

INCIDENCE, SOCIODEMOGRAPHIC, AND CLINICAL CHARACTERISTICS OF ANOVULATORY INFERTILITY AMONG WOMEN PRESENTING TO A SECONDARY CARE HOSPITAL OF NORTH INDIA

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ABSTRACT

Objectives: The objective of the study was to assess the incidence and factors associated with anovulatory infertility among reproductive-age women.

Infertility is a global problem, which, worryingly, has seen an increasing rate of incidence over the years. The present study was conducted to assess the incidence and factors associated with anovulatory infertility among reproductive-age women presenting to the Department of Obstetrics and Gynecology of a secondary care hospital of North India.

Methods: The study was an observational cross-sectional study conducted in the Department of Obstetrics and Gynecology of a secondary care hospital of Prayagraj, Uttar Pradesh over a period of 20 months, from October 2020 to May 2022. A consecutive sampling method was used to recruit a total of 100 women presenting with a complaint of inability to conceive even after regular intercourse over the past 1 year into the present research. Based on the detailed physical and clinical examination as well as laboratory findings, the final diagnosis of the cause and the nature of the infertility (primary/secondary) were established.

Results: Among the 100 patients, 22 were found to have anovulatory infertility. The mean age was 28.68±3.71 years. Majority (50%) belonged to the upper socioeconomic class the mean weight of patients was 55.91±5.66 kg and the mean body mass index was 22.85±2.21 kg/m². Majority presented with normal menstruation, followed by oligomenorrhoea (45.5%). 81.8% of the participants had hirsutism. The mean follicle-stimulating hormone of patients was 6.30±1.87 IU/mL, the mean luteinizing hormone was 6.04±1.83 IU/mL, mean estradiol was 45.00±6.50 pg/mL, mean anti-mullerian hormone was 6.94±2.13 ng/mL, mean total cholesterol was 76.21±16.86 ng/dL, mean thyroid stimulating hormone was 2.63±0.98 mIU/L and mean prolactin was 15.94±4.94 ng/mL. About 86.4% had primary infertility, the most common cause being polycystic ovarian syndrome (PCOS, 63.6%). This was followed by hyperprolactinemia (13.6%) and hypothyroidism (9.2%). Secondary anovulation associated with obesity was identified in 13.6% of the patients.

Conclusion: The incidence of anovulatory infertility was 22%, with the majority being primary infertility due to PCOS, followed by hyperprolactinemia, and hypothyroidism.

Keywords: Infertility, Polycystic ovarian syndrome, Hyperprolactinemia, Hypothyroidism, Anovulation.

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INTRODUCTION

Infertility is the inability to become pregnant after 12 months of regular and unprotected intercourse. Infertility is a global problem, which, worryingly, has seen an increasing rate of incidence over the years [1]. It has been estimated that among couples of 15–44 years of age, about 7 million have used infertility services at some point [2]. A recent the World Health Organization (WHO) report estimated a lifetime prevalence of 17.5% of infertility [3]. However, the actual numbers might be grossly underestimated, as most of these estimates only include married couples [4]. Infertility might arise from the male factors, female factors, or the combination of these. The WHO categorizes infertility due to ovulatory disorders in three groups: Hypothalamic pituitary failure (10.0%), dysfunction of the hypothalamic-pituitary ovarian axis (85.0%), and ovarian failure (5.0%) [5]. Ovulatory disorders make up to a quarter of all female infertility encountered in general gynecology and obstetrics practice. Infertility resulting from anovulation occurs due to no oocyte being released from the ovaries, whose absence means no chances of fertilization and therefore pregnancy [6]. Anovulatory infertility

can result from a host of different causes. Primary anovulation in reproductive age women can result from conditions such as polycystic ovarian syndrome (PCOS), congenital abnormalities, imbalances of circulating hormones such as follicle stimulating hormone (FSH), luteinizing hormone (LH), and anti-mullerian hormone (AMH) or as a result of metabolic diseases such as hypo- and hyperthyroidism, and hyperprolactinemia [7]. Secondary anovulatory infertility in women has also been reported, resulting from increased age, physical and psychological stress, increased body mass index (BMI) (obesity), and that associated with medications such as anti-psychotics and hormonal contraceptives [8]. While several methods are available for the assessment of ovulation or the lack of it in a woman suffering from infertility, there are pitfalls to each method. Furthermore, the distribution patterns of each of the causes of anovulatory infertility and their clinical characteristics differ between different regions due to their different geographical and demographic characteristics.

The present study was conducted to assess the incidence and factors associated with anovulatory infertility among reproductive-age women

presenting to the Department of Obstetrics and Gynecology of a secondary care hospital of North India.

Objectives

The objective of the study was to assess the incidence and factors associated with anovulatory infertility among reproductive-age women.

