrium in patients with PCOD thickens even though ovarian production of estrogen is suppressed because estrogen is synthesized in extra-glandular sites such as fatty tissues(Devin Dean 2005).

Teratoma: Dermoid Tumors. Dermoid tumors are the most common ovarian neoplasm, constituting 20% of ovarian tumors. Up to 15% are bilateral. About 80% occur in women of childbearing age, but they may occur at any age. They are composed of well-differentiated derivatives of the three germ layers: ectoderm, mesoderm, and endoderm. In 10% of cases, the tumor is diagnosed during pregnancy. A rare dermoid that is composed of thyroid tissue is termed a stroma ovarii (thyroid tissue) and may produce insuppressible thyrotoxicosis. Malignant degeneration into squamous cell carcinoma is uncommon (2%) in teratomas, usually in older women.

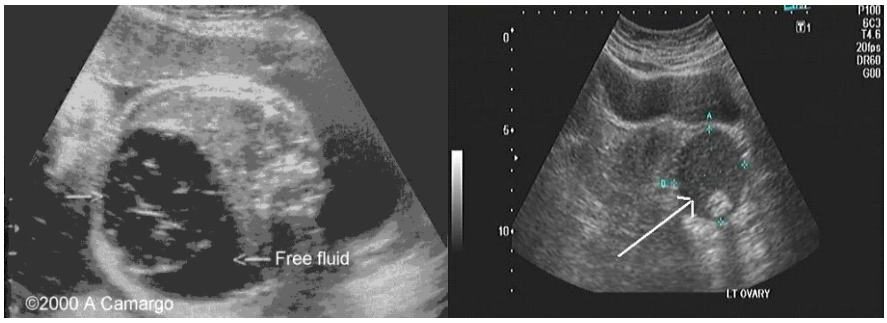

Figure No (2-8) ultrasound image for ovarian teratoma (Rumak,c.et al 2011)

Sonographic Findings. Dermoids have a spectrum of sonographic appearances, depending on which elements (ectoderm, mesoderm, or transderm) are present. Teeth, bones, and fat can be seen on plain films.

Clinical findings include abdominal mass or pain secondary to torsion or hemorrhage.

Sonography may demonstrate one of several patterns:

(1) a completely cystic mass, (2) a cystic mass with a very echogenic nodule along the mural wall representing a “dermoid plug,” (3) a fat-fluid level, (4) high-amplitude echoes with shadowing (e.g., teeth or bone), or (5) acomplex mass with internal septations. Echogenic dermoids are often confused with bowel, as the mass may have characteristics similar to those of complex bowel tissue with shadowing posterior.

If a palpable pelvic mass is present that is not identified on sonography, an echogenic dermoid must be considered and further imaging is usually performed. Indentation on the bladder wall will be a clue that a pelvic mass is present. The calcification within the pelvic cavity is also shown on the radiograph.

The term “tip-of-the-iceberg” refers to a mixture of matted hair and sebum producing ill-defined acoustic shadowing that obscures the posterior wall of the lesion. The “dermoid mesh” refers to multiple linear hyperechoic interfaces floating within the cyst and represent hair.

Acute hemorrhage into an ovarian cyst or an endometrioma may be so echogenic that it resembles a dermoid or a dermoid plug. Posterior sound enhancement is usually seen where a dermoid plug usually causes attenuation. Other pitfalls include a pedunculated fibroid or an appendicolith in a perforated appendix (Sandra L et al ,2012).

2.4 Previous Studies:

Alaina A et al 2007 found that The most causes of female Infertility Ovulation disorders (40%), Tubal factors (30%), Endometriosis (15%), Uterine/cervical factors (more than 3%), Other (about 10 percent) (moghadamet al 2013).

Mittal A et al 2015 found that on risk factors affecting female infertility in South Indian districts of Tamil Nadu and Kerala opine that there was a positive correlation between infertility and menstrual irregularit 34.1%.

The most common infertility period 40.4% were 1-5 years (steinkeler et al 2009).

