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COMPARISON OF HYSTEROSALPINGOGRAPHY AND ULTRASOUND IN EVALUATION OF UTERINE ABNORMALITIES IN PRIMARY AND SECONDARY INFERTILE PATIENTS

Isbah Khanam[*1], Hafiz Ayaz Ahmad[2]

*[*1]Student MS Medical Imaging Technology (Allied Health Science) Superior University, Lahore*
[2]Lecturer, M.Phill MBBT Faculty of Allied Health Science. Superior University Lahore.

[*1]isbah.idrees13@gmail.com

ABSTRACT

Background: The leading issue that every couple is experiencing in present era is infertility. Many factors contribute in infertility. It is important to diagnose the underlaying causes that lead to inability to conceive. The primary modes of diagnosis include Ultrasound and Hysterosalpingography. But which modality is better for ruling out the infertility is point of debate.

Objective: To Compare diagnostic effectiveness of Ultrasound and Hysterosalpingography in detecting uterine abnormalities among Primary and Secondary Infertile women.

Methodology: 73 patients were examined on Ultrasound in Dr. Essa Lab Lahore and then referred for Hysterosalpingography to Punjab Radiology and Lab Lahore. Patients with Primary and secondary infertility between the age of 18 to 45 were included whereas pregnant women and women with PID and GTI were excluded. The data were processed in SPSS version 25 by using descriptive and frequencies and Chi-Square test for comparison of USG and HSG.

Results: In the total 73 patients, 36 patients were of the age between 26-35 years. Primary Infertility constituted 63% out of total patients. According to the history, 37% patients presented more than one symptom. On Ultrasound, 49 patients were shown normal. 8 patients diagnosed with ovarian cysts which were the highest percentage. While No Fallopian pathology was diagnosed. On HSG, 74% patient were normal. Tubal pathologies constituted 17.8% of patients, were the most common. While, ovarian pathology could not be seen on it.

Conclusion: This study Concludes that Ultrasound has higher sensitivity in diagnosing uterine and cervical pathologies but not tubal pathologies. While, Hysterosalpingography helps in diagnosing Tubal pathologies and congenital Uterine anomalies more efficiently.

Keywords: *Hysterosalpingography, Ultrasound, Infertility, Uterine Abnormalities.*

INTRODUCTION

A disorder of the male or female reproductive system known as infertility, is characterized by the inability to conceive even after 12 months or more of consistent, unprotected intercourse (1). The National Institute for Health and Clinical Excellence (NICE 2013) suggested that, in the absence of developed reproductive disease, infertility be defined as the inability to conceive between the time period of two years (2).

According to WHO estimation, almost 80 million people worldwide suffer with infertility. In their lifetime, 10% to 15% of couples experience it (3). Certain regions, like the Middle East and North Africa, have reportedly experienced high rates of primary infertility compared to low rates of secondary infertility. However, in other parts of the world, like Central and Western Europe, the opposite has happened (4).

Infertility might be Primary Infertility (in this case, the couple has never conceived a child) or Secondary Infertility (the couple has had at least one prior pregnancy (5). There are numerous etiological factors that contributes in female infertility. There are male and female variables that might lead to infertility. Uterine abnormalities, menstruation and ovulation disorders, and uterine factors are among the most common causes of infertility in women. Male infertility factors are known to reduce the number of sperm with normal morphology and progressive motility (6).

Genetic abnormalities were identified as causes of infertility in 5–10 % of women. PCOS is the main cause of oligo-anovulation and hyperandrogenism, which result in infertility in women. 10% of women in the world who are of reproductive age have this endocrine and reproductive illness (7). For underweight women, eating disorders like anorexia nervosa (AN) are the most prevalent cause of infertility (8).

The age of a woman at conceiving and at marriage have an impact on her infertility. Infertile women were older when they married compared to fertile women (9). The study also showed that women who reported no history of alcohol usage had a 0-point 78 greater probabilities of having a female infertility factor than non-alcoholic women. The study's findings showed that alcoholic women had higher rates of endometriosis, infertility, ovulation issues, menstrual disruption, and abortion (10).

