RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING

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CERTIFICATE BY THE INSTITUTION

This is to certify that dissertation entitled **"RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING"** is a bonafide work done by **Dr.RAMYA K** at R.S.R.M Lying in Hospital, Stanley Medical College, Chennai. This dissertation is submitted to Tamilnadu Dr. M.G.R. Medical University in partial fulfillment of university rules and regulations for the award of M.S. Degree in Obstetrics and Gynaecology.

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This is to certify that this dissertation entitled "**RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING**" submitted by **Dr.RAMYA K,** appearing for Part II MS, Branch II Obstetrics and Gynecology Degree Examination in MAY 2018, is a Bonafide record of work done by her, under my direct guidance and supervision as per the rules and regulations of the Tamil Nadu Dr. MGR Medical university, Chennai, Tamil Nadu, India. I forward this dissertation to the Tamil Nadu Dr. MGR Medical University Chennai, India.

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DECLARATION

I Dr. RAMYA K, solemnly declare that the dissertation titled, "**RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING**" is a bonafide work done by me at R.S.R.M. Lying in Hospital. Stanley Medical College, Chennai – during January 2017–to October 2017 under the guidance and supervision of **Prof. Dr. K.Kalaivani M.D.,D.G.O., DNB.,** Professor and Head of the department , Obstetrics and Gynaecology. The dissertation is submitted to the Tamilnadu Dr. M.G.R. Medical University, in partial fulfillment of University rules and regulations for the award of M.S. Degree in obstetrics and Gynaecology.

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Finally I thank Lord Almighty, who gave me the will power and showered blessings to complete my dissertation work.

PLAGIARISM CERTIFICATE

This is to certify that this dissertation work titled **RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING** of the candidate **Dr. RAMYA K.** with Registration Number 221516057 for the award of **MASTER OF SURGERY** in the branch of **OBSTETRICS AND GYNAECOLOGY**.

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INTRODUCTION

INTRODUCTION

The health aspects in postmenopausal women is gaining importance in recent years owing to the increased life expectancy. According to WHO, the life expectancy exceeds 70 years in developed countries, with women living longer than men by an average of 4 to 5 years (1). The average age at menopause is 46.2 years in the Indian woman to 51 years in the Western population depending on the hereditary, life style and nutritional factors (2, 3, 4).Thus a woman spends more than two decades of life in her menopause.

Principal gynecological cancers (breast, ovary, uterus, and cervix) account for more than 40% of cancers found in women worldwide. However, there is a huge difference in both their incidence and geographical distribution.

Endometrial cancer is the most common gynecological malignancy in developed countries (5). Its incidence is increasing in the United States and other industrialized countries (6, 7). The incidence of endometrial cancer is 3.7% to 17.9% in postmenopausal women with abnormal uterine bleeding (8, 9). The incidence of endometrial cancer in asymptomatic women was 0.13% and atypia was seen in 0.63% (10). Endometrial carcinoma when diagnosed early can be cured with less

morbidity and mortality and higher cure rates . Vaginal bleeding is the symptom in more than 90% of postmenopausal women with endometrial cancer. But majority of women with postmenopausal vaginal bleeding have bleeding secondary to atrophic changes of endometrium. 1-14% can have endometrial cancer depending on age and risk factors. Thus the clinical approach to postmenopausal bleeding requires prompt evaluation to exclude or diagnose carcinoma.

Fractional curettage is invasive, and is associated with a 1–2% complication rate, thus less invasive office endometrial sampling techniques are increasingly favoured for evaluating these women (11). Often Pipelle biopsy is preferred for the initial evaluation of women with bleeding suspicious or malignancy . However, if sampling techniques fail to provide sufficient diagnostic information or if abnormal bleeding persists, fractional curettage may be required to clarify the diagnosis. Although many safe techniques are now available for detecting and diagnosing neoplastic lesions of the endometrium, these methods are invasive (12, 13). It might be preferable to first use some non-invasive method, such as ultrasound, to identify women at risk who should undergo endometrial biopsy.

Transvaginal sonography yields detailed images of the uterus (14, 15). It facilitates the measurement of endometrial thickness and morphology with good patient acceptance.

Transvaginal Sonography measurement of endometrial thickness and morphology has been demonstrated to have high accuracy in excluding endometrial polyps, hyperplasia and cancer in women with post menopausal bleeding (16). Similar sensitivities for detecting endometrial carcinoma are detected for TVS when an endometrial thickness of >5mm is considered abnormal and for endometrial biopsy when sufficient tissue is obtained().TVS is minimally invasive and has high cancer detection rates (17,18). In populations with 31% or less combined prevalence of endometrial carcinoma or atypical hyperplasia, algorithms utilizing transvaginal sonography as the initial test are most cost effective when compared to biopsy-based algorithms in evaluating perimenopausal and postmenopausal women with abnormal vaginal bleeding (19).

The society of Radiologists in Ultrasound sponsored Consensus Conference statement state that in the evaluation of women with PMB either transvaginal sonography or endometrial biopsy could be used safely and effectively as the first Diagnostic step (21).

AIM OF STUDY

AIM OF THE STUDY

The purpose of this study is to find out the correlation between the endometrial thickness and the histopathological findings in women with postmenopausal bleeding.

MATERIALS AND METHODS

MATERIALS AND METHODS

- A total of 100 women with postmenopausal bleeding who attended the Gynecology outpatient department at Govt RSRM Lying-in Hospital from January 2017 to October 2017 were screened for this study.

- The women were selected based on the inclusion and exclusion criteria.

Inclusion criteria:

1. Age more than 40 years

2. Amenorrhoea for a period of at least one year.

3. Not on any hormonal treatment.

4. Absence of other pelvic diseases and blood dyscrasis.

Exclusion criteria

1. Women on hormone replacement therapy

2. Women who had local pathologies as a cause of postmenopausal bleeding.

3. Carcinoma cervix.

4. Other pelvic pathologies or blood dyscrasis.

- Thorough per abdominal, per speculum and per vaginal examination was done to rule out any local cause of abnormal bleeding.

- Transvaginal ultrasound examination was carried out to calculate endometrial thickness. The subject is asked to empty the bladder before the examination. A small amount of gel was applied over the transducer tip and the probe is covered by a condom.

Transvaginal transducer of 5.5 to 8.5 MHz was used.

- The endometrium was imaged in the sagittal plane.

- Both anterior and posterior layers of the endometrium were measured

- The thickest point of the endometrium was measured from the anterior to posterior myometrial-endometrial junction.

- If there was fluid in the cavity each layer was measured separately and summed up.

- Morphological changes were determined by irregular endometrium, heterogeneous echo texture, focal thickening and indistinct endometrial borders.
- The presence of endometrial halo (hypoechoic area between the endometrium and inner myometrium) was noted.
- The patients with endometrial thickness more than 10mm were subjected to MRI pelvis.

Transvaginal ultrasonography diagnosis was given as

• Atrophic:	Thin line, homogenous, endometrial thickness of <5mm.
• Thickened:	homogenous, regular margins, endometrial thickness <10mm with no features suggestive of any abnormality.
• Endometrial polyp:	A focal homogenous endometrial thickening, with regular margins.

• Endometrial hyperplasia : Uniform, diffuse thickening, echogenic, endometrial thickness >10mm or <10mm thickness with features suggestive of hyperplasia present.

• Endometrial carcinoma : Thick, echogenic, heterogenous, irregular endometrial myometrial interface, loss of endometrial halo.

- Histopatholgical diagnosis of the endometrium was obtained from specimens obtained by Pipelle's forceps or Fractional curettage or operative hysteroscopy guided biopsy or by hysterectomy.

- The histopathology of the endometrium was considered gold standard.

REVIEW
OF
LITERATURE

REVIEW OF LITERATURE

Menopause is the permanent cessation of menstruation. It is defined retrospectively as the time of the final menstrual period followed by 12 months of amenorrhea. It describes the period following the final menses (3).

Postmenopausal bleeding describes the occurrence of vaginal bleeding following a woman's last menstrual cycle irrespective of the quantity of bleeding. Vaginal bleeding that occurs after 6 months of amenorrhea from presumed menopause should be considered abnormal (22). Post-menopausal bleeding is a serious complaint. It is the most common clinical symptom of endometrial carcinoma.

About 10 to 20% of all women with postmenopausal bleeding are diagnosed with endometrial carcinoma and hence all women require investigation to exclude malignancy (24).

Causes of postmenopausal bleeding

[Weiderpass et al (23)]

Atrophic	58.8 %
Endometrial carcinoma	9.4 %
Endometrial polyp	9.4 %
Carcinoma of cervix	6 %
Submucous fibroid	4 %
Endometrial hyperplasia, pyometra, ovarian cancer, urethral caruncle .	12.4 %

Imaging techniques of the endometrium

- Transvaginal ultrasonography (TVS)
- Ultrasound with Colour Doppler imaging
- Saline infusion sonohysterography (SIS)
- Computed Tomography(CT)
- Magnetic Resonance Imaging(MRI)

Transvaginal ultrasound

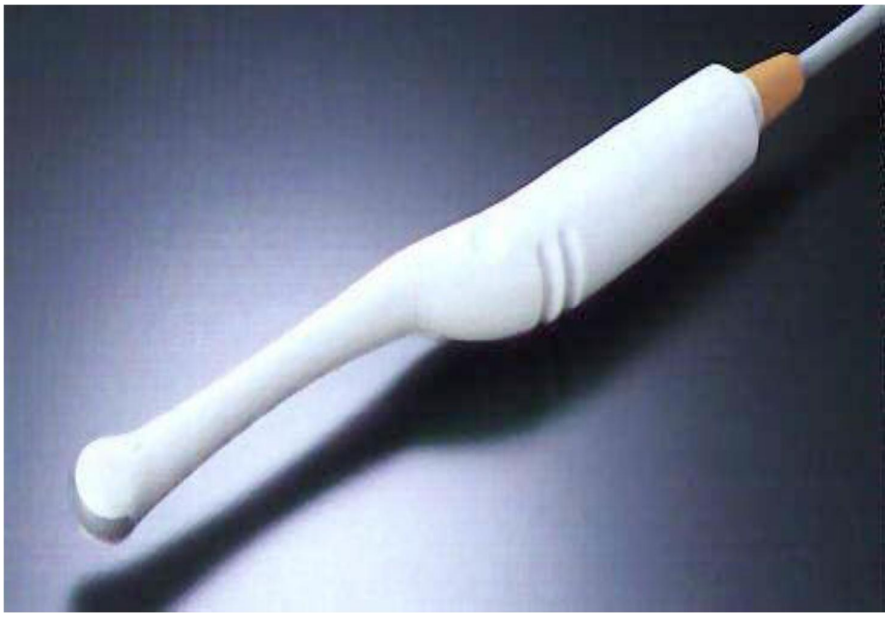
TVS is now being extensively used in the Obstetrics and Gynaecology for imaging of pelvic pathology. Gynaecologic transvaginal ultrasound uses a transducer placed in the vaginal part of a woman. This transducer is made up of special shape that can fit into vagina. It uses a probe frequency of 5 to 8 MHz.

Transvaginal ultrasound technique allows placement of high frequency probe close to target pelvic organs to demonstrate anatomic detail not duplicated by transabdominal approach. Pelvic ultrasound evaluates the bladder, ovaries, uterus, cervix, fallopian tubes.

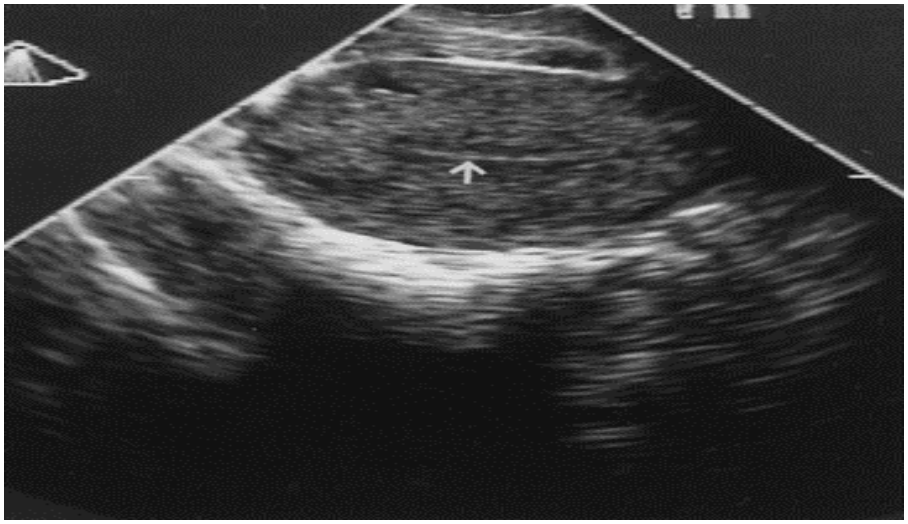
Uses in Gynaecology :

- Used in assessing pelvic organs.
- To diagnose and manage diseases like endometriosis, leimyoma, adenomyosis, ovarian cysts.
- In perimenopausal and postmenopausal bleeding.
- To diagnose ovarian mass and other adnexal masses.
- In the screening and diagnosis of gynaecological cancer.
- In infertility treatments.
- To detect the cause of pelvic pain.
- To check for intrauterine device (IUD).

