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Original Research Article

Hystrosalpingograms of Tubal Structures in Infertile Women from Western Sudan

Salaheldinn Gumaa[1,2*], Hussain Gadelkarim Ahmed[2,3]

[1]Khair Alelag Private Hospital, El-Obeid, North Kordofan, Sudan
[2]Professor, Medical Research Consultancy Center, NK, El-Obeid, Sudan
[3]Department of Histopathology and Cytology, FMLS, University of Khartoum, Sudan

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***Corresponding author:** Salaheldinn Gumaa
Khair Alelag Private Hospital, El-Obeid, North Kordofan, Sudan

Abstract

***Background*:** A variety of factors, including tubal blockage, cause infertility, a global problem**.** As a result, the purpose of this study was to look at the most common tubal irregularities. ***Methodology*:** A descriptive longitudinal study was undertaken in Khair Alelag private hospital in El-Obeid, North Kordofan State, Sudan, from January to December 2023. We included approximately 60 individuals who presented for a hygrosalpingogram (HSG) evaluation. ***Results*:** According to our findings, half of the study group 30(50%) has a history of PID, with 17 (57%) having tubal obstruction, either bilaterally (7%) or unilaterally (10%). Those without a history of PID (12%) have tubal obstruction, either bilaterally (3%) or unilaterally (9%). 12 (20%) have a history of uterine or tubal surgery, all with tubal obstruction; 8 (13%) have unilateral tubal obstruction; and 4 (7%) have bilateral tubal obstruction. ***Conclusion*:** Tubal blockage is common in Sudan, and it may contribute to the country's high rate of infertility. Unilateral tubal blockage is the most prevalent form.

Keywords: Tubal obstruction, infertility, women, Hystrosalpingogram, Sudan.

INTRODUCTION

In both industrialized and developing nations, infertility affects one in six women, negatively impacting their psychosocial wellness and quality of life [1]. Premature ovarian failure (POF), uterine and fallopian tube illnesses, as well as CTRI (cancer treatment-related infertility) in oncologic patients, are all considered social diseases in women [2]. After 12 months of unprotected sexual activity, infertility and subfertility can be predicted. About 85% of infertile couples had the following main causes of infertility: ovulatory failure, male factors, and tubal illness. An additional 15% of infertile couples suffer from "unexplained infertility." Lifestyle and environmental variables, such as smoking and obesity, can negatively impact fertility. Obesity can impair fertility. About 25% of infertility diagnoses are ovulatory abnormalities. Infertility can indicate a persistent condition [3]. Congenital defects, acute and chronic inflammatory disorders, endometriosis, and other illnesses that block the fallopian tubes cause infertility. About 30% of women with fallopian tube disease experience infertility, while 10% to 25% experience proximal obstruction. Natural conception requires adequate fallopian tube function. Tubal blockage causes many infertility cases [4].

Hydrosalpinx accounts for approximately 10–30% of tubal diseases. Pelvic inflammatory disease frequently causes hydrosalpinx, a distal tubal blockage-induced fallopian tube dilatation [5]. Hysterosalpingography (HSG) is now common because of the advancement and popularity of reproductive medicine. HSG detects uterine and fallopian tube abnormalities. HSG reveals uterine congenital abnormalities, polyps, leiomyomas, surgical changes, synechiae, and adenomyo Abnormalities in the tubules include blockage, salpingitis isthmica nodosa, polyps, hydrosalpinx, and peritubal adhesions. Awareness is crucial because HSG risks include bleeding and infection. HSG is useful for uterine and fallopian tube exams [6]. Pelvic ultrasound can diagnose anovulation by examining ovarian morphology and antral follicle count [7].

