كلية الطب والصيدلة - مراكش
FACULTÉ DE MÉDECINE ET DE PHARMACIE - MARRAKECH
MARRAKECH
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# The correlation between ultrasonography and histology in endometrium pathology in postmenopausal bleeding

## THESIS

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BY

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Born on June 09th, 1995 in Marrakech

TO OBTAIN THE DEGREE OF DOCTOR OF MEDICINE

## KEYWORDS

Ultrasonography – Postmenopausal bleeding – Endometrial lesions – Histology – Diagnostic

## JURY

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بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

قَالُواْ سُبْحَٰنَكَ لَا عِلْمَ لَنَآ إِلَّا مَا عَلَّمْتَنَآ ۖ إِنَّكَ أَنتَ ٱلْعَلِيمُ ٱلْحَكِيمُ ﴿٣٢﴾

صَدَقَ ٱللَّهُ ٱلْعَظِيمُ

(سورة البقرة)

# *HYPPOCRATIC OATH*

***At the time of being admitted as a member of the medical profession,***

*I solemnly pledge to dedicate my life to the service of humanity;*

*the health and well being of my patient will be my first consideration*

*I will respect the autonomy and dignity of my patient*

*I will maintain the utmost respect for human life*

*I will not permit considerations of age, disease or disability, creed,*

*ethnic origin, gender, nationality, political affiliation, race, sexual orientation, social standing or any other factor to intervene between my duty and my patient;*

*I will respect the secrets that are confided in me, even after the patient has died;*

*I will practice my profession with conscience and dignity and in accordance*

*with good medical practice;*

*I will foster the honour and noble traditions of the medical profession;*

*I will give to my teachers, colleagues, and students the respect and gratitude that is their due;*

*I will share my medical knowledge for the benefit of the patient*

*and the advancement of healthcare;*

*I will attend to my own health, well being,*

*and abilities in order to provide care of the highest standard;*

*I will not use my medical knowledge to violate human rights and civil liberties,*

*even under threat;*

***I make these promises solemnly, freely and upon my honour.***

***Declaration of Geneva, 1948***

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# DEDICATIONS

*All the letters can't find the right words...*

*All the words cannot express my gratitude, my love and my respect*

*To all the people who have supported me during my journey,*

*Those who knew how to lift me up to reach my goals and achieve my dreams.*

*Also, it is with great affection that...*

*I dedicate this thesis to...*

*To Allah*

*The Almighty*

*Who inspired me*

*And guided me to the right path*

*I owe Him what I have become*

*Praise and thanks*

*For His clemency and mercy.*

## *To My Dearest Parents*

## *ES-SAHLI Malika and HAMIM Mustapha*

*To whom I owe everything after Allah, and for whom no dedication can express my deep love, and my infinite gratitude*

*for the huge sacrifices and sufferings that they have endured for my education, as well as for my well-being.*

*You have always been my role models, because throughout my life, I have only seen gentleness, goodness, honesty, humanism and seriousness.*

*You have always given me your time, your energy, your heart and your love.*

*I can say and without any doubt that you are the best parents a person could ever have.*

*Today, I hope to achieve dear mother and father -sweet creatures that you are- one of your dreams, knowing that all I could do or say could not equal what you have given and done for me.*

*Your prayers have been a great support for me throughout my life.*

*This modest work, above all, is yours. It is only the fruit of your great efforts and your immense sacrifices. Without you, I would not be where I am today. I hope I will always be worthy of your esteem.*

*May Allah the Almighty protect you from evil and grant you a healthy and happy life.*

# *I love you so much.*

***A mes Très Chers Parents***

***ES-SAHLI Malika et HAMIM Mustapha***

*A qui je dois tout après Allah, et pour qui aucune dédicace ne peut exprimer mon profond amour, et mon infinie gratitude pour les énormes sacrifices et souffrances*

*que vous avez endurés pour mon éducation, ainsi que pour mon bien-être.*

*Vous avez toujours été mes modèles, car tout au long de ma vie, je n'ai vu que douceur, bonté, honnêteté, humanisme et sérieux.*

*Vous m'avez toujours donné de votre temps, votre énergie, votre cœur et votre amour.*

*Je peux donc dire et sans aucun doute que vous êtes les meilleurs parents qu'une personne puisse avoir.*

*Ce jour, j'espère réaliser, chers père et mère, douces créatures que vous êtes, un de vos rêves, sachant que tout ce que je pourrais faire ou dire ne pourrait égaler ce que vous avez donné et fait pour moi.*

*Vos prières ont été pour moi d'un grand soutien tout au long de ma vie.*

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*Qu'Allah le Tout-Puissant vous préserve du mal, vous comble de santé et de bonheur et vous accorde une longue et heureuse vie.*

***Je vous aime tellement.***

## *To my sister IMANE and my brother SALAH EDDINE*

*You are the best that life has to offer.*

*Thank you for the joy you give me, for your support, your help and your generosity which have been a source of courage and confidence for me.*

*I will always remember the good times we had together.*

*The happiness I feel when we are together is immense.*

*Even if you are far from my eyes, you are always in the depths of my heart.*

*You are the apple of my eye, the happiness of my life.*

*Words can never express the depth of my love and my affection.*

*Since our childhood, the complicity that bound us has made you more than a brother and a sister.*

*Your kindness, your generosity are without limits, your big heart, your encouragements have been for me a great support.*

*I dedicate this work to you as a testimony of the love and blood ties that unite us.*

*I wish you a flourishing future and a life full of happiness and prosperity.*

*May love and brotherhood unite us for eternity.*

***S.I.F always and forever.***

***May God protect you!***

***I adore you.***

## *To my dearest friends:*

## *Hanane Ikrou, Hakima Imilik and Leila Ahid*

*I cannot express my feelings towards you, your continuous support and precious help will remain forever engraved in my memory.*

*May God protect you from all evil and keep you in my life.*

*To all my friends and those who are dear to me.*

*To all those who have contributed in any way to the elaboration of this work.*

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*Thank you for always being there.*

## *To the memory of my grandfathers and grandmothers:*

*May your soul rest in peace my dears.*

*To Professor ELMEZRAAI Fahd*

*English professor*

*Your professional and personal qualities are exemplary. I was really touched by your kindness and spontaneity.*

*Through these words, I want to express my respect, appreciation and gratitude*

*for your interest in reviewing and correcting my work.*

*Please find in this thesis the testimony of my deep respect.*

*To Doctor MANSOURY Ouassim and Mrs JDDARH Meriem*

*From the epidemiology and research department*

*For your help when it comes to the statistical work*

*and results of this study.*

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***Professor of Obstetrics and Gynecology***

*We thank you for the honor you have given us by accepting to preside over the jury of our thesis.*

*We will keep of you the image of a devoted and helpful professor; a man whose presence and words are reassuring.*

*I would like to thank you so much and to appreciate your professional competences and the extent of your knowledge as well as your sympathy.*

*Please find in this thesis the testimony of our deep respect and our most sincere thanks.*

***To our professor and thesis supervisor Pr. Bouchra FAKHIR***

***Professor of Obstetrics and Gynecology***

*It has been a great pleasure to work under your supervision.*

*I found in you the advisor and guide who received me in all circumstances with sympathy, smile and benevolence.*

*You have always given me the best welcome*
*despite your professional obligations.*

*Your kindness, your competence, your human and professional qualities inspire me with admiration and great respect.*

*I thank you infinitely, dear Professor, for having devoted your precious time and for having guided me with rigor and benevolence throughout the realization of this work.*

*I am very proud to have learned from you and*
*I hope to have lived up to your expectations.*

*Please accept, dear Professor, in this work my sincere gratitude and my deep respect.*

***To our professor and judge, Pr. Latifa ADARMOUCH***

***Professor of Epidemiology and Research Department***

*We are particularly touched by the kindness*
*with which you have agreed to judge this work.*
*Your professional background, your undeniable competence*
*and your human qualities inspire us with great admiration.*
*I would always be grateful for your availability and your patience*
*during this work preparation despite your professional obligations.*
*Please accept, dear professor, in this work the expression of our honest*
*gratitude and our deep respect.*

***To our professor and thesis judge, Pr. Yassir AIT BENKADDOUR***

***Professor of Obstetrics and Gynecology***

*Allow me to express, dear Professor,*
*all my gratitude for having accepted to judge this thesis.*
*I am deeply grateful for the great interest you have shown*
*in receiving this modest work.*
*I have nothing but high esteem and admiration for your professional*
*competences, your seriousness, your dynamism and your kindness.*
*Please accept, dear Professor,*
*the expression of our respectful and devoted feelings.*

# ABBREVIATIONS

I vowed to avoid abbreviations in this work to the best of my abilities. I have done that. But if any such is found in this work, it must have been an oversight. For that I'm sincerely sorry.

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# INTRODUCTION

Postmenopausal uterine bleeding is defined as abnormal uterine bleeding after permanent cessation of menstruation resulting from loss of ovarian follicular activity (1).It is one of the most frequent complaints with which women present in the outpatient gynecology clinic (2) and is often caused by abnormalities of the endometrium, whether they are benign or malignant (3,4).

Several different approaches have been proved to be clinically useful screening methods for early detection of endometrial abnormality for women with abnormal uterine bleeding. These include transvaginal sonography with the measurement of endometrial thickness, hysteroscopy , hysterography and dilatation and curettage (5).

Transvaginal sonography is useful for detecting and determining the extent of changes in the patient's endometrium, as well as for detecting other abnormalities of the pelvis in women reporting abnormal bleeding from the uterus. There are many advantages of transvaginal sonography as a screening method. It is non-invasive, causes minimal stress for the patient, and can be performed without extensive preparation (6). For women with postmenopausal bleeding, a simple measurement of endometrial thickness can reliably discriminate between women who are at low or high risk of endometrial cancer (7).

The earliest reports comparing transvaginal ultrasound with endometrial sampling for women with postmenopausal bleeding consistently revealed that an endometrial thickness 4 mm to 5 mm or less reliably excluded endometrial cancer. Since that time, a number of confirmatory multicenter studies have been carried out (8). Transvaginal ultrasound does not adequately show the endometrial cavity in all women with postmenopausal bleeding. An axial uterus, obesity, coexisting myomas, adenomyosis, or previous uterine surgery can preclude satisfactory endometrial evaluation. Failure to adequately identify a thin, distinct endometrial echo in a postmenopausal woman with bleeding should trigger an alternative method of evaluation. When alternative evaluation is necessary, saline infusion sonohysterography or hysteroscopy, preferably in an office setting, is appropriate(8).

Multiple causes of postmenopausal bleeding have been found, but endometrial atrophy account for 60-80% of cases(9,10). Other common benign etiologies are endometrial hyperplasia, endometrial polyps, and submucous leiomyomas (11). Endometrial adenocarcinoma was a major finding among the malignant causes, with a percentage of 66.70% of malignancies, and 10% of endometrial lesions including benign and malignant causes (10,12).

Unlike other malignancies, endometrial cancer often appears at an early stage when there is a possibility of curative treatment via hysterectomy. Survival decreases with increased staging and lower histological differentiation, therefore accurate and timely diagnosis is important and should preferably be carried out by a safe, simple and minimally invasive method. Guidelines addressing postmenopausal bleeding are therefore aimed at excluding cervical cancer, endometrial carcinoma or precancerous lesions of the endometrium (4).

In the United States, endometrial cancer is the fourth most common cancer in women after breast, lung, and colorectal cancers(13).

In Morocco, endometrial cancer is the fifth most common cancer in women (after breast, cervical, colon and lung cancer)(14). The standardized incidence of uterine cancer for the Moroccan population is 4.2 per 100,000 women (15) .

The guideline development group determined that, for initial management of spontaneous postmenopausal bleeding, primary assessment may be with either endometrial sampling or transvaginal ultrasonography (1).

Since we are highly using the ultrasonography for postmenopausal bleeding at the Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech, we aimed at evaluating the accuracy of this practice. By doing so, we will be answering the following question: Is there a significant correlation between the ultrasonography results and the endometrial histopathology results in a group of patients at Mohammed the sixth University Hospital of Marrakech?

# PATIENTS AND METHODS

# I. Type of study:

We conducted a retrospective analytic cohort study on patients with postmenopausal bleeding. The patients were hospitalized at the department of Gynecology and Obstetrics of Mohammed the sixth University Hospital of Marrakech, over a period of 2 years (from January 2018 to December 2019).

# II. Objectives of the study:

The aim of the present study was to evaluate the ultrasonography practice for postmenopausal bleeding in the Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

1. The first outcome was to study the correlation between endometrial ultrasonography results and endometrial histopathology in a group of patients in Mohammed the sixth University Hospital of Marrakech during standard care process.
2. The second outcome was to be sure of the quality of our standard of care.

# III. Selected population:

The present retrospective study was carried out on women in the postmenopausal age group cared for with hospitalization in the Gynecological Department of Mohammed the sixth University Hospital in Marrakech between 2018 and 2019.

All the women were clinically evaluated. Initially, an ultrasonography study of the endometrium was done; then, it was followed by dilatation and curettage and histopathological examination of the endometrial curetting.

1. Inclusion criteria
2. Exclusion criteria
3. Data collecting

The data were collected from the gynecological department's registers, the clinical records, the surgery report and the anatomopathological department. Concerning the missing information, they were collected by either phoning some patients or meeting others.

For each patient, we collected:

- Epidemiology data
- Medical history
- Clinical findings
- Ultrasonography results
- Histopathological results
- Therapeutic attitude
- Histopathological classification

A patient's information form was made for each patient in order to facilitate the collection and the analysis of the different clinical, Para clinical and histological results (see annex 1).

All ultrasound examinations were performed using VOLUSON S6 IC9-RS with IC9-RS endovaginal probe for 2D gynecology and fetal imaging and C1-5-D5499513 abdominal probe as ultrasound machine.

## 1. Inclusion criteria:

Patients with postmenopausal bleeding hospitalized in the Gynecology Department of Mohammed the sixth University Hospital of Marrakech between January 2018 and December 2019.

## 2. Exclusion criteria:

- Pelvic infection

- Drug intake that can lead to vaginal bleeding ( anticoagulants, hormone replacement therapy)
- Vaginal, vulval or cervical causes of bleeding
- Coagulopathy, thrombocytopenia
- Patients who did not undergo a histological investigation

## IV. Analytic and statistic method :

All the clinical and para clinical data were collected into the Microsoft Office Excel software version 2010 using a patient's information form.

The analysis of the results was done using the Statistical Package for the Social Sciences (SPSS) software version 21 within the Epidemiology and Clinical Research Department of Mohammed the sixth University Hospital of Marrakech. First, we made a description of patients' epidemiological profile. All the quantitative variables were presented as means and standard deviations and all the categorical variables by means of frequencies. Afterwards, we analyzed the concordance between ultrasonography and histology results using Cohen's kappa coefficient: it is a statistical measure that measures not only the percentage of agreement between two raters, but also calculates the degree to which agreement can be attributed to chance (16).

# RESULTS

# I. Descriptive study :

## 1. Number of patient records included and excluded :

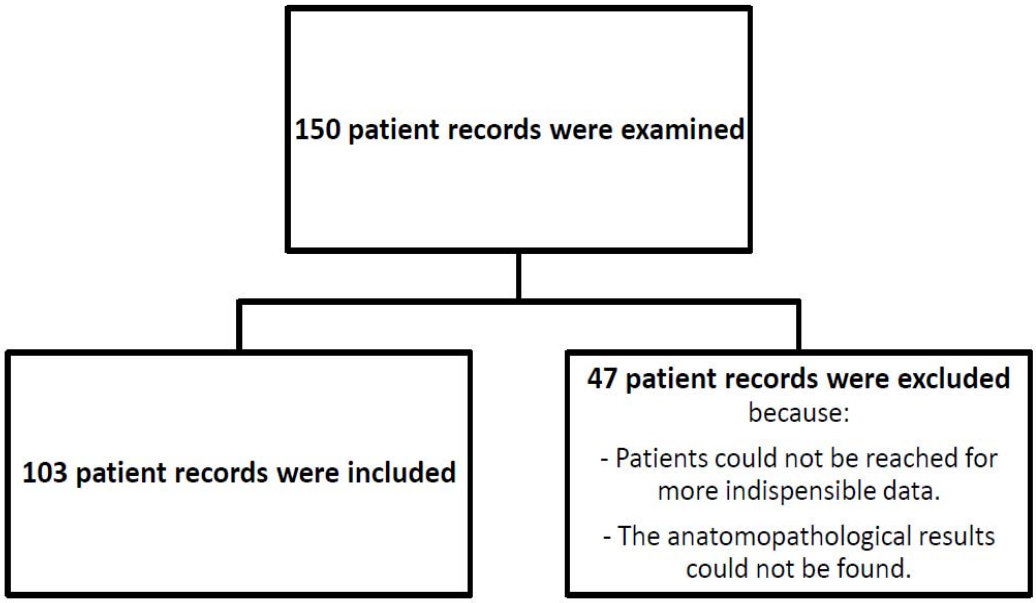


Figure 1: Number of patient records included and excluded

## 2. Period prevalence of postmenopausal bleeding in the Gynecological department of Mohammed the sixth University Hospital :

The period prevalence of patients with postmenopausal bleeding hospitalized between January 2018 and December 2019 in the Gynecological department of Mohammed the sixth University Hospital of Marrakech is 12.5% of all hospitalizations in the same department and the same period.

# 3. Profile of the patients:

### 3.1. The age:

The ages of the patients ranged from 43 to 80 years. A mean age of 59.42 years +/- 8.954 years was found in the sample.

Patients aged 43 – 59 years were the most frequent with a relative frequency of 47.60%, whereas the least frequent age group was patients aged 70-78 years who had a frequency of 14.50%. (FIG 2)

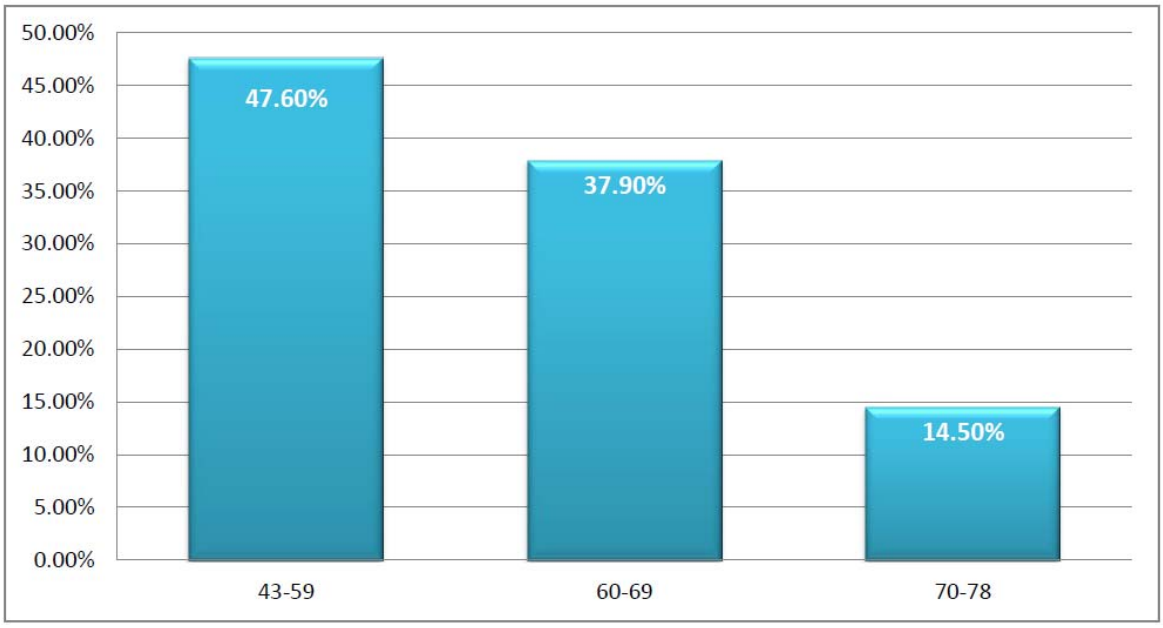


Figure 2: Distribution of patients based on age groups

### 3.2. Medical history:

#### *a. Gravidity and parity:*

The gravidity of the patients ranged from 0 to 14. A mean gravidity of 4.49 +/- 3.266 was found in the sample.

The parity of the patients ranged from 0 to 14. A mean parity of 4.09 +/- 3.049 was found in the sample.

