

ORIGINAL RESEARCH ARTICLE

Comparison of transperineal ultrasound findings and pelvic organ prolapse quantification examination in women with pelvic organ prolapse: A prospective cross-sectional study

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Abstract

This study aimed to evaluate and compare the findings of transperineal ultrasound (TPUS) with those obtained through the Pelvic Organ Prolapse Quantification (POP-Q) system in women with symptoms of pelvic organ prolapse (POP). This cross-sectional study evaluated 30 women at a gynecological clinic in Kerman, Iran (March–August 2021). Prolapse severity was assessed during maximum Valsalva using both POP-Q and TPUS. Data analysis in SPSS-25 included Cohen's kappa for agreement and Student's t-test for mean comparisons. According to the POP-Q system, Stage II prolapse (POP-Q) was most common in the posterior compartment (78.8%), while TPUS most frequently detected anterior compartment prolapse (56.7%). The highest agreement was between POP-Q stage I anterior prolapse and TPUS anterior findings. Overall agreement was moderate ($\kappa = 0.333$), with a significant positive correlation between the two methods' severity assessments. The results indicate a moderate agreement between the POP-Q system and TPUS in the assessment of pelvic organ prolapse. TPUS appears to be a valuable complementary diagnostic tool, particularly for identifying conditions such as enterocele, rectal intussusception, and muscular defects. Further research with larger samples is needed. Given its ability to detect associated pelvic floor abnormalities often missed by physical examination alone, the incorporation of TPUS into the routine diagnostic workup for women with POP symptoms is recommended. Such an approach may improve surgical planning and reduce reoperation rates, and health policymakers should consider including TPUS in clinical guidelines as a standard adjunct to POP-Q assessment. (*Afr J Reprod Health* 2026; 30 [19]: 61-70).

Keywords : Transperineal Ultrasound, Pelvic Organ Prolapse Quantification, Pelvic Organ Prolapse, Female Pelvic Floor

Résumé

Cette étude visait à évaluer et à comparer les résultats de l'échographie transpérinéale (ETP) avec ceux obtenus grâce au système de classification du prolapsus des organes pelviens (POP-Q) chez des femmes présentant des symptômes de prolapsus des organes pelviens (POP). Cette étude transversale a porté sur 30 femmes suivies dans une clinique gynécologique de Kerman, en Iran (mars-août 2021). La sévérité du prolapsus a été évaluée lors d'une manœuvre de Valsalva maximale, en utilisant à la fois le système POP-Q et l'ETP. L'analyse des données (logiciel SPSS-25) a inclus le calcul du coefficient kappa de Cohen pour mesurer la concordance et le test t de Student pour comparer les moyennes. Selon le système POP-Q, le stade II était le plus fréquent au niveau du compartiment postérieur (78,8 %), tandis que l'ETP a le plus souvent détecté un prolapsus du compartiment antérieur (56,7 %). La meilleure concordance a été observée entre le stade I du prolapsus antérieur selon le POP-Q et les résultats de l'ETP pour ce même compartiment. La concordance globale était modérée ($\kappa = 0,333$), avec une corrélation positive significative entre les évaluations de la sévérité réalisées par les deux méthodes. Les résultats indiquent une concordance modérée entre le système POP-Q et l'ETP pour l'évaluation du prolapsus des organes pelviens. L'ETP apparaît comme un outil diagnostique complémentaire précieux, notamment pour identifier des affections telles que l'entérocele, l'invagination rectale et les anomalies musculaires. Des recherches supplémentaires portant sur des échantillons plus vastes sont nécessaires. Compte tenu de sa capacité à détecter des anomalies associées du plancher pelvien souvent méconnues lors du seul examen clinique, l'intégration de l'ETP dans le bilan diagnostique de routine des femmes présentant des symptômes de POP est recommandée. Une telle approche pourrait améliorer la planification chirurgicale et réduire les taux de réintervention ; les décideurs en matière de santé devraient envisager d'inclure l'ETP dans les recommandations cliniques en tant que complément standard à l'évaluation POP-Q. (*Afr J Reprod Health* 2026; 30 [19]:61-70).

