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ORIGINAL RESEARCH

COMPARISON OF PIPELLE ENDOMETRIAL SAMPLING VERSUS DILATATION AND CURETTAGE IN CASES OF ABNORMAL UTERINE BLEEDING

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ABSTRACT

Background: Pipelle endometrial sampling versus Dilatation and curettage in collecting a sufficient endometrial sample for histopathological diagnosis was the subject of this observational clinical correlation diagnostic study. Aim: The present study is done in our hospital to know if Pipelleaspiration endometrial sampling can replace D&C for histological examination in cases of AUB.

Materials and Methods: This was an observational clinical correlation diagnostic study designed to compare the efficacy of Pipelle endometrial sampling with Dilatation and curettage in obtaining an adequate endometrial sample for histopathological diagnosis. After obtaining informed consent to participate and determining fitness for the procedure, 100 patients who reported with AUB to the Department of Obstetrics &Gynaecology at Government Medical College, Kadapa, were enrolled in the study. The study was carried out from October 2019 to September 2021. The patient underwent a thorough clinical evaluation in the outpatient department, which included a history, physical examination, and baseline investigations. Prior to the procedure, TAS/TVS were done. Endometrial sampling was performed using the Pipelle device, followed by a diagnostic reference standard and D&C endometrial sampling under anaesthesia.

Results: The most common age group presented with AUB is between 41 and 45 years. Most of the patients (45%) had < 6months duration of AUB. Pre and perimenopausalwomen made up 94% of the study population, whereas postmenopausal women made up 6%. Among the study group, 4% were nulliparous, and the remaining 96% were parous women. Of the study group, the ET thickness varies as - 13 had <

6mm, 18 had ET between 6.1- 9mm, 50 had ET between 9.1-12mm, 13 had ET between 12.1-15mm, 4 constitute between 15.1-18mm, 2 had >18mm ET. In Pipelle and D & C, sampling inadequacy was significantly more in menopausal women compared to pre-menopausal women. (P<0.05). In 16 cases, Pipelle sampling was deemed challenging. Sampling was difficult in nulliparous women when compared to parous women. Histopathology reports were obtained in 93 of the 100 Pipelle samples and 94 of the 100 D&C samples in current study. The most frequent endometrial pattern observed was Hyperplasia without atypia (21%) , followed by proliferative phase of the endometrium (20%), no evidence of malignancy (14%), Secretory phase (11%), disordered proliferative phase (11%), atrophic endometrium (4%), nonsecretory phase in (4%), endometrial polyp (2%), Hyperplasia with atypia (2%), early secretory phase (1%), endometrial carcinoma (1%), late secretory phase (1%), Endometrial glandular hypertrophy (1%). When comparing Pipelle to D&C, the chi-square test shows that Pipelle has a sensitivity of 98.9% for retrieving sufficient tissue and a specificity of 100%. The positive predictive value is 100 percent, while the negative predictive value is 85.7%. The p-value estimated is< 0 .001, which is statistically significant. Out of 100 cases that had Pipelle sampling, 91 had no complications. 5 had pain, and 4 had bleeding. Out of 100 cases that had D & C, 59 had no complications, 29 had pain, 5 had bleeding, and 7 had both pain and bleeding.

Conclusion: Pipelle sampling can be used as an effective screening procedure in the outpatient department.

Keywords: Pilelle, Hyperplasia, Carcinoma, Endometrium, Histopathology, AUB.

INTRODUCTION

Endometrial sampling for histopathological assessment is the most reliable tool to assess the cause of abnormal uterine bleeding.[1-3] In gynaecological patients, AUB is one of the most common complaints. AUB is defined as menstrual bleeding of abnormal volume, duration, regularity or frequency and includes bleeding between the cycles.[4] According to the NICE Guidelines, heavy menstrual bleeding can be defined as excessive menstrual blood loss, which interferes with the woman's physical, emotional, social and material quality of life.[5] It is a subjective definition. Objectively, for research purposes, HMB has been defined as blood loss of more than 80 mL in any menstrual period, whether regular or irregular.[6] It has a significant impact on the women's quality of life, with an incidence of about 30% among reproductive women.[7] Its incidence among perimenopausal and postmenopausal women is about 70%. So it is crucial to evaluate AUB. The fundamental goal of AUB evaluation is to make a diagnosis as quickly as possible and with as little intrusive technique as possible. The primary role of sampling the endometrium in patients with AUB is to determine whether carcinomatous or premalignant lesions are present by evaluating histological samples so that management either medical or surgical can be planned accordingly.[8,9]

The prevalence of AUB varies with each country. In India, the prevalence is about 17.9%. In Government Medical College, Kadapa AUB constitutes about 15.3% of OPD visits. In India, incidence of endometrial cancer is 1.8-5.5 per 1, 00,000 women and mortality rate is 1.5 per 1,00,000. Endometrial sampling is considered to be required in light of the importance of AUB in clinical practice and the rising incidence of endometrial cancer in India. As a result,

ACOG recommends endometrial biopsy as a first-line diagnostic for women over 45 with AUB and younger women with a background of unopposed oestrogen exposure (such as obesity or PCOS) and chronic AUB.[5] Dilatation and curettage (D&C) still remain India's most common endometrial sampling method. In about 60% of cases, less than half of the uterine cavity is curetted. It is also associated with short term (haemorrhage, perforation of uterus, cervical injury) and long-term complications like haemorrhage, infection, intrauterine adhesions (Asherman syndrome). This led to the development of office endometrial biopsy devices that do not require cervical dilatation. The procedure can be done without anaesthesia.

