ORIGINAL RESEARCH

Efficacy of MRI in detecting female infertility- A clinical study

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ABSTRACT
Background: One year of unprotected sexual activity without a pregnancy is considered infertility. 15–27% of infertile women had uterine abnormalities found. The present study was conducted to assess efficacy of MRI in detecting female infertility. **Materials & Methods:** 70females age ranged 20-40 years were selected. Symptoms such as pelvic pain, dysmenorrhoea etc. was noted.A serum hCG test was done before the examinations.MRI was performed on a 1.5 Tesla unit equipped with a 32 phased-array surface coil, with the patient in the supine position. On MRI various anomalies were recorded. **Results:** Age group 20-35 years had 15, 26-30 years had 12, 31-35 years had 8 and 36-40 years had 21 patients. The difference was significant (P< 0.05). The etiology of female infertility was adenomyosis in 10, endometriosis in 2, PCOS in 4, pelvic inflammatory disease in 4, endometrial polyps in 29, tubal disease in 17, and leiomyoma in 3 cases. A significant difference was observed (P< 0.05). **Conclusion:** For routine infertility work-ups, MR imaging is a helpful non-invasive method. Due of its excellent accuracy and comprehensive description of uterovaginal anatomy, magnetic resonance imaging is the preferred technique for infertile women with suspected uterine abnormalities. Additionally, MRI has the benefit of expanding diagnostic data to identify often linked urinary tract abnormalities. Only women who are likely to undergo interventional therapy are eligible for laparoscopy and hysteroscopy.
Keywords: infertility, MRI, uterovaginal

INTRODUCTION

One year of unprotected sexual activity without a pregnancy is considered infertility. 15–27% of infertile women had uterine abnormalities found. This clinical entity which bears extreme social relevance affects 13-15% couples globally. Amongst the common causes of female infertility, 30-50% of cases are due to tubal and peritubal disorders, while ovarian disorders account for 30-40% of all cases of female infertility.[1]

The most popular technique for assessing the uterus and fallopian tubes is hysterosalpingography (HSG), however it is intrusive and uncomfortable for women.[2] In order to do HSG, many patients ask for anesthesia. It could potentially spread diseases like chlamydia. Laparoscopy is frequently necessary when an abnormality of the uterus is detected. However, as far as we know, magnetic resonance imaging (MRI) is safe and generates images with fine anatomical details that are crisper than those acquired with radiography or ultrasonography.[3,4]

It is commonly recognized that MR imaging can accurately identify and locate uterine leiomyomas as well as differentiate congenital uterine abnormalities. The fact that MR imaging doesn't employ ionizing radiation is one of its benefits, which is crucial for women who are of reproductive age.[5] Another benefit of MR imaging over traditional imaging methods is that it is less intrusive and observer dependant. Additionally, new developments in MR imaging using the phased-array coil have opened up new imaging options, leading to fast procedures, multiplanar capability, and great spatial and tissue contrast resolution.[6]

Additionally, pathological abnormalities such as pituitary adenoma and tubal lesions can be detected by MRI. In cases of leiomyoma, adenomyosis, and endometriosis that are treated conservatively, it aids in prognostic prediction.[7] The present study was conducted to assess efficacy of MRI in detecting female infertility.

MATERIALS & METHODS

The present study consisted of 70females age ranged 20-40 years. All enrolled patients gave their written consent for participation in the study.

Data such as name, ageetc. was recorded. Dysmenorrhea and pelvic discomfort were among the symptoms observed. Prior to the examinations, a serum hCG test was performed. The patient was in the supine position when the MRI was conducted using a 1.5 Tesla machine that had a 32 phased-array surface coil. A number of abnormalities were noted on the MRI. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