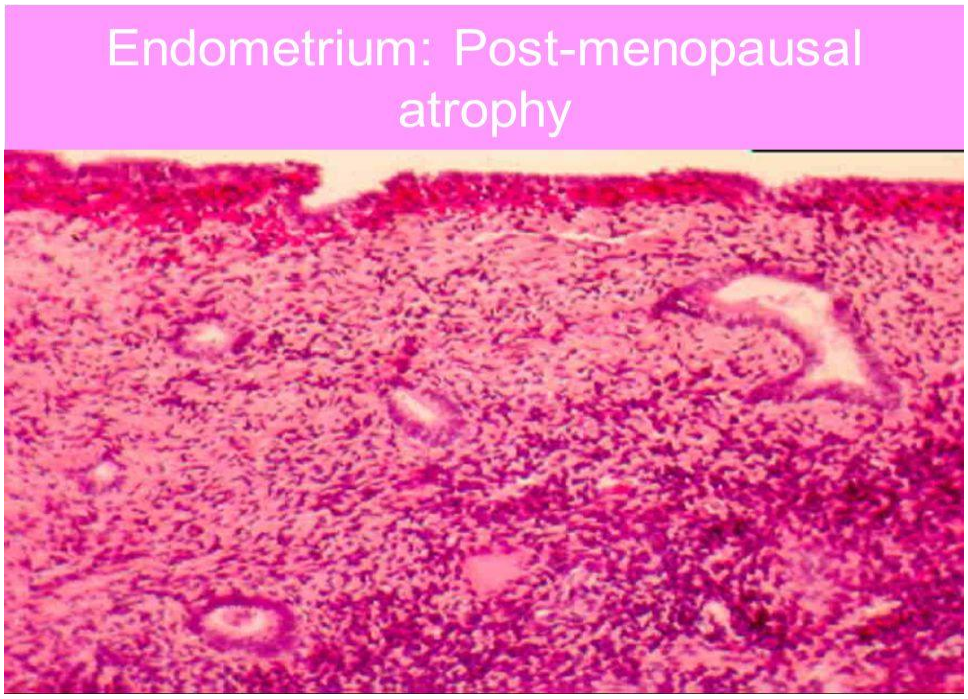
TRANSVAGINAL ULTRASOUND



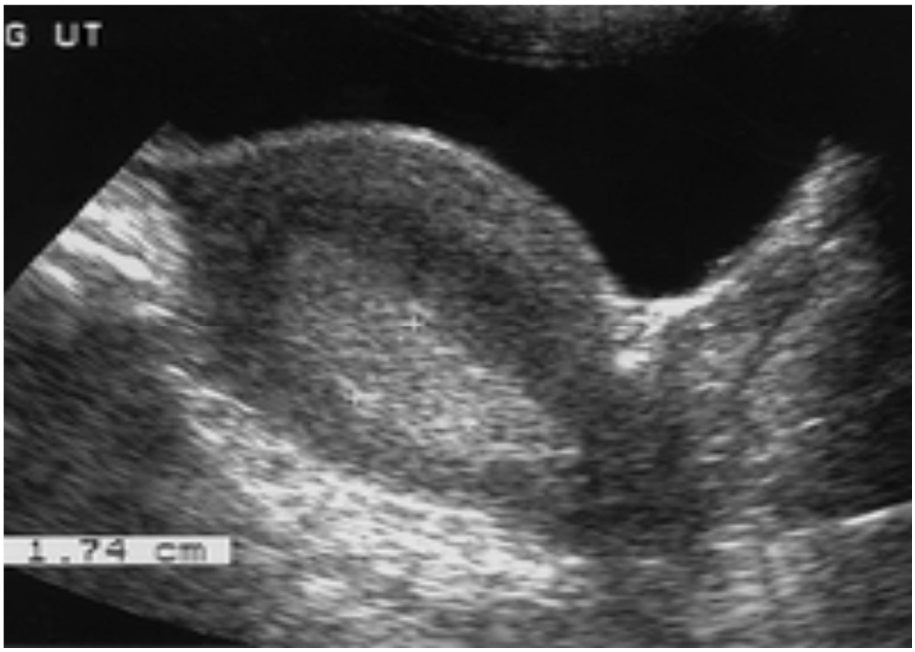
ENDOMETRIAL ATROPHY



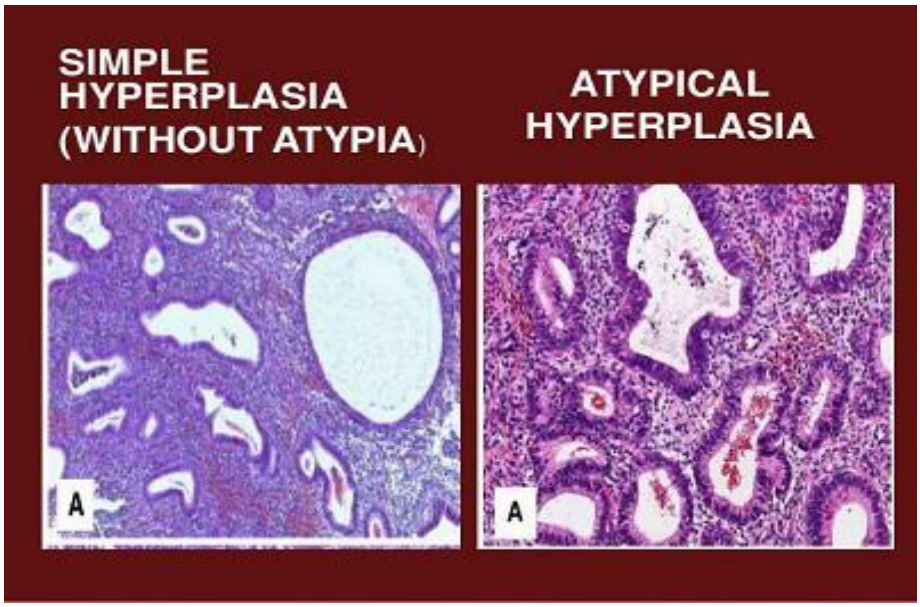
Endometrial atrophy is the loss of glandular and stromal elements of the endometrium that arises following the withdrawal of endogenous ovarian hormones. It is the most common cause of abnormal postmenopausal bleeding that usually occurs after a considerable number of years following menopause. In postmenopausal women the thin atrophic endometrium is more prone for superficial ulceration that can lead to bleeding. It is difficult or impossible to separate the functional layer of endometrium from the basalis. Tissue biopsy from atrophic endometrium is sparsely cellular and is often inadequate .



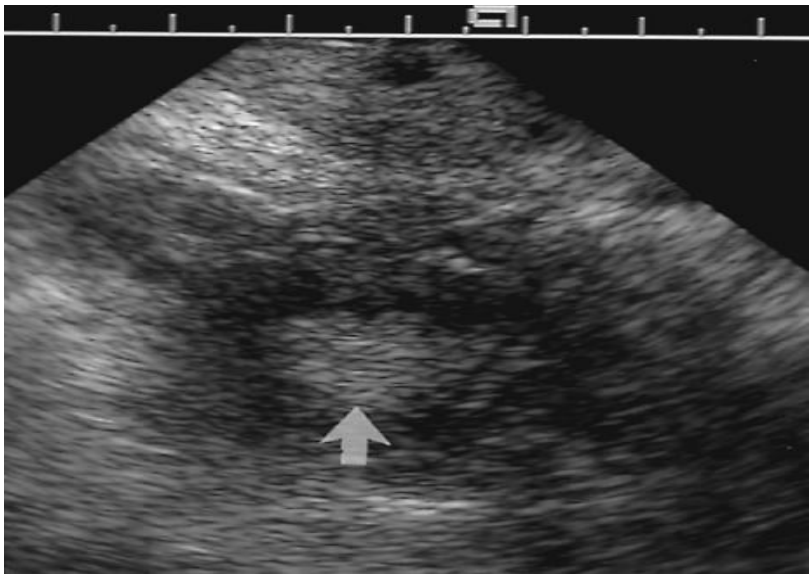
ENDOMETRIAL HYPERPLASIA



The increase in the glandular to stromal tissue ratio to more than one is endometrial hyperplasia (3). It increases the risk of endometrial carcinoma, which comprises a wide spectrum of histological changes from simple aggregation of the normal-looking proliferate glands at one end to the changes which are difficult to distinguish from carcinoma at the other end of the spectrum. Endometrial hyperplasia may cause abnormal bleeding, that results from hormonal therapy or precede or occur simultaneously with endometrial cancer and is thus clinically important. Most of these cases of endometrial hyperplasia result from high levels of estrogens, combined with insufficient levels of the progesterones which counteract estrogen's proliferative effects on the endometrium. The main concern is for atypical hyperplasia progressing to invasive cancer.



ENDOMETRIAL CANCER



The peak age of incidence of endometrial carcinoma is 55-65 years and is primarily a disease of postmenopausal women. More than 80% of endometrial cancers are adenocarcinoma. Other types are papillary, serous, clear cell, squamous, mucinous carcinoma, and sarcomas. Staging of endometrial carcinoma is based on histologic differentiation -grade 1 (least aggressive) to grade 3 (most aggressive) and extent of spread, including invasion depth, cervical involvement -glandular involvement versus stromal invasion, and extrauterine metastases. On the basis of pathogenetic factors endometrial carcinoma has been classified into 2 groups:

Type 1 carcinoma

It accounts for about 75% to 85% of the carcinoma. It often arises in patients with a history of unopposed estrogen exposure or hyperplastic endometrium. Type I is so called estrogen-dependent, which appears mostly in pre- and perimenopausal women. It is usually of the low-grade endometrioid type, and carries a good prognosis.

Type 2 carcinoma

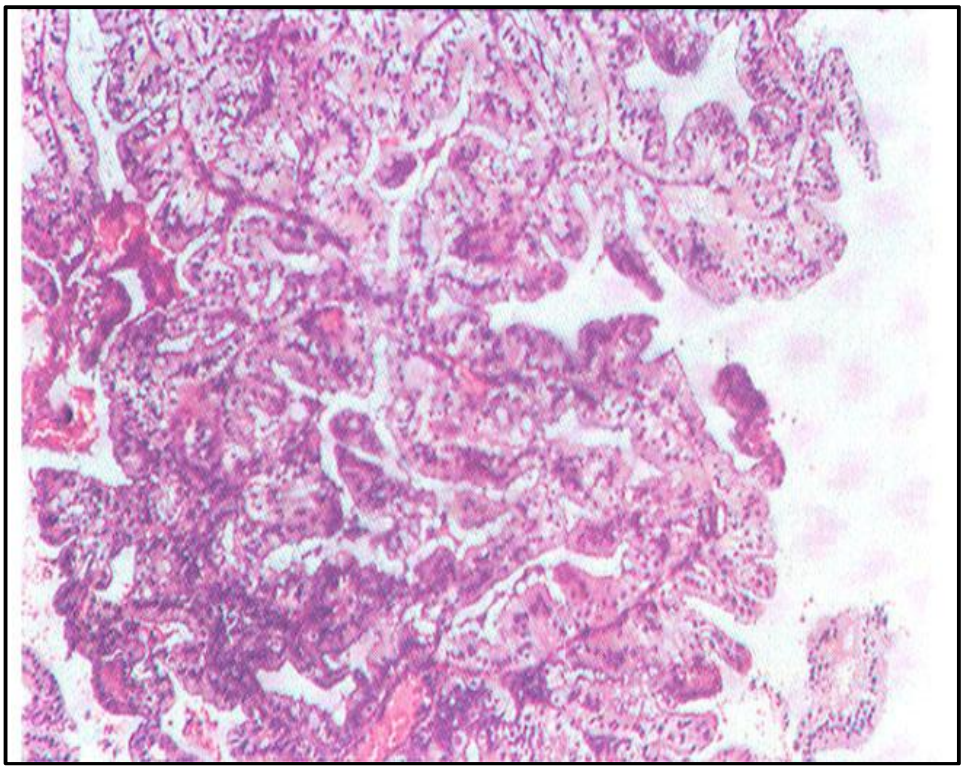
Type 2 occurs in the background of atrophic endometrium (3). Type 2 carcinoma is estrogen independent, diagnosed mostly in postmenopausal women. It is often high grade tumor with poor prognosis.

Risk factors for endometrial carcinoma :(3)

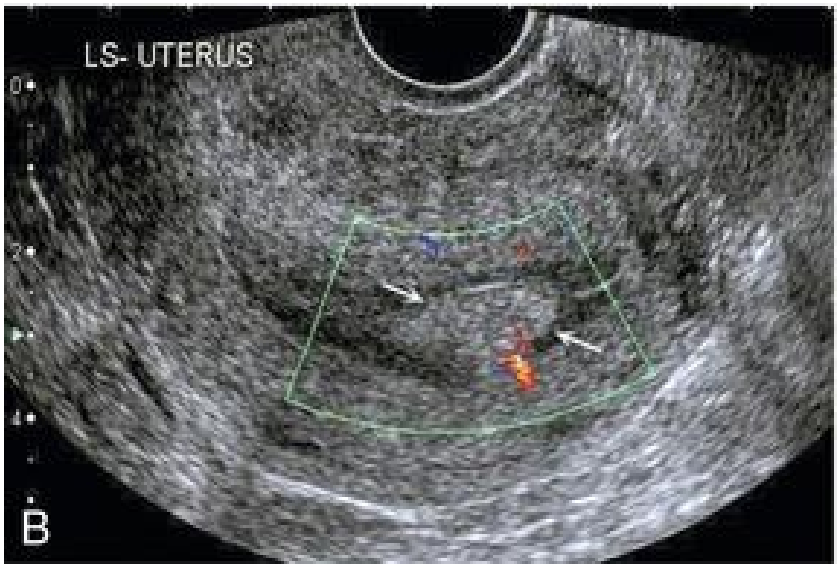
- Early menarche <10 yrs
- Late menopause >55 yrs
- Nulliparity
- Unopposed estrogen therapy
- Obesity
- Diabetes

- Liver disease
- Persistent / Recurrent bleeding
- Hypertension
- Atypical hyperplasia
- Tamoxifen therapy
- HNPCC syndrome

SECRETORY ADENOCARCINOMA



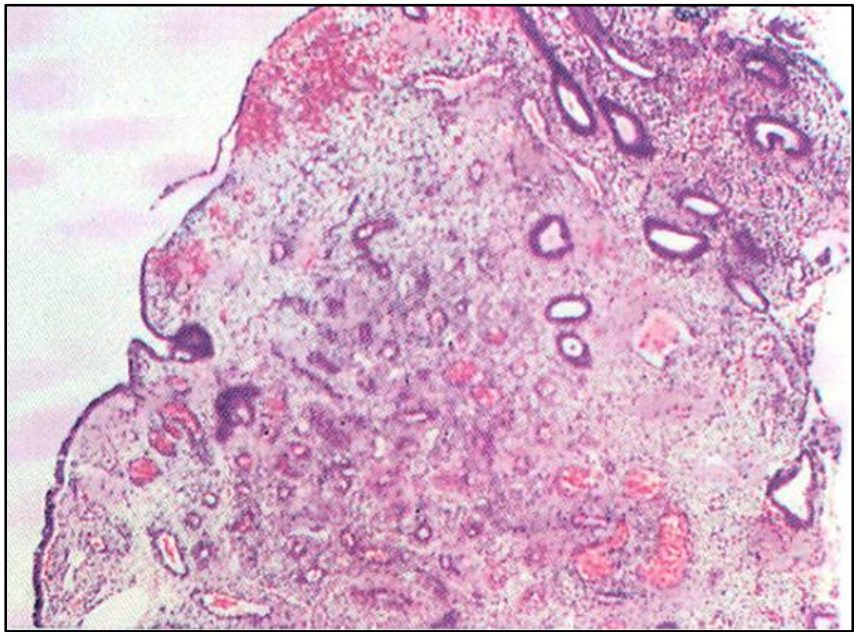
ENDOMETRIAL POLYP



Endometrial polyps are localized hyperplastic overgrowths of endometrial glands and stroma around a vascular core that form a sessile or pedunculated projection from the surface of the endometrium. These can be single or multiple and can range from a few millimeters to several centimeters in size. It rarely occurs in women younger than 20 years of age. The incidence rises steadily with increasing age, peaks in the fifth decade of life, and gradually declines after menopause. Compared to the general population women with Hereditary Nonpolyposis Colon Cancer syndromes may have an increased incidence of endometrial polyps with malignant changes. Large endometrial polyps can also be associated with tamoxifen use. These polyps are associated with a higher risk of neoplasia.

Endometrial intraepithelial neoplasia (EIN) within polyps are best recognized as geographic regions of contiguous glands with an architecture and cytology readily distinguished from that of the background polyp. EIN features are more commonly seen in endometrial polyps with metaplastic changes.

ENDOMETRIAL POLYP



Endometrial sampling techniques

- Pap smear
- Aspiration cytology
- Fractional curettage
- Hysteroscopy guided biopsy

Pap smear

- It is primarily used as a screening test for preinvasive and early invasive cervical carcinoma.
- It is a noninvasive and cost-effective test but it is inadequate and insensitive to be used as a screening test or diagnostic test for endometrial diseases (35).
- Only 50% of the endometrial cancer is present are positive for (glandular) cancer cells. This is not a high enough percentage to be used as the primary diagnostic test.

Aspiration cytology

- It is used as one of the first line investigations of postmenopausal bleeding.
- Various models are available like the Vabra aspirator, Pipelle aspiration etc.
- Advantages are it is an out patient procedure and cost effective.
- The sensitivity of the procedure is 81.63% and the specificity is 83.33%

- Major limitations are they are invasive, small focus are missed, a risk of uterine perforation and inability to sample in cervical stenosis.

Fractional curettage

- Introduced in 1943 and been used since for endometrial sampling.
- Only less than half of the uterine surface is sampled and the probability of missing the diagnosis is 10-25% and fails to diagnose 70% of all focal intracavitary lesions.
- The sensitivity, specificity, PPV, and NPV of dilation and curettage were 47, 68, 57 and 59%, respectively.
- It is being replaced by other modalities due to the blind nature of the procedure, invasive, risk of uterine perforation and infection, need for anesthesia, and inadequate sampling.

Hysteroscopy

- Hysteroscopy is considered the gold standard investigation in abnormal uterine bleeding.

- It is the inspection of the uterine cavity by endoscope. It allows for the diagnosis of intrauterine pathology and serves as a method for surgical intervention.

- It allows direct visualisation of the uterine cavity enabling guided biopsy, without cervical dilatation and could be done as a office procedure

- Disadvantages are the cost of instruments, operator expertise and risk of uterine perforation.