Infertility affects a significant portion of the population worldwide, with tubal factors and uterine abnormalities being common contributors. Both Ultrasound and Hysterosalpingography (HSG) is a widely used imaging modality for evaluating tubal patency and uterine morphology in women undergoing infertility assessment. However, there is a need to further investigate the diagnostic accuracy and clinical utility of both Ultrasound and HSG in this context, each offering unique advantages and limitations.

This study aims to compare the sensitivity and specificity of Ultrasound and Hysterosalpingography to determine which imaging modality offers superior diagnostic accuracy in detecting uterine abnormalities in case of infertility.

Methodology

This study is designed as Comparative Cross-Sectional study. In order to obtain the necessary results, 73 patients were selected by using the formula as given below:

With confidence level of 95% and margin of error of 05%, We get the sample size of 73.

$$n_0 = \frac{p \times (1-p) \times z^2}{error^2}$$

$$n_0 = \frac{0.5 \times (1-0.5) \times 1.96^2}{0.05^2} = 385$$

$$\mathbf{n} = \frac{n_0}{1 + \frac{n_o}{N}}$$

$$\mathbf{n} = \frac{385}{1+\frac{385}{90}} = 73$$

Patients were examined on Ultrasound and then referred for Hysterosalpingography at Radiology Department of Dr. Essa Lab and Punjab Radiology. Patients with Primary and secondary infertility between the age of 18 to 45 were included whereas pregnant women and women with PID and GTI were excluded. The data were collected utilizing the questionnaire and then processed in SPSS version 25. For continuous variables, mean and standard deviation (SD) was determined. For categorical values, frequency and percentage was calculated. Chi-Square test was used to compare the catagorical values between the groups. Additionally, specificity and sensitivity was used to evaluate the diagnostic performance. Microsoft Office was used to store the collected data.

Results

In total 73 patients of the age between 18 years to 45 years, 49.3% patients (36 patients) were of the age between 26 to 35 years which was the higher in all age group while, the patient between the age of 36 to 45 years shown the lesser percentage (6.8%). In both types of infertility, 63% of the patients are facing Primary Infertility while 37% patients have Secondary Infertility (shown in table 1).

Table1: Distribution of Age group and type of infertility among patients referred for USG and HSG.

Frequency Distribution of Age of patients		
Age (years)	No. of patients	Percentage
18-25	32	43.8
26-35	36	49.3
36-45	5	6.8
Total	73	100
Type of Infertility among patients		
Type of Infertility	No Of Patients	Percentage
Primary Infertility	46	63
Secondary Infertility	27	37
Total	73	100

According to the history taken from the patients, 37% of the patients presented with more than one symptoms, while 16.4% patients showed no symptoms at all. Other than this, 16.4% percent patients showed the symptoms of Irregular Menstrual Cycle, which was higher in all. Abnormal Intrauterine Pregnancy alone consists of only 1.4%, (Shown in fig 1).