Moghadam et al 2013 found that Polycystic ovary syndrome causes infertility in young women and provides 70% of unovulation infertility, and 15.6% of primary infertilities.Pelvic inflammatory occurs in 3.1% of primary infertility cases.Endometriosis has been involved with 12.5% of primary infertilities . Ovarian cyst was only detected in 6.3% of cases with primary infertility.The prevalence of uterine malformation is estimated to be 6.7% in general population, 7.3% in infertile women, and 16% in women with a history of recurrent miscarriages.ovulatory dysfunction was attributed in more than half (53%) of all women infertility cases. Irregular menstrual cycles, acanthosisnigricans, hirsutism, polycystic ovary syndrome. Obesity is strongly associated with female infertility mechanism underlying this relationship is largely unknown but it is clear that fat cells produce estrogen(A. sangamithra 2015).

Dr.A.Sangamithra and S.Bhavani Priyadarshini 2015 found that The proportion of infertile women in the 21-30 years age group which is 50% seems to be more than others, indicating the increasing trend of infertility in Coimbatore city. Overall, a higher proportion of younger rather than older women experienced infertility. In order to

check and confirm other social and environmental factors responsible for decrease in fertility the people who 17 employed and 83 not employed were also included in the study. It is clear from the data that women who are not going for job seems to be affected more from Infertility, out of 100 respondents only 17 women were engaged in different sort of jobs.

The BMI levels seem to affect infertility levels significantly. Infertility levels are higher amongthose who married late, had the worst health habits and were over weight or obese (Roupa Z et al 2009).

Roupa Z et al 2009 found that the causes of infertility in women at reproductive ageThe studied population consisted of 110infertile women Regarding age, 64.5% of the 110 women coming to the center of the Assisted Reproduction and agreeing to participate were 20-29 years old,20% of the infertility was due to menstrual disorders (Roupa Z et al 2009).

The second common cause (9.1%) of infertility was problems in the uterus(Roupa Z et al 2009).

Chapter Three

Research Methodology

Chapter Three

Methodology

3.1 Study design:

Descriptive cross-sectional study to evaluate the role of ultrasound in diagnosis of infertility.

3.2 Study area :

Wadmadani city

3.3 Duration of study:

From August 2019 to November 2019

3.4 Study population:

The study population consisted of infertile women who sought medical assistance.

3.5 sampling:

Sample type and size: coverage patients attending to hospital

Sample size is 125

3.6 material :

SIUI Apogee 1200 ultrasound machine

Transvaginal probe 7.5MHZ.

3.7 Variables of study :

Patient age Symptoms Risk factors. Socioeconomic status

Pariety Period of infertility ultrasound finding

3.8 Inclusion criteria :

All patient under 40 years age were suffering from infertility.

3.9Exclusion criteria:

Normal women and patient above 40 years.

3.10Methods of data collection:

For data collection, a specially data sheet for the purpose of the research was used. The questionnaire included both the demographic characteristics of the population and questions regarding the causing factors of infertility.

by using transvaginal transducer 7.5 MHZ .

For gynecological EVS evaluations, the patient's bladder should be empty since this allows close proximity of the vaginal transducer to the body of the anteverted uterus.

3.11 Patient Position

Ideally, an EVS 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 amounts of intra peritoneal free fluid, a minor reversed Trendelenburg position is 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's 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.

3.12 Data Collection sheet

Data Collected using special data sheet designed to evaluate the infertility in women

3.13 Data Analysis

Data was analyzed using the Statistical Package for the Social Science (SPSS), version 20.

Then cross tabulation to correlation btween the variables

2.14 Ethical considerations:

Verbal Consent taken from hospital and population under the study.

Chapter 4

Results

Chapter 4

Results

Table No (4.1) Frequency distribution of patients age

Age	Frequency	Percent
15-20	4	3.2
21-30	68	54.4
31-40	53	42.4
Total	125	100.0

Table No (4.2)Frequency distribution of Patient Occupation

Occupation	Frequency	Percent
employee	35	28.0
house	90	72.0
wife		
Total	125	100.0

Table No (4.3) Frequency distribution of socioeconomic

socioeconomic	Frequency	Percent
high	51	40.8
moderate	62	49.6
low	12	9.6
Total	125	100.0

Table No (4.4) Frequency distribution of infertility type

infertility type	Frequency	Percent
primary	86	68.8
secondary	39	31.2
Total	125	100.0

