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Original Article

HYSTEROLAPAROSCOPIC EVALUATION OF INFERTILE WOMEN

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ABSTRACT

Background: Infertility affects approximately 10-15% of couples worldwide, with a significant psychological, social, and economic burden. In the evaluation of infertility, while non-invasive methods such as ultrasound and hormonal assays are widely used, direct visualization of the pelvic organs through hysteroscopy and laparoscopy remains the gold standard for diagnosing several underlying conditions.
Objective: To assess the role of hysterolaparoscopy as diagnostic and possible therapeutic measure for female infertility in our hospital
Methods: Hospital based descriptive study.
Result:
• There is a significant statistical association between Socio Economic Status and type of infertility
• There is a statistically significant association between Duration of infertility with Education of the patients.
• There is a significant statistical association between Age and type of infertility. Comparatively younger patients tend to have primary infertility.
• There is a significant association of type of infertility with duration of infertility.
• Nulliparous patients tend to have duration of infertility less than 3 years whereas, multiparous women have more than 3 years of duration which is statistically significant.
• There is a statistically significant association between type of infertility with presence of intrauterine adhesion. Patients with secondary infertility tend to have more chances of intrauterine adhesion.
Conclusion: Hysteroscopic and laparoscopic evaluation are essential diagnostic tools in the workup of infertility, providing valuable insights into the underlying causes of infertility that may not be detected through less invasive methods. Early diagnosis and timely intervention, particularly for tubal and uterine abnormalities, can significantly improve fertility outcomes in infertile women. These procedures should be considered an integral part of the infertility evaluation process in tertiary care settings.

Keywords: *Socio Economic Status, parity, duration of infertility, intrauterine adhesion, Hysterolaparoscopy, chromopertubation.*

INTRODUCTION

Infertility is defined as 1 year of regular unprotected intercourse without conception. The term subfertility is used interchangeably to describe women or couples who may not be sterile but exhibit decreased reproductive efficiency. Approximately 85–90% of healthy young couples conceive within 1 year, most within 6 months. Infertility therefore affects approximately 10–15% of couples and represents an important part of clinical practice[1].

The prevalence of infertility is rising rapidly worldwide, with female factors accounting for 40-45% of infertility cases[2,7]. The diagnosis and treatment of female infertility have become the most rapidly advancing fields in reproductive medicine.

However, routine pelvic exams and standard diagnostic procedures often fail to accurately identify the majority of pelvic pathologies in women experiencing infertility.

METHODOLOGY

Study design: Hospital based prospective type of descriptive study.
Study area: Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata.

Sample size:
Sample size will be calculated by following formula:
$n= Z^2 \times p \times (1-p) / d^2$
n = minimum sample size
Z = 1.96 at 95% confidence interval obtained from standard statistical
P= estimated prevalence of the event in a given population
(15%, obtained from previous literature)
d = absolute precision (0.1)
Accordingly n is more than 60 considering 20% drop out patients.

INCLUSION CRITERIA:
1.Couples of reproductive age group who are presenting with infertility at gynae. & obs. OPD
2. Couples with both primary and secondary Infertility
3.Women with infertility who has indications of hysterolaparoscopy

EXCLUSION CRITERIA
1. Women who are not willing to be included in the study
2. Women who are not willing for follow up in our hospital.
3. Couples with male factor infertility
4. Women with severe cardiac/respiratory illness, acute generalized peritonitis, patient unfit for anaesthesia
5. Women with acute infection, severe urinary tract infection.

STUDY TECHNIQUE:
1) Interview
2) Clinical Examination
3) Laboratory investigation (eg. Blood Tests for hormone profile, semen analysis of husband)
4) Imaging and others (Ultrasonography, hysterosalpingography)
5) Pre Anaesthetic check up
6)Hysteroscopy and laparoscopy
7) Follow-up to document results of the procedure

STATISTICAL ANALYSIS PLAN:
All data will be analysed using appropriate statistical procedures with the help of standard statistical software, if required. Data will be described by estimating mean, standard deviation, median, proportion etc, and displaying of data will be accomplished by the help of tables and different charts.

ETHICAL CLEARANCE: This study has been conducted after getting due permission from Institutional Ethics Committee and approval of The West Bengal University of Health Sciences

RESULTS AND ANALYSIS

Socio-economic status: Modified BG Prasad scale 2021 was used, and the study population was classified accordingly[8].

