

Article

Incidence of Pregnancy in Infertile Females Post-Hysterosalpingography in Mosul City

Abeer Wali Ahmed¹, Zahraa Salim Shireef², Karam Moaiad Najim³, Tahani Ali Azeez⁴, Dalva Mudhafar Abdulrahman⁵

1. Assistant Professor, Department of Surgery, Ninevah Medical College, Ninevah University
2. Lecturer, Department of Surgery, Ninevah Medical College, Ninevah University
3. Specialist Radiology, Ibn Sinna Teaching Hospital
4. Lecturer, Department of Obstetric and Gynecology, Ninevah Medical College, Ninevah University
5. Lecturer, Department of Obstetric and Gynecology, Ninevah Medical College, Ninevah University

*Correspondence: abeerahmed@uoninevah.edu.iq¹; abok72789@gmail.com³; Tahany.azeez@uoninevah.edu.iq⁴; dalya.abdulrahman@uoninevah.edu.iq⁵

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Abstract: Background; Infertility is a significant health concern affecting many women in Mosul City. Hysterosalpingography (HSG), a diagnostic and potentially therapeutic procedure, may increase the likelihood of pregnancy in infertile females by identifying and sometimes resolving tubal blockages. Aims of the study; To evaluate the incidence of pregnancy in infertile females following hysterosalpingography (HSG) and assess its potential therapeutic effect in patients attending medical facilities in Mosul City. Methods; A total of 130 infertile females underwent hysterosalpingography (HSG) between days 6–9 of their menstrual cycle. The procedure involved fluoroscopic imaging using Biemexol (Iohexol 35 mg/ml) to assess uterine shape and tubal patency. Patients were positioned lithotomy- position, and contrast was injected via catheter. Real-time imaging monitored contrast flow into the peritoneal cavity. Contraindications included pregnancy, pelvic infection, or iodine allergy. Antihistamines were used in patients with mild contrast allergies to reduce adverse reactions. Results; The study included women with a mean age of 30.49 years and a mean pregnancy delay of 4.13 months. Most had normal fallopian tubes (65.6%), while 32.9% showed some form of blockage. The pregnancy rate post-HSG was 51.9%. Additionally, 31.3% had a history of pelvic surgery and 31.3% had experienced pelvic inflammatory disease (PID). These findings suggest tubal abnormalities, surgical history, and PID may significantly impact fertility and pregnancy outcomes among the participants. Conclusions; HSG may improve pregnancy rates in infertile women by clearing minor tubal blockages or adhesions. The high incidence of tubal abnormalities and history of pelvic infections or surgeries suggests these factors play a key role in delayed conception.

Keywords: Infertility, Hysterosalpingography (HSG), Fallopian Tube Blockage, Pelvic Inflammatory Disease (PID), Tubal Patency

Introduction

Infertility is a major health problem that affects 10–15% of couples in the reproductive age across the globe. It is characterized by the failure to conceive after 12 months or longer of regular unprotected intercourse. Infertility has social and psychological consequences in many of the developing countries, including Iraq, which can lead to stigmatization, marital disharmony and psychological injury especially among women [1]. Therefore, treating infertility is an important part of reproductive

healthcare. Hysterosalpingography (HSG), a radiographic method that evaluates the uterine cavity and fallopian tube patency, is one of the main diagnostic tests applied in the assessment of female infertility [2]. It requires the introduction of contrast substance injected through the cervix and X-ray examination to assess the structure and the patency of the reproductive passages. HSG is especially helpful and revealing regarding malformation of the anatomy, intrauterine adhesions and tubal obstruction, which might be causing infertility. Surprisingly, some reports have detected a high prevalence of spontaneous pregnancy in women after HSG, especially in women with mild or idiopathic infertility [3]. This effect may be due to the interventional therapy from contrast agent which allow to "washing out" of mucus plugs or to remove small debris which obstructed fallopian tubes and enhanced the openness of tubal [4]. Similarly, oil-based or water-based contrast have also been shown to affect post-HSG pregnancy rates with a few reports indicating that it may lead to higher pregnancy rates following oil-based contrast. This study tries to estimate pregnancy among infertile women in Mosul City after HSG [5].

