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Research Article

Hysterosalpingography Findings Among Infertile Women in A Tertiary Health Facility in Northwest Nigeria

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Abstract

Background: Infertility is a global health problem with a high prevalence in low- and middle-income countries, particularly Sub-Saharan Africa, where infection-related tubal damage is the leading cause. Hysterosalpingography (HSG) is the first-line imaging modality for assessing tubal patency in the evaluation of female infertility. This study aimed to determine the prevalence and spectrum of HSG findings among infertile women referred to the radiology department of Sir Yahaya Memorial Hospital, Birnin Kebbi, Nigeria.

Methods: This was a cross-sectional prospective study involving 300 infertile women aged 18 – 48 years who underwent HSG at a tertiary healthcare facility. Patient demographics and HSG findings were analyzed.

Results: Out of the three hundred participants, one hundred and seventy-five (58.3%) patients had abnormal HSG findings while one hundred and twenty-five (41.7%) had normal findings. Tubal abnormalities were seen in eighty-nine (29.7%) with bilateral proximal tubal occlusion been the commonest abnormality comprising of 10% of the total tubal abnormalities. Bilateral distal tubal occlusion was seen in only 1% of the total number of patients. Seventeen (5.7%) had only right tubal occlusion while eight (2.6%) had only left tubal occlusion. Other abnormalities include: hydrosalpinx (n = 28; 9.4%), uterine fibroids (n = 35; 11.7%), cervico-uterine adhesions (n = 20; 6.7%), pelvic adhesions (n = 17; 5.7%), endometrial hyperplasia (n = 3; 1%) and congenital anomalies (n = 11; 3.7%).

Conclusion: Bilateral proximal tubal occlusion was the most common hysterosalpingographic finding among women with infertility at Sir Yahaya Memorial Hospital, Birnin Kebbi. Sexually transmitted diseases, as well as post-abortal and postpartum infections, are major contributors to the high rate of tubal pathologies. Prompt diagnosis and treatment of these preventable reproductive tract infections would significantly reduce high prevalence of infertility in our environment.

Keywords: hysterosalpingography; infertility; tubal occlusion; reproductive tract infections; birnin kebbi

Introduction

Infertility is a significant public health concern, defined as failure to achieve a successful pregnancy after 12 months or more of regular, unprotected sexual intercourse[1]. It is termed primary if pregnancy has never occurred and secondary if a prior pregnancy has occurred or previously documented[2]. Infertility affects up to 15% of reproductive-aged couples worldwide[3]. Infertility is a global health problem with the highest prevalence seen in low-resource countries, particularly in sub-Saharan Africa where infection related tubal disease is the commonest cause[4]. Studies conducted in Nigeria highlight the scope of this problem, with Panti and Sununu[5] reporting a prevalence of 15.7% in Sokoto, North-West Nigeria, and a community-based survey in South-West Nigeria documenting a higher prevalence of 30.3%[6].

Hysterosalpingography (HSG) is a special radiographic procedure that involves the administration of radio-opaque contrast medium through the cervical canal to outline the uterine cavity and the fallopian tubes[7]. HSG is predominantly used in evaluating female patients with infertility[8]. Other indications of HSG include the evaluation of women with previous history of recurrent miscarriages, postoperative evaluation in those who had undergone tubal ligation or reversal of tubal ligation and assessment of patients prior to myomectomy[8].

HSG remains an important radiographic procedure in the investigation of infertility and has become a commonly performed examination due to recent advances in reproductive medicine[9]. Newer imaging techniques for the study of the uterine cavity and the fallopian tubes include: hysterosonosalpingography (Sono-HSG) and virtual hysterosalpingography; however, conventional HSG is frequently used because it has a shorter learning curve than Sono-HSG and is less expensive than virtual HSG[10]. Despite the advent of newer imaging modalities, HSG still remains the best procedure to image the fallopian tubes[11]. It has a sensitivity of 85 – 100% in identifying tubal occlusion and a specificity approaching 90% in identifying pelvic inflammatory disease (PID) related causes of tubal occlusion[12].

This study was carried out to assess the pattern of HSG findings of infertile women being referred to the radiology department of Sir Yahaya Memorial Hospital, Birnin Kebbi. No similar study has been carried out in this environment resulting in lack of data in the subject matter. This study is hopefully expected to fill in this gap.

