



## DOES WEIGHT REDUCTION IMPROVE OVULATION IN OBESE WOMEN ?

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### ABSTRACT

Obesity adversely alters the functioning of HPO axis resulting in irregular ovulation or anovulation resulting in infertility. This prospective study was conducted on female patients with BMI>25 (i.e.) overweight patients suffering from anovulatory infertility. The patients were put on low glycemic diet and regular physical exercise for one year with aim of losing weight . They were followed up closely. The study group participants lost on an average 8.5 kg of body weight. The participants who could not adhere to the life style modification plan to reduce weight were treated as controls to evaluate the benefit of weight loss on ovulation. It was a matter of immense pleasure that by the time study was over, 18 patients had delivered healthy babies and 123 patients were pregnant. Weight loss not only improved ovulation but also improved their physical fitness, dietary habits and psychological uplift. Based on the study results, we recommend weight loss therapy to obese patients with PCO for restoring regular ovulatory cycles and achieve conception.

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### INTRODUCTION

About 10% of the population in the world is suffering from obesity. More than one billion people are obese today and the number is still increasing. WHO criteria for overweight is BMI>25kg/m<sup>2</sup> Obesity is

considered when BMI  $>30$  kg/m<sup>2</sup>. These figures are expected to exceed 2.3 billion and 700 million in near future.

	BMI
Under weight	<18.5
Normal weight	18.5-24.9
Over weight	25.0-29.9
Obesity class 1	30.0-34.9
Obesity class 2	35.0-39.9
Obesity class 3	40+

Consumption of junk fast food in the modern time and sedentary life has contributed a lot to obesity and the higher BMI among the population even in middle and lower middle class population. Obesity is a multifactorial disease having serious impact on health. It can bring with it hypertension, cardiovascular disease, stroke, type 2 DM, osteoarthritis and malignancy of endometrium, breast and colon. In women it can also disrupt her married life by bringing infertility. Obesity which occurs in 30-75% of women with PCOS<sup>2</sup> increases the magnitude of hormonal and metabolic dysfunction in these women. The mechanisms by which obesity causes or exacerbates subfertility are manifold. High BMI is associated with an increase in serum and follicular fluid leptin concentration<sup>3</sup> and decrease in serum adiponectin levels.<sup>4</sup> Leptin acting through the receptors on the theca and granulosa cells inhibits ovarian steroidogenesis.<sup>5-7</sup> Lower adiponectin levels associated with increased circulating insulin<sup>8</sup> can cause hyperandrogenemia by inhibiting the hepatic SHBG (sex hormone binding globulin) production.<sup>9</sup> In addition, hyperinsulinemia acting via IGF1 (insulin like growth factor 1) enhances LH mediated steroidogenesis in the theca cell system of the ovary and thus increases ovarian androgens<sup>10</sup>. Hyperandrogenemia results in granulosa cell apoptosis, while peripheral conversion of androgens to estrogen in adipose tissue inhibits gonadotrophin secretion in males to affect the process of spermatogenesis adversely. Peripheral conversion of estrogens in to testosterone by fat cells raises the LH levels thus taking LH/FSH ratio above 2 with resultant anovulation. Stein Leventhal syndrome characterized by polycystic ovary, secondary anovulation resulting in to amenorrhoea and signs of hyperandrogenism manifested by hirsutism. PCOS is the most common barrier for the couples desirous of parenthood in the present era. Obese women tend to respond poorly to ovulation induction using drug clomiphene citrate<sup>11</sup> and pregnancy rates are lower<sup>12</sup> in those who do.

Obesity is also associated with polycystic ovary syndrome (PCOS) which is a heterogeneous condition characterized by oligo or anovulation, hyperandrogenism, menstrual irregularities and subfertility.<sup>13-14</sup> Obesity which occurs in 30-75% of women with PCOS<sup>15</sup>. PCOS magnifies hormonal and metabolic dysfunction in these women.<sup>14</sup> Obesity predisposes women to infertility, diabetes, high cholesterol, high bloodpressure and cardiovascular disease.

Impaired transfer of glucose in to adipocytes resulting in to raised levels of free fatty acids is the basic pathophysiology in PCOS. Higher fatty acid levels in turn suppresses the inhibition of gluconeogenesis as well as production of sex hormone binding proteins by the liver. Resultant free circulating testosterone induces hirsutism in female. Peripheral insulin resistance resulting in to hyperinsulinemia and raised LH levels are the markers for the presence of PCOS. Weight loss plays a significant role in improving the condition and restoring ovulation helping the patient to conceive. Weight loss helps in regularizing the menstrual cycle and improves chances of conception.<sup>1</sup> Losing weight(fat) with low carbohydrate, low-calorie diets, and increasing physical activity can help patients with PCOS who are overweight or obese. Many Studies have shown that losing just 5% of one's body weight can help restore normal ovulation and menstruation, and in turn, increase chances of conception. This study was conducted in Dhiraj hospital, a teaching tertiary care hospital to study the beneficial effect of weight reduction on improving the fertility rate amongst the couples desirous to conceive

Key words: anovulation, infertility, PCOS, weight loss,

## AIMS AND OBJECTIVES

The aim of the study was to study the magnitude of problem of infertility due to obesity and PCOS. Weight reduction achieved by dietary modification and physical exercise forms important first line therapeutic tool in improving the ovulation rate in the PCOS patients. We aim at studying the beneficial effect of weight reduction in achieving ovulation in the patients who are anovulatory having irregular menstrual cycles.