Mots-clés: Échographie trans-périnéale, quantification du prolapsus des organes pelviens, prolapsus des organes pelviens, plancher pelvien féminin

Introduction

Pelvic Organ Prolapse (POP) is a prevalent gynaecological condition characterised by the descent of pelvic organs—such as the uterus, bladder, or rectum—into or through the vaginal canal due to weakening or damage of the pelvic floor muscles and connective tissues. This condition significantly impacts women's physical, psychological, and social well-being, particularly in older women or those with a history of multiple vaginal deliveries. POP can cause a range of symptoms, including pelvic pressure, vaginal bulging, urinary incontinence or retention, defecatory dysfunction, and sexual discomfort, all of which can substantially impair quality of life.¹

The prevalence of POP varies considerably depending on the population studied and the diagnostic criteria used. Global estimates suggest that up to 50% of parous women may exhibit some degree of prolapse, although only 10–20% report symptoms severe enough to warrant medical intervention.² The condition is more prevalent among postmenopausal women due to reduced estrogen levels, which decrease collagen support in pelvic tissues.³ In addition, risk factors such as multiparity, advanced age, obesity, chronic constipation, and prior pelvic surgeries contribute to its development.⁴ Despite its widespread impact, POP remains underdiagnosed and undertreated, especially in low-resource settings, due to social stigma, limited awareness, and insufficient access to healthcare services.⁵

Traditionally, the Pelvic Organ Prolapse Quantification (POP-Q) system has been the gold standard for clinical evaluation of POP, offering a structured, reproducible method for assessing and staging prolapse severity.⁶ While POP-Q has proven useful in research and clinical practice, it is examiner-dependent and somewhat invasive, potentially leading to participants' discomfort. In contrast, Transperineal Ultrasound (TPUS) has emerged as a non-invasive, dynamic imaging technique that can assess pelvic organ descent during the Valsalva manoeuvre, along with potential abnormalities such as rectal intussusception, enterocele, and levator ani muscle avulsion. TPUS allows for a real-time, detailed

evaluation of pelvic floor structures, making it an appealing option for diagnosis and monitoring.⁷

Despite its promise, the comparison between TPUS and POP-Q remains inconsistent in the literature. While some studies have reported good agreement between these two methods, others have found significant discrepancies, particularly in assessing certain compartments of the pelvic floor.⁸ Moreover, few studies have focused on specific populations, such as women from southeastern Iran, where cultural, obstetric, and healthcare factors may influence both the clinical presentation and diagnosis of POP. This gap in research highlights the need for region-specific studies to determine the applicability of these diagnostic tools.⁹

The novelty of this study lies in its comparative analysis of POP-Q and TPUS findings within a unique and under-researched population of women from Kerman, Iran. While previous studies have predominantly involved Western or urban populations, this study provides valuable insights into the effectiveness of these diagnostic methods in a region with distinct socio-economic, cultural, and healthcare challenges. By correlating imaging findings with clinical symptoms, this research offers new perspectives on the functional relevance of each diagnostic tool, which could lead to improved diagnostic accuracy and treatment outcomes.

Given the increasing prevalence of POP, particularly in ageing populations, and the need for accessible and non-invasive diagnostic tools, this study seeks to determine whether TPUS can serve as a reliable alternative or complement to POP-Q in clinical practice, especially in resource-limited settings.^{10–12}

Methods

Study design and population

This prospective cross-sectional comparative study was conducted at the gynecological clinic of Afzalipour Hospital, Kerman, Iran, between March and August 2021 (corresponding to the first half of 1400 SH). The aim was to compare results from transperineal ultrasound and POP-Q-based clinical examination among women experiencing

symptoms of pelvic organ prolapse (POP). A census approach was used to determine the sample size, resulting in the inclusion of 30 participants through consecutive non-probability sampling.

POP-Q Examination

This prospective cross-sectional comparative study was conducted at the gynecological clinic of Afzalipour Hospital, Kerman, Iran, between March and August 2021. The study aimed to compare transperineal ultrasound findings with POP-Q physical examination results in women experiencing symptoms of pelvic organ prolapse (POP).

Upon receiving ethical approval and institutional permissions, the researcher explained the study aims and procedures to eligible participants, and written informed consent was obtained from all participants. A census approach was used to determine the sample size, and 30 participants were enrolled through consecutive non-probability sampling.