Materials and methods

This was a one-year prospective cross-sectional study of patients with infertility who were seen at the Obstetrics and Gynaecology (O & G) and the General Out Patients Clinics of Sir Yahaya Memorial Hospital, Birnin-Kebbi as well as other hospitals within Kebbi State and environs whom were referred to the Radiology department of Sir Yahaya Memorial Hospital, Birnin-Kebbi for HSG between January to December, 2022. The patients were scheduled to come for the procedure between days 7 – 12 of the menstrual cycle (day 1 being the first day of menstrual bleeding). They were instructed to abstain from unprotected sexual intercourse between booking and the time of examination in order to avoid a potential pregnancy. Serum β-human chorionic gonadotropin level was assessed in patients with irregular menstrual cycle to exclude an existing pregnancy. The sample size was calculated using the prevalence of infertility in Sokoto (15.7%)[5] where consecutive patients with infertility who presented for HSG were selected. Written informed consent was obtained from the patients to carry out the examination. A structured questionnaire containing patient's demographics, clinical information and radiographic findings was filled.

The patient was made to lie supine on the x-ray table and a scout image of the pelvis was taken. Thereafter, the patient was placed in a lithotomy position; the perineum was cleansed with povidone-iodine solution and draped with sterile towels. A speculum was inserted into the vagina; the cervix was localized and cleansed with povidone-iodine solution. A Leech-Wilkinson cannula was coupled to a 20 ml syringe filled with contrast medium (urografin), air bubbles were expelled from the syringe. The anterior lip of the cervix was gently grasped with a vulsellum forceps and the cannula was inserted into the cervical canal. Contrast medium was injected slowly and images were taken with filling up of the uterine cavity and tubal spillage. The examination was done using SHIMADZU diagnostic x-ray equipment (Model No: 21400BZZ00192000), manufactured in January, 2014. Images were processed using iCRco digitizer and printer. The images were reported by two consultant radiologists; the findings were recorded on the data sheet, and analysed using the statistical package for Social Sciences (SPSS) version 22.

Approval was obtained from the Institutional Ethics and Research Committee before the commencement of the study.

Results

A total of 300 patients participated in the study; the minimum age was 18 years and the maximum was 48 years. One hundred and forty patients (46.7%) were in the 18 – 28 years age group while 122 (40.7%) and 38 (12.7%) were seen in the 29 – 38 years and 39 – 48 years age groups respectively.

Age category	Frequency	Percentage
18-28 years	140	46.7
29-38 years	122	40.7
39-48 years	38	12.7
Total	**300**	**100.0**

Table 1: showing the distribution of the age groups of the study population

One hundred and thirty-four (44.7%) patients presented with primary infertility while 166 (53.3%) had secondary infertility as indication for the HSG examination. Primary infertility predominated in the 18 – 28 years group while the 29 – 38 years group had more patients with secondary infertility.

Type of infertility	Frequency	Percentage
Primary	134	44.7
Secondary	166	53.3
Total	**300**	**100.0**

Table 2: showing the indication for the HSG examination

			Type of infertility		
			Primary	Secondary	Total
age category	18-28 years	Count	90	50	140
		% within age category	64.3%	35.7%	100.0%
	29-38 years	Count	32	90	122
		% within age category	26.2%	73.8%	100.0%
	39-48 years	Count	12	26	38
		% within age category	31.6%	68.4%	100.0%
Total		Count	134	166	300
		% within age category	44.7%	55.3%	100.0%

Table 3: Cross tabulation showing relationship between age group and the type of infertility

Chi-square = 41.216
P = <0.005

One hundred and twenty-five (41.7%) patients had normal HSG findings while the remaining 175 (58.3%) patients showed various cervico-uterine and tubal abnormalities.

Tubal pathologies were observed in 89 (29.7%) patients with bilateral proximal tubal occlusion been the commonest comprising of 10% of the total tubal pathologies. There were 35 (11.7%) with uterine fibroids; the 29 – 38 years group (22) had the highest number of patients involved. Twelve patients were from the 39 – 48 years group and only one patient had uterine fibroid from the 18 – 28 years group. Twelve patients out of the total patients with uterine fibroids presented with secondary infertility while the remaining 10 patients had primary infertility.