Multiparous patients were the most frequent with a relative frequency of 49%, whereas the least frequent parity group was primiparous patients who had a frequency of 4%. (FIG 3)

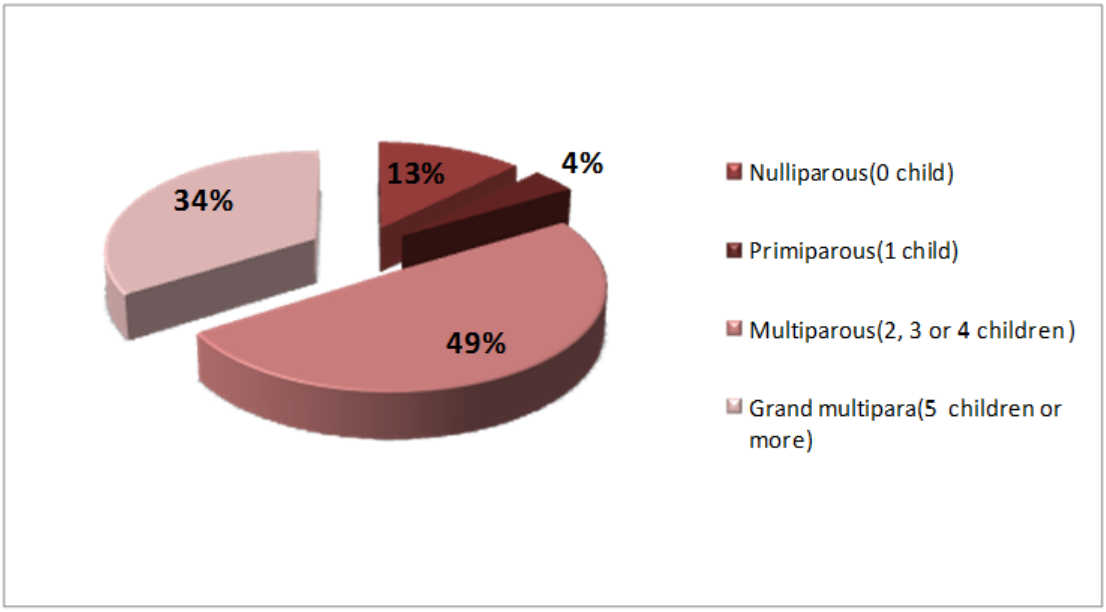


Figure 3: Distribution of patients based on parity groups

***b. Menarche :***

In our study, we found that the menarche ranged from 11 to 15 years. A mean menarche of 12.44 years +/- 1.026 years was found in the sample.

***c. Age and duration of menopause:***

The ages of menopause of the patients ranged from 40 to 59 years. A mean age of 48.85 years +/- 4.449 years was found in the sample.

The duration of menopause ranged from 1 to 37 years. A mean duration of menopause of 10.58 years +/- 7.200 years was found.

Patients with age of menopause between 45-55 years represented the higher percentage with 76.7% of our sample. (FIG 4)

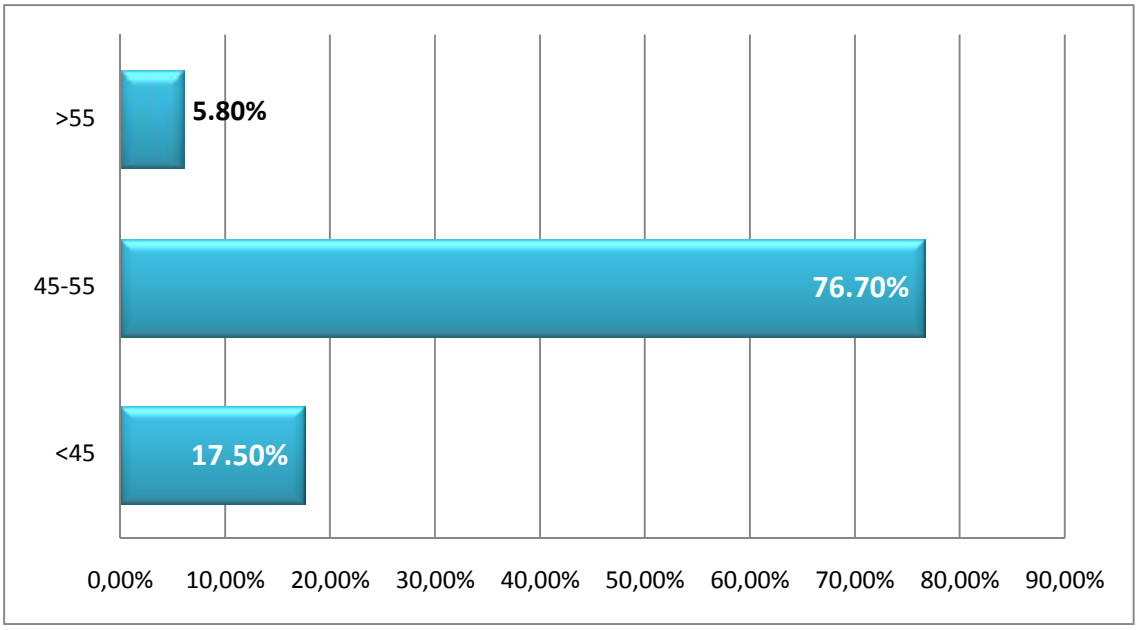


Figure 4: Distribution of patients based on age of menopause groups

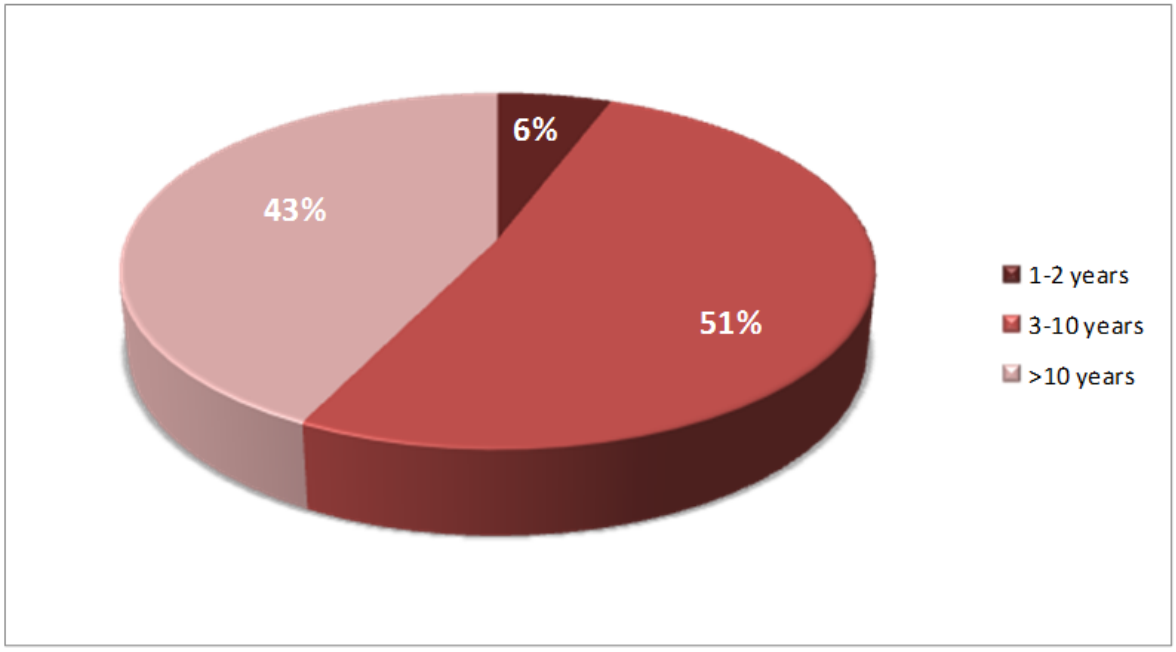


Figure 5: Distribution of patients based on percentage of duration of menopause groups

### *d. Fertility/Uterine fibroid/Endometriosis:*

In our study, we defined fertility as the capacity to establish a clinical pregnancy (17,18).

Based on the latest international glossary on infertility and fertility care, infertility is defined as a disease characterized by the failure to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse or due to an impairment of a person's capacity to reproduce, either as an individual or with his/her partner (18).

The percentage of fertility in our sample was at 88.30% which means that only a minority of our sample was infertile.

From 103 patients of our sample, 15 had a history of uterine fibroid with a percentage of 14.60%.

History of endometriosis was found in 5 patients with a percentage of 4.9% of our sample. (FIG 6)

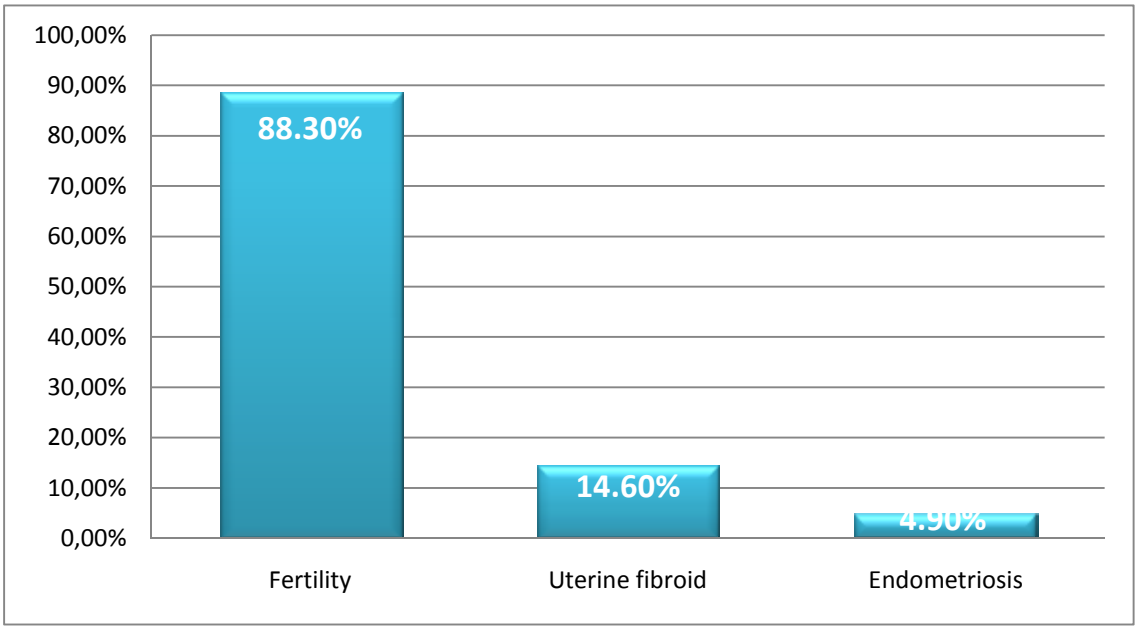


Figure 6: Distribution of patients based on percentage of fertility/uterine fibroid/endometriosis groups

### *e. High blood pressure/diabetes:*

Up to 50.50% of our patients were diagnosed with high blood pressure.

36 patients of our sample had diabetes making it a frequency of 35%. (FIG 7)

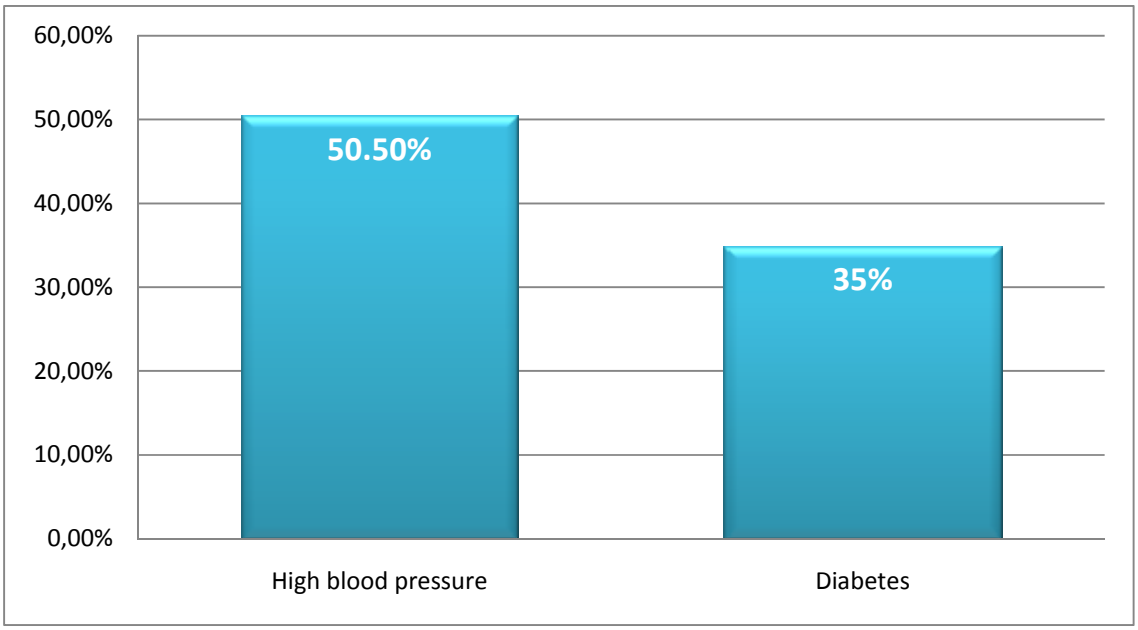


Figure 7: Distribution of patients based on percentage of high blood pressure and diabetes

### *f. Smoking:*

2 patients of our sample had a history of smoking. Its frequency was 1.9%.

### *g. Obesity:*

Obesity in our study was evaluated by the body mass index.

Underweight patients were the least frequent with a relative frequency of 1%, whereas the most frequent body mass index group was obese patients who had a frequency of 55.3%, followed by overweight patients with a frequency of 34% of our sample. (FIG 8)

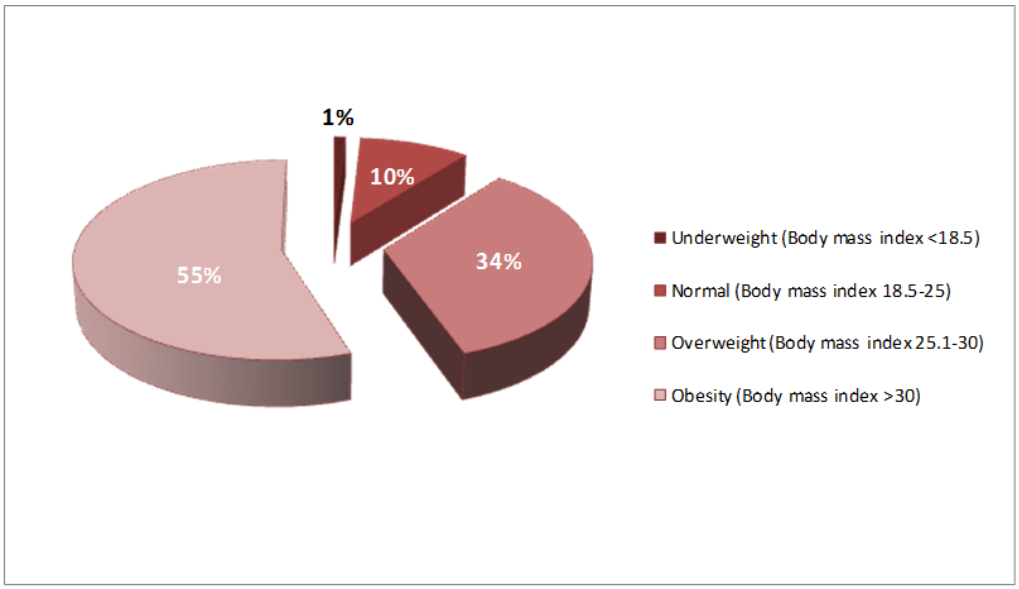


Figure 8: Distribution of patients based on percentage of the body mass index

***h. Surgery:***

Out of the 103 patients in our sample, 8 had cesarean section which means a frequency of 7.80%. 9 patients had a mastectomy for breast cancer with a frequency of 8.70% of our sample. 7 patients in our sample had a history of thyroidectomy representing a frequency of 6.80%. The percentage of uterine fibroid removal in our sample was around 12.60%. (FIG 9)

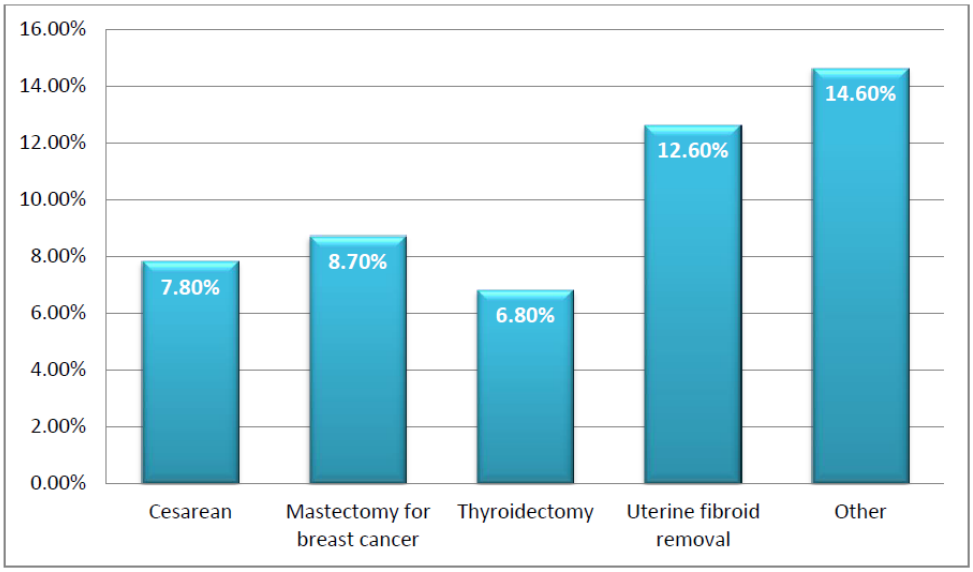


Figure 9: Distribution of patients based on their history of surgery

### *i. Family medical history:*

Family medical history of breast cancer was the most frequent with a relative frequency of 18.40%, whereas the least frequent was the family medical history of ovary cancer with a frequency of 3.90%.

Up to 10.70% of the patients had a family history of hemostasis disorder, and 6.80% had a family history of endometrial cancer. (FIG 10)

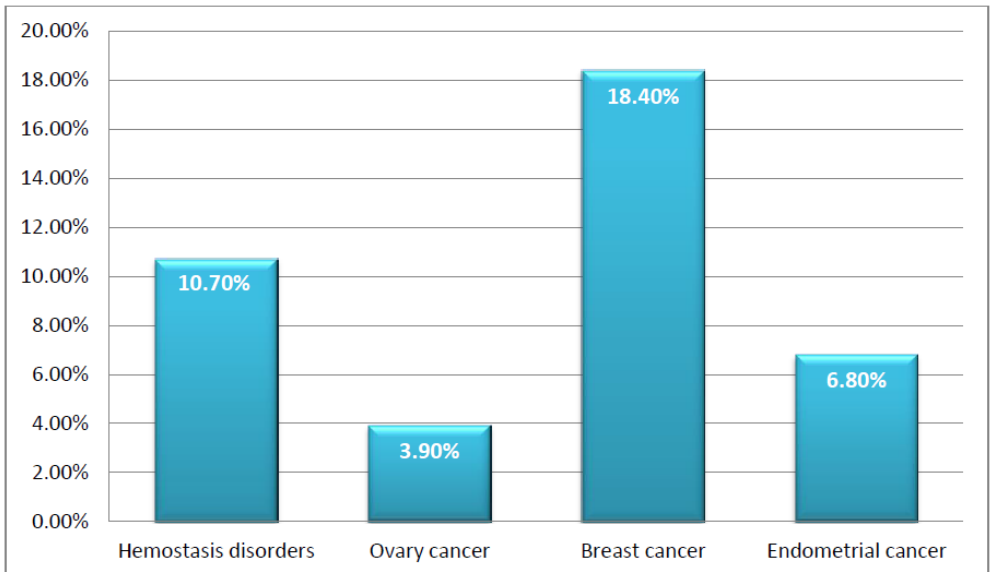


Figure 10: Distribution of patients based on their family medical history

## 4. Patients' complaints:

All the patients in our sample had postmenopausal bleeding.

Up to 77.70% of our sample had postmenopausal bleeding as an isolated symptom and this frequency was the highest among patients' complaints groups.

The patients presenting postmenopausal bleeding + pelvic pain had a frequency of 7.70%, those presenting postmenopausal bleeding + mass followed with a frequency of 6.80%, then those presenting postmenopausal bleeding + leucorrhoea came in the fourth place with 5.80%.

Only 2 patients of our sample had postmenopausal bleeding + pelvic pain + leucorrhoea as a presented complaint with a frequency of 1.90% (FIG 11).

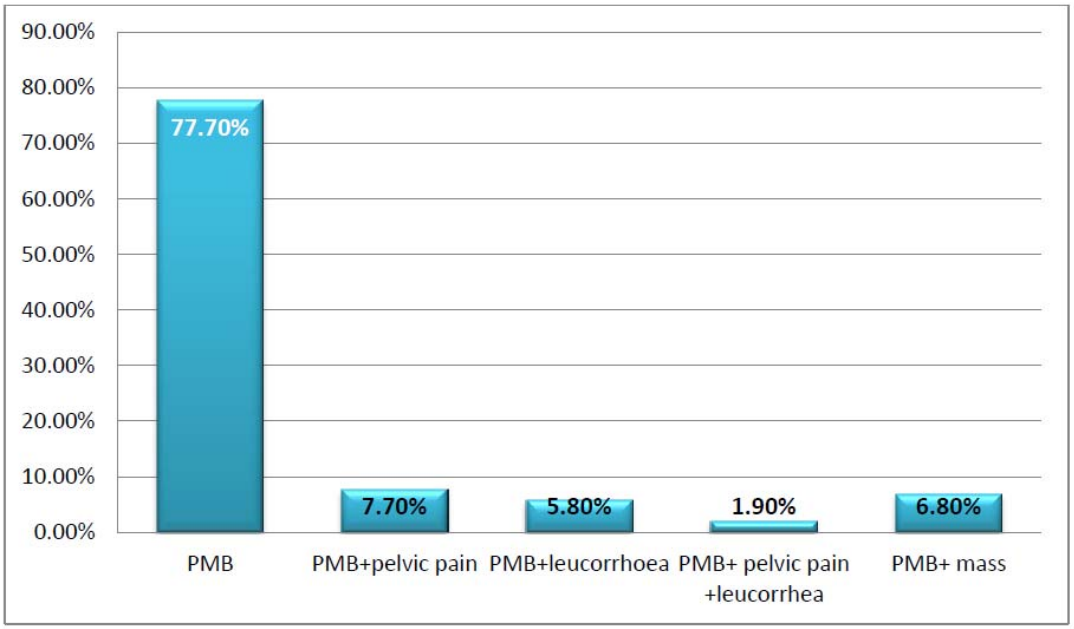


Figure 11: Distribution of patients based on presenting complaint

**PMB:** Postmenopausal bleeding

Characteristics of bleeding:

All the patients (100%) in our sample had a spontaneous bleeding.