Inclusion criteria included women of reproductive age and postmenopausal women who presented with symptoms of pelvic floor dysfunction (including pelvic pressure or fullness, sensation of a vaginal bulge or lump, incomplete bladder or bowel emptying, or the need for manual assistance during urination or defecation) and were willing to participate in the study. Exclusion criteria were women with POP-Q stage III or IV prolapse, those with a history of previous pelvic prolapse surgery, unwillingness to continue participation, or more than 10% incomplete data in the study questionnaire.

A detailed data collection form was completed for each participant, capturing demographic information (e.g., age, body mass index, parity, delivery methods), previous surgeries, comorbidities, and prolapse-related symptoms.

Patients recruitment

Upon receiving ethical approval and institutional permissions, the researcher explained the study aims and procedures to eligible participants. Informed consent was obtained. A detailed data

collection form was completed for each participant, capturing demographic information (e.g., age, BMI, parity, delivery methods), previous surgeries, comorbidities, and prolapse-related symptoms including:

Pelvic pressure or fullness

Sensation of a bulge or lump from the vagina

Incomplete bladder or bowel emptying

Manual assistance needed for urination or defecation

Participants who reported one or more symptoms were physically examined in the supine and semiflexed hip position with an empty bladder and bowel. POP severity during maximal Valsalva was assessed using the standardized POP-Q system, which involves measuring six vaginal sites and three additional support points (genital hiatus, perineal body, and total vaginal length). POP staging was defined according to established criteria see Table 2.

Transperineal ultrasound scan

Transperineal ultrasound (TPUS) was performed using a Samsung HS50 ultrasound machine equipped with a curved abdominal probe with a frequency of 3.5–5 MHz. Patients were examined in the dorsal lithotomy position with an empty bladder to minimize discomfort and avoid displacement of pelvic organs. The probe was covered with a sterile sheath and placed gently on the perineum in the midsagittal plane. Imaging was performed both at rest and during maximal Valsalva maneuver, with the patient instructed to bear down for at least 5 seconds to achieve maximum pelvic organ descent. The inferoposterior margin of the symphysis pubis was used as the reference line for all measurements. Bladder neck position, cervical/vault descent, and rectal ampulla position were measured perpendicular to this reference line. The presence of rectocele, enterocele, and rectal intussusception was also assessed. All ultrasound examinations were performed by a single experienced gynecologist who was blinded to the POP-Q results.

Interval between the two tests

The POP-Q examination and transperineal ultrasound were performed on the same day during

a single clinic visit. The POP-Q examination was conducted first, followed by the transperineal ultrasound after an interval of approximately 30 minutes. This interval allowed the patient to rest briefly and empty the bladder, if required, without compromising the consistency of prolapse assessment.

Study quality assessment

To avoid bias, the physician conducting the transperineal ultrasound was blinded to both the clinical symptoms and results of the physical (POP-Q) examinations. Similarly, the clinician performing the POP-Q assessment was unaware of the ultrasound results. Ultrasound examination was performed using a Philips G-50 machine with a 3.5 MHz curved probe and a 9 MHz vaginal probe, positioned midsagittally. Measurements were recorded during three Valsalva manoeuvres. Only participants with POP-Q stage 2 or less underwent TPUS evaluation.

Outcome variables

The primary outcome variables of this study were the severity of pelvic organ prolapse in the anterior, middle, and posterior compartments, as assessed by both the POP-Q system and transperineal ultrasound. For the POP-Q examination, compartment-specific prolapse was defined using the standard anatomical points: points Aa and Ba for the anterior compartment, points C and D for the middle compartment, and points Ap and Bp for the posterior compartment. Prolapse was defined as descent of these points to or beyond the hymenal ring (≥ 0 cm) during maximal Valsalva maneuver. The overall POP-Q stage (Stage 0 to IV) was assigned according to the most distal point relative to the hymen.

For transperineal ultrasound, prolapse in each compartment was quantified by measuring the maximal descent of the relevant pelvic organ relative to the inferoposterior margin of the symphysis pubis on the midsagittal image during maximal Valsalva. Anterior compartment prolapse was defined as bladder neck descent ≥ 1 cm below the symphysis pubis reference line. Middle compartment prolapse was defined as cervical or

vaginal vault descent to or below this line. Posterior compartment prolapse was defined as rectal ampulla descent ≥ 1 cm below the reference line, or the presence of a rectocele, enterocele, or rectal intussusception during straining. All measurements were recorded in centimeters.