Table No (4.5) Frequency distribution of parity

parity	Frequency	Percent
1-5	39	31.2
>5	1	.8
no	85	68.0
Total	125	100.0

Table No (4.6) Frequency distribution of Last delivery

Last delivery	Frequency	Percent
1-5	32	25.6
>5	8	6.4
no	85	68.0
Total	125	100.0

Table No (4.7) Frequency distribution of infertility Period

Infertility Period	Frequency	Percent
1-5	95	76.0
>5	30	24.0
Total	125	100.0

Table No (4.8) Frequency distribution of Symptomatic_Existance

Symptoms	Frequency	Percent
no	45	36.0
yes	80	64.0
Total	125	100.0

Table No (4.9) Frequency distribution of patient pelvic_pain

Pelvic pain	Frequency	Percent
no	93	74.4
yes	32	25.6
Total	125	100.0

Table No (4.10) Frequency distribution of mensterual_disorder presence

Menstrual disorder	Frequency	Percent
no	61	48.8
yes	64	51.2
Total	125	100.0

Table No (4.11) Frequency distribution of menorrhagia existance

menorrhagia	Frequency	Percent
no	98	78.4
yes	27	21.6
Total	125	100.0

Table No (4.12) Frequency distribution of risk factors

risk factor	Frequency	Percent
no	24	19.2
yes	101	80.8
Total	125	100.0

Table No (4.13) Frequency distribution of psychological_factor

Psychological factor	Frequency	Percent
no	89	71.2
yes	36	28.8
Total	125	100.0

Table No (4.14) Frequency distribution of obesity_factor

obesity	Frequency	Percent
no	28	22.4
yes	97	77.6
Total	125	100.0

Table No (4.15) Frequency distribution of US finding

causes	Frequency	Percent
PCO	95	76.0
Fundal fibroid	21	16.8
Endometriom	2	1.6
Hydrosalpenx	5	4.0
Others	2	1.6
Total	125	100.0

Count obesity_factor * US finding Cross tabulation

			USfinding			Total
	PCO	fundal fibroid	endometrioma	hydrosalpenx	others	
no	20	5	0	3	0	28
Obesity factor						
yes	75	16	2	2	2	97
Total	95	21	2	5	2	125

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.345a	4	.254
Likelihood Ratio	5.414	4	.247
Linear-by-Linear Association	.688	1	.407
N of Valid Cases	125		

a. 7 cells (70.0%) have expected count less than 5. The minimum expected count is .45.

psychological_factor * US finding Cross tabulation

Count

				USfinding		
	PCO	fundal fibroid	endometrioma	Hydrosalpenx	others	Total
No	71	12	1	3	2	89
psychological_factor						
Yes	24	9	1	2	0	36
Total	95	21	2	5	2	125

Chi-Square Tests

	Value	Df	Asymp. Sig. (2- sided)
Pearson Chi-Square	4.156a	4	.385
Likelihood Ratio	4.513	4	.341
Linear-by-Linear Association	.557	1	.455
N of Valid Cases	125		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is .58.

Count US finding * age Crosstabulation

		age			Total
		15-20	21-30	31-40	
USfinding	PCO	4	63	28	95
	fundal fibroid	0	1	20	21
	endometrioma	0	2	0	2
	hydrosalpenx	0	1	4	5
	others	0	1	1	2
Total		4	68	53	125

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.227a	8	.000
Likelihood Ratio	39.959	8	.000
Linear-by-Linear Association	11.064	1	.001
N of Valid Cases	125		

a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .06.

Chapter Five

Discussion, Conclusion and Recommendations

Chapter Five

Discussion, Conclusion and Recommendations

5.1. Discussion:

It is a cross-sectional study where125 cases of infertile women attended to ultrasound department for investigation to determine the causes of infertility in Wadmadani hospital in the period of August 2019 to November 2019.

In this study the most common type of infertility is primary infertility which is 69%, and secondary infertility which is 31 % these observation are supported by a study done by(Mittal A et al at 2015) who found that 51.7% had primary infertility while 48.3% had secondary infertility.

The female infertility increases between 21-30 years of age which is 54.4% in agreement to study conducted by (Dr.A.Sangamithra and S.Bhavani Priyadarshini 2015) which found that 50% their age between 21-30years. And also similar to another study conducted by Roupa Z et al 2009 which found that 64.5% their age between 20-29 years old.

This study showed that most infertile women have moderate socioeconomic status49.6% of cases similar to study conducted by (Mittal A et al at 2015) which found that 43.6% had moderate socioeconomic status, most sudanease their income is moderate.

This study found that most infertile women are house wives 72 %Which is in agreement to study conducted by(Dr.A.Sangamithra and S.Bhavani priyadarshini at 2015) which found that 83% were not employed.