Based on subjective quantification of blood loss (Pictorial Blood Loss Assessment Chart) (19), 82.5% of our sample had a low blood loss and 17.5% had a medium blood loss. High blood loss was not found in our sample.

## 5. Physical examination results:

### 5.1. General condition:

93 patients of our sample had a good general condition which means a frequency of 90.30%, while only 10 patients (9.70%) had a deteriorated general condition. (FIG 12)

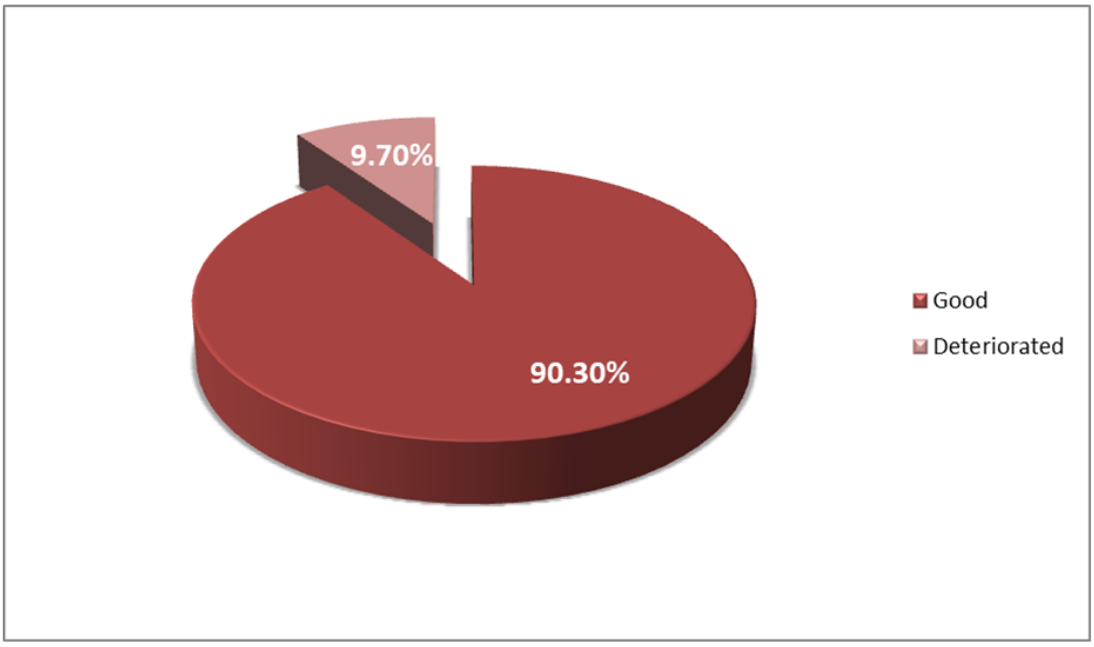


Figure 12: Distribution of patients based on general condition

### 5.2. Anemia signs:

Weakness (or tiredness) was the most frequent sign of anemia with a relative frequency of 20.40%, whereas the least frequent anemia sign was headache that had a frequency of 5.80%. (FIG 13)

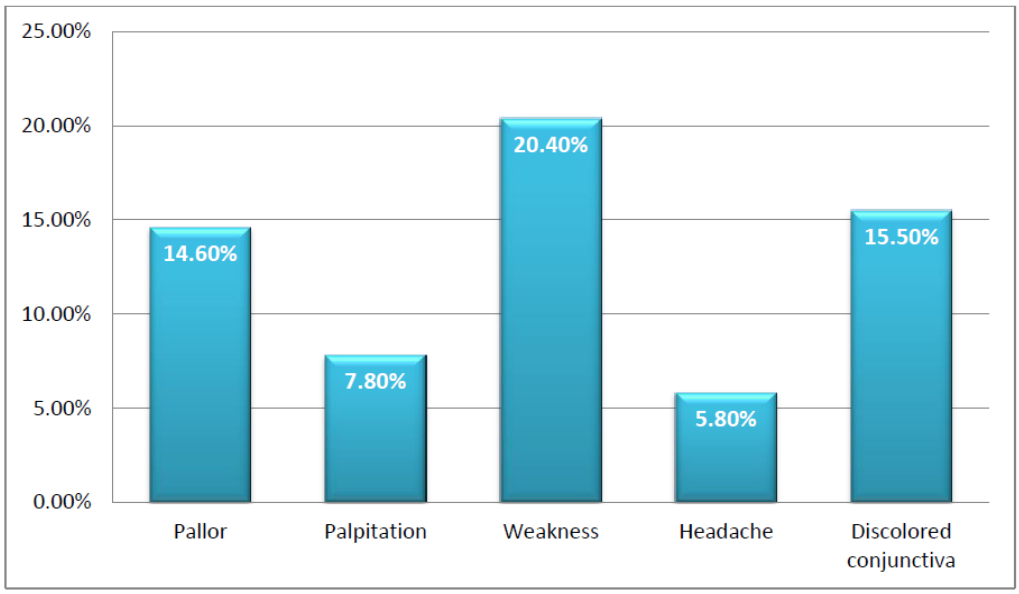


Figure 13: Distribution of patients based on anemia signs

### 5.3. Speculum examination:

Up to 82.50% of our sample had a normal cervix without abnormalities in the speculum examination, 6.80% had cervicitis, 28.20% had an atrophic vaginitis and 53.40% had an abnormal bleeding most likely from the uterus seen in the speculum examination. Only 1% of our sample had a prolapse. None of the patients had petechiae or suspicious lesion. (FIG 14)

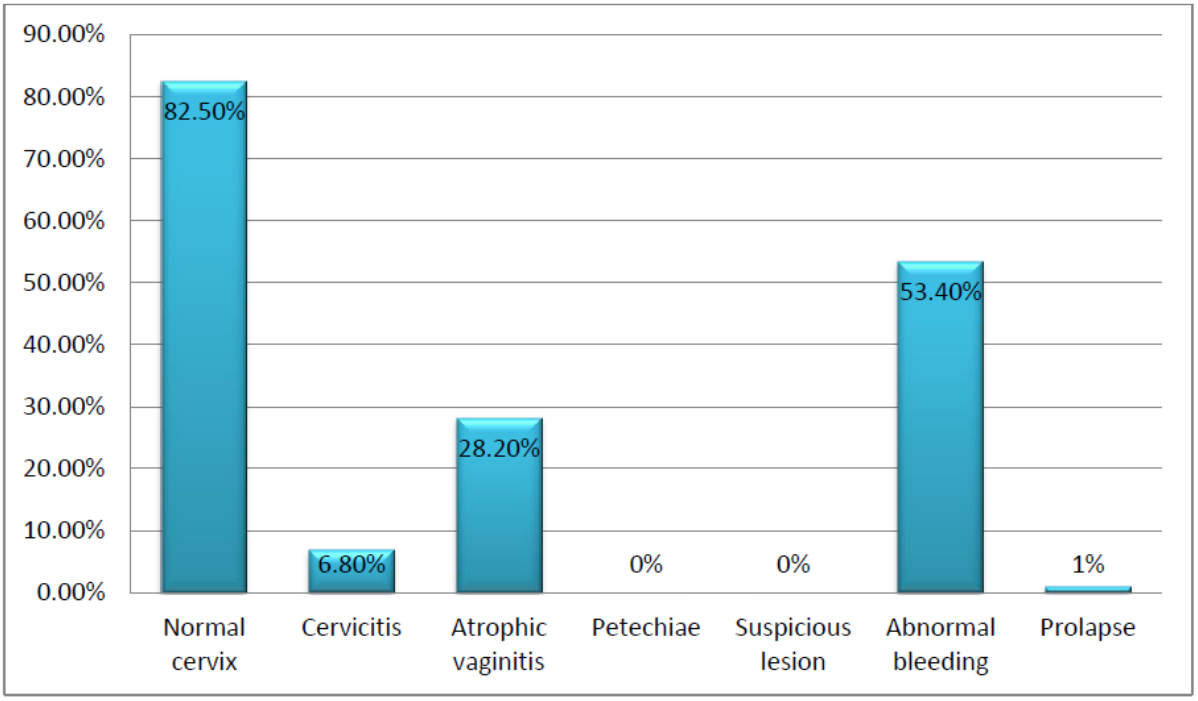


Figure 14: Distribution of patients based on speculum examination

### 5.4. Vaginal touch:

81 patients out of 103 in our sample had a normal vaginal touch with a frequency of 78.60 % which was the highest frequency, followed by the increased uterine volume with 17.50% of our sample, and then came sensitivity of the uterus with a frequency of 9.70%.

None of our patients had an infiltration of vaginal walls. Only 2 patients had a latero uterine mass. (FIG 15)

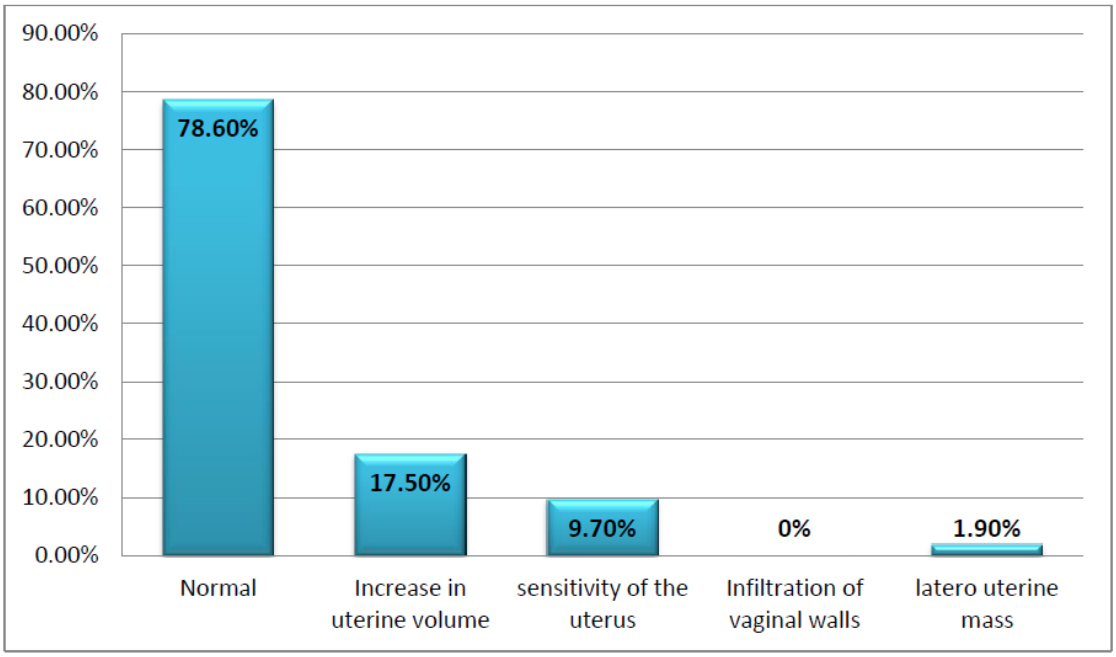


Figure 15: Distribution of patients based on vaginal touch

### 5.5. Breast examination:

Up to 96.1% of our sample did not show any abnormality in the breast examination, while 3.9% of our sample had at least one abnormality in the breast examination (tenderness, tightness, nodule …).

## 6. Medical investigations:

### 6.1. Ultrasonography:

#### *a. Uterine size:*

In postmenopausal women, the size of the uterus gradually decreases with age. A mean uterus length of 67 mm in postmenopausal women with 5 years or less since menopause was found as normal and a mean uterus length of 56 mm in postmenopausal women with more than 5 years since menopause was found as normal (20).

Normal uterine size was the most frequent with a relative frequency of 73.80%, whereas the least frequent was the increased uterine size that had a frequency of 26.20%. (FIG 16)

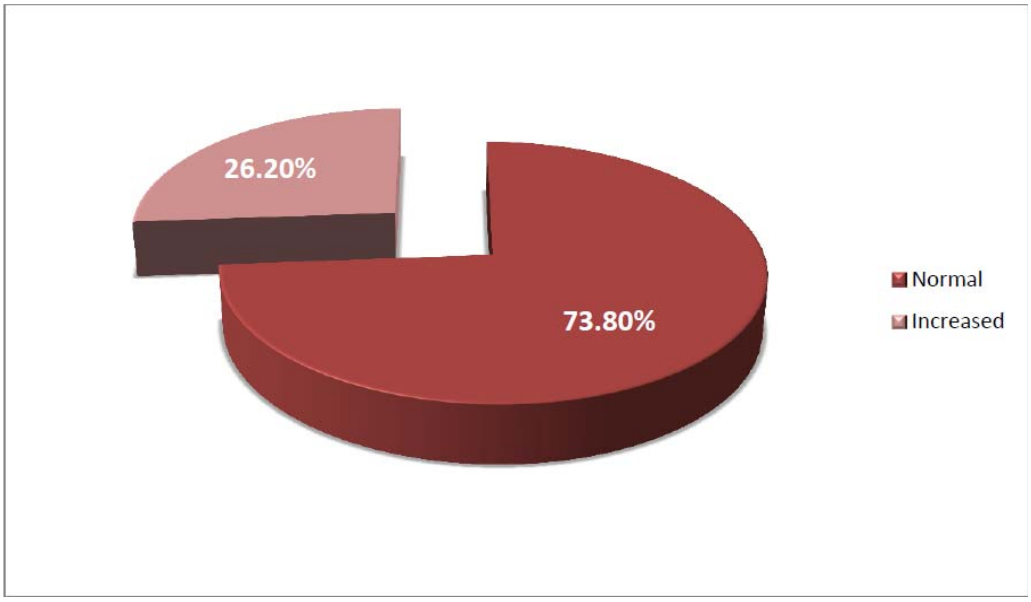


Figure 16: Distribution of patients based on uterine size

***b. Uterine outline:***

Up to 88.30% of our sample had a regular uterine outline showed in the ultrasonography, while only 11.70% had an irregular uterine outline. (FIG 17)

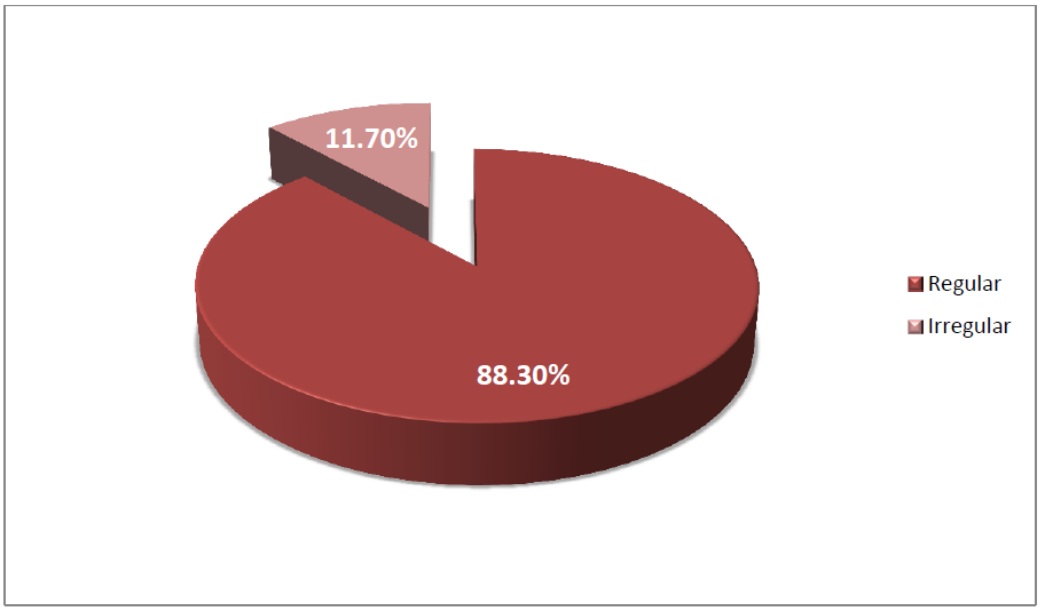


Figure 17: Distribution of patients based on uterine outline

### c. *Endometrial thickness:*

The endometrium should be analyzed for its thickness. The thickest part of the endometrium should be measured perpendicular to its longitudinal plane in the anteroposterior diameter from echogenic to echogenic border (21).

Many authors determined that a threshold endometrial thickness of 5 mm had a sensitivity rate of 96% for endometrial carcinoma and 92% for other endometrial disease (22). So in this study, an endometrial thickness of 5 mm or more was considered hypertrophic.

Atrophic endometrium, in a postmenopausal patient who is on no hormone replacement therapy, appeared on Ultrasonography as a thin "pencil line" echogenicity (23); which means it is linear, echogenic and homogeneous: any heterogeneity should lead to reconsideration of the diagnosis (24,25).

Hypertrophic endometrium was the most frequent with a relative frequency of 77.70%, whereas the least frequent was atrophic endometrium that had a frequency of 3.90%. (FIG 18)

19 patients of our sample had a normal endometrial thickness with a frequency of 18.40%. (FIG 18)

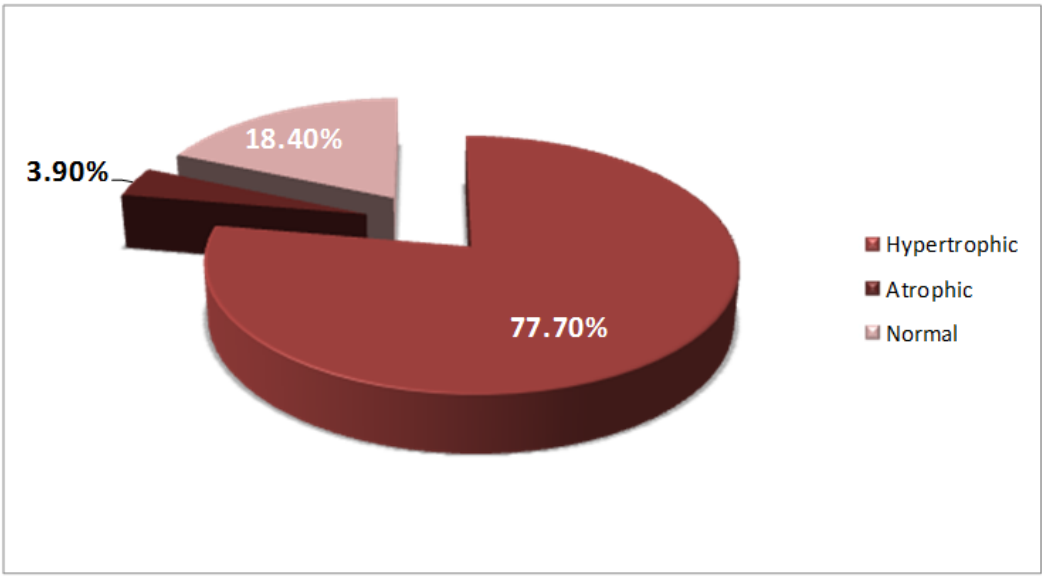


Figure 18: Distribution of patients based on endometrial thickness

### *d. Endometrial midline:*

The endometrial midline is defined as 'linear', if a straight hyperechogenic interface within the endometrium is visualized, as 'non-linear' if a waved hyperechogenic interface is seen, and as 'irregular' or as 'not-defined' in the absence of a distinct interface (7,26).

