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Original Research Article

Investigation of Primary and Secondary Infertility through Different Hormonal Assays

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Abstract:

Background: Infertility is a global public health issue that affects roughly 10% to 15% of couples trying to conceive during the reproductive age. This study was designed to investigate primary and secondary infertility through different hormonal assays.

Methods: In this cross-sectional study, out of 160 cases, 104 cases of infertile females were evaluated. Demographic characteristics and various medical factors were used to determine primary and secondary infertility. Infertility cases were also studied through ultrasonography investigation and various biochemical parameters, including estimating the levels of LH, FSH, prolactin and thyroid hormones.

Results: The primary and secondary infertility rates were 80.76% and 19.24%, respectively. Maximum cases (42.3%) of infertility were in the age group of 21-25 yrs. Among the causes of primary and secondary infertility in this study, 46.2% of cases had PCOS, 19.2% had tubal block and 7.7% had hypothyroidism. The present study showed no menstrual abnormalities in 28.9% of cases. In 45.2% of cases, oligomenorrhoea cycle was observed. Among these 70% had PCOS and 19% had hypothyroidism cases with an oligomenorrhoea cycle. Ultrasonography investigation showed normal and abnormal pelvic findings in 51% and 49% of cases, respectively. Identification of various hormone levels in primary and secondary infertility cases showed increased level of serum LH in 29.8% of cases. Of 48 PCOS cases, 28 (58.3%) cases were observed with increased serum LH levels.

Conclusion: Primary and secondary infertility were caused by the interaction of numerous demographic and medical variables in the current investigation. The study found that younger individuals had a higher rate of infertility. The main cause of infertility was PCOS with elevated serum LH levels, hypothyroidism, and hyperprolactinemia.

Keywords: Primary infertility, Secondary infertility, LH, FSH, Prolactin, Thyroid hormone.

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Introduction

Infertility is a public health issue throughout reproductive age, affecting approximately 10-15% of couples attempting to conceive globally [1]. The failure to achieve a natural pregnancy after 12 months or more of regular unprotected sexual intercourse is characterised as infertility [2]. For many couples, infertility is a tragedy that leads to major physical, social, psychological, and sexual difficulties [3].

According to the World Health Organisation (WHO), primary infertility occurs when a woman has never conceived, whereas secondary infertility occurs when a couple has had at least one successful conception in the past [4]. Problems with either the male or female reproductive systems, or both can cause infertility. Several things can disrupt the reproductive process at any point. Female infertility, for example, may be caused by one or more of the following conditions: polycystic ovary syndrome [5], hormonal disorders [6], premature ovarian failure [7], genital infections [8], endometriosis [9], fallopian tube obstruction [10], congenital uterine anomalies [11], uterine synechiae [12], or other medical complications (diabetes and thyroid disorders) [13, 14].

Both primary and secondary infertility have common causes. Infertility has been more common in the recent decade. As couples have been more eager to seek medical assistance, there has been an increase in awareness of infertility. Infertility issues are frequently caused by hypothalamo-pituitary gonadal axis hormonal imbalance [15]. Therefore, we aimed to determine primary and secondary infertility through hormonal assays.

Materials and Methods

The present study was conducted in the Department of Obstetrics and Gynaecology, M.K.C.G. Medical College and Hospital, Berhampur, from 2016 to 2018. A total number of 160 cases of infertility, including

both males (56 cases) and females (104 cases) were included in the study.

After excluding male factors, primary and secondary infertility in females were distributed according to age, duration of infertility and BMI. Patients were identified for possible causes of primary and secondary infertility such as tubal block, PCOS, uterine factor, hypothyroidism, endometriosis, turner syndrome, pelvic adhesion, POF, hyperprolactinemia, cervical elongation, unexplained infertility and central causes such as hypogonadotropic and hypogonadism.

Menstrual history of patients was studied to identify normal, oligomenorrhoea, menorrhagia, hypomenorrhea, dysmenorrhoea, primary amenorrhoea and secondary amenorrhoea cycle. Ultrasonography investigation was done in both primary and secondary infertility cases to identify normal and abnormal pelvic. Infertility cases were also studied through various biochemical parameters, including estimating the levels of LH, FSH, prolactin and thyroid hormones.

