Section: Miscellaneous

Original Research Article

INCIDENCE AND FACTORS ASSOCIATED WITH ANOVULATORY INFERTILITY IN REPRODUCTIVE-AGE WOMEN AT A TERTIARY CARE HOSPITAL IN EASTERN INDIA

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ABSTRACT

Background: Infertility, defined as the inability to conceive after 12 months of regular, unprotected intercourse, is a growing global health concern, with ovulatory disorders accounting for a significant proportion of female infertility cases. This study aims to evaluate the incidence and contributing factors of anovulatory infertility among women attending a tertiary care hospital in Eastern India.

Material and Methods: This cross-sectional study was conducted over a year, including 100 women unable to conceive after a year of unprotected intercourse. Participants underwent clinical evaluations, including history-taking, physical examinations, and various laboratory tests. Causes of anovulatory infertility were classified based on clinical and laboratory findings.

Results: Among the 150 women analyzed, 38 (25.3%) were diagnosed with anovulatory infertility. The mean age of these patients was 29.01±2.89 years. The predominant cause of anovulation was Polycystic Ovary Syndrome (PCOS) (64.7%), followed by hyperprolactinemia (14.2%) and hypothyroidism (7.2%). Secondary anovulation associated with obesity was observed in 13.9% of cases. Hormonal analysis revealed mean FSH levels of 6.5±1.76 IU/mL, LH at 5.91±1.69 IU/mL, and AMH at 7.01±1.99 ng/mL.

Discussion: The study highlighted PCOS as the leading cause of anovulatory infertility, consistent with global and regional trends. The findings emphasize the importance of early identification and management of risk factors like obesity and hormonal imbalances to improve fertility outcomes.

Conclusion: Anovulatory infertility remains a significant challenge, predominantly driven by PCOS in this cohort. Addressing modifiable risk factors can potentially reduce the incidence of this condition.

Keywords: Anovulatory infertility, Polycystic Ovary Syndrome, Ovulatory disorders, Reproductive health, Hormonal imbalance, Eastern India.

INTRODUCTION

Infertility is characterized by the inability to achieve pregnancy after 12 months of regular, unprotected sexual intercourse. This condition represents a significant global concern, with its prevalence reportedly rising over the years.[1] Estimates suggest that approximately 7 million individuals aged between 15 and 44 have sought infertility services at some point.[2] According to a recent report by the World Health Organization (WHO), the lifetime prevalence of infertility stands at around 17.5%.[3] However, this figure may be significantly underestimated, as it primarily considers married couples.[4] Infertility can stem from male factors, female factors, or a combination of both. The WHO

classifies infertility due to ovulatory disorders into three categories: hypothalamic-pituitary failure (10.0%), dysfunction of the hypothalamic-pituitary-ovarian axis (85.0%), and ovarian failure (5.0%).[5] Ovulatory disorders account for approximately a quarter of female infertility cases seen in gynecology and obstetrics practices.

Anovulation, a condition where no oocyte is released from the ovaries, leads to infertility because no fertilization can occur in the absence of an oocyte.[6] The causes of anovulation are diverse. Primary anovulation in women of reproductive age may result from conditions like polycystic ovarian syndrome (PCOS), congenital anomalies, hormonal imbalances involving follicle-stimulating hormone (FSH), luteinizing hormone (LH), and anti-Müllerian hormone (AMH), or metabolic diseases such as hypo- or hyperthyroidism and hyperprolactinemia.[7] Secondary anovulatory infertility can arise due to factors like advancing age, physical and psychological stress, increased body mass index (BMI), and certain medications, including antipsychotics and hormonal contraceptives.[8]

Although various methods exist to assess ovulation or its absence in infertile women, each method has limitations. Additionally, the distribution and clinical characteristics of anovulatory infertility causes can vary regionally due to differences in geographical and demographic factors.

This study aimed to evaluate the incidence and contributing factors of anovulatory infertility in reproductive-age women attending the Department of Obstetrics and Gynecology at a tertiary care hospital in Eastern India.

Objectives: The primary objective was to assess the incidence and factors linked to anovulatory infertility in reproductive-age women.

