

Prevalence of Female Pelvic Pathology: A Retrospective Study among Patients Undergoing Magnetic Resonance Imaging for Pelvic Assessment at Prince Mohammed bin Nasser in Jazan Region

Musferha Ghazi Abdullah Alomari¹, Dr. Hassan Ahmad Alwadaani², Dr. Asrar Faisal Ageeli³, Farhan Saeed Ali Almalki⁴, Khalid Hasan Husain Gadri⁴, Mousa Hassan Mousa Wushayli⁴, Asayil Mohammed Abushamlah Hakami⁴, Bushra Ali Hadi Athlawi⁴

1. Radiology technologist, Jazan Specialist Hospital (Jazan Health Cluster)
2. Radiologist, Prince Mohammed Bin Naser hospital (Jazan Health Cluster)
3. Radiologist, Jazan general hospital (Jazan Health Cluster)
4. Radiology technologist, Prince Mohammed Bin Naser hospital (Jazan Health Cluster)

ABSTRACT

Introduction: Female pelvis contains urogenital and gastrointestinal organs, and disorders can affect women of all ages, presenting with various symptoms. MRI is a reliable diagnostic tool, offering superior imaging for pelvic pathologies, including tumors and adenomyosis, without radiation. This study aims to examine female pelvic disorders diagnosed via MRI in Jazan, Saudi Arabia.

Methodology: It is a retrospective study analyzes MRI pelvic findings among 86 adult female patients at Prince Mohammed bin Nasser Hospital (PMNH) from June 2020 to June 2023. Data was cleaned in Excel and analyzed by IBM SPSS 29.0.0.

Results: Our study included 86 patients, predominantly aged 41-50 years (n=26, 30.2%), with the majority having no comorbidities (n=84, 97.7%). Clinical presentations included lumps/masses (n=48, 55.8%), menstrual disturbances (n=39, 45.3%), and pelvic pain (n=32, 37.2%). MRI findings were abnormal in 93.0% (n=80), with benign pathologies such as adenomyosis (n=13, 15.1%). Malignancies were rare, with only 1 case of endometrial carcinoma (n=1, 1.2%). Ovarian pathologies included simple ovarian cysts (n=15, 17.4%) and endometriosis (n=7, 8.1%). Age and comorbidities showed no significant association with MRI findings ($p=0.165$ and $p=1.000$, respectively).

Conclusion: Our study underscores the importance of MRI in the accurate diagnosis of female pelvic pathologies, particularly in the identification of benign and malignant uterine and ovarian conditions. The findings are consistent with existing literature and support the usefulness of MRI as a crucial diagnostic tool in gynecology.

KEYWORDS: Pelvic Pathologies, Magnetic Resonance Imaging, pelvic pathologies, women, Saudi Arabia.

1. Introduction

The pelvis contains both urogenital and gastrointestinal organs, therefore disorders in this area may impact females of all age groups. The diseases exhibit variations in terms of their size, location, and categorization, including conditions such as tumors, ectopic pregnancy, ovarian torsion, and ruptured ovarian follicles, among others. Patients often exhibit gynecological symptoms such as irregular menstruation, atypical pelvic hemorrhage, and difficulty conceiving. Additional symptoms unrelated to gynecological issues, such as uncomfortable urination and difficulty with bowel movements, may also occur. Magnetic resonance imaging (MRI) and other imaging modalities may be valuable tools in diagnosing various illnesses, when used in conjunction with a thorough history and physical examination, for the purpose of early clinical diagnosis. MRI is a very reliable imaging method that may be used in pregnant individuals with suspected abdominal or pelvic malignancy. It does not use ionizing radiation and is widely regarded as safe for the fetus. Magnetic resonance imaging (MRI) offers a more comprehensive visualization of the female pelvic anatomy in gynecology, surpassing other imaging techniques like ultrasound and computed tomography (CT). The method offers the choice to use a paramagnetic contrast agent and enables the acquisition of high-resolution multiplanar pictures without any exposure to radiation. In the field of oncology, the use of MRI allows for a more comprehensive evaluation of the spread and behavior of the tumor. This is due to the ability of MRI to offer detailed information on the morphology of the disease, including its size, shape, number of lesions, presence of edema and necrosis, as well as its proximity to surrounding structures.(1)