Pipelle endometrial biopsy is one of the most regularly utilised methods for office endometrial biopsy. It is comfortable and it gave comparable HPE reports from the tissue which is obtained by D&C or hysterectomy Pipelle-type devices' utility in endometrial sampling as an outpatient procedure has been reviewed in a number of research conducted outside India. In India, however, there are only a few research accessible. Therefore the present study is done in our hospital to know if Pipelleaspiration endometrial sampling can replace D&C for histological examination in cases of AUB.

MATERIALS & METHODS

Study Design: Prospective Observational Clinical Correlation Study.

Study Setting: Department of Obstetrics and Gynaecology at Government Medical College, Kadapa,

Study Population: Carried Out In 100 Patients in the Department of Obstetrics And Gynaecology at Gmc, Kadapa, Who Presented With Aub.

Study Period: October 2019 to September 2021

Inclusion Criteria:

- Age 35 Years and Above.
- Perimenopausal Women with Abnormal Uterine Bleeding.
- Postmenopausal Bleeding.

Exclusion Criteria:

- Pregnancy
- Structural Anomalies Of The Uterus
- Pelvic Inflammatory Disease
- Clotting Disorders Or Coagulopathy
- Lower Genital Infection
- Endometrial Thickness≤4mm
- On Hormonal Therapy

Methodology:

- After receiving written and informed consent from the participants, patients aged 35 and up who presented with AUB were enrolled in the study.
- In the Outpatient Department, a thorough clinical evaluation of the patient was undertaken, including a history, physical examination, and baseline investigations, which were all documented.
- Investigations like:

- Complete blood count (Hemoglobin, Total count, Differential count,ESR, Platelet count)
- Blood grouping and typing
- HIV, HBSAG,VDRL
- Urine examination
- Random blood sugar
- Bleeding time and clotting time
- Thyroid profile in indicated cases
- Ultrasound abdomen & Pelvis
- Pap smear

Statistical Analysis: In this study, descriptive statistical analysis was used. The results of continuous measures are reported as Mean SD (Min - Max), while categorical measurements are presented as a number (percent). The level of significance is set at 5%. On the basis of the facts, the following assumptions are made:

Software for statistical analysis: The data was analysed using statistical tools such as SPSS 23.0 and MedCalc 9.0.1, and graphs, tables, and other graphics were created using Microsoft Word and Excel.

RESULTS

The current study is a prospective observational clinical correlation study of 100 patients in the Department of Obstetrics and Gynaecology at Government Medical College, Kadapa, who presented with AUB. Pipelle endometrial sampling was studied and compared to dilatation and curettage in AUB cases.

Table: 1 - Age Distribution

Age (Years)	Number of Patients	Percent
35-40	33	33
41-45	45	45
46-50	11	11
>50 Years	11	11
Total	100	100

The majority of the patients (45%) were in the age category of 41-45 years, followed by the age group of 35-40 years (33%) and then 11 percent of the patients were in the age group of 46-50 years, and 11 percent of the subjects were over 50 years old.

Table 2: Duration of AUB

Duration	Number	Percent
<6 Months	45	45
6mon - 1 Year	37	37
2year	7	7
3 Year	4	4
>3 Year	1	1
Pmb	6	6

In this study group, 45% of subjects had <6months duration of AUB, 6- 12 months in 37%, 2years in 7% , 4% had 3 years of duration, 1% subjects had >3years duration of AUB.6 % subjects had post-menopausal bleeding.

Table 3: Menopausal Status

	Number	**Percentage**
Pre And Perimenopausal	94	94
Post-Menopausal	6	6
Total	100	100

Of the study group, 94% were pre and peri menopausal and 6% were postmenopausal.Among the study group, 4% were nulliparous and remaining 96% were parous women.
Among parous women, 4.16% (4) were P1, 43.75% (42) were Para 2, 40.62%(39) were Para 3, 10.42%(10) were Para 4, 1.04% (1) were Para 5.Of the study subjects, 90% were sterilised and 10% were not sterilised.

Table 4: Distribution of Study Subjects According to BMI

Bmi	**Freq**	**%**
<24.9	83	83.0
25-29.9	13	13.0
30-34.9	4	4.0
Total	100	100.0

Of the study group, 83% are under <24.9kg/m2, 13% are between 25-29.9 kg/m2 are between 30-34.9kg/m2

Table 5: Distribution of Study Subjects According to Pap smear

Pap Smear	**Freq**	**%**
Acute Inflammatory Smear	77	77.0
Chronic Inflammatory Smear	10	10.0
HSIL	1	1.0
LSIL	1	1.0
Negative for Intraepithelial Malignancy	11	11.0
Total	100	100.0

Among 100 subjects,Pap smear results were: 77 had aute inflammatory smear,10 had chronic inflammatory smear,11 had negative inflammatory smear, 1 had HSIL and 1 had LSIL.

Table 6: Distribution of Study Subjects According to USG

USG	Freq	%
Fibroid	51	51
Bulky Uterus	24	24
Thickened Endometrium	12	12
Adenomyosis	9	9
Polyp	2	2
Ovarian Cyst	2	2
Total	100	100.0

Of the study group, the USG findings were: 51 cases had fibroid, normal in 24 cases, 12 had thickened endometrium, 9 had Adenomyosis, 2 had polyp, 2 had ovarian cyst.

Table 7: Distribution of Study Subjects According to ET

ET	Freq	%
<6mm	13	13.0
6.1-9mm	18	18.0
9.1-12mm	50	50.0
12.1 -15mm	13	13.0
15.1 To 18mm	4	4.0
>18mm	2	1.0
Total	100	100.0

Of the study group, the ET thickness varies as: 13 had < 6mm, 18 had ET between 6.1- 9mm, 50 had ET between 9.1-12mm, 13 had ET between 12.1-15mm, 4 constitute between 15.1-18mm, 2 had >18mm ET.

