The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 7, 2025

PATTERN OF UTERINE AND TUBAL ABNORMALITIES IN INFERTILE WOMEN ON HYSTEROSALPINGOGRAPHY

Dr Saman Rauf[*1], Prof Dr Shahid Waheed[2], Dr Fatima Azam[3], Dr Shanza Naeem[4], Dr. Syed Muhammad Hadi Ali Shah[5], Dr Sehrish Fatima[6]

*[*1]Postgraduate Resident, MBBS, Al-Noor Diagnostic Center*
[2]Professor of Radiology, MBBS, DMRD, MCPS, FCPS, Al-Noor Diagnostic Center
[3]Consultant Radiologist, MBBS, FCPS, Al-Noor Diagnostic Center
[4,5,6]Postgraduate Resident, MBBS, Al-Noor Diagnostic Center

[*1]samanrauf1992@gmail.com, [2]drswaheed@hotmail.com, [3]fatimaazam.kemu@gmail.com, [4]shanzabutt94@gmail.com, [5]hadi20.shah@gmail.com, [6]sehrish_khichi23@hotmail.com

DOI: https://doi.org/10.5281/zenodo.16631430

Keywords
Hysterosalpingography, Infertility, Tubal Blockage, Fibroids, Uterine Abnormalities

Article History
Received on 20 June 2025
Accepted on 28 June 2025
Published on 06 July 2025

Corresponding Author: *
Dr Saman Rauf
Postgraduate Resident, MBBS, Al-Noor Diagnostic Center
samanrauf1992@gmail.com

Abstract

OBJECTIVES: *To determine the pattern of uterine and tubal abnormalities in infertile women undergoing hysterosalpingography.*

STUDY SETTINGS: *Alnoor Diagnostic Centre, Lahore. Duration of Study: (Feb to May, 2025).*

DATA COLLECTION: *This descriptive cross-sectional study enrolled 280 women aged 20–40 years presenting with primary or secondary infertility for at least 12 months. HSG was performed between days 7–12 of the menstrual cycle using a standardized protocol. Findings were categorized as normal or pathological (tubal blockages, hydrosalpinx, fibroids, adenomyosis, congenital anomalies).*

RESULTS: *Normal HSG findings were observed in 80% of patients. Tubal blockage was found in 13.2% (right 7.9%, left 4.6%, bilateral 0.7%), hydrosalpinx in 13.6%, fibroids in 16.1%, adenomyosis in 1.4%, and congenital uterine anomalies in 1.8%. Significant associations were noted between age and fibroids ($p = 0.001$), adenomyosis ($p = 0.026$), and between type of infertility and fibroids ($p = 0.000$).*

CONCLUSION: *A considerable number of infertile women exhibit structural abnormalities detectable by HSG. Fibroids and tubal pathologies were among the most common abnormalities, especially in older women and those with secondary infertility. HSG remains a valuable initial tool in the diagnostic workup for female infertility.*

INTRODUCTION

Female infertility is commonly due to a combination of hormonal, ovulatory, and anatomical factors. Structural abnormalities in the uterine cavity and fallopian tubes are among the leading contributors identified through diagnostic evaluations.[1] These issues can prevent sperm from reaching the egg, hinder the fertilization process, or impair the implantation of a fertilized egg into the uterine lining. One of the most commonly used diagnostic tools to evaluate these structural factors is hysterosalpingography (HSG), which has been used in clinical practice for decades to investigate female infertility. Hysterosalpingography is a radiographic procedure that involves the introduction of a

contrast medium into the uterine cavity and fallopian tubes, followed by X-ray imaging.[2] The contrast allows the visualization of the internal structures of the uterus and fallopian tubes, enabling the detection of blockages, hydrosalpinx, loculated spill that could define infertility. The test not only helps in assessing the patency (openness) of the fallopian tubes but also reveals uterine abnormalities such as fibroids, adenomyosis or congenital malformations. One of the prior studies showed that among patients who were investigated for infertility, 68% had normal HSG, 17.5% had tubal blockages, 3.6% had hydrosalpinx, 3% had loculated spill, 4.9 % had fibroids, 0.3% had adenomyosis and 1.8 % had congenital abnormalities.[5]

