Role of ultrasonography in evaluation of various causes of pelvic pain in first trimester of pregnancy

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ABSTRACT

Introduction: Pelvic pain in early pregnancy presents a diagnostic challenge due to overlapping physiological and pathological causes. Ultrasonography is the primary modality for prompt and accurate diagnosis. The aim of this study was to evaluate the role of ultrasonography in determining the underlying causes of pelvic pain in first trimester pregnancies. **Methods:** A hospital-based cross-sectional study was conducted from April 2023 to September 2024 at the Radiology Department of Gandaki Medical College, Pokhara. A total of 87 pregnant women presenting with pelvic pain in their first trimester were evaluated using abdominal ultrasonography; transvaginal scans were performed when required. **Results:** Among the 87 pregnant women presenting with first-trimester pelvic pain, the mean age was 28.5±6.2 years (range 20–45 years), with most participants between 20 to 29 years. Nearly one-third were primigravida, and 35(40.2%) were nulliparous. A history of pelvic surgery was reported in 18(20.7%) of cases. The most frequent cause of pelvic pain was normal pregnancy 45(51.7%), followed by ectopic pregnancy 21(24.1%), abortion 12(13.8%), blighted ovum 3(3.4%), and simple ovarian cyst (22.3%). Less common causes included acute appendicitis, dermoid cyst, fibroid uterus, and distal ureteric calculus 1(1.1% each). **Conclusions:** Ultrasonography is an essential first-line imaging modality in the evaluation of pelvic pain in early pregnancy. It enables accurate differentiation between viable pregnancy, pregnancy loss, and non-obstetric causes, guiding timely management and improving maternal outcomes.

Keywords: First trimester, pelvic pain, pregnancy.

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INTRODUCTION

Pelvic pain in the first trimester of pregnancy (up to 12 weeks and 6 days) is a common and distressing complaint, arising from both physiological and pathological causes.[1] While normal changes such as ligament stretching and hormonal effects may explain some discomfort, more serious conditions—including ectopic pregnancy, miscarriage, gestational trophoblastic disease, ovarian cysts, pelvic inflammatory disease, and even non-gynecological disorders like appendicitis or urinary tract pathology—must be considered.[2,3] Accurate diagnosis requires careful clinical evaluation supported by diagnostic modalities such as urine beta-hCG, ultrasound, Doppler studies, and occasionally MRI or CT in selected cases.

Ultrasonography (USG) is the cornerstone in evaluating pelvic pain during early pregnancy due to its safety, accessibility, high diagnostic accuracy, and absence of radiation. It allows early confirmation of intrauterine pregnancy, assessment of embryonic viability, and detection of complications such as ectopic gestation, miscarriage, and adnexal or pelvic pathology. Transvaginal sonography in particular provides high-resolution imaging of the uterus and adnexa. Additional tools like color doppler further aid in differentiating pathologies. Despite limitations such as operator dependence and reduced sensitivity in obese patients, USG remains the most reliable

and non-invasive first-line modality for timely diagnosis and management.[4]

Several studies worldwide, including those from South Asian countries, have demonstrated the diagnostic value of USG in first-trimester pelvic pain, especially in identifying life-threatening conditions like ectopic pregnancy.[2,3] Notably, there is a lack of research on this topic within Nepal, where the prevalence and patterns of early pregnancy pain may differ. Our study is distinct in that it comprehensively evaluates multiple obstetric, gynecological, and non-gynecological causes of pelvic pain in the first trimester, emphasizing the pivotal role of USG. The objective of this study was to highlight the spectrum of sonographic findings in women presenting with pelvic pain during early pregnancy and to underscore its significance in guiding prompt and appropriate management.

