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# Role of Transvaginal Ultrasound in Abnormal Uterine Bleeding and its Histopathological Correlation - A prospective study.

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**Abstract**

**Introduction**-Abnormal uterine bleeding is a common presenting symptom in gynecology OPD. Transvaginal ultrasound is ideally suited as primary tool in evaluation of AUB.

**Method**-This was a prospective study conducted at Obstetrics and Gynecology department Mahatma Medical College, Jaipur. This study was carried out with 50 women in the perimenopausal age group who presented with AUB during the period from January 2016 to January 2017. All the patients were subjected to Transvaginal UltraSound followed by hysteroscopic biopsy.

**Statistical Analysis** –Data was entered in Microsoft Excel sheet and result was compiled as percentage.

**Results** -Age of the patients in this study age ranged from 40-55 yr. Mean age was 44.3 yr. Out of 50 cases 50% presented with heavy menstrual bleeding. Transvaginal Ultra Sound finding were reported normal in 50% patients with AUB, in the rest 50% cases the TVS findings were endometrial hyperplasia in 24%, polyp in 14 %, fibroid in 8 %, adenomyosis in 4%. Endometrial hyperplasia was the most common TVS finding in our study. Histopathology reports showed no abnormality in 48%.Endometrial hyperplasia in 22%, polyp in 16%, fibroid in 8% and adenomyosis in 6%.In present study one patient with ET> 20 mm and one patient with ET 15-19 mm had atypical endometrial hyperplasia. No case of carcinoma was diagnosed in the study.

Results of our study showed that TVS has got less sensitivity; being 62.5 %, 75%, 33.33% for endometrial polyp, sub mucosal fibroid and adenomyosis respectively **but it has got good specificity of 92.3%, 95.23%, 97.87%, and 97.87% for endometrial hyperplasia, polyp, sub mucosal fibroid and adenomyosis respectively.** TVS has low PPV 50% for

adenomyosis and sub mucosal fibroid 75% but **good NPV for all lesions**

This study proves that Transvaginal Ultrasound, as a diagnostic tool is more specific than sensitive.

**Keywords:** Abnormal uterine bleeding, Transvaginal ultrasound, Biopsy, histopathology, diagnosis.

**Introduction**

Abnormal uterine bleeding is any change in regularity, frequency, duration or amount of bleeding during menses or any vaginal bleeding in between the periods. [1,2]

AUB is responsible for 20-30% of patients attending gynecology OPD in reproductive age group and 50% in perimenopausal age group. [3]

The International Federation of Gynecology and Obstetrics has proposed an etiological classification system (**PALM-COEIN)** for AUB. [4]

The acronym PALM stands for structural causes of AUB namely: Polyp, Adenomyosis, Leiomyoma, Malignancy and hyperplasia and COEIN stands for the functional causes i.e.-Coagulopathy, Ovulatory Dysfunction, Endometrial, Iatrogenic, and not yet classified.[4] Fibroid and polyp are amongst the most common anatomical causes of AUB.

In perimenopausal women with AUB prevalence of endometrial hyperplasia is 11.8%, polyp 4.2% and adenocarcinoma being 5.5%. [5]

Endometrial hyperplasia is a known precursor of endometrial carcinoma. The incidence of hyperplasia and cancer is more common in perimenopausal women with AUB.

Various tools available for evaluations of AUB are Transvaginal Sonography, Saline Sonography, and Hysteroscopy and histopathology; being the gold standard.

TVS is an inexpensive, non-invasive, painless and convenient way to assess the uterine and adnexal pathologies. Transvaginal ultrasounds can alsoevaluate the endometrium in term of thickness and echotexture. It detects intracavitary abnormalities like uterine tumors, polyps, and endometrial and myometrial abnormalities with a sensitivity of 60–92% and a specificity of 62–93 % in perimenopausal women.[6]It is recommended as a first line diagnostic tool for assessing the patients of AUB. TVS being less sensitive may not diagnose the etiology in all cases of AUB; however because of more specificity, a normal TVS precludes the need of further extensive investigation.

In this study after detail clinical and physical examination, all participants were subjected to TVS and hysteroscopy followed by guided biopsy. Sensitivity and specificity of TVS in diagnosingetiologies of AUB was calculated by comparing it with the finding of histopathology.

**Aim & Objective**

To calculate the sensitivity and specificity of Transvaginal sonography in diagnosing intrauterine pathology in abnormal uterine bleeding in relation to histopathology.

