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Association of Endometrial Thickness with Histopathological Pattern of Endometrium in Postmenopausal Bleeding In a Tertiary Care Hospital in North Kerala

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ABSTRACT
INTRODUCTION-. Vaginal bleeding that occurs after 6 months of amenorrhea from presumed menopause should be considered abnormal. 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. In women with postmenopausal bleeding, transvaginal sonography measurements of endometrial thickness and morphology have been shown to have good accuracy in ruling out endometrial polyps, hyperplasia, and malignancy.By doing this study, I hope to determine the typical causes of postmenopausal bleeding that are prevalent in this region using histopathological analysis and to correlate those findings with sonographic endometrial evaluation.
OBJECTIVE: To determine the association of histopathological finding with endometrial thickness obtained by transvaginal ultrasound.
METHODS :A cross sectional study was conducted among 147 women with postmenopausal bleeding attending the Obstetrics and Gynecology Department at GMC, Kannur, during a period of 1 year.A pre tested semi structured questionnaire was given to obtain information of sociodemographic details and other relevant detailed clinical history, clinical examination, and routine investigations for all patients. Patients were then subjected to transvaginal ultrasound to look for endometrial thickness and endometrial sampling was obtained using the Pipelle aspiration.
RESULTS:38% of the participants had an EM thickness of Up to 4 mm, followed by 30 % who had an EM thickness of 4.1–6, followed by 6.1–8 mm thickness by 19% of the study participants.In case of HPE, majority had atrophic endometrium (41%), followed by proliferative endometrium (17%), and hyperplasia with atypia and secretory endometrium (10.8%).
CONCLUSION: It is observed that there is a statistically significant association between HPE diagnosis and EM thickness, with the majority of patients with atrophic endometrium having lower EM thickness, and patients with hyperplasia and cancer having higher EM thickness.

I. INTRODUCTION

Menopause is the loss of ovarian follicular activity, which results in a permanent cessation of menstruation(1). Postmenopausal bleeding is defined as any uterine bleeding in a menopausal patient.As PMB is a cardinal sign of endometrial carcinoma,all postmenopausal patients with unanticipated PMB should be evaluated for endometrial hyperplasia or carcinoma(2)

Postmenopausal bleeding (PMB), which follows confirmed menopause, accounts for roughly 5% of gynaecological consultations[2]. Endometrial atrophy is the most frequent cause of PMB, accounting for 60 to 80 percent of cases[3]. Only 10% of postmenopausal bleeding is caused by endometrial hyperplasia and endometrial cancer, yet it increases patient morbidity and death. The most prevalent genital cancer and the sixth most common cause of cancer-related mortality in women is endometrial cancer. Throughout all, 2-3% of women will acquire endometrial cancer in their lives[2]. Only fewer than 5% of endometrial cancer cases in women are asymptomatic, and approximately 90% of these cases present as postmenopausal bleeding(4).

After menopause, bleeding in a woman who does not use hormone replacement treatment (HRT) increases her chance of genital cancer by 10% and severe pathology by another 10%[4].As a result, patients with PMB should constantly be checked for an early endometrial cancer diagnosis. The 5-year survival rate for endometrial cancer could rise to 95% with early diagnosis. Thickened

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endometrium is typically observed in endometrial hyperplasia and endometrial cancer. According to a study by Dimitraki et al [5] on clinical assessment of women with PMB, it was found that ultrasound may be helpful in predicting endometrial disease. However, the study concluded that there is still some disagreement over how well the aforementioned test is able to predict endometrial hyperplasia and endometrial cancer. As the initial study for women with PMB, transvaginal ultrasound assessment of endometrial thickness has replaced more invasive techniques. However, there is still no agreement on what cut-off value should be used to diagnose abnormalities[6]. More research is needed to produce information on this topic because advanced endometrial cancer has been documented to develop in patients without discernible endometrial thickening on ultrasonography. In order to create additional information on endometrial thickness in the prediction of endometrial hyperplasia and endometrial cancer, the current study compares the endometrial thickness with the histopathology report of endometrial biopsy of patients with PMB.

II. MATERIAL AND METHODS

We conducted a cross-sectional study in the Department of Obstetrics and Gynaecology, Government Medical College, Kannur between April 2021 to March 2022

The study participants were women with postmenopausal bleeding, visiting Gynaecology OPD or admitted in the Gynaecology ward.

Diagnosed cases of premalignant and malignant lesions of vagina, vulva and cervix, cervical and endocervical pathology,post-hysterectomy patients were excluded

The sample size was calculated to be 147 at confidence level 95%,acceptable error 5%.

The study proceeded after the institutional ethical committee permission and after obtaining informed written consent from the eligible study participants. We used a pre tested semi structured questionnaire to obtain information of sociodemographic details and other relevant detailed clinical history, clinical examination, and routine investigations for all patients. Patients were then subjected to transvaginal ultrasound to look for endometrial thickness and endometrial sampling was obtained using Pipelle aspiration.

III. OBSERVATION AND RESULTS

Table 1 Age distribution

Characteristics	Frequency (%)
Age group	
<50 years	24 (16.3)
51-70 years	84 (57.1)
>70 years	39 (26.5)

Table 1 shows the age distribution of all the participants.We could see that almost around 57% of the participants belonged to 51-70 years age category, with a mean age of 56.4 (9.1) years.

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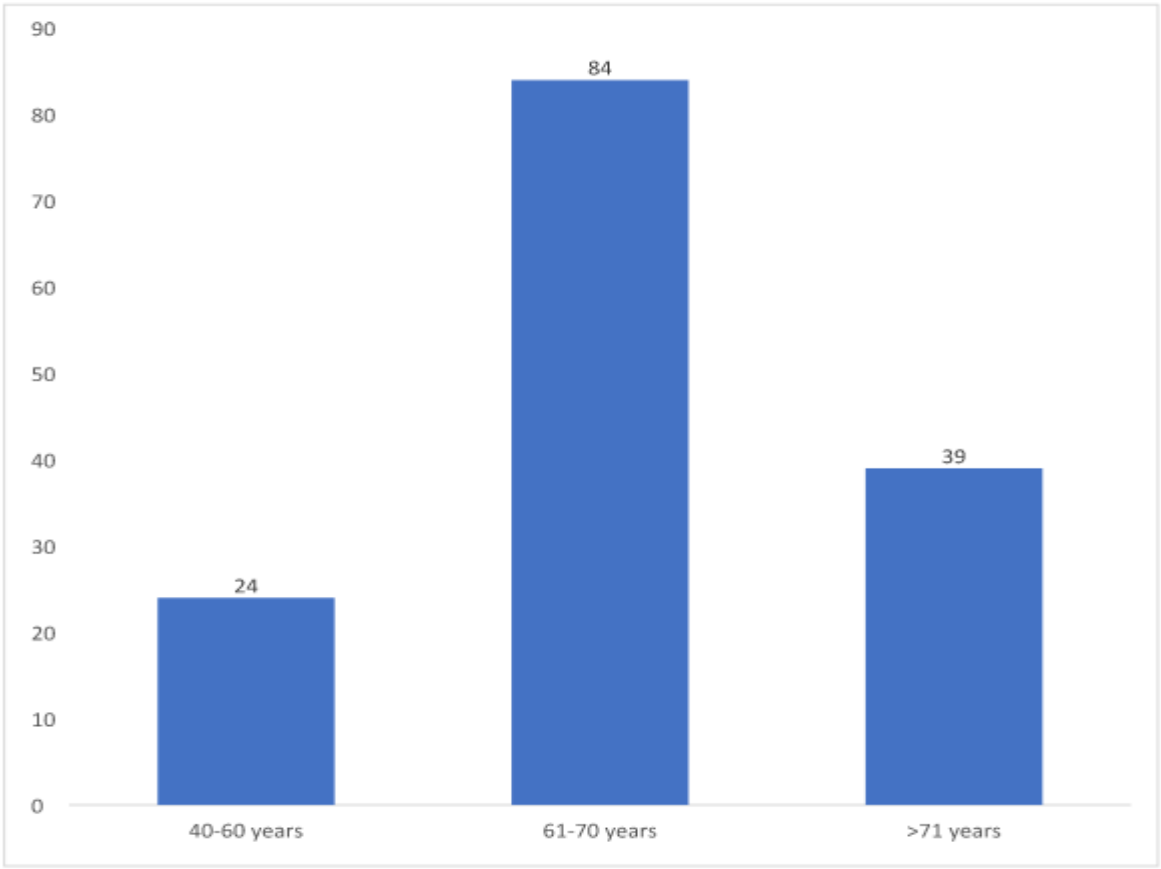

