"A PROSPECTIVE STUDY FOR THE CORRELATION OF DIAGNOSTIC ACCURACY OF TRANSVAGINAL ULTRASONOGRAM WITH SONOHYSTEROGRAPHY AND HYSTEROSCOPY FOR THE SCREENING OF INTRACAVITARY PATHOLOGIES IN WOMEN WITH ABNORMAL UTERINE BLEEDING"

dissertation submitted to

The Tamil Nadu Dr. M.G.R. Medical University

in partial fulfilment for the award of the Degree of

M.D. (OBSTETRICS AND GYNECOLOGY)

BRANCH-II

THE TAMIL NADU Dr. M. G. R. MEDICAL UNIVERSITY

INSTITUTE OF SOCIAL OBSTETRICS,

GOVT KASTURBA GANDHI HOSPITAL,

MADRAS MEDICAL COLLEGE & HOSPITAL.

APRIL 2012

BONAFIDE CERTIFICATE

This is to certify that this dissertation entitled ***"PROSPECTIVE STUDY FOR THE CORRELATION OF DIAGNOSTIC ACCURACY OF TRANSVAGINAL ULTRASONOGRAM WITH SONOHYSTEROGRAPHY AND HYSTEROSCOPY FOR THE SCREENING OF INTRACAVITARY PATHOLOGIES IN WOMEN WITH ABNORMAL UTERINE BLEEDING "*** is the bonafide work done by **Dr. V. SANGEETHA.,** Post Graduate in Obstetrics and Gynaecology under my over all supervision and guidance in the Institute of Social Obstetrics, Kasturba Gandhi Hospital, Madras Medical College Chennai, in partial fulfillment of the requirements of The Tamil Nadu Dr.M.G.R.Medical University for the award of M.D DEGREE in Obstetrics and Gynaecology BRANCH - II.

Prof. Dr. P.M. GOPINATH, M.D., D.G.O
Director and Superintendent
Institute of Social Obstetrics,
Kasturba Gandhi Hospital,
Madras Medical College,
Chennai - 600005,

Dr.KANAGASABAI M.D,
Dean
Madras Medical College,
Chennai- 600003,

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INSTITUTIONAL ETHICAL COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No: 04425305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. V. Sangeetha
PG in MD Obstetrics & Gynaecology
K.G.H / Madras Medical College, Chennai -3.

Dear Dr. V. Sangeetha

The Institutional Ethical Committee of Madras Medical College reviewed and discussed your application for approval of the project / proposal / clinical trail entitled " Saline infusion sonohysterography with the transvaginal ultrasonography and hysteroscopy for the screening of intracavitary pathologies in women with abnormal uterine bleeding" No 48082010.

The following members of Ethical committee were present in the meeting held on 24.08.2010 conducted at Madras Medical College,Chennai -3.

1. Prof. S.K. Rajan, MD	-- Chairperson
2. Prof. J. Mohanasundaram, MD,Ph.D,DNB Dean, Madras Medical College, Chennai -3	-- Deputy Chairman
3. Prof. A. Sundaram, MD Vice Principal , MMC, Chennai -3	-- Member Secretary
4. Prof R. Nandhini, MD Director, Institute of Pharmacology, MMC, Ch-3	-- Member
5. Prof. C. Rajendiran , MD Director, Institute of Internal Medicine, MMC, Ch-3	-- Member -- Member
6. Prof. Md. Ali, MD, DM Professor & Head ,,Dept. of MGE, MMC, Ch-3	-- Member -- Member
7 Prof. Shantha Ravishankar, MD Professor of Neuro Pathology, MMC, Ch-3	-- Member
8. Tmt. Arnold Soulina	-- Social Scientist

We approve the trail to be conducted in its presented form.

Sd /. Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information / informed consent and asks to be provided a copy of the final report

Member Secretary, Ethics Committee

CONTENTS

INTRODUCTION

Abnormal uterine bleeding is a common women's health disorder, affects 20% of reproductive age women. Diagnostic evaluations and treatment modalities for abnormal uterine bleeding are rapidly evolving the diagnostic ones in abnormal uterine bleeding is to exclude endometrial hyperplasia and endometrial carcinoma. Sonohysterography and even diagnostic hysteroscopy with direct visualization cannot reliably diagnose a malignancy without tissue biopsy. Therefore, the gold standard for diagnosis of endometrial hyperplasia or carcinoma is tissue biopsy either blind endometrial biopsy or directed endometrial biopsy done after sonohysteroscopy or diagnostic hysteroscopy. Blind endometrial biopsy with transvaginal ultrasound is the most readily available technique but the increasing availability of sonohysterography allows more specific anatomical endometrium detail and can diagnose endometrial polyps. The echogenicity of the endometrium has certain characteristics during

various phases of the menstrual cycle, thus enabling the histology to be evaluated with precision by examining with transvaginal sonogram During the early proliferative phase the endometrial thickness is 2-4mm. Endometrium functionalis is hypoechoic or isoechoic and endometrium basalis echogenic. During the periovulatory phase the endometrium, has trilaminar appearance or triple sign-lumen is echogenic surrounding which there is hypoechoic endometrium functionalis and the echogenic endometrium basalis. The thickness ranges from 6-12mm. During secretory phase, the whole

endometrium from basalis to lumen is very echogenic. The greatest thickness is achieved during secretory phase measuring upto 14mm in width. In postmenopausal patients, thickness less than 4-5mm or thin pencil line echo is usually associated with tissue insufficient for diagnosis. In general, normal thickness in postmenopausal patients is 4mm..It is now widely accepted that dilatation and curettage has little therapeuctic effect on irregular or excessive uterine bleeding and the technique has limitations for diagnosis of focal endometrial lesions such as polyps, submucous fibroids and adenomyosis. Pre-operatively the results of transvaginalsonography and sonohysteroscopy may help to schedule and plan hysteroscopic surgery and these methods have already been proven to be more effective than the traditional dilatation and curettage. Furthermore the findings from a transvaginal scan may be used to plan the surgical procedure, but there is still a need for a more detailed preoperative sonographic diagnosis for example of the size and the depth of attachment of submucous fibroids. Cost effective analyses need to be done comparing these techniques including the more invasive and potentially therapeutic hysteroscopy with resection of polyps and submucosal fibroids. Typically, patients with normal Sonohysterography results can be reassured and spaced on endometrial biopsy, whereas patients with focal lesions can proceed with biopsy and or therapeutic operative hysteroscopy. Patients who have normal Sonohysterography results, but still continue to have abnormal uterine bleeding should be considered for diagnostic hysteroscopy as it allows more complete visualization of the cornual areas. Refinements in diagnosing

the aetiology of abnormal uterine bleeding allows for increased options for targeted treatment thus potentially reducing the number of hysterectomies particularly in women with anatomically normal uteri.

REVIEW OF LITERATURE

Role of Saline Infusion Sonography in Evaluating Intrauterine and Endometrial Pathology

Parsons et al., in 1996, studied the value of SIS in the diagnosis of endometrial abnormalities. 53 patients scheduled for hysterectomy due to abnormal uterine bleeding underwent SIS and their findings were confirmed by pathological examination of hysterectomy specimen. SIS correctly diagnosed 95% of lesions with a sensitivity of 95% and specificity of 100%.

Bernard et al., in 1997 conducted a study involving 109 premenopausal and 53 postmenopausal women with the objective to assess the effectiveness of saline infusion sonohysterography as a first line investigation of women with uterine bleeding. SIS was highly sensitive and specific in the differentiation between women with intrauterine lesions and those with normal or atrophic endometrium (98.4% and 76.4% respectively).SIS was also accurate in the diagnosis of polyps and submucousmyomas (sensitivity 87.8% and 89.6%, specificity 90.7 and 95%).SIS and surgery displayed the same reliability in the measurement and the localization of the lesions.SIS recognized endometrial cancer in only 40% cases. However all these patients had abnormalities in SIS which indicated a surgical exploration leading to a zero false negative rate.

They concluded SIS to be a reliable tool for the investigation of abnormal uterine bleeding in perimenopausal women. It can distinguish women who only

require medical therapy from those who require surgery. The method is easy to learn and is well tolerated by the patients.

Cohen et al., in 1994, studied 15 patients who underwent TVS followed by SIS and findings were confirmed by hysteroscopy and pathology. They concluded that SIS can differentiate endometrial hyperplasia from polyp with a sensitivity of 93%, but cannot differentiate between benign and malignant lesions.

Saidi et al., in 1997 did a randomized controlled trial in which 68 patients underwent either TVS or SIS and findings were confirmed by hysteroscopy / pathological examination. SIS was found to have a sensitivity of 90% and specificity 83% while TVS was found to have a sensitivity of 95% and specificity of 65%.

Gaucherand et al., 1997 studied 104 patients to compare salinesonohysterography in the exploration of the uterine cavity with classical transvaginalsonography, hysterography and hysteroscopy. SIS was found to be more effective (sensitivity 94%, specificity 98%) than HSG (sensitivity 67%, specificity 94%). The difference between TVS and SIS was less marked with SIS showing some superiority to TVS (sensitivity 77%, specificity 93%).

They concluded that SIS represents an improvement over conventional TVS and is fully capable of replacing HSG for the study of the uterine cavity.

Laugh head and Stones et al., in 1997 studied 124 patients with abnormal bleeding, and subjected 114 patients to SIS, who had an endometrial thickness

of > 5 mm in TVS, the findings were correlated with tissue samples and concluded that :

i. SIS afforded better visualisation of the endometrium in patients with leiomyomas and polyps

ii. Can be learnt with ease and quickness by an individual already performing ultrasonography.

iii. Finally SIS was minimally painful, requiring no analgesia, rarely associated with infection or any other complication.

Turner et al., in 1995 screened a group of 30 patients with TVS followed by SIS and the findings were confirmed by hysteroscopy and operative procedure with pathological examination. They concluded that there is an improved demonstration of endometrial polyps and submucous myomas using saline enhanced vaginalsonohysterography.

Goldstein et al., in 1997, under took a study to evaluate anultrasonography based triage paradigm for perimenopausal patientswith abnormal uterine bleeding. The clinical algorithin usedendovaginal ultrasonography followed by saline infusionsonohysterography for selected patients. 153 patients weresubjected to SIS, and the findings were compared with hysteroscopy and pathological examination.

They suggested that

i. Undirected endometrial sampling is unnecessary if TVSclearly shows a distinct homogenous endometrium < 5 mmearly with proliferative phase.

ii. Further a single layer anterior and posterior endometrialmeasurments< 3 mm at the time of SIS excludes significantabnormality and contended that undirected endometrial samping is only appropriate, if one first demonstrates thatthe endometrial process in indeed global and not focal.

iii. Finally hysteroscopy with curettage should be reserved forthose patients with demonstrated focal abnormality on SIS, who are in need of visually directed removal or whose ultrasonographic triage was technical unable to excludesignificant abnormality.

Schwarzler P et al., 1998 conducted a study to evaluate the use of transvaginalsonography, saline sonohysterography and diagnostic hysteroscopy for the assessment of uterine cavity in 100 patients with abnormal uterine bleeding. The overall sensitivity of TVS improved after saline enhancement from 67 to 87% and the specificity from 89 to 91%. The positive predictive value increased from 89 to 92% and the negative predictive value from 71 to 85%. The use of saline sonohysterography also improved the quality of information about the location and size of polyps and submucous fibroids.They concluded that the use of saline sonohysterography increasedthe diagnostic accuracy of transvaginalsonography to approach that of diagnostic hysteroscopy and also provides some additional information. This development has implications for the management of uterine bleeding disorders.

Krampl E; Bourne et al., 2001, evaluated the diagnostic accuracy of transvaginalsonography, saline sonohysterography and hysteroscopy in 100 patients presenting with abnormal uterine bleeding. The detection rate of focal intrauterine pathology using Saline hysterography was 94.1% but was significantly lower with TVS alone (23.5%).Visual examination at operative hysteroscopy yielded no additional information to the detection or exclusion of focal lesions than was obtained at outpatient sonohysterography. They concluded that outpatient saline sonohysterography may replace diagnostic hysteroscopy in many patients with AUB.

Elizabeth Epstein et al., 2004 conducted a questionnaire based survey to determine the management of postmenopausal bleeding in Sweden and concluded that more than one – third of the gynecologic departments never perform saline Sonohysterography to rule out focal lesions or operative hysteroscopy for the removal of such lesions. They stressed the central role of saline sonohysterography and hysterosocpy in the new guidelines for the management of postmenopausal bleeding and the need to broaden their use.

Mihm, Lillian et al., 2002 concluded a study to determine the accuracy of outpatient endometrial biopsy and saline sonohysterography for the evaluation of abnormal uterine bleeding.They demonstrated a high sensitivity and high negative predictive value of SIS combined with endometrial biopsy thus making it useful for evaluation of abnormal uterine bleeding. It may allow some patients to avoid more invasive operative procedures.