Infertility treatment entails addressing its causes. Treatments for infertility include uterine and tubal factors, ovarian stimulation, and recanalization [3]. We recommend a laparoscopic salpingectomy before IVF to remove the tube. Women who seek natural conception can have salpingostomy or distal tubal plastic surgery for hydrosalpinx; however, ectopic pregnancy rates can reach 10% [8]. For women aged 38–40, the first step may be to undergo urgent IVF treatment. We recommend IVF for severe male factor infertility and untreated bilateral tubal factors [3]. In vitro fertilization can fix unexplained subfertility after 2 years. Involuntary childlessness promotes psychological morbidity; thus, couples need prompt evaluation and therapy [7].

Sexually transmitted and pelvic inflammatory disorders damage most tubules. Pelvic adhesions after leiomyoma, ovarian cyst, and endometriosis surgery can cause infertility. Minimizing infertility involves avoiding unnecessary procedures and identifying women who can receive treatment without surgery. Pelvic adhesion prevention should be the goal of clinically indicated surgery that aims to prevent pelvic adhesion. Good surgery and anti-adhesion drugs can help to reduce pelvic adhesions. Skilled surgeons, or "centers of clinical competence," should perform endometrioma and other benign cyst surgery to maintain normal ovarian tissue [5].

Radiologists, radiographers, and nurses took the exams, and experienced radiologists reported. Upon arrival at the x-ray department, the patients received information about the operation and its complications and provided their informed consent.

We performed hysterosalpingography (HSG) as described [9]. Before sexual activity, HSG was performed on the 7th to 12th day of the menstrual cycle to ensure a thin endometrium for image interpretation and no pregnancy, which is contraindicated. We advised some patients with irregular menstrual cycles to take ibuprofen 400 mg 30 minutes before hysterosalpingography to prepare for discomfort.

We used a local anesthetic to aseptically implant a vaginal speculum into each patient's lithotomy position at the foot of the table. We determined the size and direction based on uterine sounds. The cannula was connected to a 15-ml syringe of 60% Omnipague contrast medium, and air was removed. After gently pressing vulsellum forceps on the anterior cervical lip, the cannula was inserted and secured to the cervix, and the patient moved up the table. Fluoroscopic monitoring followed the patient's placement and the gradual introduction of contrast. Films were taken supine after 5 ml of contrast was given to show the uterine cavity and 5 ml to show free leaking into the peritoneal cavity. Life-saving drugs and normal saline surrounded the patient. Other than minor procedural pain, this experiment had no HSG problems. After surgery, patients were warned of one to two days of vaginal bleeding. Some needed antibiotics.

MATERIALS AND METHODS

This study is a descriptive longitudinal investigation that took place at Khair Alelag private hospital in El-Obeid, North Kordofan State, Sudan. We conducted the study from January 2023 to December 2023. The study included a total of 60 individuals who underwent a hysterosalpingogram (HSG) evaluation.

Statistical Analysis

We first organized the data in a datasheet and then input it into a computer program known as the Statistical Package for Social Sciences (SPSS) (Version 24, Chicago, USA). We performed calculations for frequencies, percentages, cross-tabulation, and the chi-square test. We deemed a P-value greater than 0.05 as statistically significant for a 95% confidence interval (95% CI).

Informed Consent

Prior to the interview, every participant was required to provide their signature on a written document indicating their ethical consent.

Ethical approval

The Human Research Ethics Committee (HREC) at the Pro-Medical Research Consultancy Center (MRCC) approved the study protocol.

RESULTS

This study examined a group of 60 women, ranging in age from 18 to 43 years, with an average age of 29. Many patients fell within the age range of 26–36 years, followed by 21–25 and 31–35 years, accounting for 37%, 23%, and 18%, respectively, out of a total of 60 patients. The study participants' distribution was rather homogeneous, as reported by the residents. Many patients have a marriage duration of less than 4 years. The most common age group is 26-30 years followed by 21-25 and 31-35 years, which make up 22/60 (37%), 27%, and 23%, respectively, as shown in Table 1 and Fig 1.