Fig 9: Age distribution of the participants

Table 2 Socioeconomic status distribution

Socio economic status	
Upper class	16 (10.8)
Middle class	91 (61.9)
Lower class	40 (27.2)

Table 2 shows the distribution of socioeconomic status among the study participants.Almost 60 % of the study population belonged to middle class socioeconomic status.

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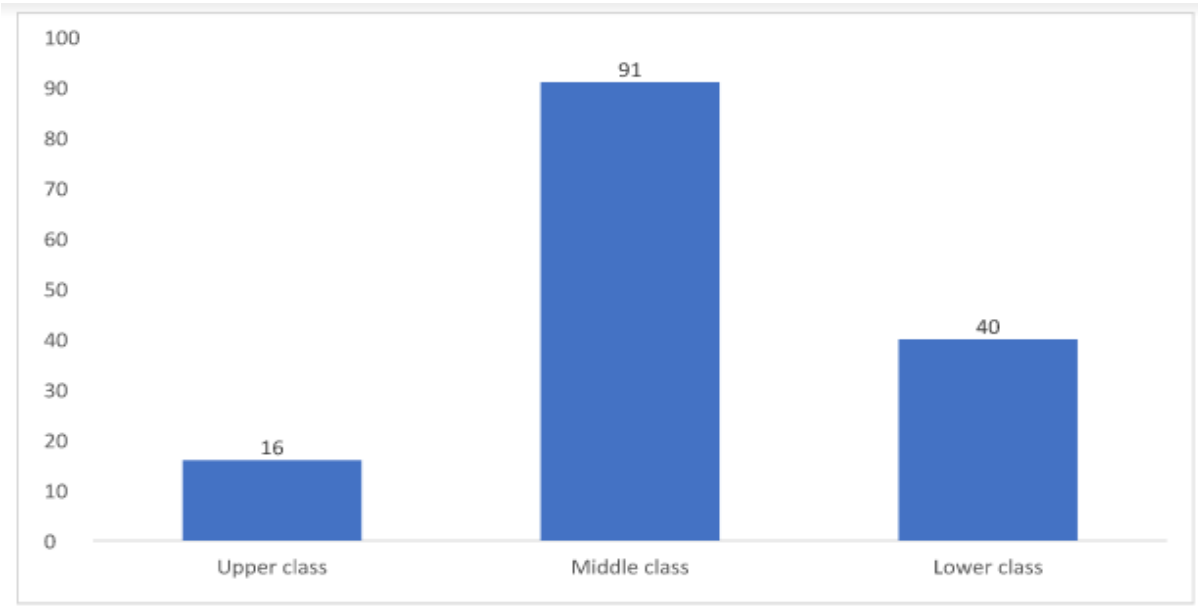

Fig 10: Socioeconomic status distribution of the participants

Table 3 Parity distribution

Parity	
0 to 3	105 (71.4)
>3	42 (28.6)

Table 3 shows the parity distribution of the study participants.Almost 70% of the study participants had parity less than 3.

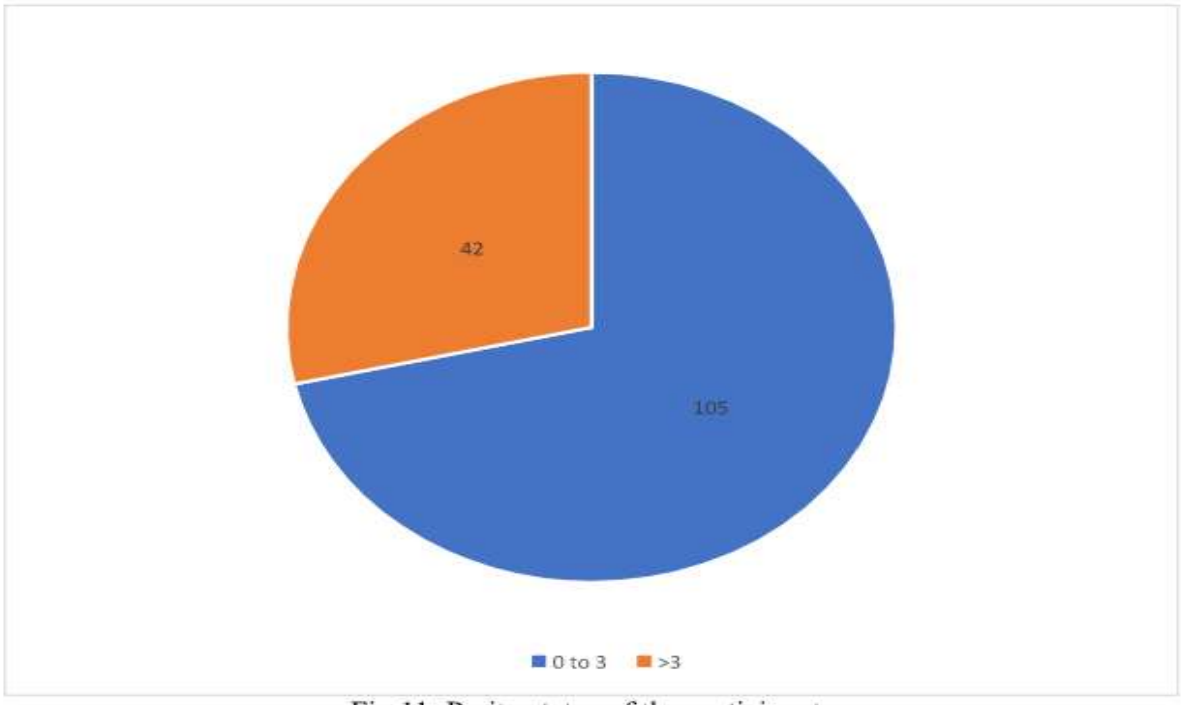

Fig 11: Parity status of the participants

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Table 4 Comorbidity status of the patients

Comorbidity	
Yes	91 (61.9)
No	46 (38.1)

Table 4 shows the comorbidity status of the study participants.Almost 62% of the study participants had one comorbidity or other.

