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Precision in Diagnosis of Factors in Female Infertility Through Diagnostic Laparoscopy Insights from Lady Reading Hospital Peshawar

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ABSTRACT

Infertility afflicts millions worldwide and often stems from female factors. The World Health Organization reports that 60-80 million couples struggle with infertility due to blocked fallopian tubes, polycystic ovary syndrome, or endometriosis. Understanding the intricacies of infertility is paramount to addressing this prevalent issue. **Objective:** To determine factors in female infertility through diagnostic Laparoscopy. **Methods:** A cross-sectional study was conducted from Nov 2020 to April 2021 in the Gynecology Unit of Lady Reading Hospital, Peshawar. No longitudinal elements were involved; the analysis was purely observational. We included 90 infertile women aged 18-45 with normal male partner semen analysis. Exclusion criteria consisted of contraceptive use or no intercourse in a year. Participants were divided into primary (n=62) and secondary (n=28) infertility. Diagnostic laparoscopy investigated the cause. Data were analyzed by SPSS version 26.0. **Results:** Tubal blockage emerged as the leading cause at 33.3%, followed by polycystic ovaries at 21.1% and endometriosis at 13.3%. Other etiologies comprised fibroids at 6.7%, ovarian cysts at 4.4%, and pelvic inflammatory disease at 3.3%. Laparoscopy proves integral to identifying occult pathologies driving infertility. It facilitates clinical management and improves reproductive outcomes for women presenting with fertility complications. **Conclusions:** It was concluded that tubal blockage was the most common cause (33.3%). In 33.3% of cases, polycystic ovaries were found, in 13.3% endometriosis, in 6.7% fibroids, in 4.4% ovarian cysts, and in 3.3% pelvic inflammatory disease (PID).

INTRODUCTION

Infertility remains a complicated global health concern, impacting approximately 10-55% of couples worldwide. Developing nations regularly report even higher rates because of socioeconomic and healthcare barriers [1, 2]. A Pakistani study uncovered an infertility rate of 22%, with essential infertility comprising 4% of instances. The causes of infertility are multifaceted, with tubal blockages, ovulatory issues, Polycystic ovary syndrome (PCOS), and endometriosis specifically impacting female [3, 4]. Male factors for example sperm abnormalities also play a part. Laparoscopy provides an immediate view of pelvic anatomy, allowing the diagnosis of conditions for instance adhesions, endometriosis, and tubal blockages that other instruments may miss [5, 6]. Infertility involves deep psychosocial implications, specifically in cultures with powerful expectations of fertility [7]. Pakistani women confronting infertility frequently experience melancholy, anxiety, and emotions of inadequacy. Societal pressures surrounding motherhood can amplify distress, potentially leading to stigmatization, marital strain, and isolation. A multifaceted, integrated response that we already use for medical and psychological issues is the answer. Experiences are also shaped by socioeconomic status and education through access to and choices made within the healthcare system [8]. Research also shows the psychological impact of infertility spreads beyond women,

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with relationships often strained and family dynamics altered. Support, emotional and social, thus become important for those undergoing fertility remedies [9]. Support systems help alleviate the psychological burden and emphasize the importance of integrated care where therapy and counselling coexist. This is especially important in areas like Pakistan, where fertility is tied to social expectations [10, 11].

This study aims to investigate the causes of primary and secondary infertility in female of the Peshawar region with the help of diagnostic laparoscopy.

