

Tubal Factors: A Laparoscopic Evaluation in Case of Patients with Subfertility

Sadia Tamanna^{1*} Jahanara Begum²

ABSTRACT

Background: Tubal factors are one of the most common factors responsible for Subfertility in females while an accurate diagnosis is the key to successful treatment. Laparoscopy is the standard means of diagnosing the tubal pathology. This study was effort to evaluate the tubal factors among subfertile women through diagnostic laparoscopy.

Materials and methods: The hospital based observational cross-sectional study was conducted in the Inpatient Department of Obstetrics & Gynaecology in Dinaipur Medical College Hospital from June 2018 to May 2019. Subfertile women either primary or secondary causes were investigated for tubal disease and were enrolled into the study according to inclusion and exclusion criteria. After selecting the patients, informed written consent were taken from the subjects. All patients were subjected to detailed history, clinical examination, relevant investigation and diagnostic laparoscopy. Data were collected by using semi-structured questionnaire designed for the study by the researcher.

Results: Mean age of respondents was 34.28 ± 5.46 (SD) years with majority patients in age group 31-35 years (32.43%). Duration of subfertility was 1 to 5 years among 64.90% respondents, 6-10 years in 28.40% and more than 10 years in 6.80%. Of all, 72.97% had primary Subfertility and 27.03% had secondary subfertility and 60.81% respondents had tubal pathology. The tubal pathology found in this study was unilateral block 14.8% (n=8) in case of primary subfertility and 30% (n=6) in case of secondary subfertility, Bilateral block 9.3% (n=5) in case of primary subfertility and 15% (n=3) in case of secondary subfertility. Peritubal adhesion, signs of endometriosis and hydrosalpinx had been found among 7.4% (n=4), 18.5% (n=10) and 3.7% (n=2) in case of primary subfertility respectively and much higher in case of secondary subfertility as 25% (n=5) 15% (n=3) and 15% (n=3) respectively. Only 13.52% respondents experienced complications following laparoscopy which included nausea, vomiting, pyrexia and right shoulder tip pain.

Conclusion: More than half of the population had been found to have tubal pathology responsible for subfertility during diagnostic laparoscopy which included tubal block, peritubal adhesion, hydrosalpinx and tubo ovarian mass.

KEY WORDS

Laparoscopy; Subfertility; Tubal factors.

INTRODUCTION

The desire to reproduce is an intensely motivating human force. Couples may also experience strong religious, cultural and social pressure to conceive. Subfertility is a life crisis for them. It is a growing

problem across all cultures and societies almost all over the world and affect an estimated 10-15% of couples of reproductive age. In recent years, the number of couples seeking treatment for subfertility is dramatically increased.¹

Today in the era of scientific advancement and technology, newer diagnostic and operative modalities have paved the path for further insight into this problem. Approximately 85% of subfertile couples have an identifiable cause. The most common causes of subfertility are ovulatory dysfunction, male factor infertility and tubal diseases. The remaining 15% of subfertile couples have unexplained subfertility.² Laparoscopy has emerged in recent years as an accurate method of assessing, evaluating and treating subfertility.³⁻⁵

Tubal factor subfertility accounts for a large portion of female factor subfertility. The most prevalent cause of

1. Assistant Professor of Obstetrics & Gynecology

Rajshahi Medical College, Rajshahi.

2. Professor of Obstetrics & Gynecology

TMSS Medical College, Bogura.

*Correspondence Dr. Sadia Tamanna

Email: tsadia25@yahoo.com

Cell : +88 01723 54 57 63

Date of Submission 14.03.2026

Date of Acceptance 10.04.2026

tubal factor subfertility is pelvic inflammatory disease and acute salpingitis. Tubal factor is responsible for 25% of female subfertility.⁶ The degree of tubal occlusion, the presence of endosalpingeal destruction and the presence and type of peritubal adhesions are the factors causing this type of female subfertility.^{7, 8}