Table 1: Distribution of the study subjects according to tubal obstruction and demographic features

Variable	No Obstruction	Unilateral Ob	Bilateral Ob	Total
Age				
≤ 20 years	3	2	0	5
21-25	7	4	3	14
26-30	14	6	2	22

Variable	No Obstruction	Unilateral Ob	Bilateral Ob	Total
31-35	5	5	1	11
≥36	2	3	3	8
Total	31	20	9	60
Residence				
Urban	16	8	7	31
Rural	15	12	2	29
Total	31	20	9	60
Duration of marriage				
<4 years	13	5	4	22
4-6 years	6	7	1	14
7-9 years	9	5	2	16

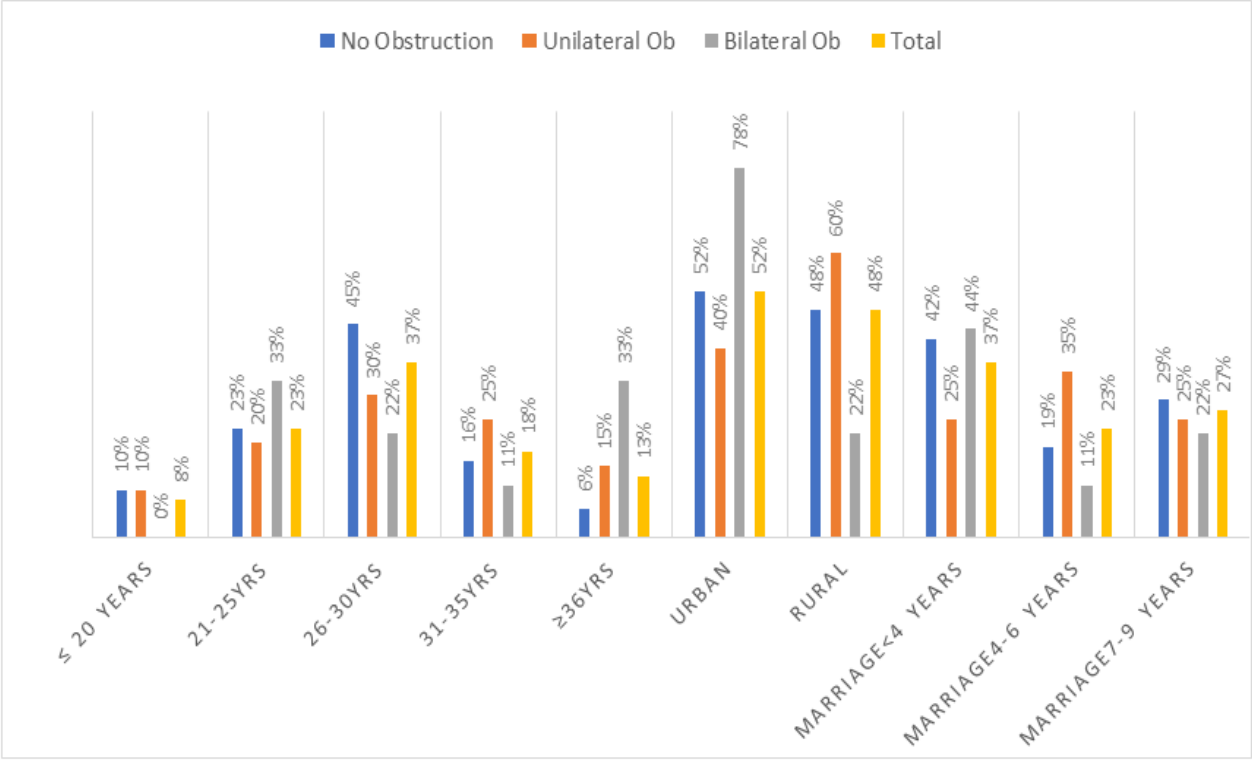

Figure 1: Provides a description of the study subjects by tubal obstruction and demographic features

Our study found that 50% of the study population, or 30 individuals, have a history of pelvic inflammatory disease (PID). Of those with PID, 57% have tubal obstruction, 23% have bilateral obstruction, and 33% have unilateral obstruction. This contrasts with individuals without a history of PID. Of the 12 cases with a history of surgery, all (100%) developed obstruction including 4/12(33%) being bilateral and 8/12 (67%) being unilateral. Out of the total of 12 cases, 20% have a history of uterine or tubal surgery, all of which resulted in tubal obstruction. Among these cases, 8 (13%) have unilateral tubal obstruction and 4 (7%) have bilateral tubal obstruction, as shown in Table 2 and Figure 2.