Inclusion Criteria

Patients older than 20 yrs of age with associated primary and secondary infertility were included in the study.

Exclusion Criteria

Those patients who had not given their consent were excluded from the study.

Ethical Approval

The ethical committee of the Department of Obstetrics and Gynaecology, M.K.C.G. Medical College and Hospital, Berhampur, India approved the above study. Before the study, written informed consent was obtained from each patient.

Results

In the present study, 104 cases of female infertility were assessed after excluding the male factors and screening out the patient following standard investigation and several hormonal assays. Out of 104 cases, 84 cases (80.76%) were of primary and 20 (19.24%) cases were of secondary infertility.

Age distribution of patients showed 44 (42.3%) cases of primary infertility and 0 cases of secondary infertility in the age group of 21-25 yrs. In the 26-30 yrs of age group, 32 (30.76%) primary and 11(10.57%) cases of secondary infertility were observed. In contrast, 6 (5.76%) primary and 9 (8.65%) cases of secondary infertility were observed in the 31-35 yrs. Furthermore, more than 35 yrs of age group were observed with 2 (1.92%) cases of primary infertility and no secondary infertility cases (Figure 1).

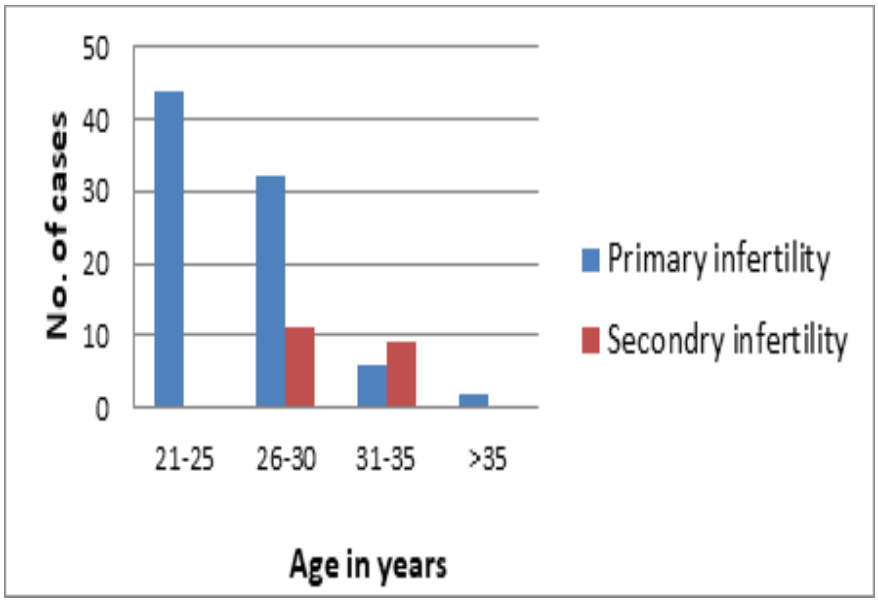

Figure 1: Age distribution of primary and secondary infertility patients

Figure 2 shows the results of primary and secondary infertility in terms of duration (in yrs). In 2-3 yrs of duration, 22 cases of primary and 4 cases of secondary infertility were observed. In contrast, 50 cases of primary and 14 cases of secondary infertility were found in 3-6 yrs. However, 6-9 yrs of duration showed 8 cases of primary and only 1 case of secondary infertility. Furthermore, in 9 or more years of duration, 4 cases of primary and 1 case of secondary infertility were observed.