MATERIALS AND METHODS

This observational cross-sectional study was conducted at the Department of Obstetrics and Gynecology, a tertiary care hospital in Berhampur, Odisha, over a year from September 2020 to August 2022. A consecutive sampling technique was used to include 100 women who had been unable to conceive after a year of regular, unprotected intercourse. The sample size was calculated based on a review of past records, which indicated an average of 5.1±0.2 women per month presenting with infertility over the previous two years.

Exclusion criteria encompassed pregnant women, those with chronic liver or kidney diseases, other gynecological issues, active tuberculosis, and those unwilling to provide informed consent. After obtaining written consent, participants underwent a thorough clinical evaluation, including detailed history-taking, general, systemic, and local examinations. Investigations such as complete hemograms, hormonal assays, and endometrial biopsies were performed. Cervical mucus samples were collected during the post-ovulatory period of the menstrual cycle to check for the presence of ferning patterns. Based on clinical assessments and laboratory findings, the causes and nature (primary or secondary) of infertility were diagnosed. Patient anonymity and data confidentiality were strictly maintained.

RESULTS

Among the 150 patients analyzed in this study, 38 were diagnosed with anovulatory infertility. The mean age of these patients was 29.01±2.89 years, while the average age of their husbands or partners was 31.91±2.06 years. The patients had been attempting to conceive through unprotected intercourse for an average duration of 3.99±1.34 years without success. According to the modified Kuppuswamy scale for assessing socioeconomic status in India, most participants (51%) belonged to the upper socioeconomic class. The mean weight of the patients was 54.87±5.44 kg, and their mean BMI was 21.96±2.19 kg/m². [Table 1]

In terms of presenting signs and symptoms, the majority of the patients exhibited normal menstruation. However, oligomenorrhea was the next most common symptom, affecting 44.4% of the patients, while 3.9% experienced amenorrhea. A significant proportion (80.3%) of the participants showed signs of hirsutism. The mean hormonal levels observed among the patients were as follows: FSH at 6.5±1.76 IU/mL, LH at 5.91±1.69 IU/mL, estradiol at 46.00±7.1 pg/mL, AMH at 7.01±1.99 ng/mL, total cholesterol at 75.86±17.02 mg/dL, TSH at 2.59±0.86 mIU/L, and prolactin at 16.01±5.21 ng/mL. [Table 2]

When investigating the underlying causes of anovulatory infertility, it was found that 85.3% of the women had primary infertility, with the remaining cases being secondary infertility. The predominant cause of anovulation was Polycystic Ovary Syndrome (PCOS), which was present in 64.7% of the participants. Following this, hyperprolactinemia was identified in 14.2% of the cases, and hypothyroidism in 7.2%. Additionally, secondary anovulation associated with obesity was observed in 13.9% of the patients. [Figure 1]

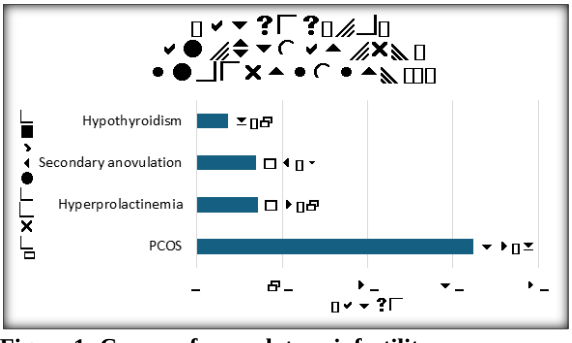

Figure 1: Causes of anovulatory infertility

Table 1: Sociodemographic characteristics of the study participants (n=38)

Parameters	Mean/ frequency	SD/ percentage
Age (years)	29.01	2.89
Age of husband (years)	31.91	2.06
Years of unprotected intercourse (years)	3.99	1.34
Socioeconomic status		
• Upper	10	49
• Upper middle	7	35.3
• Lower middle	2	12.4
• Weight (kg)	54.87	5.44
• BMI (kg/m2)	21.96	2.19

Table 2: Clinical and laboratory findings of the study participants (n=38)