MRI is advantageous for diagnosing specific uterine lesions like leiomyomas, widespread illnesses like adenomyosis, assessing complicated pelvic masses, determining the nature of adnexal lesions that are difficult to diagnose with ultrasound, and detecting and staging gynecological cancers. In addition, MRI is beneficial for postoperative surveillance, detecting tumor recurrence, and differentiating it from residual scarring after surgery.(2)

Additionally, MRI serves as a valuable problem-solving tool when ultrasound results are inconclusive.(3)

Finally, MRI has the potential to be a valuable technique for diagnosing uncertain conditions, we have not found any local literature at Jazan Region that particularly addresses the diagnosis or frequency of female pelvic disorders using MRI. This research seeks to uncover a wide range of female pelvic disorders that may be identified and diagnosed using MRI imaging. The goal is to provide clinicians with accurate data that can be used for future studies and analysis.

Purpose: To demonstrate the wide spectrum of female pelvic Pathologies that can be diagnosed using MRI at PMNH in Jazan region, Saudi arabia.

2. Methodology:

The research work involved collecting and analysing retrospective data from the Radiology Information System at PMNH, starting from June 1, 2020, to June 30, 2023. We focused on all MRI findings related to the female pelvis during this period. The

study included adult women who underwent pelvic MRI at PMNH due to gynaecological, urinary, or bowel symptoms. We excluded cases involving perianal fistulas, pelvic bone pathology, males, the paediatric age group, and fetal MRIs.

3. Results:

Our study included 86 patients, with the majority falling in the 41–50-year age group (n=26, 30.2%). A smaller percentage were aged over 50 years (n=14, 16.3%) and between 36–40 years (n=12, 14.0%). Other age groups included 31–35 years (n=10, 11.6%), 20–25 years (n=11, 12.8%), 26–30 years (n=7, 8.1%), and 14–19 years (n=6, 7.0%). Nearly all patients had no comorbidities (n=84, 97.7%), while only 2 had anemia (n=2, 2.3%). In terms of clinical presentation, 48 patients presented with a lump or mass (n=48, 55.8%), 39 with menstrual disturbances (n=39, 45.3%), and 32 with pelvic pain (n=32, 37.2%). Vaginal bleeding affected 12 patients (n=12, 14.0%), while rectal bleeding (n=3, 3.5%) and congenital anomalies (n=1, 1.2%) were less common.

Table 1:- Patient Demographic, Comorbidities and Clinical Presentation related characteristics (n=86)

		Frequency N (%)
Age (years)	14-19	6 (7.0%)
	20-25	11 (12.8%)
	26-30	7 (8.1%)
	31-35	10 (11.6%)
	36-40	12 (14.0%)
	41-50	26 (30.2%)
	>50	14 (16.3%)
		84 (97.7%)
Background Comorbidities	None	84 (97.7%)
	Anemia	2 (2.3%)
*Clinical Presentation	Lump/mass	48 (55.8%)
	Menstrual disturbance	39 (45.3%)
	Pelvic pain	32 (37.2%)
	Vaginal Bleeding	12 (14.0%)
	Rectal bleeding	3 (3.5%)
	Congenital anomaly	1 (1.2%)

N: frequency, %: percentage, *Note: The total is not 86 as some patients had more than one clinical presentation

Table 2 shows the prevalence of MRI Findings and different benign and malignant uterine pathologies. Out of the 86 patients, MRI findings revealed that the majority had abnormal results (n=80, 93.0%) (Figure 1 shows involved organs), while only a small proportion showed normal findings (n=6, 7.0%). Among benign uterine pathologies, different types of fibroids were classified based on location, with submucosal >50 intramural (n=3, 3.5%) and sub-serosal >50 intramural (n=3, 3.5%) being the most common. Other types included intramural (n=2, 2.3%), sub-serosal <50 intramural (n=2, 2.3%), and sub-serosal pedunculated (n=1, 1.2%). Additional benign pathologies included adenomyosis (n=13, 15.1%), endometrial polyp (n=1, 1.2%), and large uterine leiomyoma (n=1, 1.2%). Malignancies were rare, with only one case of endometrial carcinoma (n=1, 1.2%).