METHODS

This descriptive one-time, cross-sectional study was conducted on 87 pregnant women presenting with pelvic pain in the first trimester at Department of Radiology and Imaging, Gandaki Medical College Teaching Hospital, Pokhara, Nepal, from April 2023 to September 2024. Data were collected after receiving ethical approval from Gandaki Medical College Institutional Review Committee (GMC-IRC) (Ref. No. 262/079/080). All participants referred to the Radiology department with pelvic pain in the first trimester of pregnancy were enrolled after obtaining informed consent excluding participants below 18 years of age and trauma patients. Participants demographic details, including age, gravida (total number of times a woman has been pregnant, regardless of outcome), parity (number of pregnancies carried to a viable gestational age regardless of whether the infant was born alive or stillborn), and history of previous pelvic surgeries, were recorded. Ultrasound examinations were performed using Samsung HS40 equipment with low-frequency curvilinear (2–8 MHz), high-frequency linear (3–16 MHz), and transvaginal probes (4–9 MHz) as needed. Imaging findings related to obstetric causes (e.g., fetal viability, molar pregnancy), gynecological causes (e.g., ovarian cysts, fibroids), and non-gynecological causes (e.g., appendicitis, nephrolithiasis) of pelvic pain were documented. All ultrasound procedures were conducted by the principal investigator under supervision. Data were collected on case record forms and analyzed using statistical package for social sciences (SPSS) version 25.0 to identify the various causes of pelvic pain in first-trimester pregnancies.

RESULTS

Among the 87 pregnant women presenting with pelvic pain in the first trimester, none were excluded from the study. The overall mean age of participants was 28.5 ± 6.2 years (range: 20 to 45 years). Most participants 53(60.9%) were in the 20 to 29 years and minimum 5(5.7%) in 40 to 49 age groups. (Table 1)

Table 1: Age distribution among study participants (n=87)

Age Category (in years)	Frequency(n)	Percentage(%)
Mean±SD	28.5±6.2	
20 to 29	53	60.9
30 to 39	29	33.9
40 to 49	5	5.7

Regarding the gravida, primigravida was most common 30(34.5%) and least 1(1.1%) was gravida 7. (Figure 1)

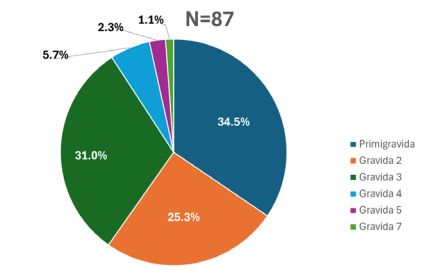

Figure 1: Distribution of gravida

Regarding the parity, the maximum finding was 35(40.2%) nulliparous women, while the minimum finding was 2(2.3%) participants with parity 3. (Figure 2)

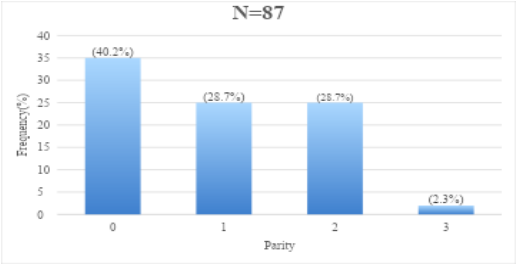

Figure 2: Distribution of parity

Regarding previous pelvic surgeries, 69(79.3%) participants had no surgical history, while 18(20.7%) had undergone pelvic surgery. (Figure 3)

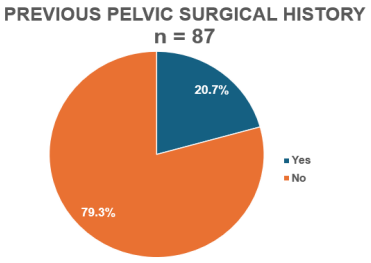

Figure 3: Distribution of participants by previous surgical history

The most common cause of pelvic pain in the first trimester was normal pregnancy, while the least common were acute appendicitis, dermoid cyst, fibroid uterus, and right distal ureteric calculus, as shown in Table 2.

Table 2: Causes of pelvic pain in the first trimester based on ultrasound findings

Findings	Frequency(n)	Percentage(%)
Normal Pregnancy	45	51.7
Ectopic Pregnancy	21	24.1
Abortion	12	13.8
Blighted Ovum	3	3.4
Simple ovarian cyst	2	2.3
Acute appendicitis	1	1.1
Dermoid cyst	1	1.1
Fibroid uterus	1	1.1
Right distal ureteric calculus	1	1.1

DISCUSSION

This descriptive study utilized ultrasonography to evaluate 87 participants experiencing pelvic pain during the first trimester of pregnancy.