Thus the review of the above cited studies shows less invasive Saline sonohysterogram as an upcoming best screening tool for intracavitary pathologies in women with AUB as compared to TVS or hysteroscopy and in our study we have tried to work on this concept .

Terms Used to Describe Abnormal Uterine Bleeding

Term	Abnormal uterine bleeding pattern
Oligomenorrhea	Bleeding occurs at intervals of > 35 days and usually is caused by a prolonged follicular phase.
Polymenorrhea	Bleeding occurs at intervals of < 21 days and may be caused by a lutealphase defect.
Menorrhagia	Bleeding occurs at normal intervals (21 to 35 days) but with heavy flow (80 mL) or duration (7 days).
Menometrorrhagia	Bleeding occurs at irregular, noncyclic intervals and with heavy flow (80 mL) or duration (7 days).
Amenorrhea	Bleeding is absent for 6 months or more in a nonmenopausal woman.
Metrorrhagia or bleeding intermenstrual	Irregular bleeding occurs between ovulatory cycles; causes to consider include cervical disease, intrauterine device, endometritis, polyps, submucousmyomas, endometrial hyperplasia, and cancer.
midcycle spotting	Spotting occurs just before ovulation, usually because of a decline in the estrogen level.
Postmenopausal bleeding	Bleeding recurs in a menopausal woman at least 1 year after cessation of cycles.
Acute emergent abnormal uterine bleeding	Bleeding is characterized by significant blood loss that results in hypovolemia (hypotension or tachycardia) or shock.
Dysfunctional uterine bleeding	This ovulatory or anovulatory bleeding is diagnosed after the exclusion of pregnancy or pregnancy-related disorders, medications, iatrogenic causes, obvious genital tract pathology, and systemic conditions.

Evaluation of Abnormal Uterine Bleeding

Diagnostic step	Pertinent signs, symptoms, and tests	Conditions
History	Pelvic pain	Miscarriage, ectopic pregnancy, PID, trauma, sexual abuse or assault
	Nausea, weight gain, urinary frequency, fatigue	Pregnancy
	Weight gain, cold intolerance, constipation, fatigue	Hypothyroidism
	Weight loss, sweating, palpitations	Hyperthyroidism
	Easy bruising, tendency to bleed	Coagulopathy
	Jaundice, history of hepatitis	Liver disease
	Hirsutism, acne, acanthosisnigricans, obesity	Polycystic ovary syndrome
	Postcoital bleeding	Cervical dysplasia, endocervical polyps
	Galactorrhea, headache, visual-field disturbance	Pituitary adenoma
	Weight loss, excessive exercise, stress	Hypothalamic suppression
Physical examination	Thyromegaly, weight gain, edema	Hypothyroidism
	Thyroid tenderness, tachycardia, weight loss, velvety skin	Hyperthyroidism
	Bruising, jaundice, hepatomegaly	Liver disease
	Enlarged uterus	Pregnancy, leiomyoma, uterine cancer
	Firm, fixed uterus	Uterine cancer
	Adnexal mass	Ovarian tumor, ectopic pregnancy, cyst
	Uterine tenderness, cervical motion tenderness	PID, endometritis
Laboratory tests	Beta-subunit human chorionic gonadotropin	Pregnancy
	Complete blood count with platelet count and coagulation studies	Coagulopathy
	Liver function tests, prothrombin time	Liver disease
	Thyroid-stimulating hormone	Hypothyroidism, hyperthyroidism
	Prolactin	Pituitary adenoma
	Blood glucose	Diabetes mellitus
	DHEA-S, free testosterone, 173-hydroxyprogesterone if hyperandrogenic	Ovarian or adrenal tumor
	Papanicolaou smear	Cervical dysplasia
	Cervical testing for infection	Cervicitis, PID
Imaging and tissue	Endometrial biopsy or dilatation and curettage	Hyperplasia, atypia, or adenocarcinoma

Diagnostic step	Pertinent signs, symptoms, and tests	Conditions
sampling	Transvaginal ultrasonography	Pregnancy, ovarian or uterine tumors
	Saline-infusion sonohysterography	Intracavitary lesions, polyps, submucous fibroids
	Hysteroscopy	Intracavitary lesions, polyps, submucous fibroids

HYSTEROSCOPY:

The hysteroscope can be used to aid the diagnosis or to direct the performance of a variety of intrauterine procedures.Developments in the design of endoscopes have resulted in smaller diameter instruments that retain the ability to provide a high quality image.Such developments further facilitate the use of hysteroscopy as office procedure.

DIAGONOSTIC HYSTEROSCOPY :

The goal of evaluation of uterine cavity is to either a sample of endometrium usually for the dtetection of hyperplasia or neoplasia or to identify structural abnormalities such as polyps, myomas or a uterine septum.

OPERATIVE HYSTEROCPY:

A number of intrauterine procedures can be performed under endoscopic guidance including adhesiolysis, sterilisation,division of septum,myoma resection,endometrial destruction through Nd:YAG laser,or radiofrequency resection,dessication,or vaporisation,removal of foreign bodies,or to position occluding devices in fallopian tube for sterilisation.

Rigid hysteroscopes :

Rigid hysteroscopes are the most commonly used instruments. Their wide range of diameters allows for in-office and complex operating-room procedures. Of the narrow options (3-5 mm in diameter), the 4-mm scope offers the sharpest and clearest view. It accommodates surgical instruments but is small enough to require minimal cervical dilation. In addition, patients tolerate this instrument well with only paracervical block anesthesia.

Flexible hysteroscopes:

The flexible hysteroscope is most commonly used for office hysteroscopy. It is notable for its flexibility, with a tip that deflects over a range of 120-160°. Its most appropriate use is to accommodate the irregularly shaped uterus and to navigate around intrauterine lesions. It is also used for diagnostic and operative procedures.

Energy Sources:

Monopolar and bipolar electricity, as well as laser energy, all have uses in hysteroscopy.

MEDIA :

Gases Carbon dioxide (CO_2) is rapidly absorbed and easily cleared from the body by respiration. The refractory index of CO_2 is 1.0, which allows for excellent clarity and widens the field of view at low magnification. The gas easily flows through narrow channels in small-diameter scopes, making it

useful for office-based diagnostic hysteroscopy. However, this method offers no way to clear blood from the scope.

Fluids :

The advantage of fluid over gas is the symmetric distention of the uterus with fluid and its effective ability to flush blood, mucus, bubbles, and small tissue fragments out of the visual field .0.9% sodium chloride solution and lactated Ringer solution, 5% Mannitol, 3% sorbitol and 1.5% glycine , Dextran 70.

POTENTIAL INDICATIONS FOR Diagnostic hysteroscopy

- Unexplained AUB
- Infertility cases with abnormal hysterography or TVS and in unexplained infertility
- Recurrent spontaneous abortions

RISKS:

The risks are more with operative hysteroscopy than diagnostic hysteroscopy.most patients have slight vaginal bleeding,lower abdominal cramps.risks related to anaesthesia,perforation which range from failure to complete the procedure to haemorrhage,injury to intestines or urinary tract.Air embolus associated with gaswous or fluid distension media**.**

Advantages

- direct visualization of pathology
- accurate localization of lesion
- to take biopsy from lesion (good volume of tissue obtained)

TRANSVAGINAL ULTRASOUND

Today the modern Obstetrics & Gynaecology is not complete without the aid of diagnostic sonography The first report of Transvaginal sonography is attributed to Kvatochwil in 1969. Development of Transvaginal sonogaphy was delayed until 1980s when it was used to evaluate infertility problems in Japan and in United States. The advent of Transvaginal probes in 1985 enabled the use of higher frequencies in sonographic evaluation of female pelvis As Transvaginal sonography is employing higher frequencies (5-7.5 Mhz) improved image resolution is obtained. This higher frequencies provide superior axial and lateral resolution. The abdominal sonography is not that much useful for the gynaecologist willing to image female organs in the true pelvis as bending of the pelvic bone covered by gut and omentum will hinder the view. The Mandated Distension of urinary bladder creating acoustic window to view the pelvic organs further distorts the normal anatomy. Obesity, Retroverted uterus create further obstruction giving difficulties to visualise the target organ. A larger distance produces more attenuation of ultrasonic beam resulting in inferior image quality. Transvaginal ultrasonography has been explored as an alternative technique to indirectly visualize the endometrium. Endometrial thickness is measured as the maximum anterior – posterior thickness of the endometrial echo on a long-axis transvaginal view of the uterus. Because transvaginal ultrasonography in patients with bleeding has an extremely high negative predictive value, it is a reasonable first approach. Transvaginal ultrasonography may reveal leiomyoma, endometrial thickening,

or focal masses. Although this imaging modality may miss endometrial polyps and submucous fibroids, it is highly sensitive for the detection of endometrial cancer (96 percent) and endometrial abnormality (92 percent). Compared with dilatation and curettage, endometrial evaluation with transvaginal ultrasonography misses 4 percent more cancers, but it may be the most cost-effective initial test in women at low risk for endometrial cancer who Have abnormal uterine bleeding that does not respond to medical management.

ENDOMETRIAL THICKNESS

A measurement of total endometrial thickness should include both the

anterior and posterior layer of the endometrium. Caliper placement should be perpendicular to the endometrial cavity echo.

At the end of menstruation - 1 to 4 mm

Proliferative phase - 4 to 8 mm

Secretory phase - 12 to 14 mm

Post menopausal women - Thin endometrium. Thickness should not be more than 5 mm

Patient on Estrogen Therapy - Thickness should not be more than

10 mm

SALINE INFUSIONSONOGRAM

Saline-infusion sonohysterography bolsters the diagnostic power of transvaginal ultrasonography. This technique entails ultrasound visualization after 5 to 10 mL of sterile saline has been instilled in the endometrial cavity. Its sensitivity and specificity for endometrial cancer are comparable with the high sensitivity and specificity of diagnostic hysteroscopy. Saline-infusion sonohysterography is more accurate than transvaginal ultrasonography in diagnosing intracavitary lesions and is more accurate than hysteroscopy in diagnosing endometrial hyperplasia. The combination of directed endometrial biopsy and saline-infusion sonohysterography results in a sensitivity of 95 to 97 percent and a specificity of 70 to 98 percent for the identification of endometrial abnormality.Saline provides an acoustic window, which delineatesthe intraluminal and endometrial pathology very well and aids in a correct diagnosis. Use of a negative contrast like saline is better than a positive ultrasound contrast in the evaluation of the endometrial pathology.

AIM OF THE STUDY

To evaluate the diagnostic accuracy of transvaginal ultrasonogram with sonohysterography and hysteroscopy for the screening of intracavitary pathologies in women with abnormal uterine bleeding and to correlate the findings with the histopathological specimens of the endometrium obtained by dilation and curettage or hysterectomy.

MATERIALS AND METHODS

The study included 200 women who had come to the Institute of Social Obstetrics and Government Kasturba Gandhi hospital with complaints of abnormal uterine bleeding were selected, admitted and subjected for transvaginal ultrasonogram followed by sonohysterography using saline instilled through an endocervically placed catheter in sequence of the same day of admission. 24 hours later diagnostic hysteroscopy was performed under intravenous sedation and endometrial tissue collected for histology by D&C/directed biopsies.

This is prospective one year study conducted September 2010 to August 2011 and the study was conducted in our hospital after getting approval from the ethical committee of Madras Medical College.

PATIENT SELECTION:

Inclusion criteria:

- Only parous women of age 25years to 45 years
- No demonstratable pelvic pathology
- Not on hormonal therapy
- No evidence of haematological disorder/medical illness/surgical complications so as to avoid any anaesthetic or surgical risk during hysteroscopy

Exclusion criteria:

- Nulliparous women
- Age more than 45 years
- Post menopausal bleeding
- Associated adnexal, pelvic pathologies like fibroid uterus
- IUCD in situ
- History of PID, endometriosis, tuberculosis,
- Severe anaemia due to AUB requiring immediate ICU care
- Profuse bleeding requiring emergency therapeutic curettage

PROCEDURE:

Detailed history taking was done (as in Proforma) Informed consent is obtained for all the patients.

PERFORMING TRANSVAGINAL ULTRASOUND

TVS is done using 5 megahertz curvilinear probe. Patients were asked to empty the bladder before the procedure. Patient is dorsal position with knees semi flexed. TVS probe covered by condom painted with acoustic gel gently introduced into introitus and saggital and coronal section of the uterus used. Endometrial thickness and other uterine or adnexal pathologies were looked for and findings noted.

PERFORMING SONOHYSTEROGRAPHY:

Patients in same dorsal position, a sterile SIMS speculum is introduced vaginally. Cervix and vagina disinfected with betadine solution. Anterior lip of cervix is held with vulsellum and a 6F Foleys catheter prefilled with sterile saline introduced into uterine cavity transcervically to avoid air entering uterine cavity. 2 ml distilled water was used to inflate the Foleys bulb which was placed in the lower most part of the uterine cavity to avoid backflow of saline. After removing the speculum the TVS probe was gently introduced posterior to the catheter. Under ultrasound guidance the uterine cavity was distended with 10ml sterile normal saline injected through the Foleys.