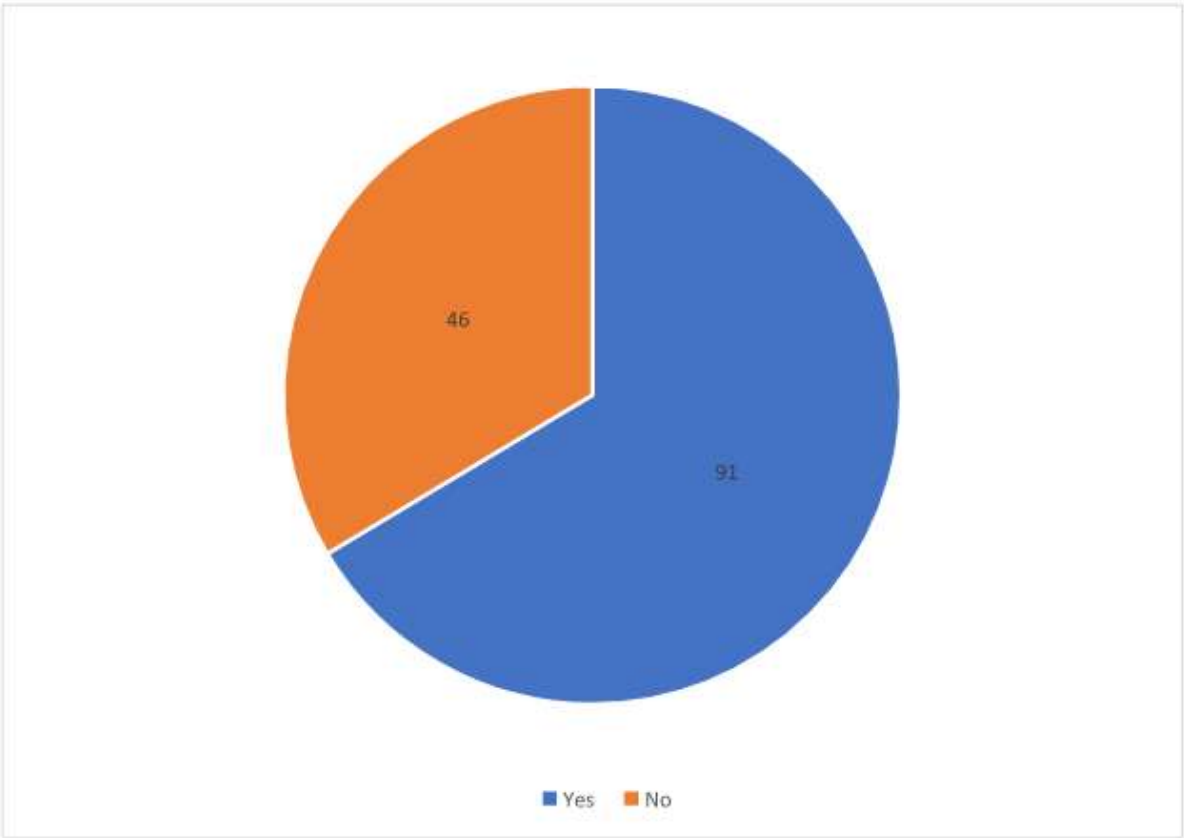

Fig 12: Comorbidity status of the participants

Table 5 Type of comorbidities

Type of comorbidities	
HTN	47 (31.9)
DM	41(27.9)
Dyslipidemia	27(18.4)
CAD	15(10.2)
CKD	8 (5.4)
Hypothyroidism	7(4.7)

Table 5 shows the distribution of comorbidities among the study participants.Most common among them was HTN(31.9%) followed by DM (27.9).

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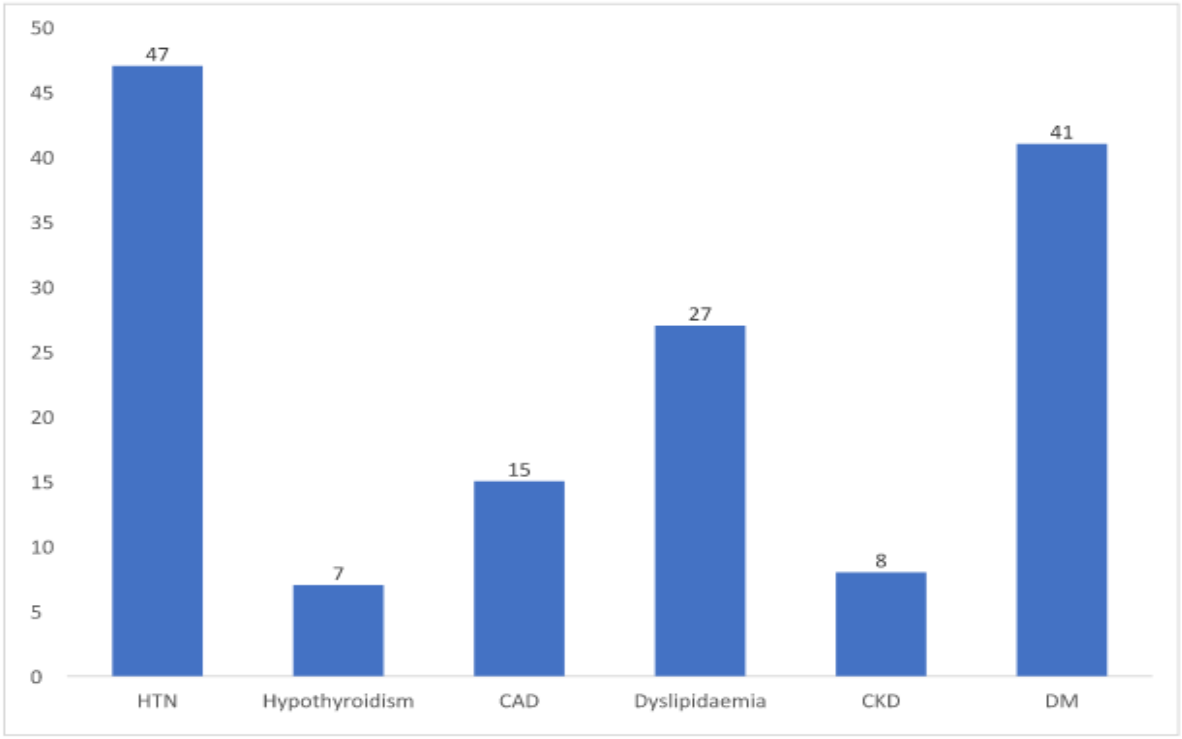

