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Female factors infertility: Laparoscopic evaluation at a public health facility in Ilorin, Nigeria

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Abstract:

BACKGROUND: Infertility is a problem of global proportions, the majority being the residents of developing countries. The contribution of female factor is assuming a tremendous proportion. Laparoscopy remains an indispensable tool in the evaluation of the fertility potential of these female partners.

AIMS: This study was aimed at determining the various causes of female factor infertility among female partners of infertile couple in a tertiary health facility.

METHODS: A cross-sectional observational study of ninety seven (97) eligible infertile women who underwent diagnostic laparoscopy between 1st January 2012 and 31st December 2015 were enrolled for the study. The data were analyzed using SPSS/PC version 16.0 and p value was preset at <0.05.

RESULTS: The patients aged 21-50 years with a mean age of 33.2 ± 6.6 years. Majority (79.4%) were nulliparous. Fifty (51.5%) had primary infertility. Their duration of infertility ranged from 1 to 33 years (5.7 ± 5.5 years). Most (63.9%) belong to middle social class and their spouse age ranges between 28-60 years (39.0 ± 7.5). More than a quarter had clomiphene resistant Polycystic Ovarian Syndrome, 19 (19.6%) tubal blockage, 13 (13.4%) uterine fibroid and 10 (10.3%) each had endometriosis, peritubal and ovarian adhesions, ovarian cyst and normal findings respectively. There was significant association between patients' age, intra-operative findings and tubal patency evaluation on laparoscopy ($P < 0.05$).

CONCLUSION: Laparoscopic procedures are less invasive, more convenient and more precise for diagnosis of infertility in women. The common causes responsible for infertility were polycystic ovarian syndrome, tubal occlusion, uterine fibroid, endometriosis, peri-tubovarian adhesions and ovarian cyst.

Keywords:

Female factor, Ilorin, infertility, tubal patency

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Introduction

Infertility in addition to being a medical problem has assumed social proportions^[1] becoming a major public health problem with devastating consequences.^[2] The World Health Organization (WHO) estimates that 60–80 million couples worldwide currently suffer from infertility.^[3] Infertility varies across regions of the world and is estimated to affect 8%–12% of couple's worldwide.^[3] Total infertility is divided into primary

and secondary infertility. Definitions of primary infertility vary between studies, but the operational definition put forth by the WHO, defines primary infertility as the "Inability to conceive within 2 years of exposure to pregnancy (i.e. sexually active, noncontracepting, and nonlactating) among women 15–49-year-old."^[3] Secondary infertility refers to the inability to conceive following a previous pregnancy.^[3] Infertility could also be classified as male, female factor, combined male/female factor, and unexplained.

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Female factor infertility is a significant cause of infertility in our environment.^[4] About 30% of all cases of infertility are due to female factor.^[4] Various etiologies leading to female factor infertility include tubal problems, uterine pathologies, cervical factors, ovarian diseases, congenital anomalies/malformations of the female genital tract and disruption of the hypophyseal-pituitary-ovarian axis.^[5]

The evaluation of the infertile woman requires an in-depth knowledge of these etiologies in arriving at a definitive diagnosis. This is supported by carrying out various modalities of investigations that help in the diagnosis of female factor infertility. A novel and key modality that has found tremendous application in the investigation of infertility is the use of laparoscopy which has the double advantage of serving both as a diagnostic as well as therapeutic means.^[6]

Laparoscopy provides a panoramic view of the anatomy of pelvis and magnifies the view of pelvic organs. It is generally accepted that it is the gold standard in diagnosing tubal pathology and other intra-abdominal causes of infertility.^[6] Hence, this study was aimed at determining the common causes of female factor infertility among female partners of infertile couple in our center with the aid of laparoscopy and to offer therapeutic interventions as deemed necessary to ensure restoration of fertility in those women.

Materials and Methods

A cross-sectional study of infertile women who underwent diagnostic laparoscopy for infertility at the assisted reproductive technology (ART) unit of the Department of Obstetrics Gynaecology, University of Ilorin Teaching Hospital Ilorin between January 1, 2012, and December 31, 2015. Institute Ethics Committee approval was taken to review the patient records. Information on biosocial data, detailed history, and findings on clinical examination of the patients were documented. A tentative diagnosis was made at this point, and various investigations as indicated were requested for. These include a complete hormonal profile (luteinizing hormone, follicle-stimulating hormone, E2, P2, prolactin, and testosterone) and abdominopelvic/transvaginal ultrasound.