METHODS

A cross-sectional study was conducted from Nov 2020 to April 2021 in the Gynaecology Unit of Lady Reading Hospital, Peshawar. Ethical permission was taken from the ethical review committee of Lady Reading Hospital and was granted ethical permission Ref no: 604 ILRH/ MTI. In consideration of infertility frequency, an adequate sample size was figured out to guarantee a reliable investigation with 95% confidence adjacent to a 5% margin of error. This formula helped with estimating the test probably going to differentiate the estimated infertility prevalence, with worldwide between 20-40%. Screening estimated unlike Follicle-Stimulating Hormone (FSH), luteinizing hormone (LH), and progesterone levels, essential pointers singular of ovarian records rises and falls, ovulation circumstances, luteal stage capacities' rises and falls. These tests offered significant knowledge of regenerative richness and propelled demonstrative and remedial translations. Ultrasound was linked to the identification of anatomical anomalies such as cysts, polycystic ovaries, and fibroids, which can impact fertility. It also measured the thicknesses of the endometrial lining, which is important for embryo implantation. High ethical principles were strictly adhered to, ensuring patient privacy, informed consent, and anonymous data, preserving trust and transparency during the investigation. Data were isolated depending on infertility type (essential or auxiliary), socioeconomic status, family arranging learning, and mental factors. This isolation permitted an intensive comprehension of how these viewpoints impact fertility and treatment viability. The connection between Socioeconomic status (SES) and infertility results was inspected, acknowledging that admittance to human services, instructive assets, and natural introductions differ by socioeconomic position. The investigation investigated the job of family arranging information and past contraceptive utilization in infertility. Ladies with more prominent information and earlier intercessions may have had a superior possibility of analyzing and treating infertility sooner. FSH levels were measured using chemiluminescent immunoassay (CLIA), LH via radioimmunoassay (RIA), and progesterone using

enzyme-linked immunosorbent assay (ELISA). For diagnostic methods, ultrasonography (both transabdominal and transvaginal) was employed to detect anatomical abnormalities and measure endometrial thickness. Laparoscopy was used to identify causes of infertility, such as tubal obstruction, endometriosis, and polycystic ovaries, aiding in the development of targeted treatments. Laparoscopy uncovered different infertility variables, including tubal hindrance (33.3%), polycystic ovaries (21.1%), endometriosis (13.3%), and fibroids (6.7%). These discoveries helped decide the fundamental drivers of infertility, zeroing in on tending to tubal hindrance through medical or helped regenerative strategies. Pelvic inflammatory disease (PID) was analyzed in over 3% of members and was generally connected to tubal factor infertility that can diminish fertility potential. Mindful conclusion through laparoscopy was critical for recommending focused remedies to conceivably improve the chances of the idea. This sorted out and diligent strategy guaranteed the legitimacy of the investigation, considering an assortment of infertility drivers and giving a comprehensive way to approach regenerative well-being investigation. Initial factual examinations of the investigation incorporated different tests to ensure strong outcomes and important ends. Descriptive measurements were initially connected to summarize the information, like focal patterns (normal, middle) and dissemination (standard deviation). Data were analyzed by SPSS version 26.0. The chi-squared test was utilized to survey the relationship between class factors, for example, infertility type and socioeconomic status, while t-tests and ANOVA were connected to look at means between different gatherings for case those with essential versus auxiliary infertility. To inspect the connections between constant factors, connection coefficients were estimated, and different relapse investigations were utilized to perceive indicators of infertility results. The typicality of the information was tried utilizing the Shapiro-Wilk test, and the noteworthy level was set at 0.05 for all tests, affirming the factual intensity and legitimacy of the discoveries.

RESULTS

The data reveals the following descriptive statistics for the given variables: The average age of the participants was 29.39 ± 4.83, indicating a relatively narrow age range. The mean weight was 76.27 ± 5.34, suggesting a moderate variation in weight. The mean average height was 1.64 ± 0.07, indicating little variation in height. The mean BMI was 28.54 ± 3.64, implying that most participants fall within a similar range of BMI but there was some variation. The average duration of infertility was 3.98 ± 2.11, suggesting a wide range of infertility durations. Lastly, the average hormonal profile (FSH IU/L) was 12.26 ± 4.56, indicating a

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moderate variation in FSH levels among the participants (Table 1).

Table 1: Analysis of Female Infertility Descriptive Statistics and Stratified Laparoscopic Findings at Lady Reading Hospital Peshawar 2022

Subcategory	Mean ± SD
Age (Years)	29.39 4.83
Weight (kg)	76.27 ± 5.34
Height (Meters)	1.64 ± 0.07
BMI (kg/mÂ²)	28.54 ± 3.64
Duration of Infertility	3.98 ± 2.11
Hormonal Profile (FSH IU/L)	12.26 ± 4.56

The distribution of participants across different age groups was as follows: 48.9% of the participants fall in the 18 to 28 age group, making it the largest group. The 29 to 35 age group comprises 37.8% of the participants, while the 36 to 45 age group includes 13.3% of the participants. This indicates that most participants are younger, with a significant portion in the middle age range and a smaller proportion in the older category (Table 2).