Table 8: Distribution of Study Subjects According To Adequacy of Sample with Pipelle

Sample with Pipelle	Freq	%
Adequate	93	93.0
Inadequate	7	7.0
Total	100	100.0

Out of 100 cases who had Pipelle sampling, 93 had adequate sample, 7 had inadequate sample.

Table 9: Distribution of Study Subjects According to Adequacy of Sample with D&C:

Sample With D&C	Freq	%
Adequate	94	94.0
Inadequate	6	6.0
Total	100	100.0

Of the study group who had undergone D&C, 94 had adequate sample, 6 had inadequate sample.

Table 10 - Distribution of Study Subjects According to Complications with Pipelle

Complication With Pipelle	Freq	%
Bleeding	4	4.0
Pain	5	5.0
No Complications	91	91.0
Total	100	100.0

Out of 100 cases that had Pipelle sampling, 91 had no complications. 5 had pain and 4 had bleeding.

Table 11 - Distribution of Study Subjects According to Complications with D&C

Complication With D&C	Freq	%
Bleeding	5	5.0
Pain	29	29.0
Pain & Bleeding	7	7.0
No Complications	59	59.0
Total	100	100.0

Table 12: Distribution of Study Subjects According to Hpe Report Pipelle

Hpe Report Pipelle	Freq	%
Hyperplasia Without Atypia	21	21
Proliferative Phase	20	20
N0 Evidence of Malignancy	14	14
Disordered Proliferative Phase	11	11
Secretory Phase	11	11
Inadequate	7	7
Atrophic Endometrium	4	4
Non Secretory Phase	4	4
Endometrial Polyp	2	2
Hyperplasia With Atypia	2	2
Early Secretory Phase	1	1
Endometrial Carcinoma	1	1
Endometrial Glandular Hypertrophy	1	1
Late Secretory Phase	1	1
Total	100	100

Out of 100 subjects who had undergone Pipelle, the HPE reports were:secretory phase in 11, proliferative phase in 20, nonsecretory phase in 4 cases, 14 had no evidence of malignancy,1 in late secretory phase, 2 cases had hyperplasia with atypia, hyperplasia without atypia seen in 21 cases, 2 had features of endometrial polyp, 1 had endometrial glandular hypertrophy,1 had endometrial carcinoma, 1 had early secretory phase, 11 had disordered proliferative phase, 4 had atrophic endometrium, 7 had inadequate sample.

Table 13: Distribution of Study Subjects According to Hpe Report in D& C

Out of 100 subjects who had undergone D&C, the HPE reports were:secretory phase in 11 , proliferative phase in 20, nonsecretory phase in 4 cases, 14 had no evidence of malignancy,1 in late secretory phase, 2 cases had hyperplasia with atypia, hyperplasia without atypia seen in 22 cases, 2 had features of endometrial polyo,1 had endometrial carcinoma, 1 had early secretory phase, 12 had disordered proliferative phase, 4 had atrophic endometrium, 6 had inadequate sample.

Hpe Report D&C	**Freq**	**%**
Hyperplasia Without Atypia	22	22
Proliferative Phase	20	20
No Evidence of Malignancy	14	14
Disordered Proliferative Phase	12	12
Secretory Phase	11	11
Inadequate	6	6
Atrophic Endometrium	4	4
Non Secretory Phase	4	4
Endometrial Polyp	2	2
Hyperplasia With Atypia	2	2
Early Secretory Phase	1	1
Endometrial Carcinoma	1	1
Late Secretory Phase	1	1
Total	100	100

Table-14: Association between Menopause and ET

Total							
Menopause	**<6mm**	**6.1 -9 mm**	**9.1-12mm**	**12.1mm – 15mm**	**15.1 – 18mm**	**>18mm**	
	Freq(%)	Freq(%)	Freq(%)	Freq(%)	Freq(%)	Freq(%)	Freq(%)
No	10(10.6)	16(17.0)	49(52.1)	13(13.8)	4(4.3)	2(1.1)	94(100.0)
Yes	3(50.0)	2(33.3)	1(16.7)	0(0.0)	0(0.0)	0(0.0)	6(100.0)
Total	13(13.0)	18(18.0)	50(50.0)	13(13.0)	4(4.0)	2(2.0)	100(100.0)

Chi-Square = 10.187, df=6, P=0.117

Among the study subjects, 94 were under peri and pre menopausalage .The ET among them varies as <6mm in 10, 6.1 mm – 9mm in 16, 9.1 – 12mm in 49 cases, 12.1mm-15mm in 13,15.1 mm -18mm in 4 and >18mm in 2. Among 6 menopausal women, ET was <6mm in 3 cases, 6.1 – 9mm in 2 cases, 9.1 – 12mm in 1 case.

Table-15: Association between Menopause and Sampling

Menopause	**Sampling**		**Total**
	Difficult	**Easy**	
	Freq (%)	Freq (%)	Freq (%)
No	15 (16.7)	79(84.0)	94 (100.0)
Yes	3(50)	3(50)	6 (100.0)
Total	18(18.0)	82(84.0)	100 (100.0)

Chi-Square = 0.002, df=1, P=0.963

Among 6 post menopausalwomen, the procedure was difficult in 1 case and among pre and peri menopausal women sampling was difficult in 15 cases.

Table-16: Association between Menopause and Sampling with Pipelle

Menopause	**Sampling with Pipelle**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
No	89 (94.7)	5(5.3)	94 (100.0)
Yes	4(66.7)	2(33.3)	6 (100.0)
Total	93(93.0)	7(7.0)	100 (100.0)

Chi-Square = 6.799, df=1, P=0.009

Among 94 cases who are pre and perimenopausal women, who had undergone pipelle sampling, 89 had adequate sample and in 5 cases sample was inadequate. Among postmenopausal women, 4 had adequate and 2 had inadequate sample.