METHODS

The study was an observational cross-sectional study conducted in the Department of Obstetrics and Gynecology of a secondary care hospital of Prayagraj, Uttar Pradesh over a period of 20 months, from October 2020 to May 2022. A consecutive sampling method was used to recruit a total of 100 women presenting with a complaint of inability to conceive even after regular intercourse over the last 1 year into the present research. The sample size was calculated based on previous records review that showed that on an average, 4.8 ± 0.3 women presented to the study institution with a complaint of inability to conceive per month over the past 2 years. All pregnant women, women with chronic liver or kidney diseases, other gynecological problems, those with active tuberculosis, and those not willing to provide written informed consent were excluded from the study. After obtaining written informed consent, the recruited women underwent detailed clinical examination, where a detailed history of patients by general, systemic, and local examination was taken. A complete hemogram, hormonal assay, and endometrial biopsy were conducted. Samples of cervical mucus were collected during the selection period of the menstrual cycle, that is, in post-ovulatory period to see the ferning is appearing or not appearing. Based on the physical and clinical examination as well as laboratory findings, the final diagnosis of the cause and the nature of the infertility (primary/secondary) were established. Proper ethical clearance was obtained from the Institutional Ethics Committee of the study institution before starting the study. The anonymity and confidentiality of the patient details were ensured.

OBSERVATION AND RESULTS

Among the 100 patients studied, 22 were found to have anovulatory infertility. Of them, the mean age was 28.68 ± 3.71 years. The mean age of husbands/partners of the patients was 32.00 ± 2.20 years. The participants reported to have been engaged in unprotected intercourse without success for an average of 4.07 ± 1.21 years. Of the participants, the majority (50%) belonged to the upper socioeconomic class as per the modified Kuppuswamy scale for the estimation of socioeconomic status among Indians. The mean weight of patients was 55.91 ± 5.66 kg and the mean BMI was 22.85 ± 2.21 kg/m² (Table 1).

Regarding the presenting signs and symptoms, it was seen that the majority of the patients presented with normal menstruation, while oligomenorrhoea was the next most common presentation (45.5%). Amenorrhoea was present in 4.5% of the patients. 81.8% of the participants had hirsutism. The mean FSH of patients was 6.30 ± 1.87 IU/mL, mean LH was 6.04 ± 1.83 IU/mL, mean estradiol was 45.00 ± 6.50 pg/mL, mean AMH was 6.94 ± 2.13 ng/mL, mean total cholesterol was 76.21 ± 16.86 ng/dL, mean TSH was 2.63 ± 0.98 mIU/L and mean prolactin was 15.94 ± 4.94 ng/mL (Table 2).

Regarding the cause of anovulatory infertility among the women, it was seen that 86.4% had primary infertility, while the rest had secondary infertility. The most common cause of anovulation was identified as PCOS, present in 63.6% of the participants. This was followed by hyperprolactinemia (13.6%) and hypothyroidism (9.2%). Secondary anovulation associated with obesity was identified in 13.6% of the patients (Fig. 1).

DISCUSSION

Infertility is one of the major reproductive problems globally, showing an alarming increasing trend, especially in the developing countries. It has been estimated that about a quarter of all infertility due to

Table 1: Sociodemographic characteristics of the study participants (n=22)

Parameters	Mean/ frequency	SD/ percentage
Age (years)	28.68	3.71
Age of husband (years)	32.00	2.20
Years of unprotected intercourse (years)	4.07	1.21
Socioeconomic status		
Upper	11	50
Upper middle	8	36.4
Lower middle	3	13.6
Weight (kg)	55.91	5.66
BMI (kg/m ²)	22.85	2.21

BMI: Body mass index

Table 2: Clinical and laboratory findings of the study participants (n=22)

Parameters	Mean/frequency	SD/percentage
Menstrual history		
Oligomenorrhoea	10	45.5
Amenorrhoea	1	4.5
Normal	11	50
Hirsutism	18	81.2
FSH	6.30	1.87
LH	6.04	1.83
Estradiol	45.00	6.50
AMH	6.94	2.13
Total cholesterol	76.21	16.86
TSH	2.63	0.98
Prolactin	15.94	4.94

FSH: Follicle stimulating hormone, LH: Luteinizing hormone, AMH: Anti-mullerian hormone, TSH: Thyroid stimulating hormone

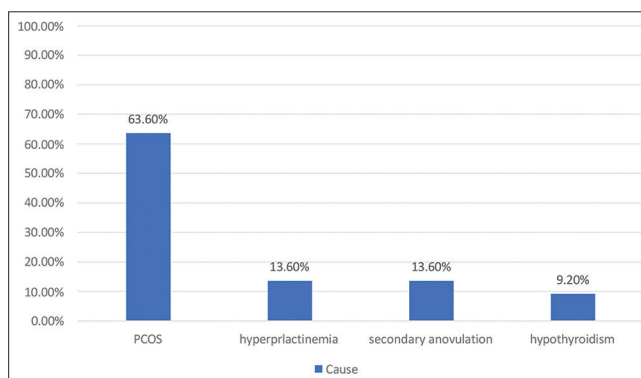


Fig. 1: Causes of anovulatory infertility in the participants (n=22)