This study finds that most of patients have a period of infertility between 1-5 years 76.4% which is similar to the findings of (Mittal A et al at 2015) which found that most infertile women 40.4% with infertility period between 1-5 years.

This study finds that most of the patients are symptomatic 64% and the most common symptom is menstrual disorders which is 51.2% then pelvic pain which is 25.6% and this finding agree with study conducted by (Mittal A et al at 2015) which found that 34.1% of infertility was due to menstrual disorders. And also similar to another study conducted by (Roupa Z et al 2009) which found that 20% of the infertility was due to menstrual disorders.

This study finds that the most common causes of female infertility are PCOD in the 76% of the cases, while the second most common cause is fundal fibroid in the 17% of the cases the third most common cause is hydrosalpinx in the 4% of the cases, the forth is endometrioma in the 1.6% of the cases and others are1.6 % of the cases which is in agreement to study conducted by (Roupa Z et al 2009) which found that The second common cause (9.1%) of infertility was problems in the uterus. And also similar to another study conducted by (Alaina et al at 2007) which found that most causes of female Infertility: Ovulation disorders (including PCOD) (40 %), tubal factors (30 %), endometriosis (15 %), uterine/cervical factors (3%), other (about 10 %).

And also similar to another study conducted by (Moghadam et al at 2013) which found that Polycystic Ovary Syndrome (PCOS) causes infertility in young women and provides 70%. Pelvic inflammatory occurs in 9.9%, endometriosis has been involved with 11.8%.

This study finds that most patients have a positive risk factors which is 81% the most risk factors of infertility is the obesity which is 77.6% similar to study conducted by(Dr.A.Sangamithra and S.Bhavani Priyadarshini at 2015) which found that the BMI levels seem to affect infertility levels significantly. Infertility levels are higher among those who had overweight or obese. And also similar to another study conducted by (Moghadam et al.2013) which found that Obesity is

strongly associated with female infertility mechanism underlying this relationship is largely unknown but it is clear that fat cells produce estrogen.

This study shows that 28.8% of the patients have psychological problem which is not similar to study conducted by (Moghadam et al 2013) who found that association between female infertility and stress. Because most of Sudanese women are house wive so there is no stress and this factor had less effect on infertility.

5.2 Conclusion:

Child bearing and family are considered a right of every human being. Infertility is a health problem that requires appropriate treatment strategy. Modern medical science has developed advanced therapies to assist reproduction over the last 20 years.

The main causes of female infertility are the problems of the overy (PCOD), Fundal fibroid, PID, endometrioma, menstrual disorders.

The most risk factor that cause infertility is obesity then the psychological factor

Algazira state ministry of health must try to plan for helping this portion of the population and show interest, in order to allocate the necessary resources to solve it. The medical and socio-economic support of infertile women, which means easier access to medical services, higher insurance coverage, broader social support, and information are important requirements for resolving the problem.

5.3.Recommendations:

- Ultrasound is an important modality for early detection and diagnosis causes of infertility.
- All mass must be seen by Doppler machine because the color Doppler playes an important role in diagnosis and differentiated benign from malignant masses by measuring the resistive index of the mass.
- Not delaying parenthood: Fertility starts to decline after age 27 and drops at a somewhat greater rate after age 35.
- Preventing or treating existing diseases: Identifying and controlling chronic diseases such as diabetes hyperthyroidism and hypothyroidism increases fertility prospects. Regular physical examinations (including Papsmears) help to detect early signs of infections or abnormalities.
- Maintaining a healthy lifestyle: Excessive exercise, consumption of caffeine and alcohol, and smoking (tobacco and marijuana) are all associated with decreased fertility, hence should be avoided. Eating abalanced and nutritious diet,fruits and vegetables(plenty of folates) and maintenance of normal body weight are associated with better fertility prospects.

References:

A.Sangamithra and S.Bhavani Priyadarshini. Prevlance of different factors responsible for female infertility in Coimbatore.Shanlax International Journal of Economics,2015 . 3:49-55.

Alaina A. et al, infertility. American Family Physician, 2007 ,75:850-856.

Devin Dean, Gynacological ultrasound part3, edition one. The Burwin institute of Diagnostic Ultrasound 2005.

Mittal A et al, An epidemiological study of infertility among urban population of Ambala, Haryana. International Journal of Interdisciplinary and multidisciplinary Studies, 2015, Vol 2, 124-130.