Around 15% of couples face infertility, which is characterized by the inability to conceive following 12 months of regular, unprotected intercourse.[1] Causes include male-related issues (45%) and female-related conditions such as ovulatory disorders (37%) and tubal pathology (18%).[2] Multiple factors are involved in roughly 20% of affected couples. Evidence suggests a direct association between the severity of tubal damage in infertile females and their serum CAT levels.[4] Approximately 10% of women with subfertility have uterine abnormalities, and such abnormalities are reported in up to 50% of women experiencing recurrent implantation failure.[5] Fibroids may appear on HSG as filling defects or irregularities in the uterine contour, and the test can also detect congenital uterine anomalies.[1] Imaging modalities are integral to infertility assessment.[6] TVUS is commonly employed as the first-line technique, while further investigation can be conducted via saline or contrast-based hysterosalpingo sonography.[1] HyCoSy has shown excellent accuracy in detecting uterine lesions like polyps, though its utility in tubal assessment remains limited. MRI, while helpful in diagnosing Müllerian anomalies and adenomyosis, is not routinely used for tubal evaluation.[6–7]

HSG's main function is to examine fallopian tube patency. Normal tubes should appear as fine, regular lumens expanding at the ampulla. Tubal anomalies may result from various etiologies, including congenital malformations, spasms, infections, or blockages. Obstruction is seen as a sudden termination of contrast flow, either unilaterally or bilaterally, while adhesions can impede contrast from dispersing into the peritoneum.[6–8] Uterine cavity issues are also detectable with HSG, though despite its high sensitivity (60–98%), specificity is comparatively lower (15–80%), necessitating hysteroscopy for conclusive diagnosis. According to ESHRE (2008), semen analysis and ovulatory assessment should precede tubal testing. When there is high suspicion of pathology, laparoscopy is suggested as the first-line diagnostic and therapeutic method. TVUS is also advised for evaluating ovarian morphology.[10]

The rationale for this study lies in the critical need to determine the pattern of pathologies found on hysterosalpingography in females with infertility, a condition that affects millions of women globally. By providing a non-invasive method to evaluate fallopian tube patency and uterine cavity abnormalities, HSG serves as a key tool in infertility assessments.

METHODOLOGY:

This descriptive cross-sectional study was conducted at Alnoor Diagnostic Centre, Lahore. The study commenced four months after obtaining ethical approval from the College of Physicians and Surgeons Pakistan (CPSP) (Letter no. CPSP/REU/RAD-2021-092-3621, 2025). A total of 280 female patients were enrolled using a non-probability consecutive sampling technique. The sample size was calculated based on a previous study by Naqi S et al., using a 95% confidence level, a 2% margin of error, and an expected frequency of loculated spill in hysterosalpingography of 3%.

Women aged 20 to 40 years presenting for infertility treatment were included if they had a history of at least 12 months of infertility. Both women with primary infertility (no prior pregnancies) and those with secondary infertility (inability to conceive following one or more pregnancies) were eligible. Patients were excluded if they had a known history of pelvic inflammatory disease, active vaginal or cervical infections, known allergy to contrast dye used in HSG, or if male factor infertility was identified. Informed written consent was obtained from all participants. Each patient first underwent a preliminary transvaginal ultrasound examination. Hysterosalpingography was then performed under

fluoroscopic guidance between the 7th and 12th day of the menstrual cycle. All patients received premedication with 3 mg bromazepam the night before the procedure, and intravenous Buscopan was administered immediately prior to the examination. A water-soluble contrast medium was gradually instilled into the uterine cavity, and intermittent fluoroscopic imaging was used to assess the uterine cavity and fallopian tubes. All procedures and image interpretations were performed by the same consultant radiologist to minimize observer bias.