Findings	**Frequency**	**Percentage**
Normal examination	125	41.7
Endometrial hyperplasia	3	1.0
Bilateral hydrosalpinx	17	5.7
Right hydrosalpinx	5	1.7
Left hydrosalpinx	6	2.0
Bilateral distal tubal occlusion	3	1.0
Bilateral proximal tubal occlusion	30	10.0
Right proximal tubal occlusion	14	4.7
Left proximal tubal occlusion	4	1.3
Right distal tubal occlusion	3	1.0
Left distal tubal occlusion	4	1.3
Uterine fibroids	35	11.7
Pelvic adhesions	17	5.7
Cervicouterine adhesions	20	6.7
Bilateral combined proximal and distal tubal occlusion	3	1.0
Bicornuate unicollis uterus	2	0.7
Unicornuate uterus	1	0.3
Septate uterus	1	0.3
Arcuate uterus	2	0.7
Hypoplastic uterus	5	1.7
TOTAL	**300**	**100**

Table 4: Showing the HSG findings in the study population

			Fibroid status		
			Non-fibroid	Fibroid	Total
age category	18-28 years	Count	139	1	140
		% within age category	99.3%	0.7%	100.0%
	29-38 years	Count	100	22	122
		% within age category	82.0%	18.0%	100.0%
	39-48 years	Count	26	12	38
		% within age category	68.4%	31.6%	100.0%
Total		Count	265	35	300
		% within age category	88.3%	11.7%	100.0%

Table 5: Cross tabulation between age group and the fibroid status of the patient

Chi-square = 35.714
P = <0.005

			Fibroid status		
			Non-fibroid	Fibroid	Total
Type of infertility	Primary	Count	124	10	134
		% within Type of infertility	92.5%	7.5%	100.0%
	Secondary	Count	141	25	166
		% within Type of infertility	84.9%	15.1%	100.0%
Total		Count	265	35	300
		% within Type of infertility	88.3%	11.7%	100.0%

Table 6: Cross tabulation between fibroid status and type of infertility

Chi-square = 4.153
P = <0.005

Eleven (3.7%) patients were found to have congenital uterine anomalies. The commonest congenital uterine anomaly in this study was hypoplastic uterus seen in 5 (1.7%) patients; bicornuate unicollis uterus and arcuate uterus had 2 (0.7%) patients, unicornuate and septate uterus had 1 (0.3%) each. The 18 – 28 years group had the highest frequency of these congenital anomalies, only one congenital anomaly was seen in the 29 – 38 years group and none was found in the 39 – 48 years group.

Twenty (6.7%), 17 (15.7%) and 3 (1%) patients had cervico-uterine adhesions, pelvic adhesions and endometrial hyperplasia respectively.

Age category	Congenital uterine anomalies	Total
18 – 28 years	8	140
29 – 38 years	1	122
39 – 48 years	0	38
Total	**9**	**300**

Table 7: Showing the frequency of congenital uterine anomalies amongst the age group of the patients