.Moghadamet al . Epidemiology of Female Infertility; A Review of Literature . Biosciences Biotechnology Research Asia ,2013, 10 : 559-567.

Rumac,C.et al. Diagnostic ultrasound ,4th , Mosby, Inc, an affiliate of Elsevier Inc,United States of America. 2011,556-558.

Roupa Z et al,causes of infertility in women at reproductive age,health science ,2009,3:80-87.

Sandra L.et al.text book of diagnostic sonongraphy,7th, Mosby, Inc, an affiliate of Elsevier Inc, United States. 2012,1022-1023.

Steinkeler et al, Female Infertility A Systematic Approach to Radiologic Imaging and Diagnosis, radiographics,2009, 29:1353–1370.

Appendices

Appendix (I): Data collection sheet

Sudan University of Science and Technology

Faculty of Graduate Studies and Scientific Research

No ( )

1-Age /years

1. 15_20 ( ) 2. 21_30 ( ) 3. 31_40 ( )

2-occupation :

1. Employee ( ) . house wife. ( )

3-socioeconomic status :

1. High ( ) 2. moderate ( ) 3. low ( )

4-type of infertility :

1 .primary ( ) 2. secondary. ( )

5-Parity:

1. 0 ( ) 2. 1-5( ) 3.more than 5 ( )

6-last delivery:

1.1-5 ( ) 2.more than 5 ( )

7-period of Infertility. :

1. 1-5years ( ) 2. more than 5years ( )

8-clinical feature :

1. Symptomatic. ( ) 2. asymptomatic ( )

in case of symptomatic patient symptoms are

9. Menstrual disorder. 1. yes ( ) 2.No. ( )

10. pelvic pain: 1. yes ( ) 2.No ( )

11. vaginal bleeding: 1. yes ( ) 2. No. ( )

12 presence of risk factor :

1. positive risk factor ( ) 2. No risk factor ( )

13.obesiy:1. yes ( ) 2 . No. ( )

14.weight loss:1- yes. ( ) 2. No ( )

15.psychological:1-yes ( ) 2. No. ( )

16.Ultrasound finding :

1. PCO ( ) 2. fundal fibroid 3.endometrioma 4.hydrosalpenx 5.others ( )

Appendix (II): Ultrasonography

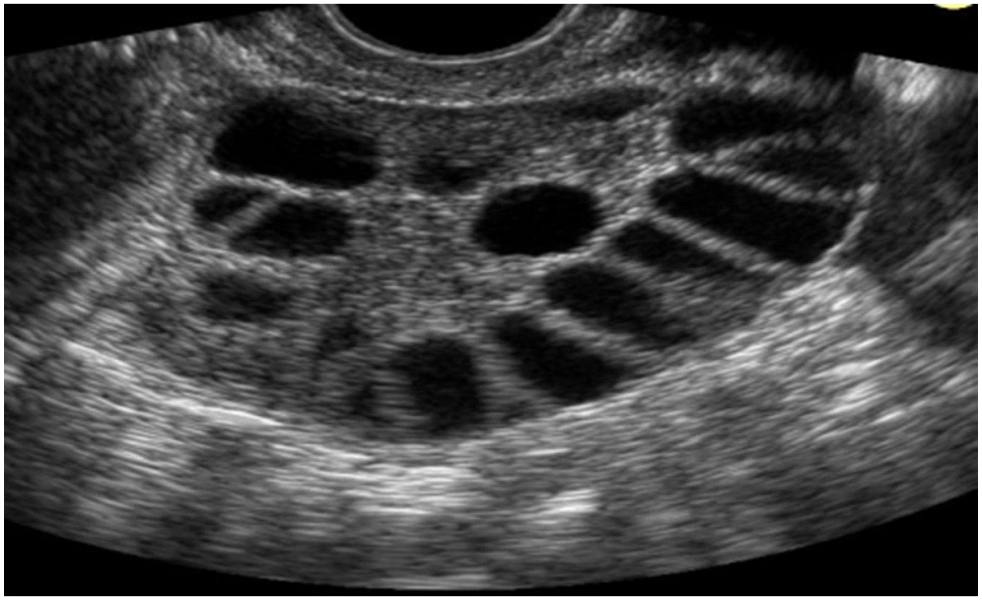

Image (1) Shows Transvaginal ultrasound image of poly cystic ovarian disease of 35 years patient