TABLE I Distribution of patients based on age groups

Age group (Years)	Number	P value
20-25	15	0.34
26-30	18	
31-35	10	
36-40	27	

Table I, graph I shows that age group 20-35 years had 15, 26-30 years had 12, 31-35 years had 8 and 36-40 years had 21 patients. The difference was significant (P< 0.05).
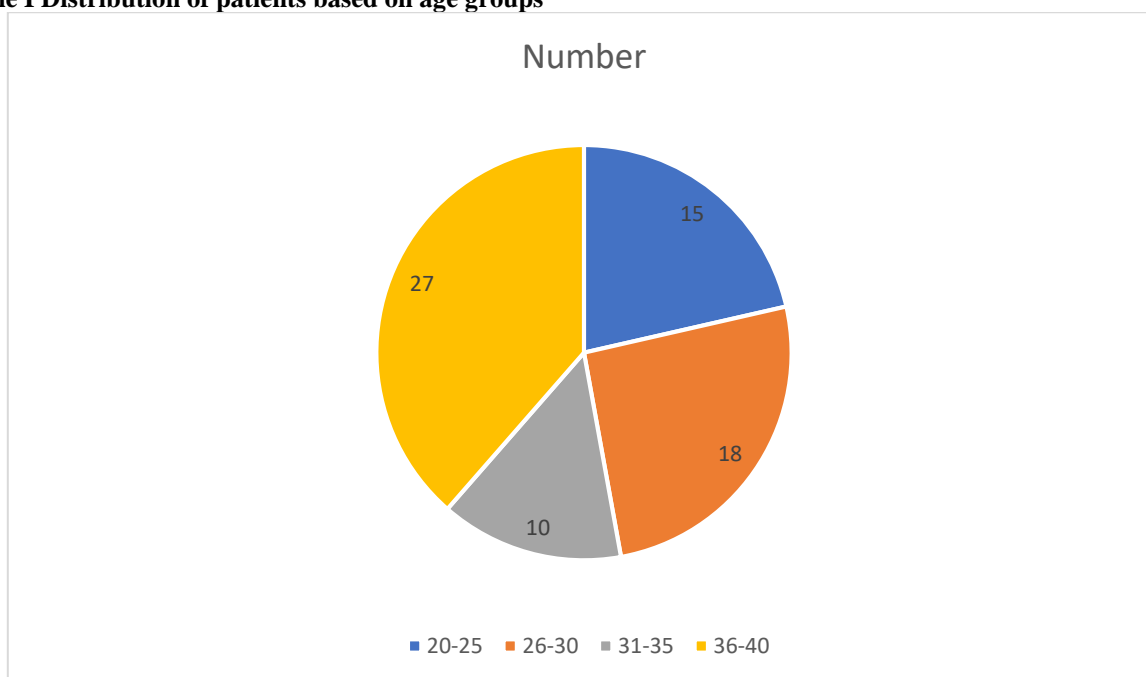
Pie I Distribution of patients based on age groups

Table II Assessment of etiology

Etiology	Number	P value
Adenomyosis	10	0.01
Endometriosis	2	
PCOS	5	
Pelvic inflammatory disease	4	
Endometrial polyps	29	
Tubal disease	17	
Leiomyoma	3	

Table II, graph II shows that etiology of female infertility was adenomyosis in 10, endometriosis in 2,PCOS in 4, pelvic inflammatory disease in 4, endometrial polyps in 29, tubal disease in 17, and leiomyoma in 3 cases. A significant difference was observed (P< 0.05).

Pie II Assessment of etiology
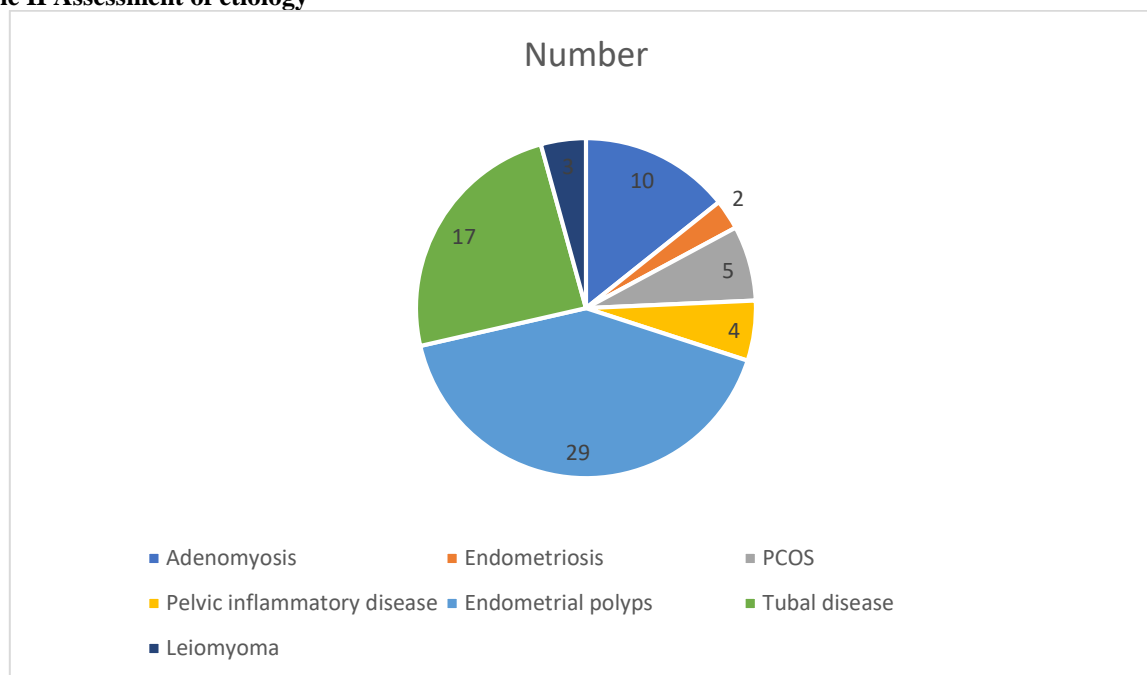
DISCUSSION