Table 2: Distribution of the study subjects according to tubal obstruction and clinical presentations

Variable	No Obstruction	Unilateral Ob	Bilateral Ob	Total
History of PID				
Negative history of PID	**18**	9	**3**	30
Positive history of PID	13	10	7	30
History of surgery				
Negative history of surgery	31	12	5	48
Positive history of surgery	0	8	4	12

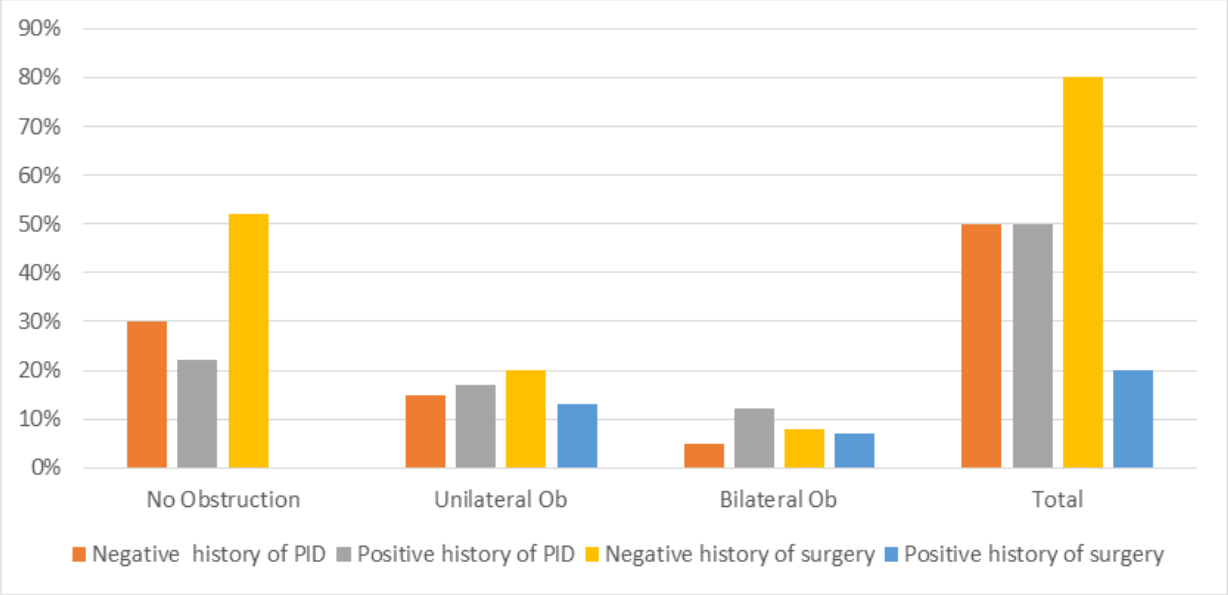

Figure 2: Illustrates the distribution of study subjects based on tubal obstruction and clinical presentations

Table 3, Fig 3, summarize the distribution of the study subjects by tubal obstruction site and radiological findings. Out of 19 unilateral obstruction sites, 7/19(37%) occurred as Unilateral intra-mural, 7/19(37%) occurred as Unilateral ampullary, 4/19(21%) occurred as Unilateral isthmic, and 1/19(5%) occurred as Isthmic and ampullary. Out of 10 bilateral blockages, 5/10(50%) occurred as Bilateral intra-mural, 3/10(30%) occurred as Bilateral ampullary, 1/10(10%) as Isthmic and ampullary, and 1/10(10%) as Isthmic and ampullary. obstruction, with two bilateral and one unilateral. The remaining case (2%) shows hydrosalpinx without any obstruction.