Up to 86.40% of our sample had a linear endometrial midline showed in the ultrasonography, 7.80% had a non-linear endometrial midline, and 5.80% had a not-defined endometrial midline. (FIG 19)

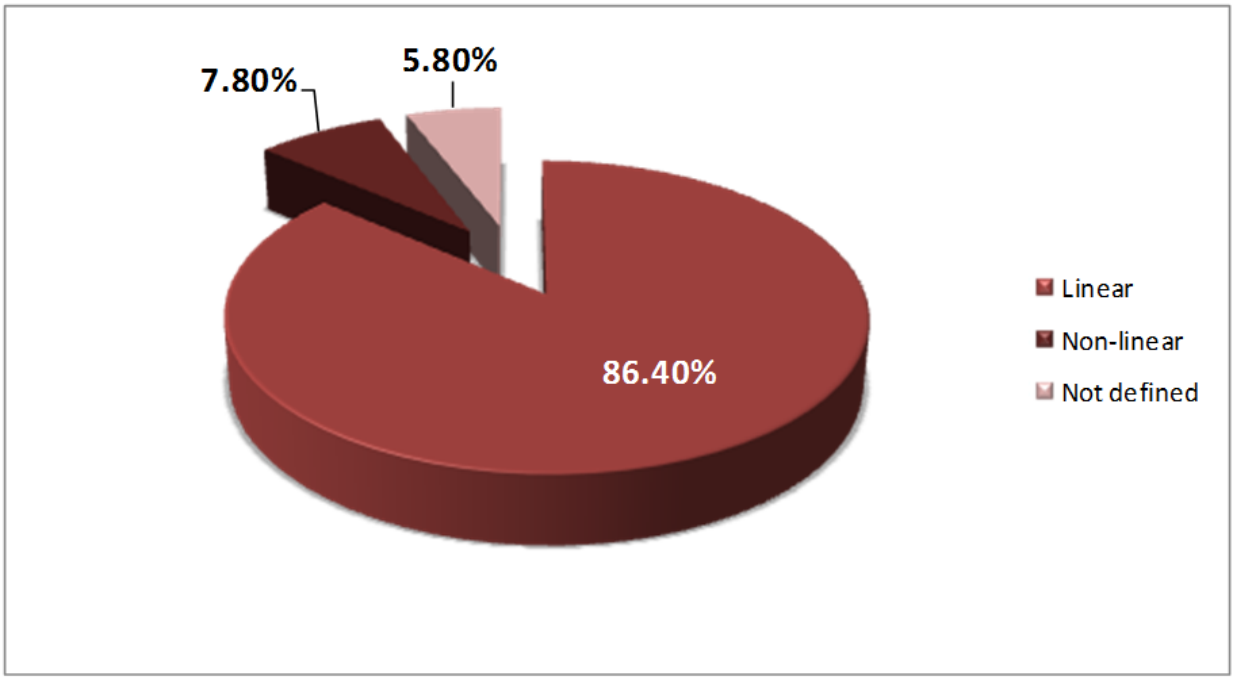


Figure 19: Distribution of patients based on endometrial midline

### *e. Endometrial myometrial junction:*

78.60% of our sample had a regular endometrial myometrial junction showed in the ultrasonography, 14.60% had an irregular endometrial myometrial junction, and 6.80% had a not-defined endometrial myometrial junction. (FIG 20)

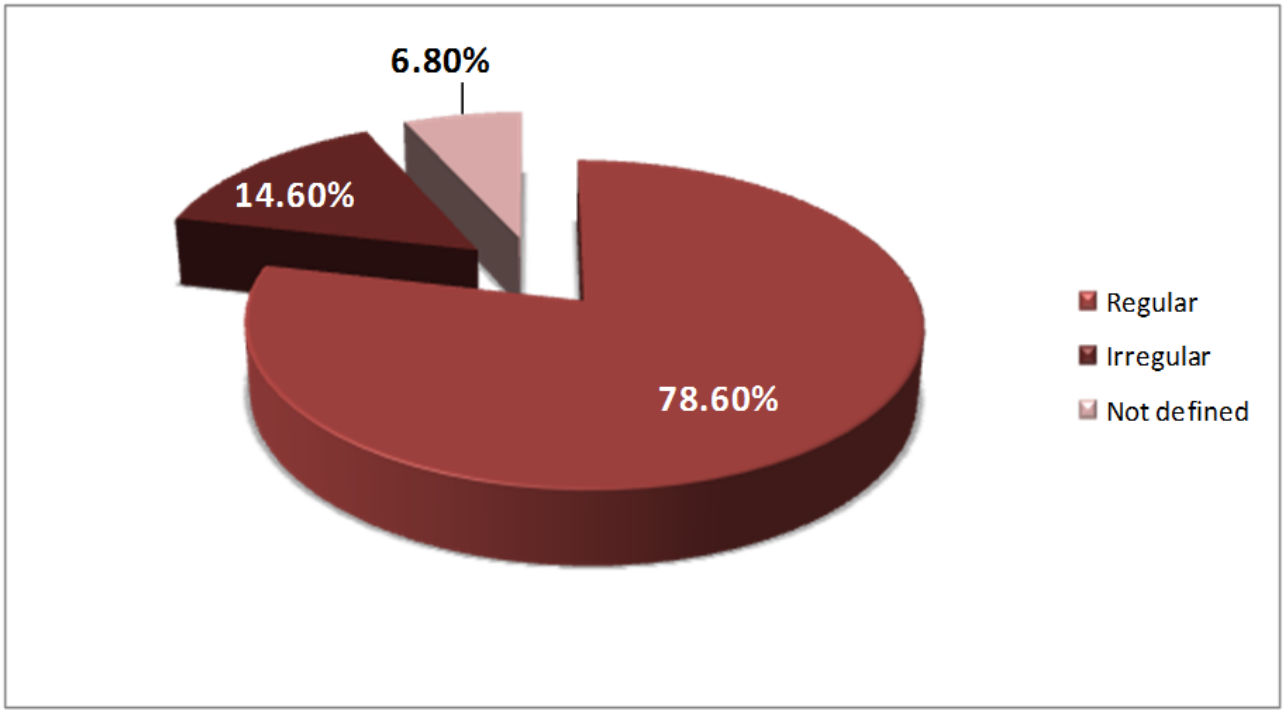


Figure 20: Distribution of patients based on endometrial myometrial junction

### *f. Endometrium echo texture:*

Another important consideration, in addition to measured endometrial thickness, is the texture of the endometrium (23).

The endometrial echogenicity is considered uniform, if the endometrium is homogeneous with symmetrical anterior and posterior walls. The echogenicity is termed non-uniform, if the endometrium appears heterogeneous, asymmetrical or cystic (7).

52.40% of our sample had a homogeneous endometrium echo texture showed in the ultrasonography, and 47.60% had a heterogeneous endometrium echo texture. (FIG 21)

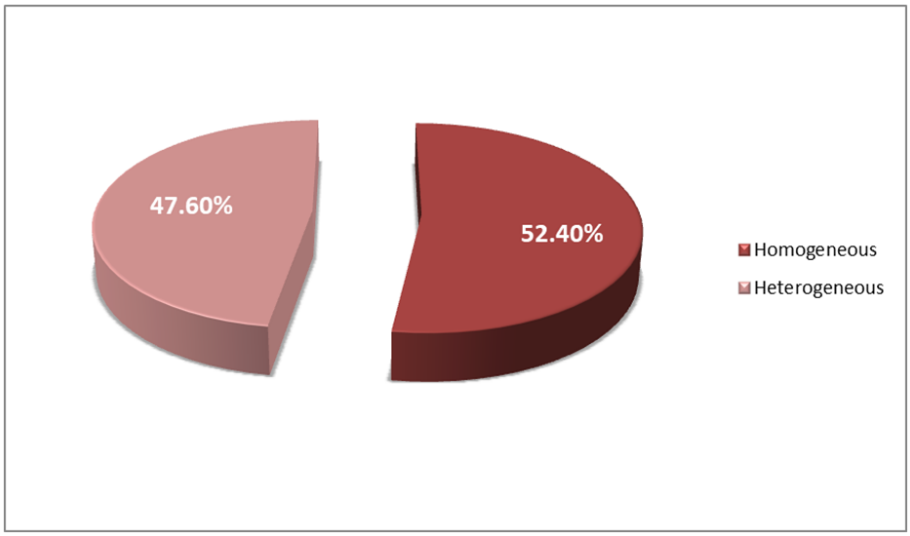


Figure 21: Distribution of patients based on endometrium echo texture

### *g. Endometrium echogenicity:*

The echogenicity of the endometrium is described as hyperechogenic, isoechogenic or hypoechogenic compared with the echogenicity of the myometrium (7).

52.40% of our sample had an isoechogenic endometrium showed in the ultrasonography, 28.20% had a hypoechogenic endometrium, and 19.40% had a hyperechogenic endometrium. (FIG 22)

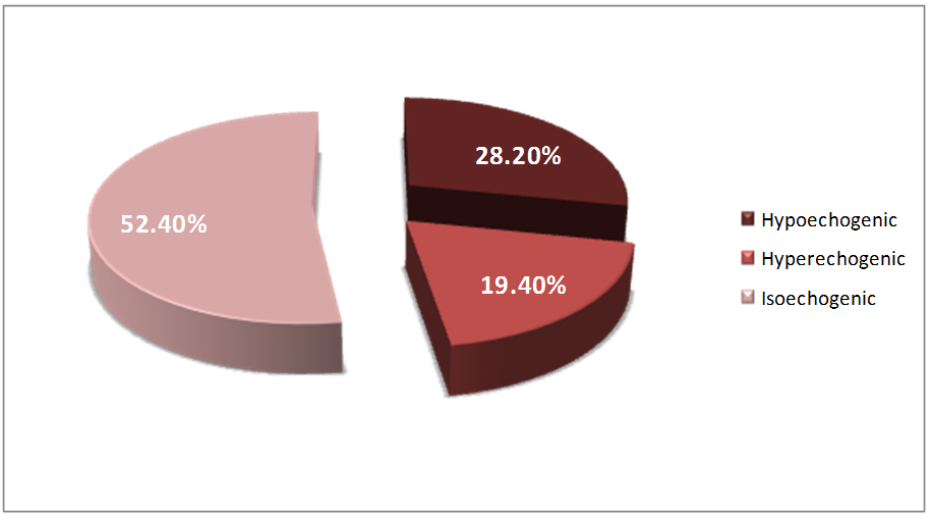


Figure 22: Distribution of patients based on endometrium echogenicity

### *h. Cervix echo texture:*

All our patients had a normal echo texture in ultrasonography examination with a frequency of 100% of our sample.

### *i. Myometrium:*

Up to 69.90% of our sample had a homogeneous myometrium showed in the ultrasonography, while 30.10% had a heterogeneous myometrium with well-defined hypoechoic comparing to normal myometrium echogenicity. (FIG 23)

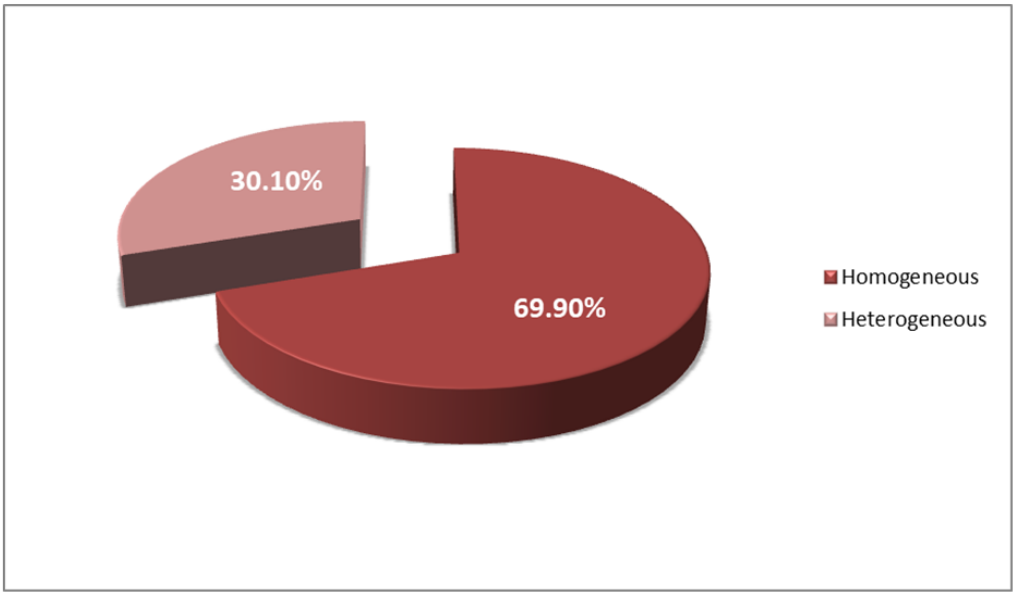


Figure 23: Distribution of patients based on myometrium appearance

### *j. Ultrasonography conclusion:*

In this work, we considered hypertrophic endometrium, seen in ultrasonography as an endometrium with a thickness equal or more than 5 mm. We also considered polyp as a homogeneous hyperechogenic lesion with regular contours and one blood vessel in Doppler; leiomyoma appears as well-defined, solid, concentric, hypoechoic masses that cause a variable amount of acoustic shadowing. Suspicious image could have different appearances, it could be seen as a non-uniform endometrial morphology, non-uniform echogenicity and heterogeneous

endometrium without cystic areas, a irregular endometrial-myometrial junction with multiple vessels of focal or multifocal origin and high color score in Doppler. Finally, we considered an endometrium with a thickness equal or less than 1 mm as an atrophic endometrium.

46 patients out of 103 in our sample had a hypertrophic endometrium with a frequency of 44.70 % which was the highest frequency. It was followed by the suspicious image with a frequency of 40.80% of our sample. Then, we found polyp with 15.50%. After that, myoma followed with 12.60%. Finally, atrophy of the endometrium came with a frequency of 2.90%.

(FIG 24)

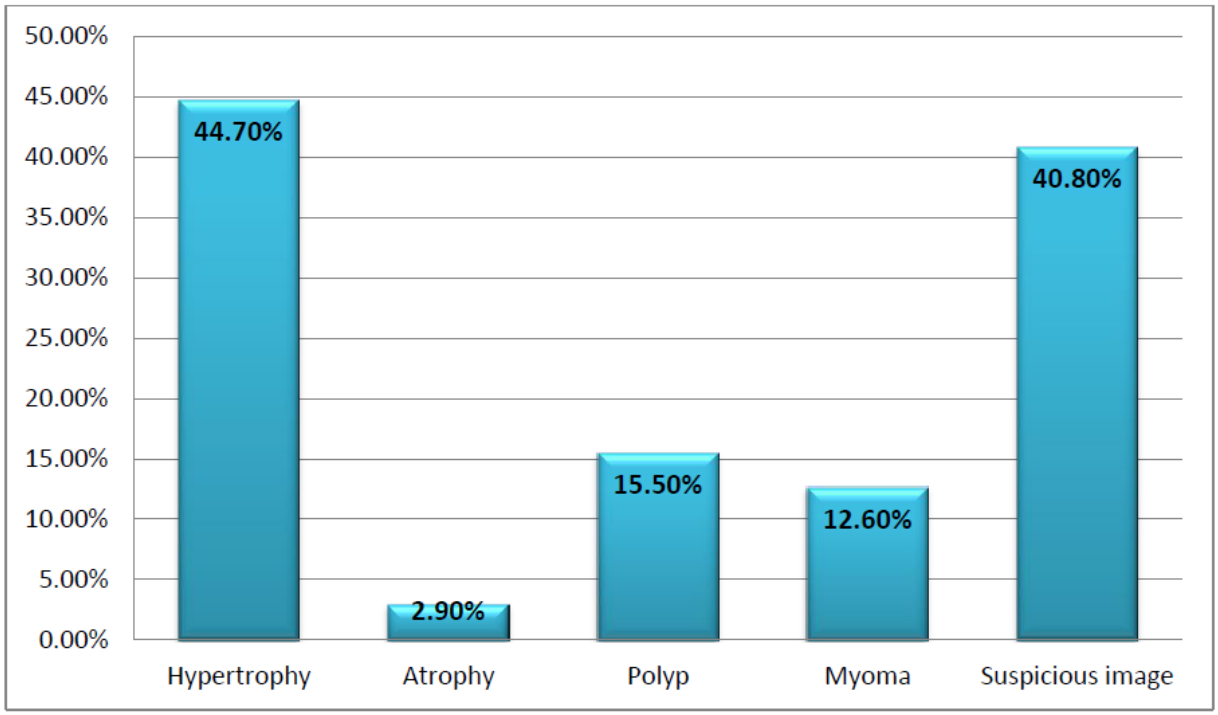


Figure 24: Distribution of patients based on ultrasonography conclusion

### *k. Ultrasonography conclusion benign/suspicious image:*

In this classification, atrophic endometrium, polyp, leiomyoma and regular hypertrophy were considered as benign images, while, irregular hypertrophy and suspicious images were considered as suspicious image.

Up to 59.20% of our sample had a benign image showed in the ultrasonography, while 40.80% had a suspicious image. (FIG 25)

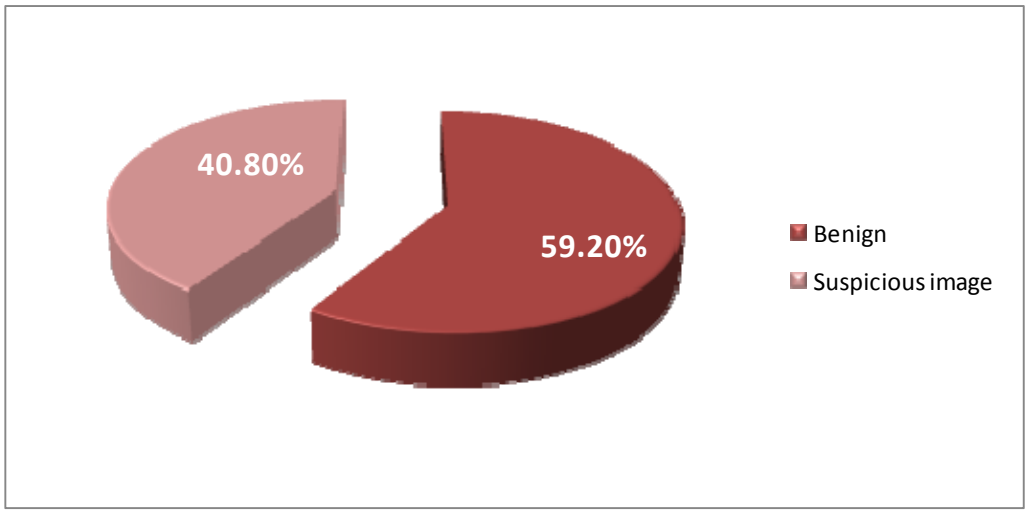


Figure 25: Distribution of patients based on ultrasonography conclusion benign/suspicious image

### l. *Ultrasonography images from Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.*

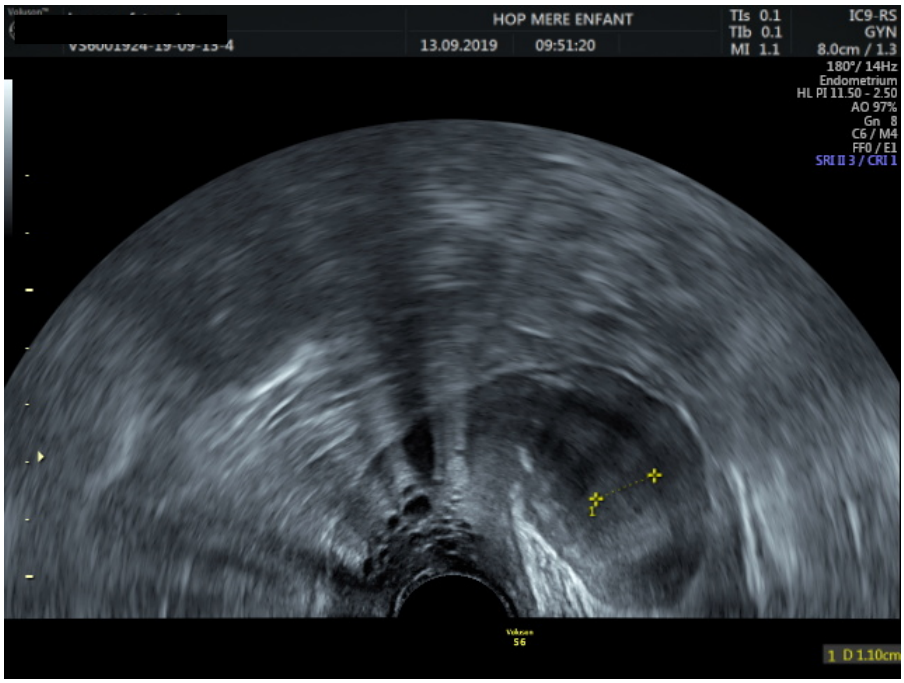


Figure 26: Image showing a hypertrophic endometrium in ultrasonography. Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

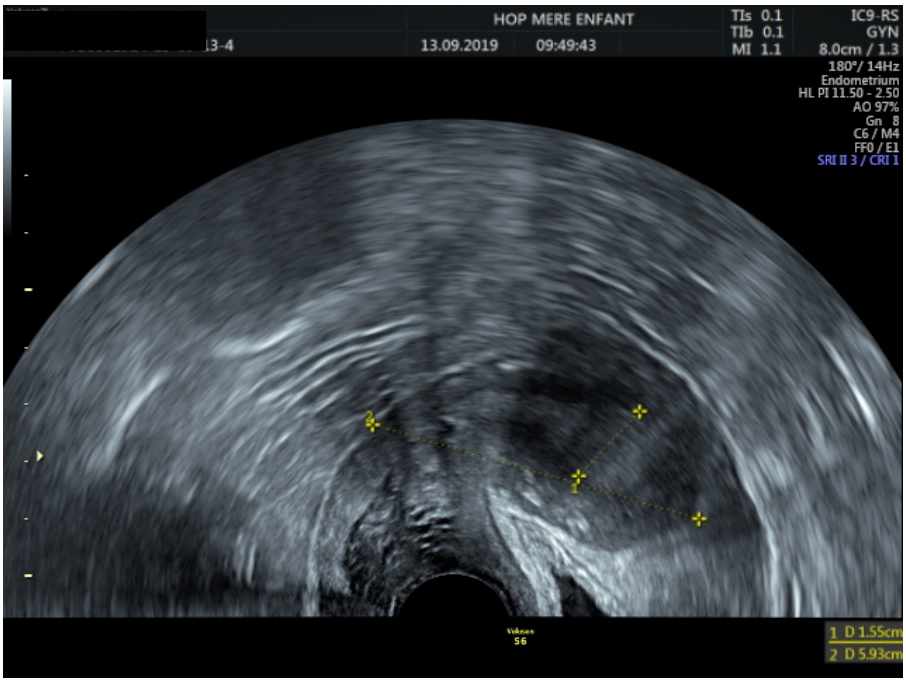


Figure 27: Image showing a hypertrophic endometrium in ultrasonography. Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