All women whose husband has male factor infertility were excluded from the study. So also are women who were found to have inadequate coital exposure in the last 1 year as well as those with absolute or relative contraindications to laparoscopy, i.e., preexisting cardiorespiratory disorders, previous abdominal surgeries with suspected dense adhesions, generalized peritonitis, and intestinal obstruction.

Informed consent was obtained from 97 eligible patients for the study. All patients were evaluated and confirmed fit for surgery. A complete blood counts, urinalysis, electrolyte, urea, and creatinine estimation were requested preoperatively. Patients also had bowel preparation with Dulcolax and enema saponis. All procedures were performed under general anesthesia. In positioning of patients for surgery, both the modified Trendelenburg and Lloyd-Davis positions were used according to the need of the surgeon. During the procedure, perineum, and vagina were cleansed and draped leaving only the umbilical area and the vulva. A stab skin incision was made on the subumbilical region, and then the anterior abdominal wall was lifted between gauze pads and a Veress needle introduced. Pneumoperitoneum was achieved with carbon dioxide electronic insufflator at 4–6 l/min and preset pressure of 12–15 mmHg. Subsequently, Veress needle was removed, the incision extended to 2 cm and a 10 mm trocar and cannula were passed through the incision. The trocar was then removed and the laparoscope inserted into the peritoneum through the primary port and panoramic evaluation of the pelvis and abdominal cavity was undertaken by rotating camera through 360° to rule out any adherence of bowel and decision made depending on the procedure for inserting secondary ports through small incisions under direct vision with attention to the deep inferior epigastric vessels. Tubal patency was confirmed using methylene blue dye introduced through Leech-Wilkinson cannula whose spillage was observed through the fimbrial ostia.

After the procedure, the peritoneal cavity was lavaged with warm saline and suctioned out. Instruments and laparoscope were removed under direct vision; followed by sequential closure of port sites with Vicryl 2/0. Data were collected using a pro forma designed for that purpose, and descriptive statistical analysis was carried out using a commercial statistical package (SPSS/PC version 16.0, SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered as statistically significant.

Results

A total of 97 patients underwent successful laparoscopic procedures within the study period. The patients aged 21–50 years with a mean age of 33.2 ± 6.6 years. Majority (79.4%) were nulliparous. Fifty (51.5%) had primary infertility while 47 (48.5%) had secondary infertility. Their duration of infertility ranged from 1 to 33 years (5.7 ± 5.5 years). Most (63.9%) belong to middle social class, and their spouse age ranges between 28 and 60 years (39.0 ± 7.5) [Table 1].

Table 2 shows intraoperative findings at laparoscopy. More than a quarter had clomiphene-resistant polycystic

Table 1: Sociodemographic characteristics of respondents (n=97)

Variable	Frequency (%)
Age (years)	
21-30	42 (43.3)
31-40	43 (44.3)
41-50	12 (12.4)
Range	21-50
Mean±SD	33.21±6.554
Parity	
0	77 (79.4)
1	19 (19.6)
2	1 (1.0)
Husband's age (years)	
21-30	10 (10.3)
31-40	53 (54.6)
41-50	26 (26.8)
51-60	8 (8.2)
Range	28-60
Mean±SD	38.95±7.450
Social class	
High	19 (19.6)
Middle	62 (63.9)
Low	16 (16.5)
Type of infertility	
Primary	50 (51.5)
Secondary	47 (48.5)
Duration of infertility (years)	
1-10	86 (88.7)
11-20	9 (9.3)
21-30	1 (1.0)
31-40	1 (1.0)
Range	1-33
Mean±SD	5.66±5.524

SD: Standard deviation

Table 2: Intraoperative findings at laparoscopy (n=97)

Variable	Frequency (%)
Operative findings	
PCOS	25 (25.8)
Tubal blockage	19 (19.6)
Fibroid	13 (13.4)
Endometriotic cyst	10 (10.3)
Normal	10 (10.3)
Ovarian cyst	10 (10.3)
Peritubal and ovarian adhesions	10 (10.3)
Tubal patency test	
Bilateral patent tube	51 (52.6)
Unilateral patent tube	28 (28.9)
Bilateral tubal blockage	18 (18.6)

PCOS: Polycystic ovarian syndrome

ovarian syndrome (PCOS), 19 (19.6%) tubal blockage, 13 (13.4%) uterine fibroid, and 10 (10.3%) each had endometriosis, peritubal and ovarian adhesions, ovarian cyst and normal findings, respectively. Furthermore, tubal patency test revealed bilateral patent tubes in 51 (52.6%), unilateral patent tube 28 (28.9%), and

bilateral tubal blockage 18 (18.6%) patients, respectively [Table 2].

