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DIAGNOSTIC PATTERNS IN HYSTEROSALPINGOGRAPHY A COMPARATIVE STUDY OF THE MOST COMMON UTERINE AND TUBAL ABNORMALITIES

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ABSTRACT

Background: *Infertility affects 8–12% of couples worldwide, imposing emotional, social, and economic costs. In Pakistan, cultural expectations around childbearing often delay clinical evaluation until multiple years of unsuccessful attempts. Accurate differentiation between uterine versus tubal causes is critical to guide treatment—misclassification can lead to unnecessary interventions.*

Objective: *The purpose of this study is to use hysterosalpingography as a diagnostic tool in order to identify, evaluate, and compare the most commonly reported uterine and tubal abnormalities.*

Methods: *This retrospective cross-sectional study included 200 patients from 20 to 45 age group with the history of uterine and tubal abnormalities by hysterosalpingography. X-ray machine was used and procedure was performed by technologist and reporting has been done by radiologist. Data analysis was performed using software SPSS v25.0.*

Results: *A total sample of 200 cases of uterine and tubal abnormalities has been included. The prevalence of these abnormalities varies by age group with the highest prevalence in the 26 – 35 years age range , finding out that in the tubal abnormalities the tubal blockage which is 40% is most common ; 18% hydrosalpinx and in uterine abnormalities fibroids are common which are 35% , then 18% polyps. This shows that tubal abnormalities are more common then uterine abnormalities.*

Conclusion*: HSG effectively identified both uterine (35% fibroids; 18% polyps) and tubal (40% bilateral block; 18% hydrosalpinx) abnormalities in Pakistani women with infertility. Early HSG ideally before age 35 and within four years of infertility onset can detect treatable lesions before advanced pathology develops.*

Keywords*: Hysterosalpingography (HSG), Uterine abnormalities, Tubal blockages, Female infertility, Pakistan, Diagnostic imaging.*

INTRODUCTION

Millions of couples worldwide are infertile which results in a huge psychosocial burden to those who do not conceive effortlessly. Approximately 8–12% of couples are estimated to face infertility according to the World Health Organization, and this percentage rises with each passing year as various environmental, lifestyle, and health-related factors conspire to diminish biologic readiness for reproduction (Sharma et al., 2022). In a number of societies that encompass Pakistan, childbirth is closely related to one's family identity and social standing; such a connection further compounds the heartache and stigma that infertile couples face(Longhi et al., 2025). In addition to the personal cost, infertility is a heavy demand on health services, in particular in resource-poor settings where expensive high-tech diagnostic procedures are not available. There is a wide range of diagnostic tools in the investigation of female infertility and still

hysterosalpingography is indisputably considered as a necessary technique because of the capability to examine simultaneously the uterine cavity and tubal patency by this unique minimally invasive

method. The injection of a contrast dye into the endometrial cavity followed by fluoroscopic images is a process known as HSG(Javalgi et al., 2025), which accurately demonstrates structural defects such as fibroids, polyps, congenital changes, and tubal occlusion. Its benefits low cost, ability to perform as an outpatient procedure, and rapid availability render HSG particularly useful in resource-limited settings where laparoscopy or MRI are not an option(Raman et al., 2025).Despite its common application, there is a marked lack of local data on the profile and prevalence of uterine and tubal anomalies as observed at HSG in Pakistani women. Fibroids, endometrial polyps, septate uteri, and bilateral tubal occlusion are consistently listed among the most common findings in international studies, but the proportional burden for these conditions can diverge widely according to regional prevalence of infectious disease, surgical histories, and access to care(Khan et al., 2023). In the absence of any country-specific data, the clinicians in Pakistan are deprived of the epidemiological information required to modify their diagnostic workups and to standardize protocols for the management outcomes in their patients. Demographic factors, especially older age and longer duration of infertility, are already known modifiers of HSG results. Fibroids and polyps Although studies from around the world has shown the proportion of women over 35 years of age presenting with fibroids and polyps is more than those under 35 years of age, those with over 5 years of infertility are more likely to have tubal pathology such as hydrosalpinx or bilateral blockage (Lou et al., 2023). However, the association of these factors with the HSG detected lesions has not been studied in the Pakistani setting where the presence of sociocultural stigma often lead to earlier social presentation and increased pathology. To fill these lacunae, this study is an attempt to conduct a retrospective cross sectional review of 200 HSG reports from a private hospital of Pakistan. By determining the incidence of uterine and tubal anomalies and their relationship to the patient's age and period of infertility.