The fallopian tubes are very delicate structures that are responsible for picking up the egg and providing the site for fertilization of the egg as well as early embryo development and transport to the uterine cavity. The tubes may be damaged by infections or other pelvic conditions. A previous history of pelvic inflammatory disease, tubal surgery, ectopic pregnancy, ruptured appendix, ovarian surgery or septic abortion strongly suggests the possibility of tubal disease. The most prevalent cause of tubal factor subfertility is pelvic inflammatory disease and acute salpingitis. The incidence of tubal damage after one episode of pelvic infection is approximately 12%, 23% after two episodes and 54% after three episodes.⁹⁻¹¹ Proximal, distal, and peritubal damage can be caused by a number of pathologic processes such as inflammation, endometriosis and surgical trauma. Tubal pathology impairs functions of the fallopian tube and reduces fertility. The degree of tubal pathology determines the possibility for subfertility. The evaluation of the fallopian tube is necessary to determine the management plan of subfertility. Hysterosalpingography (HSG) is often performed as a first line approach to assess tubal patency and the presence of adhesions; however, HSG has limitations in detecting tubal pathology.¹²

In many cases, laparoscopy is the final diagnostic procedure of the female fertility exploration, as outlined by the American Fertility Society in 1992 and by the World Health Organization guidelines.¹³ The reference standard for diagnosing tubal factor subfertility is laparoscopy with tubal dye testing, by which tubal patency and the presence of periadnexal adhesions and endometriosis can be assessed. This has led to a recommendation by the NICE (UK, 2010) that women suspected of having comorbidities (Such as endometriosis and pelvic inflammatory disease) should undergo laparoscopy so that pelvic and tubal pathology can both be assessed. The purpose of the study was to evaluate tubal factors of subfertility by laparoscopy.

MATERIALS AND METHODS

This was an observational cross-sectional study conducted in Department of Obstetrics & Gynaecology,

Dinajpur Medical College Hospital, Dinajpur during the period of June 2018 to May 2019. Female patients with subfertility underwent Diagnostic Laparoscopy admitted in the department were included as study population. Purposive sampling technique was implied and sample size was 74 after fulfilling inclusion (Subfertile patients selected for laparoscopy, unexplained infertility and patients with endometriosis, pelvic inflammatory diseases) and exclusion (Patients who had medical disorders e.g. Cardiovascular disease, pulmonary compliance and who had contraindication for laparoscopy e.g. coagulopathy, adhesion caused by previous surgery) criteria.

After ethical approval, the study was conducted at the Inpatient Department of Obstetrics and Gynaecology in Dinajpur Medical College Hospital. For recruitment of the patient, firstly the aims and objectives of the study were discussed separately with each physician working as attending doctor. In-patient Department, the attending doctor screened the patient and immediate contacts were done with the principal investigator. Recruitment into the study began after obtaining informed consent from the eligible patients. In this study, subfertile women either primary or secondary causes were investigated by laparoscopy for tubal disease were approached into the study. Patients fulfilling the inclusion and exclusion criteria were enrolled as case.

All the subjects were thoroughly informed about the aims, objectives and detailed procedure of the study before examination. An informed written consent was taken from the entire participants who were selected for the study. They were encouraged for voluntary participation and allowed freedom to withdraw from the study whenever she/he liked even after participation.

Once a patient has been selected as study sample detailed clinical history and physical examination were done according to standard protocol. Relevant data were collected in a semi structured pretested Case Record Form (CRF).

Baseline investigations like CBC, ECG, Chest x-ray, FBS, HbsAg, serum creatinine, and blood grouping for fitness of anesthesia were performed. All blood reports were performed from the biochemistry lab relevant medical college.

Total 74 patients of subfertility were considered for interview and all of them underwent laparoscopy by single surgeon. Laparoscopy was done at the time of

hospital stay after admission. After underwent diagnostic laparoscopy data were collected and all detailed were recorded in case record form. Collected data were analyzed by SPSS software version 23.