Table-17: Association between Menopause and Sampling with D&C

Menopause	**Sampling With D&C**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
No	90 (95.7)	4(4.3)	94 (100.0)
Yes	4(66.7)	2(33.3)	6 (100.0)
Total	94(94.0)	6(6.0)	100 (100.0)

Chi-Square = 8.455, df=1, P=0.004

Among 94 cases who are pre and perimenopausal women who had undergone pipelle sampling, 90 had adequate sample and in 4 cases sample was inadequate. Among postmenopausal women, 4 had adequate and 2 had inadequate sample.

Table-18: Association between ET and Sampling

ET	**Sampling**		**Total**
	Inadequate	**Adequate**	
	Freq (%)	Freq (%)	Freq (%)
<6mm	4 (30.8)	9(69.2)	13 (100.0)
6.1-9mm	0(0.0)	18(100)	18 (100.0)
9.1-12mm	2(4.0)	48(96.0)	50 (100.0)
12.1-15mm	1(7.7)	12(92.3)	13 (100.0)
15.1-18mm	0 (50.0)	4(100.0)	4 (100.0)
>18mm	0(0.0)	2(100.0)	2 (100.0)
Total	7(16.0)	93(84.0)	100 (100.0)

Chi-Square = 16.565, Df=6, P=0.011

Table-19: Association between ET and Sampling with Pipelle

ET	**Sampling with Pipelle**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
<6mm	9 (69.2)	4(30.8)	13 (100.0)
6.1-9mm	18(100.0)	0(0.0)	18 (100.0)
9.1-12mm	48(96.0)	2(4.0)	50 (100.0)
12.1-15mm	12(92.3)	1(7.7)	13 (100.0)
15.1-18mm	4 (100.0)	0(0.0)	4 (100.0)
>18mm	2(100.0)	0(0.0)	2 (100.0)

Chi-Square = 13.789, df=6, P=0.032

Among 100 cases that had undergone Pipelle sampling, adequate sample was obtained in 93 cases and inadequate sample in 7 cases. Inadequate sample obtained in 4 patients with ET <6mm, 2 patients with ET between 9.1-12mm and 1 patient with ET between 12.1mm-15mm.Adequate sample in 9 patients with ET <6mm,18 with 6.1-9mm, 48 patients with ET12.1-15mm, 12 patients with ET 12.1- 15mm, 4 patients with ET 15.1mm – 18mm and 2 cases with ET >18mm.

Table-20: Association between ET and Sampling with D&C

ET	**Sampling with D&C**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
<6mm	9 (69.2)	4(30.8)	13 (100.0)
>18mm	2(100.0)	0(0.0)	2 (100.0)
12.1-15mm	13(100.0)	0(0.0)	13 (100.0)
15.1-18mm	4 (100.0)	0(0.0)	4 (100.0)
6.1-9mm	18(100.0)	0(0.0)	18 (100.0)
9.1-12mm	48(96.0)	2(4.0)	50 (100.0)
Total	94(94.0)	6(6.0)	100 (100.0)

Chi-Square = 16.858, df=6, P=0.010

Among 100 cases that had undergone D&C, In 94 cases, a sufficient sample was acquired, while in 6 cases, an unsatisfactory sample was obtained. Inadequate sample obtained in 4 patients with ET <6mm, 2 patients with ET between 9.1-12 mm. Among 94 patients who had adequate sample, the number varies as: 9 patients with ET <6mm,18 with 6.1-9mm, 48 patients with ET 12.1-15mm, 12 patients with ET 12.1- 15mm, 4 patients with ET 15.1mm – 18mm and 2 cases with ET >18mm.

Table-21: Association between Parity and Sampling with Pipelle

Parity	**Sampling with Pipelle**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
Nullipara	2 (50.0)	2(50.0)	4 (100.0)
P1	4(100.0)	0(0.0)	4 (100.0)

P2	39(92.9)	3(7.1)	42 (100.0)
P3	37 (92.3)	2(7.7)	39 (100.0)
P4	10(100.0)	0(0.0)	10 (100.0)
P5	1(100.0)	0(0.0)	1 (100.0)
Total	93(93.0)	7(7.0)	100 (100.0)

Chi-Square = 3.150, df=5, P=0.677

Among 100 subjects, 96 were Parous women in which 5 had inadequate sample. 4 were nulliparous among which 2 had inadequate sample.

Table-22: Association between Parity and Sampling with D&C

Parity	**Sampling with D&C**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
Nullipara	2 (50.0)	2(50.0)	4 (100.0)
P1	4(100.0)	0(0.0)	4 (100.0)
P2	40(95.2)	2(4.76)	42 (100.0)
P3	37 (94.9)	2(5.1)	39 (100.0)
P4	10(100.0)	0(0.0)	10 (100.0)
P5	1(100.0)	0(0.0)	1 (100.0)
Total	94(94.0)	6(6.0)	100 (100.0)

Chi-Square = 13.731, df=5, P=0.017

Among 100 subjects, 96 were Parous women in which 4 had inadequate sample. 4 were nulliparous among which 2 had inadequate sample.

Table-23: Association between Age Group and Sampling with Pipelle

Age Group	**Sampling with Pipelle**		**Total**
	Adequate	**Inadequate**	
	Freq (%)	Freq (%)	Freq (%)
35-40	31(96.9)	1(3.1)	32 (100.0)
41-45	45(97.8)	1(2.2)	46 (100.0)
46-50	10 (83.3)	2(16.7)	12 (100.0)
>51	7 (70.0)	3(30.0)	10 (100.0)
Total	93(93.0)	7(7.0)	100 (100.0)

Chi-Square = 12.232, df=3, P=0.007

Among 100 patients who had undergone Pipelle sampling, the age distribution varies as: 32 belong to age group 35-40 in which 1 had inadequate sample. 46 belong 41-45 age group, in which 1 had inadequate sample. 12 belong to age group of 41-50 in which 2 had inadequate sample. 10 belong to age group of >51 years in which 3 had inadequate sample.