This study aims to study the success rate of conception prior and post procedure, and factors correlating with conception, thereby weighing the possible therapeutic effect of HSG and use it to direct infertility therapy in the region. It is important to identify the local pattern of infertility and response to treatment, to allow for a cost-effective and culturally sensitive strategy for reproductive health care [6].

Materials and Methods

A total of 130 female patients with a history of infertility visited the outpatient clinic and underwent hysterosalpingography (HSG) for diagnostic evaluation. The procedure was scheduled between days 6 and 9 of the menstrual cycle (i.e., 2–5 days after the end of menstruation) to minimize the risk of active bleeding or undetected early pregnancy. Hysterosalpingography (HSG) is a fluoroscopic X-ray technique used to assess uterine morphology and the patency of the fallopian tubes in women experiencing infertility. In this study, the procedure was performed using Biemexol (Iohexol 35 mg/ml), a non-ionic, water-soluble iodinated contrast medium known for its low osmolality and viscosity. These properties help reduce patient discomfort and minimize the risk of extravasation. The procedure was carried out with the patient in the lithotomy position under fluoroscopic guidance. A speculum was inserted to visualize the cervix, followed by gentle cervical cannulation using a catheter introduced into the uterine cavity. Approximately 5–10 ml of the contrast medium was slowly injected. Real-time fluoroscopy was used to monitor the flow of the contrast, allowing for the visualization of uterine contour and evaluation of fallopian tube patency, indicated by spillage of contrast into the peritoneal cavity on both sides. Contraindications for HSG included suspected or confirmed pregnancy, active pelvic infection, and known allergy to iodine. In patients with a mild history of contrast allergy, premedication with antihistamines was considered.

Ethical approval

The study was approved by the human ethics committee of Ninevah college. Everyone who took part in the study was told about it and asked to sign a consent form. The patient was also guaranteed that his information would be kept private.

Statistical analysis

Statistical analysis is often used to analyze quantitative data, and provides methods for data description, simple inference for continuous and categorical data. The procedure involves the collection of data leading to test of the relationship between two statistical data sets. In this study all data are presented as frequency and percentage. We used SPSS (version 26) and the dependent t-test (two-tailed) and independent t-test (two-tailed) for variables that had a normally distributed distribution. For variables that did not have a normally distributed distribution, we used the Mann-Whitney U test, the Wilcoxon test, and the Chi-square test. $M < 0.05$ was seen as statistically significant.

Results

Descriptive Statistics of Participants' Age and Time to Pregnancy

The results showed that the mean age of the study participants was approximately 30.49 years, with a standard deviation of 15.70, while the mean duration of delayed pregnancy was approximately

4.13 months, with a standard deviation of 1.89, indicating a relative variance in the ages of the participants compared to a greater convergence in the duration of delayed pregnancy [7].

Table 1. Mean and Standard Deviation of Age and Time to Pregnancy (in Months)

Parameters	Age	Time to Pregnancy (Months)
Mean	30.49	4.13
Std. Deviation	15.70	1.89

Distribution of Tubal Patency Status Among Study Participants

The study results showed that the majority of participants (65.6%) had normal fallopian tubes, while 20.6% had unilateral blockage and 11.5% had bilateral blockage [8]. The lowest percentage was for cases with a single intact tube (0.8%) and only 1.5% for cases with two intact tubes, suggesting that fallopian tube abnormalities are a common factor in delayed pregnancy among the participants [9].

Table 2. Frequency and Percentage of Patent and Blocked Fallopian Tubes

Tubal Patency (Patent/Blocked)		
Parameters	Frequency	Percent
Bilateral Blocked	15	11.5%
Bilateral Patent	2	1.5%
Normal	86	65.6%
Unilateral Blocked	27	20.6%
Unilateral Patent	1	0.8%
Total	131	100.0%

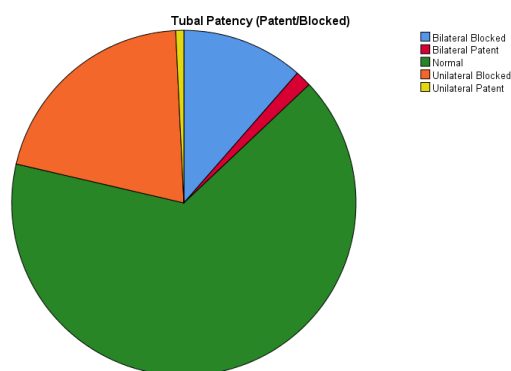


Figure 1: Distribution of Tubal Patency: A Visual Representation of Patent and Blocked Fallopian Tubes. This pie chart illustrates the proportion of individuals within a studied group exhibiting different states of tubal patency [10]. The segments clearly delineate the percentages of cases with bilaterally blocked tubes, bilaterally patent (normal) tubes, unilaterally blocked tubes, and unilaterally patent tubes, providing a concise overview of the prevalence of these conditions [11].