**Material And Methods**

This is a prospective study conducted in department of Obstetrics & Gynecology in Mahatma Gandhi Hospital, Jaipur from January 2016 to January 2017. This study was performed on women in perimenopausal age group presenting to the gynecological OPD with complain of abnormal uterine bleeding.The inclusion and exclusion criteria were applied and a total of 50 women who were eligible to participate and gave consent were enrolled in the study.

**Inclusion Criteria**

1. Perimenopausal age group (40-55 yrs )
2. Having abnormal uterine bleeding
3. Uterus less than 12 weeks size.

**Exclusion Criteria**

1. Acute pelvic infection
2. Uterus more than 12 week size
3. Pregnant women
4. Vaginal or cervical cause of bleeding
5. Bleeding disorder
6. Any drug intake causing AUB

After history and general physical examination; per speculum examination was done to look for any abnormal vaginal or cervical discharge, erosion over cervix, cervical hypertrophy or cervical polyp. A per vaginal examination was done to detect any uterine, cervical and adnexal abnormality. Laboratory investigations including CBC, coagulation profile, random blood sugar, liver and kidney function test were done. All the patients were subjected to transvaginal sonography, using 5 MHz transvaginal probe and the various sonographic parameters such as endometrial thickness and echotexture, uterine abnormality, adnexal and any other pelvic lesion was noted. This was followed by diagnostic hysteroscopy and guided biopsy and finally histopathology to get the final diagnosis. The sensitivity and specificity of TVS to diagnose the cause of abnormal uterine bleeding was calculated by comparing it with final histopathology report.

**Observations and Results**

**Demographic profile of the study population.**

Age of the patients in this study ranged from 40-55 yr. Mean age was 44.3 yr. 48%patients were in the age group of 40-44 yrs. and 14% in the age group of 50-55 yr. In study population, 56% patients belonged to rural background and 44% patients were from the urban area. In the study 94 %patients were multiparous, 4% nulliparous and 2% primiparous.

Table 1: Distribution of cases according to the clinical presentation

| Bleeding Pattern | No. of Patient | Percentage |
|---|---|---|
| Heavy Menstrual Bleeding | 25 | 50% |
| Inter Menstrual Bleeding | 9 | 18% |
| Frequent Bleeding | 7 | 14% |
| Irregular menstrual Bleeding | 6 | 12% |
| Heavy prolonged Bleeding | 3 | 6% |
| **Total** | **50** | **100%** |

Table 1 shows that in the study the most common pattern of menstrual irregularity was heavy menstrual bleeding, being 50%; others were intermenstrual bleeding in 18%, frequent bleeding in14%, irregular bleeding in 12% and heavy prolonged bleeding in 6%.

Table 2: Distribution of Cases According to the Associated Complains

| Associated Complain | No. | % |
|---|---|---|
| Pain Abdomen | 22 | 44 |
| Pain with vaginal discharge | 5 | 10 |
| Vaginal Discharge | 4 | 8 |
| Dysmenorrhea | 3 | 6 |
| No other Complaints | 16 | 32 |
| **Total** | **50** | **100** |

Table 2 depicts that out of 50 cases of AUB, 44% patients had associated complaints of pain abdomen, 8% had vaginal discharge, 10% had pain and vaginal discharge both and 6% had dysmenorrhea, 32% of patients had no associated complain with menstrual irregularity.

Table 3 : TVS findings in AUB patients

| TVS Findings | No. of Cases | Percentage % |
|---|---|---|
| Normal | 25 | 50 |
| Endometrial Hyperplasia | 12 | 24 |
| Endometrial Polyp | 7 | 14 |
| Sub mucosal Fibroid | 4 | 8 |
| Adenomyosis | 2 | 4 |
| **Total** | **50** | **100** |

Table 3- shows findings of TVS in AUB patients. Out of total studied cases, 50% patients had normal TVS and 50% had abnormal findings. Most common finding on TVS was endometrial hyperplasia 24% followed by polyp 14%, sub mucosal fibroid 8% and adenomyosis 4%.

Table 4: Relation of Type of Bleeding and TVS Findings

| Endometrial Thickness (mm) | Menstrual Symptoms | | | | |
|---|---|---|---|---|---|
| | HMB | IMB | Frequent | HPB | Irregular |
| <5 | 1 | 1 | 0 | 0 | 0 |
| 6-9 | 12 | 1 | 3 | 2 | 2 |
| 10-14 | 8 | 5 | 3 | 0 | 2 |
| 15-19 | 2 | 1 | 1 | 0 | 1 |
| >20 | 2 | 1 | 0 | 1 | 1 |
| **Total** | **25** | **9** | **7** | **3** | **6** |

Table 4 shows correlation of patient's menstrual symptoms with endometrial thickness.76% patients had endometrial thickness between 6-14 mm. the most common endometrial thickness being 6-9mm. Out of 50 patients 48 (96%) patients had ET > 5 mm, only 2 patients had ET < 5mm.

