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ACCURACY OF TRANSVAGINAL ULTRASOUND IN THE DIAGNOSIS OF ENDOMETRIAL POLYPS: A SYSTEMATIC REVIEW

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Diagnostic accuracy, endometrial polyp, endometrial thickening, abnormal uterine bleeding, ultrasound, sonography, transvaginal ultrasonography (TVUS), ultrasound sensitivity.

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Abstract

Background: *Endometrial polyps are focal intrauterine endometrial neoplasm that may be single or multiple. Their size varies from few millimeters to several centimeters, and their morphology may be sessile with large or small implantation base or pedunculated. The aim of this study is to access the diagnostic accuracy of transvaginal ultrasound in the diagnosis of endometrial polyps in symptomatic as well as asymptomatic patients.*

Methods: *This systematic review follows PRISMA guidelines. A comprehensive literature search was done including PubMed, Scopus and Google Scholar.*

Results: *A total of 2040 articles were identified through database searching. After removing 140 duplicate records, 1900 articles remained for screening. During the title and abstract screening phase, 1750 articles were excluded due to irrelevance or not meeting the study criteria. This left 150 full-text articles for detailed eligibility assessment. Among these, 150 articles were further excluded due to reasons such as insufficient data, lack of comparative analysis, or methodological limitations. Finally, 10 studies were selected for inclusion in the systematic review and analysis.*

Conclusion: *Transvaginal ultrasound proves to be a valuable and widely used tool for assessing endometrial abnormalities, its diagnostic limitations should be acknowledged. In cases where uncertainty remains, adjunctive testing should be considered to enhance accuracy and optimize patient management.*

INTRODUCTION

Endometrial polyps are focal intrauterine endometrial neoplasm that may be single or multiple. Their size varies from few millimeters to several centimeters, and their morphology may be sessile with large or small implantation base or pedunculated.[1] Endometrial polyps consist of three elements: endometrial glands, stroma, and blood vessels. Known risk factors for the development of endometrial polyps are advanced age, hypertension, obesity, and tamoxifen use among others. Tamoxifen is an effective and widely used adjuvant therapy for women with breast cancer because it reduces recurrence rates and prolongs disease free survival. It is a partial estrogen agonist in that it exhibits anti-estrogenic activity in the breast,

but has a stimulatory effect on the endometrium. This hormonal activity results in a higher incidence of post-menopausal vaginal bleeding and endometrial pathology such as endometrial polyps, hyperplasia and cancer [2]. Endometrial polyps may be asymptomatic, and when causing symptoms, the most common clinical manifestations include abnormal (including postmenopausal) uterine bleeding and less commonly infertility. Malignant transformation is rare, and occurs in 0%–12.9% of cases, based on large cohort analysis. Transvaginal ultrasound (TVUS) is the initial noninvasive modality of choice for the evaluation of endometrial polyps[3]. Endometrium evaluation is significantly aided by ultrasound, which is non-invasive, inexpensive, and administered in outpatient clinics with minimal patient discomfort. Infertility, postmenopausal hemorrhage, heavy otherwise irregular vaginal bleeding, pelvic pain, & postmenopausal bleeding are all potential indications for pelvic ultrasound Transabdominal sonography (TAS) and transvaginal sonography (TVS) are customary diagnostic procedures, occasionally complemented by color Doppler imaging[4]

In TAS uterus and ovaries are visualized by using 3-5MHz transducer at a depth of 10-15cm through full urinary bladder, which acts as an acoustic window whereas with TVS, same structures are visualized at a depth of 1-8cm by 5-7MHz transducer, which does not require a full urinary bladder. TVS unquestionably provides excellent depiction of pelvic organs. TAS provides an overview of both normal structures and pathological lesions. TVS is superior in obese patients, in patients with retroverted uterus, it also bypasses obstacles such as gas filled bowel and extensive pelvic adhesions and there is no need for the patient to have uncomfortably full bladder as in TAS[5]

Transabdominal ultrasound (TAS) is used to assess the female pelvic organs and scanning through lower abdomen, it provides an overview of the pelvis rather than detailed images. It is particularly helpful for the examination of large pelvic masses extending into the abdomen, which are not always well viewed with TVS[6]