The hysterosalpingographic findings were recorded and included the following categories: normal (no pathology), tubal blockage (unilateral or bilateral), hydrosalpinx (with or without spillage of contrast), loculated spill, submucosal fibroids (seen as filling defects), adenomyosis (characterized by irregular uterine contour), and congenital uterine anomalies (such as septate, arcuate, unicornuate, or bicornuate uterus). Any complications during or after the procedure, including post-procedural pain, mild vaginal spotting, or contrast-induced vomiting, were documented and managed accordingly. The collected data were analyzed using SPSS version 23. Quantitative variables such as age and duration of infertility were presented as mean ± standard deviation, while categorical variables including HSG findings and type of infertility were expressed as frequencies and percentages. Data were stratified based on age, duration of infertility, and type of infertility. Post-stratification, chi-square tests were applied to determine statistical significance, with a p-value of less than 0.05 considered significant.

RESULTS:

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 280)

This table outlines the basic demographic and clinical distribution of the study participants. The majority of the patients (55.0%) were aged between 18 and 30 years, while the remaining 45.0% were between 31 and 45 years. Most participants (80.4%) presented with primary infertility, indicating they had never conceived, whereas 19.6% had secondary infertility, having conceived in the past. Regarding the duration of infertility, a significant proportion (94.6%) had been trying to conceive for 1–5 years, while only 5.4% had a longer duration ranging from 6 to 10 years.

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 280)

Variable	Category	Frequency (n)	Percentage (%)
Age Group (years)	18–30	154	55.0
	31–45	126	45.0
Type of Infertility	Primary	225	80.4
	Secondary	55	19.6
Infertility Duration	1–5 years	265	94.6
	6–10 years	15	5.4

Table 2: Uterine and Tubal Pathologies Detected on Hysterosalpingography (n = 280)

This table presents the distribution of various uterine and tubal pathologies identified through hysterosalpingography (HSG). A large portion of participants (80.0%) exhibited normal findings, while smaller proportions showed unilateral patency (7.1% right, 4.3% left) or no patency (8.6%). Tubal blockage was absent in 86.8% of cases, but right, left, and bilateral blockages were identified in 7.9%, 4.6%, and 0.7% of patients, respectively. Hydrosalpinx was not detected in 86.4% of cases; however, 6.1% had right-sided, 3.9% had left-sided, and 3.6% had bilateral hydrosalpinx. Loculated spills were a rare finding (1.1%). Fibroids were present in 16.1% of the sample, while adenomyosis and congenital abnormalities were infrequent, observed in 1.4% and 1.8% respectively. Among congenital anomalies, septate uterus was more common (1.1%) than bicornuate uterus (0.7%).

Table 2: Uterine and Tubal Pathologies Detected on Hysterosalpingography (n = 280)

Pathology	Category	Frequency (n)	Percentage (%)
Normal Findings	Normal	224	80.0
	Right Patent	20	7.1
	Left Patent	12	4.3
	No Patency	24	8.6
Tubal Blockage	No Blockage	243	86.8
	Right Blockage	22	7.9
	Left Blockage	13	4.6
	Bilateral Blockage	2	0.7
Hydrosalpinx	No	242	86.4
	Right	17	6.1
	Left	11	3.9
	Bilateral	10	3.6
Loculated Spills	Yes	3	1.1
	No	277	98.9
Fibroids	Present	45	16.1
	Absent	235	83.9
Adenomyosis	Present	4	1.4
	Absent	276	98.6
Congenital Abnormalities	Septate	3	1.1
	Bicornuate	2	0.7
	No Abnormality	275	98.2

Table 3: Stratified Crosstab Analysis by Age Group with Count and Percentage (n = 280)

This table compares uterine and tubal pathologies across two age groups (18–30 and 31–45 years). Normal findings were more prevalent among younger participants (58.0%) compared to the older group (42.0%). Left patency was more common in the younger group, whereas right patency and no patency were more frequently seen in the older age group. Tubal blockages showed no significant age-related difference (p = 0.461). Hydrosalpinx was also distributed relatively evenly across age groups. Loculated spills and adenomyosis showed a higher frequency in the older group, with statistically significant associations (p = 0.054 and p = 0.026, respectively). Fibroids were significantly more common in women aged 31–45 years (p = 0.001), indicating age-related prevalence. No significant associations were noted for congenital anomalies across age groups (p = 0.911).