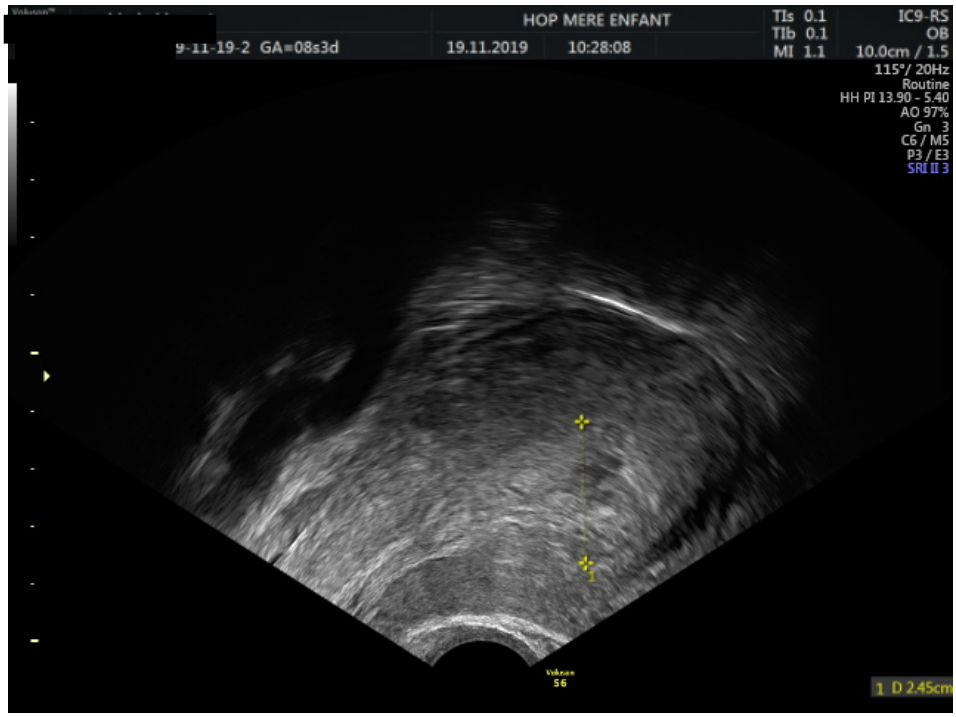


Figure 28: Image showing a regular hypertrophic endometrium in ultrasonography . Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

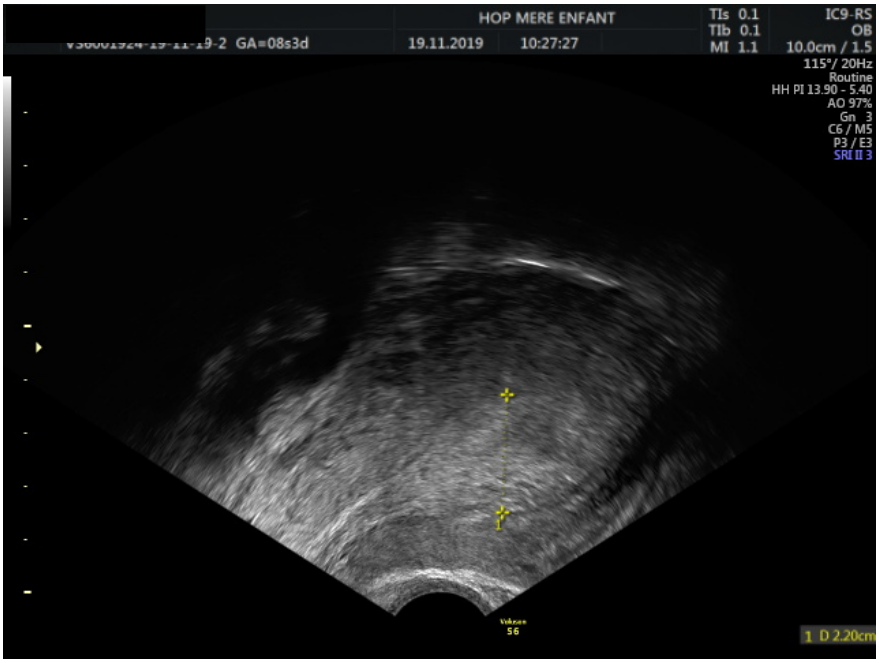


Figure 29: Image showing a regular hypertrophic endometrium in ultrasonography . Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

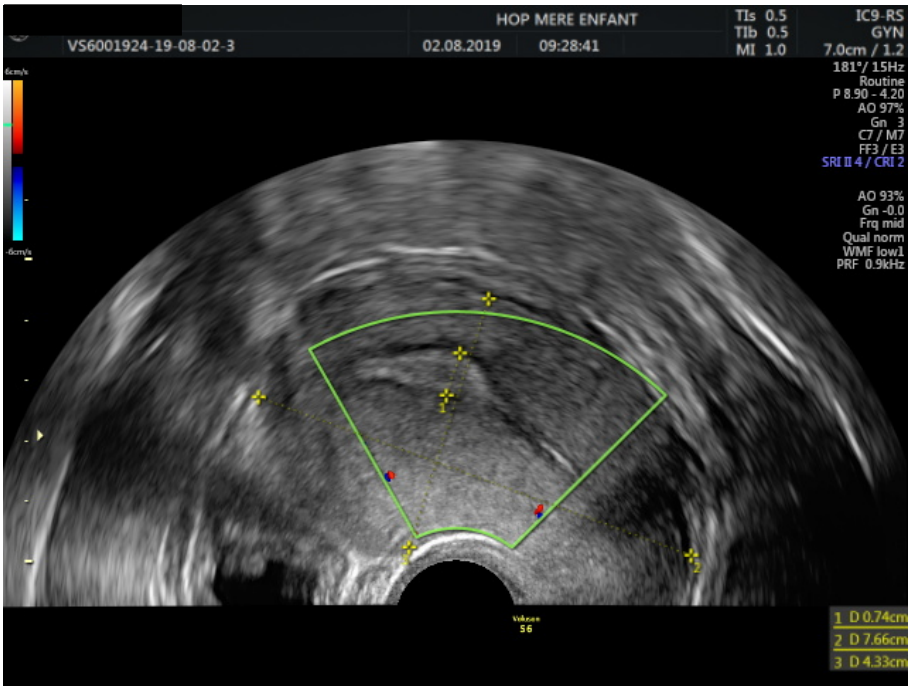


Figure 30: Image showing a localized hypertrophy in endometrium in color and power doppler ultrasonography. Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

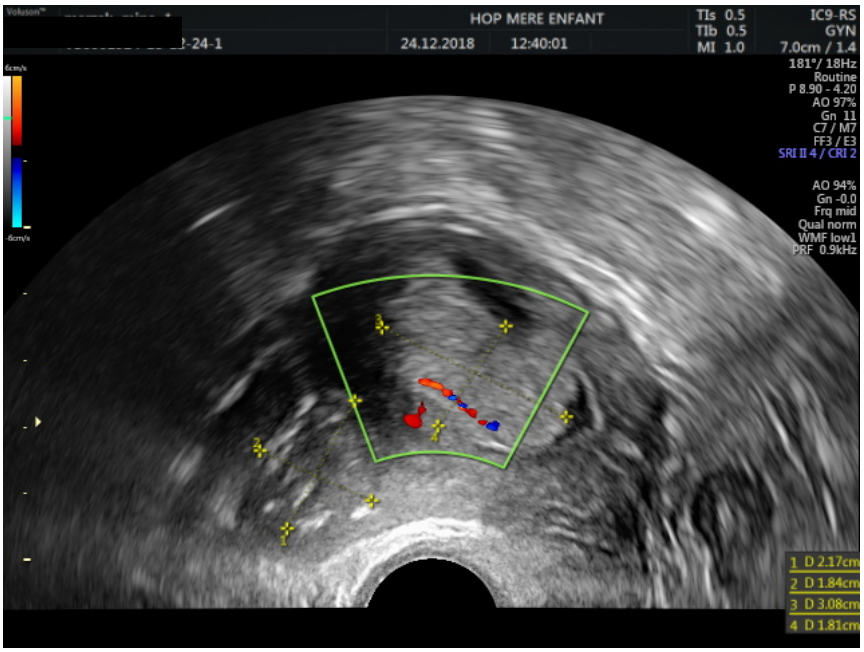


Figure 31: Image showing a polyp in the endometrium in color and power doppler ultrasonography. Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech.

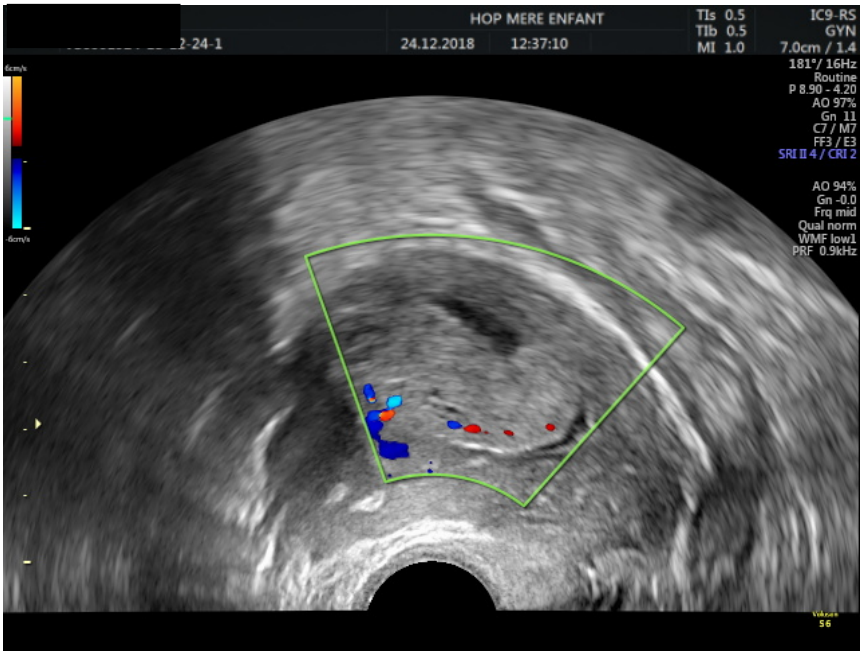


Figure 32: Image showing a polyp in the endometrium in color and power doppler ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

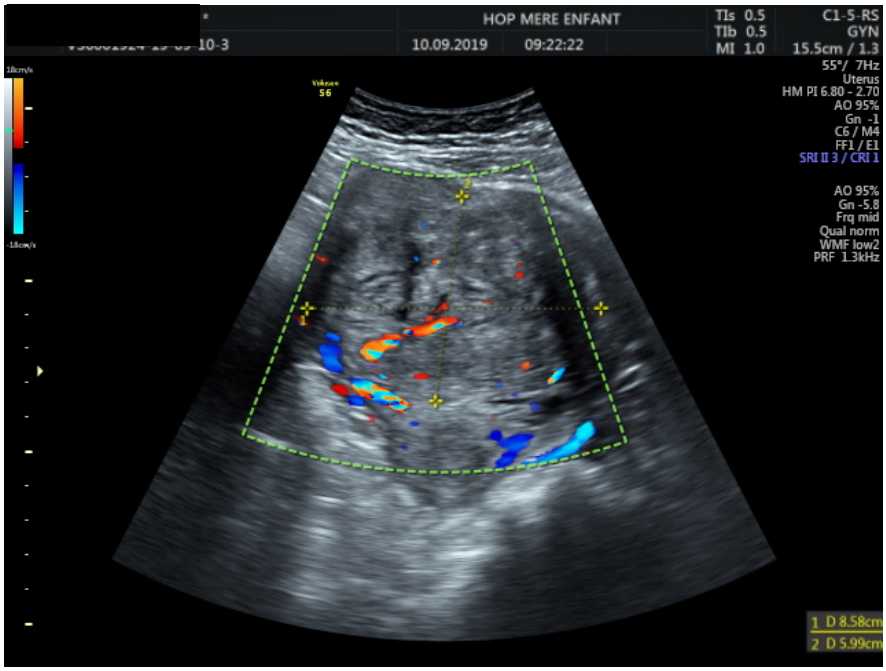


Figure 33: Image showing a polyp and a posterior leiomyoma in the endometrium in color and power doppler ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

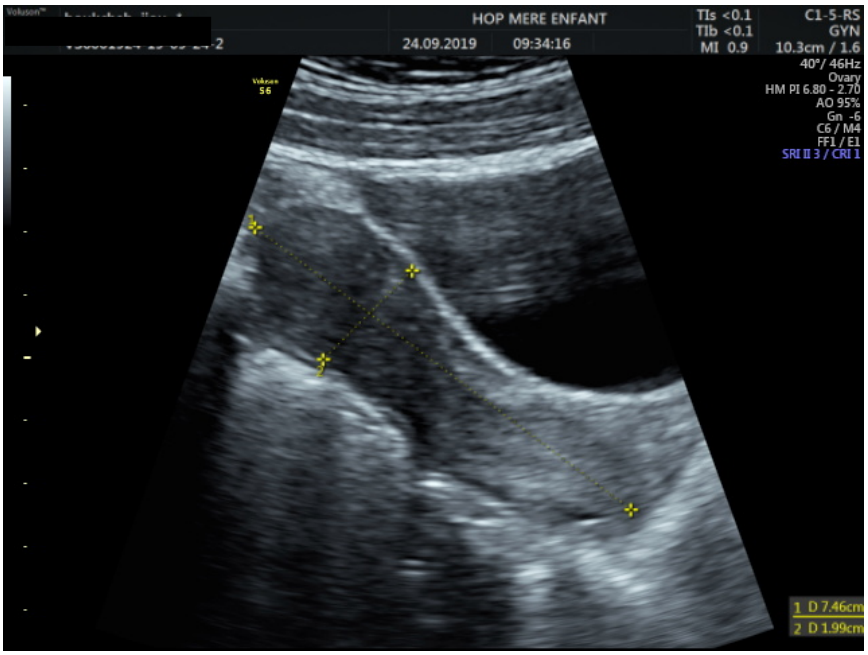


Figure 34: Image showing a hematometra in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

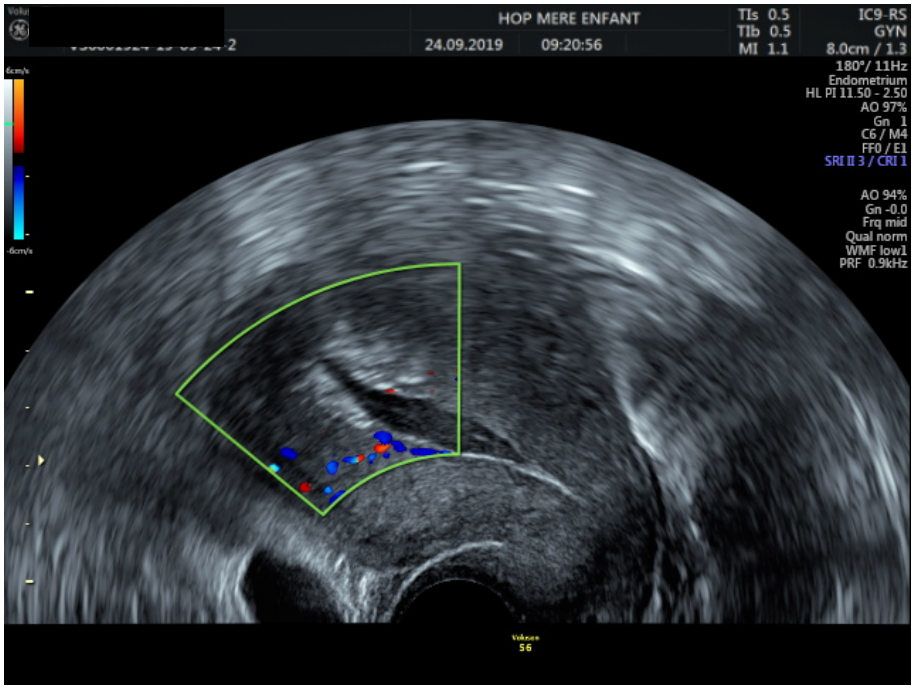


Figure 35: Image showing a hematometra in the endometrium in color and power doppler ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

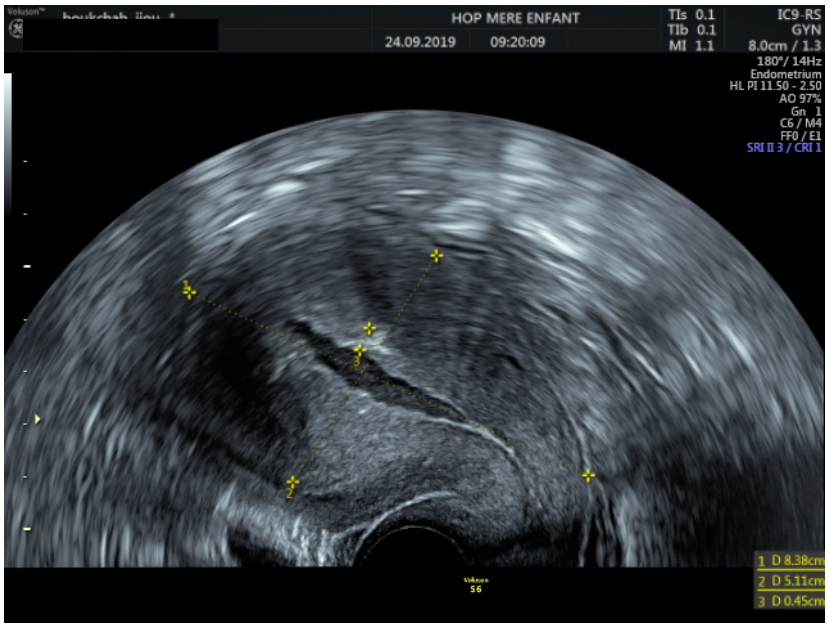


Figure 36: Image showing a hematometra in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

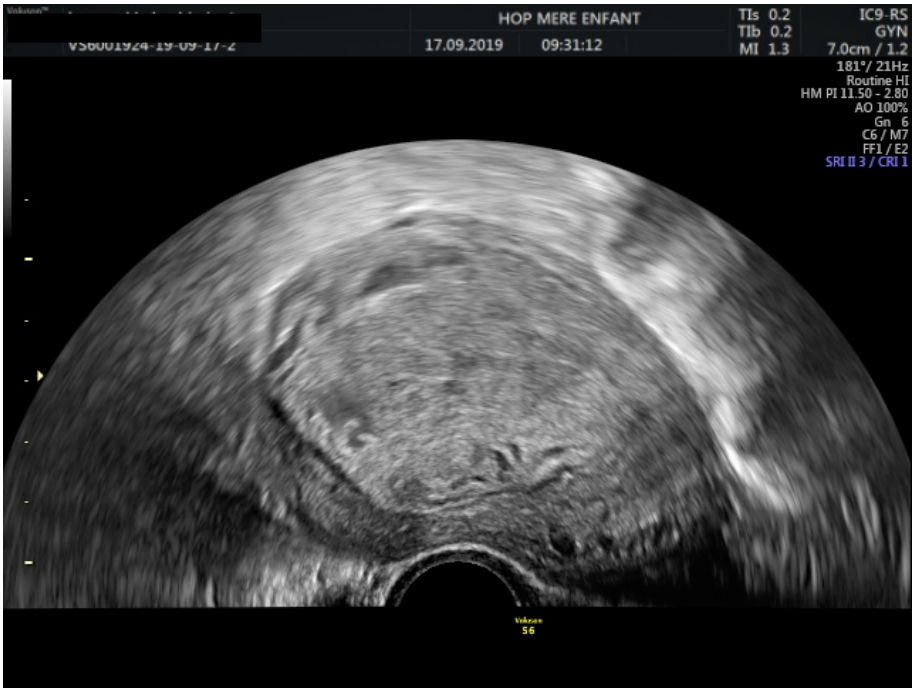


Figure 37: Image showing a suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