As TVUS becomes more widely used in routine gynecological practice, the diagnosis of endometrial polyps in asymptomatic women is becoming more common, and physicians have to decide whether to treat these patients with incidental findings[7]. TVS has led to an increased detection of endometrial polyps in symptomatic and asymptomatic women. However, the diagnostic accuracy of TVS still varies across different studies and the need for routine polypectomy is still the subject of discussion[8]. In addition, the increasing use of transvaginal ultrasound scanning has resulted in many more asymptomatic (i.e nonbleeding) polyps being diagnosed. Finding a noninvasive method to reliably distinguish benign endometrial polyps from polyps that are malignant or even hyperplastic would be advantageous, especially to peri-menopausal women with minimal or absent symptoms who might then avoid surgical intervention. Previously, color Doppler sonography has been used to assist in the differentiation of benign and malignant masses of the ovary[9]. At present, transvaginal ultrasonography (TVUS) is used as a first step in the evaluation of women with postmenopausal bleeding. The probability of malignant pathology is strongly reduced in the presence of a distinct endometrial ultrasound with an endometrial thickness[10]. The addition of intrauterine contrast by the addition of saline during saline infusion sonohysterography (SIS) improves diagnostic accuracy of detecting endometrial polyps, especially because SIS can better delineate small endometrial polyps[11].

METHOD AND MATERIAL

This systematic review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines but does not include a meta-analysis. This study aims to systematically evaluate and compare the diagnostic accuracy of transvaginal ultrasound (TVUS) in detecting endometrial polyps in women with abnormal uterine bleeding or other gynecological indications. A systematic search was conducted in Google scholar, PubMed, EMBASE, Scopus, and Cochrane databases. Keywords included: endometrial polyps, endometrial thickening, abnormal uterine bleeding, ultrasound or sonography, transvaginal ultrasonography, and transabdominal ultrasonography

This study includes previous studies evaluating the diagnostic accuracy of TVUS for endometrial polyps, prospective and retrospective studies randomized controlled trials (RCTs), and observational studies and studies published in peer-reviewed journals. While excluding the case reports, editorials, and expert's opinions, studies involving other endometrial

pathologies and studies that have incomplete data as well as animal based studies are also excluded.

RESULTS

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines but does not include a meta-analysis for accuracy of TVUS in diagnosing endometrial polyps follows a structured selection process. Initially, 2040 articles were identified through database searching. After removing 140 duplicate records, 1900 articles were considered for screening. During the title and abstract screening phase, 1750 articles were also excluded due to irrelevance or not meeting the study criteria. 150 full-text articles for detailed eligibility assessment were left. Among these, 150 articles, further were excluded due to reasons such as insufficient data, lack of comparative analysis, or methodological limitations. Finally, 10 studies were selected for inclusion in the systematic review and analysis.

