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ULTRASOUND FINDINGS OF WOMEN PRESENTING WITH INFERTILITY AT TERTIARY CARE HOSPITAL IN PESHAWAR

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Abstract

Background: *Infertility is presently characterized as a year of unintended non-conception with unprotected sexual intercourse during the fertile phase of menstrual cycles. It refers to the inability of women of reproductive age to conceive due to the consistent penetration of functional, active sperm into the reproductive organs via artificial or natural methods for a period of one year.*

Objective: *To determine the most common pelvic abnormality that causes female infertility. To determine associated history related risk factors (diabetes, hypertension, family history of infertility, late marriages and life style).*

Method: *A descriptive cross sectional study was conducted with non-probability consecutive sampling technique for data collection systematically. Data was collected from 234 female infertile patients that arrive at lady reading hospital for their fertility concerns to determine the most common cause related to female infertility from the study population proceeded at Lady Reading Hospital Peshawar which is the main referral hospital in Peshawar Pakistan.*

Results: *A total of 234 female infertile patients who were referred for ultrasonographic scan were evaluated. The effected age group was 14 to 55 years. The most common cause as found by our study was uterine fibroid and polycystic ovaries being the second leading cause for female infertility. while others including endometriosis, uterine cyst, pelvic inflammatory disease, premature ovarian failure being the less common causes. Also this study assessed various patient history related risk factors. Present study most of the participant were overweight n= 128 (54.7%), normal weight n= 97 (41.5%) and in underweight n=9 (3.8%) which demonstrated obesity as a significant risk factor*

Conclusion: *This study concludes that the most common cause of female infertility as observed on ultrasonography is uterine fibroids while poly cystic ovaries were the second leading cause contributing to female infertility. Ultrasound play an important and essential role in evaluating the cause the female infertility and it also helps in treatment and follow up. Diagnosing the cause of female infertility is very important to proceed with further treatment plan while considering the awareness of infertility risk factors to general public can help to reduce the chances of female infertility.*

INTRODUCTION

Infertility is presently characterized as a year of unintended non-conception with unprotected sexual intercourse during the fertile phase of menstrual cycles (1). It refers to the inability of women of reproductive age to conceive due to the consistent penetration of functional, active sperm into the reproductive organs via artificial or natural methods for a period of one year (2)

In humans, infertility signifies the inability to conceive or sustain a pregnancy to full term, (4). The World Health Organization (WHO) presently defines infertility as "a disease of the reproductive system characterized by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse"(5)(6). This is a relative metric (7). Primary infertility refers to a female's inability to conceive a child or who has never had a pregnant uterus, whereas secondary infertility pertains to couples who have previously been able to conceive but are now unable to(8). As far as we are aware, infertility has existed as long as humanity itself. It is indeed as ancient as recorded history (9).

Ultrasound is, in fact, the most preferred imaging technique in the study of the female pelvis (10). Secondary infertility inability to conceive again after the first successful pregnancy, it may be absolute (without treatment) or relative (with treatment) (3). A meta-analysis of infertility causes among patients referred to various infertility clinics in Iran indicated that 78. 4% of couples experienced primary and 21. 6% secondary fertility issues. Overall, 34% of them had male factors, 43. 5% had female factors, 17% had both male and female factors, and 8. 1% had no identified cause for their infertility (11).

The key indicator of infertility in women is the failure to become pregnant for a year or more under favorable conditions for conception, particularly such conditions: Regular sexual intercourse; A sexual partner with a satisfactory spermogram, Complete, prolonged cessation of contraception; Being between the ages of 20 and 45. Infertility frequently lacks a pathognomonic (primary, distinct) symptom and may occur without symptoms or with indirect indicators. Signs of infertility are identified through an examination, physical, laboratory, and instrumental investigations. The primary female anatomical factors contributing to infertility encompass post-infectious tubal damage, endometriosis, and congenital/acquired uterine anomalies. Congenital (septate uterus) and acquired (myomas and synechiae) conditions of the uterus can result in infertility, pregnancy loss, and various obstetric complications (12).