Fig 13 Type of comorbidities among the participants

Table 6 Years of menopause among study participants

Years of menopause	
<5 years	44 (29.9)
5 or more years	103 (70.1)

Table 6 shows the distribution of years of menopause among the study participants. Almost 70% of the participants had menopause 5 or more years back

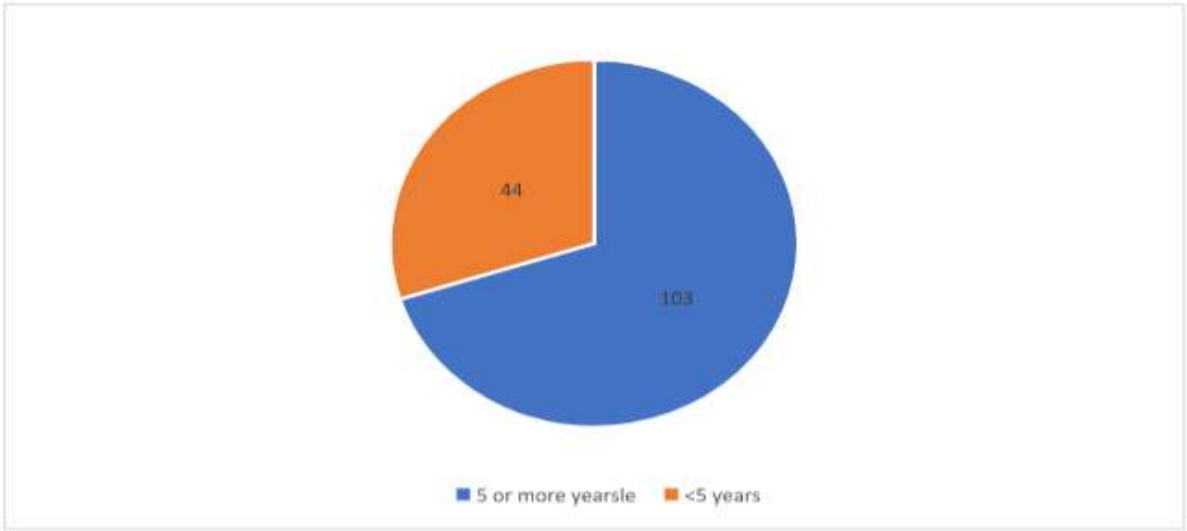

Fig 14: Years of menopause among the participants

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Table 7: Distribution of EM thickness among the study participants (N=147)

EM thickness	
Up to 4 mm	56 (38.1)
4.1–6	44 (29.9)
6.1–8	27 (18.4)
8.1–10	12 (8.2)
>10 mm	8 (5.4)

Table 2 showed the distribution of EM thickness among the study participants measured using the TVS. We observed that almost 38% of the participants had an EM thickness of Up to 4 mm, followed by 305 who had an EM thickness of 4.1–6, followed by 6.1–8 mm thickness by 19% of the study participants.

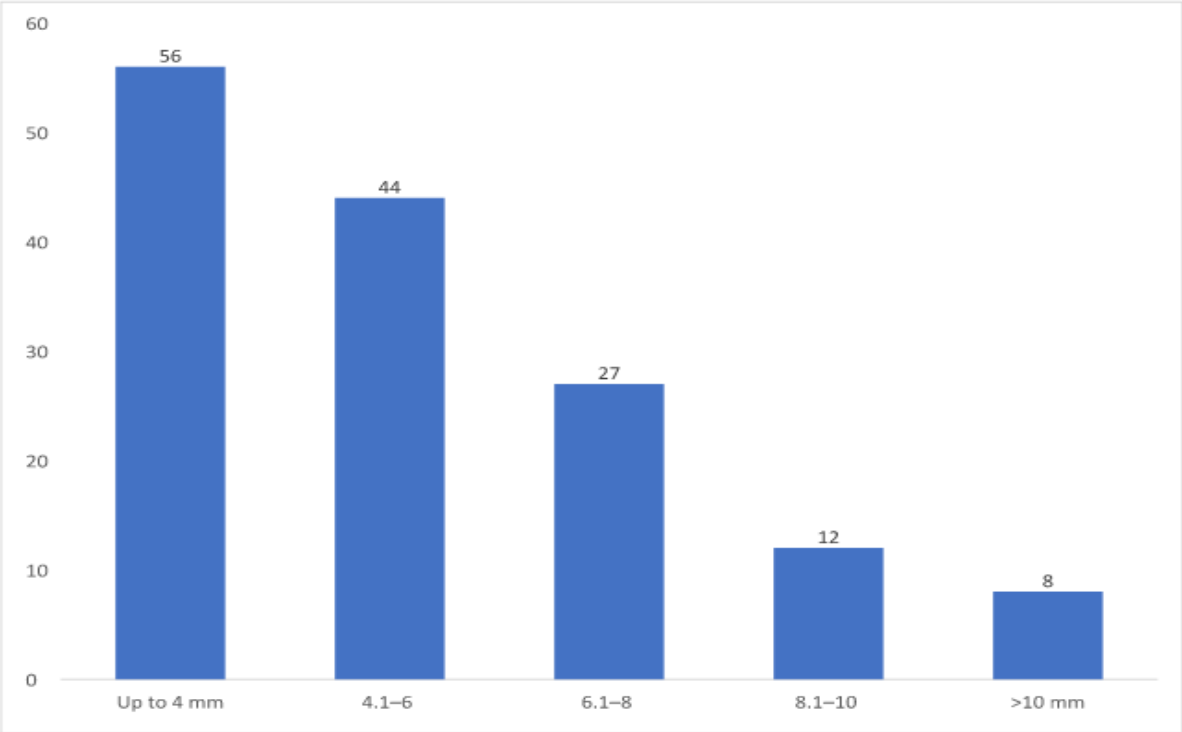

Fig 15: EM thickness among the participants

Table 8 : Distribution of HPE characteristics (N=147)

HPE characteristics	
Atrophic	61 (41.5)
Proliferative	24(16.4)
Secretory	16(10.8)
Hyperplasia with atypia	16(10.8)
Hyperplasia without atypia	9(6.1)
Polyp	12(8.2)
Ca endometrium- low grade	7(4.8)
Ca endometrium-high grade	2(1.3)

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Table 3 showed the distribution of HPE characteristics and diagnoses among the study participants. We observed that the majority had atrophic endometrium (41%), followed by proliferative endometrium (17%), and hyperplasia with atypia and secretory endometrium (10.8%)

