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Research Article

TO STUDY ASSOCIATION OF OBESITY WITH HORMONAL IMBALANCE IN PRIMARY INFERTILITY AND EARLY PREGNANCY LOSS

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ABSTRACT

Objectives: The study aimed to assess follicle-stimulating hormone (FSH), luteinizing hormone (LH), prolactin, and thyroid-stimulating hormone in obese patients with primary infertility and early pregnancy loss (EPL) and compare with normal fertile patients.

Methods: Patients were divided into two groups. Group A consists of 50 patients with a history of infertility and EPL with a body mass index of more than 30 kg/m^2. Group B consists of 50 normal fertile patients. Informed written consent was taken from all the patients. Blood samples were taken and hormone levels in two groups were measured and compared statistically.

Results: Comparison and statistical analysis of FSH levels in obese infertile and normal fertile groups showed the difference to be statistically highly significant. LH levels in both groups were statistically highly significant. When compared statistically, the difference between prolactin levels of both groups was highly significant.

Conclusion: This study supports the impact of obesity on infertility and pregnancy outcomes. Obesity affects dysfunction of the hypothalamus, pituitary ovarian axis, and results in a higher risk of infertility and EPL.

Keywords: Follicle-stimulating hormone, Luteinizing hormone, Prolactin, Thyroid-stimulating hormone, Body mass index, Early pregnancy loss.

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INTRODUCTION

The inability to conceive or the loss of a fetus in early pregnancy can have a direct bearing on the mental and social health of a woman. Many causes have been assigned to infertility and early abortions. Many times early pregnancy loss (EPL) is not reported in developing countries, making it very difficult to know the exact numbers. As per government data, at least 15–20% of documented pregnancies end in early abortion [1].

Physiology related to fertility and continuation of pregnancy is dependent on the functioning of the hypothalamus-pituitary ovarian axis [2]. Normal functioning of this axis is important for conceiving and maintaining the pregnancy. Any deviation from normal in the levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), and prolactin, which constitute the hormones of hypothalamus pituitary ovarian axis, can lead to the inability to conceive or early abortion [3].

Many causes have been assigned to infertility and EPL. These causes included various factors that upset the normal values of various hormones involved in the reproductive cycle. Obesity has been found to be one of the causes of hormonal imbalance. The World Health Organization has defined obesity as a body mass index (BMI) of equal to or more than 30 kg/m^2 [4]. The incidence of obesity has been on the rise in the last couple of decades [5]. High BMI has been found to be associated with decreased fertility because of ovulatory dysfunction [6]. Women with obesity show not only a higher incidence of infertility but their response to the treatment is also sub-optimal [6].

This study has been designed to assess the effect of obesity on hormonal levels and resultant infertility.

Aims and objectives

The aim of the study was to study the prevalence of obesity in women visiting obstetrics and gynecology department and comparing the extent of hormonal imbalance as compared to the normal fertile female population.

METHODS

This study was conducted in the Department of Biochemistry in the government medical college, in collaboration with the Department of Obstetrics and Gynaecology.

Fifty patients reporting in the infertility clinic and with a BMI of equal to or more than 30 kg/m^2 were included in the study and were assigned to Group A.

Patients with other known causes of infertility such as tubal factors, male reasons, and pelvic pathology were excluded from the study.

Fifty patients reporting to the antenatal clinic with normal pregnancy were included in the study as a control group (Group B).

Informed written consent was obtained from all the patients before enrolment.

FSH, LH, thyroid-stimulating hormone (TSH), and prolactin levels were measured in blood sample of all the patients included in the study. The results were analyzed statistically to establish the significance.

RESULTS AND DISCUSSION

Both the groups were similar in age group shown in (Table 1).

It is expected that the age of participants in Group A would be higher as the patients would report to the infertility clinic after trying to conceive

for at least a couple of years. However, the newer trend of not having a baby immediately after marriage, especially in working class, made the age difference between two groups non-significant.

Groups A and B were similar in duration of marriage also (Table 2).

FSH levels were measured in both groups and compared statistically (Table 3).

Comparison and statistical analysis of FSH levels in obese infertile and normal fertile groups showed the difference to be statistically highly significant.

LH levels were measured in both groups and compared statistically (Table 4).

When compared statistically, the difference between LH levels of both groups was highly significant.

Prolactin levels were measured in both groups and compared statistically (Table 5).

When compared statistically, the difference between prolactin levels of both groups was highly significant.