Another significant reason for infertility in women may be the inability to ovulate. Abnormalities in the eggs themselves can hinder conception. For instance, polycystic ovarian syndrome is characterized by eggs that have only partially developed within the ovary along with an excess of male hormones (4).

Numerous well-established lifestyle risks have been identified that make women more prone to infertility, including postponing childbirth, a history of sexually transmitted infections (STIs), and a background of pelvic inflammatory disease (PID). Links between extremes of body mass index (BMI) and reduced fertility highlight weight-related issues as a notable risk to fertility. Smoking has been associated with decreased fertility, with research suggesting an extension in time to conception, primary and secondary infertility, miscarriages, and ectopic pregnancies among smokers in comparison to non-smokers (13).

Sonography is often considered the ideal imaging technique for examining the female pelvis. It is easily accessible, noninvasive, cost-effective, does not involve ionizing radiation, and can deliver definitive diagnostic information across a wide range of clinical scenarios. In addition, when other imaging modalities are necessary for comprehensive disease assessment, it facilitates the selection of the most suitable route to accurate diagnosis. Various examination methods can be employed for the ultrasound investigation of the pelvis. Ultrasound, indeed, is the favored imaging technique for evaluating the female pelvis, and it offers essential information in identifying and characterizing pelvic masses of uterine, ovarian, or adnexal origin, also providing criteria that aid in determining their benign versus malignant characteristics(10). All women experiencing infertility undergo an initial pelvic ultrasound examination (baseline sonography) to explore the potential causes of infertility. A thorough pelvic ultrasound, especially transvaginal

sonography (TVS), is capable of identifying uterine abnormalities, ovarian issues, and other pathological conditions that contribute to female infertility. Consequently, it can assist midwives, physicians, gynecologists, and infertility specialists in evaluating women with infertility and making improved treatment decisions for these patients (14).

MATERIALS AND METHODS:

Ethical approval for this study was obtained from the Clinical Research Ethical Committee of Lady Reading Hospital Peshawar, Pakistan. The study included 234 participants who visited the Radiology Department. Oral consent was obtained from each participant. The calculated sample size of 234 was based on a prevalence rate of 18.67%, and a non-probability consecutive sampling technique was used. Participants included all infertile female patients referred for ultrasonographic scans for infertility assessment, within the age group of 14 to 55 years. Patients with a history of bilateral oophorectomy, hysterectomy, bilateral tubal ligation, or congenital uterine pathologies were excluded from the study.

Participants were informed about the study's objectives, provided oral consent, and completed a semi-structured proforma that assessed demographics, medical history, and ultrasonographic findings. The proforma collected information on age, gender and ultrasonographic findings. Statistical analysis was performed using SPSS Statistics version 22.

RESULTS:

This study enlisted N =234 infertile female with age ranges from 14 to 55 years undergoing pelvic ultrasound with the mean age of 30 ±7 S.D as shown in fig 4.1.