Out of 25 cases of Heavy Menstrual Bleeding; 12 had ET between 6-9 mm, 8 patients had ET between 10-14mm, and 2 patients had ET > 20 mm.

Out of 9 patients with Intermenstrual Bleeding, 5 patients had ET between 10-14 mm.

Out of 7 patients of Frequent Bleeding, 3 patients had ET between 6-9mm, 3 patients had ET 10-14mm and1 patient had ET between 15-19 mm.

Out of 6 patients of Irregular Bleeding, 2 had ET 6-9 mm, 2 had ET between 10-14 mm and 1 patient had ET between15-19 and 1 patient had ET> 20 mm.

Table 5: Diagnosis of endometrial pathology in AUB patients by TVS and Histopathology.

| Etiology of AUB | | |
|---|---|---|
| | Diagnosed by TVS (number) | Diagnosed by Histopathology (number) |
| Normal | 25 | 24 |
| Endometrial Hyperplasia | 12 | 11 |
| Endometrial Polyp | 7 | 8 |
| Sub Mucosal Fibroid | 4 | 4 |
| Adenomyosis | 2 | 3 |

Table 5 shows endometrial pathologies in AUB patients diagnosed by TVS and histopathology. Out of total 50 cases of AUB, on histopathology majority (48%) of the patients had normal endometrial findings, in rest 52% histopathology was abnormal, and these were endometrial hyperplasia 22%, endometrial polyp 16%, submucosal fibroid 8% and adenomyosis 6%.

Out of 11 cases of endometrial hyperplasia TVS identified only 9 (81%) cases and 2 cases were diagnosed as normal and endometrial polyp; this leads to 2 false negative.

Out of total 8 cases of endometrial polyp on histopathology, TVS identified 5 (62.5%) cases correctly as endometrial polyp and out of rest 3 cases , 2 diagnosed as normal finding and 1 as endometrial hyperplasia; leads to 3 false negative.

Out of total 4 cases of sub mucosal fibroid on histopathology, TVS identified 3(75%) cases correctly and 1 case as normal endometrium; leads to one false negative.

Out of total 3 cases of adenomyosis on histopathology, TVS detected 2 (66.6%) cases correctly as adenomyosis.

Table 6: Histopathological findings in relation to Endometrial Thickness

| Endometrial thickness | Total | Histopathological Findings | | | | |
|---|---|---|---|---|---|---|
| | | Normal | EH | EP | SMF | A |
| <5 | 2 | 2 (100%) | - | - | - | - |
| 6-9 | 20 | 16 (80%) | 1 | 0 | 1 | 2 |
| 10-14 | 18 | 6 (33.3%) | 6 | 2 | 3 | 1 |
| 15-19 | 5 | 0 (100%) | 2 | 3 | - | - |
| >20 | 5 | 0 (100%) | 2 | 3 | - | - |
| **Total** | **50** | **24** | **11** | **8** | **4** | **3** |

Table 6 shows different endometrial thickness on TVS in relation to histopathological findings. Out of total 50 cases, 2 patients had ET<5mm in TVS and both had normal histopathology.

The endometrial thickness was 6-9 mm on TVS in 20 patients, out of which 16 (80%) cases were normal on histopathology and 20% patients had abnormal histopathology. Out of these 1 had endometrial hyperplasia, 1 had sub mucosal fibroid and 2 cases had adenomyosis when tested in histopathology.

In 18 cases TVS showed ET 10-14 mm, of which 6 (33.3%) cases had normal histopathology and Histopathological abnormalities were found in 12 (66.6%) cases, 6 had endometrial hyperplasia, 2 had endometrial polyp, 1had adenomyosis and 3 had sub mucosal fibroid on histopathology.

In 5 cases TVS showed ET 15-19mm and all of them (100%) had abnormal histopathology. Out of these; 3 cases were of endometrial polyp and 2 case of endometrial hyperplasia on histopathology out of which1 showed **atypical cystic glandular hyperplasia.**

In 5 cases TVS showed ET >20 mm; all (100%) had abnormal findings in histopathology. Out of these 2 cases had endometrial hyperplasia out of which 1 showed atypical cystic glandular hyperplasia and 3 cases had endometrial polyp on histopathology.