Table 3: Distribution of the study subjects by tubal obstruction site and radiological findings

Variable	No Obstruction	Unilateral Ob	Bilateral Ob	Total
Site of obstruction				
No obstruction	31	0	0	31
Unilateral intra-mural	0	7	0	7
Unilateral isthmic	0	4	0	4
Unilateral ampullary	0	7	0	7
Bilateral intra-mural	0	0	5	5
Bilateral ampullary	0	0	3	3
Intramural and isthmic	0	0	1	1
Isthmic and ampullary	0	1	1	2
Total	31	19	10	60
Presence of hydrosalpinx				
No	30	19	7	56
Unilateral	1	1	0	2
Bilateral	0	0	2	2
Total	31	20	9	60

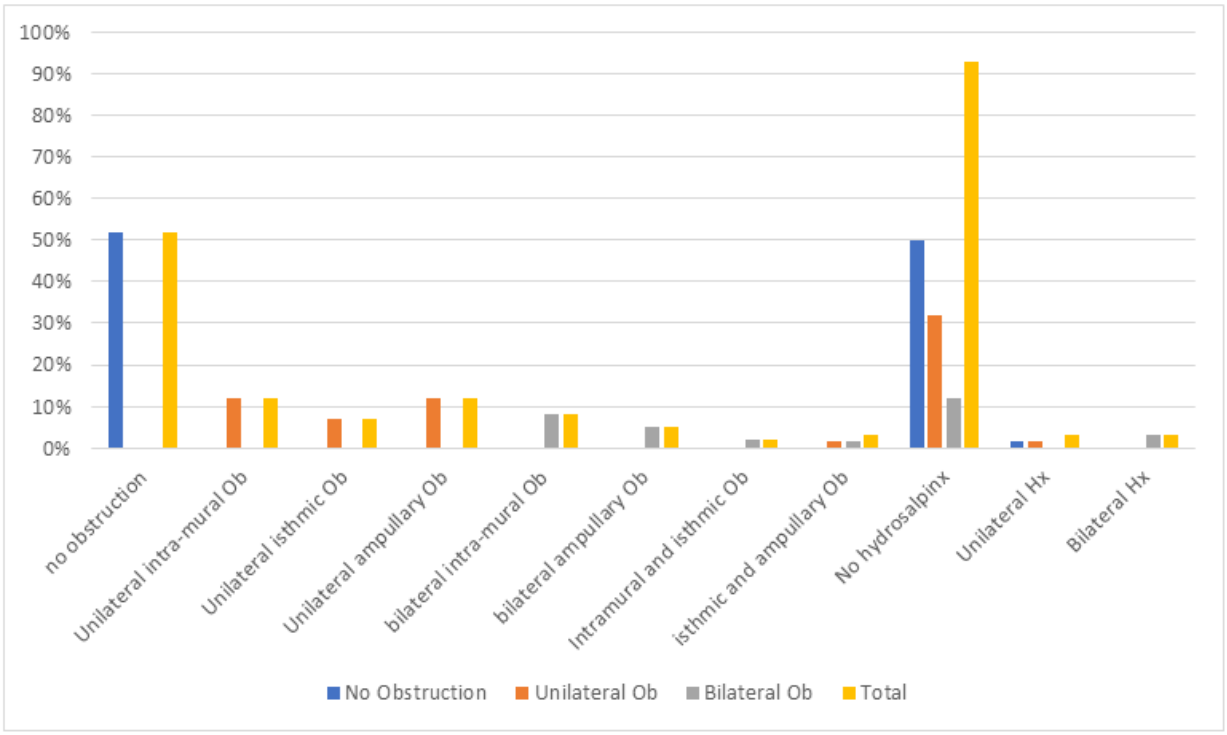

Figure 3: Shows the distribution of study subjects according to tubal obstruction and radiological findings

Out of the 30 participants with pelvic inflammatory disease (PID), 12 (20%) had peri-tubal adhesions. Among these, 10 (17%) have adhesions on only one side, while 2 (3%) have adhesions on both sides. Table 4 and Figure 4 provide this information.