Table 24: Association between Age Group and Sampling with D&C

Age Group	Sampling with D&C		Total
	Adequate	Inadequate	
	Freq (%)	Freq (%)	Freq (%)
35-40	31(96.9)	1(3.1)	32 (100.0)
41-45	45(97.8)	1(2.2)	46 (100.0)
46-50	11 (91.7)	1(8.3)	12 (100.0)
>51	7 (70.0)	3(30.0)	10 (100.0)
Total	94(94.0)	6(6.0)	100 (100.0)

Chi-Square = 11.992, df=3, P=0.007

Among 100 patients who had undergone D&C, the age distribution varies as: 32 belong to age group 35-40 in which 1 had inadequate sample. 46 belong 41-45 age group, in which 1 had inadequate sample. 12 belong to age group of 41-50 in which 1 had inadequate sample. 10 belong to age group of >51 years in which 3 had inadequate sample.

Table 25: Association between Sample with Pipelle and BMI

Sample with Pipelle		BMI		Total
	<24.9	25-29.9	30-34.9	
	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Adequate	79 (84.9)	13 (14.0)	1 (1.1)	93 (100.0)
Inadequate	4 (57.1)	0 (0.0)	3 (42.9)	7 (100.0)
Total	83 (83.0)	13(13.0)	4 (4.0)	100 (100.0)

Chi-Square = 29.996, df=2, P=0.000.

Among 100 patients who had undergone pipelle sampling, 7 had inadequate sample in which 4 belong to BMI <24.9 and 3 belong to BMI 30-34.9 kg/m2.

Table 26: Association between Sample with D&C and BMI

Sample With D&C		BMI		Total
	<24.9	25-29.9	30-34.9	
	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Adequate	80 (85.1)	13 (13.8)	1 (1.1)	94 (100.0)
Inadequate	3 (50.0)	0 (0.0)	3 (50.0)	6 (100.0)
Total	83 (83.0)	13(13.0)	4 (4.0)	100 (100.0)

Chi-Square = 35.433, df=2, P=0.000

Among 100 patients who had undergone D&C, 6 had inadequate sample in which 3 belong to BMI <24.9 and 3 belong to BMI 30-34.9 kg/m2.

Table 27: Association between Pipelle and D&C for Tissue Adequacy

Sample	Pipelle	D&C
Adequate	93	94
Inadequate	7	6
Total	100	100

Chi-Square = 84.80, df=1, P=0.00

In the present study, Pipelle sampling had 93 adequate and 7 inadequate samples. While the D&C had 94 adequate and 6 inadequate samples. Hence Pipelle can be used effectively as an outpatient procedure for endometrial sampling.

Table 28: Tissue Adequacy Efficacy of Pipelle Compared to D&C

Statistic	**Value**	**95% Ci**
Sensitivity	98.94%	94.21% To 99.97%
Specificity	100.00%	54.07% To 100.00%
Positive Likelihood Ratio	99.08	
Negative Likelihood Ratio	0.01	0.00 To 0.07
Disease Prevalence (*)	94.00%	87.40% To 97.77%
Positive Predictive Value (*)	100.00%	
Negative Predictive Value (*)	85.71%	46.06% To 97.68%
Accuracy (*)	99.00%	94.55% To 99.97%

The Pipelle sampling has a sensitivity of 98.94%, specificity of 100%, PPV of 100%, NPV of 85.71%, and Accuracy of 99% in tissue adequacy efficacy.

Table 29: Validity of Pipelle Endometrial Sampling for Each Endometrial Condition (Gold Standard Method- D& C Sampling):

In The Present Study, The Sensitivity, Specificity, Ppv And Npv Were Calculated For Each Endometrial Condition. It Is As Follows:

Validity of Pipelle'sampling	**Sensitivity**	**Specificity**	**Ppv**	**Npv**
Hyperplasia Without Atypia	100	100	100	100
Hyperplasia With Atypia	100	100	100	100
Proliferative Phase	95.2	100	98.7	99
Disordered Proliferative Phase	91.6	100	100	98.8
Early Secretory Phase	100	100	100	100
Late Secretory Phase	100	100	100	100
Endometrial Polyp	100	100	100	100
Endometrial Carcinoma	100	98.9	100	99
Atrophic Endometrium	100	100	100	100
Secretory Phase	100	100	100	100
Non Secretory Phase	100	100	100	100
No Evidence of Malignancy	100	100	100	100

DISCUSSION

At the Department of OBG, Government Medical College, Kadapa, the current study was conducted on 100 AUB patients to compare the efficacy of Pipelle endometrial sample in AUB diagnosis with D&C.

Endometrial biopsy is helpful in determining the cause of AUB. There are several malignant and premalignant lesions that can be found. As a result, non-invasive treatment options for benign lesions are available. Endometrial biopsy can be done in a number of methods. Each has pros and cons.[10,11,12]

D&C is a surgical procedure that requires anaesthesia. The Pipelle, on the other hand, is a highly sensitive and precise test for endometrial cancer. This is a costbenefit analysis that does not necessitate admission to the hospital and
anaesthesia.[11,13]

One of the most common cancers in women is endometrial cancer.[14] Although several research have compared the Pipelle technique and D&C, there is little proof that these methods are comparable to permanent histology after hysterectomy. As a result, the outcomes of Pipelle and D&C pathology reports are compared in this study.