Other Contemporary studies

1. To Validate The Use Of Trans Vaginal Sonography – A Non Invasive Tool As A Screening Method For Patients With Postmenopausal Bleeding (25)

The objective of this study was to measure the endometrial thickness by transabdominal or trans-vaginal sonography in patients with postmenopausal bleeding and to correlate the endometrial thickness with histopathological diagnosis in these patients .The mean age of study population was 50 to 80 years. This study was conducted on 70 patients who presented with complaints of post-menopausal bleeding. Thorough per abdominal, per speculum and per vaginal examination was done to rule out any local cause of abnormal bleeding. The patients with palpable

pathology like fibroid and ovarian tumours and patients on hormonal treatment were excluded.

Transvaginal ultrasound examination was carried out to calculate endometrial thickness, endometrial morphology, intrauterine collection and adnexa .The patients were then subjected to fractional curettage and the sample was sent for histopathological examination.

In the current study, using cut off value of endometrial thickness < 4 mm, no abnormal endometrium was found if the cases with insufficient tissue were excluded from final analysis, i.e. sensitivity was 100%. The specificity was 72.73% and no case of endometrial carcinoma was detected at an endometrial thickness of <4mm.

2. Correlation of Endometrial Thickness with the Histopathological Pattern of Endometrium in Postmenopausal Bleeding (26)

The aim of the present study was to study endometrial thickness by transvaginal sonography, and correlate it with the cytological pattern evaluated by endometrial aspiration and histopathological pattern of the hysteroscopic directed biopsy. Sixty patients presenting with postmenopausal bleeding in outpatient department, after applying both inclusion and exclusion criteria, were enrolled in the present study. After history, detailed clinical examination and routine investigations , all

patients were subjected to pap smear and endometrial aspiration for histopathological examination. This was preceded by transvaginal sonography. In the current study , the sensitivity and specificity of TVS for suspecting endometrial pathology at et < or = 4mm were 87.09 and 75.86 % repectively. No carcinoma or polyp was detected at et < 4mm.

3. Transvaginal ultrasonography of the endometrium in postmenopausal Japanese women (27).

The aim of the study was to determine the cut-off level of endometrial thickness for detecting endometrial disease on a large scale screening and to examine the usefulness of TVS for screening endometrial disease in postmenopausal Japanese women. The study involved a total of 1,400 women in whom TVS was performed and then compared with histopathological specimen. The prevalence of endometrial disease was seen in 2.3% of asymptomatic and 21% of symptomatic women. A 3 mm cut off has 94% sensitivity, 70 specificity and 46% PPV in detecting endometrial disease in symptomatic cases. In asymptomatic cases for a similar cut off the values were 90%, 84%, 12% respectively. They concluded that TVS did not appear to be an effective screening method in asymptomatic postmenopausal women. They recommend a 4 mm cut off level in symptomatic Japanese women as normal.

4. Can ultrasound replace dilatation and curettage? A longitudinal evaluation of postmenopausal bleeding and transvaginal sonographic measurement of the endometrium as predictors of endometrial cancer (28).

The study purpose was to evaluate postmenopausal bleeding and TVS measurements of endometrial thickness as predictors of endometrial cancer and atypical hyperplasia in women whose cases were followed up for ≥ 10 years after referral for postmenopausal bleeding. Of the 394 patients, it was possible to obtain records of 339 women. Thirty-nine of 339 women (11.5%) had endometrial cancer, and 5 women (1.5%) had atypical hyperplasia. The relative risk of endometrial cancer in women who were 22 referred for postmenopausal bleeding was 63.9; the corresponding relative risk for endometrial cancer and atypical hyperplasia together was 72.1 compared with women of the same age from the general population. No woman with an endometrial thickness of ≤ 4 mm was diagnosed as having endometrial cancer. The relative risk of the development of endometrial cancer in women with an endometrial thickness of > 4 mm was 44.5 compared with women with an endometrial thickness of ≤ 4 mm. The reliability of endometrial thickness (cutoff value, ≤ 4 mm) as a diagnostic test for endometrial cancer was assessed: Sensitivity, 100%; specificity, 60%; positive predictive value, 25%; and negative predictive value, 100%. No endometrial cancer was

diagnosed in women with a recurrent postmenopausal bleeding who had an endometrial thickness of ≤ 4 mm at the initial scan. The authors conclude that postmenopausal bleeding incurs a 64-fold increase risk for endometrial cancer. There was no increased risk of endometrial cancer or atypia in women who did not have recurrent bleeding, whereas women with recurrent bleeding were a high-risk group. No endometrial cancer was missed when endometrial thickness measurement (cutoff value, ≤ 4 mm) was used, even if the women were followed up for ≤ 10 years. We conclude that transvaginal sonographic scanning is an excellent tool for the determination of whether further investigation with curettage or some form of endometrial biopsy is necessary.

RESULTS

RESULTS

In this prospective study, 100 women with postmenopausal bleeding were involved in the study and outcome analysed using various parameters. The results were statistically analyzed using Chi-square test and frequency and percentage analysis .

Sample size- 100

TVS performed in 100

Histopathological diagnosis obtained in 100

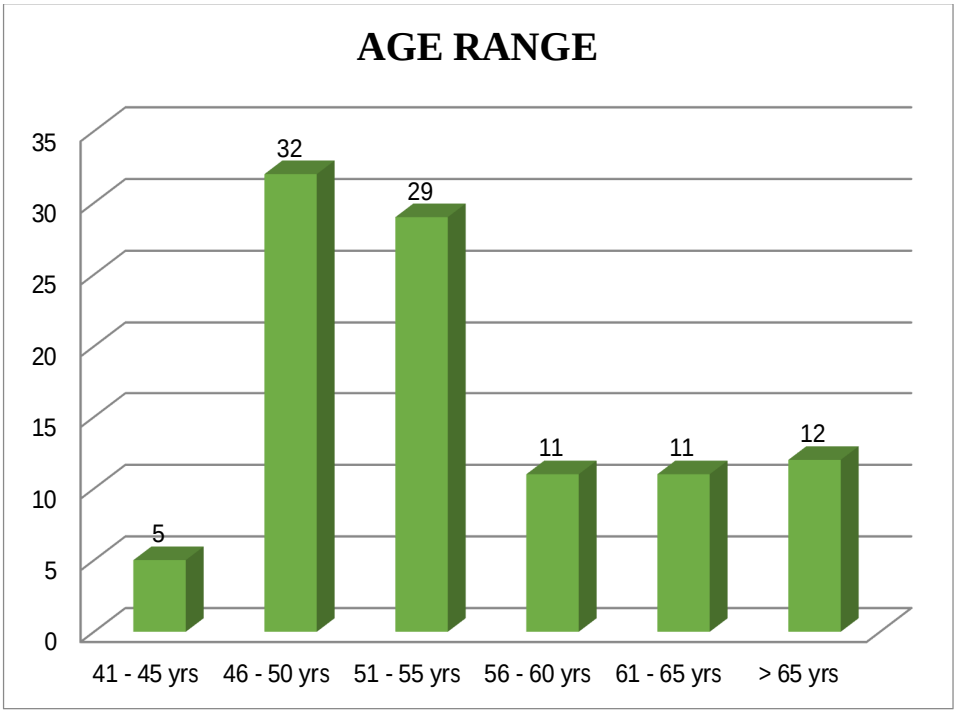
DISTRIBUTION PARAMETERS:

Table 1: Age Distribution

AGE (YEARS)	Frequency	Percent
41 - 45	5	5.0
46 - 50	32	32.0
51 - 55	29	29.0
56 - 60	11	11.0
61 - 65	11	11.0
> 65	12	12.0
Total	100	100.0

Majority of the women belong to the age group 46-50 years (32).

The mean age of distribution: 54.50 years.

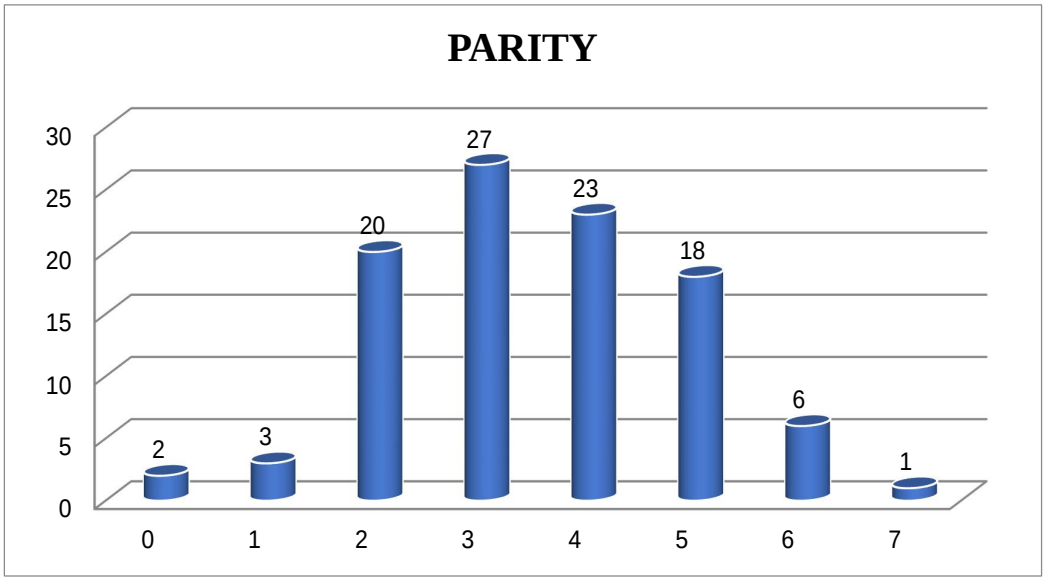


Years	Age Range
41 - 45	5
46 - 50	32
51 - 55	29
56 - 60	11
61 - 65	11
>65	12

Table 2: Parity Distribution

PARITY	Frequency	Percent
0	2	2.0
1	3	3.0
2	20	20.0
3	27	27.0
4	23	23.0
5	18	18.0
6	6	6.0
7	1	1.0
Total	100	100.0

Women of all parity were included. Majority of the women were had 3 or more parous pregnancies (75%) .

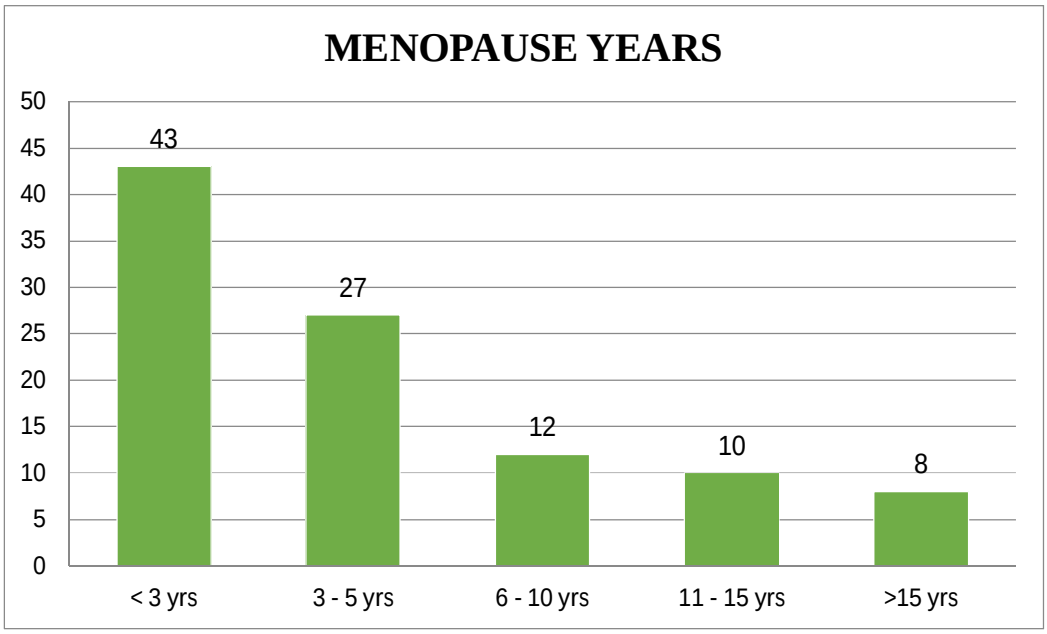


PARITY	No. of Patients
0	2
1	3
2	20
3	27
4	23
5	18
6	6
7	1

Table 3: Distribution of years of Menopause

Years of Menopause	Frequency	Percent
< 3	43	43.0
3 - 5	27	27.0
6 – 10	12	12.0
11 - 15	10	10.0
>15	8	8.0
Total	100	100.0

Most of the women had attained menopause within 1 to 5 years. The mean number of years in menopause was 5.32 years.



MENOPAUSE YEARS	No. of Patients
< 3 yrs	43
3 – 5 yrs	27
6 - 10 yrs	12
11 - 15 yrs	10
>15 yrs	8

Table 4: Distribution of Associated Diseases

	NO.	**%**
Diabetes mellitus	35	35
Hypertension	17	17
Obesity	37	37
HTN & DM	8	8
HTN & Obesity	3	3
DM & Obesity	16	16
HTN , DM & Obesity	2	2

37% women (37/105) were obese (obesity was determined as BMI >30). Diabetes mellitus was found in 35 women .Of these 16 of them were obese, 8 had associated hypertension and 2 were hypertensive and obese.

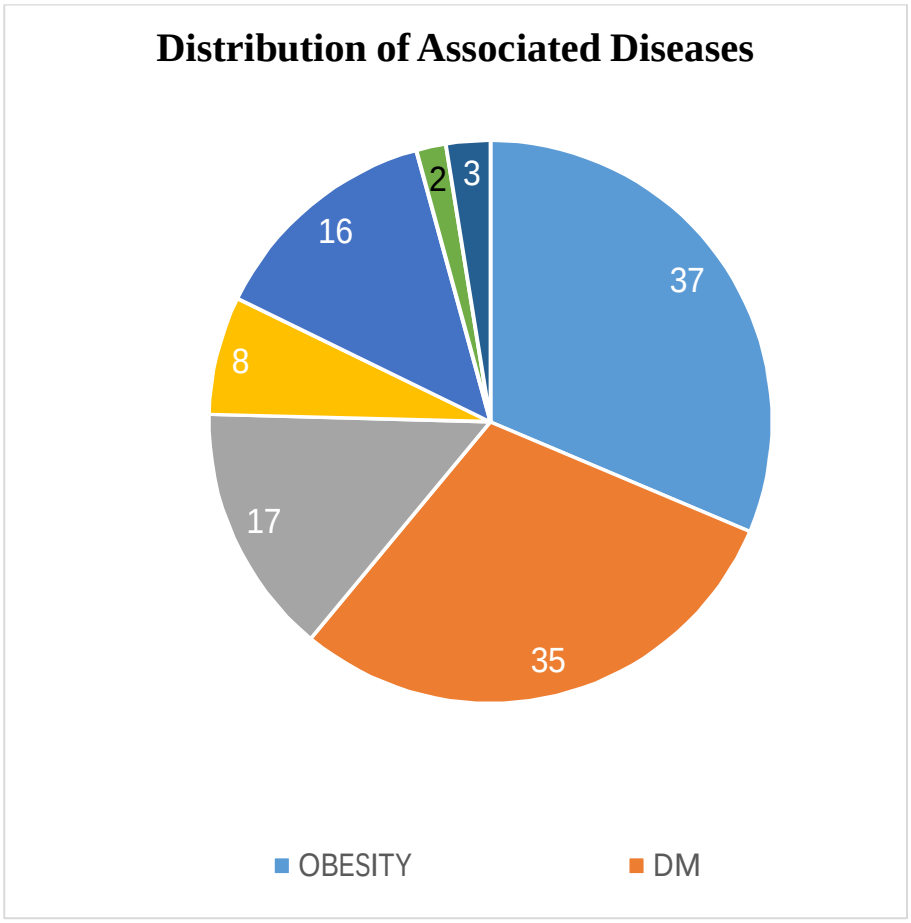

Distribution of Associated Diseases
37
35
17
8
16
2
3
OBESITY
DM

Table 5: Distribution of findings in TVS of endometrium

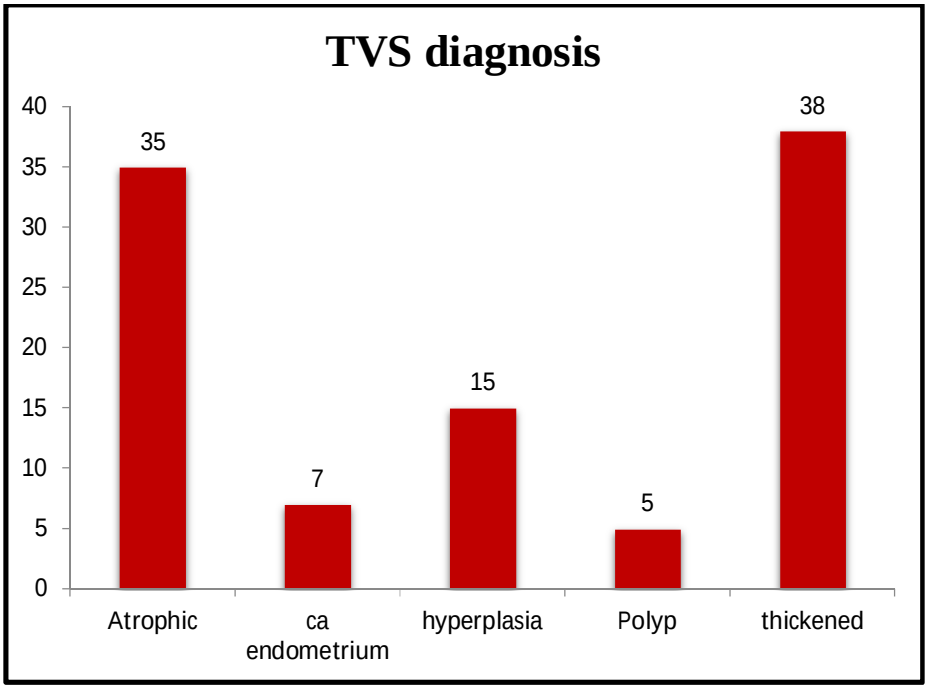
TVS Diagnosis	Frequency	Percent
Atrophic	35	35.0
Ca endometrium	7	7.0
Hyperplasia	15	15.0
POLYP	5	5.0
Thickened	38	38.0
TOTAL	100	100.0

Of the subjects screened the TVS findings determined were:

Atrophic and thickened endometria were considered normal findings which was73 of 100 (73%).