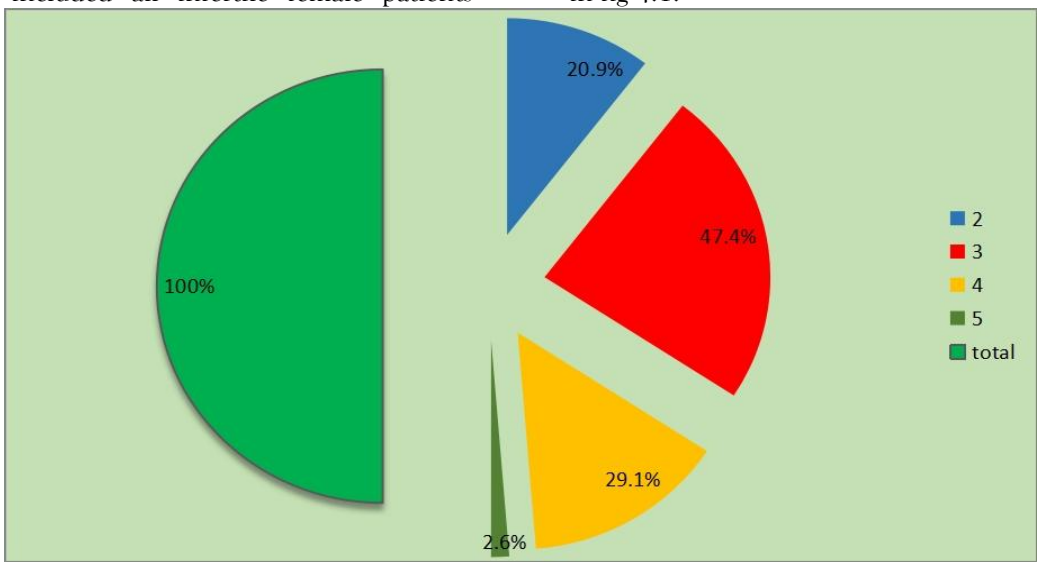

Fig 4.1: Age of participants

The frequency of female infertile patients in between age group of 14 to 24 was n= 49 (20.9%), 24 to 34 years was n=111 (47.4%), between 34 to 44 years was n= 68 (29.1%) and in between 44 to 54 years was n=6 (2.6%).

In present study most of the participant were overweight n= 128 (54.7%), normal weight n= 97 (41.5%) and underweight n=9 (3.8%) shown in fig 4.2

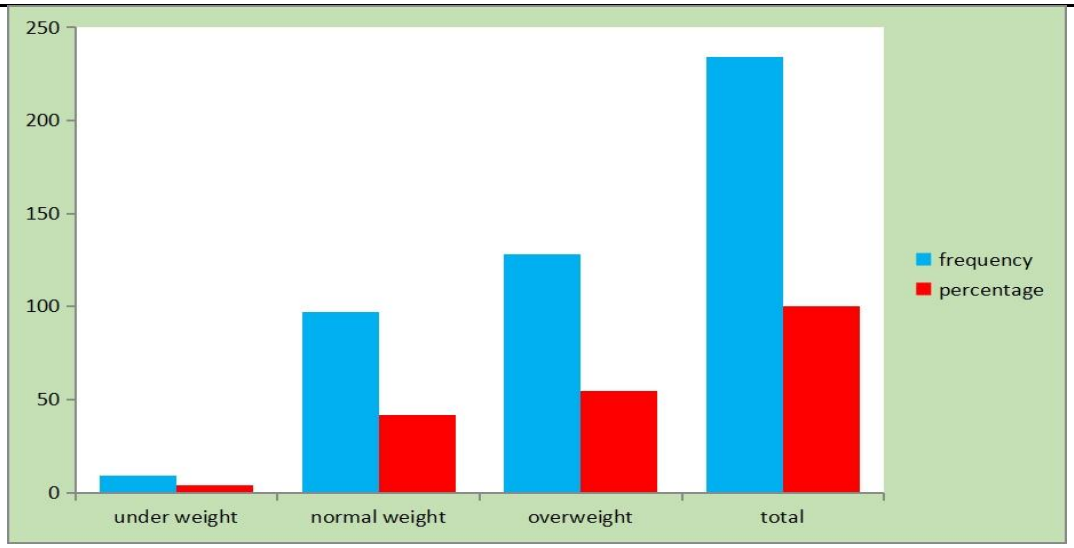

Fig: 4.2 Body Mass Index of Participants

Hypertensive participants were n=83 (35.5%) and without hypertension n=151 (64.5%)

Participant with diabetes mellitus were n=22(9.4%) and without mellitus were n= 212(90.6%)

In the present study, n=80 (34.2%) had family history of infertility and all other n=154 (65.8%) has no such history. The mean age at the time of marriage among the participant was 23.99 ±6.4 S.D. The mean duration of marriage among participants were 6.57 ±4.38 S.D.

Fig: 4.3 Mean duration of marriage among participants

Among the participant n= 122(52.1% have active life style while the remaining n=112 (47.9%) had sedentary life style. participant n=103(44%) has history of abortion and the remaining n=131 (56%) has no such history. In this study most of the participants were diagnosed with primary type of infertility n=147 (62.8%) followed secondary infertility were n=87(37.2%), as shown in table: 4.