Parameters	Mean/frequency	SD/percentage
Menstrual history		
Oligomenorrhoea	11	44.4
Amenorrhea	1	3.9
Normal	10	49
Hirsutism	19	80.3
FSH	6.5	1.76
LH	5.91	1.69
Estradiol	46	7.1
AMH	7.01	1.99
Total cholesterol	75.86	17.02
TSH	2.59	0.86
Prolactin	16.01	5.21

DISCUSSION

Infertility is a significant reproductive health issue globally, with a rising trend that is particularly alarming in developing countries. It is estimated that about 25% of infertility cases attributed to female causes are due to ovulatory dysfunctions, with anovulation being a critical subset.[2] In this study, we assessed the incidence and factors associated with anovulatory infertility among 150 consecutively selected women of reproductive age presenting with infertility complaints. The incidence of anovulatory infertility was found to be 23%, which is lower than the 35.9% reported by Bhandoria and Rudra.[9] However, Singangutti reported a similar incidence of 22%.[10] These findings are consistent with those of Bhoyar et al. in their related research.[11]

Most participants in this study were aged between 26 and 30 years, comparable to the age distribution reported by Singangutti and Fitzgerald et al.[10,12] The mean age of participants (29.01±2.89 years) aligned closely with findings by Ali et al,[13] indicating that the age profile of anovulatory infertility in this population mirrors global trends. Interestingly, most participants were from upper and upper-middle socioeconomic classes, contrasting with findings by Singangutti and Ali et al., who observed higher infertility rates in poorer socioeconomic groups.[10,13] This disparity may stem from lifestyle factors prevalent in higher socioeconomic classes that increase the risk of anovulatory conditions, as supported by Prasad et al. and Mohan et al.[14,15] Moreover, the higher obesity rates in upper socioeconomic groups, as documented in previous studies, likely contribute to an increased risk of anovulatory infertility.

The average BMI of participants (21.96±2.19 kg/m²) reflected the higher end of the spectrum, similar to findings by Sudha and Reddy, and Fichman et al.[16,17] Given that obesity is a modifiable risk factor, interventions targeting weight control could significantly reduce anovulation rates in this population.

Among the 38 patients with anovulatory infertility, 51% had a normal menstrual history, while the majority of those with menstrual irregularities presented with oligomenorrhea. Although polymenorrhea is linked to anovulatory infertility by some studies, most research, including this one, associates it more frequently with oligomenorrhea or amenorrhea.[10,18] The high prevalence of hirsutism among participants was attributed to the widespread occurrence of PCOS, a condition where hirsutism is a common symptom. PCOS emerged as the leading cause of anovulation, followed by hyperprolactinemia and obesity-related secondary anovulation, corroborating findings from Elhussein et al. and Sudha and Reddy.[16,19]

Thyroid dysfunction and hyperprolactinemia have been identified as significant contributors to anovulatory infertility by Bhandoria and Rudra, and Singangutti.[9,10] The study found that 14.1% of participants had obesity-related secondary infertility, underscoring the importance of managing BMI to mitigate infertility risks. Hormonal profiles, including FSH (6.5±1.76 IU/mL), LH (5.91±1.69 IU/mL), estradiol (46.00±7.1 pg/mL), and AMH (7.01±1.99 ng/mL), did not show substantial deviations in anovulatory infertility cases. FSH and LH levels aligned with Bhandoria and Rudra's findings, while AMH levels were lower than those reported by Gupta et al.[20] Estradiol levels were elevated compared to baseline norms, similar to observations by Pajai et al.[21]

Although obesity and hypothyroidism were prevalent among the study participants, total cholesterol and TSH levels remained within normal limits, diverging from findings by Bhandoria and Rudra, and Singangutti.[9,10] This may be due to the high proportion of participants with PCOS, aligning with Gupta et al.'s research on PCOS-related anovulation.[20]

CONCLUSION

This study highlights the significant prevalence of anovulatory infertility among reproductive-age women, with PCOS emerging as the leading cause. The findings underscore the critical role of early diagnosis and targeted management of risk factors, such as obesity and hormonal imbalances, to enhance fertility outcomes. The hormonal profiles of the participants largely align with existing literature, supporting the need for comprehensive clinical evaluations in managing anovulatory infertility. Addressing modifiable factors and increasing awareness about ovulatory disorders can potentially reduce the burden of infertility, particularly in regions with rising prevalence.