Findings noted:

Uterus – length, AP measurements, transverse dimensions, endometrial thickness, any polyps adenomyosis, or other intracavitary pathologies, their number size position noted.

The maximum Endometrial thickness was the distance in millimetres from one myometrial endometrial interface to the other across the uterine cavity measured at the level of the fundus. In SIS, the anterior and posterior endometrial thickness were measured separately and added for total endometrial thickness. A cut of value of 14mm was set to delineate normal from hyperplastic endometrium on ultrasound as per previous studies.

All the patients who underwent the above procedures tolerated well. There was no need for cervical dilation or local anaesthesia in any of the patients for catheter insertion. Some patients complained of mild abdominal cramps which required oral analgesics(NSAIDS).

All these 200 patients who underwent TVS and SIS were posted for hysteroscopy under IV sedation the next day.

USG FINDINGS:

NUMBER	FINDINGS	TYPES
0	NORMAL	EMthickness less than or equal to 14 mm
1	ABNORMAL	1. ENDOMETRIAL HYPERPLASIA 2. ENDOMEDTRIAL POLYP 3. SUBMUCOUS FIBROIDS

PERFORMING HYSTEROSCOPY

- Patients were advised to have light dinner before 10 PM on night prior to hysteroscopy and remain nil per oral since then
- Preparation done as for other surgical procedures
- Informed consent for the procedure & anaesthetic assessment for hysteroscopy and D& C obtained.
- Patient is examined and reassessed by anaesthetist in the theatre. After a routine examination which includes vital parameters such as Temperature, Pulse, blood pressure, cardio vascular and Respiratory system examination.

Positioning:

hysteroscopy is best performed with the patient in the dorsal lithotomy position. A 10% povidone-iodine vaginal and perineum preparation is preferred for hysteroscopic procedures

ANAESTHESIA:

Under iv sedation using ketamine

The hysteroscope is gently inserted through the external cervical os, and the endocervical canal is inspected. Insufflation medium ringer lactate injected, allowing visualization of the cavity,which appears as a dark spot (the location of this “dark spot” depends on the angle of scope and the position of the uterus). The hysteroscope is directed toward this dark spot until the cavity is entered. The flow of medium is adjusted so the cavity is adequately distended.. The cervical mucosa is whitish in colour which differentiates it from the uterine cavity lining. The entire uterine cavity,cornua ,papillary and glandular structure of the mucosa be studied. Systematic inspection of the cavity is performed andshould include examination of the fundus, anterior and posterior walls, lateral walls, both tubal ostia, and the lower uterine segment. The endometrium was classified as abnormal if it appeared to be excessively thick, irregular and hypervascular,with widened glandular openings. A polyp was defined as a smooth, firm and poorly vascularized mucous or fibrous tumor that could be single or multiple, sessile or pedunculated. Their color was required to be similar to that of the surrounding endometrium, with no glandular orifices present. A submucous fibroid was defined as a smooth, irregular shaped, sessile or pedunculated tumor that distorted the regular contour of an otherwise normal uterine cavity. The covering endometrium was required to be pale and transparent for the obvious visualization of surface blood vessels.

Hysteroscopic diagnosis of endometrial hyperplasia was based on one or more of the following criteria.

1. Focal or diffuse increase in endometrial thickness
2. Irregular aspects of endometrial surface
3. Cystic formations protruding into endometrial surface
4. Increased dilated superficial vessels on panaromic view

   The procedure was completed after obtaining directed biopsies from lesions that gave the impression of focal hyperplasia or from all the uterine walls in case of diffuse hyperplasia.

Dilatation and Curettage done for all the patients

Under anaesthesia endometrial curettage was done and curettings and directed biopsy specimens were sent for histopathological examination.

All the patients in our study tolerated the procedure well and were discharged the next day. They were asked to come for follow up a week later to collect the HPE report and further planning for AUB management..

RESULTS AND ANALYSIS

In our study 200 patients with AUB who were subjected to trans vaginal usg followed by saline infusion sonogram and hysteroscopy were reviewed a week later with HPE result of the D&C/directed endometrial lesion biopsy .Among these 200 patients,91 patients were selected for hysterectomy .(i.e) those patients who had abnormal findings in the above investigations and also for patients with h/o long standing AUB not ready for regular follow up.and who wanted hysterectomy .

The findings of TVS,SIS and hysteroscopy were correlated with hysterectomy which is considered the gold standard and the diagnostic accuracy of individual tests was evaluated..

The results were subjected to statistical analysis and they are as follows

TABLES AND CHARTS

TABLE 1 SIS Findings Vs AGE

	SIS	N	Mean	Std. Deviation	Std. Error Mean
Age	0	145	39.49	3.893	.323
	1	55	41.11	2.608	.352

Abnormal SIS was found in 55 patients and the mean age group was found to be 41 in our study

TABLE 2 SIS Vs Duration of complaints

	SIS	N	Mean	Std. Deviation	Std. Error Mean
DURATION OF COMPLAINT (months)	0	145	7.14	1.942	.161
	1	55	7.30	1.870	.254

Mean duration of complaint among the patients with abnormal SIS findings was 7 months in our study

TABLE 3: TVS Findings VS age & duration of complaints

	TVS abn/ norm	N	Mean	Std. Deviation	Std. Error Mean
DURATION OF COMPLAINT in months		144	7.14	1.945	.162
	1	55	7.29	1.863	.251
AGE	0	144	39.47	3.895	.325
	1	56	41.13	2.608	.349

Abnormal TVS found in 56 patients and the mean age group was 41 in our study.The mean duration of complaints among the abnormal group was 7 months.

TABLE 4 Hysteroscopy Vs age &duration of complaints

	HYSTER SCOPY abn/nor	N	Mean	Std. Deviation	Std. Error Mean
DURATION OF COMPLAINT (months)	0	149	7.11	1.937	.159
	1	50	7.38	1.872	.265
AGE	0	149	39.55	3.879	.318

Abnormal hysteroscopy found in 51 patients and the mean age group was 41 in our study.The mean duration of complaints among the abnormal group was 7 months.

TABLE 5 : TVS Findings Vs age group

			Tvs				
			0	1	2	3	Total
Age	1	Count	3	0	0	0	3
		% within Tvs	2.1%	.0%	.0%	.0%	1.5%
		% of Total	1.5%	.0%	.0%	.0%	1.5%
	2	Count	24	0	0	0	24
		% within Tvs	16.7%	.0%	.0%	.0%	12.0%
		% of Total	12.0%	.0%	.0%	.0%	12.0%
	3	Count	52	17	1	2	72
		% within Tvs	36.1%	42.5%	10.0%	33.3%	36.0%
		% of Total	26.0%	8.5%	.5%	1.0%	36.0%
	4	Count	65	23	9	4	101
		% within Tvs	45.1%	57.5%	90.0%	66.7%	50.5%
		% of Total	32.5%	11.5%	4.5%	2.0%	50.5%
	Total	Count	144	40	10	6	200
		% within Tvs	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	72.0%	20.0%	5.0%	3.0%	100.0%

AGE GROUP

1-----<30YR

2-----31-35YR

3-----36-40YR

4----->41YR

FROM THE ABOVE TABLE :20%patients(40) had endometrial hyperplasia.5% (10) had endometrial polyp.3%(6) had submucous

fibroids.50%(101) patients with abnormal TVS finding belonged to >40 years in our study.

Chi square value 17.467 and P value was 0.042 which is significant.

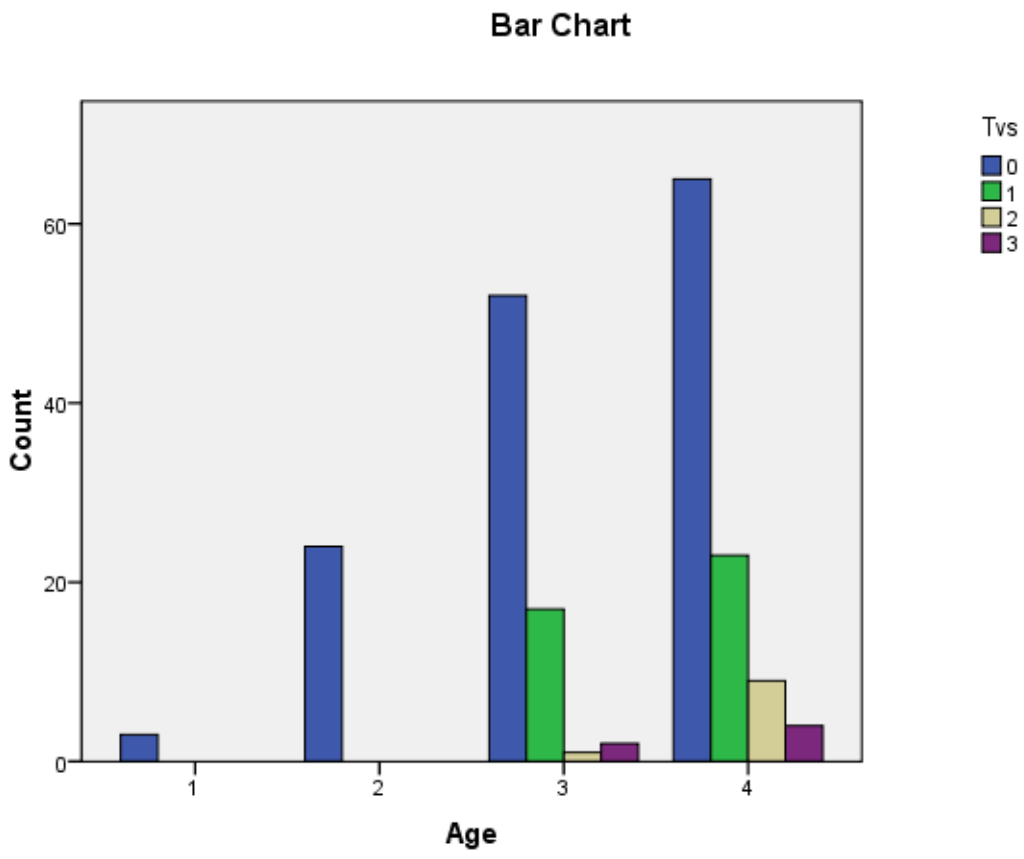


TABLE 6 : SIS Findings Vs age group

			SIS				
			0	1	2	3	Total
Age	1	Count	3	0	0	0	3
		% within SIS	2.1%	.0%	.0%	.0%	1.5%
		% of Total	1.5%	.0%	.0%	.0%	1.5%
	2	Count	24	0	0	0	24
		% within SIS	16.7%	.0%	.0%	.0%	12.0%
		% of Total	12.0%	.0%	.0%	.0%	12.0%
	3	Count	51	14	6	1	72
		% within SIS	35.4%	48.3%	27.3%	20.0%	36.0%
		% of Total	25.5%	7.0%	3.0%	.5%	36.0%
	4	Count	66	15	16	4	101
		% within SIS	45.8%	51.7%	72.7%	80.0%	50.5%
		% of Total	33.0%	7.5%	8.0%	2.0%	50.5%
	Total	Count	144	29	22	5	200
		% within SIS	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	72.0%	14.5%	11.0%	2.5%	100.0%

FROM THE ABOVE TABLE: 29% patients(14) had endometrial hyperplasia.11% (22) had endometrial polyp.2%(5) had submucous fibroids.50%(101) patientswith abnormal SIS findings belonged to >40 years in our study.