The secondary outcome variable was the degree of agreement between the POP-Q and TPUS findings, which was assessed using Cohen's kappa coefficient for categorical staging and the absolute measurements were compared between the two methods.

Data analysis

Data were analyzed using SPSS version 25.0 (SPSS Inc., Chicago, Illinois, USA). Qualitative variables were described using frequencies and percentages, and quantitative variables were summarized using means and standard deviations. The statistical significance threshold was set at $p < 0.05$. Analytical methods included Cohen's kappa coefficient for assessing agreement between diagnostic methods, and Student's t-test for comparing mean values between groups in Figure 1. Results for each compartment were reported according to the following stages in Table 1:

Explanatory note

POP = Pelvic Organ Prolapse;

POP-Q = Pelvic Organ Prolapse Quantification;

TVL = Total Vaginal Length;

Aa, Ba, Ap, Bp, C, D = Standard anatomical reference points in the POP-Q system.

No statistical test was applied in this staging table as it is based on descriptive anatomical classification according to the POP-Q system criteria. Then, participants diagnosed with stage 2 and below PO, received a transperineal ultrasound examination utilizing a 3.5 MHz curved probe followed by a 9 MHz vaginal probe from a Philips G-50 device, positioned in the midsagittal plane of the pelvis. The descent of the pelvic visceral organs during the Valsalva maneuver was measured and documented in accordance with the standard method (15). Maneuver and measurements were performed three times. It is important to highlight that throughout every phase of the physical

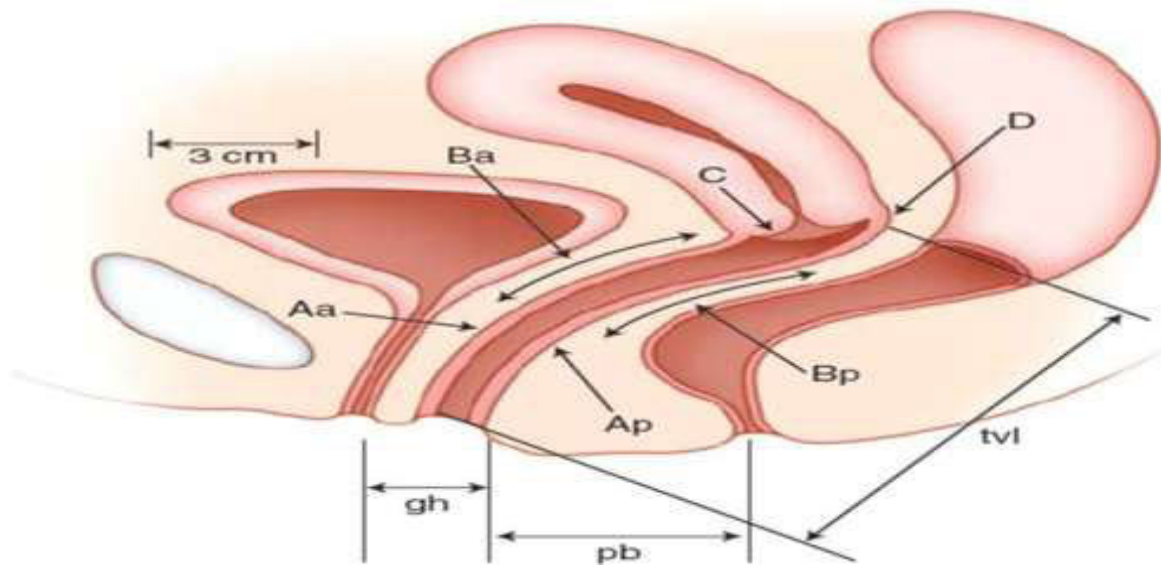


Figure 1: Pelvic organ prolapses quantification system - measurements of the POP-Q parameters and their representation

Table 1: Staging of Pelvic Organ Prolapse (POP) According to the POP-Q System

Staging of POP according to POP-Q system	
Stage 0	No prolapse. Anterior and posterior points are all -3, C and D are between Tv1-2cm
Stage 1	Stage 0 conditions are not present. The lowest point of prolapse is higher than 1 cm above the level of the hymen (1->)
Stage 2	The lowest point of prolapse is between 1 cm above and 1 cm below the level of the hymen (at least one of the points is -1, 0 or +1)
Stage 3	The lowest point of prolapse is more than 1 cm below the level of the hymen but not lower than Tv1-2cm.
Stage 4	Equivalent to complete vaginal prolapse. The lowest point of prolapse is at least Tv1-2cm

examinations and ultrasound, the medical specialist did not have knowledge of the participant's history, the symptoms documented in the data collection form, nor the results from the subsequent examinations (in the case of ultrasound, the physical examination results).