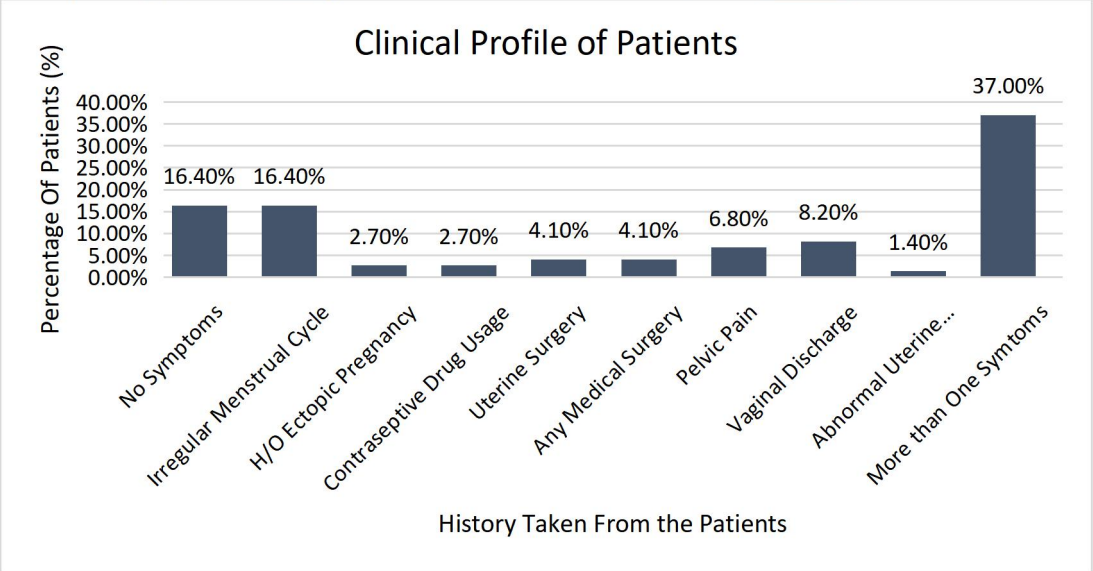

Figure 1: Clinical profile of the patients presented with the complain of infertility.

Table 2: Different Abnormalities diagnosed on Ultrasound and Hysterosalpingography.

Diagnosis on Ultrasound			Diagnosis on Hysterosalpingography	
	No. Of patients	Percentage	No. Of Patients	Percentage
Normal Scan	43	58.9	56	76.7
Uterine	3	4.1	0	0.0

Enlargement				
Endometrial Fibroids	8	11.0	2	2.7
Endometrial Polyp	1	1.4	0	0.0
Ovarian cyst	8	11.0	0	0.0
Cervical fibroids	3	4.1	1	1.4
Thickened endometrium	6	8.2	0	0.0
Tubal blockage	0	0.0	13	17.8
Hydrosalpinx	1	1.4	1	1.4
Total	73	100	73	100

According to the final Diagnosis on both modalities I.e Ultrasound and Hysterosalpingography, It can be clearly stated Ultrasound picked up more abnormalities than HSG. 58.9% appeared with no abnormality on Ultrasound while 76.7% appeared normal on HSG, which were quite higher. No Tubal blockage could be figure out in Ultrasound, while HSG was showed best in identifying Tubal Pathologies, that's 17.8%. Percentages of different pathologies on USG and HSG are shown in Figure 2 and Figure 3.

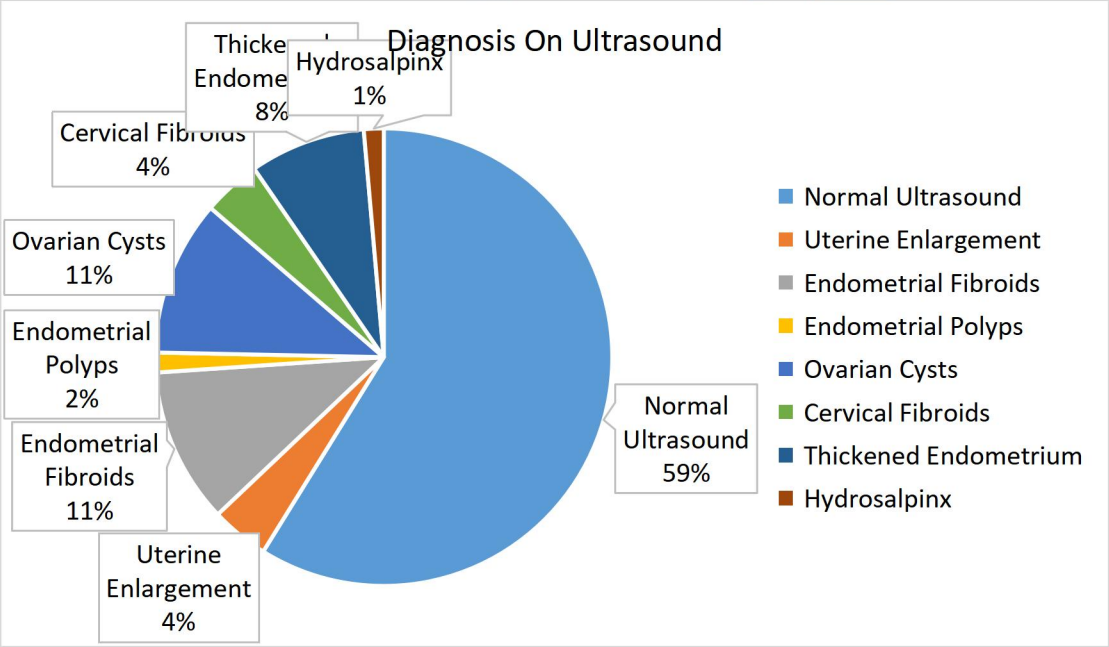

Figure 2: Pattern of Different Abnormalities diagnosed on Ultrasound.