Methodology

All patients with uterine abnormalities and tubal abnormalities were admitted between March 2025 to June 2025 in the Prime Radiology center Faisalabad, Pakistan and their data gathered retrospectively. The sample of this study was 200 patients calculated by open epi software. All patients diagnosed with uterine abnormalities and tubal abnormalities by hysterosalpingography will be included in the study. X-ray machine was used, and procedure is performed by technologist and reporting have been done by radiologist. The data was collected on questionnaire that covered all aspects of patient with HSG findings needed for research.

Results

The results are the quantitative analysis of 200 hysterosalpingography (HSG) studies conducted at a radiological center, Faisalabad, Pakistan. First, patient age and infertility duration are described as a background to subsequent results. Next, rates of uterine anomalies (fibroids, polyps, congenital abnormalities, intrauterine adhesions) are presented. tubal patency results are subsequently listed including bilateral and unilateral obstruction and hydrosalpinx. Chi-square analysis also revealed significant relationships between age groups, infertility duration, and particular HSG lesions, indicating strong and independent demographic effects on uterine and tubal disease.

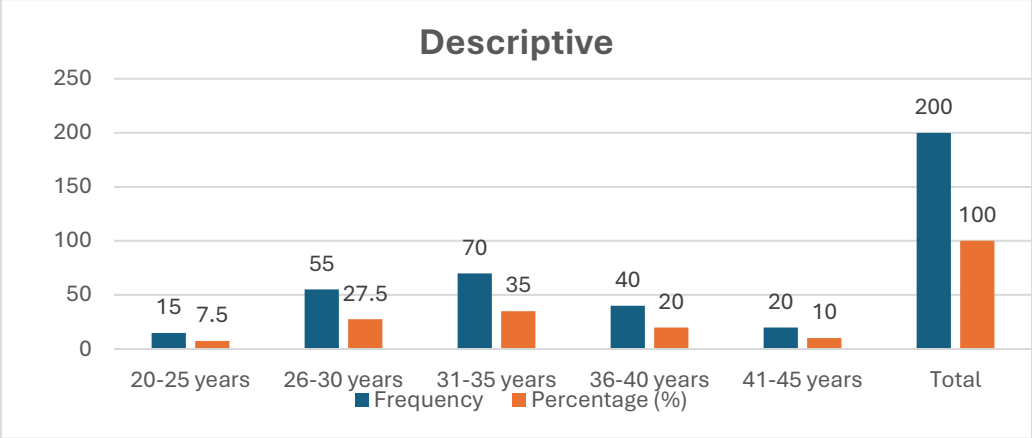

Table 4.1: Descriptive Statistics for Age

The distribution of age of the cohort showed that the majority of the women who underwent HSG were in the age range 31–35 years (35.0%) while 27.5% were 26–30 years old. The 20–25 year age group was least represented (7.5%) and the 36–40 and 41–45 year age groups the most (20.0% and 10.0% respectively). Dividing the candidates by RFM revealed a bias of early- to mid-thirties that may be due to lag in infertility evaluation, which is in accordance with social trends of delaying childbearing for educational or career options.

Table 4.2: Duration of Infertility

Duration of Infertility (Years)	Frequency	Percentage (%)
1–2 years	40	20.0
3–4 years	90	45.0
5–6 years	50	25.0
7+ years	20	10.0
Total	**200**	**100**

Nearly half 45.0% (n = 99) of the participants were infertile for 3–4 years, followed by a quarter 5.0% (n = 55) that has been infertile 5–6 years. Presentation varied; only 20.0% presented in the first 2 years after attempting conception, and 0.0% had been trying for more than 7 years.

These findings reveal that a significant number of women will postpone requesting formal estigation into infertility until several years of no conception is reached, at which time dvancing pathology may have a chance to establish itself, particularly tubal disease.