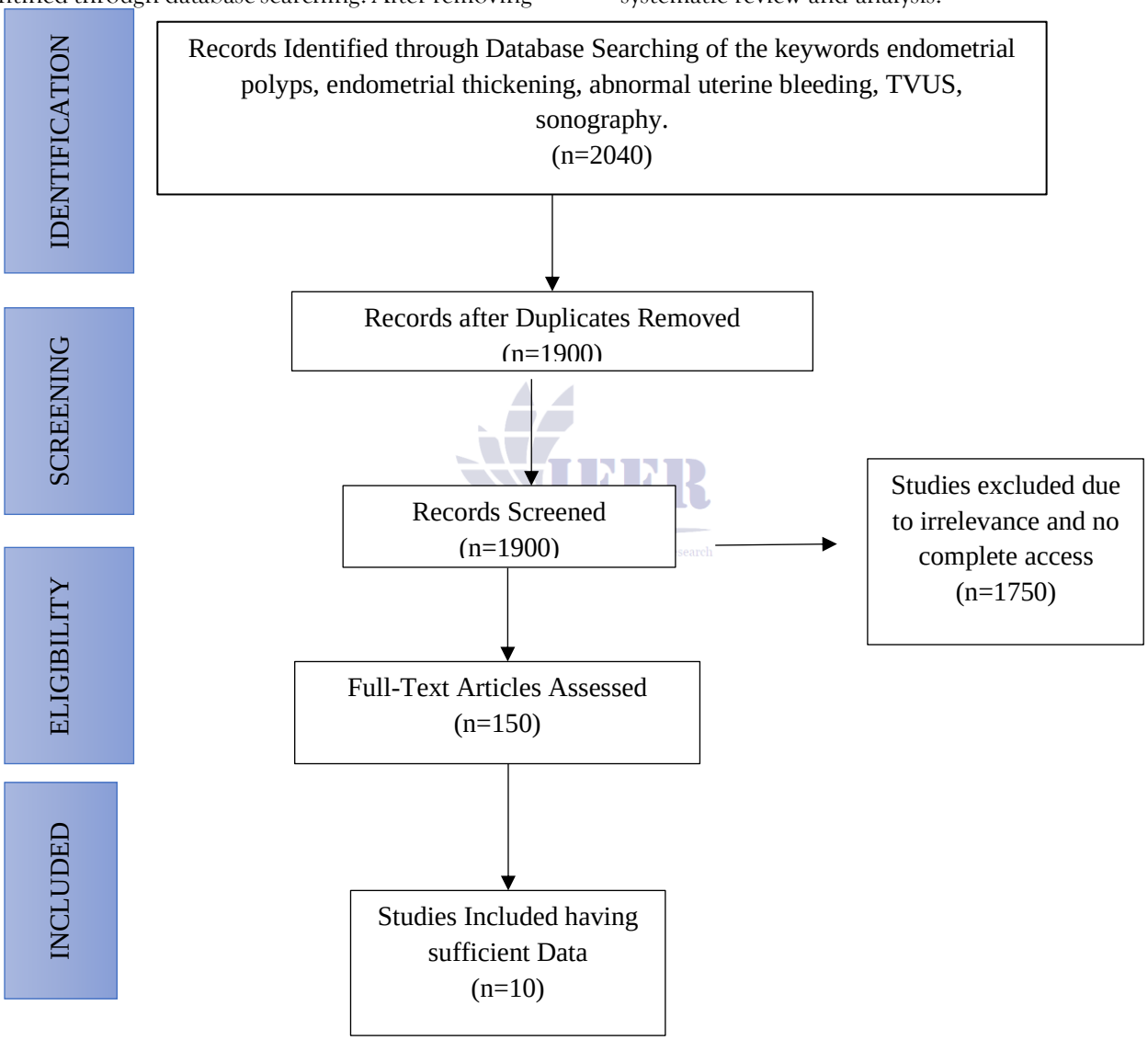

Figure 1: PRISMA flow diagram

Table 1: Accuracy of transvaginal ultrasound in detecting endometrial polyps.

Authors	Year	Total cases	Cases of EP	Modality	SN	SP	PPV	NPV
Rawhia T. Hassan[4]	2024	30	11	TVUS	100%	72.73%	63.6%	100%
Manal Niazi[5]	2015	200	6	TVUS	96%	89%	97%	84%
Media Ghazi Sedeq[6]	2015	98	9	TVUS	100%	94.7%	--	--

R. MACHTINGER[7]	2005	438	350	TVUS	75%	-	75%	-
Yevheniia Poliakova[8]	2020	266	97	TVUS	68.9%	50.9%	73.1%	26.8%
J WEAVER[2]	2005	56	19	TVUS	97%	35%	66%	72%
Salvatore Giovanni Vitale[1]	2021	487	215	TVUS	70%	50%	80%	-
SOHA TALAAT[12]	2009	41	22	TVUS	100%	95.2%	-	-
Shaimaa A. Fadl[11]	2018	151	80	TVUS	83.3%	63%	69.2%	54.1%
Vatsal Patel[13]	2017	304	44	TVUS	65.65%	78.6%	12.3%	95%

EP = endometrial polyps, SN= sensitivity, SP= specificity, PPV= positive predictive value, NPV= negative predictive value

DISCUSSION

In 2024, a prospective comparative study was conducted by Rawhia T. Hassan on transabdominal, transvaginal and Doppler ultrasound. 30 individuals participated in this prospective comparative research. The patient's age ranged from 34 to 71 and the BMI ranged from 20 to 36. The study shows that there was statistically significantly substantial agreement between biopsy outcomes and ultrasound outcomes with 100 % sensitivity, 82.6 % specificity[4]. In 2015, a study conducted by Manal Niazi, on transvaginal ultrasound to evaluate its diagnostic performance. The study was carried out from October 2014 till April 2015. Ages of the patients were between 35 to 39 years of age. Major clinical indication for a pelvic ultrasound examination was abnormal bleeding. This study concluded that trans-vaginal sonography is more sensitive and specific than trans-abdominal sonography[5]. In 2015, a prospective comparative study was conducted by Media Ghazi Sedeq. The study included 100 women presenting with abnormal uterine bleeding (2 were excluded from analysis). Ultrasound findings were compared with histopathological results. The study claims that transvaginal ultrasound scanning is an excellent tool for the determination, whether further investigation with histopathological examination of endometrial biopsy is necessary or not for women presented with abnormal uterine bleeding[6].