## INCLUSION CRITERIA

- (1) The patients attending the infertility clinic of Dhiraj hospital .
- (2) The patients with BMI of more than 25
- (3) The patients having complaints of secondary amenorrhoea or crypto oligoamenorrhoea.
- (4) The patients with documented anovulation in last 6 cycles by serial ultrasound examinations.
- (5) The patients without urogenital congenital abnormality
- (6) The patients whose husbands had normal semen examinations

## EXCLUSION CRITERIA

- (1) The patients having normal BMI
- (2) The patients harbouring other etiological factors accountable for infertility e.g. tubal factors
- (3) Patients having metabolic disorders e.g. DM, hormone producing disorders of adrenal glands and thyroid disorders

- (4) Patients not willing to do regular exercise  
 (5) Patients who were migrating and not traceable for follow up.

#### MATERIAL AND METHODS

The study was conducted in the fertility clinic of the gynaecology department of Dhiraj hospital affiliated to the SBKS MI and RC from the period Jan 2019 to Dec 2021. During the time period all the patients fulfilling the criteria were included in the study who willing fully consented to participate in the study. BMI of all the participants was calculated at the beginning of study. The participants were periodically observed for significant change in BMI. Serial transvaginal sonography was the gold standard method employed for studying the ovulation. The patients who were overweight and having BMI of more than 25 were put on diet control under the supervision of the dietician and also were advised under exercise regimen so that effective weight loss can be achieved. The candidates who strictly followed the diet plan and exercise schedule lost weight and their BMI came down within normal range. The patients who were noncompliant and could not return to normal BMI were taken as controls in the study to evaluate the beneficiary effect of weight loss on anovulation. The patients were subjected to ovulation study. Continuous 6 normal ovulatory cycles were set as criteria for established normal ovulation. The data was systemically entered and analysed at the end of one year after the diet modification and starting regular prescribed weight losing exercise.

#### OBSERVATION AND RESULTS

TABLE 1

year	No of patients attending gynaec OPD	No of patients having infertility	patients of infertility having crypto or oligo or sec amenorrhoea	% of pt

2019	3187	418	147	35.16
2020	2966	391	131	33.50
2021	3042	403	152	37.71

As seen from the above table infertility patients comprise about 15 percent of total patients. Almost 1/3<sup>rd</sup> of the patients suffer from anovulatory infertility.

TABLE 2

YEAR	NO OF PT WITH ANOVULATORY CYCLE	NO OF PT HAVING PCOS	% OF ANOVULATORY PT HAVING PCOS
2019	147	122	82.99
2020	131	110	83.96
2021	152	119	78.28

Literature reports incidence of PCOS in anovulatory cycles to be between 40 to 85 %. In our study the PCOS accounted for almost 80%

TABLE 3

YEAR	NO OF PCOS PT	NO OF PT WITH OBESITY (high BMI)	%
2019	122	76	62.29
2020	110	79	71.81
2021	152	125	82.23

Literature reveals the prevalence of PCOS among 70% of patients with obesity. In our study it ranged from 60 to 80 percent.

All the patients who were enrolled for the study were under close observation during the study period. The participants were monitored for their diet practice, exercise adherence and periodic weight measurement for one year. All the participants were subjected to serial sonographic screening for ovulation study for 6 months. No drugs were administered for ovulation induction. Average weight loss among the patients who strictly followed the diet chart and exercise regimen amounted 8.5 kg. The patients who could not follow strictly and could not lose weight were taken as controls to compare the improvement in ovulation rate due to weight reduction.

TABLE 4

REAR	NO OF PT WITH BMI>25	NO OF PT WHO LOST WT	NO OF PT WHO REESTABLISHED NORMAL OVULATION	% of pt% of pt	CONTROL NO OF NON COMPLIANT PT	of pt NO who re established n ovulation	
2019	76	49	47	95.91	27	03	
2020	79	54	51	94.44	24	01	
2021	125	97	91	93.81	28	02	

**RESULT**

As seen from the tables the magnitude of infertility in the society is gradually rising. As we know intake of fast food and lack of exercise has contributed a lot to obesity. Obesity is no more a privilege of rich class only. Availability of modern machines and gadgets have also reduced the physical exercise among the labour class people. Abundant use of oil and ghee in junk food and outside eating habits are also responsible for obesity. Obesity also prevails in the middle and lower middle class. Obesity and stress of modern life hampers the process of ovulation. Anovulation is seen in 40 to 85% of patients with obesity with resultant infertility. Weight reduction has significant role in improving the ovulation rate. In our study we found that weight reduction successfully improved ovulation rate in more than 90 % of patients. A M CLARK et al reported improvement in ovulation to 92.3 According to his study a weight loss of 5-10% can improve the ovulation rate to normal.

**CONCLUSION**

From our study it is evident that weight loss plays significant role in regularizing the menstrual cycle and reestablishing ovulation. Even the conception rate is also significantly high. In our view weight loss should be advised to obese patients with infertility as the first line therapeutic advice even before putting the patient on ovulation inducing drugs.

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