Chi square value: P value was 0.062

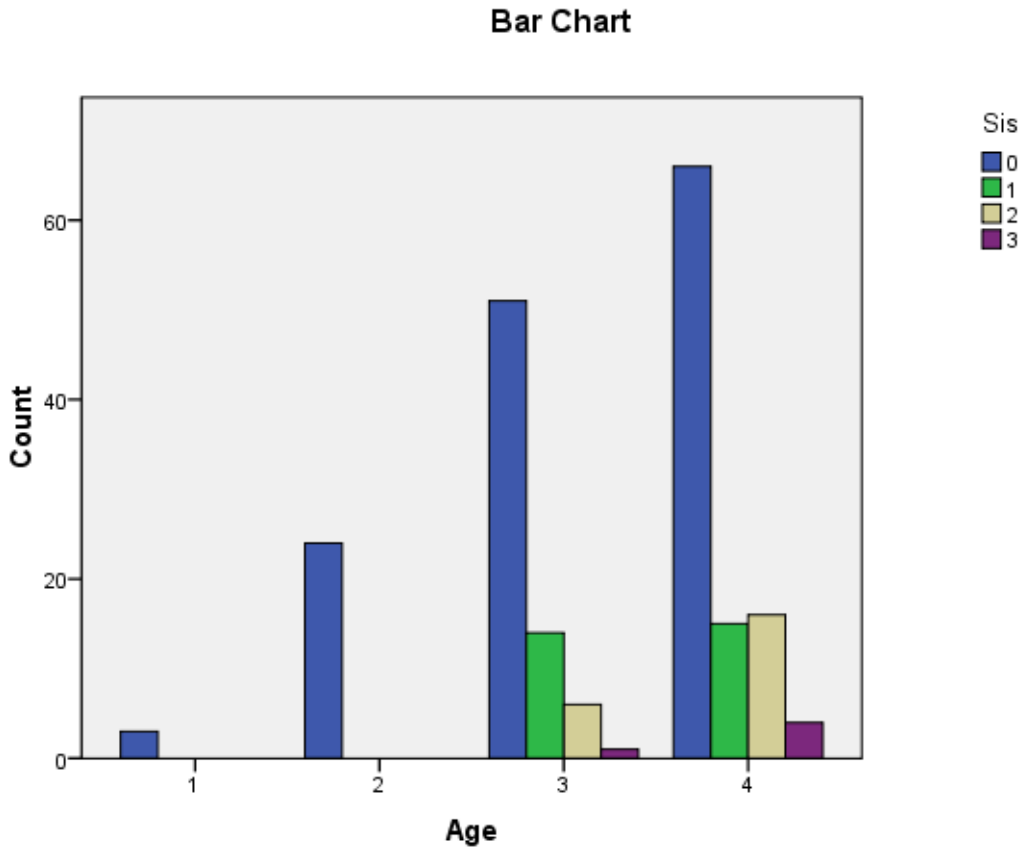

Bar Chart
Count
60
40
20
0
1
2
3
4
Age
Sis
0
1
2
3

TABLE 7: HYSTEROSCOPY VS AGE

			HYSTEROSCOPY TYPES				
			0	1	2	3	Total
Age	1	Count	3	0	0	0	3
		% within Hysteroscopy types	2.0%	.0%	.0%	.0%	1.5%
		% of Total	1.5%	.0%	.0%	.0%	1.5%
	2	Count	24	0	0	0	24
		% within Hysteroscopy types	16.0%	.0%	.0%	.0%	12.0%
		% of Total	12.0%	.0%	.0%	.0%	12.0%
	3	Count	52	13	6	1	72
		% within Hysteroscopy types	34.7%	50.0%	31.6%	20.0%	36.0%
		% of Total	26.0%	6.5%	3.0%	.5%	36.0%
	4	Count	71	13	13	4	101
		% within Hysteroscopy types	47.3%	50.0%	68.4%	80.0%	50.5%
		% of Total	35.5%	6.5%	6.5%	2.0%	50.5%
	Total	Count	150	26	19	5	200
		% within Hysteroscopy types	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	75.0%	13.0%	9.5%	2.5%	100.0%

FROM THE ABOVE TABLE: 13 % patiet(26) had endometrial hyperplasia.9% (19) had endometrial polyp. 2.5% (5) had submucous fibroids.50%(101) patient with abnormal hysteroscopy findings belonged to >40 years in our study.

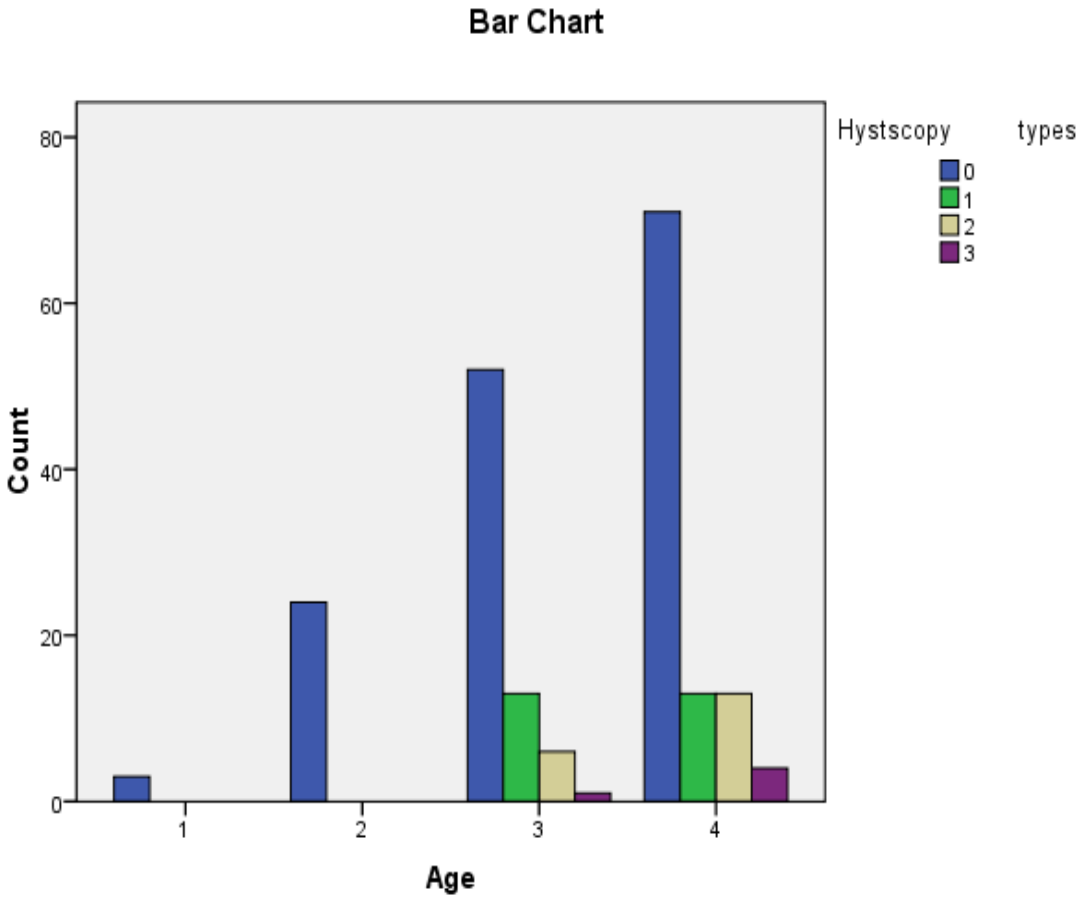
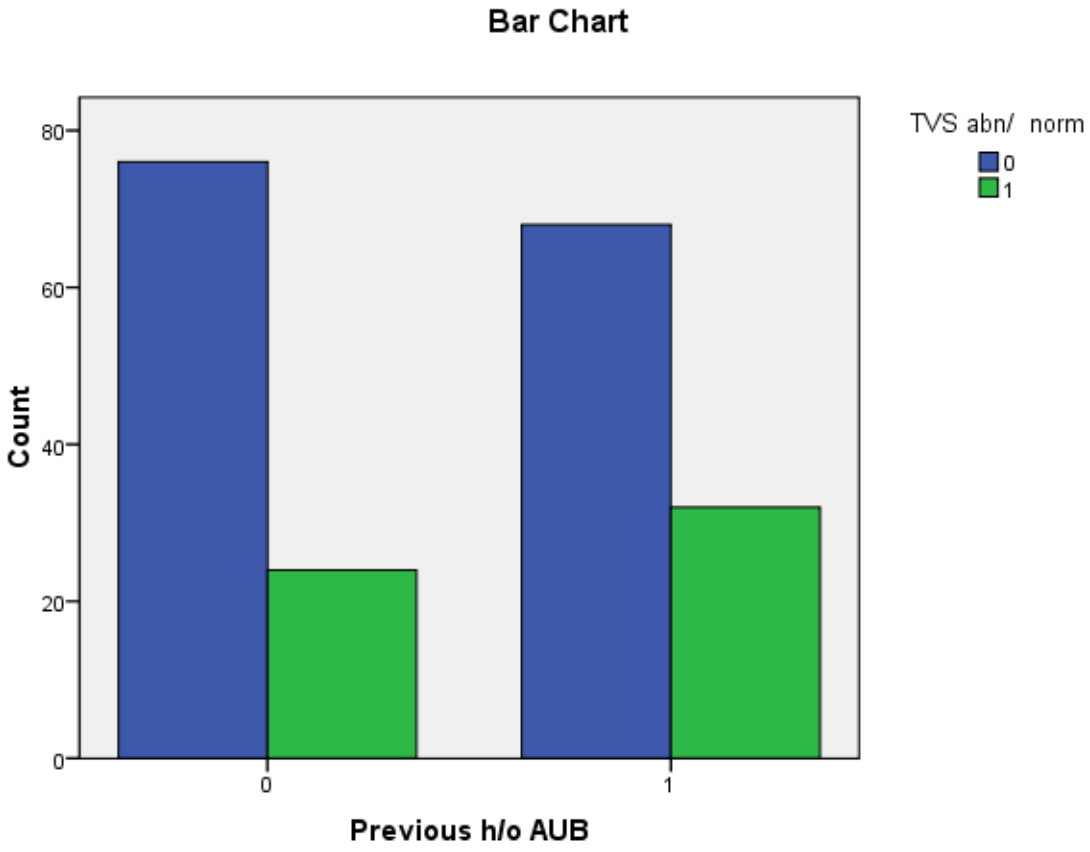

Bar Chart
Hystscopy types
0
1
2
3
Count
80
60
40
20
0
1
2
3
4
Age

TABLE 8 : TVS Vs Previous h/o AUB

			TVS abn/ norm		
			0	1	Total
Previous h/o AUB	0	Count	76	24	100
		% within TVS abn/ norm	52.8%	42.9%	50.0%
		% of Total	38.0%	12.0%	50.0%
	1	Count	68	32	100
		% within TVS abn/ norm	47.2%	57.1%	50.0%
		% of Total	34.0%	16.0%	50.0%
	Total	Count	144	56	200
		% within TVS abn/ norm	100.0%	100.0%	100.0%



Out of the 100 patients who had previous h/o AUB ,32 patients had abnormal TVS findings whereas 68 patients had normal TVS

TABLE 9 : SIS Vs Previous h/o AUB

Crosstab

			Sis		
			0	1	Total
Previous h/o AUB	0	Count	75	25	100
		% within Sis	51.7%	45.5%	50.0%
		% of Total	37.5%	12.5%	50.0%
	1	Count	70	30	100
		% within Sis	48.3%	54.5%	50.0%
		% of Total	35.0%	15.0%	50.0%
	Total	Count	145	55	200
		% within Sis	100.0%	100.0%	100.0%

Out of the 100 patients who had previous h/o AUB ,30 patients had abnormal SIS findings whereas 70 patients had normal SIS.

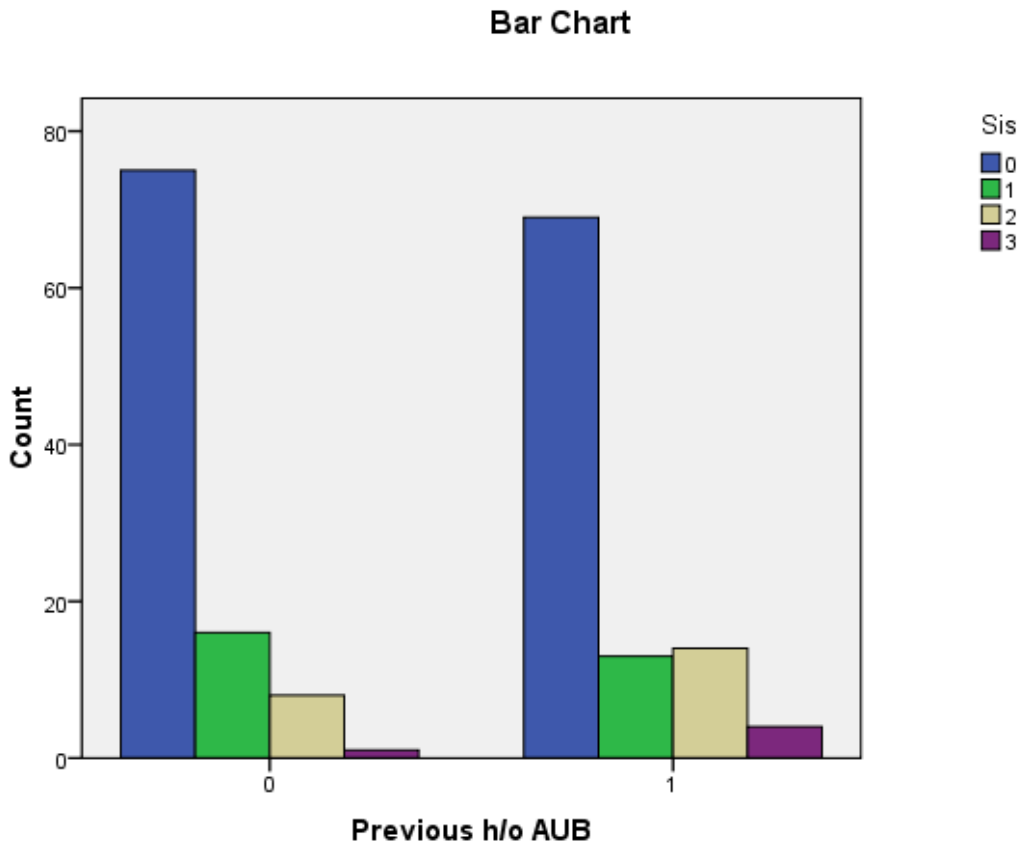

Bar Chart
Count
80
60
40
20
0
0
1
Previous h/o AUB
Sis
0
1
2
3

TABLE 10 : HYSTERO SCOPY Vs Previous h/o AUB

			HYSTERO SCOPY ABN/NOR		
			0	1	Total
Previous h/o AUB	0	Count	78	22	100
		% within HYSTERO SCOPY abn/nor	52.3%	43.1%	50.0%
		% of Total	39.0%	11.0%	50.0%
	1	Count	71	29	100
		% within HYSTERO SCOPY abn/nor	47.7%	56.9%	50.0%
		% of Total	35.5%	14.5%	50.0%
	Total	Count	149	51	200
		% within HYSTERO SCOPY abn/nor	100.0%	100.0%	100.0%
		% of Total	74.5%	25.5%	100.0%