The following were considered abnormal seen in 27% (27/100).

Endometrial hyperplasia was seen in 15 of 100 women (15%), endometrial carcinoma in 7 women (7%) and endometrial polyp in 5 women (5%).



TVS Diagnosis	No. of Patients
Atrophic	35
Ca endometrium	7
Hyperplasia	15
Polyp	5
Thickened	38

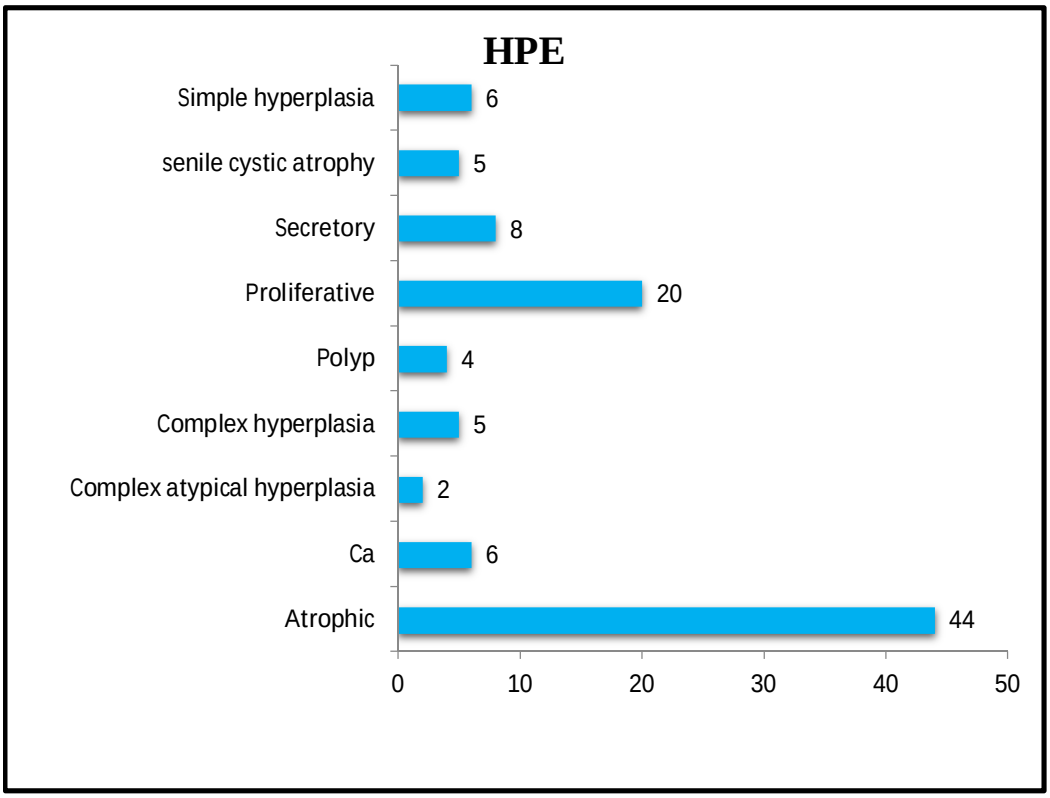
Table 6: HPE

HPE	Frequency	Percent
Atrophic	44	44.0
Ca endometrium 1c	3	3.0
Ca endometrium 2a	2	2.0
Ca endometrium 2b	1	1.0
Complex atypical hyperplasia	2	2.0
Complex hyperplasia	5	5.0
Polyp	4	4.0
Proliferative	20	20.0
Secretory	8	8.0
senile cystic atrophy	5	5.0
Simple hyperplasia	6	6.0
Total	**100**	**100.0**

The histopathological diagnosis was considered gold standard.

The following were considered normal findings seen in 77/105(81%) of all women, atrophy of endometrium seen in 49%, secretory and proliferative endometrium seen in 28%.

Abnormal findings were Endometrial Hyperplasia (diagnosed in 13 women), endometrial carcinoma (in 6 women) and endometrial polyp in (4 women.) Abnormal findings constituted 20/105 (23%) of the study population.

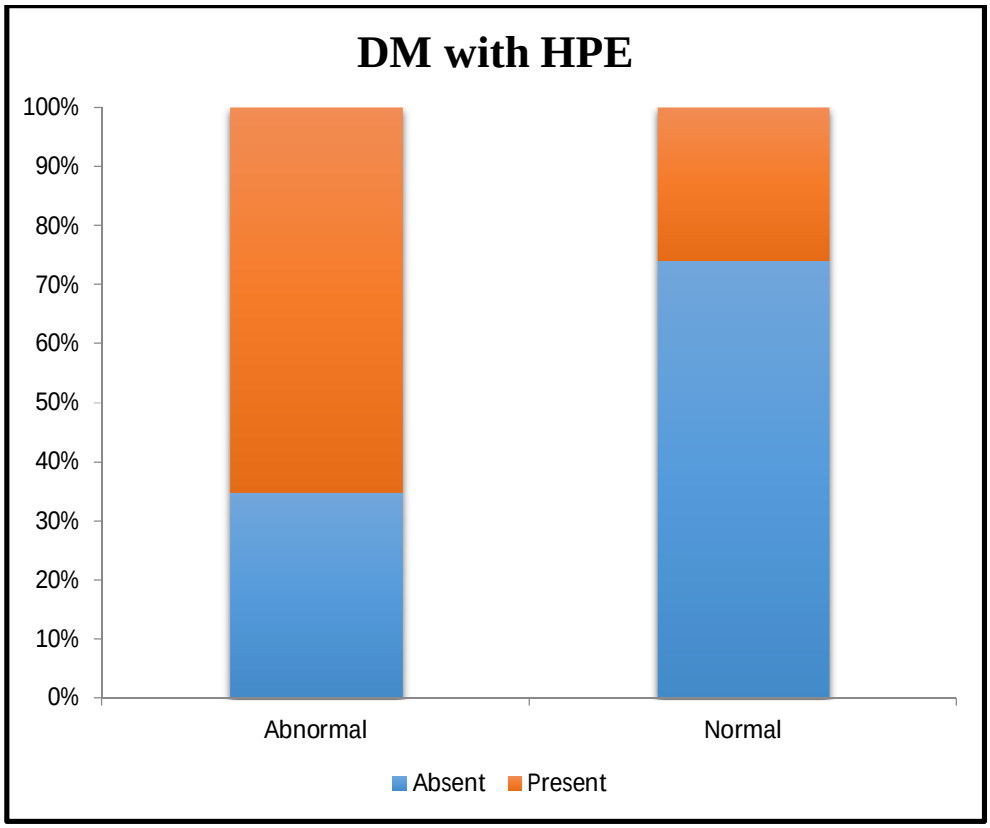


HPE	NO
Atrophic	44
Ca	6
Complex atypical hyperplasia	2
Complex hyperplasia	5
Polyp	4
Proliferative	20
Secretory	8
Senile cystic atrophy	5
Simple hyperplasia	6

Table 7: DM & HPE

DM		HPE		Total
		Abnormal	**Normal**	
Absent	Count	8	57	65
	% within HPE	34.8%	74.0%	65.0%
Present	Count	15	20	35
	% within HPE	65.2%	26.0%	35.0%

DM was present in 35 women, of whom 15 had abnormal HPE findings and 20 had normal HPE findings. The comparison between DM and HPE findings shows that there is a highly statistically significance with ($P = 0.001 < 0.01$) in women with diabetes and endometrial disease.

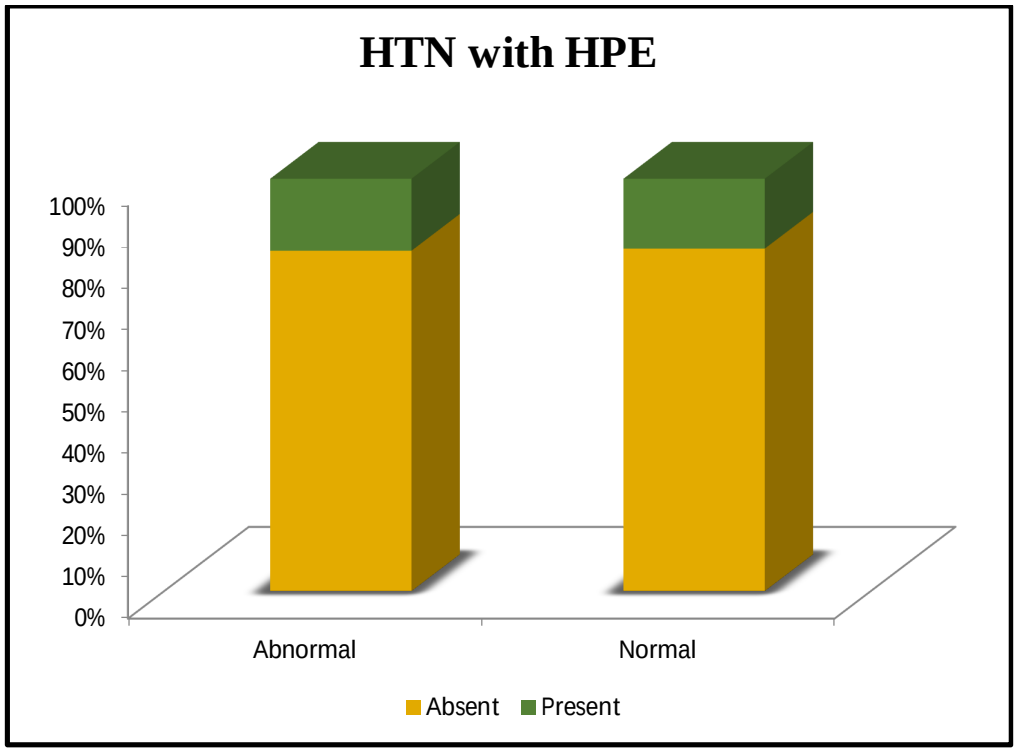


DM	HPE	
	Abnormal	**Normal**
Absent	34.8%	74.0%
Present	65.2%	26.0%

Table 8: HTN & HPE

HTN		HPE		Total
		Abnormal	**Normal**	
Absent	Count	19	64	83
	% within HPE	82.6%	83.1%	83.0%
Present	Count	4	13	17
	% within HPE	17.4%	16.9%	17.0%

Hypertension was present in 17 patients, of whom 4 had abnormal hpe findings. The comparison between Hypertension and HPE findings shows that there is no statistical significance (with p = 0.955) between hypertension and endometrial disease.

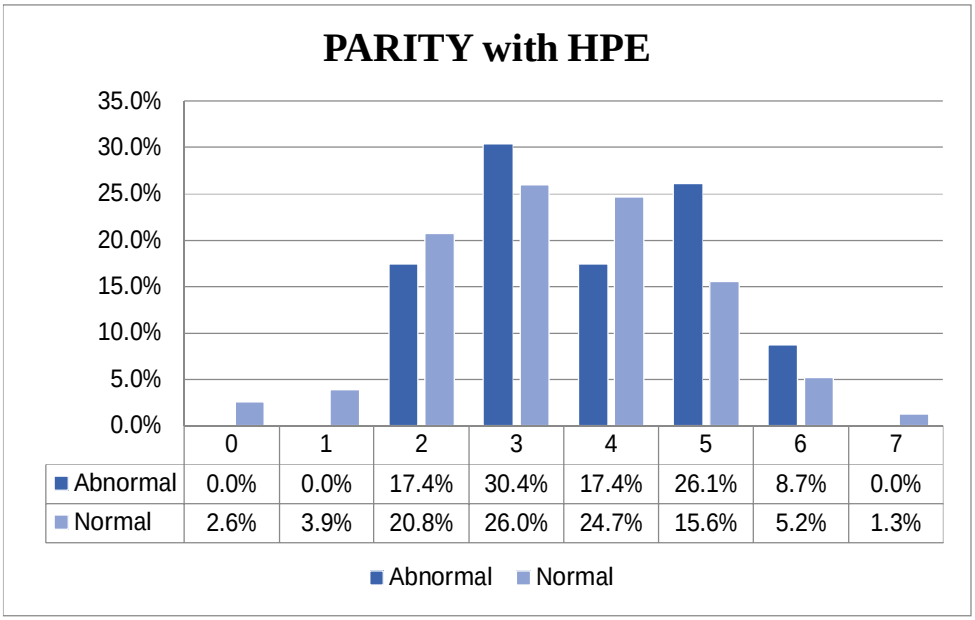


HTN	HPE	
	Abnormal	**Normal**
Absent	34.8%	74.0%
Present	65.2%	26.0%

Table 9: PARITY & HPE

PARITY		HPE		Total
		Abnormal	Normal	
0	Count	0	2	2
	% within HPE	0.0%	2.6%	2.0%
1	Count	0	3	3
	% within HPE	0.0%	3.9%	3.0%
2	Count	4	16	20
	% within HPE	17.4%	20.8%	20.0%
3	Count	7	20	27
	% within HPE	30.4%	26.0%	27.0%
4	Count	4	19	23
	% within HPE	17.4%	24.7%	23.0%
5	Count	6	12	18
	% within HPE	26.1%	15.6%	18.0%
6	Count	2	4	6
	% within HPE	8.7%	5.2%	6.0%
7	Count	0	1	1
	% within HPE	0.0%	1.3%	1.0%

Women of all parity were included in the study. Women with higher parity had more abnormal findings in HPE in this study. The comparison between parity and HPE findings shows that there is no statistical significance (with p = 0.793) between parity and endometrial disease.