TSH levels were measured in both groups and compared statistically (Table 6).

When compared statistically, the difference between TSH levels of both groups was highly significant.

In a study conducted by the national family health survey 2019–2021, the prevalence of obesity in India was pegged at 13.85% [7]. It has become more of a lifestyle disease. Obesity can lead to many comorbidities including hormonal imbalance further leading to infertility or reduced fertility.

Seth *et al.* in their study on obesity and infertility, found a positive correlation between obesity and levels of FSH, LH, and TSH [8]. The present study also suggests higher than normal levels of these hormones in obese females presenting in an infertility clinic.

Gautam *et al*. in their review article stated that obesity can be one of the reasons for infertility and described how the excess of adipose tissue disturbs the hormonal balance in many ways [9]. This study also associates obesity with hormonal imbalance and infertility.

Dardar *et al*. in their study on obesity and infertility concluded that BMI, hormonal imbalance, and extreme age contribute to infertility. They also suggested weight reduction as a strategy to increase fertility [10]. Our study also correlates obesity with hormonal imbalance and infertility.

Nelson and Chukwuma conducted a study to establish the correlation between obesity and dysfunction of the hypothalamus, and pituitary ovarian axis resulting in infertility. They found a significant association between obesity and infertility due to hormonal imbalance [11]. The findings of their study are consistent with the present study.

Baraskar *et al*. in their study on the association of obesity with endocrine disruption and resultant infertility concluded that obesity is a primary factor that influences fertility in a negative manner [12]. Obesity affects various functions of the body at different levels of the reproductive system and disrupts the system. These findings are parallel to the findings of the present study.

Goldsammler *et al*. did a meta-analysis of PubMed publications on obesity and infertility. They found that there exists a relationship between obesity and hormonal changes that lead to infertility [2]. Adipose tissue affects the hypothalamus and pituitary ovarian axis.

Table 1: Age distribution in both the groups

Group	Range	Mean	SD	p-value	Significance
A	25–36	30.1	4.2	1.974	Non-significant
B	23–35	28.5	3.9		

SD: Standard deviation

Table 2: Duration of marriage in both groups

Group	Range	Mean	SD	p-value	Significance
A	3–5	4.1	0.9	0.0942	Non-significant
B	2–6	4.3	1.2		

SD: Standard deviation

Table 3: FSH Levels (mIU/mL) in both the groups

Group	Range	Mean	SD	p-value	Significance
A	3.9–13.1	8.2	3.2	<0.001	Highly significant
B	3.5–8.9	6.1	1.5		

SD: Standard deviation, FSH: Follicle-stimulating hormone

Table 4: LH Levels (mIU/mL) in both the groups

Group	Range	Mean	SD	p-value	Significance
A	2.9–44.3	16.6	12.1	<0.001	Highly significant
B	3.1–8.1	5.4	1.9		

SD: Standard deviation, LH: Luteinizing hormone

Table 5: Prolactin Levels (ng/mL) in both the groups

Group	Range	Mean	SD	p-value	Significance
A	13.3–59.6	25.8	12.7	<0.001	Highly significant
B	11.47–17.6	14.9	3.1		

SD: Standard deviation

Table 6: TSH Levels (ng/mL) in both the groups

Group	Range	Mean	SD	p-value	Significance
A	2.2–45.4	22.6	12.7	<0.001	Highly significant
B	1.6–5.3	3.2	3.1		

SD: Standard deviation, TSH: Thyroid-stimulating hormone

Silvestris *et al*. in their review article suggested that obese women need longer time to conceive and are at higher risk of infertility. They attributed this subfertility to obesity-related changes in ovarian function and other hormonal dysfunctions [13].

Dağ and Dilbaz in their study on the impact of obesity on infertility in women established the association between obesity and adverse fertility outcomes [14]. They also advised weight reduction as part of the treatment regimen for the cure of infertility. The findings of the present study are also the same.

CONCLUSION

Obesity adversely affects many systems of the body including the hormonal balance. It has an effect on the hypothalamus-pituitary ovarian axis and results in decreased reproductive functions. Obese women should be educated about the advantages of weight reduction, including improved chances of conceiving.

AUTHOR'S CONTRIBUTION

Dr. Jasvir Singh -– Data collection and paper writing. Dr. Seema – Techniques, Methodology, and paper writing. Dr. Maninder Kaur – Data

analysis and paper writing. Dr. Manjit Kaur Mohi – Patient selection and enrolment.

CONFLICT OF INTEREST

None.

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