Ethical consideration

This study was approved by the Ethics Committee of Kerman University of Medical Sciences, Kerman, Iran. (Ethics code: IR.KMU.AH.REC.1400.149). All study participants provided informed Oral consent, and the researcher ensured the confidentiality of their information.

Results

The majority of participants were multiparous (76.7%), with two or more pregnancies reported by 76.7% of women. Among parous participants, the most common parity was one (33.3%), followed by two (30.0%) and three (13.3%). Regarding delivery history, 52.2% of first deliveries and 47.8% of last deliveries were vaginal (NVD), while cesarean section (C/S) accounted for 47.8% and 52.2%, respectively. Detailed demographic and obstetric characteristics are presented in Table 2.

The study findings indicated that, according to the POP-Q system, the majority of prolapse cases were classified as Stage II. Among those diagnosed with Stage II POP-Q, the posterior

Table 2: Demographic characteristics of participants

Variable	Sub-category	n (%)
Gravid	1	7 (23.3)
	2	9 (30)
	3	8 (26.7)
	≥4	6 (20)
	0 (zero)	7 (23.3)
Parity	1	10 (33.3)
	2	9 (30)
	3	4 (13.6)
Type of first delivery	NVD	12 (52.2)
	C/S	11 (47.8)
Type of last delivery	NVD	11 (47.8)
	C/S	12 (52.2)

Table 3: Comparison of POP-Q staging and transperineal ultrasound findings by compartment (n=30)

Compartment	POP-Q Stage II n (%)	POP-Q Stage I n (%)	POP-Q Stage 0 n (%)	TPUS Prolapse n (%)
Anterior	3 (10.0)	8 (26.7)	19 (63.3)	8 (26.7)
Posterior	11 (36.7)	1 (3.3)	18 (60.0)	3 (10.0)
Apical	4 (13.3)	3 (10.0)	23 (76.7)	4 (13.3)

Table 4: Relationships between TPUS and POP-Q results

Prolapse Site	Spearman's Correlation Coefficient (P.V)	Results	Ultrasound		Cohen's kappa
			Negative n (%)	Positive n	
Anterior	351 (0.29)	POP-Q Negative	3 (100)	5 (45.5)	0.545
		Positive	0 (0)	6 (54.5)	
Posterior	0.416 (0.203)	Negative	0 (0)	3 (30)	0.148
		Positive	1 (100)	7 (70)	
Apical	0.745 (0.152)	Negative	3 (30)	1 (50)	0.341
		Positive	0 (0)	1 (50)	
Anterior, Posterior, and Apical	0.428 (0.018)	Negative	6 (85.7)	9 (39.1)	0.333
		Positive	7 (14.3)	14 (60.9)	

Note: Data are presented as frequency and percentage [n (%)]. POP-Q: Pelvic Organ Prolapse Quantification system; TPUS: Transperineal Ultrasound. Correlation analysis was performed using Spearman's rank correlation coefficient. Inter-rater agreement was assessed using Cohen's kappa coefficient. Statistical analysis was conducted using Statistical Package for the Social Sciences, version 17.0 (SPSS Inc., Chicago, Illinois, USA).

compartment was the most frequently affected (78.8% of Stage II cases). In contrast, transperineal ultrasound (TPUS) detected prolapse most frequently in the anterior compartment (56.7% of TPUS-positive cases) and posterior compartment (46.7% of TPUS-positive cases). When comparing the two methods compartment by compartment, the highest concordance in detection rates was

observed in the anterior compartment, where 69.9% of participants had POP-Q Stage I anterior prolapse and TPUS concurrently identified anterior compartment prolapse in 56.7% of the overall sample. A detailed compartment-specific comparison of POP-Q and TPUS findings is presented in Table 3.