Table 3: Stratified Crosstab Analysis by Age Group with Count and Percentage (n = 280)

Pathology		18-30 years	31-45 years	Total	P-value
Normal	Normal	130 (58.0%)	94 (42.0%)	224 (100.0%)	0.053
	Left Patent	8 (66.7%)	4 (33.3%)	12 (100.0%)	
	No	9 (37.5%)	15 (62.5%)	24 (100.0%)	
	Right Patent	7 (35.0%)	13 (65.0%)	20 (100.0%)	
Tubal Blockage	Right	10 (45.5%)	12 (54.5%)	22 (100.0%)	0.461
	Left	5 (38.5%)	8 (61.5%)	13 (100.0%)	
	No	138 (56.8%)	105 (43.2%)	243 (100.0%)	
	Bilateral	1 (50.0%)	1 (50.0%)	2 (100.0%)	
Hydrosalpinx	Right	6 (35.3%)	11 (64.7%)	17 (100.0%)	0.33

	No	137 (56.6%)	105 (43.4%)	242 (100.0%)	
	Left	5 (45.5%)	6 (54.5%)	11 (100.0%)	
	Bilateral	6 (60.0%)	4 (40.0%)	10 (100.0%)	
Loculated Spills	Yes	0 (0.0%)	3 (100.0%)	3 (100.0%)	0.054
	No	154 (55.6%)	123 (44.4%)	277 (100.0%)	
Fibrosis	Yes	15 (33.3%)	30 (66.7%)	45 (100.0%)	0.001
	No	139 (59.1%)	96 (40.9%)	235 (100.0%)	
Adenomyosis	Yes	0 (0.0%)	4 (100.0%)	4 (100.0%)	0.026
	No	154 (55.8%)	122 (44.2%)	276 (100.0%)	
Congenital Abnormalities	Bicornuate	1 (50.0%)	1 (50.0%)	2 (100.0%)	0.911
	No	151 (54.9%)	124 (45.1%)	275 (100.0%)	
	Septate	2 (66.7%)	1 (33.3%)	3 (100.0%)	

Table 4: Stratified Crosstab Analysis by Type of Infertility with Count and Percentage (n = 280)

This table analyzes the pathological findings by type of infertility. Normal findings were more frequent in patients with primary infertility (82.6%) compared to those with secondary infertility (17.4%), though this difference was not statistically significant (p = 0.226). Tubal blockages, particularly left-sided and bilateral, were relatively more common in secondary infertility cases. Hydrosalpinx also did not show a significant association with the type of infertility (p = 0.776). Loculated spills and adenomyosis showed strong associations with secondary infertility, with p-values of 0.000 and 0.005, respectively. Fibroids were significantly more frequent in patients with secondary infertility (44.4%) compared to primary (55.6%), with a p-value of 0.000. No significant difference was observed for congenital abnormalities by infertility type (p = 0.387).