RESULTS

Table I showed that majority respondents was in age group 31-35 years (32.43%, n=24) and followed by in decreasing order 26-30 years (25.67%, n=19) and 18-25 years (21.60%, n=16) and >35 years (17.56%, n=13). Mean age of respondents was 34.28 ± 5.46 years. Majority respondents hailed from urban area (71.60%, n=53) and 28.49% (n=21) hailed from rural area. Majority respondents were studied up to Graduation and above (43.24%, n=32) and followed by in decreasing order SSC (21.62%, n=16), HSC (16.21%, n=12), primary school (12.16%, n=9) and illiterate (6.75%, n=5). Majority respondents were Service Holder (70.30%, n=52) and followed by decreasing order homemaker (21.60%, n=16) and Business (8.10%, n=6). Majority respondents were belong to Upper Class (59.50%, n=44) and followed by in decreasing order (25.70%, n=19) and Lower Class (14.90%, n=11). Majority respondents were married for 1 to 5 years (59.50%, n=44) and followed by in decreasing order 6-10 years (27%, n=20) and >10 years (13.50%, n=10). Majority respondents 'duration of subfertility' was 1 to 5 years (64.90%, n=48) and followed by in decreasing order 6-10 years (28.40%, n=21) and >10 years (6.80%, n=5). Around 39.19% respondents had regular menstrual cycle and 60.81% respondents had irregular menstrual cycle.

Table I Demographic characteristics of participants (n=74)

Characteristics	Frequency	Percentage (%)
Age in years		
18-25	16	21.6
26-30	19	25.67
31-35	24	32.43
36-40	13	17.56
Residence		
Urban	53	71.60
Rural	21	28.49
Level of education		
Illiterate	5	6.75
Primary	9	12.16
SSC	16	21.62
HSC	12	16.21
Graduation and above	32	43.24
Occupation		
Homemaker	16	21.60
Service holder	32	70.30
Business	06	8.10

Characteristics	Frequency	Percentage (%)
Scio- economic condition		
Upper class	44	59.50
Middle class	19	25.70
Lower class	11	14.90
Duration of marriage		
1-5 years	44	59.50
10-10 ears	20	27
> 10 years	10	13.50
Duration of subfertility		
1-5 years	48	64.90
10-10 ears	21	28.40
> 10 years	5	6.80
Menstrual history		
Regular	29	39.19%
Irregular	45	60.81%

Majority respondents were suffering for primary subfertility (72.97%, n=54) and 27.03% (n=20) were suffering for secondary subfertility (Figure 1). Around 60.81% respondents had tubal pathology (Figure 2).

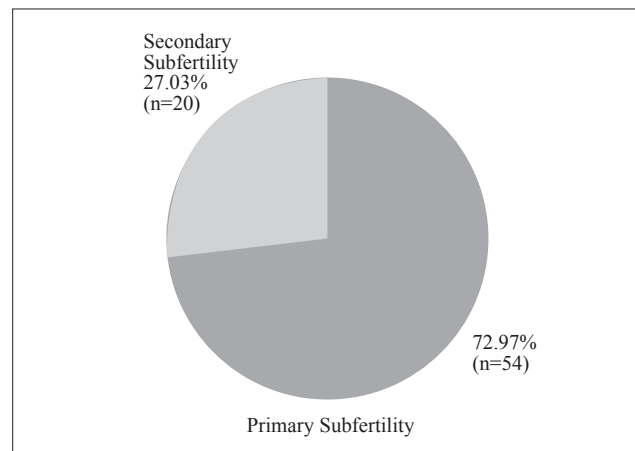


Figure 1 Distribution of respondents by type of subfertility (n=74)

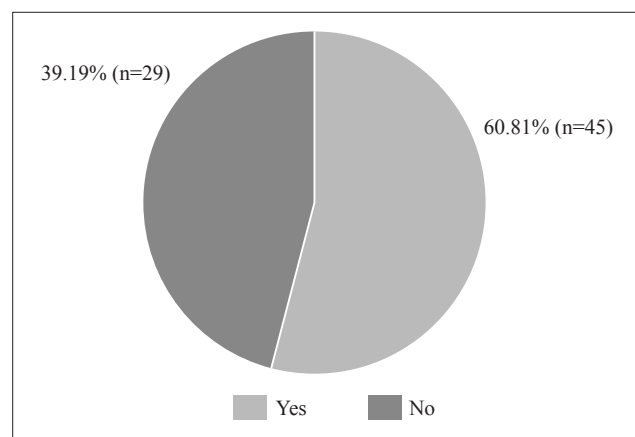


Figure 2 Distribution of respondents by distribution of tubal pathology (n=74)