The findings of our study showed that the Cohen's kappa agreement coefficient between the POP-Q and transperineal ultrasound results was 0.333. Additionally, a positive and significant correlation was found between the prolapse stage according to the POP-Q system and the related TPUS results. Additional details are listed in Table 4.

Discussion

This cross-sectional study evaluated the concordance between transperineal ultrasound (TPUS) findings and clinical staging using the Pelvic Organ Prolapse Quantification (POP-Q) system in 30 women presenting with symptoms of pelvic organ prolapse (POP). The principal finding was a moderate overall agreement between the two diagnostic modalities (Cohen's $\kappa = 0.333$), indicating that while the methods share some consistency, they are not interchangeable. This level of agreement aligns with the findings of previous investigations that have similarly reported moderate correlations between TPUS and POP-Q assessments.^{13–16}

A key observation of the present study was the compartment-specific variability in diagnostic concordance. Agreement was satisfactory for the anterior compartment but notably poor for the posterior compartment, a pattern that has been consistently documented in the literature.^{16,18} There are several plausible anatomical and methodological explanations for this discrepancy. In the anterior compartment, the bladder neck serves as a well-defined, hyperechoic landmark that descends in a relatively predictable trajectory during the Valsalva maneuver, making sonographic visualization and measurement highly reproducible against the symphysis pubis reference line. Conversely, the posterior compartment presents inherent diagnostic challenges, as the clinical differentiation between a true rectocele and an enterocele during physical examination is notoriously difficult. Furthermore, POP-Q measurements in the posterior compartment are heavily influenced by perineal body displacement and hiatal distension during straining, parameters that do not have direct anatomical analogues in the midsagittal ultrasound plane. This mismatch

between the physical points of measurement (POP-Q) and the dynamic sonographic assessment of organ descent likely accounts for the weaker statistical correlation observed in the posterior compartment.¹⁹ From a clinical perspective, this underscores a key utility of TPUS; even when it does not perfectly correlate with POP-Q staging, it provides crucial diagnostic information by identifying the specific contents of the posterior compartment bulge (e.g., enterocele, rectal intussusception, or isolated rectocele), which has direct implications for surgical planning.²⁰

A further important finding was the discrepancy in the dominant site of prolapse identified by each method. POP-Q staging identified Stage II posterior compartment prolapse as the most prevalent finding (78.8%), whereas TPUS most frequently detected prolapse in the anterior compartment (56.7%). This disparity may be attributed to the fundamental differences in the measurement techniques. POP-Q is a fixed, point-based anatomical system that measures the most dependent portion of the vaginal wall, whereas ultrasound provides a dynamic, real-time assessment of actual organ position relative to a bony landmark. The greater sensitivity of TPUS for anterior compartment descent may reflect a true higher prevalence of cystocele that is under-appreciated on routine physical examination, or it could indicate that the standardized Valsalva effort during the ultrasound examination generates a more consistent and maximal pelvic floor strain, thereby unmasking anterior compartment descent that is not always elicited during the bimanual POP-Q examination.^{21–22}

However, several important limitations warrant consideration. The most significant of these is the small sample size ($n=30$), which limits the statistical power of the study and the generalizability of our findings to a broader population. The constrained timeframe and the absence of participant follow-up further limit the scope of the conclusions that can be drawn. An additional limitation is the lack of a third, independent reference standard (such as MRI or intraoperative findings) to serve as a definitive comparator, meaning the true diagnostic accuracy of each modality could not be established. Furthermore, the dataset was collected in 2021.

While there may be a concern regarding the timeliness of the data, the fundamental physical principles of ultrasound imaging and the clinical application of the POP-Q system have not changed in the intervening period, and the core clinical question of how these two readily available diagnostic tools compare remains highly relevant to contemporary practice.