This study showed the participants with pelvic pain during the first trimester of pregnancy were primarily between the ages of 20 and 29 years, with a mean age of 28.5±6.2 years. This is consistent with the study done by Waqar et al. and Iqbal et al. who reported average age as 26.8 years and 26.33 years respectively.[5,6] This is slightly lower than the mean age observed in the present study but falls within a similar reproductive age range. The similarity in age distribution across these studies underscores the importance of focusing on this demographic when evaluating pelvic pain in early pregnancy. Identifying patterns in age-related prevalence can aid clinicians in tailoring diagnostic and management strategies to address the unique needs of this population effectively.

This study found that multigravida women experienced pelvic pain more frequently compared to primigravida women and grand multigravida women. These findings highlight that pelvic pain is more commonly reported among women with multiple pregnancies, possibly due to cumulative physiological and anatomical changes associated with repeated pregnancies.

In this study, nulliparous women comprised the largest group experiencing pelvic pain. This distribution highlights that pelvic pain during the first trimester affects women across all parity groups, with a slightly higher prevalence among nulliparous women. These findings suggest that while parity may influence the occurrence of pelvic pain, other factors, such as individual physiological variations and underlying pregnancy-related conditions, likely play a significant role in its development.

The study also observed that the majority of pregnant women did not have a history of prior pelvic surgery. This indicates that previous pelvic surgeries may not be a predominant risk factor for pelvic pain in the first trimester, although further research could explore whether specific types of surgeries or related complications might influence the prevalence or severity of pain.

The findings of this study revealed that the majority of women with pelvic pain had normal pregnancies, followed by ectopic pregnancies and abortions. Similar findings with abortion and ectopic pregnancy being the most common cause was seen in the study done by Freire et al. and Samanta et al.[7,8] Likewise, Elbashir et al. identified miscarriage as the most common cause.[9] While bleeding and abortion was the commonest one in the study done by Waqar et al. and Muhannad et al. respectively.[5,10]

The consistency of findings across these studies underscores the critical role of ultrasonography in evaluating pelvic pain during early pregnancy. The diagnostic capabilities of ultrasound not only help identify gynecological and non-gynecological causes but also provide crucial insights into pregnancy viability and associated complications. This study contributes to the growing body of evidence and emphasizes the importance of a systematic and thorough ultrasonographic assessment in managing pelvic pain during the first trimester. These findings align with existing literature that emphasizes the multifactorial nature of pelvic pain during early pregnancy, where gravidity, parity, and surgical history all play interrelated roles. Understanding these demographic and clinical characteristics can help clinicians better anticipate and address the diverse etiologies of pelvic pain in this population.

This study was designed as a one-time cross-sectional assessment, meaning that it did not involve any follow-up evaluations to track changes over time. Additionally, the research was conducted in a small geographic area, which could limit the ability to generalize the findings to other regions or populations. Participants under the age of 18 were excluded from the study, as the legal age for sexual consent in Nepal is 18 years, according to Section 219(2) and Section 20(c) of Nepal's Muluki Criminal Code, 2074. Furthermore, trauma patients were not included in the study population to avoid potential confounding factors that could arise from the complexity of their medical conditions.

CONCLUSIONS

Ultrasonography proved essential as a first-line tool for evaluating pelvic pain in the first trimester, offering accurate and timely diagnoses across various conditions. While most women had normal pregnancies, many presented with ectopic pregnancies, abortions, or other pathologies, highlighting USG's role in identifying life-threatening issues. The study mainly involved younger, multigravida and nulliparous women, most without a history of pelvic surgery. Overall, it reinforces ultrasonography's importance in guiding prompt, informed clinical decisions for improved patient outcomes.

CONFLICTS OF INTEREST: None declared

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AUTHORS' CONTRIBUTIONS

KG contributed to the conception, study design, data collection, analysis, interpretation, and drafting of the manuscript. PG and KS provided supervision, methodological guidance, and critical review throughout the development of the study. All authors reviewed and approved the final version of the manuscript.

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