Table: 4.1: Characteristic of participants

S.NO	Variable		Frequency(F)	Percentage (%)
1	BMI	Underweight	9	3.8
		Normal	97	41.5
		overweight	128	54.7
2	Hypertension	YES	83	35.5
		NO	151	64.5
3	Diabetes mellitus	YES	22	9.4
		NO	212	90.6
4	Family history of infertility	YES	80	34.2
		NO	154	65.8
5	Life style	Active	122	52.1
		Sedentary	112	47.9
6	Abortion history	YES	103	44
		NO	131	56
7	Types of infertility	Primary	147	62.8
		Secondary	87	37.2
8	Age	14 to 24	49	20.9
		24 to 34	111	47.4
		34 to 44	68	29.1
		44 to 54	6	2.6

Ultrasound assessment shows that most of the infertile females were n=180 (76.9%) are diagnosed with pelvic abnormalities n= 54(23.1%) infertile females having normal pelvic ultrasound while. ovarian evaluation shows that n= 34(14.5%) has polycystic ovaries, n=5(2.1%) has premature ovarian follicles, n= 16(6.8%) have ovulation disorders, n= 21(9%) have other diseases and n=104(44.4%) has normal ovaries. Ultrasound finding of uterus shows that n=46(19.7%) has uterine fibroids, n= 16(6.8%) has endometriosis, n=14(6%) has uterine cyst, n= 25(10.7%) has other diseases and n=79(33.8%) has normal uterus. Further assessment of fallopian tube n= 3(1.3%) has damage/ blocked fallopian tube, n=5(2.1%) has pelvic inflammatory diseases, n=6(2.6%) has other diseases and n= 165(70.5%) has normal fallopian tube shown in table: 4.2.

Table: 4.2: Ultrasonic assessments of Pelvic scan of infertile patients

S.NO	Variable		Frequency (F)	Percentage (%)
1.	Pelvic abnormalities	Abnormal pelvis	180	76.9
		Normal pelvis	54	23.1
2.	Ovarian evaluation	Normal ovaries	104	44.4
		Polycystic ovaries	34	14.5
		Other finding	21	9
		Ovulation disorders	16	6.8
		Premature ovarian follicles	5	2.1
3.	Uterus evaluation	Normal uterus	79	33.8
		Uterine fibroids	46	19.7
		Other finding	25	10.7
		endometriosis	16	6.8
		Uterine cyst	14	6
4.	Fallopian tube evaluation	Normal fallopian tube	165	70.5

		Other finding	6	2.6
		Pelvic inflammatory diseases	5	2.1
		Damage / blocked fallopian tube	3	1.3

DISCUSSION:

Infertility is no pregnancy after one year of unprotected intercourse (23) and it can be primary and secondary infertility (15). Infertility is a serious health issue that affects millions of individuals all over the world (15). Infertility is a common finding in women presenting in gynae OPD for pelvic ultrasound. An excellent modality for primary evaluation of infertility is ultrasonography because of its non-invasiveness, inexpensive and no use of ionizing radiations (22). Excellent detection and effective management of sterility by health care providers is important due to its high susceptibility and prevalence (16). Common causes of infertility in females include polycystic ovarian syndrome, endometriosis, pelvic inflammatory disease, uterine fibroids, structural ovarian abnormalities and blocked fallopian tubes. Risk factors considered that were associated with both primary and secondary infertility include hypertension (21), lifestyle, body mass index and diabetes (17). Beside all, patients with family history of infertility and those female that have obesity are affiliated with greater infertility incidence in female (18)

A study conducted by Shahzad et al. reported that infertility issue is so common that it accounts for 22 percent of the females presenting for imaging(15). A research article published by American society for reproductive medicine states that Female fertility window starts to close many years before the emergence of menopause despite stable menstrual cycles. Although there is no strict clinically defined advanced maternal age in women, rather infertility becomes more noticeable after the age of 35 (19).

A classic research report on the effect of age on female fertility found out that the proportion of women without contraception who remained without children increased gradually according to their age at wedding: 6% at 20yr to 24yr, 9% at age of 25 to 29, 15% at the age of 30 to 34, 30% from age 35 to 39 years, and 64% at the age of 40year to 44years (19) which aligns with our study. In this research studies all female patients with suspected infertility with in the age group of 14 to 55 years were included and the cases peaked at the age 30 to 35 years. As mentioned in a study conducted by sharma et al. that age is an essential factor that can affect a woman's childbearing ability. As the age of a woman increases, her chances of getting pregnant go down (23).