The inability of a couple to conceive spontaneously after a year of consistent, unprotected sexual activity is known as infertility.[8] The need for infertility treatments and services has grown in recent years. Infertility-related pelvic diseases in women are currently evaluated using the most effective methods, which include laparoscopy, hysteroscopy, and hysterosalpingography.[9,10] Magnetic resonance imaging (MR) has been utilized for more than a decade to assess issues related to female infertility, even though transvaginal ultrasonography (US) has been the most popular imaging modality for evaluating the female genital tract.[11] The present study was conducted to assess efficacy of MRI in detecting female infertility.

We found that age group 20-35 years had 15, 26-30 years had 12, 31-35 years had 8 and 36-40 years had 21 patients. Malek et al[12] evaluated the role of magnetic resonance imaging versus hysterosalpingography during investigating infertile women due to uterotubal causes of infertility Setting: All infertile women were subjected to both hysterosalpingography and MRI. Laparoscopy was performed to confirm different findings, being considered the gold standard for diagnosis. MRI was superior to HSG in diagnosing uterine anomalies (accuracy 100% vs. 96%), but failed to diagnose any case of intrauterine adhesions or peritubal adhesions. In infertile women with suspected uterine anomalies, magnetic resonance imaging is the study of choice because of its high accuracy and detailed elaboration of uterovaginal anatomy. Laparoscopy and hysteroscopy are reserved for women in whom interventional therapy is likely to be undertaken

We found that etiology of female infertility was adenomyosis in 10, endometriosis in 2, PCOS in 4, pelvic inflammatory disease in 4, endometrial polyps in 29, tubal disease in 17, and leiomyoma in 3 cases. Woodward PJ et al[13] found that Magnetic resonance (MR) imaging has proved useful in evaluating various conditions associated with female infertility. With T2-weighted pulse sequences, uterine zonal anatomy can be clearly delineated, and with images obtained in a plane coronal and perpendicular to the long axis of the uterus, the external uterine contour can be evaluated. This latter capability allows the differentiation of a bicornuate uterus from a septate one, a distinction that has not been possible with hysterosalpingography and that enables improved treatment planning. MR imaging accurately demonstrates leiomyomas, providing improved preoperative localization compared with that achievable with hysterosalpingography or ultrasonography, and may be useful in differentiating these tumors from adenomyosis. Endometriosis can be detected with MR imaging, but laparoscopy is more reliable for diagnosis and staging. Although the use of MR imaging is not indicated in every evaluation, the modality is valuable in certain settings, especially those that involve differentiation of congenital anomalies and localization of leiomyomas. In these settings, use of MR imaging can obviate more invasive procedures, such as laparoscopy.A study by Imaoka et al of uterine remodeling after myomectomy revealed a gradual decrease in uterine volume in the 6 months after the procedure, with the most remarkable change occurring in the initial 2–3 months. In an MR imaging study, the most remarkable uterine change occurred 1 month after myomectomy and consisted of

a reduction in uterine volume and a proportionally normal zonal anatomy.

Various investigators have opined that MRI has a superior sensitivity (95% vs 81%), specificity (89% vs. 78%), and overall diagnostic accuracy (93% vs. 80%) for the diagnosis of pelvic inflammatory disease as compared to transvaginal ultrasound. These authors have further concluded that the superior performance of MRI may reduce the need for diagnostic laparoscopy. Diffusion-weighted MRI shows superior sensitivity (100% vs. 47.1%), specificity (97.1% vs. 91.4%), positive predictive value (97.1% vs. 84.2%), negative predictive value (100% vs 64%), and overall accuracy (98.6% vs. 69.6%) as compared to standard MRI sequences in assessment of tubo-ovarian abscess.[14,15]

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that for routine infertility work-ups, MR imaging is a helpful non-invasive method. Due of its excellent accuracy and comprehensive description of uterovaginal anatomy, magnetic resonance imaging is the preferred technique for infertile women with suspected uterine abnormalities. Additionally, MRI has the benefit of expanding diagnostic data to identify often linked urinary tract abnormalities. Only women who are likely to undergo interventional therapy are eligible for laparoscopy and hysteroscopy.

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