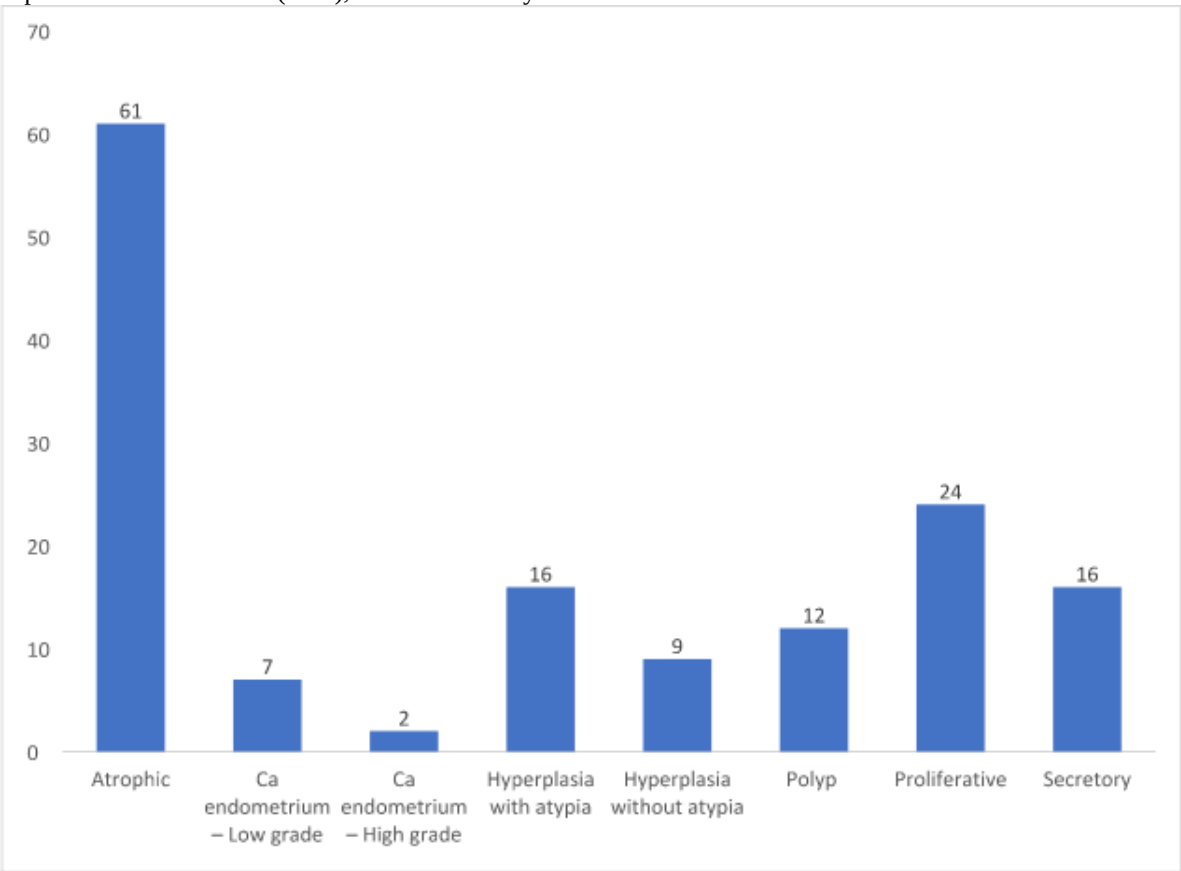

Fig 16 Distribution of HPE characteristics

Table 9: Association between HPE diagnosis and EM thickness (N=147)

(N=147)

	Up to 4 mm	**4.1–6 mm**	**6.1 to 8 mm**	**8.1 to 10 mm**	**>10 mm**	**P value**
Atrophic	37 (60.6)	19 (31.1)	5 (8.2)	0 (0.0)	0 (0.0)	
Malignancy	1 (11.1)	1 (11.1)	2 (22.2)	2 (22.2)	3 (33.3)	
Hyperplasia with atypia	0 (0.0)	1 (6.2)	5 (31.2)	7 (43.7)	3 (18.7)	
Polyp	5 (41.6)	6 (50.0)	1 (8.3)	0 (0.0)	0 (0.0)	
Proliferative	8 (33.3)	15 (62.5)	1 (4.2)	0 (0.0)	0 (0.0)	0.02
Secretory	4 (25.0)	0 (0.0)	12 (75.0)	0 (0.0)	0 (0.0)	
Hyperplasia without atypia	1 (11.1)	2 (22.2)	1 (11.1)	3 (33.3)	2 (22.2)	

Table 5 showed that the association between HPE diagnosis and EM thickness among the study participants. We observed a statistically significant association between HPE diagnosis and EM thickness, with the majority of patients with atrophic endometrium having lower EM thickness, and patients with hyperplasia and cancer having higher EM thickness.

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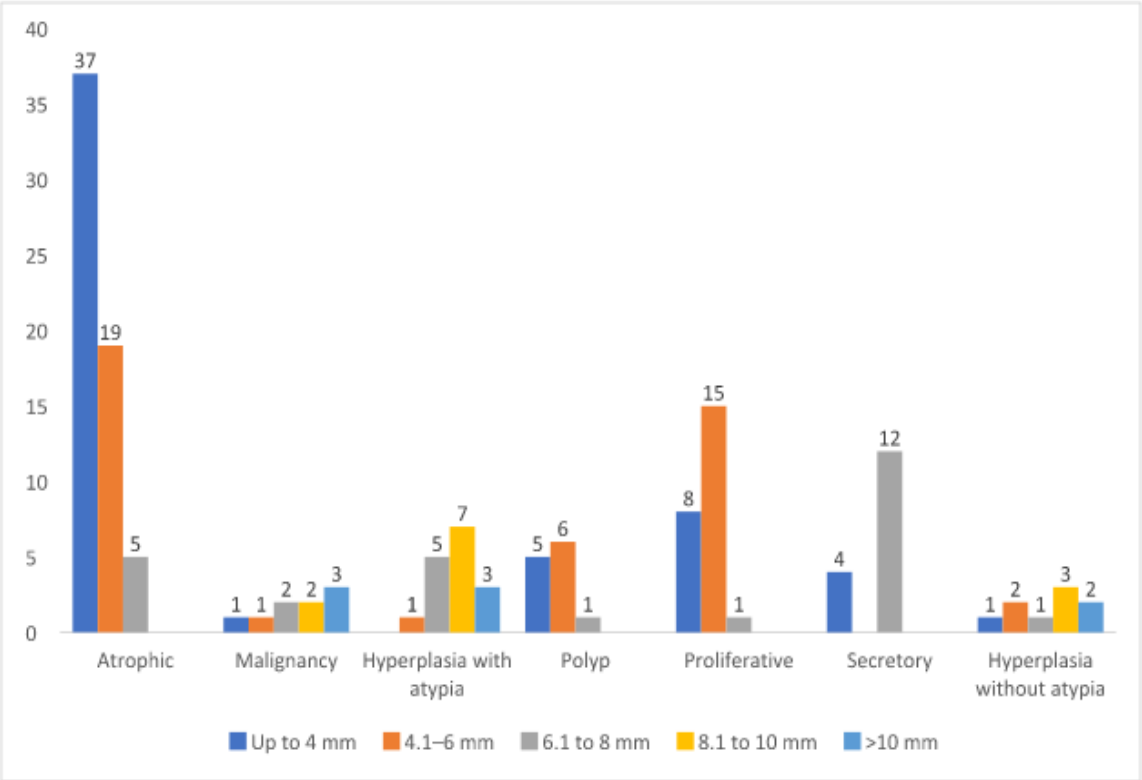