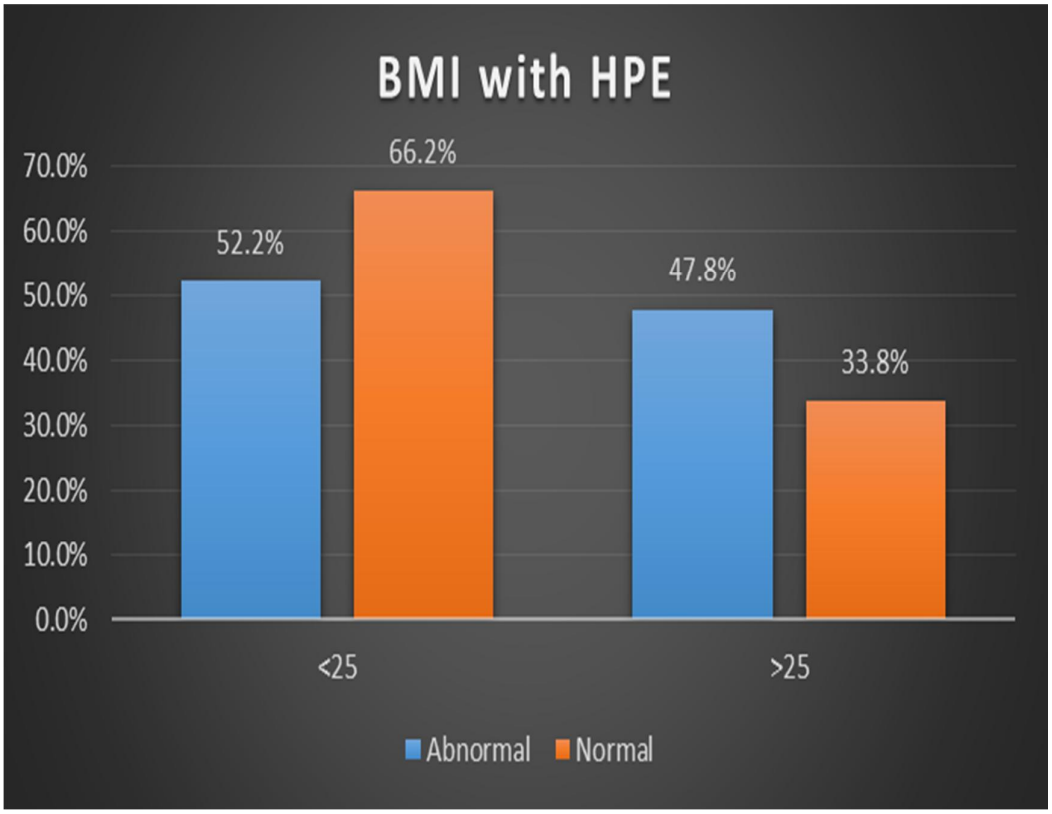


Parity	HPE	
	Abnormal	Normal
0	0.0%	2.6%
1	0.0%	3.9%
2	17.4%	20.8%
3	30.4%	26.0%
4	17.4%	24.7%
5	26.1%	15.6%
6	8.7%	5.2%
7	0.0%	1.3%

Table 10: BMI & HPE

BMI		HPE		Total
		Abnormal	**Normal**	
<25	Count	12	51	63
	% within HPE	52.2%	66.2%	63.0%
>25	Count	11	26	37
	% within HPE	47.8%	33.8%	37.0%

37 women had BMI > 25, of whom 11 had abnormal HPE findings. The comparison between BMI and HPE findings shows that there is no statistical significance (with p = 0.220) between BMI and endometrial disease in this study.

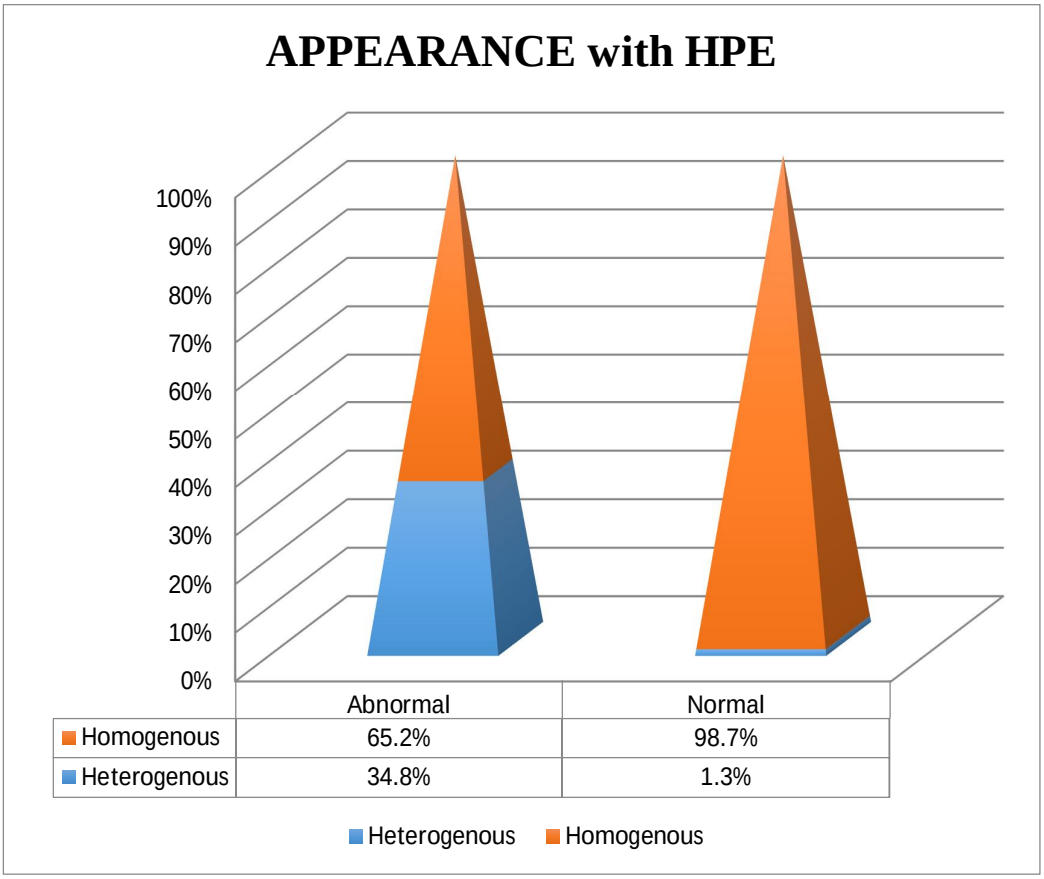


BMI	HPE	
	Abnormal	**Normal**
<25	52.2%	66.2%
>25	47.8%	33.8%

Table 11: APPEARANCE & HPE

APPEARANCE		HPE		Total
		Abnormal	**Normal**	
Heterogenous	Count	8	1	9
	% within HPE	34.8%	1.3%	9.0%
Homogenous	Count	15	76	91
	% within HPE	65.2%	98.7%	91.0%

Appearance of the endometrium is statistically significant (with p=0.0) in detecting endometrial abnormality.



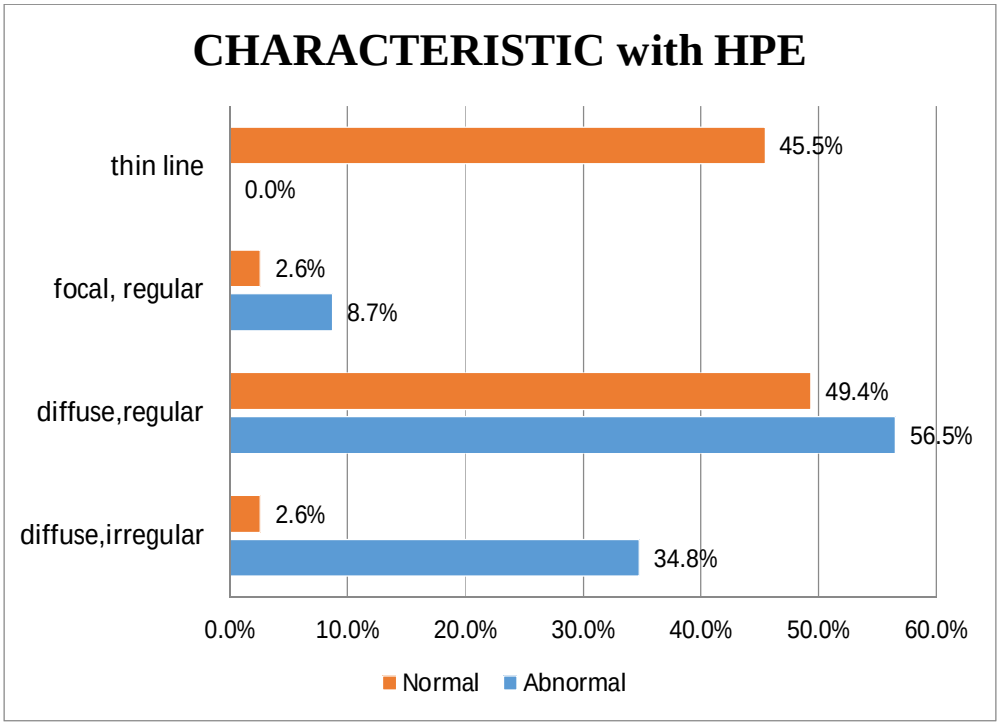
Appearance	HPE	
	Abnormal	Normal
Heterogenous	34.8%	1.3%
Homogenous	65.2%	98.7%

Table 12: CHARACTERISTICS & HPE

Characteristic		HPE		Total
		Abnormal	Normal	
Diffuse, irregular	Count	8	2	10
	% within HPE	34.8%	2.6%	10.0%
Diffuse, regular	Count	13	38	51
	% within HPE	56.5%	49.4%	51.0%
Focal, regular	Count	2	2	4
	% within HPE	8.7%	2.6%	4.0%
Thin line	Count	0	35	35
	% within HPE	0.0%	45.5%	35.0%

Thin line, diffuse with regular margin – were considered normal findings in TVS .

Diffuse with irregular margin, Focal with regular margin, Focal with irregular margin were considered abnormal. Characteristics of the endometrium is statistically significant (with p=0.0) in detecting endometrial abnormality.



Characteristics	HPE	
	Abnormal	**Normal**
Diffuse, irregular	34.8%	2.6%
Diffuse, regular	56.5%	49.4%
Focal, regular	8.7%	2.6%
Thin line	0.0%	45.5%

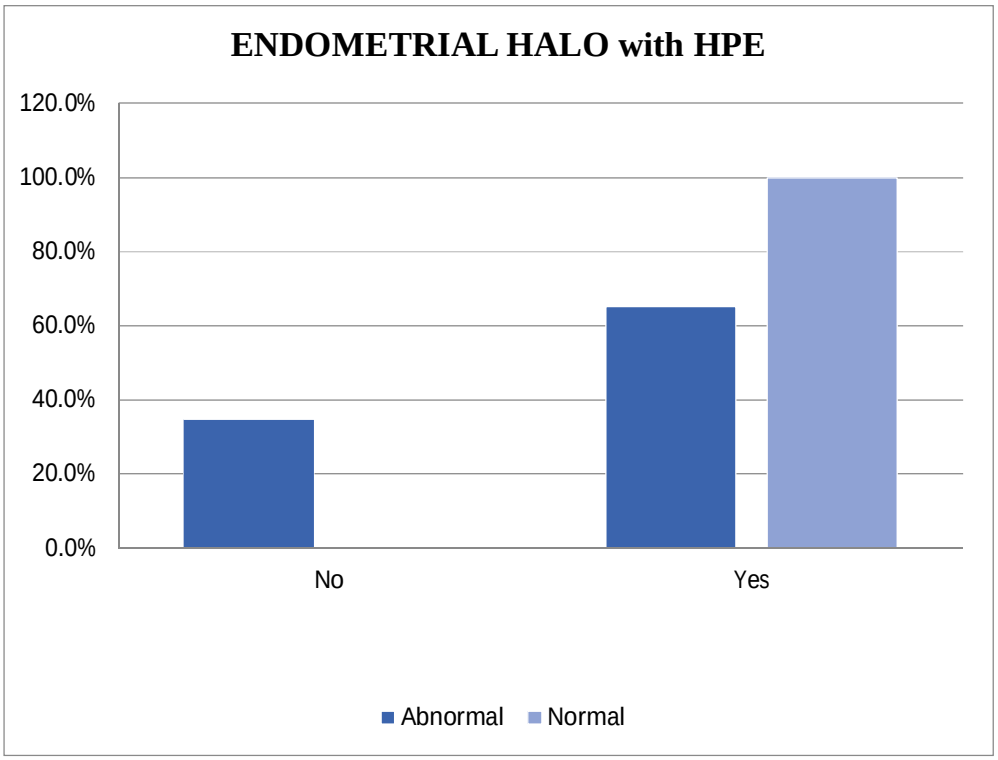
Table 13: ENDOMETRIAL HALO & HPE

Endometrial Halo		HPE		Total
		Abnormal	Normal	
No	Count	8	0	8
	% within HPE	34.8%	0.0%	7.0%
Yes	Count	15	77	92
	% within HPE	65.2%	100.0%	92.0%

Endometrial halo was significantly associated with endometrial abnormality (with p= 0.0)

Accuracy of endometrial halo in detecting endometrial abnormality

Endometrial Halo	HPE		Total
	Abnormal	Normal	
Yes	15	77	92
No	8	0	8
Total	23	77	100



ENDOMETRIAL HALO	HPE	
	Abnormal	Normal
No	34.8%	0.0%
Yes	65.2%	100.0%

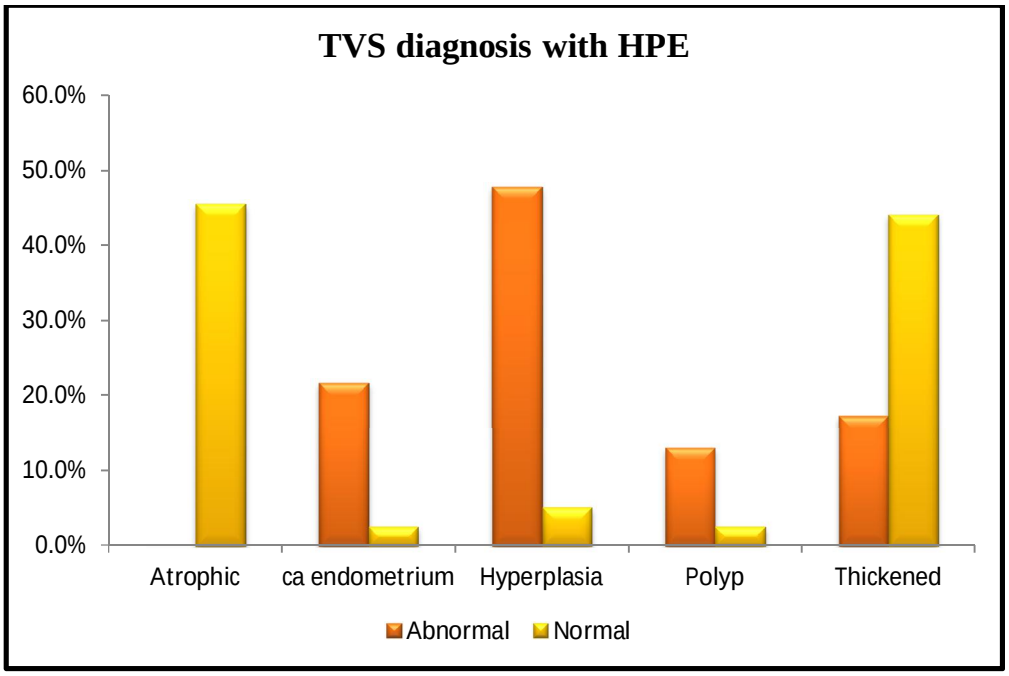
	%
Sensitivity	65.2
Specificity	0.0
PPV	16.3
NPV	0.0

Table 14: TVS DIAGNOSIS & HPE

TVS DIAGNOSIS		HPE		Total
		Abnormal	Normal	
Atrophic	Count	0	35	35
	% within HPE	0.0%	45.5%	35.0%
Ca endometrium	Count	5	2	7
	% within HPE	21.7%	2.6%	7.0%
Hyperplasia	Count	11	4	15
	% within HPE	47.8%	5.2%	15.0%
Polyp	Count	3	2	5
	% within HPE	13.0%	2.6%	5.0%
Thickened	Count	4	34	38
	% within HPE	17.4%	44.2%	38.0%

The 35 women who had TVS finding as atrophy had normal HPE findings. Of the 7 patients who had TVS finding of ca endometrium, 2 had normal HPE findings. 15 women had hyperplasia as the TVS diagnosis of whom 4 had normal HPE findings. 2 out of 5 women diagnosed with polyp had normal findings in HPE. 38 women had thickened endometrium in TVS of whom 34 patients had normal HPE.