Table 2: - Prevalence of MRI Findings and different Benign and Malignant Uterine Pathologies (n=86)

		Frequency N (%)
MRI Findings	Normal	6 (7.0%)
	Abnormal	80 (93.0%)
Benign Pathology	Intramural	2 (2.3%)
	Submucosal >50 Intramural	3 (3.5%)
	Subserosal <50 Intramural	2 (2.3%)
	Subserosal >50 Intramural	3 (3.5%)
	Subserosal Pedunculated	1 (1.2%)
	Adenomyosis	13 (15.1%)
Other uterine pathology	Endometrial Polyp	1 (1.2%)
	Large Uterine Leiomyoma	1 (1.2%)
	Endometrial Carcinoma	1 (1.2%)

N: frequency, %: percentage

Figure 1 shows the distribution of different organ pathologies identified on MRI in a sample of 80 patients. The largest proportion of cases (46.25%) involve uterine/cervical pathology, followed closely by adnexal pathology at 41.25%. A smaller percentage of patients (7.5%) were diagnosed with both uterine/cervical and adnexal pathologies, while the remaining 5% had other pathologies, such as urinary bladder or rectal pathologies.

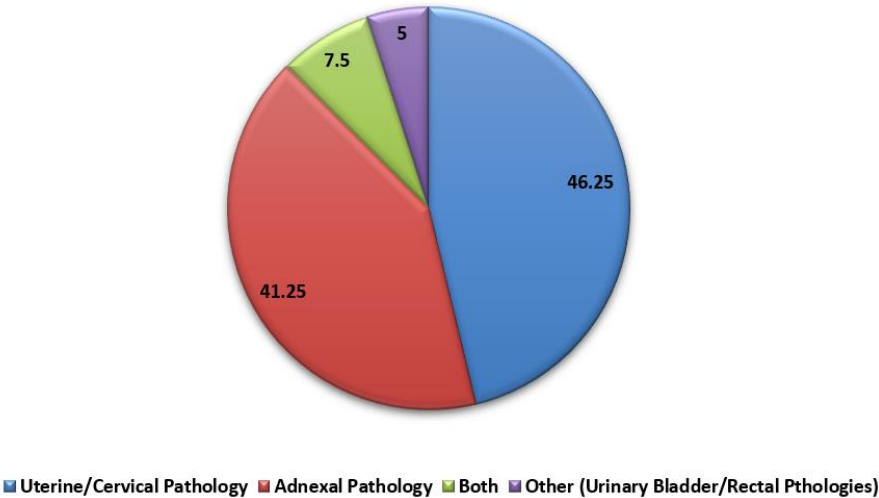


Figure 1: - Different Pathologies seen on MRI (n=80)

Table 3 shows different benign and malignant ovarian and other pathologies. Notably, the most prevalent benign ovarian pathology was a simple ovarian cyst (n=15, 17.4%), followed by complex cysts (n=7, 8.1%) and endometriosis or endometrioma (n=7, 8.1%). Ovarian hemorrhagic cysts were observed in 6 patients (n=6, 7.0%). Malignancies were less common, with 3 cases of rectal carcinoma (n=3, 3.5%) and 1 case of cervical carcinoma (n=1, 1.2%).

Table 3: - Different Benign and Malignant Ovarian and other Pathologies (n=86)

		Frequency N (%)
Benign Ovarian Pathology	Simple Ovarian Cyst	15 (17.4%)
	Complex Cyst	7 (8.1%)
	Endometriosis/Endometrioma	7 (8.1%)
	Ovarian Hemorrhagic Cyst	6 (7.0%)
Malignancy	Cervical Carcinoma	1 (1.2%)
	Rectal Carcinoma	3 (3.5%)

N: frequency, %: percentage

Table 4 shows the association between MRI findings and various patient characteristics. Age-wise, patients aged 14–19 years had 83.3% abnormal findings (n=5), while those aged 20–25 years showed 90.9% abnormal findings (n=10). Patients over 50 years all had abnormal findings (n=14, 100%), with no significant association between age and MRI findings ($p=0.165$). Among those with comorbidities, 100% of patients with anemia had abnormal findings (n=2), while 92.9% of those without comorbidities also had abnormal findings (n=78), with no significant association ($p=1.000$). Clinical presentations such as menstrual disturbance or lump/mass were associated with 96.6% abnormal findings (n=28), while pelvic pain alone was linked to 80.0% abnormal findings (n=16), with no significant association ($p=0.103$).