Sl No	Class	Per capita monthly income
1	Upper	8220 and above
2	Middle	4110-8219
3	Lower Middle	2645-4109
4	Upper Lower	1230-2644
5	Lower	Below 1230

The patients were asked about their total family income and number of members in the family, and the per capita income of the family was calculated.

Table:1 Showing association with socio economic status and type of infertility

Hysteroscopic findings	Present Study (n=66)	Nandhini et al[7] (n=50)	Anusha et al[11] (n=150)	Wadadekar et al[5] (n =41)	Sharma et al[3] (n=75)
Normal	41 (62.1%)	37(74%)	21(86%)	31(75.6%)	45(60%)
Intrauterine adhesion	9(13.6%)	1 (2%)	5 (3.33%)	2 (4.8%)	7 (9.33%)
polyp	3 (4.5%)	1 (2%)	4 (2.67%)	4 (9.75%)	4 (5.33%)
myoma	3 (4.5%)	4 (8%)	5(3.33%)	1 (2.43%)	2 (2.66%)
septum	3 (4.5%)		5 (3.33%)	1 (2.43%)	2 (2.66%)

Contingency Tables

	Type of infertility		
SES	primary	secondary	Total
Lower Middle	14	13	27
Middle	17	10	27
Upper lower	5	2	7
Upper	5	0	5
Total	41	25	66

χ^2 Tests

	Value	df	p
χ^2	7.52	3	**0.021**
N	66		

Table:2 Showing association between parity and duration of infertility.

	Duration of Infertility category		
Parity	**<3 years**	**>=3 years**	**Total**
Nullipara	**23**	**18**	**41**
Primipara	**2**	**20**	**22**
Multipara	**1**	**2**	**3**
Total	**26**	**40**	**66**

χ^2 Tests

	Value	df	p
χ^2	**13.3**	**2**	**0.001**
N	**66**		

Table:3 Comparison of the hysteroscopic findings with other studies.

Hysteroscopic findings	Present Study (n=66)	Nandhini et al[7] (n=50)	Anusha et al[11] (n=150)	Wadadekar et al[5] (n =41)	Sharma et al[3] (n=75)
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myoma	3 (4.5%)	4 (8%)	5(3.33%)	1 (2.43%)	2 (2.66%)
septum	3 (4.5%)		5 (3.33%)	1 (2.43%)	2 (2.66%)

Table:4 Comparison of chromopertubation results with study of Anusha et al[11]

Type of infertility	Present Study(n=66) (Primary- 41) (Secondary -25)		Anusha et al[11] (n=150) (Primary-89) (secondary-61)	
	b/l block	u/l block	b/l block	u/l block
Primary	15(36.6%)	8(32%)	35(39.3%)	20(22.4%)
Secondary	8(32%)	2(8%)	20(32.7%)	9(14.7%)

Table:5 showing comparison between the present study and other studies regarding the laparoscopic findings responsible for infertility.

Laparoscopic findings	Present Study (n=66)	Sarwade et al[12] (n=50)	Sharma et al[3] (n=75)	Patel et al[4] (n=70)	Ramalingappac et al[13] (n=668)	Prasanta k n et al[14] (n=300)
Normal	19(28.8%)	9 (18%)	15(20%)	26 (37.1%)	270 (40.4%)	199(66.3%)
Tubal pathology	24(36.4%)	18 (36%)	24(32%)	14(20.6%)	55 (8.2%)	61(20.3%)
Ovarian cyst/ pco appearence	11(16.7%)	15 (30%)	17(22.6%)	16 (22.8%)	184 (27.5%)	22 (7.3%)
Endometriosis	7(10.6%)		8 (10.66%)	7 (10%)	59 (8.8%)	37(12.3%)
Pelvic adhesion	3 (4.5%)	3 (6%)	5 (6.66%)	12 (17.1%)	128 (19.2%)	26 (8.7%)
Myoma	1 (1.5%)		3 (4%)	11 (15.7%)	42 (6.3%)	15 (5%)

Table:6 Showing association between type of infertility with intrauterine adhesion

Intrauterine adhesion	Type of Infertility		
	primary	secondary	Total
present	3	6	9
absent	38	19	57
Total	41	25	66

χ^2 Tests

	Value	df	p
χ^2	3.67	1	0.05
N	66		

DISCUSSION

Maximum of the study population were belonging from lower middle and middle class of socio economic status (40.9% each). Patients belonging to Lower middle class and Middle class of socio economic status tends to have more chances of primary infertility which is statistically significant association

There is a significant statistical association between Socio Economic Status and type of infertility (Table:1)**.** Patients belonging from lower and lower middle socio economic classes tend to have more frequencies of primary infertility. Nulliparous patients tend to have duration of infertility less than 3 years whereas, multiparous women have more than 3 years of duration, which is statistically significant. Also 41 (62.1%) patients were Nullipara having primary infertility. There is a **significant statistical association** between **parity** and **duration** of infertility (Table:2).