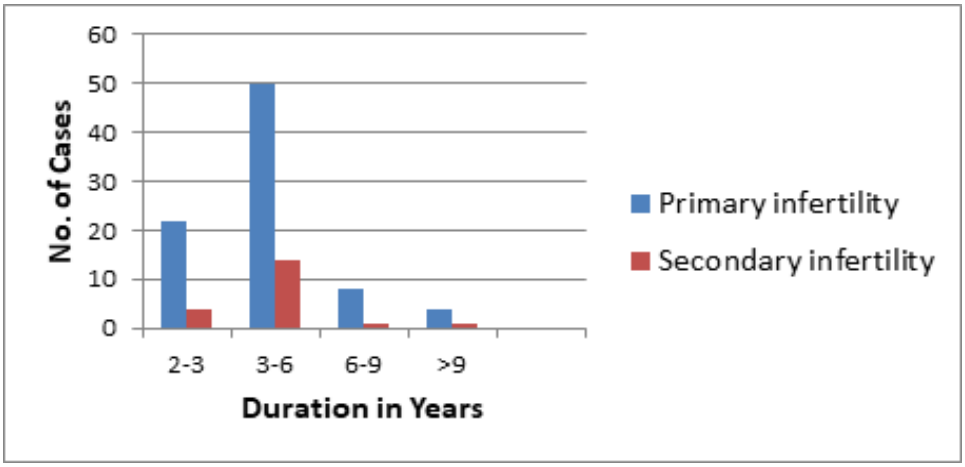

Figure 2: Duration of primary and secondary infertility

BMI associated with primary and secondary infertility showed 54 cases (51.9%), 26 cases (25%) and 24 cases (23.1%) were in the range of 23-27.5, 18.5-23, and >27.5 kg/m2 respectively (Figure 3).

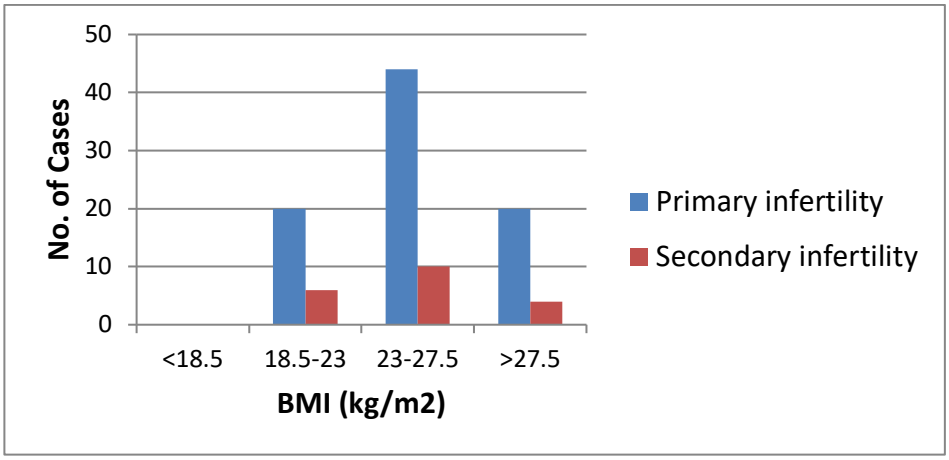

Figure 3: BMI associated with primary and secondary infertility

Causes of primary and secondary infertility observed were 48 cases (46.2%) due to PCOS, 20 cases (19.2%) due to tubal block, 8 cases (7.7%) due to hypothyroidism, 6 cases (5.8%) due to uterine myoma, 6 cases (5.8%) due to TB, 3 cases (2.9%) due to endometriosis, 2 cases (1.9%) due to Turner syndrome, 3 cases (2.9%) due to hyperpotassaemia, 1 case (0.9%) due to POF, 1 case (0.96%) due to cervical elongation, 2 case (1.9%) due to unexplained infertility and 4 cases (3.8%) due to central causes.

Menstrual history of patients showed 30 cases of normal menstrual cycle, 47 cases of oligomenorrhoea, 7 cases of menorrhagia, 5 cases of hypomenorrhea, 5 cases of dysmenorrhoea, 2 cases of primary amenorrhoea and 10 cases of secondary amenorrhoea (Figure 4).