The average (SD) age of the participants in this study was43.9 ± 5.3 years. Maximum (45%) cases belonged to 41-45 age groups, followed by 35-40 (33%) and above 45 years (22%). Similar to these results, in Gelini Moghaddam T etal,[15] mean (±SD) age was 47.5 ± 5.17 years and maximum AUB cases were 40-45 years. Liu H etal,[16] study results were in accordance with the present study.

Duration: Out of 100 AUB cases, 45% were suffering since <6 months, and 37% were 6 12months. Postmenopausal bleeding was noted in 6% of the study group (n=100).

Parity: In the study group, four patients were nulliparous, compared to 96 parous women. Among parous women, 4.16% (4) were P1, 43.75% (42) were Para 2, 40.62%(39) were Para 3, 10.42%(10) were Para 4, 1.04% (1) were Para 5.

Endometrial Thickness: In the current study, mean endometrial thickness was 10.27 ± 3.15 mm. It is in accordance with a study by Gelini Moghaddam, T etal,[15] in which the mean endometrial thickness of the patients was 11.5 mm, with a standard deviation of 5.17.

Association between Age and Ease of Sampling in Study Subjects: In the current study, in 84% of patients sampling procedure was easy, and in 16%, it was difficult. In both peri & postmenopausal women sampling procedure was difficult. However, this association was not statistically significant. (P>0.05).

As age increases ease of sampling becomes difficult. But this association was not statistically significant. (P>0.05). The findings were consistent with those Ben Baruch etal,[17] who found no significant relationship between age and the success of tissue collection acquired during Pipelle histological analysis.

Association with BMI: In the current study, 83% of patients were found with normal BMI (<24.9), 13% were overweight, and 4% were obese. Maximum Obese patients (42.9%) were found with inadequate sample with the Pipelle method. This association was statistically significant (P<0.05) similar results were found with D & C method.

Association between Ease of Procedure with Parity in Study Subjects: Williams etal,[18] reported that Pipelle insertion failure was strongly linked to nulliparity. Pipelle insertion failed in 22% of nulliparous women, but only 8% of parous women. Furthermore, nulliparous

women's tissue quality was worse (a 25% insufficient rate) than parous women's tissue quality (5 percent inadequate rate).

They discovered that device insertion failure had no effect on the effect of parity on specimen adequacy, but they presented no credible reason.

Using a multivariate regression analysis model, Baker etal,[19] found no correlation between appropriate sample and parity. The results of this study reveal a link between the easiness of the procedure and the subjects' parity.

Despite the fact that it may be predicted that the process would be more difficult in patients who did not have a vaginal delivery, the ease of the procedure does not appear to be affected by delivery mode, according to the results of this study.

However, in the current study, the sample inadequacy rate in nullipara is 50%. While it is 4.16% in parous women. This association was statistically significant. ($P<0.05$).

Sampling Procedure in the Subjects Studied-Adequacy of Sample:

Age and Adequacy of Sample: Williams etal,[18] reported that, with the Pipelle, women over 54 had more insufficient samples.

Baker etal,[19] found that on unadjusted analysis, increasing patient age was linked to insufficient Pipelle sample. When other factors were included to a multivariate regression analysis to correct for confounding, it became modest and insignificant.

In the current study, as age increases, sample inadequacy with Pipelle and D & C also increased. This association was statistically significant ($P<0.05$).

In this, 31 of 32 patients aged 35-40 had a sufficient sample, while one had a scanty sample. Pipelle and D&C showed similar findings. In the age range of 41-45years, 45 out of 46 subjects had an adequate D&C sample, compared to 45 out of 46 adequate Pipelle samples. Pipelle had 10 acceptable samples from 12 patients in the 46-50 age range, while D&C had 11 adequate samples out of 12 patients in the 46-50 year age group. D&C was successful in obtaining a sample in 7 out of 10 cases in persons older than 50 years, and the Pipelle had comparable outcomes. In that age category, three patients in D&C and Pipelle had a scanty sample. As a result, the insufficiency of the sample rose with age in both techniques. In both ways, the link was statistically significant. $P < 0.005$.

Sample Adequacy and Menopausal Status: According to Baruch etal,[17] only 74 of 88 Pipelle procedures (84.1 percent) in the postmenopausal age group had an adequate sample, compared to 80 of 84 procedures (95.2 percent) in the premenopausal age group.

In this study, correlation between sample adequacy in premenopausal women with postmenopausal women shown in [Table No: 19]. In the premenopausal age range, 89 out of 94 patients had sufficient sample in Pipelle and 90 out of 94 patients had adequate sample in D&C, respectively. In the postmenopausal age range, 4 out of 6 patients in the D&C group and 4 out of 6 patients in the Pipelle group had an adequate sample. In two D&C and two Pipelle instances in this postmenopausal cohort, samples were insufficient for a histological diagnosis. This link was found to be statistically significant ($P<0.05$). Pipelle's success in getting an appropriate sample has been observed to range from 67 % to 98 % in studies.

The histopathological report was available in 93 out of 100 Pipelle samples and 94 out of 100 D&C samples in the current study. By comparing Pipelle to D&C and using the chi-square test, the sensitivity of Pipelle in getting sufficient tissue is calculated to be 98.9%, Specificity = 100%, PPV = 100%, and NPV = 85.7 percent.

In a study comparing Pipelle to D&C, Shaziafakhar etal.[10] found that Pipelle produced an acceptable sample in 98 per cent of cases and D&C in 100 per cent of cases. In the diagnosis of endometrial cancer, hyperplasia, and secretory endometrium, Pipelle exhibited 100% sensitivity, specificity, PPV, NPV. It demonstrated high diagnostic sensitivity, specificity, and NPV for hyperplasia with atypia, with values of 100 percent, 98 per cent, and 100 percent, respectively. For endometritis, it has a low sensitivity (57%) and positive predictive value (57%) but high specificity (97%) and NPV (97%) for the condition. For proliferative endometrium, the Pipelle technique had a sensitivity of 94 percent and a specificity of 93 percent. Pipelle's samples that were deemed insufficient for histology were polyps on the D&C report.