Table 4: - Association between different MRI Findings with different patient features (n=86)

		MRI Findings		p-value
		Normal N (%)	Abnormal N (%)	
Age	14-19 Years	1 (16.7%)	5 (83.3%)	0.165 ^f
	20-25 Years	1 (9.1%)	10 (90.9%)	
	26-30 Years	2 (28.6%)	5 (71.4%)	
	31-35 Years	0 (0.0%)	10 (100.0%)	
	36-40 Years	0 (0.0%)	12 (100.0%)	
	41-50 Years	2 (7.7%)	24 (92.3%)	
	>50 Years	0 (0.0%)	14 (100.0%)	
Comorbidities	None	6 (7.1%)	78 (92.9%)	1.000 ^f
	Anemia	0 (0.0%)	2 (100.0%)	
Clinical Presentation	Menstrual Disturbance/Lump/Mass	1 (3.4%)	28 (96.6%)	0.103 ^f
	Pelvic Pain	4 (20.0%)	16 (80.0%)	
	Pelvic Pain/Lump/Mass	0 (0.0%)	10 (100.0%)	
	Vaginal Bleeding	1 (11.1%)	8 (88.9%)	
	Other	0 (0.0%)	18 (100.0%)	

F: fisher's exact test

4. Discussion:

Pelvis contains urogenital and gastrointestinal organs, and disorders in this area can affect women of all ages, presenting with symptoms like irregular menstruation, pelvic pain, and difficulty conceiving [4]. MRI is a valuable diagnostic tool for pelvic

pathologies, offering detailed imaging without radiation, making it suitable even for pregnant patients [5, 6]. It surpasses ultrasound and CT in detecting uterine and adnexal lesions, gynecological cancers, and postoperative monitoring. A study by Avesani et al. (2024) shows that MRI is preferred and primary modality for pelvic pathologies for indeterminate ovarian masses, while CT is recommended for suspected malignancies [7]. This study aims to assess female pelvic disorders diagnosed via MRI in the Jazan region, filling a local research gap.

Notably, our study revealed a high prevalence of abnormal MRI findings in all age groups, with the highest rate (100% of abnormal findings) in patients over the age of 50. This is consistent with previous studies showing that pelvic inflammation increases with age due to hormonal changes. Similarly, Burnett et al. (2020) suggest that the prevalence of pelvic disorders (PFDs) such as fibroids or masses increases significantly with age, attributed to age-related hormonal changes [8].

Most of the patients were aged 41–50 years ($n=26$, 30.2%), which is consistent with other studies revealing that women in this age group are more likely to present with pelvic infections. Moreover, Isgandarova et al (2020) show that the mean age of the benign group ($n=20$) was 36.1 ± 11.1 years, whereas the mean age of the malignant group ($n=20$) is 49.55 years ($p < 0.05$) [9].

Notably, most patients presented with a lump or mass ($n=48$, 55.8%), followed by menstrual disturbances ($n=39$, 45.3%) and pelvic pain ($n=32$, 37.2%). These findings are consistent with the established literature, which indicates that the most common symptoms of pelvic pathologies include abnormal bleeding, pain, and the presence of a palpable mass [10]. A study by Dydyk N. Gupta et al. (2020) also identified pelvic pain and menstrual disturbances as frequent complaints among women with pelvic disorders [11].

Moreover, the MRI findings in our study revealed a high prevalence of abnormal results (93.0%). This is in accordance with previous studies that emphasize the sensitivity of MRI in diagnosing pelvic pathologies, particularly when compared to other imaging modalities like ultrasound and computed tomography (CT). Similarly, Hook et al. (2020) shows that MRI findings correlate well with symptoms, and has been found to have a high sensitivity (100%) when compared with endovaginal US (91%) [12]. Our study identified various uterine pathologies, with adenomyosis (15.1%) and fibroids being the most common benign conditions. Addley et al. (2023) shows common benign disease processes include endometriosis (ectopic endometrial glands outside the uterus), adenomyosis (endometrial cells in the myometrium), uterine fibroids, and various endometrial pathologies, all common in gynecological conditions [13]. The classification of fibroids based on their location, with submucosal >50% intramural and subserosal >50% intramural being the most frequent types. This distribution of fibroid locations is consistent with findings from Sefah (2022), which highlighted that submucosal fibroid, though less common, are more symptomatic due to their effect on the endometrial cavity [14].

Adenomyosis, identified in 15.1%, is another common finding in middle-aged women, consistent with previous studies reporting adenomyosis rates of 10-20%, which are common in women of reproductive age. Similarly, in a recent study by Vannuccini et al. (2019) found that the prevalence of adenomyosis in infertile women was 24.4% in

women at least 40 years of age and 22% in women under 40 years of age [15]. Moreover, adenomyosis is frequently associated with symptoms such as heavy menstrual bleeding and pelvic pain, which were commonly reported in our study population. In addition, adenomyosis is often associated with symptoms such as excessive menstrual bleeding and pelvic pain, which are frequently reported in our study population. The use of MRI for the diagnosis of adenomyosis is well documented, since provides better imaging information compared to ultrasound. Moreover, a meta-analysis study by Anwar et al. (2022) showed pooled sensitivity and pooled specificity of MRI were 77% and 89%, respectively [16].