A study conducted by Wu et al. assessed the prevalence of hypertension in polycystic ovarian syndrome patients and concluded that the co-occurring conditions of diabetes mellitus and hyperlipidemia in PCOS patients and can increase the risk of hypertension. An earlier diagnosis for hypertension and co-occurring in PCOS patients may be indicated, even in young females (21). In this research studies out of 234 cases 83 (35.5%) have hypertension and 151 (64.5%) were normal. A study conducted by Sharma et al. stated that infertility is most commonly caused by polycystic ovarian syndrome (23)in this study Out of total 234 cases n=34 (14.5%) were polycystic ovaries which make it the second leading cause of infertility among the women of Peshawar.

A research studies published in international journal of pharmaceutical sciences and research stated that About 40% of female reproductive problems are related to ovulation problems such as irregular menstrual period or falling to ovulate at all (23) while in this research studies n=16 instances 6.8% of female infertile documented cases were because of ovulation disorders.

A review article published in IJOPSR stated that endometriosis mainly affects females in their mid-30s and about 40% of infertile females have endometriosis. endometriosis is when the lining of uterus is also found outside the uterus. It lead to some problems while conceiving. The main reason of infertility because of endometriosis seem to be adhesions and scarring that cause blockage(23). While the incidence of endometriosis recorded in our research studies is 6.8% (n=16). A study conducted by Shahzad et al. stated that the infertility is most commonly caused by sub mucosal fibroid (33.3%)(24) and these results are consistent with our findings where uterine fibroid is presented to be the most common cause contributing to infertility with instance of 19.7% (n=46). Another study conducted

by Saleem et al. states that many studies reveal that the age at time of marriage is an important factor which affects the fertility rate. A decline in fertility rate has been observed in the individuals that marry at higher age. Reproductive system gets affected due to late marriages, decreasing reproductive ability to produce eggs that can lead to barrenness (20), which align with our results. Out of 234 documented suspected infertile patients n=122 (52.1%) had active lifestyle while remaining n=112 (47.9%) had sedentary lifestyle which the females with active lifestyle more susceptible to infertility.

Similarly our study resulted in uterine fibroids (19.7%) being the most common cause of female infertility and others including polycystic ovaries(14.5%), ovulation disorders(6.8%), endometriosis (6.8%), uterine cyst(6%), premature ovarian follicle(2.1%), pelvic inflammatory disease (2%) and others. While the most significant risk factor affecting infertility was obesity (54.7%).

Conclusion

The most common cause of female infertility as observed on ultrasonography is uterine fibroids while poly cystic ovaries were the second leading cause contributing to female infertility. Other being less common causes including ovulation disorders, premature ovarian follicle, endometriosis, uterine cyst, pelvic inflammatory disease and blocked or damaged fallopian tubes. Obesity/ overweight, hypertension, late marriages were common risk factors related with female infertility. Ultrasound play an important and essential role in evaluating the cause the female infertility and it also helps in treatment and follow up. Diagnosing the cause of female infertility is very important to proceed with further treatment plan while considering the awareness of infertility risk factors to general public can help to reduce the chances of female infertility.

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Conflict of Interest:

The authors have declared no conflict of interest.

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Data availability:

the data that support the findings of this study are available upon reasonable request to the corresponding author.