The diagnostic accuracy of Pipelle biopsy, D&C, and hysterectomy were evaluated in another study by Naderi T etal,[23] (2006) .Pipelle and D&C were found to be in agreement in 89 per cent of instances, Pipelle and hysterectomy in 80% of cases, and D&C and hysterectomy in 90% of cases, indicating no substantial difference in diagnostic accuracy between the three techniques. Pipelle sampling is recommended as the first diagnostic technique due to the good consistency between pathology results, which concluded that, the Pipelle biopsy as a best outpatient method and those from D&C and hysterectomy. D&C and hysterectomy, on the other hand, which both require anaesthesia and entail more time and money, should only be used in extreme cases.

Huang GS etal,[24] (2007)conducted another comparative study to assess the ability of preoperative endometrial sampling to accurately diagnose high-grade endometrial tumours. The sensitivity of Pipelle and D&C in patients with low-grade cancer was 93.8 percent and 97 percent, respectively, and 99.2 percent and 100 percent in patients with high-grade cancer. Furthermore, preoperative and hysterectomy histologic diagnosis (kappa=0.69) and preoperative and hysterectomy tumour grades (kappa=0.780) were in good agreement.

Behnam etal,[25] evaluated the sample adequacy of the two procedures, finding that Pipelle had 157 (94%) sample sufficiency while D&C had 156 (93%).

In a separate study by Ben Baruch etal,[17] endometrial sampling with the Pipelle endometrial sampling curette was compared to traditional dilation and curettage
(D&C) in patients with AUB. Endometrial sampling with the Pipelle was performed in 172 women, while D&C was performed in 97. Seventy-seven (98.8%) of the Pipelle goals were successful. Only 154 (90.6%) of women who had Pipelle endometrial sample and 66 (68%) of those who had D&C had enough material for histological testing (p 0.0001). Pipelle acquired sufficient specimens in 74 of 88 (84.1%) of postmenopausal women, and in 22 of 48 in postmenopausal women who underwent D&C. The histologic assessment of the endometrium acquired by Pipelle sample was compared to that obtained by D&C or hysterectomy performed immediately afterward in 45 patients. In 43 (95.5%) of the instances, the diagnosis was equivalent.

Pipelle sampling was employed by Baker etal,[19] to follow up on 74 of 248 women who had inadequate tissue. None of them had endometrial hyperplasia or cancer.

Between Endometrial Thickness and Sample Adequacy in the Subjects: Baker etal,[19] looked assessed the relative importance of hysteroscopic and ultrasonographic signs of endometrial atrophy in women with AUB when it came to insufficient sample on outpatient endometrial biopsy. On the pathology report, 74 of the 248 women who had Pipelle

endometrial sampling had an insufficient endometrial sample. The 74 women were all followed up with the independent effects of age, menopausal status, hysteroscopic results, and sonographic endometrial thickness on outpatient endometrial sampling (adequate or inadequate) were evaluated using multivariate logistic regression modelling. Endometrial biopsy with insufficient sample was linked to hysteroscopic findings of endometrial atrophy (p=.04) and sonographic endometrial thickness less than 5mm (p=.001).

Elsandabesee etal,[27] looked at the factors that affect the suitability of endometrial samples for histological evaluation. The endometrial thickness had the largest impact on the sample's adequacy, he discovered. Women with an endometrial thickness of less than 5mm have a 27% chance of getting a good endometrial sample. The odds of collecting an appropriate sample are reduced when the ET is < or=4. According to this study, the approach avoided the need for hysteroscopy in 61.5 percent of cases with an ET of >4mm. There were no incidences of endometrial cancer missed by Pipelle sampling.

Distribution of ET in Relation to Menopause: There were six postmenopausal women in this study. In three of the six cases, the ET was less than 6mm. In two individuals, ET of 6.1-9 mm was observed. One patient had an ET of 9.1-12 mm.

HPE and ET: Because no pathognomonic sonographic characteristics are perfectly associated with histology, comprehensive tissue diagnosis remains the gold standard.

Both intra-observer and inter-observer ET measurements have been shown to be remarkably reproducible.[28] However, unlike perimenopausal and postmenopausal women, ET measurements in premenopausal women have not been shown to effectively predict the presence of endometrial hyperplasia or cancer.[28] Despite its limits in detecting and characterising widespread endometrial lesions among premenopausal women with AUB, TVS has a proven track record in detecting and characterising particular anatomic uterine abnormalities.

Endometrial polyp: In half of the individuals with an insufficient Pipelle sample, Gordon etal,[21] detected endometrial polyps or submucous fibroids. According to Van den Bosch etal,[29] Pipelle also missed endometrial polyps and submucousmyoma.

Kuruvila etal,[30] reported that sampling suggested "fragments of adenomatous polyps" in 8 of the 102 women who received Pipelle endometrial sampling, despite the fact that polyps were missed in 22 cases.

The Pipelle sampling also missed all polyps, according to Epstein etal,[20] Two incidences of endometrial polyp were found in this study. Both Pipelle and D&C correctly identified it. The Pipelle sampling did not miss any of the polyp cases.

Endometrial Hyperplasia: Sensitivity of 9 studies that used the Pipelle device in the detection of atypical hyperplasia was 82.3 percent, according to Dijkhuizen etal,[31] in their meta-analysis. In those studies, the specificity was 100%.

There were 22 cases of hyperplasia without atypia in the current study, and 2 cases of hyperplasia with atypia. Pipelle and D&C picked up all hyperplasia with atypia samples. Pipelle sampling identified 21 cases out of 22 individuals with hyperplasia without atypia, while D&C identified all 22 cases.