Pelvic pain had been found among 14.8% (n=8) in case of primary subfertility and 35% (n=7) in case of secondary subfertility, Dysmenorrhoea had been found among 48.1% (n=26) in case of primary subfertility and 55% (n=11) in case of secondary subfertility. Dyspareunia had been found among 22.2% (n=12) in case of primary subfertility and 45% (n=9) in case of secondary subfertility, White Discharge had been found among 14.8% (n=8) in case of primary subfertility and 25% (n=5) in case of secondary subfertility. Peritubal adhesion, signs of endometriosis and hydrosalpinx had been found among 7.4% (n=4), 18.5% (n=10) and 3.7% (n=2) in case of primary subfertility respectively and much higher in case of secondary subfertility as 25% (n=5), 15% (n=3) and 15% (n=3) respectively (Table III).

Table II Distribution of respondents according to their complains (n=74)

Complain□ □	Primary Subfertility□ (n=54)□		Secondary Subfertility (n=20)	
	Frequency□	%□	Frequency□	%
Pelvic Pain□	8□	14.8□	7□	35
Dysmenorrhoea□	26□	48.1□	11□	55
Dyspareunia □	12□	22.2□	9□	45
White Discharge□	8□	14.8□	5□	25

Table III Distribution of respondents according to morphological changes of fallopian tube (n=74)

Laparoscopic□ Evolution□ □	Primary Subfertility□ (n=54)□		Secondary Subfertility (n=20)	
	Frequency□	%□	Frequency□	%
Normal Looking□	38□	70.4□	9□	45
Peritubal Adhesion□	4□	7.4□	5□	25
Signs of Endometriosis □	10□	18.5□	3□	15
Hydrosalpinx□	2□	3.7□	3□	15

Table IV showed that unilateral block had been found among 14.8% (n=8) in case of primary subfertility and 30% (n=6) in case of secondary subfertility, Bilateral block had been found among 9.3% (n=5) in case of primary subfertility and 15% (n=3) in case of secondary subfertility.

Table IV Distribution of respondents according to tubal patency (n=74)

Findings□ □	Primary Subfertility□ (n=54)□		Secondary Subfertility (n=20)	
	Frequency□	%□	Frequency□	%
Both Tube Patent□	41□	75.9□	11□	55
Unilateral Tubal Block□	8□	14.8□	6□	30
Bilateral Tubal Block □	5□	9.3□	3□	15

Table V showed that around 86.48% respondents didn't experience any complication following diagnostic laparoscopy. The major complication was nausea and vomiting (8.1%, n=6), Pain (2.7%, n=2) and right shoulder tip pain (2.7%, n=2).

Table V Complications of laparoscopy (n=74)

Complications□	Frequency (n)□	Percentage (%)
No complication□	64□	86.48
Nausea & Vomiting□	06□	08.10
Pain□	02□	02.70
Right Shoulder Tip pain□	02□	02.70

*Multiple responses considered.