Table 7 : Comparison of Transvaginal Sonographic Findings with Histopathology

| TVS Findings | No.of Pts. | Histopathological Findings | | | | |
|---|---|---|---|---|---|---|
| | | Normal | Endometrial Hyperplasia | Endometrial Polyp | Submucosal Fibroid | Adenomyosis |
| Normal | 25 | 20 (80%) | 1 | 2 | 1 | 1 |
| Endometrial Hyperplasia | 12 | 1 | 9 (75%) | 1 | | 1 |
| Endometrial Polyp | 7 | 1 | 1 | 5 (71%) | | |
| Submucosal Fibroid | 4 | 1 | | | 3 (75%) | |
| Adenomyosis | 2 | 1 | | | | 1 (50%) |
| Total | **50** | **24** | **11** | **8** | **4** | **3** |

Table no.7 shows TVS finding in AUB patients and their comparison with the final Histopathology report. In present study out of total 50 cases; 25 cases had normal endometrium on TVS. On histopathology out of these 25 ; (80%) 20 cases had normal histopathology and in rest (20%) histopathology was abnormal , 1 case diagnosed to have Endometrial Hyperplasia, 2 cases had endometrial polyp, 1 case had sub mucosal fibroid and 1 case had adenomyosis. So diagnosis was missed in 5 (20%) cases by TVS.

**Endometrial hyperplasia** was detected on TVS in 12 cases. On histopathology 9 (75%) cases were diagnosed as endometrial hyperplasia and in rest 25% cases;1showed normal endometrium, 1had endometrial polyp, 1 had adenomyosis on histopathology.

**Endometrial polyp** was foundon TVS in 7 cases. On histopathology out of these,5 (71%) cases had polypoidal endometrium, 1 case had normal and 1 case had endometrial hyperplasia.

**Sub mucosal fibroid** was found on TVS in 4 cases. On histopathology 3(75%) cases were confirmed sub mucosal fibroid and 1 case had normal endometrium.

**Adenomyosis** was diagnosed on TVS in 2 cases. On histopathology 1(50%) case had adenomyosis and 1 case had normal endometrium.

Table 8: Sensitivity, Specificity, PPV, NPV of TVS

| | Sensitivity | Specificity | PPV | NPV |
|---|---|---|---|---|
| Normal | 83.33 | 80.76 | 80 | 84 |
| Endometrial Hyperplasia | 81.81 | 92.3 | 75 | 94.73 |
| Endometrial Polyp | 62.5 | 95.23 | 71.42 | 93.02 |
| Adenomyosis | 33.33 | 97.87 | 50 | 95.83 |
| Sub Mucosal Fibroid | 75 | 97.82 | 75 | 97.82 |

This table No.8 shows that though TVS has less sensitivity of 62.5 %, 75%, 33.33% for endometrial polyp, sub mucosal fibroid and adenomyosis respectively **but it has got good specificity of 92.3%, 95.23%, 97.87%, and 97.87% for endometrial hyperplasia, polyp, sub mucosal fibroid and adenomyosis respectively.** TVS has low PPV (50%) for adenomyosis and sub mucosal fibroid 75% but **good NPV for all lesions.**

- Sensitivity, specificity, PPV, NPV of TVS for Endometrial Hyperplasia is 81.81%, 92.3%, 75%, 94.73% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for polyp is 62.5%, 95.23%, 71.42%, 93.02% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for Fibroid is 75%, 97.82%, 75%, 97.82% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for adenomyosis is 33.33%, 97.87%, 50%, 95.83% respectively.

**Discussion**

**Distribution of Age Group**

In present study mean age of the patients was 44.3 yr. 48% of cases were between age group of 40 to 44 yrs, and 38% of cases between age group of 45-49 yr, this indicates that abnormal uterine bleeding is common in perimenopausal women.

Varadarajan R et al. [7] in their study reported 56.0 % cases belonged to the age group 40 – 43 yrs. Verma U et al. [8]also observed 41% of cases AUB belonging to age group in 44 to 47 years.

**Distribution According to Parity**

In my study analysis 94 % were multiparous (94%).Arnold JA et al [9]in their study found that approximately 90% women were multiparous, similarly Dasgupta Subhankar et al. [10]showed 88.5% multiparous patients in their study, this is suggestive that multiparty and AUB may be correlated.