A study was conducted by R. MACHTINGER in 2005 to assess accuracy of transvaginal ultrasound (TVUS) and diagnostic hysteroscopy in diagnosing endometrial polyps. The study was designed to retrospectively analyze 438 women who underwent operative hysteroscopy in a day-care unit when endometrial polyp was suspected after TVUS and diagnostic hysteroscopy. It was concluded that TVUS with diagnostic hysteroscopy reliably evaluates endometrial polyps[7]. In 2020, Yevheniia Poliakova conducted a study for diagnostic accuracy of transvaginal ultrasound for diagnosis of endometrial polyps. This was a single-center retrospective study of woman who underwent TVS from January 2017 to January 2018. The study included 266 patients. This cohort study would suggest that there might be a need to provide patients with an array of diagnostic options so that an informed decision can be reached[8]. A study was conducted by J WEAVER in 2005. The aim of this study was to determine the accuracy of transvaginal ultrasound (TVS) in diagnosing endometrial pathology in symptomatic women. Of the 56 women undergoing TVS and endometrial biopsy, 30 of 56 (54%) had endometrial disease. There was only one case of endometrial cancer, 10 cases of endometrial hyperplasia (one with cytological atypia) and 19 endometrial polyps. The study reveals that positive TVS result is of little value, so further testing is mandatory in order to detect benign and malignant endometrial disease.[2]

In 2021, Salvatore Giovanni Vitale conducted a study for diagnosis and management guide of endometrial polyps. This study claims that the diagnostic accuracy of TVUS is increased when color doppler, 3D investigation and contrast are used. Study showed that overall sensitivity rates were 70 % for transvaginal ultrasound, while the overall specificity rates were 50%[1]. A study conducted by SOHA TALAAT in 2009, comparing the diagnostic value of ultrasound and color doppler diagnosing endometrial pathologies. 41 participants underwent TVUS, colour flow mapping and power Doppler and so also 3 & 4 D US. Saline infusion sonohysterography (SIS) was performed to 10 patients and Hysterosalpingography (HSG) was done to 6 patients. The results showed that

the sensitivity on TVS in detection of polypoidal masses was 100%, but the specificity of mass characterization was 95.2%[12]. In 2018, Shaimaa A. Fadl conducted a study. The aims of this study was to determine the diagnostic accuracy of TVUS in detecting endometrial polyps in patients with abnormal uterine bleeding or infertility. A total of 151 consecutive women presenting with DUB and infertility who underwent TVUS and SIS were retrospectively evaluated. 80 patients were confirmed to have endometrial polyps. The study concluded that saline infusion sonohysterography may still be needed to confirm a TVUS diagnosis for polyps to limit the number of negative hysteroscopies[11]. Vatsal Patel in 2017 conducted a study. The aim of our study was to evaluate the clinical correlation between the TVUS endometrial thickness and histopathologic findings on endometrial biopsies in postmenopausal women with PMB. This study was restricted to only women who had a TVUS within 30 days of endometrial biopsy. The TVUS findings in our study population lacked sufficient sensitivity and specificity for the purposes of diagnosing[13].

CONCLUSION

Based on the studies reviewed, transvaginal ultrasound (TVUS) has demonstrated significant diagnostic value in evaluating endometrial pathologies, particularly in cases of abnormal uterine bleeding and suspected endometrial polyps. However, while TVUS proves to be a valuable and widely used tool for assessing endometrial abnormalities, its diagnostic limitations should be acknowledged. In cases where uncertainty remains, adjunctive testing should be considered to enhance accuracy and optimize patient management.

AUTHOR CONTRIBUTION

Author	Contribution
Syeda Saliha Shah	Manuscript writing, Conceptualization, and methodology
Muhammad Zubair	Supervision, review of methodology, and editing of the final draft.
Sana Bahadar	Data extraction, risk of bias assessment, data synthesis, and critical revision of the manuscript.
Amir Nawaz	Quality assessment, formatting, reference management, and proofreading

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