The most common benign condition was simple cyst (17.4%), followed by complicated cyst (8.1%). These findings are similar by Farhani et al. (2016), who found that simple ovarian cysts are common in postmenopausal women and are generally benign in nature [17]. Complex cysts, on the other hand, may require closer monitoring due to their potential to harbor malignancies, although they are often benign as well. Lin et al. (2022) shows that the sensitivity, specificity, positive predictive value, and negative predictive value of an MRI for diagnosing ovarian malignancy were 16.7%, 96.2%, 28.5%, and 92.7%, respectively [18]. Endometriosis, a condition characterized by the presence of endometrial tissue outside the uterus, was found in 8.1% of our sample. This is consistent with global prevalence rates of endometriosis, which range between 6–10% [19]. Moghadam et al. (2024) shows, for diagnosing endometriosis sensitivity of MRI was 69% and the specificity was 75% [20].

Moreover, malignancies were rare in this study, with 1 case of endometrial/ovarian carcinoma (1.2%) and 3 cases of rectal carcinoma (3.5%). Thus, emphasizing MRI's critical role in differentiating benign from malignant lesions through detailed imaging.

5. Limitations:

Although our study provides valuable insights into the prevalence of pelvic pathologies in the Jazan region, it is not without limitations. First, the retrospective nature of the study may introduce inherent biases, such as reliance on the accuracy and completeness of medical records, which could result in missing or incomplete data. This reliance also limits our ability to standardize diagnostic criteria or account for potential confounding factors, such as socioeconomic status, comorbidities, or variations in clinical practices among healthcare providers.

Second, the relatively small sample size reduces the statistical power of our analysis, limiting the generalizability of our findings to the broader population of the Jazan region or other regions with differing demographic or healthcare characteristics. This is particularly relevant given the potential variability in pelvic pathologies across different geographic, ethnic, and socioeconomic groups.

Third, the study focuses exclusively on data collected from a single region, and the findings may not be representative of the prevalence or patterns of pelvic pathologies in other parts of the country or globally. Regional variations in healthcare access, cultural practices, and lifestyle factors may influence the incidence and presentation of these conditions, further limiting the applicability of our results to other contexts.

Lastly, due to the retrospective design, we were unable to assess longitudinal outcomes or the progression of pelvic pathologies over time, which could provide a more comprehensive understanding of their impact on patients' quality of life and healthcare needs. Future research employing prospective designs with larger, more diverse samples could address these limitations and offer more robust evidence.

6. Conclusion:

Our study underscores the critical role of magnetic resonance imaging (MRI) in the accurate diagnosis of female pelvic pathologies, particularly in distinguishing between benign and malignant uterine and ovarian conditions. The superior soft tissue contrast, multiplanar imaging capabilities, and non-invasive nature of MRI make it an indispensable tool in modern gynecology. Through its ability to provide detailed anatomical and pathological insights, MRI aids in precise disease characterization, which is essential for guiding clinical decision-making, tailoring treatment plans, and improving patient outcomes.

The findings of our study align closely with the existing body of literature, further validating the diagnostic utility of MRI in gynecological practice. Our results highlight its particular strength in identifying and differentiating complex adnexal masses, uterine abnormalities, and other pelvic pathologies, which are often challenging to diagnose using other imaging modalities. Moreover, MRI's reliability in preoperative evaluation and staging of malignancies emphasizes its pivotal role in comprehensive patient management.

Given the growing burden of gynecological diseases globally, the findings of this study support the continued integration of MRI into routine diagnostic pathways, particularly in settings where accurate and timely diagnosis is critical. To further strengthen the evidence base, future studies should focus on the cost-effectiveness, accessibility, and potential advancements in MRI technology, such as diffusion-weighted imaging and contrast enhancement techniques, to enhance diagnostic accuracy and efficiency.

In conclusion, our study reinforces the indispensable role of MRI as a cornerstone in the diagnosis and management of female pelvic pathologies. Continued efforts to improve access to MRI and train healthcare professionals in its interpretation will undoubtedly contribute to better gynecological care and improved health outcomes for women.

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