Table 4: Stratified Crosstab Analysis by Type of Infertility with Count and Percentage (n = 280)

Pathology		Primary	Secondary	Total	P-value
Normal	Normal	185 (82.6%)	39 (17.4%)	224 (100.0%)	0.226
	Left Patent	9 (75.0%)	3 (25.0%)	12 (100.0%)	
	No	18 (75.0%)	6 (25.0%)	24 (100.0%)	
	Right Patent	13 (65.0%)	7 (35.0%)	20 (100.0%)	
Tubal Blockage	Right	17 (77.3%)	5 (22.7%)	22 (100.0%)	0.079
	Left	7 (53.8%)	6 (46.2%)	13 (100.0%)	
	No	199 (81.9%)	44 (18.1%)	243 (100.0%)	
	Bilateral	2 (100.0%)	0 (0.0%)	2 (100.0%)	
Hydrosalpinx	Right	12 (70.6%)	5 (29.4%)	17 (100.0%)	0.776
	No	196 (81.0%)	46 (19.0%)	242 (100.0%)	
	Left	9 (81.8%)	2 (18.2%)	11 (100.0%)	
	Bilateral	8 (80.0%)	2 (20.0%)	10 (100.0%)	

Loculated Spills	Yes	0 (0.0%)	3 (100.0%)	3 (100.0%)	0.0
	No	225 (81.2%)	52 (18.8%)	277 (100.0%)	
Fibrosis	Yes	25 (55.6%)	20 (44.4%)	45 (100.0%)	0.0
	No	200 (85.1%)	35 (14.9%)	235 (100.0%)	
Adenomyosis	Yes	1 (25.0%)	3 (75.0%)	4 (100.0%)	0.005
	No	224 (81.2%)	52 (18.8%)	276 (100.0%)	
Congenital Abnormalities	Bicornuate	1 (50.0%)	1 (50.0%)	2 (100.0%)	0.387
	No	221 (80.4%)	54 (19.6%)	275 (100.0%)	
	Septate	3 (100.0%)	0 (0.0%)	3 (100.0%)	

Table 5: Stratified Crosstab Analysis by Duration of Infertility with Count and Percentage (n = 280)

This table evaluates the relationship between the duration of infertility and HSG findings. Normal findings were significantly more common among patients with 1–5 years of infertility (96.0%) than those with longer durations (p = 0.039). While the distribution of tubal blockages and hydrosalpinx showed no significant differences with infertility duration (p-values > 0.05), fibroids were slightly more common in patients with longer infertility durations (11.1%), though not statistically significant (p = 0.061). Adenomyosis and congenital anomalies did not show any statistically significant association with duration of infertility. Overall, most abnormalities were found in patients with shorter infertility durations, likely reflecting earlier diagnostic workup in these individuals.

Table 5: Stratified Crosstab Analysis by Duration of Infertility with Count and Percentage (n = 280)

Pathology		1-5 years	6-10 years	Total	P-value
Normal	Normal	215 (96.0%)	9 (4.0%)	224 (100.0%)	0.039
	Left Patent	12 (100.0%)	0 (0.0%)	12 (100.0%)	
	No	20 (83.3%)	4 (16.7%)	24 (100.0%)	
	Right Patent	18 (90.0%)	2 (10.0%)	20 (100.0%)	
Tubal Blockage	Right	19 (86.4%)	3 (13.6%)	22 (100.0%)	0.093
	Left	11 (84.6%)	2 (15.4%)	13 (100.0%)	
	No	233 (95.9%)	10 (4.1%)	243 (100.0%)	
	Bilateral	2 (100.0%)	0 (0.0%)	2 (100.0%)	
Hydrosalpinx	Right	16 (94.1%)	1 (5.9%)	17 (100.0%)	0.831
	No	229 (94.6%)	13 (5.4%)	242 (100.0%)	
	Left	10 (90.9%)	1 (9.1%)	11 (100.0%)	
	Bilateral	10 (100.0%)	0 (0.0%)	10 (100.0%)	
Loculated Spills	Yes	3 (100.0%)	0 (0.0%)	3 (100.0%)	0.679
	No	262 (94.6%)	15 (5.4%)	277 (100.0%)	
Fibrosis	Yes	40 (88.9%)	5 (11.1%)	45 (100.0%)	0.061
	No	225 (95.7%)	10 (4.3%)	235 (100.0%)	
Adenomyosis	Yes	4 (100.0%)	0 (0.0%)	4 (100.0%)	0.632
	No	261 (94.6%)	15 (5.4%)	276 (100.0%)	
Congenital Abnormalities	Bicornuate	2 (100.0%)	0 (0.0%)	2 (100.0%)	0.866
	No	260 (94.5%)	15 (5.5%)	275 (100.0%)	
	Septate	3 (100.0%)	0 (0.0%)	3 (100.0%)	