**Distribution According to Bleeding Pattern**

In our study, the most common bleeding pattern was **heavy menstrual bleeding** 50% which was comparable to the study by Arnold JA et al. **[9]**. They had Heavy menstrual bleeding (HMB) in maximum no. of cases 43.7%. Pillai SS et al**.** [11] had 46.5% patients with menstrual complaints of menorrhagia**.** Bolde SA et al. [12] also had observed most common menstrual disorder as menorrhagia 46.86%. Shobhita GL et al. **[13]** showed menorrhagia in 40% of cases. Other bleeding patterns in the study was Intermenstrual bleeding in 18%, frequent bleeding was the presenting complain in14%, irregular menstrual bleeding in 12% of patients and heavy prolonged bleeding in 6%. This was comparable to Verma U et al. [8] they had polymenorrhea in 23% and metrorrhagia in 19% cases.

**Endometrial Thickness on TVS**

In my study in patients with 24 out of 50 patients (48%) had no endometrial abnormality on histopathology; out of these 24, 18 (75%) had endometrial thickness < 9 mm. Patients with Endometrial thickness <5mm on TVS had no endometrial pathology.

Veena B.T.et al**. [14]** revealed normal endometrium in 45%; majority of these patients had endometrial thickness less than 9mm. Shobhitha GL et al. [13] also observed that no endometrium abnormality was found on ET< 8mm. In most of studies it revealed that

endometrial thickness of 8 mm could be taken as cut off in perimenopausal women and in our study the similar finding was observed.

**Abnormal endometrial findings on TVS**

Out of 50 cases of AUB, in 50% patients TVS did not show any abnormality and 50% had abnormal findings. Most common abnormal finding was endometrial hyperplasia 24% followed by polyp 14%, sub mucosal fibroid 8% and adenomyosis 4%. Dangal G et al [15] observed endometrial hyperplasia in 23% study population which is comparable to present study. Takreem et al [16] observed endometrial hyperplasia in 15% cases in their study population of 100 perimenopausal women. Slobada L et al [17] showed endometrial hyperplasia in 22.6% cases.

In present study the sensitivity, specificity, PPV, NPV of TVS for endometrial hyperplasia was 81.81, 94.43%, 90%, 95% which correlated with findings of Shokouhi B.[18] The accuracy, sensitivity, specificity, PPV, and NPV were 88.25%, 90.7%, 84%, 97.7%, and 84% in premenopausal women in AUB patients specially in endometrial hyperplasia in their study.

Aslam et al. [19] reported sensitivity and specificity of TVS 81.3%, 73.6% respectively. Vercellini et al [20] showed sensitivity & specificity of TVS 96% and 86% respectively.

**Conclusion**

Abnormal uterine bleeding prevails as an important and common gynecological ailment. In my study, 48% patients had normal endometrium, and 52% had abnormal uterine endometrial finding on histopathology of which Endometrial Hyperplasia found in 22%, Polyp in 16%, Sub mucosal Fibroid in 8%, and adenomyosis in 6% of cases.TVS detects abnormalities causing AUB with varying accuracy.

- Sensitivity, specificity, PPV, NPV of TVS for Endometrial hyperplasia is 81.81%, 92.3%, 75%, 94.73% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for polyp being 62.5%, 95.23%, 71.42%, 93.02% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for fibroid is 75%, 97.82%, 75%, 97.82% respectively.
- Sensitivity, specificity, PPV, NPV of TVS for adenomyosis is 33.33%, 97.87%, 50%, 95.83% respectively.

TVS has less sensitivity of 62.5 %, 75%, 33.33% for endometrial polyp, sub mucosal fibroid and adenomyosis respectively **but it has got good specificity of 92.3%, 95.23%, 97.87%, and 97.87% for endometrial hyperplasia, polyp, sub mucosal fibroid and adenomyosis respectively.** TVS has low PPV; 50% for adenomyosis and 75% for sub mucosal fibroid but **good NPV for all lesions.**

The result showed that transvaginal sonography has a good diagnostic accuracy in detecting the various causes of AUB. TVS is quite acceptable, noninvasive and easily available in most of the clinical settings. Therefore it should be continued as the first line diagnostic tool for evaluating the patients with AUB. TVS and clinical examination should be employed hand in hand in AUB workup.

**References**

1. Vilos GA, Tureanu V, Garcia M, Abu-Rafea B. The levonorgestrel intrauterine system is an effective treatment in women with abnormal uterine bleeding and anticoagulant therapy. Journal of minimally invasive gynecology.2009 Aug 31;16(4):480-4.