In the present study, most (57.6%) had normal menstruation with regular cycles which corresponds with the study done by p sharma et al[3], where the menstrual pattern showed that 36 (48%) cases had regular cycles. 21.2% of the study population had Dysmenorrhoea. That may be associated with increased prevalence of endometriosis.

Hysteroscopy was done to all the 66 patients, the HSG finding were confirmed by hysteroscopy under direct visualisation. Uterine adhesions(synechiae), septum, myoma, polyp etc. were directly visualised and confirmed. 62.1 % patients had normal findings on hysteroscopy. Uterine Adhesion was the most common finding (13.6%) followed by bilateral ostia fibrosis (7.6%), followed by intrauterine septum (4.5%), submucosal myoma (4.5%), polyp (4.5%). Studies by various researchers show similar results (Wadadekar et al, V Nandhini et al, Anusha et al etc.), in recent literatures more than 60% of the study population shows normal hysteroscopic findings[5,7,11](Table:3). Most common abnormality was fibrosis of ostia followed by intrauterine adhesion as seen in the study by Sharma et al[3], they found 6.66% of the study population to have intrauterine adhesion which is close to the results of the present study. whereas, in most of the studies intrauterine adhesions are found in <3% of the study population, this is probably due to many patients had history of D and E done after abortions in secondary infertility cases in the present study. There is a **statistically significant association** between **presence of intrauterine adhesion and type of infertility** (Table:6).

All the 66 patients were subjected to Laparoscopic evaluation and the findings were noted. This study indicates that tubal factors accounted for the majority of infertility cases (36.4%), with tubal blockage being the most common issue identified, while hydrosalpinx was observed in some of the cases. The findings are similar to multiple previous studies, which have identified tubal factors as a leading cause of infertility in women, with incidence rates exceeding 30% in each study[12,3,4,13,14](Table:5). This is consistent with the understanding that tubal patency is critical for conception and highlights the importance of assessing tubal health in infertility evaluations. Ovarian factors contributed to 16.7% of infertility cases, with PCOS emerging as the most prevalent cause, These findings are consistent with previous studies showing that more than 15% of infertility in women is caused due to ovarian factors, as reported in extensive reviews by Walker and Wyns (2024) and Carson and Kallen (2021)[9,10].

Endometriosis is an important cause of female infertility. Almost 10.6% of the patients are attributed to female infertility due to endometriosis. Which is consistent with the findings of sharma et al[3], patel et al[4], and other researchers[4].

Other uterine factors like myoma or uterine anomalies are also responsible for infertility. In the present study, 1.5% of the study population had myoma.

Chromopertubation was done to confirm the tubal blockages by injecting methylene blue dye into the uterus and fallopian tubes through cervix. In the present study 36.6 % of the patients of primary infertility and 32% patients of secondary infertility had bilateral tubal block found in the chromopertubation . which correlates with the study done by Anusha et al[11], in their study, 39.3 % of the patients with primary infertility and 32.7% of secondary infertility had bilateral tubal block.

The most important advantage of hysterolaparoscopic evaluation is the chances of therapeutic intervention that can be done in the same sitting. Hysteroscopic Adhesiolysis was done in 5 patients (7.6%) , hysteroscopic polypectomy was done in 3 patients (4.5%) . hysteroscopic septal resection was done in 3 patients (4.5%). Selective tubal catheterisation was done in 1 patient, who subsequently conceived later and delivered a full term healthy baby. Interventions depend highly on the skill of the investigator and the availability of logistics and instruments like operative hysteroscope. Simillarly many Laparoscopic interventions were also done majorly Laparoscopic ovarian drilling was done in 4 cases, pelvic adhesiolysis was done in 3 cases and cauterisation of endometriotic spots were done in 2 patients. Few patients (4 patients) spontaneously conceived after Laparoscopic chromopertubation . It is a matter of debate and extensive research is needed to comment on whether chromopertubation itself is a therapeutic procedure which resulted in pregnancy in those patients or there were other factors responsible.