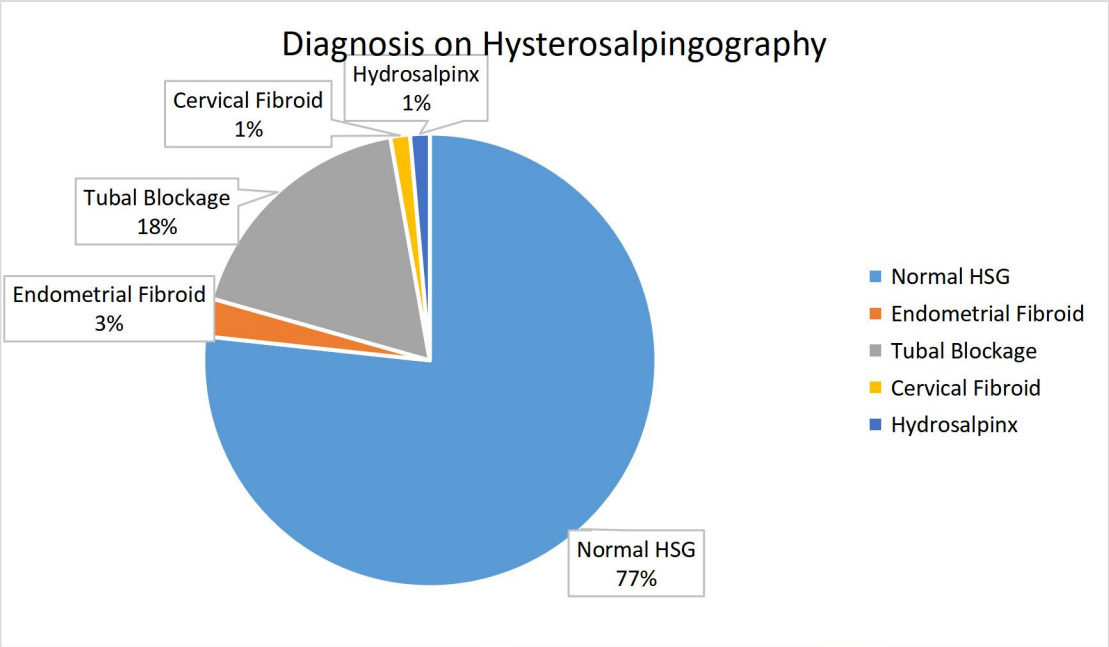

Figure 3: Pattern of Different Abnormalities Diagnosed on HSG.

Table 3: Comparison of USG and HSG in detecting abnormalities of different region of Uterus

Detection of Cervical Abnormalities			
	Sensitivity	Specificity	P-value
USG	100%	98.6%	0.001
HSG	66.7%	100%	
Detection of Endometrial Abnormalities			
USG	100%	81.43%	0.055
HSG	18.75%	100%	
Detection of Tubal Abnormalities			
USG	7.69%	100%	0.0002
HSG	100%	83.33%	

This table is a comparison of ultrasound (USG) and hysterosalpingography (HSG) with regard to cervical, endometrial, and tubal abnormalities detection efficiency. In terms of cervical abnormalities, USG has good sensitivity (100%) and specificity (98.6%), whereas HSG is less sensitive (66.7%) but totally specific (100%). Additionally, USG is highly useful in diagnosing the endometrial abnormalities with a sensitivity of 100% and moderate specificity of 81.43% but HSG has low sensitivity of 18.75% but acts as a 100% perfect specificity. As for the tubal abnormalities–while USG reaches poor sensitivity percentages (7.69%) and 100% specificity, HSG a small sensitivity rate (100%) and 83.33% accuracy. The p-values provide the necessary data on the statistical significance of these findings, where, as the p-values go down, the evidence against the null hypothesis grows stronger. On the whole, it is seen that USG achieves its highest sensitivity but its specificity varies. On the other hand, HSG is quite specific with a certain degree of sensitivity.