Fig 17 Association of HPE diagnosis and endometrial thickness

IV. DISCUSSION

We did a cross-sectional study in the Department of Obstetrics and Gynaecology in a tertiary care setting to evaluate the association between endometrial thickness obtained by transvaginal ultrasound with the histopathological pattern of endometrium in women with postmenopausal bleeding during the time period of 1 year. In our study, we estimated the clinical spectrum of women who belonged to the postmenopausal age group and presented with menstrual bleeding. We evaluated them clinically and through other relevant investigations to identify the causes of postmenopausal bleeding and categorised the different types of histopathological patterns seen among them. Existent research on this area are mainly focused in western settings, and there is a lack of literature from India, specifically from south Indian settings, where we expect that postmenopausal bleeding to be one of the leading causes of mortality and morbidity among women. Moreover, postmenopausal bleeding is a very common finding among Indian women, which is well established by several studies. (53) Thus taking the varied burden of the postmenopausal bleeding among Indian women into consideration, we decided to take up this study to determine the association between endometrial thickness obtained by transvaginal ultrasound with histopathological pattern.

In our study where we included 147 cases, we obtained results where almost around 57% of the participants belonged to 51-70 years age category, with a mean age of 56.4 (9.1) years. Almost 62% of the study participants belonged to the middle class of socioeconomic status and around 3/4th of them had parity of 0-3. The current study clearly demonstrates that as people age, menstruation issues become more common. In the current study, people over 51 years were most likely to present with severe bleeding. Similar findings were reported by studies done by Rao et al, who also documented that majority of participants presented between the age group of 45 years. (55) This again strengthens the fact that post-menopausal bleeding is quite commonly seen among middle-aged, lower-class women with low parity. However, our findings were observed to be different from a study done by Chennuru et al who estimated that the commonest age group was 40-50 years. (53) The probable reason could be differences in health-seeking behaviour, the comorbidity pattern between the study participants. Around 62% were suffering from one comorbidity or the other, where the most common among them was HTN and DM. Obesity,HTN,DM and other

lifestyle factors have been recognised as the factors associated with postmenopausal bleeding that also enhances the risk of endometrial cancer(67).In this study,47% had HTN followed by 41% with DM.In a study by Tandulwadkar etal,risk factors for endometrial cancer like obesity (62.25%), diabetes mellitus (50%), hypertension (25%) were all significantly associated with the occurrence of endometrial carcinoma(68). Almost 70% of the participants had menopause 5 or more years back. This again stresses the findings from other studies that have evaluated that post-menopausal bleeding is more commonly seen among women who are multiparous and is often associated with other comorbidities (56)

With respect to the distribution of EM thickness among the study participants measured using the TVS, we observed that almost 38% of the participants had an EM thickness of Up to 4 mm, followed by 30% who had an EM thickness of 4.1–6, followed by 6.1–8 mm thickness by 19% of the study participants. This finding was also observed to be in line with the findings put forth by another study done by Pushpa et al, who also showed that majority of women had a EM of 4.1 to 6 mm of thickness (57)

With respect to distribution of TVS findings and diagnosis among the study participants, we observed that majority had atrophic endometrium (38%), followed by thickened endometrium in TVS since the majority were belonging to the post-menopausal age group. This was also observed to be similar to findings by Xue et al from China. (58)

Taking into account of the distribution of HPE characteristics and diagnoses among the study participants into consideration, we observed that the majority had atrophic endometrium (41%), followed by proliferative endometrium (17%), and hyperplasia with atypia and secretory endometrium (10.8%). A study done by Krishnamoorthy et al, from India, has also documented similar findings thus, making our study findings comparable to relevant studies from similar study settings. (59)

With respect to our main outcome assessment to find the association between HPE diagnosis and EM thickness among the study participants, we observed a statistically significant association between HPE diagnosis and EM thickness, with the majority of patients with atrophic endometrium having lower EM thickness, and patients with hyperplasia and cancer having higher EM thickness. This finding was also observed to be comparable to findings put forth by Krishnamoorthy et al. (59)

While some authors advise endometrial biopsy for all patients with PMB (60) regardless of endometrial thickness due to reports of the prevalence of endometrial cancer with less than 4 mm thickness, certain studies emphasise evaluating the intracavitary uterine lesions only if endometrial thickness is more than 4 mm in PMB. (61) Dimitraki et al reviewed the studies on PMB and came to the conclusion that the clinician should be cautious when diagnosing postmenopausal women who have vaginal bleeding because advanced endometrial carcinoma has been known to occur in cases without discernible endometrial thickness on ultrasound. (5)

An endometrial thickness of >15 mm is highly indicative of endometrial cancer, according to multiple studies, according to a meta-analysis. (62) The average endometrial thickness for adenocarcinomas in our sample was 10 mm, which is about the same as reported by Karlson et al. (63) In cases of hyperplasia, it was 14.3 mm, while in situations of atrophic endometrium, it was 7.4. The chance of discovering pathologic endometrium at curettage when the endometrium is less than 4 mm is only 5.5 percent, according to the study by Karlsson et al, which found that none of the cases of hyperplasia and adenocarcinoma had less than 4 mm. Similarly, using the same cutoff of 4 mm, it was claimed that the sensitivity of identifying cancer was over 90%. (64)

Thus, taking into account of our own study findings and its comparison with various other studies from varied study settings it becomes imperative that there is a significant association observed between HPE diagnosis and EM thickness, with the majority of patients with atrophic endometrium having lower EM thickness, and patients with hyperplasia and cancer having higher EM thickness. Thus, our findings advocate that EM thickness could be used a screening tool among women with postmenopausal bleeding for early and easy identification of endometrial cancers.

V. CONCLUSION

To conclude, in our study we found that participants belonged to 51-70 years age category, with a mean age of 56.4 (9.1) years, and we observed that almost 38% of the participants had an EM thickness of Up to 4 mm, followed by 30% who had an EM thickness of 4.1–6, followed by 6.1–8 mm thickness by 19% of the study participants. We also observed that majority had atrophic endometrium (38%), followed by thickened endometrium in TVS, and in case of HPE, majority had atrophic endometrium (41%),

followed by proliferative endometrium (17%), and hyperplasia with atypia and secretory endometrium (10.8%). With respect to our primary objective we observed a statistically significant association between HPE diagnosis and EM thickness, with the majority of patients with atrophic endometrium having lower EM thickness, and patients with hyperplasia and cancer having higher EM thickness.

REFERENCES

[1]. Evaluation and management of postmenopausal bleeding. Indian Menopause Society. Guideline Number 4: August 2010.

[2]. Moodley M, Roberts C. Clinical pathway for the evaluation of postmenopausal bleeding with an emphasis on endometrial cancer detection. J Obstet Gynaecol 2004; 24:736.

[3]. Sarika M, Lane G. Modern management of postmenopausal bleeding. Trends in Urology Gynaecology & Sexual Health 2008;13(5):20-24.