DISCUSSION:

This study aimed to determine the pattern of uterine and tubal abnormalities in infertile women undergoing hysterosalpingography (HSG). Our findings indicate that a majority (80%) of the women demonstrated normal uterine and tubal anatomy on

HSG, while 20% had various abnormalities, including unilateral or bilateral tubal blockages, hydrosalpinx, fibroids, adenomyosis, and congenital anomalies. The results of our study align with and contrast with multiple published studies, each offering a unique perspective on HSG findings in the evaluation of female infertility.

Onwuchekwa and Oriji[12] conducted a retrospective analysis of 299 infertile women in Nigeria and reported that approximately 70% of HSGs demonstrated abnormalities, with tubal blockages and uterine filling defects being the most common. This finding contrasts with our study, where only 20% of women had abnormal HSG results. The higher abnormality rate in their cohort could be attributed to a higher prevalence of pelvic inflammatory disease, poor healthcare access, or referral bias, wherein only suspected cases with abnormal ultrasound or history were sent for HSG.

Aduayi et al[13] observed abnormal HSG findings in 74.5% of their 134 patients, with tubal pathologies being the predominant abnormality (66.4%). Interestingly, they also found a significant association between age and tubal occlusion, a pattern echoed in our study, where fibroids and adenomyosis were significantly more common in the older age group (31–45 years). However, our rate of tubal blockage was substantially lower (13.2% combined unilateral and bilateral blockage), possibly reflecting a different etiological profile in our population, including fewer post-infectious tubal diseases or earlier diagnostic intervention.

In a large-scale Pakistani study by Kayani et al,[14] 500 infertile women underwent HSG. Their findings included unilateral tubal blockages in 10%, bilateral in 8%, and hydrosalpinx in 3%. These figures closely resemble those observed in our study, where right tubal blockage was 7.9%, left 4.6%, and bilateral 0.7%, suggesting a consistent prevalence of structural abnormalities in the regional context. Additionally, congenital anomalies such as bicornuate and unicornuate uteri were seen in 5% each in the Kayani study,[14] whereas our study reported a combined anomaly rate of only 1.8%, comprising 1.1% septate and 0.7% bicornuate uterus. The discrepancy could be due to differences in sample size, radiological expertise, or the inclusion of more symptomatic patients in their cohort.

Riaz et al[15] provided further support for the predominance of tubal factors in female infertility, reporting bilateral tubal blockages in 25% of their study population and unilateral blockages in 20%. They also noted fibroids in 21% and hydrosalpinx in 15%. These results reflect a higher prevalence of structural pathology compared to our findings. Our lower rate of bilateral tubal blockage (0.7%) and slightly lower fibroid incidence (16.1%) may be explained by demographic differences, including earlier evaluation and intervention in our urban diagnostic center population. Notably, the Riaz[15] study emphasized the value of HSG in identifying overhanging or beaded tubes, which were not a focus in our study.

The study by Shermin et al[16] from Bangladesh found bilateral tubal blockages to be the most common abnormality, with 12.7% of patients affected, particularly in those with secondary infertility. Our data also demonstrated a higher rate of abnormalities, including fibroids and adenomyosis, in secondary infertility cases. Shermin et al[16] also identified arcuate uterus as the most frequent uterine anomaly (4.7%), which was not observed in our population. The methodological differences, such as contrast type, radiologist expertise, and classification criteria, may contribute to this variation. Importantly, they reported uterine or tubal abnormalities in one-third of their patients, slightly higher than our overall abnormality rate.