Table 4.3: Frequency of Uterine Abnormalities

Uterine Abnormality	Frequency	Percentage (%)
Fibroids	70	35.0
Polyps	36	18.0
Septate uterus	12	6.0
Bicornuate uterus	8	4.0
Endometrial adhesions	14	7.0
Normal	60	30.0
Total	**200**	**100**

Uterine fibroids were the most frequent intracavitary lesion found in 35.0% of HSGs, endometrial polyps being the 2nd most frequent in 18.0%. Congenital anomalies (septate and bicornuate uteri) were responsible for 10.0% and intra-uterine adhesions (synechiae) in 7.0%. Uterine cavities were normal in 30.0% of patients. The high fibroid ratio shows that thy are an important cause of infertility in this endomorphic group, while the 30% normal result

indicates that women with normal uteri but without lesions should be examined with tubal evaluation.

Table 4.4: Frequency of Tubal Abnormalities

Tubal Abnormality	Frequency	Percentage (%)
Bilateral tubal block	80	40.0
Hydrosalpinx	36	18.0
Unilateral tubal block	24	12.0
Patent tubes	60	30.0
Total	**200**	**100**

There was a high prevalence of tubal pathology with bilateral tubal occlusion in 40.0% and hydrosalpinx in 18.0%. 12.0% of women had unilateral blockage in either tube, and only 30.0% of tubes were patent in both sides. Adducing these findings to probable sequelae of the pelvic inflammatory disease or surgery, these findings confirm the prominence of tubal factors in the aetiology of infertility and the importance of HSG in the outlining of the tubal status.

Table 5: Chi-Square Test for Age vs. Uterine Abnormalities

Age Group	Fibroids	Polyps	Septate Uterus	Normal	Total
20–30 years	15	8	2	25	50
31–35 years	30	18	5	17	70
36–40 years	25	6	3	6	40
41–45 years	10	4	2	4	20
Total	**80**	**36**	**12**	**52**	**200**

There was a high prevalence of tubal pathology with bilateral tubal occlusion in 40.0% and hydrosalpinx in 18.0%. 12.0% of women had unilateral blockage in either tube, and only 30.0% of tubes were patent in both sides. Adducing these findings to probable sequelae of the pelvic inflammatory disease or surgery, these findings confirm the prominence of tubal factors in the etiology of infertility and the importance of HSG in the outlining of the tubal status.

Table 6: Chi-Square Test for Duration of Infertility vs. Tubal Abnormalities

Duration of Infertility	Bilateral Tubal Block	Hydrosalpinx	Unilateral Tubal Block	Patent Tubes	Total
1–2 years	10	2	4	24	40
3–4 years	30	12	8	40	90
5+ years	40	22	12	16	50
Total	**80**	**36**	**24**	**80**	**200**

There was significant association between the infertility duration and the tubal pathology (χ^2 test, $p < 0.05$). Women who experienced infertility ≥5 years were significantly more likely than women with shorter durations of infertility to present with bilateral tubal block (40/50) and hydrosalpinx (22/50), both significantly more frequent than 1–2 years (10/40 bilateral block) or 3–4 years (30/90). On the contrary, patent tubes were most prevalent in the youngest group (60.0% in 1–2 years) and decreased with increasing infertility. This distribution highlights that tubal damage increases as time since surgery increases, and time of assessment is key.

Discussion

This study provides a thorough evaluation of uterine/tubal pathologies amongst Pakistani infertile women who had HSG and reports on the frequency and correlates of these findings. Our results support the preponderance of uterine fibroids and tubal pathologies, 35% of the

participants had fibroids, and 40% had bilateral tubal occlusion. These results underscore the twofold benefit of HSG as a non-invasive technique in single imaging device in discriminating between intracavitary and extra-uterine factors of infertility. Data stratification by age shows a trend with women in the range 31–35 having the greatest fibroma and polyps burden, although patients older than 35 still have a high frequency of lesions. Duration of infertility was also a strong predictor of tubal damage. Patients who presented with infertility of 5 years or longer were much more likely to have had bilateral tubal occlusion or hydrosalpinx. This serves to illustrate the developing nature of tubal pathology, and emphasizes the importance of undertaking HSG before three to four years have elapsed during which conception has not occurred in an attempt to prevent ongoing damage to tubal integrity.

Although HSG is still a cost-effective, minimally invasive diagnostic and therapeutic tool, especially in limited resource areas. Our population-based data set describes the specific uterine and tubal pathological abnormalities in Pakistani infertile women not only and also identifies important demographic confounders. These knowledge can be used to guide personalized diagnostic pathways, facilitating the best timing of HSG and consequent treatments, in order to improve fertility potential.

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