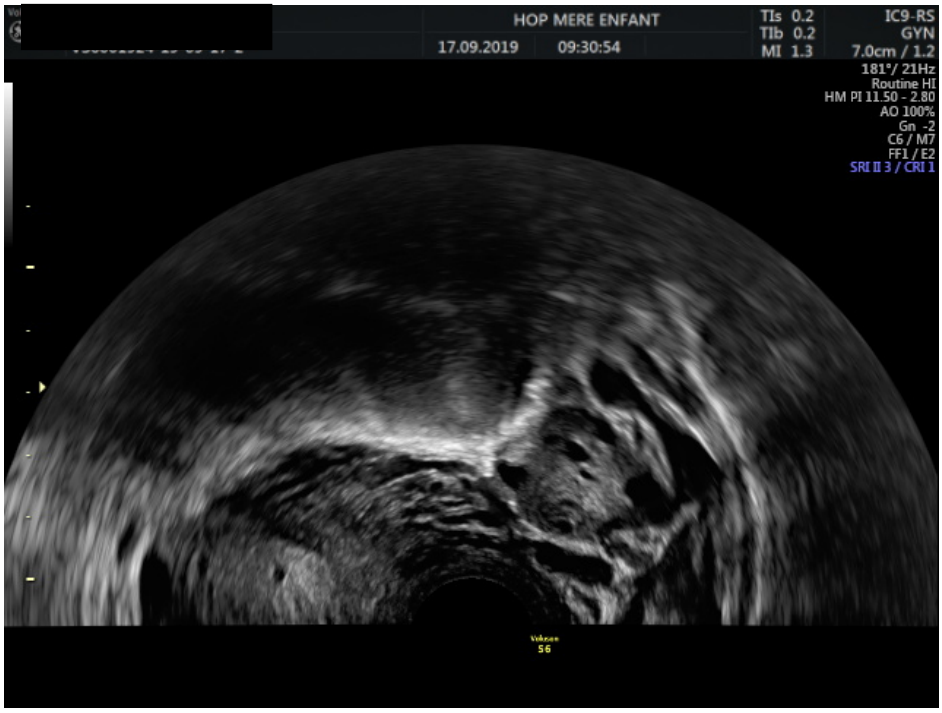


Figure 38: Image showing a suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

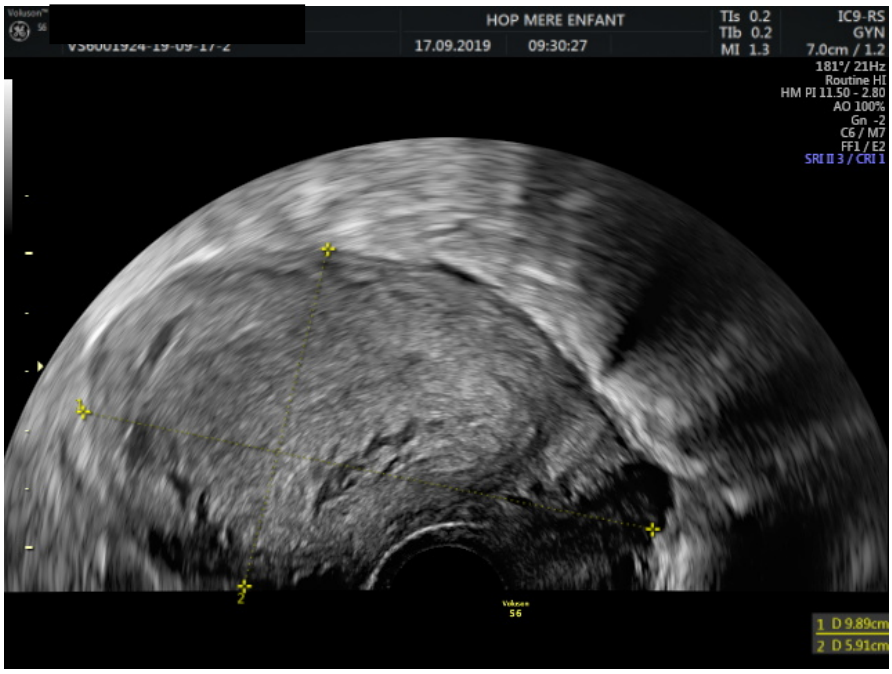


Figure 39: Image showing a suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

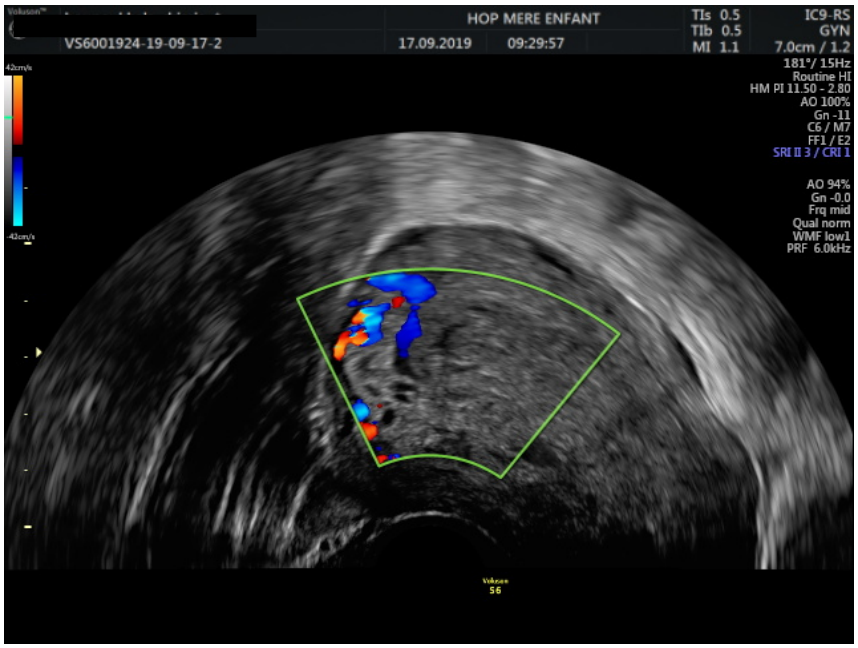


Figure 40: Image showing a heterogeneous suspicious image in the endometrium in color and power doppler ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

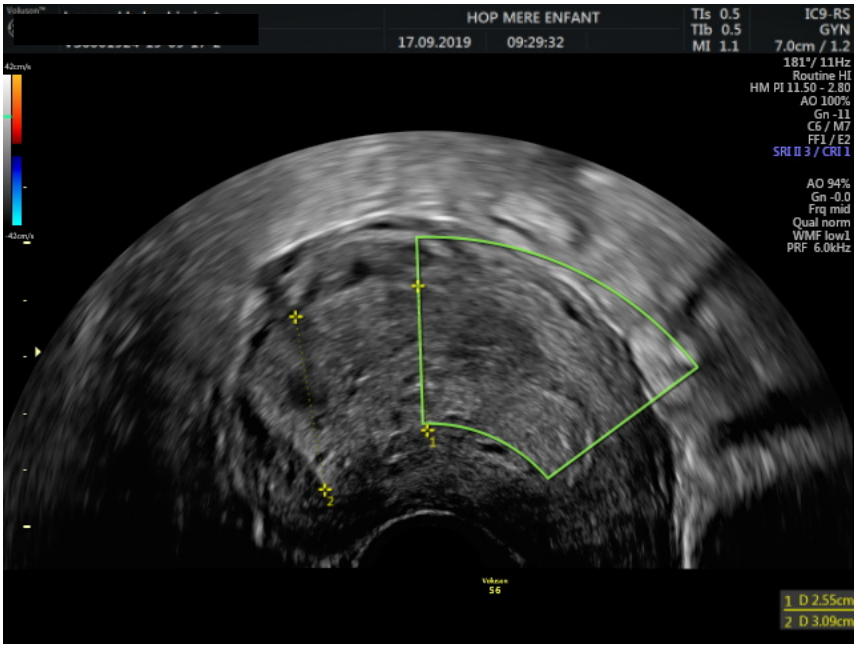


Figure 41: Image showing a heterogeneous suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

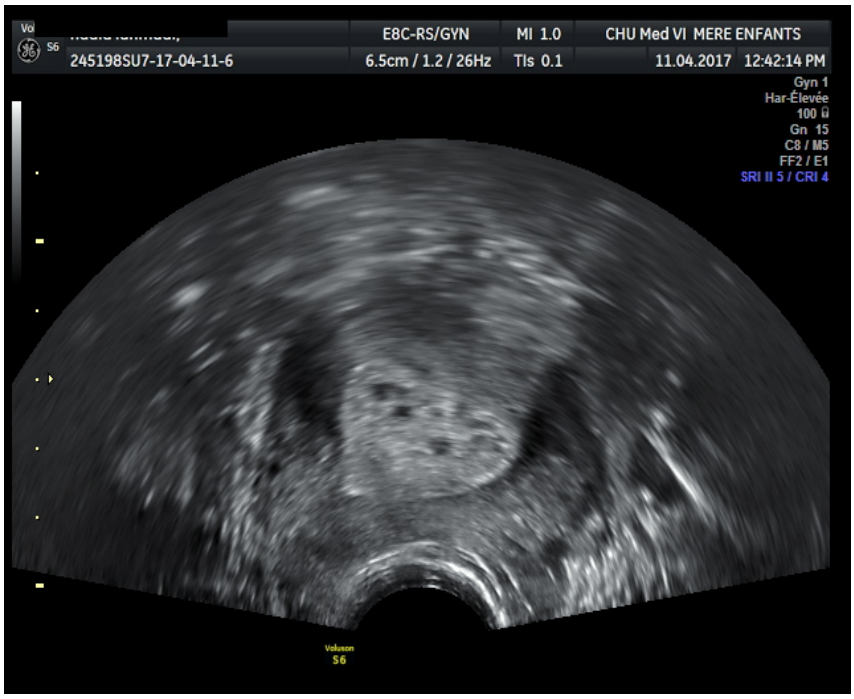


Figure 42: Image showing a heterogeneous suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

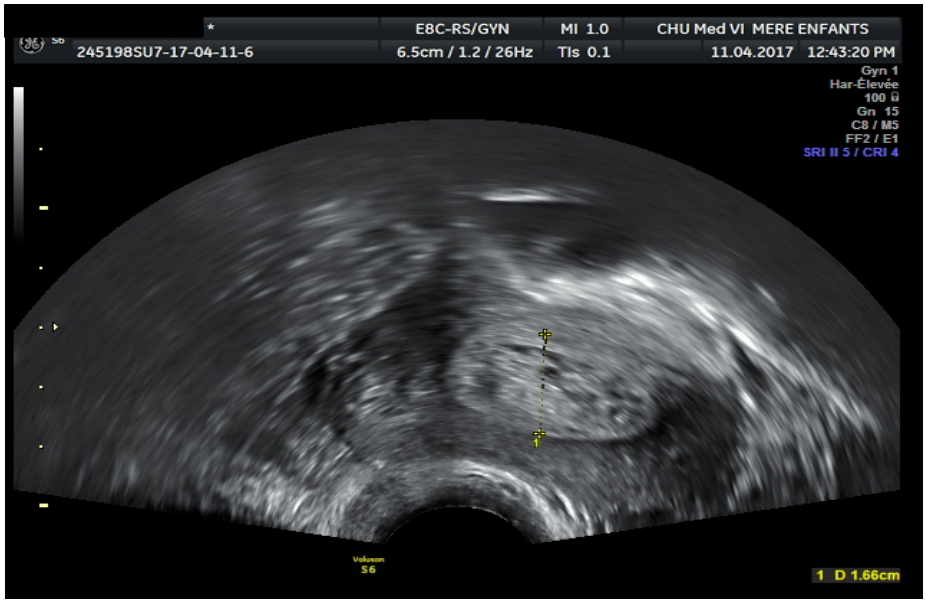


Figure 43: Image showing a heterogeneous suspicious image in the endometrium in ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

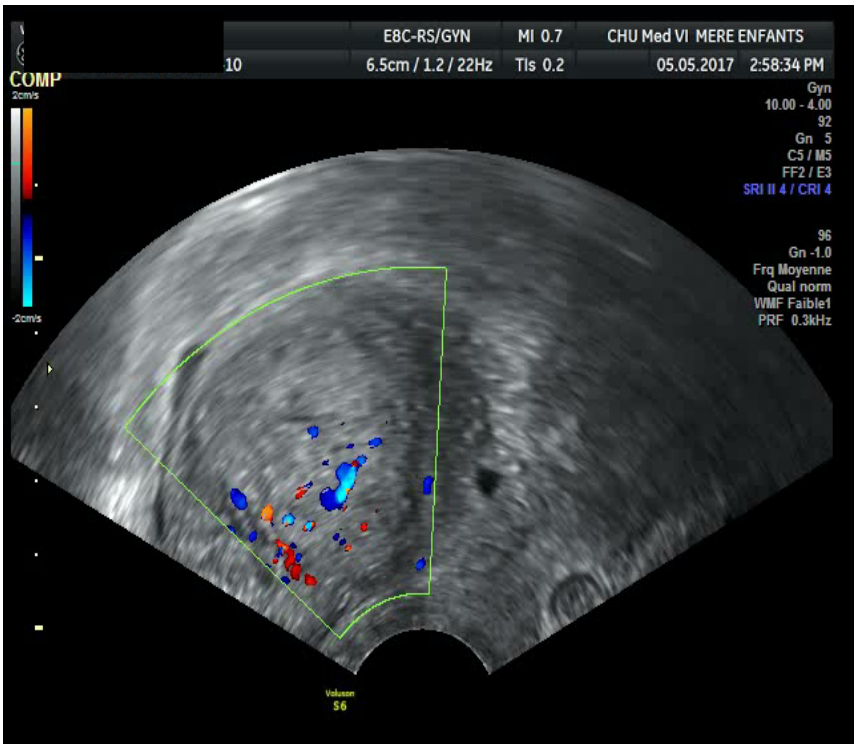


Figure 44: Image showing a heterogeneous suspicious image with central vascularization in the endometrium in color and power doppler ultrasonography. Obstetrics and gynecology department of Mohammed the sixth University Hospital of Marrakech.

### 6.2. Magnetic resonance imaging:

Up to 43.70% of our sample underwent a magnetic resonance imaging, while 56.30% had not. (FIG 45)

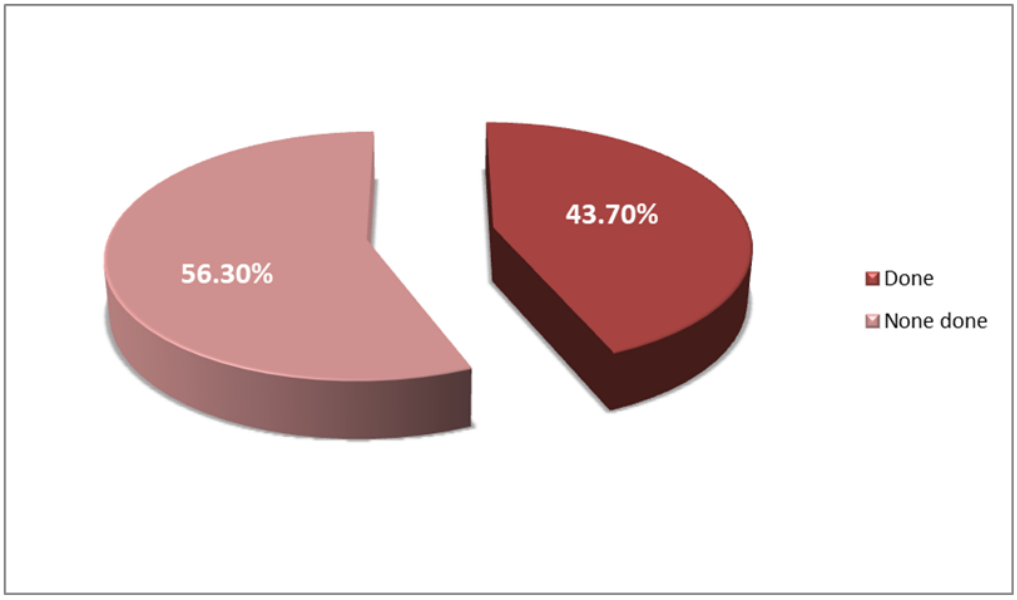


Figure 45: Distribution of patients based on magnetic resonance imaging

### 6.3. Cervical screening (smear test or papanicolaou test):

In our sample, all patients underwent a cervical screening. We found that 3 of them had abnormal results (Inflammation with atypical squamous cells of undetermined significance) with a frequency of 2.90% of our sample. Therefore, the three patients were subject to a colposcopy examination and their results were normal, so they should repeat the cervical screening after 6 months.

### 6.4. Histology:

Different methods were used to get histological samples: Curetting, Pipelle biopsy, Hysteroscopy and direct biopsy.

Most of patients of our sample had simple endometrial hyperplasia without atypia with a frequency of 22.30%. The frequency of polyps was also high with 20.40%, followed by leiomyoma with a frequency of 16.50%.

In malignancies, endometrioid adenocarcinoma was the most frequent with 8.70% of our sample, then came other types of endometrial carcinoma with 3.90%, and sarcoma with 1.90%.

8 patients of our sample had complex endometrial hyperplasia without atypia with a frequency of 7.80%, 12 patients had simple atypical endometrial hyperplasia with a frequency of 11.70%, and a frequency of 6.80% was found in women with complex atypical endometrial hyperplasia.

In our sample, atrophy was found in 3 patients with a frequency of 2.90% and adenomyosis was found with a frequency of 1.90%. (FIG 46)

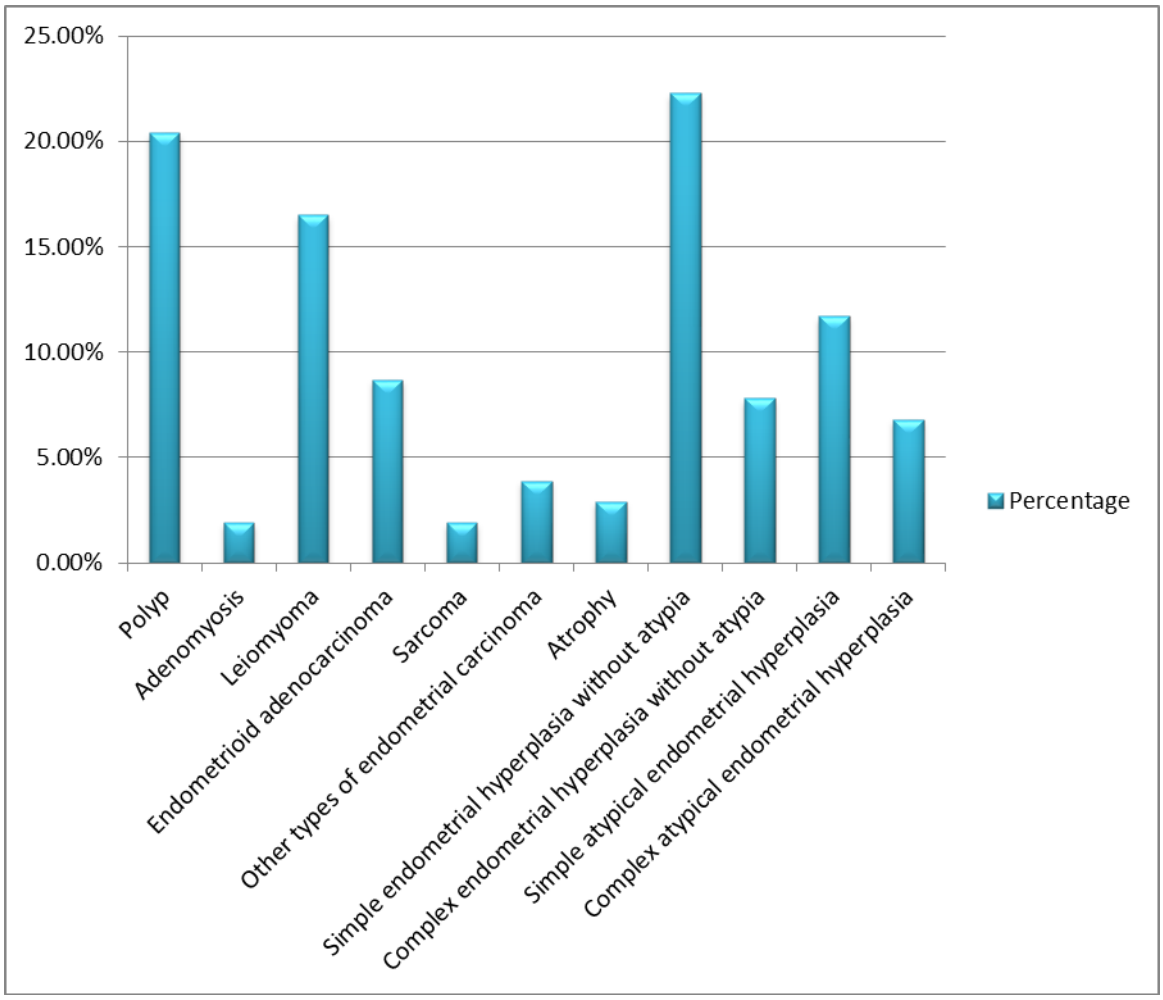


Figure 46: Distribution of patients based on histology

## II. Analytic study: Correlation between ultrasonography and histological results:

In ultrasonography conclusion classification, we considered atrophic endometrium, polyp, leiomyoma and regular hypertrophy as benign images, while, irregular hypertrophy and suspicious images were considered as suspicious image.

In histology classification, we considered polyp, adenomyosis, leiomyoma, atrophy, simple endometrial hyperplasia without atypia and complex hyperplasia without atypia as benign lesions, while, we considered endometrioid adenocarcinoma, other types of endometrial carcinoma, sarcoma, simple atypical endometrial hyperplasia and complex atypical endometrial hyperplasia as premalignant/ malignant lesions.

Out of 61 (100%) benign images concluded in the ultrasonography, 59 (97% of 61) of them were confirmed as benign in the histological results of biopsy, while 2 (3% of 61) of them were actually premalignant/ malignant in the histological results.