Out of the 100 patients who had previous h/o AUB ,29 patients had abnormal HYSTEROSCOPY findings whereas 71 patients had normal HYSTEROSCOPY findings

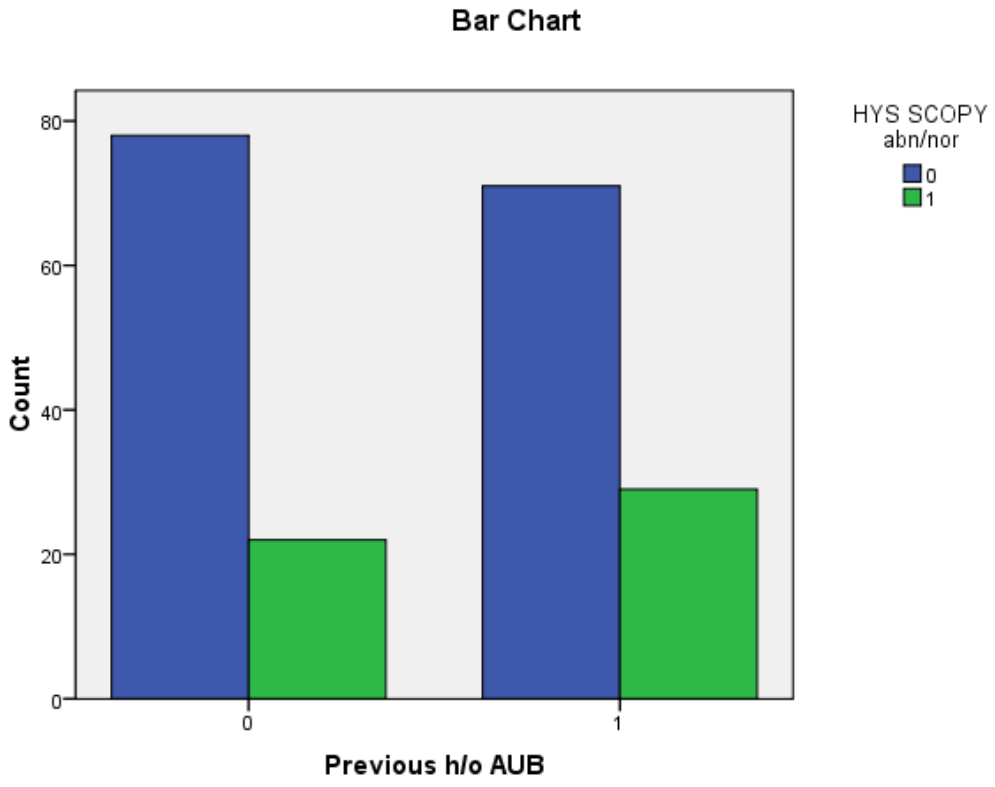

Bar Chart
Count
80
60
40
20
0
0
1
Previous h/o AUB
HYS SCOPY
abn/nor
0
1

TABLE 11 : HPE Vs Previous h/o AUB

			Hpe Nor/Abn		
			0	1	Total
Previous h/o AUB	0	Count	74	26	100
		% within Hpe nor/abn	52.9%	43.3%	50.0%
		% of Total	37.0%	13.0%	50.0%
	1	Count	66	34	100
		% within Hpe nor/abn	47.1%	56.7%	50.0%
		% of Total	33.0%	17.0%	50.0%
	Total	Count	140	60	200
		% within Hpe nor/abn	100.0%	100.0%	100.0%
		% of Total	70.0%	30.0%	100.0%

Out of the 100 patients who had previous h/o AUB, 66 patients had abnormal hpe findings whereas 34 patients had normal hpe findings.

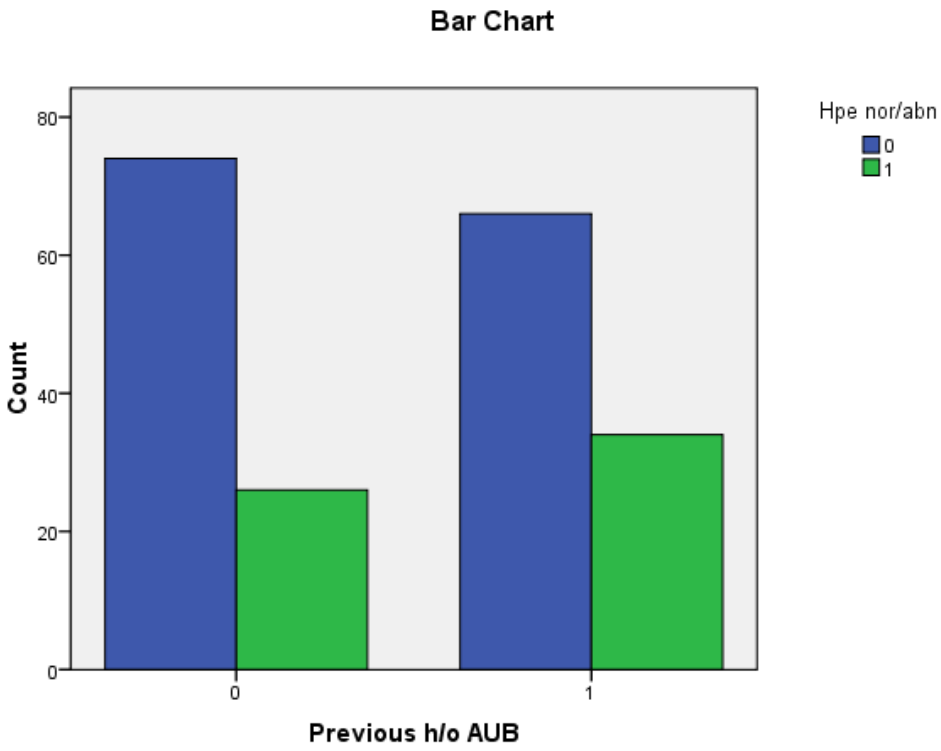

Bar Chart
Hpe nor/abn
0
1
Count
80
60
40
20
0
0
1
Previous h/o AUB

TABLE 12 : TVS Vs Hysterectomy

			HYSTERECTOMY FINDINGS		
			0	1	Total
TVS abn/ norm	0	Count	29	6	35
		% within TVS abn/ norm	82.9%	17.1%	100.0%
		% within Hysterecctomy findings	87.9%	10.3%	38.5%
		% of Total	31.9%	6.6%	38.5%
	1	Count	4	52	56
		% within TVS abn/ norm	7.1%	92.9%	100.0%
		% within Hysterecctomy findings	12.1%	89.7%	61.5%
		% of Total	4.4%	57.1%	61.5%
	Total	Count	33	58	91
		% within TVS abn/ norm	36.3%	63.7%	100.0%
		% within Hysterecctomyfindings	100.0%	100.0%	100.0%
		% of Total	36.3%	63.7%	100.0%

Hysterectomy group

0—normal (proliferative/secretory endometrium)

1—abnormal (EMhyperplasia,EM polyp,submucous fibroid)

Out of the 56 patients with abnormal finding on TVS 52(92%) had abnormal findings in hysterectomy. 6 (17%) patients with normal TVS findings had abnormality in hysterectomy .

Chi-Square Tests

	Value	Exact Sig (2- sided)
McNemar Test		.754[a]
McNemar Test	**91**	

TABLE 13 : SIS Vs hysterectomy

			Hysterectomy Findings		
			0	1	Total
SIS	0	Count	31	5	36
		% within SIS	86.1%	13.9%	100.0%
		% within Hysterecctomy findings	93.9%	8.6%	39.6%
		% of Total	34.1%	5.5%	39.6%
	1	Count	2	53	55
		% within SIS	3.6%	96.4%	100.0%
		% within Hysterecctomy findings	6.1%	91.4%	60.4%
		% of Total	2.2%	58.2%	60.4%
	Total	Count	33	58	91
		% within SIS	36.3%	63.7%	100.0%
		% within Hysterecctomy findings	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	**Exact Sig (2- sided)**
McNemar Test		.453[a]
McNemar Test	**91**	

Out of the 55 patients with abnormal finding on SIS 53(96%) had abnormal findings in hysterectomy.5(13%) patients with normal SIS findings had abnormality in hysterectomy .

TABLE 14 : hysteroscopy Vs hysterectomy

			HYSTERECTOMY FINDINGS		
			0	1	Total
HYSTERO SCOPY abn/nor	0	Count	32	8	40
		% within HYSTERO SCOPY abn/nor	80.0%	20.0%	100.0%
		% within Hysterecctomy findings	97.0%	13.8%	44.0%
		% of Total	35.2%	8.8%	44.0%
	1	Count	1	50	51
		% within HYSTERO SCOPY abn/nor	2.0%	98.0%	100.0%
		% within Hysterecctomy findings	3.0%	86.2%	56.0%
		% of Total	1.1%	54.9%	56.0%
	Total	Count	33	58	91
		% within HYSTERO SCOPY abn/nor	36.3%	63.7%	100.0%
		% within Hysterecctomy findings	100.0%	100.0%	100.0%
		% of Total	36.3%	63.7%	100.0%

Chi - Square Test

	Value	Exact Sig. (2-sided)
McNemar Test		.039[a]
N of Valid Cases	91	

a. Binomial Distribution List

Out of the 51 patients with abnormal findings on hysteroscopy 50(98%) had abnormal findings in hysterectomy . 8 (20%) patients with normal hysteroscopy findings had abnormality in hysterectomy.

Tvs vs hysterectomy.

Results

Diagnostic or Screening Test Evaluation

Single Table Analysis

	Positive	Negative	Total
Positive	52	4	56
	92.9%	7.1%	100%
	89.7%	12.1%	
Negative	6	29	35
	17.1%	82.9%	100%
	10.3%	87.9%	
	58	33	91
	63.7%	36.3%	100%
	100%	100%	

Parameter	Estimate	Lower - Upper 95% CIs	Method
Sensitivity	89.66%	(79.21, 95.17[1])	Wilson Score
Specificity	87.88%	(72.67, 95.18[1])	Wilson Score
Positive Predictive Value	92.86%	(83.02, 97.19[1])	Wilson Score
Negative Predictive Value	82.86%	(67.32, 91.9[1])	Wilson Score
Diagnostic Accuracy	89.01%	(80.94, 93.92[1])	Wilson Score

SIS vs., hysterectomy.