TVS diagnosis is statistically significant (with p=0.0)in detecting endometrial abnormality .

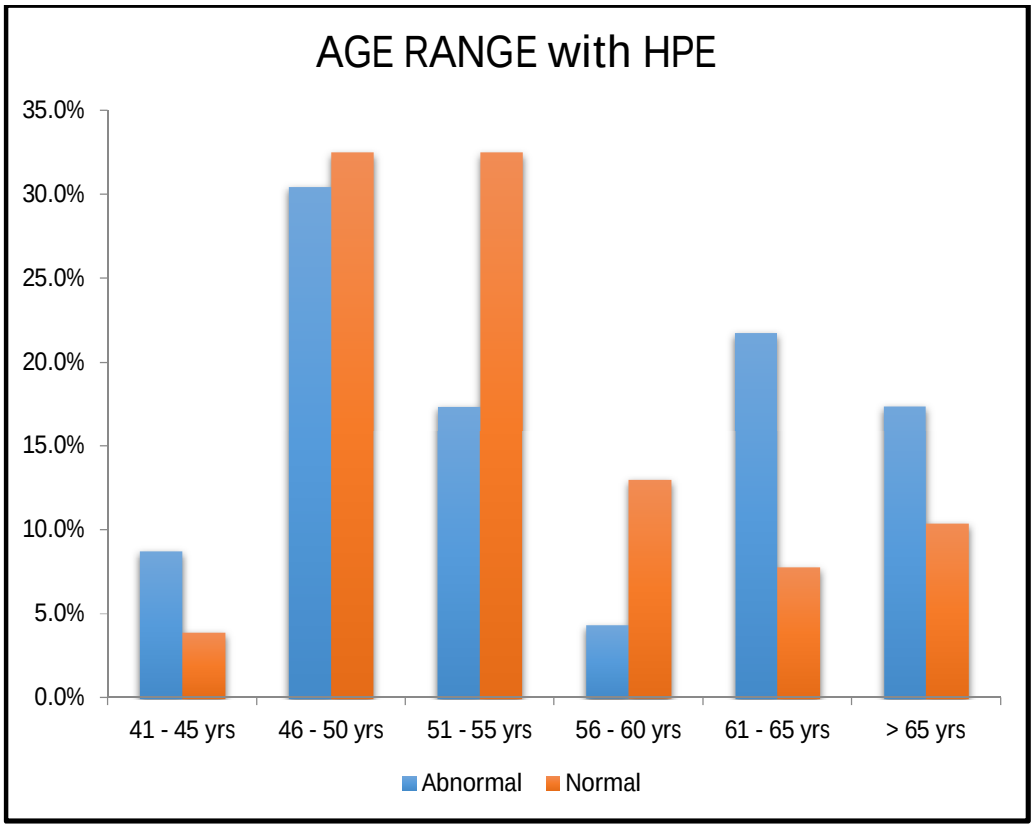


TVS diagnosis	HPE	
	Abnormal	**Normal**
Atrophic	0.0%	45.5%
Ca endometrium	21.7%	2.6%
Hyperplasia	47.8%	5.2%
Polyp	13.0%	2.6%
Thickened	17.4%	44.2%

Table 15: AGE RANGE & HPE

Age Range		Abnormal	Normal	
41 - 45 yrs	Count	2	3	5
	% within HPE	8.7%	3.9%	5.0%
46 - 50 yrs	Count	7	25	32
	% within HPE	30.4%	32.5%	32.0%
51 - 55 yrs	Count	4	25	29
	% within HPE	17.4%	32.5%	29.0%
56 - 60 yrs	Count	1	10	11
	% within HPE	4.3%	13.0%	11.0%
61 - 65 yrs	Count	5	6	11
	% within HPE	21.7%	7.8%	11.0%
> 65 yrs	Count	4	8	12
	% within HPE	17.4%	10.4%	12.0%

The comparison between Age range and HPE findings shows that there is no statistically significance with ($p = 0.200 > 0.05$) between age and endometrial abnormality.

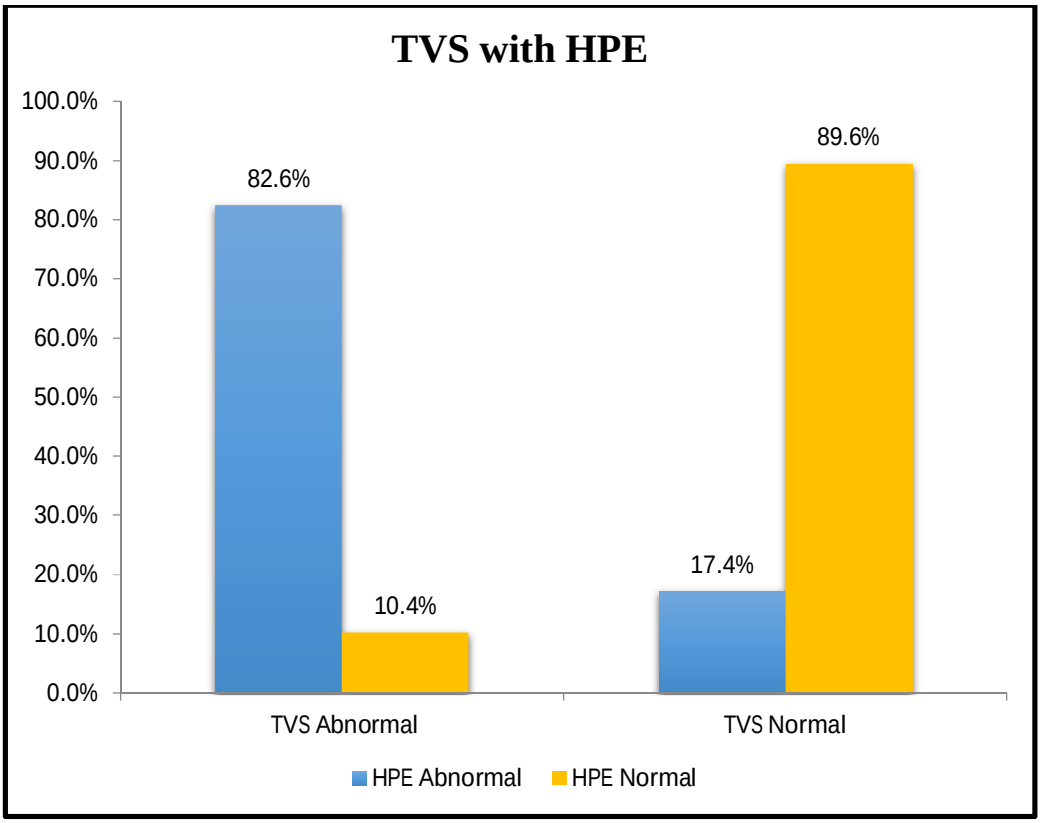


Age Range	HPE	
	Abnormal	Normal
41 - 45 yrs	8.7%	3.9%
46 - 50 yrs	30.4%	32.5%
51 - 55 yrs	17.4%	32.5%
56 - 60 yrs	4.3%	13.0%
61 - 65 yrs	21.7%	7.8%
> 65 yrs	17.4%	10.4%

Table 16. TVS FINDINGS AND HPE

TVS FINDING		HPE		Total
		Abnormal	**Normal**	
Abnormal	Count	19	8	27
	% within HPE	82.6%	10.4%	27.0%
Normal	Count	4	69	73
	% within HPE	17.4%	89.6%	73.0%

Of the 27 who had abnormal findings in TVS, 19 had abnormal findings in HPE also. Out of 73 who had normal findings in TVS, only 4 had abnormal findings in HPE.

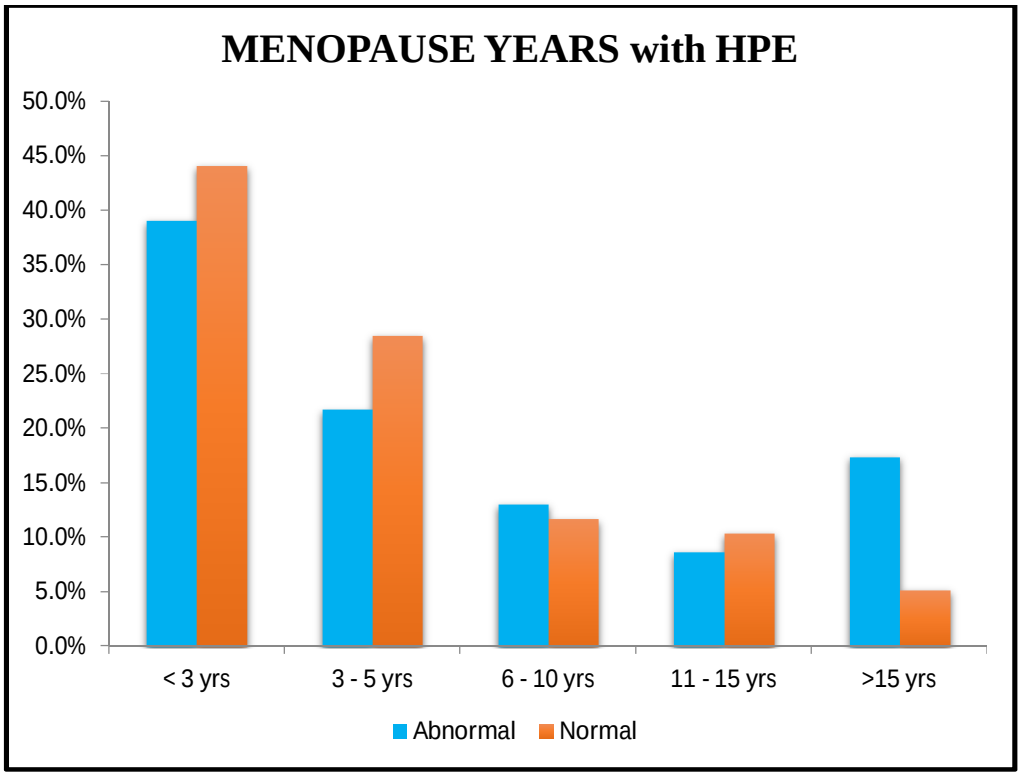


TVS	HPE Abnormal	HPE Normal
Abnormal	82.6%	10.4%
Normal	17.4%	89.6%

Table 17: NO OF YEARS AFTER MENOPAUSE & HPE

MENOPAUSE		HPE		Total
		Abnormal	Normal	
< 3 yrs	Count	9	34	43
	% within HPE	39.1%	44.2%	43.0%
3 - 5 yrs	Count	5	22	27
	% within HPE	21.7%	28.6%	27.0%
6 - 10 yrs	Count	3	9	12
	% within HPE	13.0%	11.7%	12.0%
11 - 15 yrs	Count	2	8	10
	% within HPE	8.7%	10.4%	10.0%
>15 yrs	Count	4	4	8
	% within HPE	17.4%	5.2%	8.0%

No. of years after menopause is not statistically significant (p=0.436) in detecting endometrial disease.



MENOPAUSE YEARS	HPE	
	Abnormal	Normal
< 3 yrs	39.1%	44.2%
3 - 5 yrs	21.7%	28.6%
6 - 10 yrs	13.0%	11.7%
11 - 15 yrs	8.7%	10.4%
>15 yrs	17.4%	5.2%

Table 18: ET RANGE & HPE

ET RANGE		HPE FINDINGS		Total
		Abnormal	Normal	
Up to 5	Count	1	56	57
	% within ET Range	1.8%	98.2%	100.0%
	% within HPE	4.3%	72.7%	57.0%
6 – 10	Count	18	20	38
	% within ET Range	47.4%	52.6%	100.0%
	% within HPE	78.3%	26.0%	38.0%
Above 10	Count	4	1	5
	% within ET Range	80.0%	20.0%	100.0%
	% within HPE	17.4%	1.3%	5.0%

Endometrial thickness is statistically significant (with p = 0.0)in detecting endometrial abnormality .

Endometrial thickness > 5 mm to define abnormality in PMB

HPE / Endometrial Thickness	Endometrial disease	No Endometrial disease	Total
Positive TVS	22	21	43
Negative TVS	1	56	57
Total	23	77	100

Sensitivity: 95.7%, PPV: 51.2%

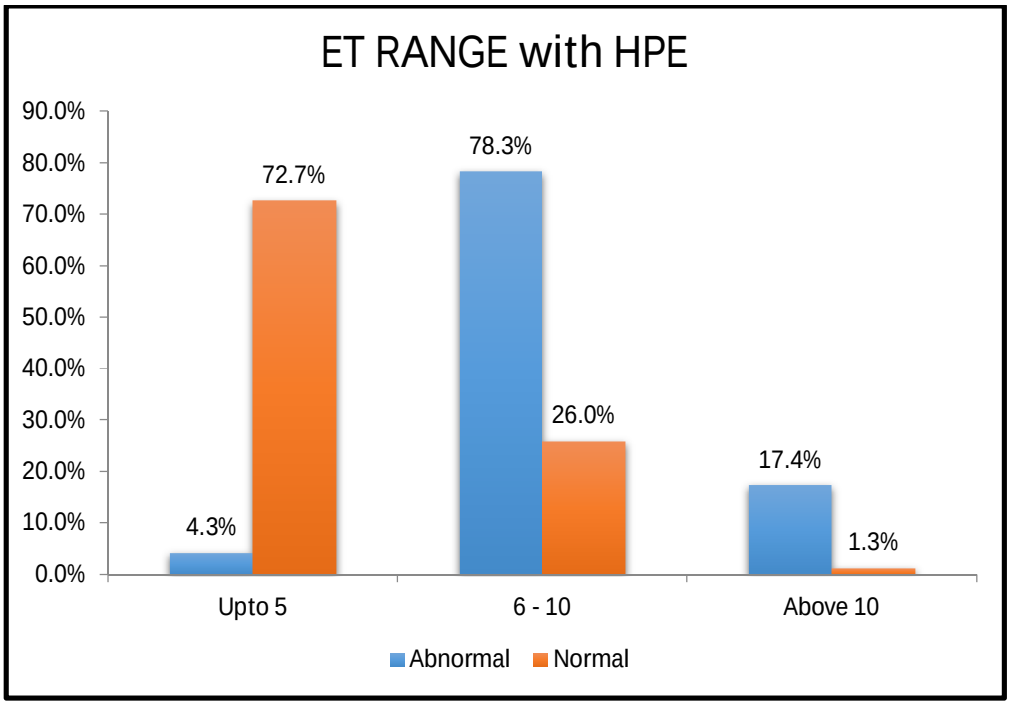
Specificity: 72.7%, NPV: 98.3%

Endometrial thickness > 10 mm cut off in women with PMB to define abnormality

HPE / Endometrial Thickness	Endometrial disease	No Endometrial disease	Total
Positive TVS	4	1	5
Negative TVS	19	76	95
Total	23	77	100

Sensitivity: 17.4%, PPV: 80%

Specificity: 98.7%, NPV: 80%



ET RANGE	HPE	
	Abnormal	Normal
Upto 5	4.3%	72.7%
6 - 10	78.3%	26.0%
Above 10	17.4%	1.3%

Table 19: HPE & TVS FINDINGS

			TVS Findings					Total
			Atrophic	ca endometrium	Hyperplasia	Polyp	Thickened	
HPE	Atrophic	Count	31	0	1	0	12	44
		% of Total	31.0%	0.0%	1.0%	0.0%	12.0%	44.0%
	Ca endometrium 1c	Count	0	2	0	0	1	3
		% of Total	0.0%	2.0%	0.0%	0.0%	1.0%	3.0%
	Ca endometrium 2a	Count	0	2	0	0	0	2
		% of Total	0.0%	2.0%	0.0%	0.0%	0.0%	2.0%
	Ca endometrium 2b	Count	0	1	0	0	0	1
		% of Total	0.0%	1.0%	0.0%	0.0%	0.0%	1.0%
	Complex atypical hyperplasia	Count	0	0	2	0	0	2
		% of Total	0.0%	0.0%	2.0%	0.0%	0.0%	2.0%
	Complex hyperplasia	Count	0	0	5	0	0	5
		% of Total	0.0%	0.0%	5.0%	0.0%	0.0%	5.0%
	Polyp	Count	0	0	1	3	0	4
		% of Total	0.0%	0.0%	1.0%	3.0%	0.0%	4.0%

			TVS Findings					Total
			Atrophic	ca endometrium	Hyperplasia	Polyp	Thickened	
HPE	Proliferative	Count	1	2	2	1	14	20
		% of Total	1.0%	2.0%	2.0%	1.0%	14.0%	20.0%
	Secretory	Count	1	0	1	1	5	8
		% of Total	1.0%	0.0%	1.0%	1.0%	5.0%	8.0%
	senile cystic atrophy	Count	2	0	0	0	3	5
		% of Total	2.0%	0.0%	0.0%	0.0%	3.0%	5.0%
	Simple hyperplasia	Count	0	0	3	0	3	6
		% of Total	0.0%	0.0%	3.0%	0.0%	3.0%	6.0%
Total		Count	35	7	15	5	38	100
		% of Total	35.0%	7.0%	15.0%	5.0%	38.0%	100.0%

TVS detected 5 cases of endometrial carcinoma correctly, and 2 cases was over diagnosed as it turned out to be benign non-pathological finding.