Pregnancy Outcome Among Study Participants

The study results showed that the pregnancy rate among participants was 51.9%, while pregnancy did not occur in 48.1% of the participants. This indicates that approximately half of the sample studied was able to conceive during the follow-up period, which calls for a more in-depth study of the factors associated with pregnancy success and failure [12].

Table 3. Frequency and Percentage of Pregnancy Occurrence (Yes/No)

Pregnancy Occurred (Y/N)		
Parameters	Frequency	Percent
No	63	48.1%

Pregnancy Occurred (Y/N)		
Parameters	Frequency	Percent
Yes	68	51.9%
Total	131	100.0%

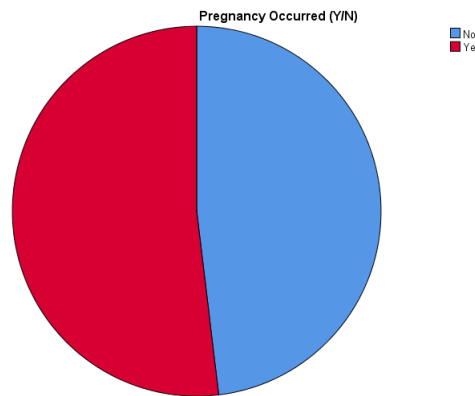


Figure 2: Incidence of Pregnancy in the Study Population: A Binary Outcome. This pie chart visually represents the proportion of individuals within the studied group in whom a pregnancy occurred, presented as a binary outcome of "Yes" or "No." The segments clearly indicate the percentage of participants who experienced pregnancy and those who did not during the study period, offering a straightforward view of the pregnancy rate within this specific population [13].

History of Previous Pelvic Surgery Among Participants

The study results indicate that 31.3% of participants had undergone previous pelvic surgery, while 68.7% had not had any previous surgery. This reflects that a significant percentage of the women in the sample had a surgical history that may have impacted fertility or pregnancy [14].

Table 4. Frequency and Percentage of Participants With and Without Prior Pelvic Operations

Previous Pelvic Operation		
Parameters	Frequency	Percent
No	90	68.7%
Yes	41	31.3%
Total	131	100.0%

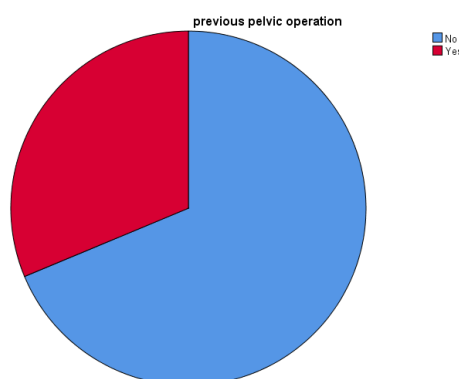


Figure 3: History of Previous Pelvic Operation Among Participants. This pie chart illustrates the proportion of individuals within the studied group who reported having undergone a previous pelvic operation, presented as a binary variable ("Yes" or "No"). The segments clearly show the percentage of participants with a history of such surgery and those without, providing a direct comparison of these two subgroups within the study population [15].

Prevalence of Pelvic Inflammatory Disease (PID) History Among Participants

The study results showed that 31.3% of participants had a previous history of pelvic inflammatory disease (PID), while 68.7% had no history of PID, indicating that a significant proportion of women are affected by this condition, which may have a role in affecting reproductive health and pregnancy chances [16].