Table 2: Age Distribution Breakdown: Insights into the Demographic Landscape

Age Group	Frequency (%)
18 to 28	44 (48.9%)
29 to 35	34 (37.8%)
36 to 45	12 (13.3%)

The distribution of education levels among participants shows that 68.9% have completed their education at the primary level, while 31.1% have completed secondary education. This suggests that most participants have a primary education, with a smaller proportion pursuing education at the secondary level (Table 3).

Table 3: Education Level Distribution at Primary vs. Secondary

Subcategory	Frequency (%)
Primary	62 (68.9%)
Secondary	28 (31.1%)

The analysis of laparoscopy findings related to reproductive health conditions reveals the following distribution: 33.3% of participants were diagnosed with tubal blockage, making it the most common condition. Polycystic ovaries were observed in 21.1% of participants, while 17.8% had normal findings. Endometriosis was found in 13.3% of the participants, and pelvic inflammatory disease was present in 3.3%. Fibroids were identified in 6.7% of cases, and ovarian cysts were found in 4.4%. This shows that tubal blockage and polycystic ovaries are the most prevalent conditions, with other conditions occurring less frequently (Table 4).

Table 4: Key Laparoscopy Findings Analysis of Reproductive Health Conditions

Laparoscopy Findings	Frequency (%)
Normal	16 (17.8%)
Tubal Blockage	30 (33.3%)
Polycystic Ovaries	19 (21.1%)
Endometriosis	12 (13.3%)
Pelvic Inflammatory Disease	3 (3.3%)
Fibroid	6 (6.7%)
Ovarian Cyst	4 (4.4%)

The data exploring the relationship between health conditions and social class shows the following distribution: 32.2% of participants reported a history of depression, while 67.8% did not. Regarding hypothyroidism, 46.7% of participants have a history of it, and 53.3% do not. In terms of social class, 48.9% of participants belong to the high social class, 35.6% belong to the middle class, and 15.6% are in the low social class. The stratification of depression and hypothyroidism by social class and history follows the same distribution, with 48.9% of participants in the high class, 35.6% in the middle class, and 15.6% in the low class for both conditions. This indicates a relatively even distribution of depression and hypothyroidism across social classes, though most participants belong to the higher social class (Table 5).

Table 5: Exploring Health and Social Stratification of Depression, Hypothyroidism, and Social Class

Category	Subcategory	Frequency (%)
History of Depression	Yes	29 (32.2%)
	No	61 (67.8%)
History of Hypothyroidism	Yes	42 (46.7%)
	No	48 (53.3%)
Social Class	High	44 (48.9%)
	Middle	32 (35.6%)
	Low	14 (15.6%)
Stratification with Social Class	High	44 (48.9%)
	Middle	32 (35.6%)
	Low	14 (15.6%)
Stratification with History of Depression	Yes	29 (32.2%)
	No	61 (67.8%)
Stratification with History of Hypothyroidism	Yes	42 (46.7%)
	No	48 (53.2%)

The analysis of family planning knowledge, experiences, and BMI stratification reveals the following: 40% of participants have high family planning knowledge, while 60% have low family planning knowledge. In terms of family planning experience, 42.2% of participants have used family planning methods, while 57.8% have never used them. When stratified by family planning knowledge, 40% of participants fall under the high knowledge category and 60% under the low knowledge category. Regarding family planning experience, 42.2% have used family planning

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methods, while 57.8% have not. For BMI stratification, 71.1% of participants have a BMI of less than 30, while 28.9% have a BMI greater than 30, indicating a significant proportion of participants fall within the normal weight range. The analysis suggests that family planning knowledge and usage are evenly distributed across categories, while a larger proportion of participants have a BMI under 30 (Table 6).