McCluggage,[32] found artefacts in endometrial biopsy specimens, particularly with outpatient sampling. Some of these could be mistaken as endometrial hyperplasia or even cancer if they aren't recognised as such.

A diagnosis of complex endometrial hyperplasia may be considered due to the artificial crowding and compression of glands. As a result, the glands become moulded together, and the tissue surrounding the glands is occasionally ripped, which serves as a clue to the artefact's nature. In biopsy specimens from outpatients, superficial strips of endometrium with a pseudopapillary architecture are a common but not exclusive artefact.

This could lead to the diagnosis of a range of benign and malignant endometrial papillary lesions. Proliferative and nuclear atypia should be examined at high magnification in such atrophic superficial strips of papillary endometrium. Crushed endometrial stroma and glands can be extremely cellular, which is a cause for concern. Crushed portions, like other tissues, should not be examined separately.

Endometrial Carcinoma: Endometrial sampling's accuracy in detecting patients with endometrial cancer and hyperplasia was investigated by Dijkhuizen etal,[31] in a meta-analysis. They looked at studies that compared the findings of endometrial sampling to those of D&C, hysteroscopy, and/or hysterectomy published between 1966 and 1999.. They found 39 studies with a total of 7914 women. They calculated the percentage of patients who had failed endometrial sample in each research. The researchers also calculated the proportion of cases of endometrial cancer and atypical hyperplasia that were correctly identified, as well as the proportion of women who were labelled as false positives. The rate of carcinoma endometrial detection was higher in postmenopausal women than in premenopausal, according to their research. The Pipelle, on the other hand, proved to be the most effective gadget, with diagnostic accuracy of 99.6% and 91 percent, respectively.

In the current study, the Pipelle procedure accurately detected endometrial cancer in one patient.

Adverse Events Associated with the Procedure: The Pipelle sampling caused minimal discomfort in 10% of women, according to. Critchley etal,[33] According to Ben Baruch etal,[17] the operation was well tolerated, causing just minor discomfort on occasion.

In the current study, 91 percent of patients who underwent the Pipelle procedure had no issues, whereas 5% of patients complained of pain and 4% complained of bleeding. However, 59 percent of those who used the D and C sampling procedure had no issues, 29 percent had pain, 7% had pain and bleeding, and 5% had haemorrhage.

Pain-Related to Procedure: Silver etal,[34] conducted a randomised trial evaluating the quality of endometrial biopsy acquired using Novak and Pipelle endometrial biopsy equipment, as well as the pain associated with surgery. Biopsies from these equipment were of comparable quality ($z = -0.18$, $p = .856$). Pipelle procedure had decreased pain scores ($z = -3.40$, $p = .001$). Pain was reported by 5% of patients in the Pipelle method and 29% in the D&C procedure in the current study.

Cost-Effectiveness: Pipelle showed to be cost-effective in studies by Shazia fakhar.[10] A pipelle sampling costs Rs.250 on average compared to Rs.2000 for D&C, which includes the operation, anaesthesia, surgery, and hospital expenditures. Pipelle is unquestionably less expensive than D&C.[24]

Validity of Pipelle Sampling Compare to D & C Sampling: Fakhar etal,[10] evaluated 100 patients with AUB. The endometrium was sampled using D&C and Pipelle, and histopathology reports were compared using D&C as the gold standard. In comparison to 100 in D&C, the sample was satisfactory in 98 of the 100 patients. Pipelle has a 100% sensitivity

and specificity in diagnosing cancer, hyperplasia, and secretory endometrium. For detecting proliferative endometrium, it has a sensitivity of 94 percent and specificity of 93 percent. Pipelle found two samples to be insufficient. In both of these cases, the D&C report revealed the presence of a polyp. The result reached was that the Pipelle approach could detect hyperplasia and malignancy with high sensitivity and specificity.

In this study, using the Pipelle device, sufficient sample was obtained in 93 cases, whereas using D&C, adequate sample was acquired in 94 cases. Both treatments yielded similar histopathological results. Endometrial cancer and hyperplasia were diagnosed with 100 percent sensitivity and specificity, which was comparable to the results by Fakhar and Saeed.[10]

Harmanliet etal,[26] (2004) looked into samples of endometrium that were deemed insufficient. In these samples, the NPV in diagnosis of endometrial carcinoma and hyperplasia was tested. Because the NPV was so high, they concluded that a small office endometrial sample might be enough to rule out carcinoma endometrium. When compared to D&C results, one of the 11 patients who had insufficient endometrium for histopathology with the Pipelle device had disordered proliferative phase.

Antoni etal,[22] reported a 71 percent sensitivity for the identification of endometrial hyperplasia and a 60 percent sensitivity in diagnosing cancer, in a research published in 1997 in Spain. In 2012 Sany etal.[35] reported an 86 percent sensitivity for curettage and Pipelle in cancer diagnosis in the United Kingdom.

CONCLUSION

- The Pipelle device allows for quick and painless endometrial sample.
- It is possible to have it done as an outpatient procedure.
- When compared to D&C, Pipelle is more cost-effective and has higher patient compliance, along with the added benefit of no anaesthetic or other procedural complications like as perforation.
- This method's sensitivity and specificity in the diagnosis of endometrial hyperplasia and cancer were comparable to the usual D&C treatment.

When all factors are considered, Pipelle sampling can be used as an effective screening procedure in the outpatient department, despite the fact that it failed to obtain a sufficient sample in 7% of cases. When comparing the high specificity in detecting endometrial hyperplasia and carcinoma, the cost-effectiveness and anaesthetic morbidity, intra and postoperative complications, Pipelle sampling can be used as an effective screening procedure in the outpatient department.

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