Summary

- 62.1 % of had primary infertility whereas, 37.9% had secondary infertility.
- Mean age of the study population was 27.1 years with SD 4.37 years.
- Maximum women belonging to age group of 25-29 years (37.9%).
- 69.7% of the study population were belonging to BMI of normal (18.5-24.9) category.
- Mean duration of marriage was 5.59 years with SD 2.52 years.
- Most of the women (68.2%) had duration of infertility less than equal to 3 years.
- 59.1% people were from rural areas.
- 62.1% were Nulliparous having primary infertility, 33.3% were primiparous,4.5% were multiparous.
- Most of the population were belonging to lower middle and middle socio economic classes (40.9% each), only 7.6% population were from upper class.
- 39.4% had higher secondary education,10.6% were graduate, no illiterate patients were found in the study
- Most of the patients (57.6%) had no comorbidities, 9 (13.6%) patients had hypothyroidism
- Most of the patients (57.6%) had normal menstrual pattern. 14 patients(21.2%) complained of dysmenorrhoea
- 80.3% of the patients had normal findings in clinical examinations
- The mean TSH level was 2.27 with standard deviation of 1.60. Total 9 (13.6 %) patients had hypothyroidism
- 49 patients (74.2%) had normal usg report.
- 50% of the patients had bilateral cornual block in HSG, 22.5% had other types of tubal blocks
- Findings of HSG were confirmed by Hysteroscopy, Laparoscopy and Chromopertubation tests.
- In hysteroscopy 41 patients (62.1%) had normal findings on hysteroscopy. 9 patients (13.6%) had intrauterine adhesion , 3 patients had intrauterine polyp , 3 patients had submucosal myoma, 3 patients had intrauterine septum. 5 patients (7.6%) had bilateral ostia fibrosis and 2 had unilateral ostial fibrosis
- In Laparoscopy, 28.8% patients had normal laparoscopic findings, whereas 24 patients (36.4%) had tubal pathology. 11 patients (16.7%) had bilateral polycystic ovaries. 7 patients (10.6%) patients had endometriosis. 3 patients (4.5%) had pelvic adhesions, 1 patient had myoma and 1 patient had hypoplastic uterus.
- In chromopertubation test, 50% of the study population had bilateral spillage of dye, i.e. no tubal block could be seen, 24 patients (36.4%) had bilateral no spillage of dye, indicating bilateral tubal blockage. Therefore, it can be opined that HSG gives many false positive results, that may be due to cornual spasms during the procedure.
- In 5 patients (7.6%) hysteroscopic adhesiolysis was done. In 3 patients (4.5%) hysteroscopic polypectomy was done, hysteroscopic septal resection was done in 3 patients (4.5%). Selective tubal catheterisation was done in 1 patient.
- Laparoscopic ovarian drilling was done in 4 patients (6.1%), pelvic adhesiolysis was done in 3 patients (4.5%), laparoscopic adhesiolysis was done in 2 patients (3%)

CONCLUSION

Hysterolaparoscopy is a very important tool for evaluation of Female infertility. Other noninvasive techniques e.g. HSG gives many false positive results. Direct visualisation by pelvic endoscopes like hysteroscopy and laparoscopy gives

conclusive and confirmatory diagnosis for infertility, specially in those cases where other usual noninvasive diagnostic techniques fail to comment.

Therefore, Hysterolaparoscopy should be implemented as a routine diagnostic tool for work up of infertility. Furthermore, both hysteroscopy and laparoscopy in the same sitting decreases number of pre op investigations, the time taken for the procedures to be completed and days of hospital stay are less and also total cost is less than the cost of the procedures if done separately.

Also there are opportunities for therapeutic interventions in the same sitting. Which results in better outcome of the patients altogether and help to know the distribution of various findings of hysterolaparoscopy in selected patients attending gynae OPD.

Limitation

- The sample size of 66 participants may not accurately represent the larger population, potentially introducing biases when generalizing the findings
- The study population primarily consists of individuals from a single tertiary care hospital which may not capture the broader diversity in terms of socioeconomic status, cultural backgrounds, and healthcare access.
- Long term follow up was not possible due to limited time period of study. The cases where therapeutic interventions were done , only few of them could be followed till they succeed to achieve pregnancy.

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