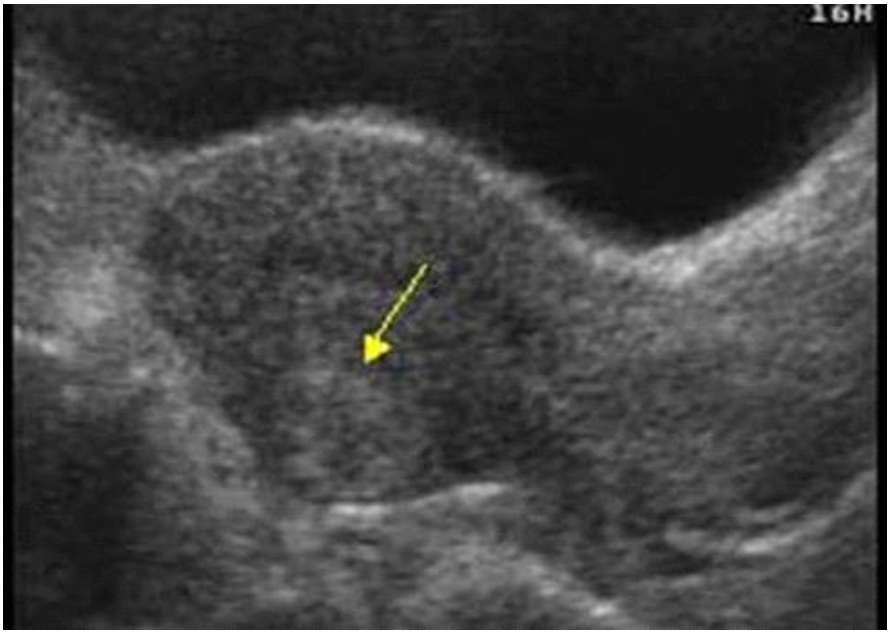

Image (2) Shows Transbdominal ultrasound image of uterine fibroid of 38 years patient

Image (3) Shows Transvaginal ultrasound image of Endometric cyst of 25 years patient.

Image (4) Shows Trans abdominal ultrasound image of Dermoid cyst of 25 years patient

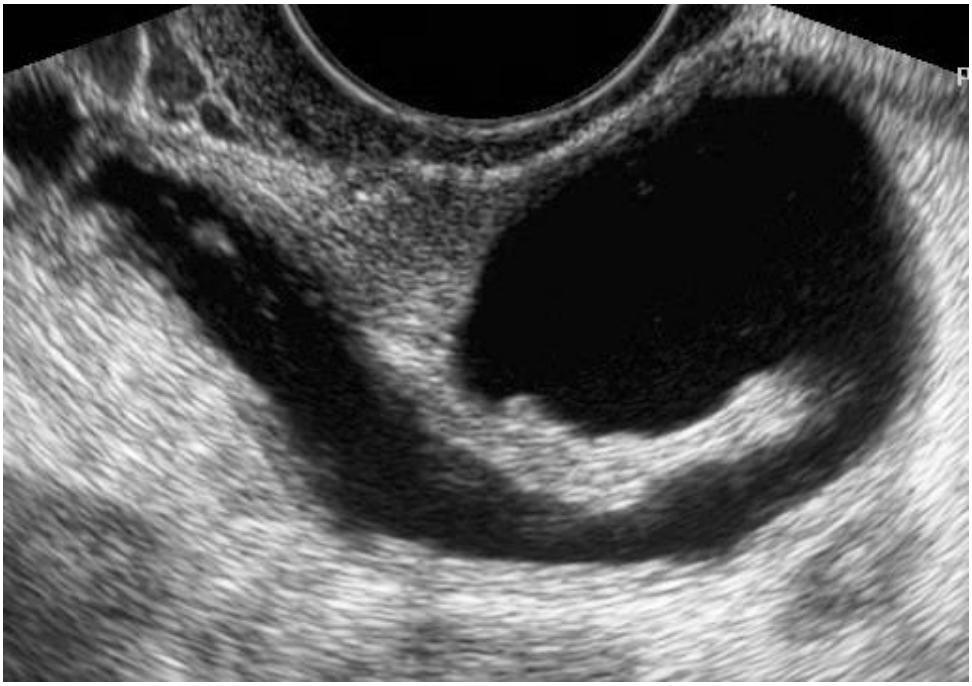

Image (5) Shows Transvaginal ultrasound image of Hydrosalpinx of 32 years