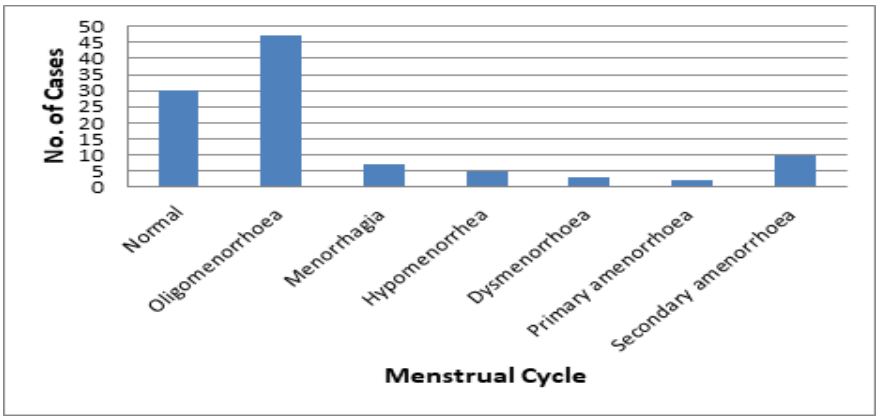

Figure 4: Menstrual cycles in patients with infertility

Results of ultrasonography (USG) showed 44 (42.3%) cases of normal and 40 (38.4%) cases of abnormal pelvic findings in primary infertility. However, secondary infertility was observed with 9 (8.7%) cases of normal and 11 (10.6%) cases of abnormal pelvic findings (Figure 5).

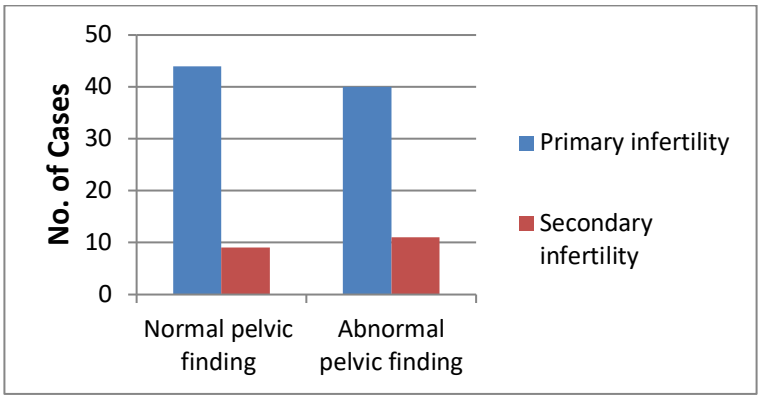

Figure 5: USG investigation of primary and secondary infertility patients

Primary and secondary infertility in patients with different causes were also studied for normal, increased and decreased levels of serum LH. Results showed, in 69 cases (66.3%), 31 cases (29.8%) and 4 cases (3.8%), there were normal, increased and decreased S. LH levels, respectively. However, evaluation of serum FSH levels showed 83 cases (79.8%), 18 cases (17.3%) and 3 cases (2.9%) associated with normal, decreased and increased levels (Table 1). Furthermore, out of 104 cases, 101 (97.1%) cases were observed with normal prolactin levels, while only 3 (2.9%) cases showed increased levels of prolactin (hyperprolactinemia) (Table 2). In addition, identification of thyroid hormone levels showed 8 cases (7.7%) associated with hypothyroidism (Table 3).

Table 1: Serum LH and FSH levels in patients with primary and secondary infertility

Causes	Primary infertility	Secondary infertility	Normal serum LH	Increased serum LH	Decrease serum LH	Normal serum FSH	In-creased serum FSH	Decrease serum FSH
Tubal block	20	--	20	-	-	20	-	-
PCOS	34	14	20	28(20+8) (26.9%)	-	34	-	14(10+4)(13.5%)
Uterine Factor (submucosal fi-broid)	6	-	6	-	-	6	-	-
Hypothyroidism	8	-	8	-	-	8	-	-
Endometriosis	3	-	3	-	-	3	-	-
Turner Syn-drome	2	-	-	2(>150 mIIU/ml (1.9%)	-	-	2(>160 mIIU/ml (1.9%)	-
Pelvic Adhesion (TB)	4	2	6	-	-	6	-	-
POF	1	-	-	1 (>30 mIIU/ml) (0.96%)	-	-	1 (>40 mIIU/ml) (0.96%)	-
Hyperprolac-tinemia	3	-	3	-	-	3	-	-
Cervical elonga-tion	1	-	1	-	-	1	-	-
Unexplained in-fertility	2	-	2	-	-	2	-	-
Central causes (hypogonado-tropic hy-pogonadism)	-	4	-	-	4 (3.8%)	-	-	4 (3.8%)
Total	84	20	69 (66.3%)	31(29.8%)	4(3.8%)	83 (79.8%)	3(2.9%)	18(17.3%)