[4]. Astrup K, Olivarius Nde F. Frequency of spontaneously occur ring postmenopausal bleeding in the general population. Acta Obstetricia et Gynecologica Scandinavica 2004;83(2):203-207.

[5]. Dimitraki M, Tsikouras P, et al. Clinical evaluation of women with PMB. Is it always necessary an endometrial biopsy to be performed? A review of the literature. Arch Gynecol Obstet 178. 2011;283:261-266.

[6]. Wong AS-W, Lao TT-H, et al. Reappraisal of endometrial thickness for the detection of endometrial cancer in postmenopausal bleeding: a retrospective cohort study. BJOG 2016;123: 439-446.

[7]. Manjusha V, Suja D, et al. Socio-demographic profile of patients with postmenopausal bleeding attending out-patient unit of a Tertiary Care Centre. Scholars Journal of Applied Medical Sciences 2014; 2(2C):681-684

[8]. Kumari L, Hafsa A. A study on correlation of endometrial thickness and its histopathological finding in women with postmenopausal bleeding. Sch J App Med Sci 2017;5(11F):4723- 4729

[9]. Saadia A, Mubarik A, et al. Diagnostic accuracy of endometrial curettage in endometrial pathology. J Ayub Med Coll Abbot- tabad 2011;23(1):129-131.

[10]. Breijer MC, Timmermans A, et al. Diagnostic strategies for postmenopausal bleeding. Obstetr Gynecol Int 2010;2010.

[11]. Fong K, Kung R, Lytwyn A et-al. Endometrial evaluation with transvaginal US and hysterosonography in asymptomatic postmenopausal women with breast cancer receiving tamoxifen. Radiology. 2001;220 (3)765-73.

[12]. LovinaS Machado, Mariam Mathew, Alia Al Hassani, Vlasta Vaclavinkova, Correlation of endometrial thickness, cycle day and histopathology in women with abnormal uterine bleeding , Saudi med journal,2005Feb;26(2):260-3.

[13]. Astrup K, Olivarius ND. Frequency of spontaneously occurring postmenopausal bleeding in the general population. Acta obstetricia et gynecologica Scandinavica. 2004 Jan 1;83(2):203-7.

[14]. Sloboda L, Molnar E, Popovic Z, Zivkovic S. Analysis of pathohistological results from the uterine mucosa 1965-1998 at the gynecology department in Senta. Med Pregl 1999;52:263-5.

[15]. Töz E, Sancı M, Özcan A, Beyan E, İnan AH. Comparison of classic terminology with the FIGO PALM-COEIN system for classification of the underlying causes of abnormal uterine bleeding. International Journal of Gynecology & Obstetrics. 2016 Jun 1;133(3):325-8.

[16]. Khare A, Bansal R, Sarma S, Elhence P, Makkar N, Tyagi Y. Morphological spectrum of endometrium in patients presenting with dysfunctional uterine bleeding. People J Sci Res 2012;5:13-6.

[17]. Reinhold C, Atri M, Mehio A, Zakarian R, Aldis AE, Bret PM. Diffuse uterine adenomyosis: Morphologic criteria and diagnostic accuracy of endovaginal sonography. Radiology 1995;197:609-14.

[18]. Chodankar R, Critchley HO. Abnormal uterine bleeding (including PALM COEIN classification). Obstetrics, Gynaecology & Reproductive Medicine. 2019 Apr 1;29(4):98-104.

[19]. Owen Jr JA. Physiology of the menstrual cycle. The American journal of clinical nutrition. 1975 Apr 1;28(4):333-8.

[20]. Bachmann GA, Leiblum SR. The impact of hormones on menopausal sexuality: a literature review. Menopause. 2004 Jan 1;11(1):120-30.

[21]. Telner DE, Jakubovicz D. Approach to diagnosis and management of abnormal

uterine bleeding. Can Fam Physician 2007;53:58-64.
[22]. Freeman EW, Sammel MD, Lin H, Gracia CR, Kapoor S. Symptoms in the menopausal transition: hormone and behavioral correlates. Obstetrics & Gynecology. 2008 Jan 1;111(1):127-36.
[23]. SHERMAN B, WALLACE R, BEAN J, SCHLABAUGH L. Relationship of body weight to menarcheal and menopausal age: implications for breast cancer risk. The Journal of Clinical Endocrinology & Metabolism. 1981 Mar 1;52(3):488-93.
[24]. Shobha PS. Sonographic and histopathological correlation and evaluation of endometrium in perimenopausal women with abnormal uterine bleeding. Int J Reprod Contracept Obstet Gynaecol 2014;3:113-7.
[25]. Kathuria R, Bhatnagar B. Correlation between D&C, USG and hysteroscopy findings in diagnosing a cause for abnormal uterinebleeding. Indian J Clin Pract 2014;25:466-70.
[26]. Dueholm M, Lundorf E, Hansen ES, Ledertoug S, Olesen F. Accuracy of magnetic resonance imaging and transvaginal ultrasonography in the diagnosis, mapping, and measurement of uterine myomas. Am J Obstet Gynecol 2002;186:409-15.
[27]. Murray MJ, Meyer WR, Zaino RJ, Lessey BA, Novotny DB, Ireland K, Zeng D, Fritz MA. A critical analysis of the accuracy, reproducibility, and clinical utility of histologic endometrial dating in fertile women. Fertility and sterility. 2004 May 1;81(5):1333-43.
[28]. PERVEEN S, PERVEEN S. " ENDOMETRIUM HISTOLOGY IN ABNORMAL UTERINE BLEEDING". Medical Channel. 2011 Oct 1;17(4).
[29]. Desai K, Patole K, Kathaley M. Endometrial evaluation by histopathology in abnormal uterine bleeding in perimenopausal and postmenopausal patients. MVP Journal of Medical Sciences. 2014 Dec 1:75-9.
[30]. Schneider LG. Causes of abnormal vaginal bleeding in a family practice center. J Fam Pract. 1983 Feb 1;16(2):281-3.
[31]. Chen BH, Giudice LC. Dysfunctional uterine bleeding. Western journal of medicine. 1998 Nov;169(5):280.
[32]. Farrell E. Dysfunctional uterine bleeding. Australian family physician. 2004 Nov;33(11):906-8
[33]. Marnach ML, Laughlin-Tommaso SK. Evaluation and management of abnormal uterine bleeding. InMayo Clinic Proceedings 2019 Feb 1 (Vol. 94, No. 2, pp. 326-335). Elsevier.
[34]. Hatasaka H. The evaluation of abnormal uterine bleeding. Clinical obstetrics and gynecology. 2005 Jun 1;48(2):258-73.
[35]. Verma U, Garg R, Singh S, Yadav P, Rani R. Diagnostic approach in perimenopausal women with abnormal uterine bleeding. Journal of SAFOMS. 2014 Jan 1;2(1):12.
[36]. Mossa B, Imperato F, Marziani R, Perniola F, Melluso J, Perniola G, Napolitano C. Hormonal replacement therapy and evaluation of intrauterine pathology in postmenopausal women: a ten-year study. European journal of gynaecological oncology. 2003 Jan 1;24(6):507-12.
[37]. Thomas MC. Treatment options for dysfunctional uterine bleeding. The Nurse Practitioner. 2011 Aug 1;36(8):14-20.
[38]. Ranganna H, Shivlingiaha N. Hysterectomy for dysfunctional uterine bleeding in women with previous tubal sterilization. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2014 Mar 1;3(1):204-8.
[39]. Felix AS, Yang HP, Bell DW, Sherman ME. Epidemiology of endometrial carcinoma: etiologic importance of hormonal and metabolic influences. Molecular Genetics of Endometrial Carcinoma. 2017:3-46.
[40]. Prat J, Gallardo A, Cuatrecasas M, Catasús L. Endometrial carcinoma: pathology and genetics. Pathology. 2007 Jan 1;39(1):72-87.
[41]. Broaddus RR, Lynch HT, Chen LM, Daniels MS, Conrad P, Munsell MF, White KG, Luthra R, Lu KH. Pathologic features of endometrial carcinoma associated with HNPCC: a comparison with sporadic endometrial carcinoma. Cancer. 2006 Jan 1;106(1):87-94.
[42]. Merritt MA, Cramer DW. Molecular pathogenesis of endometrial and ovarian cancer. Cancer Biomarkers. 2011 Jan 1;9(1-6):287-305.
[43]. Braun MM, Overbeek-Wager E, Grumbo RJ. Diagnosis and management of