DISCUSSION

Subfertility is best defined as the inability to conceive after one year of unprotected regular intercourse.^{14,15} Worldwide more than 70 million couples suffer from subfertility.¹⁶ The One evidence indicated that 9% prevalence of subfertility (Of 12 months) with 56% couples seeking medical care in more developed and 51.2% in less developed countries.¹⁷ Subfertility leads to considerable personal suffering and disruption of family life. In many cultures, the social repercussions of subfertility compound the individual impact. Subfertility has been observed to result in divorce, loss of economic resources and even the annulment of rights to burial grounds.¹⁸ Subfertility affects men and women alike, as both genders report associated psychological distress, depression and low self-esteem.¹⁹ The common factors responsible for subfertility in females are an ovulatory disorder, tubal factors, endometriosis, uterine and cervical factors.²⁰ An accurate diagnosis is the key to successful treatment. The workup of the female partner begins with history and examination. It is more important to perform the relevant investigation in a logical order at the correct time than to perform a series of tests as a routine simple, least invasive and most predictive investigations should be performed first. Diagnostic laparoscopy is generally not a part of initial subfertility evaluation, however, number of reports have shown that it is effective procedure for evaluation of long- term subfertility.^{21, 22} The common factors responsible for subfertility in females are an ovulatory disorder, tubal factors, endometriosis, uterine and cervical factors.²³ Untreated Pelvic Inflammatory Diseases (PID) postabortal, postpartum infections and tuberculosis are common factors of subfertility in developing countries.²⁴ Conventional way to assess the uterine cavity, tubal structure and tubal patency was Hysterosalpingography but it has now been largely

superseded by laparoscopy and hysteroscopy. Laparoscopy is the standard means of diagnosing the tubal pathology, peritoneal factors and endometriosis and intra abdominal causes of subfertility.²⁵ In this study an effort was made to evaluate the tubal factors among subfertile women.

In current study, mean age of respondents was 34.28 ± 5.46 years. Majority respondents were in age group 31-35 years (32.43%) 26-30 years (25.67%). One study in Pakistan by Hakim and Sultan showed that a strong association exists between subfertility and increasing female age.²³ A classic report on the effect of female age on fertility found that the percentage of women not using contraception that remained childless rose steadily according to their age at marriage: 6% at age 20 to 24, 9% at age 25 to 29, 15% at age 30 to 34, 30% at age 35 to 39 and 64% at age 40 to 49. Similarly, a sharp decline in pregnancy rate with advancing female age.²⁴ Definitely, female age is the single most important determinant of spontaneous as well as treatment related conception.

Around 71.60% respondents hailed from urban area. Majority respondents were studied up to graduation above (43.24%). Regarding occupation, 70.30% were service holder, 21.60% were homemaker (21.60%) and 8.10% were in others occupation. Most of the study population belonged to upper and middle socio economic class of society (59.50% and 25.70% respondents respectively). Only 14.90% respondents belonged to lower socio economic Class (14.90%). Chowdhury et al. conducted a study on socio demographic characteristics among women seeking treatment for subfertility.²⁶ Their findings regarding occupation and socio economic class corroborates with present study as they found 72% of study population as home maker and 52% of them being belonged to middle class of society. But the level of education was quite high than present study and majority respondent were from urban area.²⁷ Present study was held in a peripheral tertiary level hospital where majority patients are from surrounding urban area and they get educational privileges too.

Majority respondents were married for 1 to 5 years (59.50%) and among the rest 27% respondents were married for 6-10 years and 13.50% were married for more than 10 years. Majority respondent's duration of subfertility was 1 to 5 years (64.90%) and followed by in decreasing order 6-10 years (28.40%) and more than 10 years (6.80%). Around 72.97% were suffering for primary subfertility (72.97%) and 27.03% were suffering for secondary subfertility. It was also comparable to findings of earlier studies conducted in different countries.²⁸⁻³¹

Laparoscopy is a mandatory procedure for full assessment of the infertile couple. Statistics regarding subfertility in general population are difficult to overcome by since 40% of infertile couples do not attend a hospital or clinic for treatment illustrating potential for error in hospital based statistics.³² In present study, through laparoscopy around 60.81% respondents found to have tubal pathology. Unilateral block had been found among 14.8% (n=8) in case of primary subfertility and 30% (n=6) in case of secondary subfertility, Bilateral block had been found among 9.3% (n=5) in case of primary subfertility and 15% (n=3) in case of secondary subfertility. Peritubal adhesion, signs of endometriosis and hydrosalpinx had been found among 7.4% (n=4), 18.5% (n=10) and 3.7% (n=2) in case of primary subfertility respectively and much higher in case of secondary subfertility as 25% (n=5), 15% (n=3) and 15% (n=3) respectively. In a similar study by Wani et al., 2014 tubal blockage was present in 18.3% in the primary and 27.7% in the secondary subfertility group and peritubal and periovarian adhesions in 7.3% and 22.2% of primary and secondary subfertility respectively.³¹ Tubal pathology was detected in 66% cases and bilateral tubal block in 8% cases and unilateral block in 28% cases. In a study by Shetty, Shetty and Rai tubal pathology was detected in 66% cases and bilateral tubal block in 8% cases and unilateral block in 28% cases.³² Anitha et al. reported 61 % of cases had tubal block in one or both tubes in a similar study.³³ While Kanal P and Sharma S in their study, reported tubal blockage in 42.5% of primary subfertility.³⁴ In another study by Aziz, the incidence of tubal block was around 55 %.³⁵