Table 4: Distribution of the study subjects according to peri-tubal adhesion and clinical presentations

Variable	No adhesion	Unilateral adhesion	Bilateral adhesion	Total
History of PID				
No	29	1	0	30
Yes	18	10	2	30
History of surgery				
No	38	9	1	48
Yes	9	2	1	12

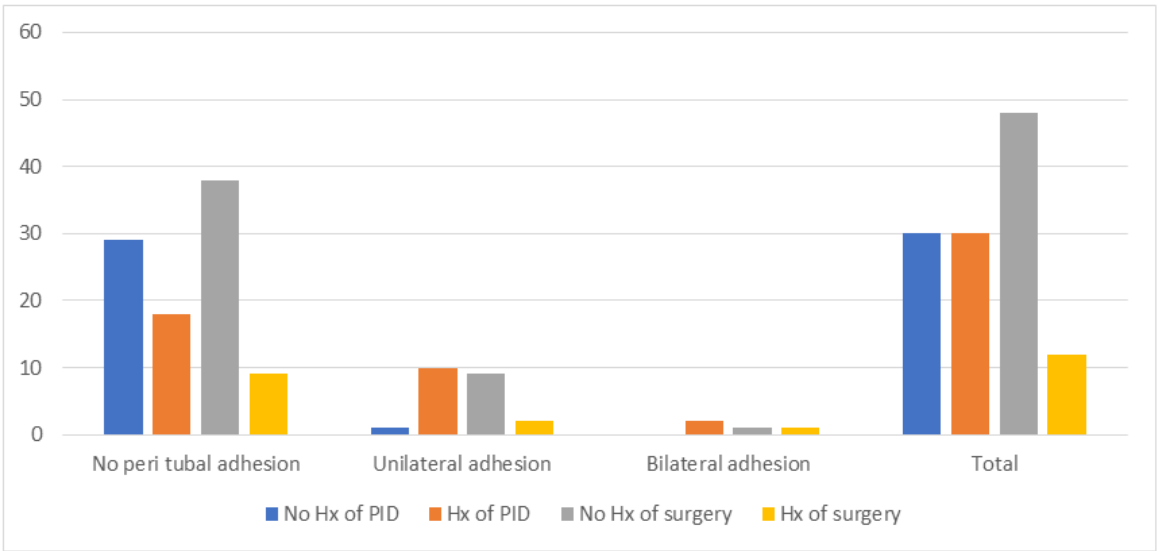

Figure 4: Distribution of the study subjects according to peri-tubal adhesion and clinical presentations

DISCUSSION

Couples commonly encounter infertility as a health issue, and in Sudan, the perception of it as a social stigma leads to numerous consequences. Despite the construction of numerous fertility centers in western Sudan, research on the causes and patterns of infertility remains inadequate.

Roughly 85% of couples experiencing infertility can attribute it to a specific cause. Ovulatory dysfunction, male factor infertility, and tubal illness are the primary causes of infertility. "Unexplained infertility" diagnoses 15% of couples unable to conceive. Various lifestyle and environmental factors, such as the habit of smoking and the condition of obesity, might have a negative impact on fertility. Over 25% of infertility diagnoses involve ovulatory abnormalities, with polycystic ovary syndrome diagnosing 70% of women experiencing anovulation. Infertility can also serve as an indicator of an underlying chronic condition linked to infertility [10].