endometrial cancer. American family physician. 2016 Mar 15;93(6):468-74.
[44]. Murali R, Soslow RA, Weigelt B. Classification of endometrial carcinoma: more than two types. The Lancet Oncology. 2014 Jun 1;15(7):e268-78.
[45]. Prat J. Prognostic parameters of endometrial carcinoma. Human pathology. 2004 Jun 1;35(6):649-62.
[46]. Du J, Li Y, Lv S, Wang Q, Sun C, Dong X, He M, Ulain Q, Yuan Y, Tuo X, Batchu N. Endometrial sampling devices for early diagnosis of endometrial lesions. Journal of cancer research and clinical oncology. 2016 Dec;142(12):2515-22.
[47]. Lachance JA, Darus CJ, Rice LW. Surgical management and postoperative treatment of endometrial carcinoma. Reviews in Obstetrics and Gynecology. 2008;1(3):97.
[48]. Kupelian PA, Eifel PJ, Tornos C, Burke TW, Delclos L, Oswald MJ. Treatment of endometrial carcinoma with radiation therapy alone. International Journal of Radiation Oncology* Biology* Physics. 1993 Nov 15;27(4):817-24.
[49]. Chaudhry P, Asselin E. Resistance to chemotherapy and hormone therapy in endometrial cancer. Endocrine-related cancer. 2009 Jun 1;16(2):363-80.
[50]. Madan SM, Al-Jufairi ZA. Abnormal uterine bleeding. Saudi medical journal. 2001;22(2):153-6.
[51]. Sinha K, Gurung P, Sinha HH, Bhadani PP. Study on abnormal uterine bleeding among adult women in a tertiary care hospital in Bihar, India. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2018 Aug 1;7(8):3136-41.
[52]. Choudhury SA, Nath P. Abnormal uterine bleeding; its prevalence, causes and management in a tertiary care hospital. N Indian J OBGYN. 2020;7(1):52-7.
[53]. Chennuru R, Potnuru R. Abnormal uterine bleeding in women of peri-menopausal age: a retrospective study. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2019 Jun 1;8(6):2407.
[54]. Talukdar B, Mahela S. Abnormal uterine bleeding in perimenopausal women: Correlation with sonographic findings and histopathological examination of hysterectomy specimens. Journal of mid-life health. 2016 Apr;7(2):73.
[55]. Rao M. A study of Abnormal Uterine Bleeding in Perimenopausal Women in a Tertiary Care Hospital. Sch Int J Obstet Gynec. 2019: 24-29
[56]. Sudhamani S, Sirmukaddam S, Agrawal D. Clinicopathological study of abnormal uterine bleeding in perimenopausal women. Journal of the Scientific Society. 2015 Jan 1;42(1):3.
[57]. Singh P, Dwivedi P, Mendiratta S. Correlation of endometrial thickness with the histopathological pattern of endometrium in postmenopausal bleeding. The journal of Obstetrics and Gynecology of India. 2016 Feb;66(1):42-6.
[58]. Xue H, Shen WJ, Zhang Y. Pathological pattern of endometrial abnormalities in postmenopausal women with bleeding or thickened endometrium. World Journal of Clinical Cases. 2022 Mar 6;10(7):2159.
[59]. Krishnamoorthy P, Balakrishnan N, Prasad G. Association of Endometrial Thickness with Histopathological Pattern of Endometrium with Postmenopausal Bleeding. Journal of SAFOMS. 2018 Dec 1;6(2):112-6.
[60]. Bakour SH, Dwarakanath LS, et al. The diagnostic accuracy of ultrasound scan in predicting endometrial hyperplasia and cancer in postmenopausal bleeding. Acta Obstet Gynecol Scand 1999;78:447-451.
[61]. Ferrazzi E, Torri V, et al. Sonographic thickness. A useful test to predict atrophy in patients with postmenopausal bleed-ing. An Italian multicentre study. Ultrasound Obstet Gynecol 1996;7(5):315–321
[62]. Gupta JK, Chien PF, et al. Ultrasonographic endometrial thickness for diagnosing endometrial pathology in women with postmenopausal bleeding: a metaanalysis. Acta Obstet Gynecol Scand 2002;81:799-816.
[63]. Karlsson B, Granberg S, et al. Endovaginal scanning of the endometrium compared to cytology and histology in women with postmenopausal bleeding. Gynecol Oncol 1993;50:173- 178
[64]. Ciatto S, Cecchini S, et al. Association of endometrial thick- ness assessed at transvaginal ultrasonography to endometrial cancer in postmenopausal asymptomatic or with abnormal uterine bleeding. Radiol Med 2002;104(5-6):437-442.

[65]. H Kaur, L Goyal, P Kaur. To Validate The Use Of Trans Vaginal Sonography – A Non Invasive Tool As A Screening Method For Patients With Postmenopausal Bleeding. The Internet Journal of Gynecology and Obstetrics. 2012 Volume 16

[66]. Gull B, Karlsson B, Milsom I and Granberg S. Can ultrasound replace dilatation and curettage? A longitudinal evaluation of postmenopausal bleeding and transvaginal sonographic measurement of the endometrium as predictors of endometrial cancer. Am J Obstet Gynecol 2003:Feb:188(2): 401-8.

[67]. Tandulwadkar S, Deshmukh P, Lodha P, et al. Hysteroscopy in postmenopausal bleeding. J Gynecol Endosc Surg 2009;1(2):89–93. DOI: 10.4103/0974-1216.71614

[68]. Breijer MC, Timmermans A, van Doorn HC, et al. Diagnostic Strategies for Postmenopausal Bleeding. Obstetrics and Gynecology International 2010;Article ID 850812:1–5. DOI: 10.1155/2010/ 850812