REFERENCES

1. Petraglia F, Serour GI, Chapron C. The changing prevalence of infertility. Int J Gynecol Obstet. 2013;123(Suppl 2): S4-8.
2. Chandra A, Copen CE, Stephen EH. Infertility service use in the United States: Data from the National Survey of Family Growth, 1982-2010. Natl Health Stat Report. 2014;(73):1-21.
3. Oakley L, Doyle P, Maconochie N. Lifetime prevalence of infertility and infertility treatment in the UK: Results from a population-based survey of reproduction. Hum Reprod. 2008;23(2):447-50.
4. Bushnik T, Cook JL, Yuzpe AA, Tough S, Collins J. Estimating the prevalence of infertility in Canada. Hum Reprod. 2012;27(3):738-46.
5. Sanad ZF, Kalil NA, Beddah ES. Infertility and related risk factors among women attending rural family health facilities in Menoufia Governorate. Menoufia Med J. 2019;32(4):1365-1371.
6. McLaren JF. Infertility evaluation. Obstet Gynecol Clin North Am. 2012;39(4):453-63.
7. Li RH, Ng EH. Management of anovulatory infertility. Best Pract Res Clin Obstet Gynaecol. 2012;26(6):757-68.
8. Van der Spuy ZM, Dyer SJ. The pathogenesis of infertility and early pregnancy loss in polycystic ovary syndrome. Best Pract Res Clin Obstet Gynaecol. 2004;18(5):755-71.
9. Bhandoria G, Rudra S. Anovulatory infertility: A prospective study. Int J Infertil Fetal Med. 2013;4(1):18-23.
10. Singangutti R. Incidence and etiologic factors responsible for anovulation in infertility cases. Int J Reprod Contracept Obstet Gynecol. 2018;7(4):1568-1572.
11. Bhoyar R, Rathi S, Mishra S, Kotpalliwar S. Screening for thyroid disorders in infertile women. Int J Clin Obstet Gynaecol. 2020;4(2):209-211.
12. Fitzgerald C, Zimon AE, Jones EE. Aging and reproductive potential in women. Yale J Biol Med. 1998;71(5):367-381.
13. Ali MM, Ghazi W, Abboud AH. Prevalence of anovulation in subfertile women in Kerbala 2012, a descriptive cross-sectional study. Al-Kufa Univ J Biol. 2014;6(2):1-6.
14. Prasad DS, Kabir Z, Dash AK, Das BC. Prevalence and risk factors for metabolic syndrome in Asian Indians: A community study from urban Eastern India. J Cardiovasc Dis Res. 2012;3(3):204-11.
15. Mohan V, Shanthirani S, Deepa R, Premalatha G, Sastry NG, Saroja R. Intra-urban differences in the prevalence of the metabolic syndrome in southern India-the Chennai Urban Population Study (CUPS No. 4). Diabet Med. 2001;18(4):280-7.
16. Sudha G, Reddy KS. Causes of female infertility: A cross-sectional study. Int J Latest Res Sci Technol. 2013;2(6):119-23.
17. Fichman V, Costa RD, Miglioli TC, Marinheiro LP. Association of obesity and anovulatory infertility. Einstein (Sao Paulo). 2020;18: eAO5150.
18. Khan A, Karim N, Ainuddin JA, Fahim MF. Polycystic ovarian syndrome: Correlation between clinical hyperandrogenism, anthropometric, metabolic and endocrine parameters. Pak J Med Sci. 2019;35(5):1227-32.
19. Elhussein OG, Ahmed MA, Suliman SO, Adam I. Epidemiology of infertility and characteristics of infertile couples requesting assisted reproduction in a low-resource setting in Africa, Sudan. Fertil Res Pract. 2019;5(1):7.
20. Gupta S, Goldberg JM, Aziz N, Goldberg E, Krajcir N, Agarwal A. Pathogenic mechanisms in endometriosis-associated infertility. Fertil Steril. 2008;90(2):247-57.
21. Pajai S, Potdar J, Gopal U, Banait T, Gopal KU. A review on the use of letrozole in female and male infertility. Cureus. 2022;14(11): e31291.