LIMITATIONS

The percentage of prevalence of tubal pathology responsible for subfertility differs study to study due to sample size variation and lack of generalized sample distribution. The study findings have several limitations as the study population was not generalized and small sample size. Therefore, further larger multi centered study is needed to finalize the findings.

CONCLUSION

In this study, women of age group 31-35 years were mostly presented with subfertility. Of all, 60.81% respondents found to have tubal pathology including unilateral and bilateral tubal block. Other tubal pathologies reported were peritubal adhesion, hydrosalpinx and tubo ovarian mass. Though laparoscopy is not so cost effective; but it reveals the under diagnosed pelvic pathologies that can contribute to subfertility, and can have a positive therapeutic effect on spontaneous conception by allowing surgical correction of these findings.

DISCLOSURE

Both the authors declared no competing interests.

REFERENCES

1. Prasanna Kumar Deka, Swarnali Sarma. Psychological aspects of infertility. In: BJMP. 2010; 3(3): a336.
2. Sandra Ann Carson, Amanda N Kallen. Diagnosis and Management of Infertility. In: JAMA. 2021; 326(1): 65-76.
3. Gomel V, Taylor P. History of laparoscopy. In: Gomel V, Taylor PJ, editors. Diagnostic and Operative Gynecologic Laparoscopy. St. Louis: Mosby Year Book Medical Publishers. 1995;46-62.
4. Coltart TM. Laparoscopy in the diagnosis of tubal patency. *ObstetGynecolSurv*. 1970; 25(9):864-865.
5. Chaudhari AD, Baria AM, Chaudhari UR, Dixit GT, Thakor N. Diagnostic laparoscopy in the evaluation of tubal factor in cases of infertility. *Int J Reprod Contraception, Obstet Gynecol*. 2017;6(4):1275.
6. Sørensen S. Infertility Factors: Their Relative Importance and Share in an Unselected Material of Infertility Patients. *Acta ObstetGynecol Scand*. 1980;59(6):513-520.
7. Boer-Meisel ME, TeVelde ER, Habbema JDF, Kardaun JWPF. Predicting the pregnancy outcome in patients treated for hydrosalpinx: A prospective study. *FertilSteril*. 1986;45(1):23-29.
8. Donnez J, Casanas-Roux F. Prognostic factors of fimbrial microsurgery. *FertilSteril*. 1986;46(2):200-204.
9. Dun EC, Nezhat CH. Tubal Factor Infertility. *ObstetGynecolClin North Am*. 2012 Dec;39(4):551-566.
10. Muzii L, Sereni M, Battista C, Zullo M, Tambone V, Angioli R. Tubo-peritoneal factor of infertility: diagnosis and treatment. *Clin Ter*. 2010;161(1):77-85.
11. Confino E, Radwanska E. Tubal factors in infertility. *Curr Opin Obs Gynecol*. 1992;4(2):197-202.
12. Tsuji I, Ami K, Fujinami N, Hoshiai H. The significance of laparoscopy in determining the optimal management plan for infertile patients with suspected tubal pathology revealed by hysterosalpingography. *Tohoku J Exp Med*. 2012;227(2):105-108.
13. Niederberger C. WHO manual for the standardized investigation, diagnosis and management of the infertile male. *Urology*. 2001;57(1):208.
14. MG H. Evaluation of the infertile couple. *ObsGynecolClin North Am*. 1987;14:821-830.
15. A. T. ABC of sub fertility: Making a diagnosis. *BMJ*. 2003;327:494-497.