Results

Diagnostic or Screening Test Evaluation

Single Table Analysis

	Positive	Negative	Total
Positive	53	2	55
	96.4%	3.6%	100%
	91.4%	6.1%	
Negative	5	31	36
	13.9%	86.1%	100%
	8.6%	93.9%	
	58	33	91
	63.7%	36.3%	100%
	100%	100%	

Parameter	Estimate	Lower - Upper 95% CIs	Method
Sensitivity	91.38%	(81.36, 96.26[1])	Wilson Score
Specificity	93.94%	(80.39, 98.32[1])	Wilson Score
Positive Predictive Value	96.36%	(87.68, 99[1])	Wilson Score
Negative Predictive Value	86.11%	(71.34, 93.92[1])	Wilson Score
Diagnostic Accuracy	92.31%	(84.96, 96.22[1])	Wilson Score

Hysteroscopy. vs. hysterectomy

Results

Diagnostic or Screening Test Evaluation

Single Table Analysis

	Positive	Negative	Total
Positive	50	1	51
	98%	2%	100%
	86.2%	3%	
Negative	8	32	40
	20%	80%	100%
	13.8%	97%	
	58	33	91
	63.7%	36.3%	100%
	100%	100%	

Parameter	Estimate	Lower - Upper 95% CIs	Method
Sensitivity	86.21%	(75.07, 92.84[1])	Wilson Score
Specificity	96.97%	(84.68, 99.46[1])	Wilson Score
Positive Predictive Value	98.04%	(89.7, 99.65[1])	Wilson Score
Negative Predictive Value	80%	(65.24, 89.5[1])	Wilson Score
Diagnostic Accuracy	90.11%	(82.26, 94.71[1])	Wilson Score

Hpe vs. hysterectomy

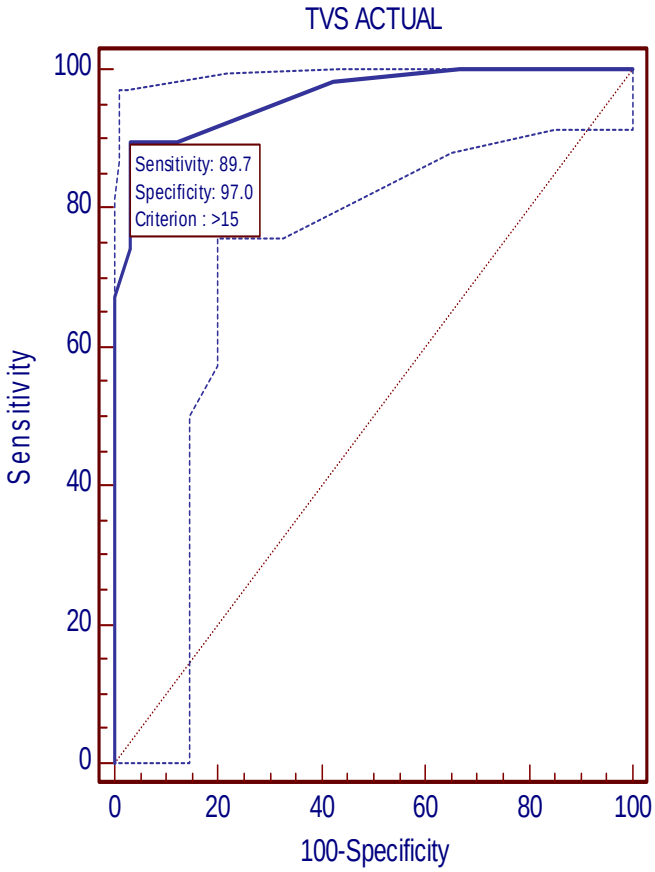
Results

Diagnostic or Screening Test Evaluation

Single Table Analysis

	Positive	Negative	Total
Positive	56	1	57
	98.2%	1.8%	100%
	96.6%	3%	
Negative	2	32	34
	5.9%	94.1%	100%
	3.4%	97%	
	58	33	91
	63.7%	36.3%	100%
	100%	100%	

Parameter	Estimate	Lower - Upper 95% CIs	Method
Sensitivity	96.55%	(88.27, 99.05[1])	Wilson Score
Specificity	96.97%	(84.68, 99.46[1])	Wilson Score
Positive Predictive Value	98.25%	(90.71, 99.69[1])	Wilson Score
Negative Predictive Value	94.12%	(80.91, 98.37[1])	Wilson Score
Diagnostic Accuracy	96.7%	(90.75, 98.87[1])	Wilson Score


TVS ACTUAL
Sensitivity: 89.7
Specificity: 97.0
Criterion : >15
Sensitivity
100-Specificity
0
20
40
60
80
100

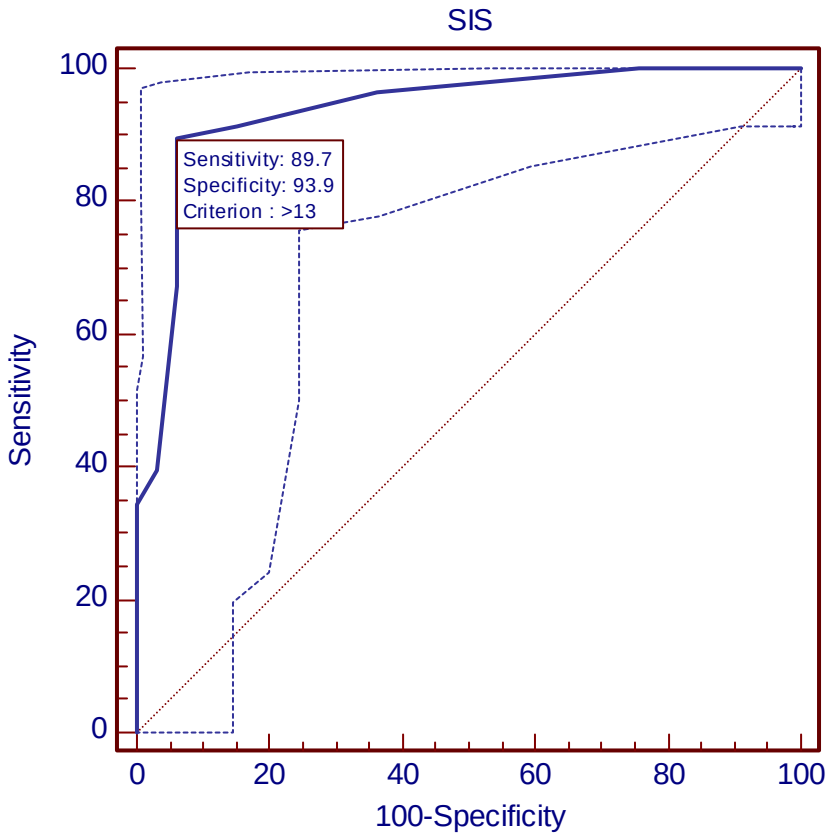
ROC curve

Variable	TVS_ACTUAL TVS ACTUAL
Classification variable	HYS_DONE HYS DONE
Positive group	
HYS DONE	= 1
Sample size	58
Negative group	
HYS DONE	= 0
Sample size	33
Disease prevalence (%)	63.7
Area under the ROC curve (AUC)	0.961
Standard error	0.0191
95% Confidence interval	0.898 to 0.990
z statistic	24.141
Significance level P (Area=0.5)	0.0001

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	-LR	+PV	-PV
>=7	100.00	93.8 - 100.0	0.00	0.0 - 10.7	1.00		63.7	
>7	100.00	93.8 - 100.0	6.06	0.9 - 20.3	1.06	0.00	65.2	100.0
>9	100.00	93.8 - 100.0	9.09	2.0 - 24.4	1.10	0.00	65.9	100.0
>10	100.00	93.8 - 100.0	15.15	5.2 - 31.9	1.18	0.00	67.4	100.0
>11	100.00	93.8 - 100.0	33.33	18.0 - 51.8	1.50	0.00	72.5	100.0
>12	98.28	90.7 - 99.7	57.58	39.2 - 74.5	2.32	0.03	80.3	95.0
>13	89.66	78.8 - 96.1	87.88	71.8 - 96.5	7.40	0.12	92.9	82.9
>14	89.66	78.8 - 96.1	90.91	75.6 - 98.0	9.86	0.11	94.5	83.3
>15 *	89.66	78.8 - 96.1	96.97	84.2 - 99.5	29.59	0.11	98.1	84.2
>16	74.14	61.0 - 84.7	96.97	84.2 - 99.5	24.47	0.27	97.7	68.1
>17	67.24	53.7 - 79.0	100.00	89.3 - 100.0		0.33	100.0	63.5
>18	44.83	31.7 - 58.5	100.00	89.3 - 100.0		0.55	100.0	50.8
>19	27.59	16.7 - 40.9	100.00	89.3 - 100.0		0.72	100.0	44.0
>20	15.52	7.4 - 27.4	100.00	89.3 - 100.0		0.84	100.0	40.2
>21	10.34	3.9 - 21.2	100.00	89.3 - 100.0		0.90	100.0	38.8
>22	6.90	2.0 - 16.7	100.00	89.3 - 100.0		0.93	100.0	37.9
>23	1.72	0.3 - 9.3	100.00	89.3 - 100.0		0.98	100.0	36.7
>119	0.00	0.0 - 6.2	100.00	89.3 - 100.0		1.00		36.3

+LR	:	Positive likelihood ratio
-LR	:	Negative likelihood ratio
+PV	:	Positive predictive value
-PV	:	Negative predictive value


SIS
Sensitivity: 89.7
Specificity: 93.9
Criterion : >13
Sensitivity
100-Specificity
0
20
40
60
80
100

ROC curve

Variable	SIS
Classification variable	HYS_DONE HYS DONE
Positive group	
HYS DONE	= 1
Sample size	58
Negative group	
HYS DONE	= 0
Sample size	33
Disease prevalence (%)	63.7
Area under the ROC curve (AUC)	0.939
Standard error	0.0244
95% Confidence interval	0.868 to 0.978
z statistic	17.969
Significance level P (Area=0.5)	0.0001

Criterion values and coordinates of the ROC curve

Criterion	Sensitivity	95% CI	Specificity	95% CI	+LR	-LR	+PV	-PV
>=7	100.00	93.8 - 100.0	0.00	0.0 - 10.7	1.00		63.7	
>7	100.00	93.8 - 100.0	3.03	0.5 - 15.8	1.03	0.00	64.4	100.0
>8	100.00	93.8 - 100.0	6.06	0.9 - 20.3	1.06	0.00	65.2	100.0
>9	100.00	93.8 - 100.0	15.15	5.2 - 31.9	1.18	0.00	67.4	100.0
>10	100.00	93.8 - 100.0	24.24	11.1 - 42.3	1.32	0.00	69.9	100.0
>11	96.55	88.1 - 99.5	63.64	45.1 - 79.6	2.66	0.054	82.4	91.3
>12	91.38	81.0 - 97.1	84.85	68.1 - 94.8	6.03	0.10	91.4	84.8
>13 *	89.66	78.8 - 96.1	93.94	79.7 - 99.1	14.79	0.11	96.3	83.8
>16	81.03	68.6 - 90.1	93.94	79.7 - 99.1	13.37	0.20	95.9	73.8
>17	67.24	53.7 - 79.0	93.94	79.7 - 99.1	11.09	0.35	95.1	62.0
>18	39.66	27.1 - 53.4	96.97	84.2 - 99.5	13.09	0.62	95.8	47.8
>19	34.48	22.5 - 48.1	100.00	89.3 - 100.0		0.66	100.0	46.5
>20	22.41	12.5 - 35.3	100.00	89.3 - 100.0		0.78	100.0	42.3
>21	13.79	6.2 - 25.4	100.00	89.3 - 100.0		0.86	100.0	39.8
>22	8.62	2.9 - 19.0	100.00	89.3 - 100.0		0.91	100.0	38.4
>23	5.17	1.1 - 14.4	100.00	89.3 - 100.0		0.95	100.0	37.5
>24	0.00	0.0 - 6.2	100.00	89.3 - 100.0		1.00		36.3

+LR	:	Positive likelihood ratio
-LR	:	Negative likelihood ratio
+PV	:	Positive predictive value
-PV	:	Negative predictive value

DISCUSSION

Considering the following studies supporting SIS as a successful procedure Alborzis et al.,55 in 2007, Compared the accuracy of saline infusion sonohysterography with transvaginal sonography for the screening of causes of abnormal uterine bleeding in outpatients.81 patients with AUB were studied. All cases who were examined with TVS, were further investigated with SIS using saline as contrast medium, finally hysteroscopy was used as the gold standard.

TVS Sensitivity - 72%

Specificity - 92%

PPV - 94%

NPV - 65%

SIS Sensitivity - 94.1%

Specificity - 95%

PPV - 96%

NPV - 90%

TVS had Kappa measure of agreement of 0.60 while 0.86 was reported for SIS, so in this study SIS was more sensitive and specific in diagnosing polyp and myoma with high positive and negative predictive value.

Van Dongen H, et al.,56 de Karoon CD et al., in 2008, did a comparison of patient discomfort during SIS and vaginoscopic office hysteroscopy.

The success rate, defined as adequate inspection of the cervical canal and the uterine cavity was 94% for SIS compared with 92% for office

hysteroscopy (p = 0.633) SIS, multiparity, shorter procedure time and position of the uterus in anti version decreased pain scores among women studied. They concluded that both SIS and office hysteroscopy are successful procedures and well tolerated by women. SIS induces significantly less discomfort than office hysteroscopy and should therefore be considered the method of choice.

In our prospective study analyzing the diagnostic accuracy of transvaginal ultrasound with Sonohysterography and hysteroscopy for the screening of intracavitary pathologies in abnormal uterine bleeding was undertaken in 200 patients at ISO-KGH Chennai. The results of this study is discussed below:

- Table 1,2,3,&4 shows that abnormal findings in SIS was found in 55 patients, 56 patients had abnormal findings in TVS, 51 patients had abnormal hysteroscopy findings and mean age group of abnormal findings was found to be 41 yrs in our study.

- The mean duration of complaints among the abnormal group was seven months

- Among the 200 patients 144 patients were found to have normal findings on both TVS and145 on SIS.

- TVS detected 40 cases of EM hyperplasia 10 cases of EM polyps and 6 cases of submucous fibroids (SMF)

- SIS findings were 14 cases of EM hyperplasia, 22 cases of EM polyp and 5 cases of SMF .