Regarding the clinical and policy implications of this research, the moderate agreement confirms that TPUS cannot and should not replace the POP-Q system as a standalone diagnostic tool for pelvic organ prolapse. However, its role as a valuable, non-invasive, and cost-effective complementary tool is clearly demonstrated. Given that ultrasound equipment is widely available in numerous healthcare facilities across Iran, the incorporation of TPUS into the diagnostic workup for women with POP symptoms is advisable, particularly when there is clinical suspicion of levator muscle injury, enterocele, or rectal intussusception. Such an approach can refine surgical planning, guide conservative management, and may contribute to improved patient outcomes. Health policymakers and clinical guideline developers should consider formalizing the role of TPUS as a standard adjunct to physical examination. To strengthen this body of evidence, it is recommended that forthcoming studies be conducted across different health facilities with an increased sample size, extended duration, and comprehensive follow-ups. Furthermore, investigations adopting a systematic review and meta-analysis format would be valuable to consolidate the existing evidence and provide higher-level recommendations for clinical practice.

Conclusions

This study investigated the level of agreement between transperineal ultrasound (TPUS) and the POP-Q system in assessing pelvic organ prolapse (POP) among symptomatic women. The findings revealed a moderate overall concordance between the two diagnostic approaches, with the highest agreement observed in the anterior compartment. However, the posterior compartment demonstrated weak statistical correlation, possibly due to anatomical and methodological differences in evaluation techniques. While TPUS showed

potential as a supportive imaging modality, particularly in identifying conditions such as enterocele, rectal intussusception, and levator ani muscle trauma, it cannot yet be considered a reliable standalone diagnostic tool for prolapse assessment.

Given TPUS's accessibility, non-invasiveness, and cost-effectiveness, its role as a complementary method alongside the clinically established POP-Q system warrants further investigation.

Recommendations

In light of the findings and the observed variability between POP-Q and transperineal ultrasound assessments—particularly across different pelvic compartments—it is recommended that future studies be conducted using larger sample sizes and extended follow-up periods to enhance the statistical power and generalisability of results. Moreover, implementing similar investigations in a multi-centre framework could account for population diversity and clinical practice variations, thereby improving external validity. Finally, a systematic review and meta-analysis of existing studies would be valuable to synthesise available evidence, identify consistent diagnostic patterns, and provide clearer insights into the complementary role of TPUS alongside POP-Q in the evaluation of pelvic organ prolapse.

Strengths

This study has several notable strengths. A particular strength is its focus on a previously understudied population of women in southeastern Iran, representing the first local investigation on this topic conducted at Kerman University of Medical Sciences. As such, it addresses a regional gap in the literature and provides baseline data for future comparisons in this population. Additionally, the study employed a robust methodology to minimize potential bias. A single experienced gynecologist performed all POP-Q examinations, and a single radiologist conducted all TPUS assessments, with both examiners blinded to each other's findings. The use of the internationally standardized POP-Q system further enhances the reproducibility and comparability of the clinical

data, ensuring that the findings can be meaningfully interpreted within the broader urogynecological literature.

Limitations

Several important limitations of this study should be acknowledged. First, the small sample size (n=30) limits the statistical power of the study and the generalizability of the findings to a broader population. Second, the constrained timeframe and the absence of participant follow-up further restrict the scope of the conclusions that can be drawn regarding long-term outcomes. Third, an important limitation is the lack of an independent validation method to confirm the comparative accuracy of POP-Q and TPUS in detecting prolapse. Without a reference standard such as dynamic MRI or intraoperative findings, it is not possible to definitively determine which modality more accurately reflects the true anatomical severity of pelvic organ descent. The reported agreement therefore reflects concordance between two methods, rather than accuracy against a gold standard. Fourth, the single-center design means that the results may have been influenced by the specific demographic and clinical characteristics of the patient population at this institution. Finally, the fact that the data were collected in 2021 may be perceived as a limitation. However, the authors believe the dataset remains fully valid, as neither the fundamental physical principles of transperineal ultrasound imaging nor the standardized methodology of the POP-Q system have undergone any substantive changes in the intervening period. The diagnostic equipment used remains in contemporary clinical practice, and the core clinical question addressed by this study—how TPUS compares to POP-Q—remains a highly relevant and actively researched topic in urogynecology. Consequently, the findings retain their significance for current practice and future research directions.

Author's contribution

E Kheradi and M Mirzaei developed the study concept and design. E Vaghefi and Samira Sohbaty acquired the data. Z Salari and S Sohbaty analyzed and interpreted the data, and wrote the first draft of the manuscript.

All authors contributed to the intellectual content, manuscript editing and read and approved the final manuscript.

Conflict of interest

The authors declared no conflict of interest.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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