female causes are due to ovulatory dysfunctions, of which, anovulation forms an important subset [2]. In the present study, the incidence of anovulatory infertility and the factors related to it were assessed among 100 consecutively selected women of reproductive age presenting to the study institution with a complaint of infertility. The incidence of anovulatory infertility was observed to be 22%. This is lower than the 35.9% incidence reported by Bhandoria and Rudra in their study [9]. However, in their study, Singangutti also reported a 22% incidence of anovulatory infertility [10]. The findings of the present study are also similar to that reported by Bhoyar *et al.* in their study on the topic [11]. It was seen that the majority of the participants belonged to the age group of 26–30 years, similar to that reported by authors such as Singangutti and Fitzgerald *et al.* [10,12]. The mean age of the study participants (28.68 ± 3.71 years) was also similar to that reported by Ali *et al.* [13]. These findings indicate that the age distribution of anovulatory infertility among the study participants was similar to that in other

parts of the world. In the present study, the majority of the patients were found to be from the upper and upper middle socioeconomic classes, different from what has been reported by Singangutti and Ali *et al.*, who observed that most of the patients with anovulatory infertility were from the poorer socioeconomic classes [10,13]. This difference in the presentation might be due to the fact that women from upper socioeconomic classes in the study population have lifestyles that predispose them to developing conditions that can lead to anovulatory infertility. This assertion has been supported by the findings of authors such as Prasad *et al.*, and Mohan *et al.* [14,15]. It has also been well-established that people from upper socioeconomic classes are at a higher risk of developing obesity than their counterparts. Since obesity is an important risk factor for anovulatory infertility, it was expected that the average BMI of the participants would be on the higher end of the spectrum, which was seen to be the case ($22.85 \pm 2.21 \text{ kg/m}^2$), a finding which was similar to that reported by Sudha and Reddy, Fichman *et al.* in their studies [16,17]. Since obesity is an important modifiable risk factor, it can be stated that strategies aimed at weight control can have an important impact in lessening the burden of anovulation in the study population. Out of a total of 22 patients, 50% patients had normal menstrual history. Of the rest, the majority (10/11) had oligomenorrhea. While polymenorrhea has been reported to be associated with anovulatory infertility by studies conducted by authors like Singangutti and Khan *et al.*, most research on the topic has observed that anovulatory infertility is associated with oligomenorrhea or amenorrhea, which is similar to what was seen in the present study [10,18]. Hirsutism was also present in the most of the study participants. This is due to the high prevalence of PCOS among them, of which hirsutism is an important manifestation. It was observed that the most common cause of anovulation in the present study was PCOS, followed by hyperprolactinemia and secondary anovulation associated with obesity. These observations mirror that reported by other authors exploring the epidemiology of anovulatory infertility among women. In their study, Elhussein *et al.* also reported that the majority of women with anovulatory infertility had PCOS [19]. Similar observations have also been made by Sudha and Reddy in their research on the topic [16]. Hypothyroidism and hyperprolactinemia have been identified as important causes of anovulatory infertility by Bhandoria and Rudra as well as Singangutti [9,10]. An increased BMI has been established as an important risk factor for the development of secondary infertility. The findings of the study conform to this assessment also, as it was found that 13.6% of the participants had anovulatory infertility secondary to obesity. It has been long established that female reproductive hormones, that is, FSH, LH, AMH, and prolactin have important roles to play in the process of ovulation. The current study noted that the mean FSH ($6.30 \pm 1.87 \text{ IU/mL}$), LH ($6.04 \pm 1.83 \text{ IU/mL}$), estradiol ($45.00 \pm 6.50 \text{ pg/mL}$), and AMH ($6.94 \pm 2.13 \text{ ng/mL}$), were not substantially altered in patients of anovulatory infertility. FSH and LH levels observed in the present study were similar to that reported by Bhandoria and Rudra in their study. The AMH levels of the participants were found to be lower than that reported by Gupta *et al.* in their research on anovulation in Indian women [20]. The estradiol levels were found to be higher than the recommended baseline among the participants of the present study, similar to that reported by Pajai *et al.*, who also found that the levels of the hormone were increased in patients with anovulatory infertility [21]. Since both obesity, as well as hypothyroidism, were observed to be important diagnoses for anovulation in the present study, it was expected that the levels of total cholesterol and thyroid stimulating hormone (TSH) would be higher in the study participants. However, it was not observed to be the case, as the levels of total cholesterol as well as TSH were found to be within normal limits for most of the study participants. Moreover, both of them were lower than that reported by other authors researching on the topic, such as Bhandoria and Rudra and Singangutti [9,10]. This discrepancy in the findings might have been due to the fact that the majority of the study participants had PCOS in the present study, which is why the findings of the study were similar to that observed by Gupta *et al.* in their research on anovulation among women with PCOS [20].

CONCLUSION

The findings of the present study showed that among reproductive-age-group women presenting to the study institution with a complaint of infertility, the incidence of anovulatory infertility was 22%, with the majority being primary infertility due to PCOS, followed by hyperprolactinemia, and hypothyroidism.

CONFLICTS OF INTEREST

None declared.

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Nil.

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