Table 2: Serum prolactin levels in patients with primary and secondary infertility

Types of infertility	Total no of cases	Normal S. Prolactin	S. Prolactin
Primary	84	81 (77.9%)	3 (2.9%)
Secondary	20	20 (19.2%)	0
Total	104	101 (97.1%)	3 (2.9%)

Table 3: Thyroid hormone levels in patients with primary and secondary infertility

Types of Infertility	No of cases	Normal TFT	Hypothyroidism (serum TSH
Primary	84	76 (73.1%)	8 (7.7%)
Secondary	20	20 (19.2%)	-
Total	104	96 (92.3%)	8 (7.7%)

Discussion

In the present study, total male infertility constituted 35% and female factor constituted 65%, out of 160 cases. After excluding the male factor, 104 cases of female infertility were evaluated in this study. Primary infertility in females constituted 80.76%, and secondary infertility constituted 19.24%. It was observed that the maximum cases (42.3%) of primary infertility were in the age group of 21-25 yrs, while secondary infertility cases (10.5%) were in between 26-30 yrs. of age. Minimum cases (1.92%) of primary infertility were in the age group of >35. In BMI study, the maximum numbers of infertility cases (51.9%) were within the BMI of 25-29.9 kg/m^2 and 23.1% of cases were within BMI> 30kg/m^2.

Among the causes of primary and secondary infertility in this study, 46.2% of cases had PCOS, 19.2% had tubal block and 7.7% had hypothyroidism. PCOS is one of the most common endocrine disorders in women of reproductive age, affecting 5-10% of women worldwide. It is frequently associated with insulin resistance and obesity [16]. The present study showed no menstrual abnormalities in 28.9% of cases. In 45.2% of cases, an oligomenorrhoea cycle was observed. Among these, 70% had PCOS and 19% had hypothyroidism cases with an oligomenorrhoea cycle. The normal length of the menstrual cycle in reproductive-age women varies from 21-35 days, with a mean of 27-29 days [17].

A preliminary USG investigation showed normal and abnormal pelvic findings in 51% and 49% of cases. This study also showed fibroid uterus in 5.8% of cases. Because of the inconvenience and expense of serial measurement, USG monitoring should be reserved for patients who fail less expensive methods for detecting ovulation or for certain types of ovulation induction [18].

Identification of various hormone levels in primary and secondary infertility cases showed increased levels of serum LH in 29.8% of cases. Of 48 PCOS cases, 28 (58.3%) cases were observed with increased serum LH level. Furthermore, our study also showed normal, decreased and increased levels of serum FSH in 79.8%, 17.3% and 2.9 % of cases, respectively. The dysfunctioning of LH, FSH, prolactin hormone and thyroid hormone levels interfere with the functions of normal female fertility [19]. The LH test cannot be used in patients with irregular cycles [20]. Prolactin was first identified as the product of the anterior pituitary in 1993 [21]. Elevation in prolactin may cause amenorrhea, galactorrhoea, both or neither. Amenorrhea without galactorrhoea is associated with hyperprolactinemia in approximately 15% of women [22].

Conclusion

In the present study, primary and secondary infertility were due to the intersection of several demographic characteristics and medical factors. The study showed higher cases of infertility in younger patients. PCOS with increased serum LH level, hypothyroidism and hyperprolactinemia were the main cause of infertility. Evaluation of various hormone levels in cases of female infertility is useful in selecting a treatment plan and can also help in assessing the treatment outcome.

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