16. Ombelet W, Cooke I, Dyer S, Serour G DP. Infertility and the provision of infertility medical services in developing countries. *Hum Reprod Updat*. 2008;14:605-621.
17. Boivin J, Bunting L, Collins JA NK. International estimates of infertility prevalence and treatment - seeking: potential need and demand for infertility medical care. *Hum Reprod*. 2009;24:2379-2380.
18. Chachamovich JR, Chachamovich E, Ezer H, Fleck MP, Knauth D PE. Investigating quality of life and health-related quality of life in infertility: A systematic review. *J Psychosom ObstGynaecol*. 2010;31(2):101-110.
19. Jose Miller AB, Boyden JW FK. Infertility. *Am Fam Physician*. 2007;75:849-856.
20. Fartum M, Laufer N SA. Investigations of infertile couple: Should diagnostic laparoscopy be performed after normal hysterosalpingography in treating infertility suspected to be of unknown origin ? *Hum Reprod*. 2002;17:1-3.
21. Godinjak Z IE. Should diagnostic hysteroscopy be a routine procedure during diagnostic laparoscopy in infertile women? *Bosn J Basic Med Sci*. 2008;8(44-47).
22. Rehana R MS. Aetiological factors of infertility. *J Postgr Med Inst*. 2004;18:166-172.
23. Hakim A, Sultan M UF. Pakistan reproductive health and family planning survey : Preliminary report Islamabad: National Institute of Population Studies. 2001;30.
24. Schwartz D MM. Female fecundity as a function of age: results of artificial insemination in 2193 nulliparous women with azoospermic husbands. *N Engl J Med*. 1982;306:404-406.
25. Maheshwari A, Hamilton M BS. Effect of female age on the diagnostic categories of infertility. *Hum Reprod*. 2008;23:538-542.
26. Chowdhury MA, Haque MM, Chowdhury S, Prodhania MS. Determinants of Infertility Among Couples Seeking Treatment in A Selected Clinic in Dhaka City. *Chattagram Maa-O-Shishu Hosp Med Coll J*. 2014;13(3):42-45.
27. Naz T, Hassan L, Gulmeen, Nighat F S. S. Laparoscopic evaluation in infertility. *J Coll Physicians Surg Pak*. 2009;19:704-707.

28. □Shetty KS SH. Diagnostic laparoscopy in infertility—a retrospective study. *Int J Biomed Res*. 2013;4:7–7.
29. □Boricha YG, Sharma RK, Boricha BG, Mhapankar S, Chaterjee A NJ. Laparoscopy in 50 infertile couples: prospective study. *Int J Med Clin Res*. 2011;2:63–66.
30. □Saini VK, Patel SC KK. Role of diagnostic laparoscopy in infertility: Study of 50 cases. *Int J Sci Res*. 2013;2:290–292.
31. □Wani QUA, Ara R, Dangroo SA, Beig M. Diagnostic laparoscopy in the evaluation of female factors in infertility in Kashmir Valley. *Int J Women's Heal Reprod Sci*. 2014;2(2):48–57.
32. □Shetty S, Shetty H, Rai S. Laparoscopic evaluation of tubal factor in cases of infertility. *Int J Reprod Contraception, Obstet Gynecol*. 2013;2(3):410–413.
33. □Anitha M ;Sheila BR. Laparoscopic Evaluation of Tubal Factor in Infertility. *J Med SciClin Res* [Internet]. 2018 12;6(6):293–297.
<http://jmscr.igmpublication.org/v6-i6/50 jmscr>.
34. □Kanal P, Sharma S. Study of Primary Infertility in females by Diagnostic Laparoscopy. *Internet J Med Updat*. 2006;1(2):7–9.
35. □Aziz N. Laparoscopic evaluation of female factors in infertility. *J Coll Physicians Surg Pak*. 2010;20(10):649–652.