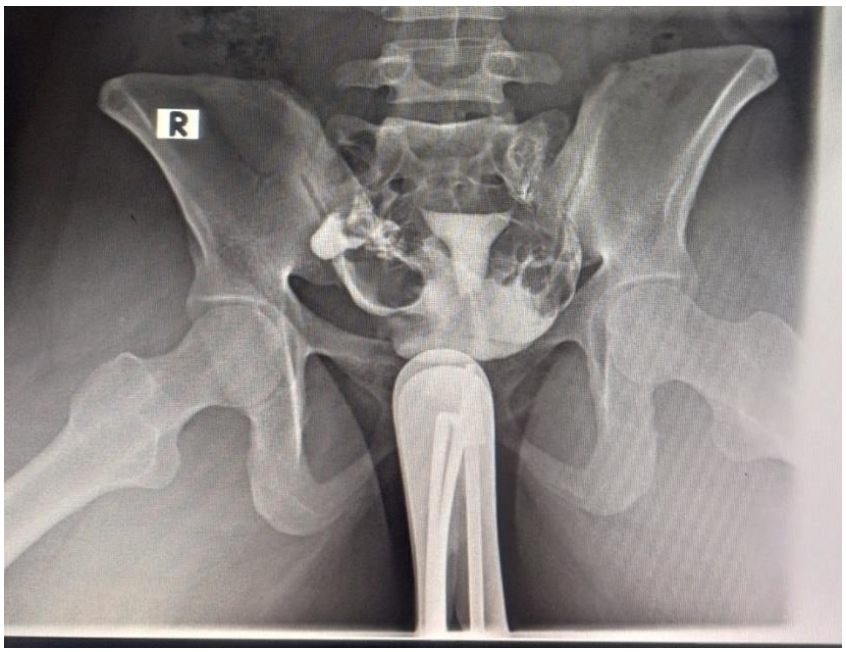

Figure 1: shows normal HSG with bilateral patent fallopian tubes

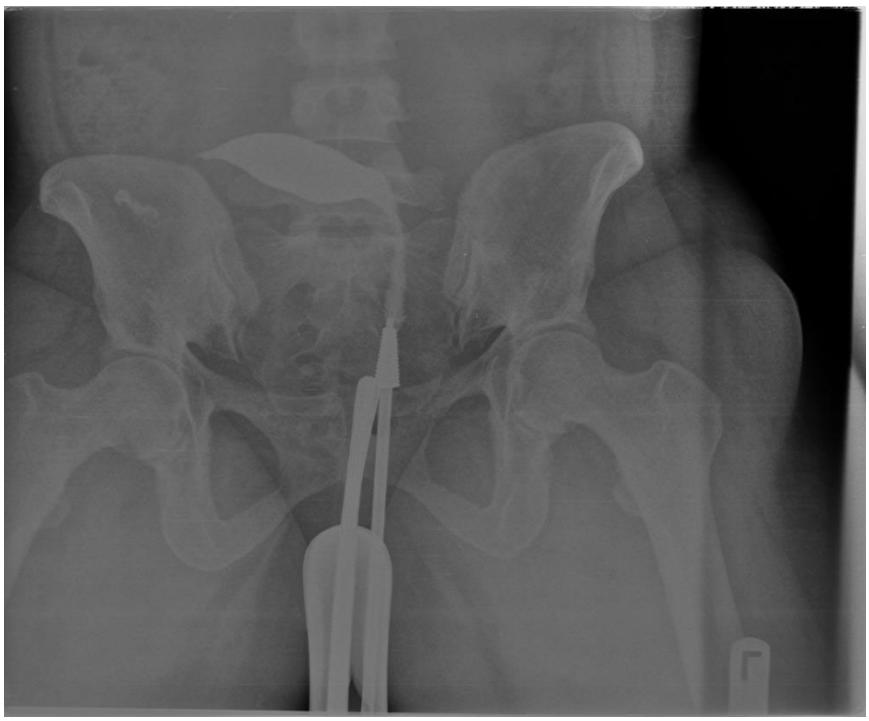

Figure 2: shows unicornuate uterus draining into a single fallopian tube

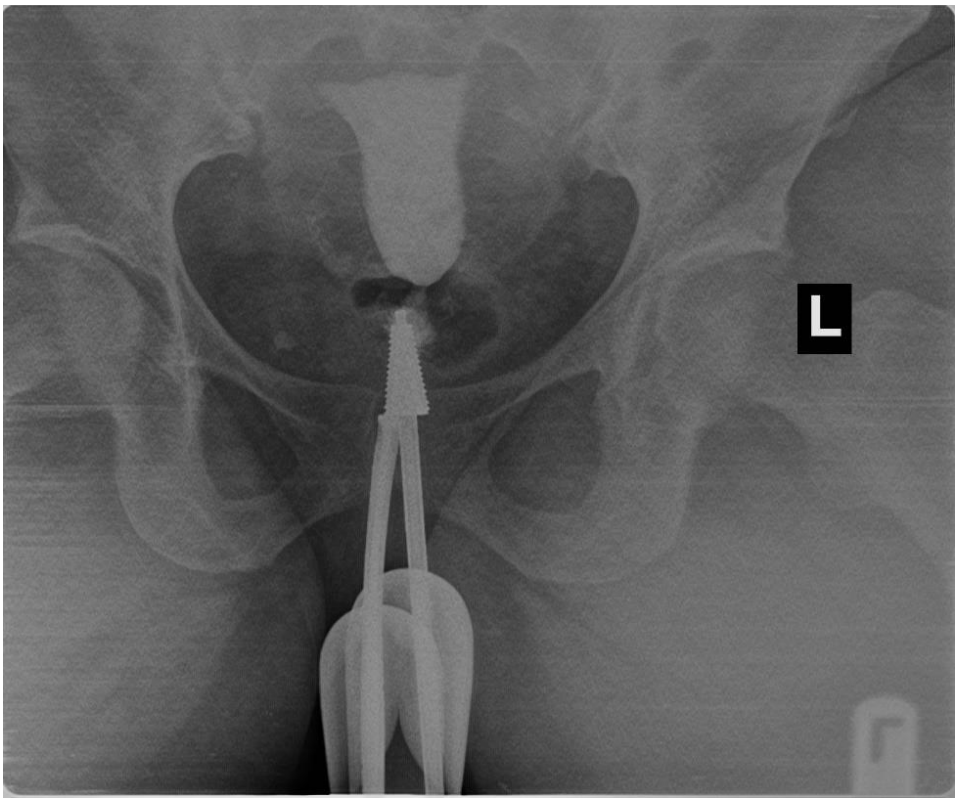

Figure 3: shows bilateral proximal tubal occlusion

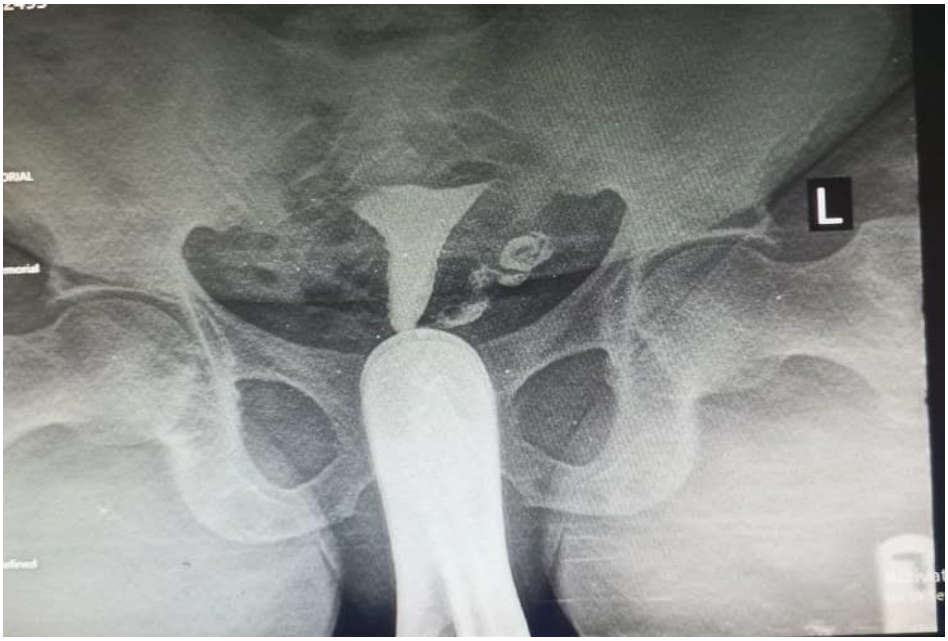

Figure 4: shows right proximal tubal occlusion

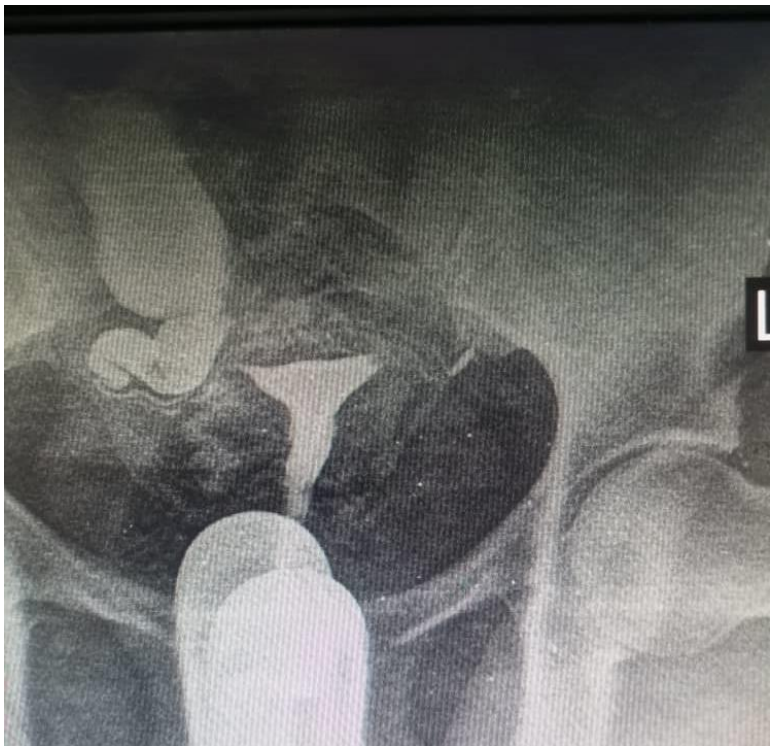

Figure 5: shows right side severe hydrosalpinx

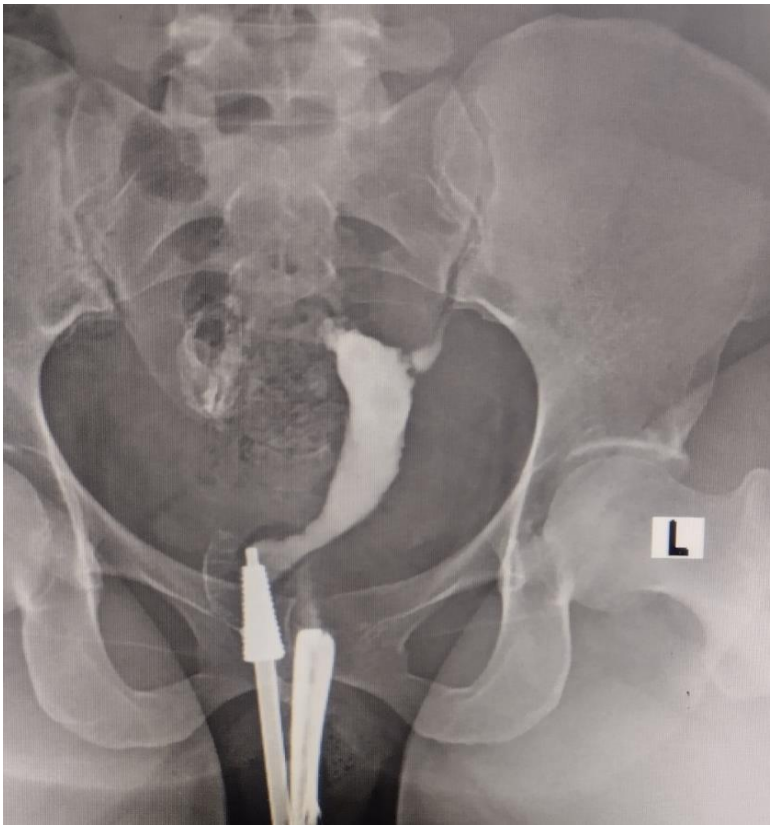

Figure 6: shows elongated and minified uterine cavity due to uterine hypoplasia

Discussion

Infertility significantly impacts individuals and couples, particularly in socio-cultural contexts where procreation is central to identity and social status. Women often bear the brunt of the societal pressures associated with infertility, experiencing violence, stigma, divorce, emotional stress, depression, anxiety, and low self-esteem. This study evaluated the hysterosalpingographic patterns among women presenting with infertility in Birnin Kebbi, North-West Nigeria, providing insights into the common structural abnormalities and their prevalence in this population.

The age distribution of the study population was between 18 – 48 years; with the highest frequency observed in the 18 – 28 years group. This is similar to a study carried out at the Korle-Bu Teaching Hospital in Ghana[14]. This outcome may be related to the socio-economic and cultural practices in the study area such as early marriage which is a common practice in the Northern parts of Nigeria.