2. Speroff L, Fritz MA, editors. Clinical gynecologic endocrinology and infertility. lippincott Williams &wilkins; 2005.
3. Euro pub med central PMID-10524483, Oriel KA, Shrageersuniversity of wiscouin school of Medicine, Madison 53715, USA. American family physician (1999, 6095):1371 -80; discussion 1381-2)
4. Munro MG, Critchley HO, Fraser IS, FIGO Menstrual Disorders Working Group. The FIGO classification of causes of abnormal uterine bleeding in the reproductive years.Fertility and sterility. 2011 Jun 30;95(7):2204-8.
5. Özdemir S, Çelik Ç, Gezginç K, Kıreşi D, Esen H. Evaluation of endometrial thickness with transvaginal ultrasonography and histopathology in premenopausal women with abnormal vaginal bleeding. Archives of gynecology and obstetrics. 2010 Oct 1;282(4):395-9.
6. de Vries LD, Dijkhuizen FP, Mol BW, Brölmann HA, Moret E, Heintz AP. Comparison of transvaginalsonography, saline infusion sonography, and hysteroscopy in premenopausal women with abnormal uterine bleeding. Journal of clinical ultrasound. 2000 Jun 1;28(5):217-23.
7. Varadarajan R, Sreekantha SM. Role of hysteroscopy in abnormal uterine bleeding in perimenopausal age group. Journal of Evolution of Medical and Dental Sciences. 2013 Mar 11;2(10):1504-9.
8. VermaU, 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.
9. Arnold JA, Saravanan S. a Two Year Clinicopathological Study of Non-Gravid Women with Abnormal Uterine Bleeding in A Rural Tertiary Care Centre in Tamilnadu: In Concurrence with The Figo Recommendations. Journal of Evolution of Medical and Dental Sciences-JEMDS. 2015Aug 6;4(63):10990-1000.
10. Dasgupta S, Chakraborty B, Karim R, Aich RK, Mitra PK, Ghosh TK. Abnormal uterine bleeding in peri-menopausal age: Diagnostic options and accuracy. The Journal of Obstetrics and Gynecology of India. 2011 Apr 1;61(2):189-94.
11. Pillai SS. Sonographic and histopathological correlation and evaluation of endometrium in perimenopausal women with abnormal uterine bleeding.International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2014;3(1):113-7.
12. Bolde SA, Pudale SS, Pandit GA, Matkari PP. Histopathological study of endometrium in cases of abnormal uterine bleeding. Int J Res Med Sci. 2014; 2(4): 1378-1381.
13. Shobhitha GL, Kumari VI, Priya PL, Sundari BT. Endometrial Study by TVS and Its Correlation with Histopathology in Abnormal Uterine Bleeding. Journal of Dental and Medical Sciences. 2015;14(4):21-32.
14. Veena BT, Shivalingaiah N. Role of transvaginalsonography and diagnostic hysteroscopy in abnormal uterine bleeding. Journal of clinical and diagnostic research: JCDR. 2014 Dec;8(12): OC06
15. Dangal G. A study of endometrium in patients with abnormal uterine bleeding at Chitwan valley. K athmandu University Medical Journal. 2003;1(2):110–12.
16. Takreem A, Danish N, Razaq S. Incidence of endometrial hyperplasia in 100 cases presenting

with polymenorrhagia/menorrhagia in perimenopausal women. J Ayub Med Coll Abbotabad. 2009;21:60–3.

17. Sloboda L, Molnar E, Popovic Z, Zivkovic S. Analysis of pathohistological results from the uterine mucosa 1965-98 at the gynecology department in Senta. Med Pregl. 1999;52(6-8):263–65.
18. Shokouhi B. Role of transvaginal ultrasonography in diagnosing endometrial hyperplasia in pre-and post-menopause women. Nigerian medical journal: Journal of the Nigeria Medical Association. 2015 Sep; 56(5):353.
19. Aslam, Muhammad A, LubnaIjaz S, Tariq KS, Meher-un-Nisa, Rubina A, and Tahira K. Comparison of transvaginal sonography and saline contrast sonohysterography in women with abnormal uterine bleeding: correlation with hysteroscopy and histopathology. Int J Health Sci (Qassim). 2007 Jan; 1(1): 17–24.
20. Vercellini P, Cortesi I, Oldani S, Moschetta M, De Giorgi O, Crosignani PG. Therole of transvaginal ultrasonography and outpatient diagnostic hysteroscopyin the evaluation of patients with menorrhagia.Human reproduction. 1997 Aug 1;12(8):1768-71.