Tubal factors account for approximately 35% of global infertility cases [4]. Evaluating the patency of the fallopian tubes is a crucial component of investigating infertility. Hysterosalpingo-foam-sonography (HyFoSy) is presently considered one of the most effective techniques for evaluating the openness of the fallopian tubes [11].

We looked at the most common types of tubal problems and found that 62% of cases were caused by proximal tubal obstruction, which included both isthmic and ampullary obstructions on both sides. This finding contrasts with previous studies that reported a proximal tubal obstruction rate of 25% [4]. Factors such as an increased occurrence of tubal spasms, previous tubal surgeries (20%), or a smaller sample size may account for the higher percentage in our study.

Tubal factors contribute to around 25% of infertility cases, with hydrosalpinx being the most severe form of tubal illness, accounting for 10–30% of all tubal diseases. Hydrosalpinx refers to the enlargement or widening of the fallopian tube due to a blockage at the end of the tube. This condition is primarily caused by a pelvic inflammatory illness. Women who have hydrosalpinges experience reduced rates of implantation and pregnancy in assisted reproductive technology (ART) due to a combination of mechanical and chemical variables that are believed to interfere with the endometrial environment. The current recommendation is to remove the tube with a salpingectomy, ideally using laparoscopic surgery, prior to undergoing IVF treatment. Salpingostomy, also known as distal tubal plastic surgery, is a viable option for women who wish to conceive naturally while having hydrosalpinx. However, it is important to note that there have been reports of ectopic pregnancy rates as high as 10%. Proximal tubal occlusion with Essure® devices inserted during hysteroscopy may be a good choice, especially if the pelvis is deformed or there are pelvic adhesions that make abdominal surgery hard to do. Nevertheless, previous studies have indicated that using these devices prior to in vitro fertilization (IVF) has resulted in suboptimal rates of clinical pregnancy and live births [12].

We discovered a low prevalence of peri-tubal adhesion, with just 3% of cases. Despite the high prevalence of pelvic inflammatory disease (PID) at 50%, the limited accuracy of HSG in detecting endometriosis, peri-tubal adhesions, and peri-fimbrial adhesions may be the cause. Despite having normal HSG results, 36 patients (63.2%) and 5 patients (8.8%), respectively, had these conditions identified during laparoscopy [13]. The user's text is "[10]." Hydrosalpinx accounts for 14% of tubal illnesses, as stated in the literature [5]. Pathology in the fallopian tubes is a major cause of infertility in women. More women have simple proximal disease or proximal disease that extends farther distally than pure distal blockage. Proximal tubal blockage is commonly associated with the upward spread of infections, such as pelvic inflammatory disease. Conversely, an ascending pelvic inflammatory illness or pelvic conditions such as endometriosis and ruptured appendicitis can cause distal blockage [14].

Hysterosalpingography (HSG) is the most commonly used technique in clinical settings to assess the condition of the uterine cavity and the patency of the fallopian tubes. A previous study found that the overall pregnancy rate of patients with hydrosalpinx who underwent laparoscopy was 65.62% in the group where the condition of the fallopian tubes improved, compared to 20% in the group where there was no improvement. This difference was statistically significant ($p < 0.05$). When considering the expenses associated with the HSG technique for infertility, as well as the possibility of discomfort, exposure to radiation, and uncommon allergic responses to the contrast material, it is crucial to carefully select the ideal conditions for undergoing this surgery. To reduce the need for unnecessary medical treatments, it is advisable to discuss the idea of HSG (hysterosalpingography) for primary infertile individuals who are younger than 28.5 years old [15, 16].

CONCLUSION

Tubal obstruction is a common issue in Sudan and could be a contributing factor to the country's high rates of infertility. The most common type of tubal obstruction is unilateral.

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Author's Contribution

SEEG: Conception, data collection, drafting, and final approval.

HGA: Drafting Critical revision, and approval of the final version.

Conflict of Interest: Authors declare no conflict of interest.

Data Availability: All data referring to this research are available from the corresponding author.

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