Table 3 shows an association between sociodemographic variables and tubal patency test on laparoscopy.

There was a significant association between patients' age, intraoperative findings, and tubal patency evaluation on laparoscopy ($P < 0.05$) while parity, social class, husbands' age, types of infertility, and duration of infertility did not [Table 3].

Discussion

In this study, of the 97 patients who underwent laparoscopy, 50 (51.5%) presented with primary infertility while 47 (48.5%) presented with secondary infertility giving a ratio of 1:1. This is similar to a study by Aslam *et al.*^[7] in Pakistan where 44% of the patients have primary infertility but different from studies by Bhutani *et al.*,^[6] Aziz^[8] and Shetty *et al.*^[9] who all recorded significantly higher cases of primary infertility compared to secondary infertility. Female age is the single most important determinant of spontaneous as well as treatment-related conception. While there is no universally accepted definition of advanced reproductive age, 35 years is considered as a watershed in fertility terms.^[5,10] The mean age of the study population was 33.2 ± 6.6 years with more than half below the age of 35 years.

It was observed that the mean duration of infertility was 5.7 ± 5.5 years. The majority of patients 67 (69%) have infertility duration of 1–5 years with a 1:1 ratio between the primary and secondary infertility groups 34 (35%) and 33 (34%), respectively. This is similar to the findings of Wani *et al.*,^[11] Aziz^[8] and Ashraf^[12] where the duration of infertility was 1–5 years in the majority of patients. This could be as a result of the high premium that our society place on female fertility and the negative perception of childlessness thereby making people to seek infertility treatment early.

The social class of the patient plays an important role in healthcare choices including that of reproductive health. The higher the educational and consequently the income level of the family, the more capable the family is in accessing health-care services.^[5] This is very relevant in this study for the fact that infertility evaluation using laparoscopic modalities tends to be more costly in the short-term. Also, because access to ART comes at a cost,^[4] this explains the preponderance of our clients in middle socioeconomic class.^[13] However, there was no significant association between social class and tubal status on laparoscopic evaluation of infertile women. On the contrary husband's education and women's education have a significant impact on the female factors infertility.^[5]

Table 3: Sociodemographic variables and tubal patency test on laparoscopy

Variable	Laparoscopy				χ^2	df	P
	Patent tube		Bilateral tubal blockage (n=18)	Total (n=97)			
	Unilateral (n=28)	Bilateral (n=51)					
Age (years)							
21-30	19 (12.1)	19 (22.1)	4 (7.8)	42 (42.0)	11.499	4	0.022*
31-40	8 (12.4)	24 (22.6)	11 (8.0)	43 (43.0)			
41-50	1 (3.5)	8 (6.3)	3 (2.2)	12 (12.0)			
Parity							
0	21 (22.2)	41 (40.5)	15 (14.3)	77 (77.0)	2.701	4	0.609
1	6 (5.5)	10 (10.0)	3 (3.5)	19 (19.0)			
2	1 (0.3)	0 (0.5)	0 (0.2)	1 (1.0)			
Husband's age (years)							
21-30	5 (2.9)	4 (5.3)	1 (1.9)	10 (10.0)	4.271	6	0.640
31-40	15 (15.3)	28 (27.9)	10 (9.8)	53 (53.0)			
41-50	7 (7.5)	13 (13.7)	6 (4.8)	26 (26.0)			
51-60	1 (2.3)	6 (4.2)	1 (1.5)	8 (8.0)			
Social class							
High	5 (5.5)	8 (10.0)	6 (3.5)	19 (19.0)	4.461	4	0.347
Middle	19 (17.9)	32 (32.6)	11 (11.5)	62 (62.0)			
Low	4 (4.6)	11 (8.4)	1 (3.0)	16 (16.0)			
Type of infertility							
Primary	14 (14.4)	26 (26.3)	10 (9.3)	50 (50.0)	0.149	2	0.928
Secondary	14 (13.6)	25 (24.7)	8 (8.7)	47 (47.0)			
Duration of infertility							
1-10	26 (24.8)	43 (45.2)	17 (16.0)	86 (86.0)	2.782	6	0.836
11-20	2 (2.6)	6 (4.7)	1 (1.7)	9 (9.0)			
21-30	0 (0.3)	1 (0.5)	0 (0.2)	1 (1.0)			
31-40	0 (0.3)	1 (0.5)	0 (0.2)	1 (1.0)			
Diagnosis							
PCOS	10 (7.2)	14 (13.1)	1 (4.6)	25 (25.0)	38.824	12	0.001*
Tubal blockage	3 (5.5)	14 (10.0)	2 (3.5)	19 (19.0)			
Fibroid	4 (3.8)	5 (6.8)	4 (2.4)	13 (13.0)			
Normal	2 (2.9)	6 (5.3)	2 (1.9)	10 (10.0)			
Endometriotic cyst	0 (2.9)	2 (5.3)	8 (1.9)	10 (10.0)			
Ovarian cyst	5 (2.9)	5 (5.3)	0 (1.9)	10 (10.0)			
Peritubo-ovarian adhesion	4 (2.9)	5 (5.3)	1 (1.9)	10 (10.0)			