In the earlier Pakistani study by Ramzan et al[17] tubal blockage was again reported as the most frequent finding. The authors concluded that HSG plays a vital role in the early identification of infertility-related pathologies, particularly when women are evaluated in their prime reproductive years. This directly supports the rationale of our study and emphasizes the benefit of timely HSG evaluation to initiate earlier treatment strategies and potentially improve fertility outcomes. The present study identified significant associations between age and abnormalities such as fibroids and adenomyosis. This is supported by Aduayi et al[13] who noted a statistically significant relationship between increasing age and tubal occlusion. Similarly, our stratified data revealed that older women (31–45 years) had a significantly higher prevalence of fibroids (66.7%, p=0.001) and adenomyosis

(p=0.026), underscoring the role of age in structural infertility. With respect to type of infertility, our study found higher rates of fibroids, loculated spill, and adenomyosis in patients with secondary infertility. This is consistent with findings from Shermin et al[16] and Kayani et al[14] both of whom noted increased pathology in patients with prior pregnancies. This suggests that secondary infertility may be associated with post-pregnancy complications, surgical trauma, or infections. Regarding duration of infertility, our findings indicated that abnormal HSG findings were present even in women with shorter durations (1–5 years), including 96% of those with normal HSG. Only 5.4% of women had infertility for over 5 years, and while abnormalities such as tubal block and fibroids were marginally more common in this group, statistical significance was limited. These results suggest that structural evaluation via HSG should not be delayed and may be beneficial even in early stages of infertility workup.

One of the major strengths of our study is the use of a standardized HSG protocol, conducted and interpreted by the same radiologist, minimizing inter-observer variability. Additionally, the relatively large sample size (n=280) enhances the generalizability of the findings within the local population. Our study also offers comprehensive stratification by age, type, and duration of infertility, enabling a nuanced analysis of patterns. Moreover, we reported a full spectrum of findings including rarer entities such as adenomyosis and congenital anomalies, which are often underreported in similar studies. The inclusion of patients from a dedicated diagnostic center also ensured consistency in imaging quality and interpretation.

This study is not without limitations. Firstly, it was a single-center study conducted at a private urban diagnostic center, which may limit the generalizability to rural or underserved populations. Secondly, the exclusion of women with known pelvic inflammatory disease or contrast allergy may have introduced selection bias. Thirdly, as with all radiologic assessments, the accuracy of HSG is operator-dependent. We did not corroborate our HSG findings with laparoscopy or hysteroscopy, which may have provided confirmatory evidence, especially for intrauterine anomalies. Additionally, the lack of long-term follow-up data on fertility outcomes limits our ability to directly correlate HSG findings with conception success. The study also did not assess the role of male infertility or hormonal factors, which may coexist and affect fertility independently.

Given our findings and those of other studies, we recommend the following:

HSG should remain an essential part of the infertility workup, particularly in early evaluation stages. Women over 30 years and those with secondary infertility should be prioritized for timely HSG due to their higher likelihood of structural abnormalities. Radiological training programs should emphasize identification of less obvious pathologies such as adenomyosis and congenital uterine anomalies. Integration of HSG findings with clinical history, ultrasound, and follow-up laparoscopy (if needed) should be encouraged for a comprehensive assessment. Further multi-center studies are warranted to establish regional variations in HSG findings and to evaluate their predictive value for fertility outcomes.

CONCLUSION:

Our study reinforces the diagnostic value of HSG in identifying structural abnormalities in infertile women. While most patients had normal findings, the detection of significant pathology in a substantial minority underscores the importance of incorporating HSG into early infertility assessments. The results are broadly consistent with national and international literature, though variations in prevalence highlight the need for population-specific guidelines.