One case of endometrial carcinoma was missed and was diagnosed as thickened endometrium.

10 cases of endometrial hyperplasia were detected co relating with HPE but over diagnosed 3 cases of normal endometrium, 1 case of polyp and 1 case of atrophic endometrium was misdiagnosed as hyperplasia.

3 cases of simple hyperplasia were missed and were detected as thickened endometrium.

3 out of 4 of the endometrial polyps were identified correctly on TVS. 1 case was misdiagnosed as hyperplasia and over diagnosed 2 cases of normal endometrium.

Of the 49 cases of endometrial atrophy 33 cases of atrophic endometrium were diagnosed by TVS.

In a total of 38 cases with thickened endometrium 12 cases designated as thickened in TVS were atrophic on HPE.

3 cases of senile cystic atrophy were diagnosed as thickened endometrium

19 cases of thickened endometrium had benign normal histopathological findings.

Accuracy of diagnosis of endometrial abnormality in TVS

TVS FINDING	**HPE**		**Total**
	Abnormal	**Normal**	
Abnormal	19	8	27
Normal	4	69	73
Total	23	77	100

	%
Sensitivity	82.6
Specificity	89.6
PPV	70.4
NPV	94.5
Overall Diagnostic Accuracy	86.1

Binary Logistic Regression

	df	**Sig.**
ET	1	.001
DM	1	.764
HTN	1	.940
MENOPAUSE years	1	.262
APPEARANCE	1	.071
CHARACTERISTIC	2	.757
ENDOMETRIALHALO	2	1.000

There was strong association with endometrial thickness significance-0.001.

DISCUSSION

DISCUSSION

The overall incidence of postmenopausal bleeding decreases with increasing age while the probability of cancer as the underlying cause increases. The prevalence of endometrial cancer in women with PMB is 3–10 %.The chance of endometrial cancer in women with PMB increases with age approximately 1 % at the age of 50 years to 25 % at 80 years of age. Traditional fractional curettage has now been replaced by other techniques like miniature endometrial biopsy devices, TVS to measure ET and hysteroscopy directed biopsy. This study was undertaken to evaluate how best a patient with PMB can be investigated by non-invasive or minimally invasive techniques. In present study, the sensitivity and specificity of TVS for suspecting endometrial pathology at ET > 5 mm were 95.7 and 72.7 %, respectively. Similar studies conducted by different investigators, Karlsson et al., Gull et al., Garuti et al. [29] , Tinelli et al. [30], and Kaur et al. [31], had shown the sensitivity ranging from 89 to 100 % while specificity from 54.8 to 86 % at ET of 4 mm.

- This study is a prospective descriptive study
- Most of the women belonged to 46 to 50 yrs of age with the range of age distribution between 44 to 73 yrs.

- Women of all parity were represented in the study.
- Majority of the patients had attained menopause within 1 to 5 years at the time of the study. The distribution range was between 1 to 20 years.
- 37 women were obese. 35 had diabetes mellitus.
- Abnormal findings like endometrial carcinoma, polyp, and hyperplasia were detected in 27% of the women by TVS and in 23 % of women by histopathology.
- Factors like age, years of menopause, co- morbid diseases, obesity were analyzed with the histopathology of the endometrium. There was statistically significant association between diabetes mellitus ($p = 0.01$) and endometrial disease using the chi-square test.
- The study by Gull B et al (2001) reported that several risk factors including hypertension and diabetes was associated with increased endometrial thickness and abnormality (32).
- BMI and endometrial abnormality had no co relation in this study. Studies by Guven MA et al in 2004 (33) and van den Bosch T et al (34) have shown no association between endometrial disease and BMI.

- Binary logistic regression was used to identify the association of risk factors and endometrial abnormality. It had strong association with advancing years of menopause.

- In a study done by Thomas Gredmark et al (35) the occurrence of PMB reduced with increasing age but the chance of cancer as a underlying cause increased with age. The peak incidence of endometrial carcinoma was found in women between 65 and 69 years of age. Also a histopathological finding of endometrial adenomatous hyperplasia or cancer was seen in about 15% of the postmenopausal women with bleeding , which justifies a thorough examination in these women.

- The TVS parameters taken into consideration were the appearance of the endometrial stripe (homogenous/heterogeneous), characteristic feature (diffuse/focal), margin (regular/irregular), endometrial halo (present/absent) and all of them were found to statistically significant ($p < 0.01$) .

The following observations were made:

TVS PARAMETERS	SENSITIVITY	SPECIFICITY	PPV	NPV
Heterogeneous Appearance	34.8	98.7	88.9	83.5

- The morphological features on TVS had a high specificity, positive predictive value and negative predictive value but a low sensitivity.

- Texture analysis of endometrium by G Michail et al (2007) (36) by gray scale ultrasound was done to investigate the feasibility of texture analysis in characterising the endometrial tissue as depicted in two-dimensional (2D) grayscale transvaginal ultrasonography in peri and postmenopausal women. This study used logistic regression model for analysis of endometrium, endometrium plus adjacent myometrium, layer containing endometrial–myometrial interface .

Its results showed that TVS images can effectively differentiate malignant from benign endometrial tissue providing 86.0% specificity at 93.3% sensitivity using the cut-off level of 0.5 for probability of malignancy.

- The morphological changes in the endometrium have a high specificity and thus can be used reliably in the exclusion of abnormal endometrial findings but further investigations are needed in diagnosis of the disease.

Endometrial Thickness	**Sensitivity**	**Specificity**	**PPV**	**NPV**
>5mm	95.7	72.7	51.2	98.3
>10mm	17.4	98.7	80	80

In patients with PMB a 5 mm cut off had 95.7% sensitivity but low specificity whereas when the cut off was increased to 10mm sensitivity was reduced to 17.4% but increases specificity to 98.7%.

- This proves that a 5 mm cut off is highly accurate in excluding the endometrial disease in PMB. As per the Compendium of Selected Publications by ACOG it recommends that if the endometrium is thin by TVS, most commonly defined as a thickness of ≤ 5 mm, the risk of cancer is sufficiently low that a biopsy may be deferred (22).

- In women with PMB when endometrium at 10 mm is considered normal the sensitivity is decreased. PMB is an important risk factor for carcinoma and there is an increased probability of missing the diagnosis.

- Of importance is the high proportion of patients falling in the 5–10 mm "grey zone" group. In the results the greater the endometrial thickness, the higher the incidence of endometrial cancer is present.

SUMMARY

SUMMARY

A total of 100 postmenopausal women were involved in the study carried out from January 2017 to October 2017 at Govt. RSRM Lying-in Hospital, SMC.

- TVS was done followed by histopathological diagnosis was made which was considered the gold standard.
- Age of women ranged from 44 to 73 years with 40% between 50 to 60 years.
- Most of the women were within 5 years of attaining menopause.
- A total of 35% had diabetes which was significantly associated with endometrial disease.
- BMI had no relation with endometrial disease.
- Morphological features including the appearance, characteristics, margins, and endometrial halo produced significant association with endometrial disease.
- The overall diagnostic accuracy of TVS was 86.1%.
- The overall sensitivity, specificity, positive predictive value and negative predictive values were 82.6%, 89.6%, 70.4% and 94.5%.

CONCLUSION

CONCLUSION

- Transvaginal sonography is safe, simple, non invasive and cost effective in the diagnosis of endometrial disease.

- It can be used as the first line investigation in women with Postmenopausal bleeding.

- A lesion if considered abnormal or suspicious can be further investigated and the mode of investigation can be decided based on findings.

- The combination of morphological features with endometrial thickness on gray scale ultrasound increases the diagnostic accuracy than with endometrial thickness alone. Based on these results, echo morphological measures can provide critical information for a conclusive diagnosis. Thus it's better to use a combination of metric and morphological parameters when performing a sonographic assessment of the endometrium in postmenopausal women. Endometrial biopsy should be performed to exclude endometrial hyperplasia and carcinoma in postmenopausal women with endometrial bleeding to perform proper and prompt treatment, particularly in old aged women.

Evaluation of PMB at the earliest is essential for diagnosing endometrial status for early intervention. Role of endometrial thickness cannot be undermined for detecting patients at high risk especially with comorbid conditions. Histopathological evaluation is mandatory for ruling out malignancy in selected cases of PMB.

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ANNEXURES

PROFORMA

DATE :

NAME :

AGE :

IP NO :

SOCIOECONOMIC CLASS :

RELIGION :

OCCUPATION:

DOA:

DOD:

ADDRESS & CONTACT NO:

OBSTETRIC CODE:

PRESENTING COMPLAINTS:

MENSTRUAL HISTORY:

MARITAL HISTORY:

OBSTETRIC HISTORY:

CONTRACEPTION HISTORY:

PAST HISTORY:

FAMILY HISTORY:

GENERAL EXAMINATION:

VITALS: TEMPERATURE

PULSE RATE

RESPIRATORY RATE

BLOOD PRESSURE

RESPIRATORY SYSTEM:

CARDIOVASCULAR SYSTEM:

ABDOMINAL EXAMINATION:

PER VAGINAL EXAMINATION:

INVESTIGATIONS:

URINE ALBUMIN

SUGAR

HB%

BLOOD GROUPING/RH TYPING

HIV (WITH CONSENT)

VDRL

BLOOD SUGAR, UREA

ULTRASONOGRAM

. ENDOMETRIAL THICKNESS

. ASSOCIATED PATHOLOGIES

.UTERINE CONTOUR

MRI PELVIS

HISTOPATHLOGICAL FINDINGS:

MASTER CHART

MASTER CHART

S.NO	NAME	AGE	IP NO	ET	HPE	DM	HTN	PARITY	BMI	MENOPAUSE YRS	APPEARANCE	CHARACTERISTIC	ENDOMETRIAL HALO	TVS diagnosis
1	SELVI	55	10890	3	Atrophic	0	0	2	>25	3	homogenous	thin line	yes	Atrophic
2	SHANTHI	48	10964	5	Proliferative	0	1	4	<25	2	homogenous	diffuse,regular	yes	thickened
3	MARIYAMMAL	52	11034	7	Proliferative	0	0	2	<25	4	homogenous	diffuse,regular	yes	thickened
4	KALA	46	11176	5	Secretory	0	0	2	>25	1	homogenous	diffuse,regular	yes	thickened
5	RANI	61	11390	4	senile cystic atrophy	0	0	5	<25	7	homogenous	thin line	yes	Atrophic
6	PUSHPA	48	11468	9	Proliferative	1	0	3	<25	3	homogenous	focal, regular	yes	Polyp
7	PREMA	54	11529	6	Simple hyperplasia	1	0	4	>25	4	homogenous	diffuse,regular	yes	thickened
8	MALAR	63	11659	4	Atrophic	0	1	6	<25	8	homogenous	diffuse,regular	yes	thickened
9	GUNAVATHY	59	11736	6	Proliferative	1	1	4	<25	5	homogenous	diffuse,regular	yes	thickened
10	KOKILA	47	11890	8	Simple hyperplasia	0	0	2	<25	2	homogenous	diffuse,regular	yes	hyperplasia
11	LAKSHMI	66	11947	10	Complex hyperplasia	1	0	5	>25	9	heterogenous	diffuse,regular	No	hyperplasia
12	MEENA	50	11	7	Polyp	1	0	3	<25	3	homogenous	focal, regular	yes	Polyp
13	RAJATHI	45	65	5	Atrophic	0	0	2	>25	1	homogenous	diffuse,regular	yes	thickened
14	NAGAMMA	70	93	4	Atrophic	0	0	6	<25	15	homogenous	thin line	yes	Atrophic
15	MUNIYAMMAL	62	105	5	Atrophic	1	0	4	<25	8	homogenous	diffuse,regular	yes	thickened
16	LATHA	55	119	3	Atrophic	0	1	5	<25	5	homogenous	thin line	yes	Atrophic
17	RAMANI	49	186	8	Complex hyperplasia	0	0	3	>25	3	homogenous	diffuse,regular	yes	hyperplasia
18	SAROJA	46	238	5	Secretory	0	0	3	<25	1	homogenous	diffuse,regular	yes	thickened
19	VANAMAYIL	53	279	3	Atrophic	1	0	5	<25	5	homogenous	thin line	yes	Atrophic
20	SARALA	51	306	4	Atrophic	0	0	0	>25	1	homogenous	diffuse,regular	yes	thickened
21	AYEESHA	48	387	7	Proliferative	1	0	2	<25	2	homogenous	diffuse,regular	yes	thickened

S.NO	NAME	AGE	IP NO	ET	HPE	DM	HTN	PARITY	BMI	MENOPAUSE YRS	APPEARANCE	CHARACTERISTIC	ENDOMETRIAL HALO	TVS diagnosis
22	PANJALI	62	468	8	Simple hyperplasia	1	1	3	<25	10	homogenous	diffuse,irregular	yes	thickened
23	KRISHNAVENI	58	527	6	senile cystic atrophy	0	0	5	>25	8	homogenous	thin line	yes	Atrophic
24	MALLIGA	60	592	4	Atrophic	0	0	4	<25	12	homogenous	diffuse,regular	yes	thickened
25	KANAGA	64	687	9	Complex hyperplasia	1	0	5	<25	16	homogenous	diffuse,regular	yes	hyperplasia
26	PADMA	56	718	3	Atrophic	1	0	3	>25	7	homogenous	thin line	yes	Atrophic
27	KAVITHA	47	789	5	Proliferative	0	0	3	<25	2	homogenous	diffuse,regular	yes	Atrophic
28	SHAKILA	52	849	3	Atrophic	0	0	2	<25	3	homogenous	thin line	yes	Atrophic
29	SARASWATHY	51	934	9	Proliferative	1	0	4	<25	3	homogenous	diffuse,regular	yes	thickened
30	NIRMALA	50	1032	4	Atrophic	0	0	3	>25	2	homogenous	diffuse,regular	yes	thickened
31	VEERAMMAL	44	1128	12	Complex atypical hyp	0	0	5	<25	1	homogenous	diffuse,irregular	yes	hyperplasia
32	DHANAM	57	1185	5	Ca endometrium 2b	1	1	6	>25	4	heterogenous	diffuse,irregular	No	ca endometrium
33	FATHIMA	53	1275	2	Atrophic	0	0	2	<25	1	homogenous	thin line	yes	Atrophic
34	GEETHA	68	1310	6	Proliferative	0	0	7	<25	14	homogenous	diffuse,regular	yes	thickened
35	HEMA	47	1396	5	Secretory	0	0	3	<25	1	homogenous	focal, regular	yes	Polyp
36	GAJALAKSHMI	54	1457	4	Atrophic	1	0	4	>25	3	homogenous	diffuse,regular	yes	thickened
37	JANAKI	60	1552	3	Atrophic	1	0	3	<25	7	homogenous	thin line	yes	Atrophic
38	KIRUPAVATHY	56	1629	2	Atrophic	0	0	3	>25	4	homogenous	thin line	yes	Atrophic
39	JAYANTHI	50	1688	7	Proliferative	1	1	2	<25	3	homogenous	diffuse,regular	yes	thickened
40	KANNAGI	45	1739	5	Proliferative	0	0	4	>25	1	homogenous	diffuse,regular	yes	hyperplasia
41	JAMUNA	51	1827	2	Atrophic	0	1	5	<25	2	homogenous	thin line	yes	Atrophic
42	KUMUDHA	66	1895	8	Secretory	1	0	5	<25	16	homogenous	diffuse,irregular	yes	hyperplasia
43	MEERA	49	2008	5	Proliferative	0	0	3	>25	3	homogenous	diffuse,regular	yes	thickened
44	KAMALI	50	2148	3	Atrophic	0	0	4	<25	2	homogenous	thin line	yes	Atrophic