Out of 42 (100%) suspicious images found in the ultrasonography, 32 (76% of 42) of them were confirmed as premalignant/ malignant in the histological results of biopsy, while 10 (24% of 42) of them were actually benign in the histological results.

In medical research, the degree of agreement between two raters is often assessed with a measure called Cohen's kappa (27).

In our study the Cohen's kappa coefficient was 0.751, which means that a concordance of 75% was found between the ultrasonography and the histological results of the biopsy.

The P value was at 0.000 which was lower than the degree of significance (<0.001); therefore we could conclude that our results were highly significant, and our concordance was significantly different from the value that would be obtained by chance.

Table I: Cross tabulation of ultrasonography and histological results of the biopsy (number of patients and percentage)

| | | Histology | | Total |
|---|---|---|---|---|
| | | Benign | Premalignant/Malignant | |
| Ultrasonography conclusion: | Benign | 59 (97% of 61)<br>(86% of 69) | 2 (3% of 61)<br>(6% of 34) | 61(100%) |
| | suspicious image | 10 (24% of 42)<br>(14% of 69) | 32(76% of 42)<br>(94% of 34) | 42(100%) |
| Total | | 69(100%) | 34(100%) | 103(100%) |

# DISCUSSION

Menopause is defined retrospectively as the cessation of spontaneous menses for 12 months. Worldwide, most women enter the period of menopause between the ages of 49 and 52 years. Classic symptoms of menopause are well-known colloquially. Yet, there are also important systemic effects that impact wellness taking place during menopausal transition into the post-menopausal period (the risk of developing cardiovascular disease, the atrophy and cystic changes of endometrium, the replacement of dense breast tissue with soft adipose and the osteoporosis…) (28).

Postmenopausal bleeding is an alarming sign that has a high possible association with the cervical or uterine malignancy. It is one of the most common symptoms the patient presents with and should be investigated on priority basis to detect abnormalities if any present (29). Postmenopausal bleeding may reveal:

- **Polyp**: is an abnormal growth containing glands, stroma and blood vessels projecting from the lining of the uterus (endometrium) that occupies spaces small or large enough to fill the uterine cavity. In ultrasonography, endometrial polyps appear as a hyper echogenic lesion with regular contours. Cystic glands may be visible within the polyp (30).
- **Leiomyomas**: are benign tumors that arise from a single genetically altered myometrial stem cell under the influence of gonadal hormones. During ultrasound examination, leiomyomas usually appear as well-defined, solid, concentric, hypoechoic masses that cause a variable amount of acoustic shadowing (31).
- **Adenomyosis**: is a common benign uterine condition, characterized by migration of endometrial glands and stroma into the myometrium (32). Exacoustos et al. found that the most sensitive and specific ultrasonography findings of adenomyosis were a heterogeneous myometrium and myometrial cysts, respectively (33).

- **Endometrial cancers:** The measurement of sonographic endometrial thickness makes it possible to separate women with postmenopausal bleeding into groups at low and high risk for endometrial malignancy: if the sonographic endometrial thickness is less than 5 mm the risk of endometrial malignancy is low. If it is 5 mm or more, the risk of endometrial malignancy is high. Women with postmenopausal bleeding and a thick endometrium should undergo endometrial sampling (34).
- **Endometrial atrophy:** is a response to a hypo-estrogenic state. It is one of the most common causes of postmenopausal bleeding, accounting for approximately 60-75% of cases. Histologically, atrophic endometrium is different from the normal endometrium in the following ways: The cells in the epithelium are smaller or cuboidal in shape, no or very few mitotic figures, the glands become large and round = cystic, the stroma between the glands becomes inactive (35).
- **Endometrial hyperplasia:** is a pre-cancerous, non-physiological, non-invasive proliferation of the endometrium that results in increased volume of endometrial tissue with alterations of glandular architecture (shape and size). In post menopause a thickness of >5 mm is considered abnormal. There are several types of endometrial hyperplasia, which include: (simple hyperplasia without atypia also known as cystic endometrial hyperplasia, simple hyperplasia with atypia, complex hyperplasia without atypia and complex hyperplasia with atypia ) (36).

In spite of the abundance of studies on the different diagnostic measures in women with postmenopausal bleeding, there is no consensus on the best diagnostic pathway (2,37,38). In many guidelines, the examination of the endometrium by transvaginal sonography is used as a first step in the diagnostic pathway to distinguish women with a low and a high risk of having endometrial cancer (2).

The ultrasonography is an operator-dependent examination. In the department where this study was conducted, the ultrasonography was performed by a heterogeneous group of

ultrasonography providers: gynecology and obstetrics Professors, senior residents and young residents of the same department. Therefore, by means of this work, we tried to evaluate our everyday standard of care without pretending to evaluate the sensibility or the specificity of ultrasonography as a screening or diagnostic tool. Doing that, we could either confirm the importance and effectiveness of ultrasound as the first para-clinical examination for postmenopausal bleeding, or propose a different alternative in the opposite case.

It should be noticed that the quality of the ultrasonography images depend on the brand and series of the ultrasound machine. Additionally, this study had no control group: External patients, who were examined and considered normal (negative), were they really negative or no? So, the sensibility and specificity of the ultrasonography couldn't be calculated.

Discussing our results, we found:

# I. Profile of the patients

## 1. The age

The risk of endometrial carcinoma in women with postmenopausal bleeding rises with age from 1% at the age of 50 years to approximately 25% at the age of 80 years (39).

Ages of patients with postmenopausal bleeding in the current study ranged between 43 years and 80 years with a mean age of 59.42 +/- 8.954 years. Our findings are in line with most of the literature. The mean age of 60 years and 58.6 years and 57.6 years found respectively in the studies conducted by N.Mathouthi et al. , Azhar Al-Turiahi et al., M.Tariq et al. are almost similar to ours (40-42).

A lower mean ages have been found in the studies conducted by A.Wong et al.(55 years) and that by S.Sreelatha et al.(51.4 years) which can be explained by the age range of the population chosen in the studies : age range between 52-62 years in A.Wong et al. and 40-60 years in S.Sreelatha et al. (29,43).

It has been reported that the incidence of postmenopausal bleeding decreases with increasing age (39,44). This study also proved the same: 47.6% of postmenopausal bleeding women in our sample were between 43 and 59 years; 37.9% of them were between 60 and 69 years of age; while only 14.6% were above 70 years.

Table II: Age in literature

| Studies | Mean age | Age range |
|---|---|---|
| **M.Tariq et al.** (42) | 57.6 | 38-80 |
| **S.Sreelatha et al.** (29) | 51.4 | 40-60 |
| **N.Mathouthi et al.** (40) | 60 | 45-82 |
| **A.Al-Turiahi et al.** (41) | 58.6 | 46-80 |
| **Arati Mallick et al.** (39) | 57.12 +/-9.13 | 43-80 |
| **A.Wong et al.** (43) | 55 | 52-62 |
| **Our study** | 59.42 +/- 8.954 | 43-80 |

## 2. Medical history:

### 2.1. Age of menopause:

The mean age of menopause of our sample was 48.85 years with a standard deviation of 4.449. Our finding closely mirrors results in an Indian study by Arati Mallick et al. who found a mean age of menopause of 48.06 +/- 51 years (39).

The mean age in our sample was, however, relatively smaller than in several studies; A.Wong et al., for example, found 50 years in a study conducted in China. We can explain this difference by the fact that our study ranged the age of menopause between 40-59 years comparing to A.Wong study that ranged it between 48-52 years (43). Therefore, our patients are relatively a younger sample.

Table III: Age of menopause in literature

| Studies | Mean age of menopause | Age of menopause range |
|---|---|---|
| I. Bani-Irshaid et al. (45) | 50.6 | - |
| A.Wong et al. (43) | 50 | 48-52 |
| Arati Mallick et al. (39) | 48.06 +/- 5.1 | 42-57 |
| Our study | 48.85 +/- 4.449 | 40-59 |

### 2.2. Age of menarche :

- A substantial body of evidence suggests that early menarche generally defined as menarche before the age of 12 (46).
- Our study ranged the age of menarche between 11-15 years with a mean of 12.44 years +/- 1.026 years. Our finding was in line with the study conducted by A.Mallick et al. who found a mean age of menarche of 13.23 years +/- 1.66 years and a range of 11-17 years.
- Both studies found patients with early age of menarche at 11 years, which has been proven to be a risk factor for the development of endometrial hyperplasia and carcinoma (39,47).

Table IV: Age of menarche in literature

| Studies | Mean age of menarche | Menarche range |
|---|---|---|
| A.Mallick et al (39) | 13.23 +/- 1.66 | 11-17 |
| Our study | 12.44 +/- 1.026 | 11-15 |

### 2.3. Parity :

- In literature, it appears that most of the patients were multipara & grandmultipara (41,48). Our study was in line with the literature since we found that multipara and grand multipara had the highest frequency in women with postmenopausal bleeding with a percentage of 49.50% of multipara and 34% of grand multipara. The studies conducted by S.Sreelatha et al. and A.Mallick et al. have found similar results (29,39).
- Nulliparity is considered a risk factor for endometrial cancer (41).
- Up to 12.6% of our sample was nulliparous, our result was the highest among the four studies we compared our frequency with (S.Sreelatha et al. found 0% of nulliparous, A.Mallick et al. pointed out that 3.57% of his sample were nulliparous, 4.80% was the frequency found by the Chinese study A.Wong et al. ,and the percentage found by M.Alhamdani et al was 7.5% (10,29,39,43).
- Furthermore, it is worth-noting that we can explain the difference between our results and the literature by the fact that our nulliparous patients group gathers both the infertile women and the unmarried ones.

Table V: Parity in literature

| Studies | Frequency and (percentage%) of parity | | | |
|---|---|---|---|---|
| | Nulliparous (0) | Primiparous (1) | Multiparous (2-3-4) | Grand multipara (5 or more) |
| S.Sreelatha et al. (29) | 0 | 3 (6%) | 43 (86%) | 4 (8%) |
| A. Mallick et al. (39) | 5 (3.57%) | - | 64 (45.72%) | 48 (34.28%) |
| A.Wong et al. (43) | 209 (4.8%) | - | - | - |
| M.Al hamdani et al. (10) | 3 (7.5%) | 37 (92.5%) | | |
| Our study | 13 (12.6%) | 4 (3.9%) | 51 (49.5%) | 35 (34%) |

### 2.4. High blood pressure/ Diabetes/ Body Mass Index:

Medical disease including diabetes, high blood pressure and obesity are common medical problems in patients with postmenopausal bleeding. These are significantly associated with endometrial cancer (39,41,49).

It is important to mention that all risk factors are based on probabilities. Even someone without any risk factors can still get endometrial cancer (41).

High blood pressure (50.5%), diabetes (35%) and obesity (89.3%) had relatively high percentages in our study. Our findings are in line with a recent Iraqi study conducted by A.Al-Turiahi et al., where it was reported that 52.9% of women with postmenopausal bleeding had high blood pressure, 29.3% had diabetes and 69.3% had obesity (41) . However, S.Pushpa et al in an Indian study found a much lower percentages: 38.3% of the studied population had high blood pressure and only 12% of them had obesity (44), although from 1998 to 2018, the prevalence of obesity in India is rapidly spurting due to sedentary life style and consumption of high calories food (50); however they found a relatively similar percentage of diabetes (33.3%).

Table VI: High blood pressure/ Diabetes/ Body Mass Index in literature

| Studies | Frequency and (percentage %) | | | | | |
|---|---|---|---|---|---|---|
| | High blood pressure | Diabetes | Body Mass Index | | | |
| | | | Underweight (<18.5) | Normal (18.5-25) | Overweight (25.1-30) | Obesity (>30) |
| A.Al-Turiahi et Al (41) | 74(52.9%) | 41(29.3%) | - | 43(30.7%) | 65 (46.5%) | 32 (22.8%) |
| S.Pushpa et Al (44) | 23 (38.3%) | 20 (33.3%) | 22(36%) | | 8 (12%) | |
| Our study | 52 (50.5%) | 36 (35%) | 1 (1%) | 10 (9.7%) | 35 (34%) | 57 (55.3%) |

# II. Medical investigations :

## 1. Ultrasonography :

### 1.1. Endometrial thickness:

The thickness of endometrium is measured by transvaginal ultrasound which is the most convenient, non-invasive investigation for diagnosis of endometrial pathogenesis, but it is a non-specific clinical attestation for uterine cancer (51).

Measuring thickness of endometrium via Ultrasound made it possible to divide women with postmenopausal bleeding into two groups low-risk and high-risk groups. If the endometrial thickness is less than 4.5 mm, this indicates low risk of endometrial malignancy. If it is 4.5 mm or more, this indicates high risk of endometrial malignancy. In the low-risk group of patients, expectant management if possible, sample is not needed; however, they are advised to follow-up if the bleeding reoccurs (51,52).

Women with postmenopausal bleeding and thick endometrium must undergo endometrial sampling, in fear of the high risk of endometrial cancer. However, normal endometrial thickness did not exclude endometrial cancer, especially in women with significant predisposing factors (51,53).

In both our study and several other studies about the endometrial thickness, we took 5 mm as an endometrial thickness cutoff, we can defend our choice by the fact that with an endometrial thickness cutoff of 5 mm, sensitivity was 80.5% and specificity was 85.7% for endometrial cancer (54).

28.2% of our simple had an endometrial thickness less than 5 mm and 71.8% had 5 mm or more. This finding is in line with the Korean study D.Lee et al. who found 26.8% of their simple with an endometrial thickness less than 5 mm and 73.2% of them had an endometrial thickness superior than or equal to 5 mm (55). However it is important to precise that S.El kady et al. and A.Wong et al. found different results with a much higher percentage in thin endometrium (less than 5 mm ) and lower percentage of thick endometrium (5 mm or more) (43,51). A possible explanation for our different findings is that the later the presentation to the medical examination is, the greater the possibility that some of the tissue will have been passed vaginally, leading to reduced endometrial thickness (56).

Table VII: endometrial thickness in literature

| Studies | Endometrial thickness: Frequency and (percentage %) | | |
|---|---|---|---|
| | 1 mm or less | 1< <5 | 5 mm or more |
| S.El kady et Al (51) | 54 (60%) | | 36 (40%) |
| A.Wong et Al (43) | 62 (1.4%) | 3069 (70%) | 1252 (28.6%) |
| D.Lee et Al (55) | 30 (26.8%) | | 82 (73.2%) |
| Our study | 4 (3.9%) | 25 (24.3%) | 74 (71.8%) |

### 1.2. Ultrasonography lesions :

If no obvious vulvar, vaginal or cervical cause has been found, the first imaging test to be performed is a pelvic ultrasound. This examination allows studying the size of the endometrium, the size of the uterus... (57).

In our study, the frequency of hypertrophy was 44.70%, atrophy was found in 2.90% of our sample, leiomyoma in 12.60%, and suspicious image had a frequency of 40.80% of our sample.

Mathlouthi et al. found different results; their study pointed out that hypertrophy had a frequency of 25% of their sample, atrophy 55%, polyp 2.50%, leiomyoyma 7.5%, and suspicious image 10% (40).

The frequency of atrophy was the least frequency in our study, and the highest frequency in the Mathlouthi et al. study. This difference of results between our study and the literature could be explained by the fact that we studied only women who have been hospitalized in our gynecological department, while women with atrophic endometrium were seen in the medical consultation and did not need to be hospitalized.

Mathlouthi et al. results remain different from ours in terms of proportion but consolidate the hypotheses of the different lesions that can be evoked on ultrasound.

Table VIII: Percentage of ultrasonography lesions in literature

| Studies | Hypertrophy | Atrophy | Polyp | Leiomyoma | Suspicious image |
|---|---|---|---|---|---|
| Mathlouthi et al (40) | 25% | 55% | 2.5% | 7.5% | 10% |
| Our study | 44.7% | 2.9% | 15.5% | 12.6% | 40.8% |

## 2. Histology findings:

Postmenopausal bleeding is a frequent manifestation in menopause and at the rate of at least 1 in every 10 women seeks medical care for it during their lifetime. Postmenopausal bleeding is the most typical sign of endometrial cancer (90%), which is the most frequent type of gynecological tumor (51,58).

Although most common cause found on investigations is benign, but as about 10% cases of postmenopausal bleeding has endometrial carcinoma as the underlying cause, every case of postmenopausal bleeding must undergo thorough evaluation. Many studies have been conducted all over the world till date, to evaluate different causes of postmenopausal bleeding (59).

All these studies whether prospective or retrospective, recruited postmenopausal patients, subjected them to transvaginal sonography to measure endometrial thickness and then to endometrial sampling (59).

The incidence of malignancy in postmenopausal period remains sufficiently high. So, it requires immediate investigation for early diagnosis, vigilant follow up and prompt treatment. It is difficult to predict the population changes in future, but it is certain that we are going to see an ever increasing number of postmenopausal women day by day. In real terms there are more women who are spending a greater proportion of their lives in the postmenopausal years (39).

The histopathological diagnosis done by curettage has been utilized as a gold-standard method for differentiating between typical and atypical endometrium in spite of the fact that it encompasses a false negative rate of 1-10% due to failure of examining the full depth. Moreover, it is an obtrusive and risky procedure, also, it lacks comfort. Additionally, it holds a little but genuine hazard of morbidity and mortality particularly in elderly patients (51).

Discussing our results: Some 20.4% of our sample had polyp, 16.5% had leiomyoma, 1.9% adenomyosis, a percentage of 22.3% had a simple endometrial hyperplasia without atypia, 7.8%

complex endometrial hyperplasia without atypia, and 2.9% of our sample had atrophic endometrium; making it a total percentage of 71.8% of studied cases with benign endometrial lesions.

On the other hand, 33% of our sample had premalignant or malignant endometrial lesions including endometrioid adenocarcinoma (8.7%), sarcoma (1.9%), other endometrial cancer (3.9%), simple atypical endometrial hyperplasia (11.7%) and complex atypical endometrial hyperplasia (6.8%).

It is important to note that in our study the percentage of benign lesions was much higher than the premalignant and malignant lesions. Our benign / premalignant or malignant classification was based on a new classification system of endometrial hyperplasia done by the World Health Organization (60). This finding is in line with the literature. S.El kady et al. in a study conducted in 2021 found a percentage of benign lesions equal to 68.9%, and 31.1% as a percentage of premalignant and malignant lesions. M.Alhamdani et al. found 60% of benign lesions and 15% of premalignant and malignant lesions. P.Singh et al in an Indian study also found a relatively similar result with 59.99% of benign lesions and 18.33%of premalignant and malignant lesions (10,44,51).

Furthermore, we found in our sample a low percentage of atrophic endometrium (2.9%) which is lower than in several studies. S.El kady et al. found a percentage of 28.9%, M.Alhamdany et al. found 12 cases of atrophic endometrium representing 30% of his sample, P.Singh et al., I. Bani-Irshaid et al, A.Mallick et al. found respectively 38.33%, 51.9% and 40.74%. This difference of results between our study and the literature could be explained by the fact that we studied only women who have been hospitalized in our gynecological department, while women with atrophic endometrium were seen in the medical consultation and did not need to be hospitalized.(10,39,44,45,51)

Our study joined the literature in the percentage of endometrial carcinoma. We found that 13 women out of 103 studied had endometrial carcinoma with a percentage of 12.6%. Our

finding closely mirrors results in a non-randomized longitudinal prospective observational study by A.Mallick et al who found a percentage of 12.96% of endometrial carcinoma, a little higher percentage was pointed out by P.Singh et al. who found 13.33% (39,44). The reason for high rate of malignancy as a cause of postmenopausal bleeding in developing countries compared to developed world might be lack of accessibility for modern health care. Among the malignant lesions, the incidence of carcinoma endometrium varied in different studies (39).

Table IX: Histology findings in literature

| Studies | Polyp | Leiomyoma | Adenomyosis | Carcinoma | | Sarcoma | Hyperplasia | | | | Atrophic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EA | OC | | SEHWA | CEHWA | SAEH | CAEH | |
| S.El kady et al (51) | - | - | - | 10 (11.1%) | | - | 36 (40%) | | 18 (20%) | | 26(28.9%) |
| M .Al hamdani et al (10) | 2 (5%) | - | - | 4 (10%) | | - | 10 (25%) | | 2 (5%) | | 12 (30%) |
| P.Singh et al (44) | 2 (3.33%) | - | - | 8 (13.33%) | | | 11 (18.33%) | | 3 (5%) | | 23 (38.33%) |
| I. Bani-Irshaid et al (45) | 24 (5.1%) | - | - | 43 (9.2%) | | - | 52 (11.1%) | | | | 243 (51.9%) |
| A.Mallick et al (39) | 5 (4.63%) | - | - | 14 (12.96%) | | - | 9 (8.34%) | 4 (3.70%) | 1 (0.93%) | | 44 (40.74%) |
| Our study | 21 (20.4%) | 17 (16.5%) | 2 (1.9%) | 9 (8.7%) | 4 (3.9%) | 2 (1.9%) | 23 (22.3%) | 8 (7.8%) | 12 (11.7%) | 7 (6.8%) | 3 (2.9%) |

**EA:** Endometrioid adenocarcinoma - **OC:** Other carcinoma - **SEHWA:** Simple endometrial hyperplasia without atypia
**CEHWA:** Complex endometrial hyperplasia without atypia - **SAEH:** Simple atypical endometrial hyperplasia
**CAEH:** Complex atypical endometrial hyperplasia

# III. Analytic study: Correlation between ultrasonography and histological results:

Ultrasonography is a less invasive test and proves quite useful when having to discriminate cancer or hyperplasia depending on endometrial thickness in a postmenopausal patient, and it is valid as an initial test in patients with postmenopausal bleeding. If its result is positive (ET values between 4 mm and 5 mm, according to some authors) , performing a hysteroscopy is recommended (55,58,61-65).