REFERENCES

1. Gnoth C, Godehardt E, Frank-Herrmann P, Friol K, Tigges J, Freundl G. Definition and prevalence of subfertility and infertility. Hum Reprod. 2005 May 1;20(5):1144–7.
2. Jiao SY, Yang YH, Chen SR. Molecular genetics of infertility: loss-of-function mutations in humans and corresponding knockout/mutated mice. Hum Reprod Update. 2021 Jan 4;27(1):154–89.
3. infertility-in-women-classification-symptoms causes-and-factors-recommendations-for-women (1).pdf.
4. Mustafa M, Hadi J, IIIzam E, Aliya S. Male and Female Infertility: Causes, And Management.
5. world wide prevalance and risk factors of infertility.pdf.
6. introduction infertility in history.pdf.
7. Sharma S, Khinchi MP, Sharma N, Agrawal D, Gupta MK. FEMALE INFERTILITY: AN OVERVIEW. Int J Pharm Sci Res.
8. Ateeb M, Asif M, Junaid M, Zakki SA. Prevalence and Determinants of Female Infertility in Rahim Yar Khan, Pakistan: A Case-Control Study. 2023;1(2)
9. Loughran T, Davis G. Introduction: Infertility in History: Approaches, Contexts and Perspectives. In: Davis G, Loughran T, editors. The Palgrave Handbook of Infertility in History [Internet]. London: Palgrave Macmillan UK; 2017 [cited 2024 Nov 1]. p. 1–25. Available from: http://link.springer.com/10.1057/978-1-137-52080-7_1
10. Derchi LE, Serafini G, Gandolfo N, Gandolfo NG, Martinoli C. Ultrasound in gynecology. Eur Radiol. 2001 Nov;11(11):2137–55.
11. Moridi A, Roozbeh N, Yaghoobi H, Soltani S, Dashti S, Shahrahmani N, et al. Etiology

and Risk Factors Associated With Infertility. Int J Womens Health Reprod Sci. 2019 Mar 10;7(3):346–53.
12. Abrao MS, Muzii L, Marana R. Anatomical causes of female infertility and their management. Int J Gynecol Obstet [Internet]. 2013 Dec [cited 2024 Nov 2];123(S2). Available from: https://obgyn.onlinelibrary.wiley.com/doi/10.1016/j.ijgo.2013.09.008
13. Kelly-Weeder S, Cox CL. The Impact of Lifestyle Risk Factors on Female Infertility. Women Health. 2007 Mar 26;44(4):1–23.
14. Irani S, Ahmadi F, Javam M. Evaluation of the uterine causes of female infertility by ultrasound: A literature review. J Midwifery Reprod Health [Internet]. 2017 Feb [cited 2024 Aug 28];(Online First). Available from: https://doi.org/10.22038/jmrh.2017.8252
15. Shahzad H, John A, Ali A, Ashraf A, Ahmad Naeem M. Incidence of infertility in females and Evaluation of its Causes Using Ultrasonography: Incidence and Causes of Infertility in Females. Pak Biomed J [Internet]. 2022 Apr 30 [cited 2024 Oct 23]; Available from: https://pakistanbmj.com/journal/index.php/pbmj/article/view/342
16. Jabeen F, Khadija S, Daud S. Prevalence of Primary and Secondary Infertility. Saudi J Med. 2022 Jan 17;7(1):22–8.
17. TYPE 1 DIABETES AND INFERTILITY ASSOCIATION.pdf.
18. female infertility (diabetes, obesity etc).pdf.
19. Aging and infertility in women. Fertil Steril. 2006 Nov;86(5):S248–52.
20. Saleem H, Chaudhry DAG, Jabbar A, Mishal S. LATE MARRIAGES AND INFERTILITY: AN ANTHROPOLOGICAL ANALYSIS ON HEALTH.
21. Wu CH, Chiu LT, Chang YJ, Lee CI, Lee MS, Lee TH, et al. Hypertension Risk in Young Women With Polycystic Ovary Syndrome: A Nationwide Population-Based Cohort Study. Front Med. 2020 Sep 23;7:574651.
22. Mohammed A. Ali, M.D. MSE M Sc;, N. Keriakos, M.D. N. Ultrasound Role in Management of Female Infertility. Med J Cairo Univ. 2020 Sep 1;88(12):1523–30.
23. Sharma S, Khinchi MP, Sharma N, Agrawal D, Gupta MK. FEMALE INFERTILITY: AN OVERVIEW. Int J Pharm Sci Res.
24. Shah N, Ursani TJ, Shah NA, Jahejo N. Assessment of infertility with related metabolic complications reported among the women of urban and Peri urban localities of Sindh, Pakistan.

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