- the findings with hysteroscopy were 26 cases of EM hyperplasia, 19 cases of polyp and 2 cases of SMF

- Out of the 55 patients with abnormal SIS 53(96%) had abnormal findings in hysterectomy whereas 5cases (13%) with normal SIS had abnormalities in hysterectomy

- Out of the 56 patients with abnormal TVS 52(92%) had abnormal findings in hysterectomy whereas 6 cases (17%) with normal TVS had abnormalities in hysterectomy

- Out of the 51 patients with abnormal HYSTEROSCOPY 50(98%) had abnormal findings in hysterectomy whereas 8cases (20%) with normal HYSTERSCOPY had abnormalities in hysterectomy

- The sensitivity,specificity and diagnostic accuracy of TVS are 89% 87% and 89% respectively.whereas that for SIS 91% 93% AND 92% which is higher

- The sensitivity of hysteroscopy wa 86%s less than the above modalities but has a high specificity 98% and positive predictive value of 98%..however the diagnostic accuracy is 90%

- In this study 14mm cut off was taken for endometrial hyperplasia..analysing our data under the ROC curve a 13mm cutoff on SIS shows sensitivity of 89% and specificity of 93% whereas 15 mm cutoff on TVS improves the specificity to 97%to detect endometrial lesions.

- Out of the 100 patients who had previous h/o AUB ,32 patients had abnormal TVS findings whereas 68 patients had normal TVS
- Out of the 100 patients who had previous h/o AUB ,30 patients had abnormal SIS findings whereas 70 patients had normal SIS.
- Out of the 100 patients who had previous h/o AUB ,29 patients had abnormal HYSTEROSCOPY findings whereas 71 patients had normal HYSTEROSCOPY findings
- Out of the 100 patients who had previous h/o AUB, 66 patients had abnormal hpe findings whereas 34 patients had normal hpe findings.

SUMMARY

This is a prospective study to evaluate the diagnostic accuracy of transvaginal ultrasonogram with sonohysterography and hysteroscopy for the screening of intracavitary pathologies in women with abnormal uterine bleeding and to correlate the findings with the histopathological specimens of the endometrium obtained by dilation and curettage or hysterectomy conducted at ISO-KGH,Chennai

Study period was 1 year sep2010 to aug 2011

The study included 200 women who had come to the Institute of Social Obstetrics and Government Kasturba Gandhi hospital with complaints of abnormal uterine bleeding were selected, admitted and subjected for transvaginal ultrasonogram followed by sonohysteroography using saline instilled through an endocervically placed catheter in sequence of the same day of admission. 24 hours later diagnostic hysteroscopy was performed under intravenous sedation and endometrial tissue collected for histology by D&C/directed biopsies .Among the 200 patients in the study group 91 patients underwent hysterectomy (i.e) those patients who had abnormal findings in the above investigations and also for patients with h/o long standing AUB not ready for regular follow up. who wanted hysterectomy

The findings of TVS,SIS and hysteroscopy were correlated with hysterectomy which is considered the gold standard and the diagnostic accuracy of individual tests was evaluated..

CONCLUSION

- Among the 200 patientswith AUB in our study group, abnormal findings was found in the mean age group of 41 years.
- Mean duration of complaint among the patients with abnormal findings was 7 months in our study .
- In our study ,TVS detected 92% abnormalities whereas 17% false negative results were found comparing with gold standard hysterectomy.
- SIS detected 96% abnormalities and13% false negative which is better than that of the TVS .
- Hysteroscopy showed high positive predictive value 98% however the false negativity was 20% in our study. suggesting SIS as a better modality than the other two investigations.
- Hysteroscopy had high positive predictive value 98% but sensitivity was low 86% and diagnostic accuracy 90%..
- SIS has highest diagnostic accuracy 92% and negative predictive value 86%.this concludes that there is an improved demonstration of endometrial polyps and submucousmyomas using saline enhanced vaginal sonohysterography.

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PROFORMA

Name :

Age :

In patient Number :

Socio-Economic status :

Literacy :

Occupation :

Place :

Married since :

Parity :

Time since Last child birth :

Sterilization :

Last Menstrual Period :

Presenting Complaints of :

Pattern of bleeding :

Number of diapers/day :

Last menstrual Period :

Any History of (H/o) passing clots :

Past menstrual History :

Prior treatment with hormones :

Prior Dilatation and Curettage :

Other presenting complaints :

H/o white discharge per vaginum :

Scanty or profuse :

Blood stained :

Itching/ foul smelling :

H/o post coital bleeding :

H/o pain abdomen in relation to menses:

H/o burning micturition :

H/o drug intake :

H/o endocrine disorders :

Menstrual History

H/o Regularity of menstrual period :

How many pads/day?

Cycle length

Duration of flow

Marital and obstetric history

Married since :

Parity, Live, Abortion (spontaneous/ induced):

Contraception History

Temporary methods –

Oral contraceptive pills :

Barrier methods :

Intra Uterine Contraceptive Device:

Natural methods:

Permanent methods :

Puerperal Sterilization:

Medical termination of pregnancy with trans abdominal tubectomy:

Medical termination of pregnancy with Laparoscopy sterilization :

Interval Laparoscopy sterilization

No contraception:

Past medical/ surgical History :

Hypertension, Diabetes mellitus, Tuberculosis, Asthma, bleeding disorders, any surgery

General examination

- Weight
- Built/Nourishment
- Anaemia
- Pedal edema
- Thyroid ,spine, breast
- Vital signs pulse rate

blood pressure

temperature

respiratory rate

Cardio vascular system

Respiratory system

Per abdomen

Per speculum

Per vaginum

INVESTIGATIONS

Urine Routine

Complete Hemogram with platelet count

Blood sugar

Blood urea

Chest x-ray ,Electrocardiography

Informed consent for hysteroscopy

Trans vaginal sonography findings

Salinesonohysterogram findings

Hysteroscopy findings

Histopathologic examination findings

Master Chart

S.No	NAME	AGE	Age Group	DURATION OF COMPLAINT in months	Previous h/o AUB	TVS actual value{mm}	Tvs types	TVS findings	SIS Actual value	Sis types	SIS findings	Hystscopy types	HYSTEROSCOPY	Hpe nor/abn	HPE on D&C	Hysterecctomy done/not done	Hystrectomy types	hysterectomy
1	LAKSHMI	30	1	8	1	8	0	norm	7	0	norm	0	norm	0	proEM	9		
2	AMBIKA	42	4	9	1	6	0	norm	8	0	norm	0	norm	0	proEM	9		
3	GRACE	34	2	7	0	4	0	norm	5	0	norm	0	norm	0	proEM	9		
1	SHEEBA	44	4	8	0	6	0	norm	6	0	norm	0	norm	0	proEM	9		
5	LALITHA	44	4	9	0	6	0	norm	6	0	norm	0	norm	0	proEM	9		
6	LILLY	33	2	6	0	9	0	norm	8	0	norm	0	norm	0	proEM	9		
7	JEBA	43	4	5	0	16	1	EMhy	18	1	EMhy	1	EMhy	1	EMpol	1	3	EMpol
8	RAMYA	41	4	6	0	6	0	norm	7	0	norm	0	norm	1	proEM	9		
9	FATHIMA	40	4	4	0	8	0	norm	7	0	norm	0	norm	0	proEM	9		
10	PRIYA	41	4	7	0	22	2	EMhy	24	2	EMpol	0	Norm	1	EMpol	1	3	EMpol
11	DEVI	39	3	6	1	7	0	norm	6	0	norm	0	norm	0	proEM	9		
12	ANNAM	38	3	8	1	9	0	norm	7	0	norm	0	norm	0	proEM	9		
13	VEMBU	37	3	6	1	9	0	norm	7	0	norm	0	norm	0	proEM	9		
14	KANIKA	43	4		1	20	1	EMhy	20	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
15	VANI	35	2	4	0	6	0	norm	8	0	norm	0	norm	0	proEM	9		
16	NITHIYA	44	4	5	0	8	0	norm	9	0	norm	0	norm	0	proEM	9		
17	RAJI	45	4	7	0	8	0	norm	9	0	norm	0	norm	0	proEM	9		
18	DIVIYA	42	4	8	0	17	1	EMhy	19	1	EMhy	2	EMpol	0	proEM	0	5	proEM
19	PUSHPA	41	4	9	0	11	0	norm	9	0	norm	0	norm	0	proEM	9		
20	USHA	42	4	8	1	23	1	EMhy	23	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
21	MARIAM	39	3	9	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		

22	ANITHA	44	4	6	1	17	1	EMhy	19	2	EMpol	0	norm	1	EMpol	1	3	EMpol
23	AMBIKA	38	3	7	1	8	0	norm	7	0	nor1m	0	norm	0	proEM	9		
24	SATHIYA	36	3	8	0	9	0	norm	7	0	norm	0	norm	0	proEM	9		
25	VANI	43	4	7	0	16	1	EMhy	16	1	EMhy	0	norm	1	SH	1	1	SH
26	MANJU	37	3	7	0	8	0	norm	6	0	norm	0	norm	0	proEM	9		
27	RAJI	45	4	7	0	9	0	norm	8	0	norm	0	norm	0	proEM	9		
28	KUMARI	43	4	8	0	11	0	norm	9	0	norm	0	norm	0	proEM	9		
29	NATHIYA	43	4	7	0	12	0	norm	10	0	norm	0	norm	0	proEM	0	5	Proem
30	KOWSEI	39	3	7	0	11	0	norm	9	0	norm	0	norm	0	proEM	9		
31	KAIALB	38	3	6	0	10	0	norm	9	0	norm	0	norm	0	proEM	9		
32	BHARTHI	43	4	6	0	20	1	EMhy	18	1	EMhy	1	EMhy	1	SH A	1	1	SH A
33	THARANI	40	3	6	0	9	0	norm	7	0	norm	0	norm	0	proEM	9		
34	KGUMARI	44	4	6	0	11	0	norm	9	0	norm	0	norm	0	proEM	0	5	proEM
35	ANITHA	45	4	7	0	11	0	norm	9	0	norm	0	norm	0	proEM	9		
36	SUJI	36	3	6	0	9	0	norm	9	0	norm	0	norm	0	proEM	9		
37	VALI	40	3	6	0	23	1	EMhy	24	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
38	REMYA	41	4	6	0	9	0	norm	8	0	No0rm	0	norm	0	proEM	9		
39	SHYNI	35	2	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
40	BLESSY	38	3	6	0	8	0	norm	8	0	norm	0	norm	0	secEM	9		
41	JAMILA	43	4	6	0	13	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM
42	MALIKA	37	3	6	0	12	0	norm	12	0	norm	0	norm	0	proEM	9		
43	SHANTHI	42	4	8	0	16	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
44	JAYA	37	3	8	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
45	MARY	39	3	8	0	22	1	EMhy	24	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
46	MALI	38	3	8	0	8	0	norm	7	0	norm	0	norm	0	proEM	9		
47	RAJI	41	4	8	0	23	2	EMpol	23	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol

48	SHEELA	44	4	8	1	13	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM
49	RAGA	38	3	8	1	9	0	norm	8	0	norm	0	norm	0	proEM	9		
50	AJIM	41	4	8	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
51	JAYA	40	3	9	1	9	0	norm	9	0	norm	0	norm	0	proEM	9		
52	ELAVARASI	45	4	11	1	9	0	norm	9	0	norm	0	norm	0	proEM	9		
53	LENI MARY	43	4	11	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	CH	1	2	CH
54	JANCY	43	4	12	0	13	0	norm	12	0	norm	0	norm	0	proEM	9		
55	ALMELU	43	4	12	0	21	2	EMpol	22	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
56	SHALINI	39	3	13	0	13	0	norm	13	0	norm	0	norm	0	proEM	0	5	proEM
57	RATHNA	44	4	6	0	12	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
58	SIVRANJANI	42	4	6	0	20	1	EMhy	22	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
59	JANCYRANI	30	1	6	0	9	0	norm	8	0	norm	0	norm	0	proEM	9		
60	KALIVANI	43	4	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
61	NANTHINI	42	4	8	1	21	2	EMpol	21	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
62	KANMANI	30	1	8	1	8	0	norm	9	0	norm	0	norm	0	proEM	9		
63	SAROJA	43	4	8	1	19	1	EMhy	20	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
64	GAYATHRI	43	4	8	1	9	0	norm	8	0	norm	0	norm	0	proEM	9		
65	KAVITHA	40	3	8	1	8	0	norm	8	0	norm	0	norm	0	secEM	9		
66	KANIKA	44	4	8	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
67	CLARA	34	2	9	1	9	0	norm	7	0	nor1m	0	norm	0	proEM	9		
68	SHEELA	42	4	9	1	20	2	EMpol	21	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
69	THARA	44	4	9	1	20	2	EMpol	21	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
70	PUSPHA	45	4	9	1	19	1	EMhy	17	1	EMhy	1	EMhy	1	SH	1	1	SH
71	THARA	43	4	14	1	11	0	norm	10	0	norm	0	norm	0	proEM	9		
72	SOBANA	32	2	4	1	8	0	norm	7	0	norm	0	norm	0	proEM	9		