*Significant P value <0.05. PCOS: Polycystic ovarian syndrome

PCOS is an endocrine disorder which accounts for over 70% of anovulatory infertility.^[13] Twenty-five (25.8%) of the infertile women were managed for clomiphene-resistant PCOS with laparoscopic ovarian drilling (LOD). This is similar to reported values by Wani *et al.*^[11] This is because LOD is an effective, one-off therapy and safe treatment modality for clomiphene-resistant PCOS patients with anovulatory infertility devoid of complications associated with medical treatments.^[13] However, there was no significant difference in rates of clinical pregnancy, live birth, or miscarriage in women with clomiphene-resistant PCOS undergoing LOD compared to medical treatment.^[14]

In this study, tubal cause of infertility was found in 19.6% of infertile women, peritoneal factor (endometriosis, peritubal, and ovarian adhesion) in 20.6% and ovarian in 10.3% of women. Furthermore, uterine cause and no obvious cause were found in 13.4% and 10.3% cases,

respectively. Similar findings have been reported by Samal *et al.*^[15] in a study of 100 infertile women who underwent laparoscopy where tubal cause was found in 34% cases, ovarian in 27%, peritoneal factor in 7%, uterine and no obvious cause in 14% and 18%, respectively. Pelvic-peritoneal adhesions (mostly sequels of prior infections from organisms such as Chlamydia trachomatis and Neisseria gonorrhea) constitute the single most common cause of tubal pathology responsible for tubal infertility. They cause anatomic and physiological dysfunction of tubes and prevent ovum pick-up, fertilization, and zygote transport between the ovary and the uterus in the normal process of procreation.^[16]

Despite the fact that a causal relationship between endometriosis and infertility has not been clearly established, the fecundity rate of untreated women with endometriosis is lower than normal couples.^[17] Although the exact prevalence

of endometriosis in general population of reproductive age is not known, it is believed to be in the range of 3%–10%.^[11] In this study, we found 10.3% cases of endometriotic cyst. This is, however, lower compared to findings of Aziz^[8] but has refuted the claims that endometriosis is very rare in our environment possibly lack of diagnostic tools may be responsible. Furthermore, the incidence of myoma in women with infertility without any obvious cause of infertility is estimated to be 1%–2.4%.^[11] In the present study, the frequency of uterine fibroid was 13.4% which is slightly higher than 6% reported by Aziz^[8] as racial differences in the prevalence of uterine fibroid could account for the disparity.

The association between patients' age, intraoperative findings, and tubal patency evaluation on laparoscopy is corroborated by results from similar study as older women were more likely to have tubal factor infertility compared with the younger women^[10] Furthermore, the influence of endometriosis, peritubal and ovarian adhesion on tubal status of infertile women cannot be over-emphasized.

Conclusion

Female factor infertility remains a significant contributor in the causation of infertility in couples. With advancement in fiber-optic technology and deployment of such in the field of laparoscopy, etiologies that were hitherto often missed during patient evaluation in the past are being captured. With this comes an array of novel interventions being employed in the treatment of female factor infertility in the field of ART. These interventions have proven safe and cost-effective in the long run while at the same time offers the patients a shorter hospital stay and fewer postoperative complications.

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Conflicts of interest

There are no conflicts of interest.

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