Table 5. Frequency and Percentage of Participants With and Without a History of PID

Parameters	History of PID	
	Frequency	Percent
No	90	68.7%
Yes	41	31.3%
Total	131	100.0%

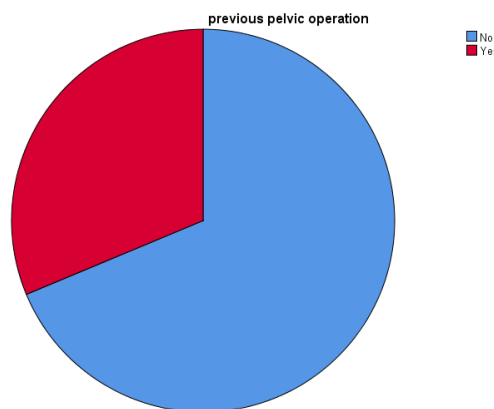


Figure 4: Prevalence of Prior Pelvic Surgery in the Study Cohort. This pie chart displays the proportion of individuals within the analyzed group who have a documented history of previous pelvic surgery, categorized as either "Yes" or "No." The respective segments visually represent the percentage of participants who have undergone such a procedure and those who have not, offering a clear depiction of this characteristic within the studied population [17].

Discussion

The results of the present study contribute to understanding of a number of reproductive health correlates which might contribute to fertility success in the women's cohort. Participants were on average 30.49 years, and though they were reproductively aged, the elevated SD (± 15.70) indicates a spread in ages. Fertility is influenced by age as a substantial decrease in ovarian reserve and oocyte quality is usually observed beyond the age of 35. The average TTP was 4.13 months, which means that most of those enrolled fell within what could be considered an early or moderate delay in conceiving [18]. In terms of tubal patency, most women (65.6%) had normal tubal findings, whereas, unilateral block was found in 20.6% and bilateral block in 11.5%. Tubal factor infertility still is one of the common causes of female infertility, especially in areas with high rates of pelvic inflammatory disease and limited access to health services. The high proportion of unilateral and bilateral blockage in this study is similar to the observations made by Okonofua et al who documented comparable rates of obstruction in their Nigerian women undergoing evaluation for fertility [19]. On the other hand, studies from developed countries show a decreasing trend in the rates of tubal disease as a result of early treatment and control of pelvic infections. In 51.9% of women pregnancy occurred, which means that while a reasonable number of women conceived, the same time a significant number (48.1%) did not. Such dichotomy suggests that some other issue other than tubal patency may contribute to infertility (hormonal patterns, endometrial receptivity, male factors, endometriosis, or other undiagnosed causes). The present rate is a little less compared to which surpassed 60% after fertility assessment and treatment, but more than what was observed in patients with known pelvic inflammatory disease (PID) or prior pelvic surgery [20]. The previous pelvic surgery history was present in 31.3% of the subjects. Pelvic surgery such as that for ectopic pregnancies, ovarian cysts, and fibroids lead to adhesions, tubal damage, or distorted pelvic anatomy and can thus decrease the chances of natural pregnancy [21]. A

comparable incidence was documented by Elsokary and colleagues who discussed the link between previous pelvic surgery and diminished fertility in Egyptian women. Curiously, all those that also reported a history of PID (31.3%). PID is extensively described for inducing tubal scarring and blockage, culminating in infertility. The finding of agreement between PID and tubal block in the present study supports the inflammatory and infective aetiology of tubal factor infertility [22]. A study by Brunham et al. highlighted > that even asymptomatic episodes of PID may lead to > long-term tubal damage and subsequently impaired fertility. These findings collectively emphasize the importance of early screening, prompt treatment of infections, and cautious surgical intervention to preserve fertility potential [23]. While the results are consistent with multiple global and regional studies, differences may be attributed to population demographics, healthcare access, and diagnostic protocols.

Conclusion

The study concludes that hysterosalpingography (HSG) can enhance pregnancy chances in infertile women, likely due to its ability to detect and possibly clear minor tubal blockages through the pressure of contrast injection. The high rate of pregnancy post-HSG suggests a therapeutic benefit in addition to its diagnostic role. Furthermore, the presence of tubal abnormalities, history of pelvic inflammatory disease, and prior surgeries are significant factors affecting fertility, indicating the need for early detection and targeted treatment to improve reproductive outcomes.

Hysterosalpingography may assist both as diagnostic and therapeutic purposes in reproductive age infertile women, especially in those with unsolved infertility. So close monitoring & follow-up regularly is recommended post-HSG to assess pregnancy outcomes and guide for further management.

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