73	KAVIYA	41	4	14	1	6	0	norm	7	0	norm	0	norm	0	proEM	9		
74	priya	38	3	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
75	KIRTHEEKA	41	4	15	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
76	JAYANTHI	39	3	15	1	9	0	norm	9	0	norm	0	norm	0	proEM	9		
77	SOLOKCHANA	37	3	9	1	4	0	norm	6	0	norm	0	norm	0	proEM	9		
78	SUGANTHI	31	2	9	1	7	0	norm	6	0	norm	0	norm	0	proEM	9		
79	MALARGODI	45	4	9	1	19	2	EMpol	20	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
80	RAVATHI	39	4	9	1	9	0	norm	9	0	norm	0	norm	0	proEM	9		
81	SUGANYA	43	4	9	1	7	0	norm	8	0	norm	0	norm	0	proEM	9		
82	RATHIKA	42	4	7	1	11	0	norm	11	0	norm	0	norm	0	proem	0	5	proEM
83	SANGEETHA	31	2	7	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
84	CHANDRA	41	4	7	0	8	0	norm	7	0	norm	0	norm	0	proEM	9		
85	MANGALA	38	3	7	0	12	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM
86	MANOGARI	42	4	7	0	9	0	norm	9	0	norm	0	norm	0	proEM	9		
87	SUBULAKSHIMI	41	4	7	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
88	JAYALAKSHM	39	3	7	0	16	1	EMhy	16	1	EMhy	1	EMhy	1	SH	1	1	SH
89	RAJALAKSHMI	39	3	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
90	NATHIYA	32	3	6	0	18	1	EMhy	17	1	EMhy	1	EMhy	1	SH	1	1	SH
91	DIVYA	38	3	3	0	6	0	norm	7	0	norm	0	norm	0	proEM	9		
92	KALAYANI	37	3	3	0	12	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
93	CHITHRA	42	4	3	0	13	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM
94	KAVITHA	39	3	3	0	4	0	norm	4	0	norm	0	norm	0	proEM	9		
95	KRISHNAVENI	36	3	4	0	16	1	EMhy	16	1	EMhy	1	EMhy	1	SH	1	1	SH

96	ANUSHYA	43	4	4	0	13	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM
97	PRIYA	34	2	4	0	7	0	norm	8	0	norm	0	norm	0	proEM	9		
98	AMMU	37	3	4	0	16	1	EMhy	16	1	EMhy	0	norm	1	SH	1	1	SH
99	ANIJA	42	4	6	0	8	0	norm	7	0	norm	0	norm	0	proEM	9		
100	PONMANI	42	4	7	1	20	1	EMhy	21	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
101	SEETHA	35	2	6	1	6	0	norm	8	0	norm	0	norm	0	proEM	9		
102	RANI	40	3	9	1	5	0	norm	6	0	norm	0	norm	0	proEM	9		
103	SUDHA	45	4	9	1	12	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
104	KAMACHI	40	3	9	1	8	0	norm	9	0	norm	0	norm	0	proEM	9		
105	ROSI	40	3	9	1	6	0	norm	5	0	norm	0	norm	0	proEM	9		
106	SANTHA	45	4	10	1	13	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
107	LAVANYA	41	4	10	1	7	0	norm	7	0	norm	0	norm	0	secEM	9		
108	SWEETY	41	4	5	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
109	PRADEEPA	41	4	6	1	17	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
110	RENUGA	41	4	7	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
111	ANITHA	40	3	5	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
112	SAVEETHA	39	3	6	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
113	BARANI	42	4	7	1	16	1	EMhy	17	1	EMhy	1	EMhy	1	SH	1	1	SH
114	PAVITHRA	45	4	5	1	19	1	EMhy	20	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
115	RAJAKUMARI	39	3	6	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
116	DEEPA	42	4	7	1	12	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
117	MUNIYAMMA	39	3	6	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
118	ANNAMALAI	43	4	6	1	11	0	norm	11	0	norm	0	norm	0	proEM	9		
119	KASTURI	42	4	6	1	19	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
120	SELI	39	3	6	1	6	0	norm	7	0	norm	0	norm	0	proEM	9		

121	NARMATHA	39	3	6	1	5	0	norm	6	0	norm	0	norm	0	proEM	9		
122	AMBIKA	40	3	6	1	16	1	EMhy	16	1	EMhy	1	EMhy	1	SH	1	1	SH
123	SARITHA	40	3	6	1	4	0	norm	5	0	norm	0	norm	0	proEM	9		
124	DAHNALAKSHMI	42	4	8	0	3	0	norm	5	0	norm	0	norm	1	proEM	9		
125	SATHYA	41	4	6	0	7	0	norm	7	0	norm	0	norm	0	proEM	9		
126	MAGESHWARI	40	3	9	0	17	1	EMhy	17	1	EMhy	1	norm	1	EMpol	1	3	EMpol
127	UMA	43	4	6	0	13	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
128	VIJAYALAKSH	42	4	7	1	13	0	norm	11	0	norm	0	norm	1	proEM	0	5	proEM
129	SHYLAJA	40	3	7	1	119	1	EMhy	20	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
130	SRIDEVI	34	2	6	1	7	0	norm	8	0	norm	0	norm	0	proEM	9		
131	MALATH	45	4	6	1	6	0	norm	7	0	norm	0	norm	0	proEM	9		
132	SATHYAPRIYA	36	3	6	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
133	KOSALYA	42	4	6	0	7	0	norm	7	0	norm	0	norm	0	proEM	9		
134	MALAR	40	3	6	0	12	0	norm	11	0	norm	0	norm	0	proEM	9		
135	DEVIPRIYA	41	4	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
136	VANI	44	4	8	0	5	0	norm	6	0	norm	0	norm	0	proEM	9		
137	INDU	37	3	8	0	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
138	RAGA	42	4	8	0	5	0	norm	6	0	norm	0	norm	0	proEM	9		
139	RAGAMATH NISHA	40	3	9	0	13	0	norm	13	0	norm	0	norm	0	proEM	0	5	proEM
140	RASATHI	41	4	9	0	4	0	norm	5	0	norm	0	norm	0	proEM	9		
141	PADMA	40	3	9	0	10	0	norm	9	0	norm	0	norm	0	proEM	9		
142	BAKYA	45	4	8	0	17	1	EMhy	17	1	EMhy	1	EMhy	1	SH	1	1	SH
143	PARAMESHWARI	43	4	9	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		

144	VALAR	44	4	8	0	5	0	norm	6	0	norm	0	norm	0	proEM	9		
145	MURUGESHWARI	40	3	8	1	12	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
146	SUNDARI	42	4	7	1	7	0	norm	8	0	norm	0	norm	0	proEM	9		
147	PODUMPONA	44	4	6	1	11	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
148	MANIMEGALAI	39	3	6	1	6	0	norm	6	0	norm	0	norm	0	proEM	9		
149	GANASUNDARI	40	3	6	1	10	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
150	UMA	35	2	7	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
151	VENODINI	36	3	6	1	6	0	norm	7	0	norm	0	norm	0	proEM	9		
152	PRABA	38	3	6	1	18	1	EMhy	17	1	EMhy	1	EMhy	1	CH	1	2	CH
153	IYAMMA	32	2	6	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
154	UNAMALI	33	2	9	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
155	devagi	36	3	6	1	6	0	norm	6	0	norm	0	norm	0	proEM	9		
156	RADIKA	42	4	9	1	20	1	EMhy	21	2	EMpol	3	SMfb	1	EMpol	1	3	EMpol
157	SASIKALA	36	3	8	1	5	0	norm	6	0	norm	0	norm	0	SecEM	9		
158	PONGODI	32	2	8	1	5	0	norm	6	0	norm	0	norm	1	SecEM	9		
159	USHA RANI	40	3	7	1	13	0	Norm	11	2	EMpol	2	EMpol	1	SH	1	3	EMpol
160	KAMACHI	39	3	5	1	21	3	SMfb	22	3	SMfb	3	SMfb	1	SH	1	4	SMfb
161	ARULMOZIL	32	2	6	0	7	0	norm	7	0	norm	0	norm	0	proEM	9		
162	MARVIZLI	43	4	7	0	11	0	norm	10	0	norm	0	norm	0	proEM	0	5	proEM
163	GOMATHIDEVAKI	31	2	8	0	8	0	norm	9	0	norm	0	norm	0	proEM	9		
164	RAMANI	40	3	6	0	19	1	EMhy	18	1	EMhy	1	EMhy	1	EMpol	1	3	EMpol
165	VENILA	32	2	7	0	8	0	norm	7	0	norm	0	norm	0	proEM	9		
166	MYTHILI	31	2	6	0	6	0	norm	7	0	norm	0	norm	0	proEM	9		
167	RENUKA	44	4	6	0	12	0	norm	9	0	norm	0	norm	0	proEM	0	5	proEM

168	AMUTHA	40	3	7	0	13	0	norm	13	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
169	KARPAKAM	40	3	6	0	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
170	MEEANKSHI	39	2	5	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
171	RASATHI	39	2	8	0	7	0	norm	8	0	norm	0	norm	0	proEM	0	5	proEM
172	KANAMMA	38	2	9	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
173	KUMUTHA	42	4	6	0	11	0	norm	11	0	norm	0	norm	0	proEM	0	5	proEM
174	RANI	34	2	8	0	7	0	norm	7	0	norm	0	norm	0	proEM	9		
175	RAMA	44	4	8	0	10	0	norm	10	0	norm	0	norm	0	proEM	0	5	proEM
176	KUMARI	39	3	8	1	18	1	EMhy	18	1	EMhy	1	EMhy	1	SH	1	1	SH
177	MANIMEGALI	44	4	9	1	11	0	norm	11	0	norm	0	Norm	0	proEM	0	5	proEM
178	SIVAGAMI	36	3	6	1	11	0	norm	11	0	norm	0	norm	0	proEM	9		
179	SUSILLA	42	4	6	1	19	3	SMfb	20	3	SMfb	3	SMfb	1	SMfb	1	4	SMfb
180	ESWARI	35	2	8	1	7	0	norm	7	0	norm	0	norm	0	proEM	9		
181	THENMIZOHI	36	3	6	1	8	0	norm	8	0	norm	0	norm	0	proEM	9		
182	JAMUNA	40	3	8	0	18	1	EMhy	18	1	EMhy	1	EMhy	1	EMpol	1	3	EMpol
183	VASANTHI	43	4	6	0	13	0	norm	12	0	norm	0	normal	0	proEM	1	4	SMfb
184	SETALLA	37	3	7	0	18	3	SMfb	17	2	EMpol	2	EMpol	1	EMpol	1	3	EMpol
185	VIJAYA	43	4	6	0	19	3	SMfb	19	3	SMfb	3	SMfb	1	EMpol	1	3	EMpol
186	HEMAVATHI	39	3	6	0	8	0	norm	8	0	norm	0	norm	0	proEM	9		
187	JEROM	38	3	7	0	18	2	EMpol	17	1	EMhy	1	EMhy	1	SH	1	1	SH
188	CELLIN	42	4	8	0	7	0	norm	7	0	norm	0	norm	0	proEM	0	5	proEM
189	SUSEELA	44	4	6	0	9	0	norm	9	0	no0rm	0	norm	0	proEM	0	5	proEM
190	JANAKI	43	4	8	1	19	2	EMpol	19	1	EMhy	1	EMhy	1	SH	1	1	SH
191	SUDHA	43	4	6	1	13	0	norm	12	0	norm	0	norm	0	proEM	0	5	proEM

192	PARVEEN	39	3	6	1	14	1	EMhy	12	0	norm	0	norm	0	proEM	0	5	proEM
193	DURGADEVI	44	4	6	1	12	0	norm	12	0	norm	0	norm	0	proEM	1	3	EMpol
194	AYSHA	44	4	7	1	13	0	norm	12	0	norm	0	norm	1	SMfb	1	4	SMfb
195	INDUMATHI	43	4	8	1	19	3	SMfb	20	3	SMfb	0	norm	1	SMfb	1	4	SMfb
196	BAKYAVATHI	39	3	8	1	7	0	norm	7	0	norm	0	norm	0	SecEM	9		
197	VALLI	43	4	8	1	15	2	EMpol	13	0	norm	0	norm	0	proEM	0	5	proEM
198	SALIMA	42	4	6	1	16	1	EMhy	18	3	SMfb	3	SMfb	1	SMfb	1	4	SMfb
199	BOMMI	45	4	6	1	13	0	norm	11	0	norm	0	norm	1	SMfb	1	4	SMfb
200	FLORA	43	4	6	1	15	3	SMfb	18	2	EMpol	0	norm	0	proEM	0	5	proEM