One hundred and twenty-five (41.7%) patients had normal HSG findings; this indicates that there was no structural abnormality detected in the cervical canal, uterine cavity and both fallopian tubes. This finding is consistent with a study in Sokoto, North-West Nigeria, which reported a comparable prevalence of normal findings[15]. However, it is higher than the findings recorded in Maiduguri, North-Eastern Nigeria[16] and Korle-Bu, Ghana[14]. The relatively higher prevalence of normal findings in this study might be attributed to the therapeutic effects of the HSG procedure, which is known to resolve certain mild tubal blockages, resulting in normal imaging appearances[14].

In this study, 53.3% of the patients presented with secondary infertility while 44.7% had primary infertility. This is in agreement with previous studies reported from Maiduguri, North-East Nigeria[16] and Nnewi, South-East Nigeria[17]. However, a study carried out in Thailand reported a higher incidence of primary infertility[18]. The high incidence of secondary infertility in developing countries like Nigeria is presumably due to complications of post abortal and postpartum infections[19].

The prevalence of tubal pathologies in this study was 29.7% with bilateral proximal tubal occlusion being the most common abnormality, accounting for 10% of cases. This finding corroborates studies conducted in Lagos[20] and Oghara[21], where similar patterns were reported. However, a study in Zaria[22] found unilateral tubal occlusion to be more common. Among unilateral cases, right sided blockages (5.7%) were more prevalent than left sided (2.6%), consistent with findings in Sokoto[15] and Lagos[20]. Conversely, studies in Maiduguri[16] and Korle-Bu[14] reported left sided predominance. Some cases of bilateral proximal tubal occlusion were presumably due to tubal spasm; in this study all patients had intramuscular injection of hyoscine bromide (Buscopan) at the beginning of the procedure which is thought to prevent spastic tubal occlusion.

Hydrosalpinx was seen in 28 participants (9.4%); a prevalence consistent with studies in Sokoto and Oghara; North-West and South-South Nigeria respectively. However, a markedly higher prevalence of 23.3% was reported in Ilorin; North-Central Nigeria[19]. The higher prevalence in Ilorin might be due to a greater burden of pelvic inflammatory diseases, which are strongly associated with hydrosalpinx.

Uterine fibroids were the most frequently detected uterine pathology, with a prevalence of 11.7%. Fertility outcomes are decreased in women with submucosal fibroids, and removal seems to confer benefit. Sub-serosal fibroids do not affect fertility outcomes while intramural fibroids appear to decrease fertility[23]. This study shows a higher prevalence of uterine fibroids in the 29 – 38 years age group and a decrease in the 39 – 48 years group. A similar study in Korle-Bu also shows a decline in uterine fibroids from the age of 40 years. Twenty participants (6.7%) had cervico-uterine adhesions; this is lower than the 14.1 % that was reported in Sokoto[15]. However, 17 participants (5.7%) were found to have pelvic adhesions; this is comparable to the findings in Zaria[22] where 8.19% was reported but exceeds the 0.3% reported in Sokoto[15].

Eleven participants (3.7%) were found to have congenital uterine anomalies. Hypoplastic uterus was the commonest congenital anomaly with an estimate of 1.7%. The 18 – 28 years group had the highest frequency of these congenital anomalies, only one congenital anomaly was seen in the 29 – 38 years group and none was found in the 39 – 48 years group. The findings in this study are lower than that of Horwitz[24] in South Africa with an estimate of 11% but higher than 0.9% and 0.36% reported in Sokoto and Zaria respectively.

Conclusion

Bilateral proximal tubal occlusion was the most common hysterosalpingographic finding among women with infertility at Sir Yahaya Memorial Hospital, Birnin Kebbi. Sexually transmitted diseases, as well as post-abortal and postpartum infections, are major contributors to the high rate of tubal pathologies. Improving early detection of reproductive tract infections and increasing access to fertility treatment in low-resource settings would significantly reduce high prevalence of infertility in our environment.

Recommendations

Based on the findings of this study, there is a need for intensified public health campaigns aimed at the prevention and early treatment of pelvic infections, which are a major contributor to tubal infertility. Fertility care services should be integrated into primary healthcare systems to enhance accessibility, particularly for women in underserved and rural communities. Additionally, further research focusing on male infertility factors is recommended to provide a more comprehensive understanding of infertility and to complement the predominantly female-centered diagnostic approaches currently in use.

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