Table 6: Analyzing Family Planning Knowledge and Experiences Knowledge, Usage, and BMI Stratification

Category	Subcategory	(%)
Family Planning Knowledge	High	40%
Family Planning Knowledge	Low	60%
Family Planning Experience	Ever Used	42.2%
Family Planning Experience	Never Used	57.8%
Stratification with Family Planning Knowledge	High	40%
Stratification with Family Planning Knowledge	Low	60%
Stratification with Family Planning Experience	Ever Used	42.2%
Stratification with Family Planning Experience	Never Used	57.8%
Stratification with BMI	<30	71.1%
Stratification with BMI	>30	28.9%

DISCUSSION

Infertility is a meaningful issue afflicting public health, especially in developing nations where female factors substantially contribute. The World Health Organization estimates globally around 60–80 million couples do battle with infertility, with 8-12% confronting fertility problems. This analysis aimed to identify primary infertility causes in a sample of 90 women in Peshawar by using diagnostic laparoscopy, widely seen as a gold standard for diagnosing female factor infertility. The results of the present study found that Tubal blockage was the most common cause (33.3%). The results of the present study are not those of Zeb and Malik, where blocked tubes were present in 23 (14.43%) [12]. The present study had endometriosis at 13.3% the results are also consistent with a study conducted by Rizvi SM et al., where endometriosis was found in 8 (13.3%) of the total cases of infertility [13]. The present study used Laparoscopy for diagnosis the results are n consistent with a study carried out Garg et al., Laparoscopy is the gold standard for the diagnosis of these disorders and has the advantage of performing corrective surgery in the same sitting [14]. While socioeconomic factors did not directly influence decisions regarding laparoscopy procedures in the study cohort, it remains true that greater access to healthcare and education often correlate with superior healthcare choices overall. This relationship could easily affect the timing of seeking infertility treatments, as diagnostic costs pose challenges in many developing nations that may unfortunately delay necessary diagnosis and care. Our findings identified

polycystic ovarian syndrome as the most prevalent endocrine disorder in those struggling with infertility, impacting 21.1% of participants. Previous investigations similarly show polycystic ovarian syndrome impacts 16-33% of women experiencing infertility issues. Given its pervasive nature and sizable effects on ovulation, careful monitoring and treatment of polycystic ovarian syndrome constitutes a key aspect of infertility management and therapy. Endometriosis occurred in 13.3% of our patients, which was consistent with the study by Mahmood, who reported a 13.6% portion in infertile women [15]. This destruction results in changes in normal ovarian, fallopian, and pelvic anatomy, which can then compromise fertility; endometriosis can "indirectly" compromise fertility. It is often difficult to diagnose because of symptomless initial stages, making laparoscopy an important tool for recognition and treatment during this critical moment. And while it remains the subject of considerable debate as a leading cause of fertility issues, there is no doubt that endometriosis greatly complicates the fertility journey. An additional common infertility consideration, fibroids, affected 6.7% of cases, in line with Khaula's Lahore-based investigation results. Although fibroids frequently are asymptomatic, they can block fallopian tube pathways or alter the shape of the uterine cavity, which can interfere with fertility. The prevalence of fibroids in this category highlights the importance of diagnostic laparoscopy for identifying uterine anomalies that adversely affect fertility. The most striking result we found in our study is that tubal blockages appear to be widespread, occurring in 33.3% of the individuals we studied [16]. Tubal blockage is an important cause of impaired fertility, often due to pelvic inflammatory disease (PID). Impact of Tubal Damage: Tubal damage is responsible for 15-20% of cases of primary infertility and up to 40% of secondary infertility [4]. PID was found in 3.3% of our cohort, suggesting that infection-related tubal injury is a relevant factor for this population, not by a study carried out by Mascagni where Pelvic inflammatory disease (PID) was found in 1 (3.1%) [17]. The tubal factor was the most common etiology in our study carried out by Kumar et al., the Tubal factor is the most common cause of infertility followed by endometriosis and ovarian factor [18]. Laparoscopy was used for the evolution of the results by Shanmugham et al., who confirmed that Laparoscopy is an effective diagnostic tool in the evaluation of infertility [19]. A retrospective study on 151 patients by Chanu et al., shows that the most common abnormalities found during laparoscopy in both the primary and secondary infertility group were features of PID (adnexal adhesion and hydrosalpinx) The results are not by our study where PID was found by 3.3% [20].

CONCLUSIONS

It was concluded that tubal blockage was the most common cause (33.3%). In 33.3% of cases, polycystic ovaries were found, in 13.3% endometriosis, in 6.7% fibroids, in 4.4% ovarian cysts, and in 3.3% PID.

Authors Contribution

Conceptualization: IU
Methodology: HNM, NH, FJ
Formal analysis: NA
Writing review and editing: PN

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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