Discussion

Infertility is a disorder that can affect both female and male throughout the world (1). NICE 2013 Suggested that if a couple is unable to conceive in more than 12 months is consider as infertile (2). World Health Organization estimated the ratio of infertile patients that was more than the 80 million people worldwide (4). The majority of infertile women in the study of Hiba Omer et. Al. (2020) were between the age of 26 to 36 years with the average value of 32 years (11). In the study of Tiwari et al. 52% of patient were belong to the age of 26 to 30 years (12). Similarly, 60.9% of the total population size were of the age between 25-30 years,

diagnose with the infertility in the study of Faisal Ali Mustafa et. Al. (2018) (13). Also, in the study of Maiti GD et. Al. Conducted In 2018, The age group with the maximum infertility complains were between 26 to 30 years old (15). While in this study the most patients were the age of 18 to 40 years. 49.3 % of the women were the age of 26 to 35 years considered as the highest percentage in the age group.

As we know commonly, there are two types of infertility, Primary infertility and Secondary infertility. In this study the percentage of both types were 63% and 37% respectively. In the study of H. Toufig (2020) et. Al. The percentage of both primary and secondary infertile women were nearly equal that was 44.2 % and 55% respectively (11). Similarly, in the study of Maiti GD et. Al. In 2018, out of 50 patients, 34 patients were primary with other 16 were secondary infertile women. Its mean the ratio of primary infertility was greater in their study as well (15).

The clinical manifestation includes irregular menstrual cycle, pelvic pain, abnormal uterine bleeding etc. In our study, most women appeared with menstrual cycle irregularity that was 16.4%. While Pelvic pain and Abnormal Uterine bleeding constituted 6.8% and 1.4% respectively. Only 2.7 of the patients presented with the history of ectopic pregnancy which were the lowest in all. 4.1% of the patient came with the history of uterine surgery including IUCD placement and removal surgery and C-sections.

Both Ultrasound and Hysterosalpingography is considered best to evaluate the cause of infertility in every age of women. However, the importance of Hysterosalpingography is getting decrease day by day. So, it is important to compare the diagnosis of both modalities to rule out the difference that which modality offer better diagnostic performance.

According to the results of Diagnosis of Ultrasound, 67.1% of the total patients were normal. In remaining patients, 11% of the patients were appeared with ovarian cysts which were the highest in all pathologies. Furthermore, Thickened endometrium and Endometrial fibroids constitutes 8.2%. Cervical Fibroid were in about 4.1% of the patients. Only 1% of the patients presented with Uterine polyp. There was no evidence of any Fallopian tubal pathologies seen in Ultrasound.

In the study of Hafiza Iqra Kanwal et. Al. (2020) The highest frequency was of Polycystic Ovarian disease, like this study, which was 44%. Similarly, No Tubal pathology could see on their study as well. (14)

Comparatively, On Hysterosalpingography, 74% patients considered normal with no pathology seen. In HSG, opposite to the ultrasound, Tubal Pathology were seen in 17% of the patients with Unilateral and bilateral tubal blockage. While, no ovarian cystic pathology could see on Hysterosalpingography. In Study of Faisal Ali Mustafa et. Al. 53% of the total cases were normal. The greater frequency of uterine pathology was of endometrial polyp which was of 10%. (13). In the study of Toufig et al. Unilateral tubal blockage on either side constituted same percentage that was 17%, with no ovarian pathology was seen (11).

Conclusion

This study Concludes that both Ultrasound and Hysterosalpingography is recommended to evaluate the uterine abnormalities in Infertile Women. Ultrasound has higher sensitivity in diagnosing uterine and cervical pathologies but not in tubal evaluation. While, Hysterosalpingography helps in diagnosing Tubal pathologies and congenital Uterine anomalies more efficiently.

Conflict of Interest

None

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