REFERENCES:

Ahmed HM, Khan M, Yasmin F, Jawaid H, Khalid H, Shigri A, Nawaz F, Hasan CA. Awareness regarding causes of infertility among out-patients at a tertiary care hospital in Karachi, Pakistan. Cureus. 2020 Apr 16;12(4).

Zhaira D, Nafisa A, Ikram N. A mosaic of risk factors for female infertility in Pakistan. Journal of Rawalpindi Medical College. 2019 May 2;23(2):80-4.

Ahmed S, Parvin S, Shaha DR, Begum P, Sanjowal L, Hassan MK, Arif KM. Clinical Profile of Pelvic Inflammatory Disease (PID). Faridpur Medical College Journal. 2017 Aug 10;12(1):25-30.

Kayiira A, Zaake D, Lwetabe MW, Sekweyama P. Impact of genital Chlamydia trachomatis infection on reproductive outcomes among infertile women undergoing tubal flushing: a retrospective cohort at a fertility centre in Uganda. Fertility research and practice. 2019 Dec;5(1):1-8.

Naqi S, Shafqat-Ul-Islam S, Raza S, Haroon H. Pattern of pathologies on hysterosalpingography in primary infertility and review of literature. PJR. 2016;18(3).

Shahzad H, John A, Ali A, Ashraf A, Naeem MA. Incidence of infertility in females and Evaluation of its Causes Using Ultrasonography: Incidence and Causes of Infertility in Females. Pakistan BioMedical Journal. 2022 Apr 30:55-8.

Montoliu-Fornas G, Martí-Bonmatí L. Magnetic resonance imaging structured reporting in infertility. Fertility and Sterility. 2016 Jun 1;105(6):1421-31.

Gharekhanloo F, Rastegar F. Comparison of hysterosalpingography and laparoscopy in evaluation of female infertility. Medical Research Archives. 2017 Oct 30;5(6).

Rantsi T, Öhman H, Puolakkainen M, Bloigu A, Paavonen J, Surcel HM, Tiitinen A, Joki-Korpela P. Predicting tubal factor infertility by using markers of humoral and cell-mediated immune response against Chlamydia trachomatis. American Journal of Reproductive Immunology. 2018 Nov;80(5):e13051.

Onwuchekwa CR, Oriji VK. Hysterosalpingographic (HSG) pattern of infertility in women of reproductive age. Journal of human reproductive sciences. 2017 Jul;10(3):178.

World Health Organization (WHO). International Classification of Diseases, 11th Revision (ICD-11) Geneva: WHO 2018.

Onwuchekwa CR, Oriji VK. Hysterosalpingographic (HSG) pattern of infertility in women of reproductive age. J Hum Reprod Sci. 2017 Jul-Sep;10(3):178–84. doi:10.4103/jhrs.JHRS_121_16

Aduayi OS, Akanbi GO, Akintayo AA, Aduayi VA. Hysterosalpingography findings among women presenting for gynecological imaging in Ado-Ekiti, South western Nigeria. Int J Reprod Contracept Obstet Gynecol. 2017;5(6):1906–11. doi:10.18203/2320-1770.ijrcog20161688

Kayani A, Khan R, Siddiqui TS, Rehman AU, Ahmed R, Khan Y. Hysterosalpingographic pattern of primary sub-fertility and secondary sub-fertility in women of reproductive age. Pak Armed Forces Med J. 2024 Oct 31;74(5):1251–4. Available from: https://www.pafmj.org/PAFMJ/article/view/5394

Riaz M, Faiz S, Fatima R, Sattar K, Islam ZU, Firdous A, et al. Hysterosalpingography findings among women presenting for infertility evaluation. Pak J Med Health Sci. 2022 Sep 16;16(08):217.

Shermin S, Noor A, Farjana S, Begum M. Evaluation of hysterosalpingography findings in women with infertility. BIRDEM Med J. 2024 Jan 29;14(1):3–9.

Ramzan R, Parveen S, Jehan S. Hysterosalpingographic findings among infertile women. Isra Med J. 2015;7:216–9