In our study the Cohen's kappa coefficient is 0.751, which means that a concordance of 75% was found between the ultrasonography and the histological results of the biopsy. Our findings were in line with most of the literature.

In a Spanish study conducted by M.Torrijos et al. the sensitivity of the transvaginal ultrasound for malign pathology (adenocarcinoma or hyperplasia with atypia) by using an endometrial thickness cut-off point of 5 mm was to 98.7%, and its specificity was 30.1% (58) .

The accuracy of transvaginal ultrasonography and endometrial histological biopsy in predicting endometrial hyperplasia and endometrial carcinoma is a subject of continuing debate. Karlsson et al. (66) compared the specificity and sensitivity of transvaginal ultrasound and dilatation and curettage to discriminate between a normal and pathological endometrium. A specificity of 81% and a sensitivity of 97% in diagnosing morphological alterations by means of transvaginal ultrasonography were found. Moreover, other authors such as R.Auslender et al.(67) determine the sensitivity and specificity for the measurement of endometrial thickness using transvaginal ultrasonography to diagnose an endometrial abnormality at 100 and 75%, respectively (68).

Gupta et al., Smith-Bindman et al., L.Alcazar et al., and Garuti et al. had found various results concerning the sensitivity and specificity of the ultrasonography; that could be explained

by the fact that the ultrasonography is operator dependent examination, and that the results could change depending on the quality of its images that changes with the brand and series of the ultrasound machine. However, they all pointed out that the specificity was lower than the sensibility with respectively for the specificity 77%, 38-90%, 60.80%, 54.80%; and a sensibility respectively at 83%, 66-100%, 100%, 95.1%. (69-72)

Gupta et al. and L.Alcazar et al. found a positive predictive value of the ultrasonography respectively at 54% and 35.70% (69,71).

Finally, it's important to precise that the ultrasonography is an operator dependent examination. This fact makes the heterogeneous operators in our study a bias. Alcazar et al. and Auslender et al. performed their examinations by one examiner and used respectively Philips P-700 SE machine (Philips Ultrasound, Santa Ana, CA, USA) with real-time 6.5-MHz sector electronic phased-array endovaginal probe and Elscint ESI 1000 scanner, equipped with a 6.5 MHz mechanical transvaginal sector transducer, as transvaginal ultrasounds in their works. They found, respectively, specificity at 60.80% and 75% and both found a sensibility at 100%. Compared to these works in literature, we could say that our results are good and the practice of the ultrasonography in the department of Gynecology and Obstetrics in Mohammed the sixth University Hospital of Marrakech is precise; because, despite our heterogeneous group of operators, we found a concordance of 75% between the ultrasonography and the histological results of the biopsy, using a VOLUSON S6 IC9-RS with IC9-RS endovaginal probe for 2D gynecology and fetal imaging and C1-5-D 5499513 abdominal probe as ultrasound machine (67,71).

# RECOMMENDATIONS

Based on our findings, we suggest the following recommendations:

- Specific ultrasonography courses for gynecology obstetrics residents should be performed beside clinical practice in order to improve the quality of this examination.
- For endometrial hypertrophies, ultrasound should always be completed by doppler scans in search of endometrial neovascularization and the study of the uterine artery, which would improve the concordance between ultrasound and histology in the diagnosis of the aspects of atypia.
- Histological examination should be performed whenever ultrasound finds an abnormality apart from atrophy.
- In the future, more prospective studies should be done to evaluate the correlation between ultrasonography and histology.

# CONCLUSION

Postmenopausal bleeding is a frequent and worrying symptom in menopausal women making the endometrial cancer the first diagnosis to evoke until proven otherwise, even if in majority of cases benign pathologies are found (polyp, leiomyoma, hyperplasia...).

Several items of the patient's medical history were very important and had a high frequency in the literature.

Our retrospective cohort study of 103 cases of postmenopausal bleeding women has allowed us to conclude that:

- We could confirm the effectiveness of ultrasound as the first para-clinical examination for postmenopausal bleeding in the Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech. The ultrasonography's contribution has improved significantly thanks to the use of high frequency transvaginal probes.
- Our study showed a high concordance between ultrasonography and histology in endometrium pathology in postmenopausal bleeding women, but it remains crucial to opt for a histopathological examination after the ultrasonography results except for the presence of an atrophied endometrium.

The probable association of two or more endometrial pathologies in a single patient is worth noting because while the postmenopausal bleeding is the main symptom, an inadequate treatment caused by a false or incomplete diagnosis would cause a recurrence of bleeding. This calls for meticulous examination and expert knowledge of the ultrasonography to remain effective in controlling the bleeding cause. This makes the diagnosis of endometrial pathology in postmenopausal bleeding tricky and therefore patient-specific care is crucial.

# ANNEXES

# Annex 1: Patient's information form:

## Correlation between ultrasonography and histology in endometrium pathology in postmenopausal bleeding

### The patient's information form:

Obstetrics and Gynecology Department FORM N°: .....

Mohamed VI University Hospital Marrakech

### I- Demographic data:

- Patient's index: .....
- Phone number: .....
- Age: ..... years old

### II- Medical history

- Patient's medical history :
  - Gravidity and parity :
  - Vaginal delivery :
  - Cesarean :
  - Menarche : ..... years old
  - Age of menopause : ..... years old
  - Duration of menopause: ..... years
  - Fertility : YES NO
  - Last cervical screening (smear test) : YES NO

If yes precise date and results: ……..

- o Uterine fibroid : YES NO
- o Endometriosis : YES NO
- o High blood pressure : YES NO
- o Obesity : YES NO
- o Diabetes : YES NO

- o Smoking : YES NO
- o Surgery : YES NO

If yes precise: …….

- o Family medical history
  - o Hemostasis disorders : YES NO
  - o Hormone dependent cancer
    - ▪ Ovary : YES NO
    - ▪ Breast : YES NO
    - ▪ Endometrium : YES NO

**III-Presenting complaint**

- ✓ Postmenopausal bleeding YES NO
- ✓ Characteristics of bleeding :
  - Date of onset : ……
  - Estimated blood loss : LOW MEDIUM HIGH

- Spontaneous bleeding : YES NO

If NO precise the cause of the bleeding : ……

✓ Associated signs :

- Pelvic pain: YES NO
- Dyspareunia: YES NO
- Leucorrhoea : YES NO
- Mass : YES NO

## IV- Physical examination

### A. General examination

o General condition : Good

Deteriorated

o Anemia signs :

- Pallor : YES NO
- Palpitation : YES NO
- Weakness : YES NO
- Headache : YES NO
- Discolored conjunctiva : YES NO

o Height : ……m

o Weight : …….. kg

o Body mass index : ……..

### B. Gynecological examination

- Speculum examination
  - ✓ Normal cervix : YES NO
  - ✓ Genital mucosa : PALE / PINK / WET / DRY
  - ✓ Cervicitis : YES NO
  - ✓ Atrophic vaginitis : YES NO
  - ✓ Petechiae : YES NO
  - ✓ Suspicious lesion : YES NO
  - ✓ Abnormal uterine bleeding : YES NO
  - ✓ Prolapse: YES NO
  - ✓ PAP test (papanicolaou test) :

    ……

    ……

- Vaginal touch
  - ✓ Normal : YES NO
  - ✓ Increase in uterine volume : YES NO
  - ✓ Sensitivity of the uterus : YES NO
  - ✓ Infiltration of vaginal walls : YES NO
  - ✓ Latero-uterine mass : YES NO
  - ✓ Cul-de-sac : PAIN / MASS / NODULE

- Breast
  - ✓ Tenderness : YES NO
  - ✓ Tightness : YES NO
  - ✓ Nodule : YES NO

**C. Examination of the remaining body systems :**

Normal Abnormal

(……
……
……)

**V- Paraclinical investigations :**

**1) Biological tests :**

- Complete blood count : ……
- Prothrombin time : ……
- Fibrinogen : ……..
- Blood type and rhesus test : ……..
- Thyroid stimulating hormone : ……
- Cervico-vaginal bacterial sampling : ……

**2) Medical imaging :**

**a) Ultrasonography :**

**i.** Uterus :

- Uterine size : Normal Increased
- Uterine position : anteverted retroverted intermediate

- Uterine outline : regular irregular
- Cervix : echotexture :

Homogeneous Heterogeneous

ii. Myometrium :

Homogeneous Heterogeneous

iii. Endometrium :

- Endometrial thickness (Antero posterior diameter) (in mm) :

……..

- Endometrium : Hypertrophic Atrophic
- Endometrial midline:

Linear Non-linear Irregular Not defined

- Endometrial-myometrial junction :

Regular Irregular Interrupted Not defined

- Endometrium echotexture: Homogeneous Heterogeneous
- Endometrium echogenicity :

Hypoechogenic Hyperechogenic Isoechogenic

iv. Color and power doppler :

- Done : YES NO

If done :

……

……

……..

**v.** Ovary :

- Right ovary :
  - Visualized : YES NO
  - Normal size and structure : YES NO
  - Follicles present : YES NO

    If present precise : number : ..... size : .....
  - Cyst : YES NO
- Left ovary :
  - Visualized : YES NO
  - Normal size and structure : YES NO
  - Follicles present : YES NO

    If present precise : number : ..... size : .....
  - Cyst : YES NO

**vi.** Uterine tubes :

- Visualized : YES NO
- Normal size and structure : YES NO

**vii.** Dougla's pouch :

- Free : YES NO
- Effusion : YES NO

b) Ultrasonography conclusion:

- ☐ Hypertrophy
- ☐ Atrophy
- ☐ Polyp
- ☐ Myoma
- ☐ Suspicious image

c) Magnetic resonance imaging :

DONE : YES NO

……

……

d) Computed tomography scan: (if MRI is contraindicated):

……

……

3) PAP-test (Cervical-vaginal smear) :

……

……

4) Colposcopy: (if PAP test result is abnormal):

……

……

5) Anatomopathological study:

- Endometrial biopsy:

☐ Curetting

☐ Pipelle biopsy or other equivalent technique

☐ Hysteroscopy and direct biopsy

☐ Endometrial cytology

**Results :**

.....

.....

.....

.....

- **Resected specimen :**

  **Results if done :**

  .....

  .....

  .....

  .....

- **Concordance between the results :** YES NO

**VI- Therapeutic attitude:**

1. Medical treatment:

   .....

   .....

2. Surgical treatment:

   ☐ Total hysterectomy

   ☐ Total hysterectomy with bilateral salpingo-oophorectomy

   ☐ Uterine myomectomy

- By hysteroscopy: YES NO

- By laparoscopy: YES NO

☐ Uterine polyp removal

☐ Pelvic lymphadenectomy

☐ Para-aortic lymphadenectomy

☐ Omentectomy

**VII- Classification :**

☐ **Benign:**

- Polyp: YES NO

- Adenomyosis: YES NO

- Leiomyoma: YES NO

- Atrophy: YES NO

- Hyperplasia:

* Simple endometrial hyperplasia without atypia:

YES NO

* Complex endometrial hyperplasia without atypia:

YES NO

☐ **Premalignant/Malignant:**

- Hyperplasia:

* Simple atypical endometrial hyperplasia:

YES NO

* Complex atypical endometrial hyperplasia:

YES NO

- Carcinoma: YES NO

  * Endometrioid adenocarcinoma: YES NO

  * Serous carcinoma: YES NO

  * Clear cell carcinoma: YES NO

  * Mucinous carcinoma: YES NO

  * Squamous cell carcinoma: YES NO

  * Undifferentiated carcinoma: YES NO

  * Other carcinomas: ……..

- Sarcoma: YES NO

- Metastasis: YES NO

# Annex 2: Standard report of ultrasonography:

Royaume du Maroc
Ministère de la Santé

Centre Hospitalo - Universitaire
Mohammed VI
Marrakech
Hôpital Mère Enfant

المملكة المغربية
وزارة الصحة
المركز الإستشفائي الجامعي
محمد السادس
مراكش
مستشفى الأم والطفل

## ECHOGRAPHIE GYNECOLOGIQUE

Examen demandé par le Docteur

Service de Gynécologie Obstétrique

Chef de Service :
Pr A.SOUMMANI

Pr A. ABOULFALLAH
Pr H. ASMOUKI
Pr Y. AIT BENKADOUR
Pr L. BOUKHANII
Pr k. HAROU
Pr A. BASSIR
Pr B. FAKHIR

Major : N. Lakhdar

Nom : ..... prénom: ..... Age : ..... an

DDR : ..... Début G : ..... Déterminé par : ..... Soit : ..... SA et ..... JS

Indication de l'examen :

.....

.....

.....

Conditions de l'examen :

.....

CR : voie endovaginale voie

Urérus : Taille :
Contours :

Endomètre Epaisseurs :

Myometrie : Homogène Hétérogène

Annexe Droite : Ovaire Droit : Taille :
Contours :

Annexe Gauche : Ovaire Gauche : Taille :
Contours :

Autres :

.....

.....

.....

CONCLUSIONS-OBSERVATIONS : .....

.....

.....

# ABSTRACTS

# Abstract

Postmenopausal bleeding is a common reason for medical consultation in gynecology. A benign or malignant pathology can be revealed at the time of diagnosis. They must be differentiated after a para-clinical assessment in search of an organic cause. Hence, the endometrial cancer must be confirmed or eliminated.

This study sought to evaluate the ultrasonography practice for postmenopausal bleeding in the Obstetrics and Gynecology department of Mohammed the sixth University Hospital of Marrakech in standard of care and to correlate the ultrasonography results with the endometrial histopathology results.

This work is a retrospective analytic cohort study about 103 patients with postmenopausal bleeding. The patients were hospitalized at the department of Gynecology and Obstetrics in Mohammed the sixth University Hospital of Marrakech over a period of 2 years (from January 2018 to December 2019).

All the clinical and para clinical data were collected into the Microsoft Office Excel software version 2010 using a patient's information form. The analysis of the results was done using the Statistical Package for the Social Sciences (SPSS) software version 21 within the Epidemiology and Clinical Research Department of Mohammed the sixth University Hospital of Marrakech.

The mean age of our patients was 59.42 years and the mean age of menopause was 48.85 years. 50.50% of our sample had high blood pressure. Diabetes was found in 35% of the patients and 89.30% of our sample were either overweight or obese. The concordance between the ultrasonography and the histological results of biopsy was at 75%.

All in all, the study concludes that the standard of care, in the gynecology obstetrics department of Mohammed the sixth University Hospital of Marrakech, leads to a high level of diagnosis in both benign and malignant endometrial pathology regarding the heterogeneity of ultrasonography operator's experiences.

# Résumé

Le saignement post-ménopausique est un motif fréquent de consultation médicale en gynécologie. Une pathologie bénigne ou maligne peut être révélée lors du diagnostic, elles doivent être différenciées après un bilan paraclinique à la recherche d'une cause organique. En outre, le cancer de l'endomètre doit être confirmé ou éliminé.

Cette étude a cherché à évaluer la pratique de l'échographie pour les saignements post-ménopausiques dans le service d'obstétrique et de gynécologie du Centre Hospitalier Universitaire Mohammed VI de Marrakech dans la norme de soins et à corréler les résultats de l'échographie avec les résultats de l'histopathologie endométriale.

Ce travail est une étude de cohorte analytique rétrospective portant sur 103 patientes présentant des saignements post-ménopausiques. Les patientes ont été hospitalisées au service de gynécologie et obstétrique du Centre Hospitalier Universitaire Mohammed VI de Marrakech sur une période de 2 ans (de janvier 2018 à décembre 2019).

Toutes les données cliniques et para cliniques ont été recueillies dans le logiciel Microsoft Office Excel version 2010 à l'aide d'une fiche d'exploitation sur la patiente. L'analyse des résultats a été réalisée à l'aide du logiciel Statistical Package for the Social Sciences (SPSS) version 21 au sein du service d'épidémiologie et de recherche clinique du Centre Hospitalier Universitaire Mohammed VI de Marrakech.

L'âge moyen de nos patientes était de 59,42 ans et l'âge moyen de la ménopause était de 48,85 ans. 50,50% de notre échantillon présentait une hypertension artérielle. Le diabète a été trouvé chez 35% des patientes et 89,30% de notre échantillon était en surpoids ou obèse. La concordance entre l'échographie et les résultats histologiques de la biopsie était de 75%.

Au total, l'étude conclut que la norme de soins dans le service de gynécologie obstétrique du CHU Mohammed VI de Marrakech, conduit à un haut niveau de diagnostic dans la pathologie endométriale bénigne et maligne, au regard de l'hétérogénéité des expériences des opérateurs d'échographie.

# ملخص

يعتبر نزيف ما بعد انقطاع الطمث سببا شائعا للاستشارة الطبية في أمراض النساء. يمكن التشخيص الطبي من الكشف عن حالة مرضية حميدة أو خبيثة. ويجب تمييز بينهما بعد إجراء تقييم شبه سريري بحثا عن سبب عضوي. بناء على ذلك، يجب تأكيد سرطان بطانة الرحم أو نفيه.

سعت هذه الدراسة إلى تقييم استعمال الموجات فوق الصوتية لنزيف ما بعد انقطاع الطمث. و ربط نتائجها بنتائج تشريح بطانة الرحم في قسم أمراض النساء والتوليد في المستشفى الجامعي محمد السادس بمراكش.

هذا العمل هو عبارة عن دراسة أترابية تحليلية بأثر رجعي حول 103 مريضة يعانين من نزيف ما بعد انقطاع الطمث. المريضات كن يخضعن للاستشفاء بقسم أمراض النساء والتوليد بالمستشفى الجامعي محمد السادس بمراكش، على مدى عامين (من يناير 2018 إلى ديسمبر2019 ).

تم جمع جميع البيانات السريرية وشبه السريرية في إصدار ميكروسوفت إكسيل 2010 باستخدام ورقة معلومات المريضات. قمنا بتحليل النتائج باستخدام الحزمة الإحصائية لبرنامج الإصدار 21 من برنامج العلوم الاجتماعية ضمن قسم الوبائيات والبحوث السريرية في المستشفى الجامعي محمد السادس بمراكش.

وكان متوسط سن المرضى 59.42 سنة وكان متوسط سن انقطاع الطمث 48.85 سنة. نسبة 50.50٪ من العينة كانت لديها ضغط دم مرتفع. تم العثور على مرض السكري في 35٪ من المرضى. و 89.30٪ من العينة كانت تعاني إما من زائدة الوزن أو السمنة. وكان هناك توافق بين الموجات فوق الصوتية والنتائج النسيجية للخزعة بنسبة 75٪.

ختاما، خلصت الدراسة إلى أن مستوى الرعاية في قسم النساء و التوليد في المستشفى الجامعي محمد السادس في مراكش يؤدي إلى الرفع من جودة تشخيص أمراض بطانة الرحم الحميدة والخبيثة، رغم تباين تجارب مشغلي التصوير بالموجات فوق الصوتية.

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# قسم الطبيب

## أقْسِم بالله العَظِيم

أن أراقبَ الله في مِهْنَتِي.

وأن أصُونَ حياة الإنسان في كآفّةِ أطوَارهَا في كل الظروف والأحَوال باذلة وسْعِي في إنقاذها مِن الهَلاكِ والمرَضِ والألَم والقَلَق.

وأن أحفَظَ لِلنَاسِ كرَامَتهُم، وأسْتر عَوْرَتهُم، وأكتمَ سِرَّهُمْ.

وأن أكونَ عَلى الدوَام من وسائِل رحمة الله، باذلة رِعَايَتي الطبية للقريب والبعيد،للصالح والطالح، والصديق والعدو.

وأن أثابر على طلب العلم، وأسَخِّرَه لِنَفْعِ الإِنْسَان لا لأذَاه.

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وأكون أختاً لِكُلّ زَميل في المِهنَةِ الطِّبِّيَة مُتعَاونِين عَلى البرِّ والتقوى.

وأن تكون حياتي مِصْدَاق إيمَاني في سِرّي وَعَلانيَتي،نَقِيَّة مِمّا يُشينهَا تجَاهَ الله وَرَسُولِهِ وَالمؤمِنين.

## والله على ما أقول شهيد

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سنة 2021 أطروحة رقم 101

# العلاقة بين التصوير بالموجات فوق الصوتية وعلم الأنسجة في أمراض بطانة الرحم خلال نزيف ما بعد انقطاع الطمث

## الأطروحة

قدمت ونوقشت علانية يوم 2021/07/08

**من طرف**


**الآنسة فاطمة الزهراء حميم**

المزدادة في 09 يونيو 1995 بمراكش


**لنيل شهادة الدكتوراه في الطب**


**الكلمات الأساسية :**

التصوير بالموجات فوق الصوتية - نزيف ما بعد انقطاع الطمث - أمراض بطانة الرحم - علم الأنسجة - تشخيص


## اللجنة

| | | |
|---|---|---|
| السيد | ع. أبو الفلاح<br>أستاذ في أمراض النساء و التوليد | الرئيس |
| السيدة | ب. فخير<br>أستاذة في أمراض النساء و التوليد | المشرفة |
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