S.NO	NAME	AGE	IP NO	ET	HPE	DM	HTN	PARITY	BMI	MENOPAUSE YRS	APPEARANCE	CHARACTERISTIC	ENDOMETRIAL HALO	TVS diagnosis
45	VARALAKSHMI	61	2275	10	Ca endometrium 1c	0	0	3	<25	11	heterogenous	diffuse,irregular	No	ca endometrium
46	LAVANYA	46	2319	6	Proliferative	0	0	3	>25	1	homogenous	diffuse,regular	yes	thickened
47	RAMA	50	2390	2	Atrophic	1	0	4	>25	2	homogenous	thin line	yes	Atrophic
48	JOTHI	65	2684	7	Polyp	1	0	6	>25	16	homogenous	focal, regular	yes	Polyp
49	MARY	54	3268	5	Atrophic	0	0	4	>25	4	homogenous	diffuse,regular	yes	thickened
50	NEELA	51	3396	8	Proliferative	0	0	3	<25	1	homogenous	diffuse,regular	yes	ca endometrium
51	PARAMESHWAR	47	3532	3	Atrophic	1	1	2	<25	2	homogenous	thin line	yes	Atrophic
52	JAYA	53	3679	6	senile cystic atrophy	0	0	4	>25	3	homogenous	diffuse,regular	yes	thickened
53	USHA	62	3793	9	Ca endometrium 1c	1	0	5	>25	9	heterogenous	diffuse,irregular	no	ca endometrium
54	KAMATCHI	66	3898	2	Atrophic	0	0	4	<25	14	homogenous	thin line	yes	Atrophic
55	SUNDARI	59	4002	5	Atrophic	0	0	3	<25	9	homogenous	diffuse,regular	yes	hyperplasia
56	GANGA	46	4237	11	Proliferative	0	0	4	>25	1	heterogenous	diffuse,irregular	yes	ca endometrium
57	JAKKAMMAL	55	4453	4	Atrophic	0	0	2	>25	3	homogenous	thin line	yes	Atrophic
58	KAVERI	50	4687	3	Atrophic	0	1	5	<25	2	homogenous	thin line	yes	Atrophic
59	KAYALVIZHI	45	4945	8	Polyp	0	0	4	<25	1	homogenous	diffuse,regular	yes	Polyp
60	MARAGADHAM	63	5113	5	Atrophic	0	0	5	<25	14	homogenous	diffuse,regular	yes	thickened
61	VALLI	68	5238	6	Ca endometrium 2a	1	1	4	>25	17	heterogenous	diffuse,irregular	No	ca endometrium
62	MANIMEGALAI	54	5476	9	Simple hyperplasia	1	0	2	<25	2	homogenous	diffuse,regular	yes	hyperplasia
63	ANANDHI	52	5675	6	Proliferative	0	0	1	<25	1	homogenous	diffuse,regular	yes	thickened
64	SUNARAVALLI	47	5812	3	Atrophic	1	0	0	>25	1	homogenous	thin line	yes	Atrophic
65	RAAGAVI	48	5903	7	Proliferative	0	0	3	<25	3	homogenous	diffuse,regular	yes	thickened
66	JAMEELA	52	5988	3	Atrophic	0	0	4	<25	2	homogenous	thin line	yes	Atrophic
67	PRABHAVATHY	54	6432	7	Secretory	0	0	3	<25	5	homogenous	thin line	yes	Atrophic

S.NO	NAME	AGE	IP NO	ET	HPE	DM	HTN	PARITY	BMI	MENOPAUSE YRS	APPEARANCE	CHARACTERISTIC	ENDOMETRIAL HALO	TVS diagnosis
68	SUJATHA	49	6678	10	Polyp	1	0	2	>25	3	homogenous	diffuse,regular	No	hyperplasia
69	AMULU	46	6956	4	Atrophic	0	0	1	<25	1	homogenous	diffuse,regular	yes	thickened
70	SATHYAVENI	60	7856	6	Proliferative	0	1	6	<25	5	homogenous	diffuse,regular	yes	thickened
71	VANI	52	7978	2	Atrophic	0	0	3	<25	3	homogenous	thin line	yes	Atrophic
72	CHELLAMMAL	70	8246	8	Simple hyperplasia	1	0	5	<25	18	homogenous	diffuse,regular	yes	hyperplasia
73	SARUMATHY	48	8576	9	Complex hyperplasia	0	0	3	>25	2	homogenous	diffuse,irregular	yes	hyperplasia
74	VELLAIYAMMA	71	8689	1	Atrophic	0	0	2	<25	17	homogenous	thin line	yes	Atrophic
75	SASIKALA	53	8734	3	Atrophic	0	0	5	<25	2	homogenous	thin line	yes	Atrophic
76	MAYAVATHI	46	8894	6	Secretory	0	0	3	<25	1	homogenous	diffuse,regular	yes	thickened
77	VIDHYA	51	8998	4	Atrophic	1	1	4	<25	2	homogenous	thin line	yes	Atrophic
78	CHANDRA	59	9134	2	Atrophic	1	0	3	>25	7	homogenous	thin line	yes	Atrophic
79	RADHIKA	64	9244	5	Atrophic	0	0	2	<25	12	homogenous	diffuse,regular	yes	thickened
80	SORNAM	73	9345	1	Atrophic	1	0	5	<25	20	homogenous	thin line	yes	Atrophic
81	MEENAMBAL	66	9468	3	Atrophic	0	0	4	<25	15	homogenous	thin line	yes	Atrophic
82	NAGAVALLI	54	9511	7	Proliferative	1	0	5	>25	2	homogenous	diffuse,regular	yes	thickened
83	JAYACHITRA	47	9620	5	Proliferative	0	0	2	>25	1	homogenous	diffuse,regular	yes	thickened
84	GOMATHY	50	9789	2	Atrophic	0	0	1	<25	3	homogenous	thin line	yes	Atrophic
85	VAANMATHY	52	9812	14	Complex atypical hyp	0	1	5	<25	2	heterogenous	diffuse,irregular	yes	hyperplasia
86	ANITHA	45	9901	6	Secretory	0	0	2	>25	1	homogenous	diffuse,regular	yes	thickened
86	AMIRTHAM	68	10012	9	Simple hyperplasia	1	0	4	<25	15	homogenous	diffuse,regular	yes	thickened
88	BANU	55	10086	4	Atrophic	0	1	2	<25	2	homogenous	thin line	yes	thickened
89	DEVI	46	11015	10	Complex hyperplasia	1	0	3	>25	1	homogenous	diffuse,regular	yes	hyperplasia
90	REVATHY	53	11089	3	Atrophic	0	0	4	>25	3	homogenous	thin line	yes	Atrophic

S.NO	NAME	AGE	IP NO	ET	HPE	DM	HTN	PARITY	BMI	MENOPAUSE YRS	APPEARANCE	CHARACTERISTIC	ENDOMETRIAL HALO	TVS diagnosis
91	NEELAVATHY	72	11176	4	Atrophic	1	0	5	<25	17	homogenous	thin line	yes	Atrophic
92	ROJA	48	11269	5	Secretory	0	0	3	>25	2	homogenous	diffuse,regular	yes	thickened
93	VALARMATHY	53	11312	7	Proliferative	1	1	2	>25	2	homogenous	diffuse,regular	yes	hyperplasia
94	VIJAYALAKSHM	49	11386	2	Atrophic	0	0	3	<25	1	homogenous	thin line	yes	Atrophic
95	MUTHAMMAL	60	11423	5	senile cystic atrophy	0	0	4	<25	9	homogenous	diffuse,regular	yes	thickened
96	DURGA	51	11497	12	Ca endometrium 1c	1	0	2	>25	2	heterogenous	diffuse,regular	No	thickened
97	GIRIJA	46	11512	3	Atrophic	0	0	4	<25	1	homogenous	thin line	yes	Atrophic
98	MANJULA	50	11554	14	Ca endometrium 2a	0	0	3	<25	2	heterogenous	diffuse,regular	No	ca endometrium
99	GNANAM	65	11587	2	Atrophic	0	1	6	<25	14	homogenous	thin line	yes	Atrophic
100	KALAIARASI	52	11600	5	senile cystic atrophy	0	0	3	>25	3	homogenous	diffuse,regular	yes	thickened

ABBREVIATIONS

BMI	**:**	Body Mass Index
DM	:	Diabetes Mellitus
ET	:	Endometrial Thickness
MRI	:	Magnetic Resonance Imaging
HTN	:	Hypertension
PMB	:	Post Menopausal Bleeding
TVS	:	Trans Vaginal Sonography

CONSENT FORM

I agree to participate in the study entitled **"RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING"** .I confirm that I have been told about this study in my mother tongue and have had the opportunity to clarify my doubts.

I understand that my participation is voluntary and I may refuse to participate at any time without giving any reasons and without affecting my benefits.

I agree not to restrict the use of any data or results that arise from this study.

Name of the participant:

Sign / Thumb print:

Name of the investigator: Dr. RAMYA. K

Sign of Investigator:

தகவல் படிவம்

ஸ்டான்லி மருத்துவமனையின் ஆர்.எஸ்.ஆர்.எம். மருத்துவமனையில் மகப்பேறு மற்றும் பெண்கள் நல மருத்துவ துறையில் மேற்கொள்ளப்படும் ஆய்வு தொடர்பான தகவல் படிவம் இது.

இந்த ஆய்வு அனுபவம் வாய்ந்த மருத்துவர்களின் உதவியோடு நடத்தப்படுகிறது.

யோனியின் வழியாக மீயொலி நோட்டம் செய்து கருப்பையகத்தின் தடிப்பு கண்டறியப்படும். தடிப்பபு அளவு 10 மி.மி மேல் உள்ளவர்களுக்கு காந்த ஒத்திசைவு படமெடுத்தல் செய்யப்படும். கருப்பையகத்தில் இழையம் மாதிரியெடுத்து திசுத்துயரியல் பரிசோதனை செய்யப்படும். இவ்விரு பரிசோதனைகளின் இணையுறவு பற்றி ஆய்வு நடத்தப்படும்.

இதனால், எந்தவித பின்விளைவுகளும் நோயாளிகளுக்கு வராது

இந்த ஆய்வு நோயாளிகள் தங்கள் சுய விருப்பத்துடன் முன்வந்தால் மட்டுமே மேற்கொள்ளப்படும்.

சுய ஒப்புதல் படிவம்

மாதவிடாய் நிறுத்தத்திற்கு பின் புணர்புழை இரத்த ஒழுக்கு உள்ள பெண்களுக்கு மீயொலி நோட்டம் மற்றும் காந்த ஒத்திசைவு படமெடுத்து கருப்பையகம் தடிப்பிற்கம் திசுத்துயரியல் கண்டுபிடிப்பதலுக்கும் உள்ள இணையுறவு பற்றிய ஆய்வு.

ஆய்வாளர் : மரு. கு. ரம்யா
முதுநிலை பட்ட மேற்படிப்பு மாணவர்
மகப்பேறு மற்றம் பெண்கள் நலத்துறை
ஆர்.எஸ்.ஆர்.எம்.மருத்துவமனை
ஸ்டான்லி மருத்துவ கல்லூரி - சென்னை

வழிகாட்டி : பேராசிரியர் மரு. **வி. ராஜலட்சுமி. M.D., D.G.O.,**
மகப்பேறு மற்றம் பெண்கள் நலத்துறை
ஆர்,எஸ்.ஆர்.எம். மருத்துவமனை
ஸ்டான்லி மருத்துவ கல்லூரி - சென்னை

பெயர் : வயது : உள்ளிருப்பு எண் :

இந்த மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது என்னுடைய சந்தேகங்களை தீர்க்கவும் அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது

நான் இவ்வாய்வில் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்த காரணத்தினாலும் எந்த கட்டத்திலும் எந்த சட்டசிக்கலும் இன்றி இந்த ஆய்விலிருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.

நான் ஆய்விலிருந்து விலகிக்கொண்டாலும் ஆய்வாளர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கோ அல்லது உபயோகிக்கவோ என் அனுமதி தேவையில்லை எனவும் அறிந்து கொண்டேன் என்னை பற்றிய தகவல்கள் ரகசியமாக பாதுகாக்ப்படும் என்பதையும் அறிவேன்.

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும் பரிசோதனை முடிவுகளையும் ஆய்வாளர் அவர் விருப்பத்திற்கேற்ப பயன்படுத்திக் கொள்ளவும் அதனை பிரசுரிக்கவும் முழுமனதுடன் சம்மதிக்கிறேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன் எனக்கு கொடுக்கப்பட்டுள்ள அறிவுரைகளின்படி நடந்து கொள்வதுடன் ஆய்வாளருக்கு உண்மையுடன் இருப்பேன், என்றும் உறுதி அளிக்கிறேன்.

உடல்நலம் பாதிக்கப்பட்டாலோ வழக்கத்திற்கு மாறான ஏதேனும் நோய்குறி தென்பட்டாலோ அதனை தெரிவிப்பேன் என்றும் உறுதி கூறுகிறேன்.

இந்த ஆய்வில் எனக்கு எவ்விதமான பரிசோதனைகளையும் சிகிச்சைகளையும் மேற்கொள்ள நான் முழுமனதுடன் சம்மதிக்கிறேன்.

இப்படிக்கு,

ஆய்வாளரின் கையொப்பம் நோயாளியின் கையொப்பம்

RECOMMENDATION OF THE RADIOLOGY HOD

The study titled by Dr. RAMYA.K is **"RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING"** at Govt.RSRM Lying in Hospital. I permit it to be done according to the regulations of theInstitutional Ethics Committee.

23/2/2017.

PROFESSOR AND HEAD,

Department of Radiology,

Stanley Medical College,

Chennai.

Date: 23/2/17

RECOMMENDATION OF THE PATHOLOGY HOD

The study titled by Dr. RAMYA.K is **"RADIOPATHOLOGICAL CORRELATION OF ENDOMETRIAL THICKNESS IN POSTMENOPAUSAL BLEEDING"** at Govt.RSRM Lying in Hospital. I permit it to be done according to the regulations of theInstitutional Ethics Committee.

22/2/17

PROFESSOR AND HEAD,

Department of Pathology,

Stanley Medical College,

Chennai.

Date: 22/2/17

INSTITUTIONAL ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work	:	Radiopathological Correlation of endometrial Thickness In Postmenopausal bleeding at Govt RSRM Lying in Hospital.
Principal Investigator	:	Dr. K. Ramya,
Designation	:	PG MS (O & G)
Department	:	Department of (O & G) Government Stanley Medical College, Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 12.01.2017 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY, 22/2/17.
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.