

The Effect of the Pituitary Gland on the Hormone Prolactin and its Relationship to Menstrual Irregularity According to Obesity

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Abstract: Background: Women's fertility and menstrual cycle function are significantly impacted by thyroid disorders. The condition is made worse by the frequent co-occurrence of elevated prolactin levels and hypothyroidism.

Research objectives: In the infertility short term branch of the College Showing Clinic in Iraq, a cross-sectional review was conducted. This study focused on women who had undergone infertility testing by reviewing their medical records. The examination took a gander at significant past information, clinical observations, and results from numerous investigations, including estimations of blood prolactin levels and thyroid function. Using both spellbinding and inferential measurable techniques, the pervasiveness and correlations among predictors and result still up in the air.

Points of the review: The reason for the review was to evaluate the recurrence of thyroid issues in barren women going through treatment at the College Showing Clinic's short-term center in Iraq. Additionally, it took a gander at the relationship — which hasn't been completely investigated in our population — among obesity and hyperprolactinemia and hypothyroidism.

Curiosity: Of the 200 members, 90 individuals (42%), or the biggest gathering, were delegated stout. The subjects' mean body mass index (BMI) was 24 ± 4 kg/m². Thyroid problems were pervasive in 18% of the population, with hyperthyroidism representing 4% and hypothyroidism for 13%. At the point when people with thyroid problems were analyzed, there was no way to see a relationship tracked down between their BMI and hyperprolactinemia. Additionally, no huge association was found between hyperprolactinemia alone and BMI. Be that as it may, there was a huge direct correlation found between prolactin levels and thyroid stimulating hormone (TSH). Hyperprolactinemia and thyroid problems are predominant in women who experience infertility. Thusly, it is suggested that these issues be regularly checked for during the underlying appraisal of infertility. It is critical to perceive the conceivable effect of weight gain on infertility, regardless of whether there was no way to see a correlation found among BMI and thyroid illness or hyperprolactinemia. This is particularly obvious considering that the heft of examination members was large.

Key points: Hyperprolactinemia, infertility, obesity, thyroid problems.

Introduction

The inability to become pregnant even after regularly engaging in unprotected sexual activity for a full year is known as infertility.¹ Infertility prevalence is estimated to be between 8% and 12%. Two common causes of female infertility are endometriosis, tubal blockage, and problems with ovulation. Menstrual function and female fertility are both greatly impacted by thyroid disease.^{2–6} This illness can lead to infertility by preventing ovulation, impairing the luteal phase, raising blood levels of prolactin, and causing abnormalities in sex hormones. There is a range of 4 to 10. Thus,

obtaining and sustaining optimal fertility is crucial for guaranteeing a fruitful and healthy pregnancy, as is keeping a regular thyroid function. PRL levels are often raised in hypothyroidism and are correlated with increased levels of thyrotropin releasing hormone (TRH).⁷⁻⁹ By interfering with the gonadotropin-releasing hormone's (GnRH) regular release, hyperprolactinemia impairs fertility by impeding ovulation. Most people agree that obesity and hypothyroidism are related.¹⁰ In any case, another review has likewise demonstrated that prolactin can be discharged by fat tissue, proposing a connection among hyperprolactinemia and obesity.¹¹ The reason for this examination is to research the relationship among obesity and hyperprolactinemia in individuals with thyroid sicknesses, as well as the relationship between the two. In our example, the correlations between these factors have not been completely analyzed. Furthermore, the audit is to survey the sorts and inescapability of thyroid anomalies in ladies who are infertile.

Methodology

This cross-sectional review was done from January 2023 to November 2023 at College Showing Medical clinic's infertility office. The examination was conducted in a clinical office. Women getting care at the infertility short term division who met the measures for essential and secondary infertility were remembered for the review. Exactly when a couple can't consider curiously, their infertility is designated fundamental, and when they can't imagine following a previous pregnancy, it is named optional. Women who were at that point on treatment for hyperprolactinemia, had a history of hyperprolactinemia, were going through pituitary gland medical procedure, were recently determined to have thyroid sickness, or were going through thyroid medical procedure at the hour of the review were excluded. The test was not regulated to patients who didn't have total clinical histories or who had prolactin or thyroid capability results that were accounted for as fragmentary.

200 individuals were chosen as the example size in light of a 95% certainty span, a 5% wiggle room, and a 10% likelihood of nonresponse. An earlier assessment at a practically identical establishment viewed that as numerous as 7% of infertile women had thyroid issues, which were factored into our calculation. Certain clinical subtleties that were reported incorporated the patient's age, menstrual cycle, type and term of infertility, history of thyroid infirmity, hyperprolactinemia, and drug use. Using anthropometric strategies, the rates of level, weight, and weight record were found out. The degrees of serum free T3, free T4, TSH, and PRL were estimated quantitatively in the first part of the day testing. They likewise estimated PRL, TSH, FT3, and FT4 levels in the blood. Laboratory reference ranges for the accompanying boundaries are given: TSH: 0.46-4.68 μ IU/ml; FT3: 4.26-8.1 pmol/L; FT4: 10.2-28.2 pmol/L; and Prolactin in non-pregnant females: 2-29 ng/mL. The women were grouped in view of their thyroid capability.

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The hallmarks of subclinical hyperthyroidism include normal FT4/FT3 levels and a low TSH level (<0.46 mIU/ml).

The hallmarks of overt hyperthyroidism include high FT4/FT3 and low TSH (<0.46 mIU/ml).

When blood prolactin levels are higher above the normal range of >30 ng/mL, hyperprolactinemia is diagnosed.

BMI, which estimates obesity, was determined by isolating load in kilos by level in meters squared.

- ✓ The normal range for BMI is 18 to 22.9 kg/m².
- ✓ Overweight - BMI between 23 and 25 kg/m²
- ✓ Obese - BMI greater than 25 kg/m²

Statistical Analysis

Data was at first placed into a Microsoft Succeed bookkeeping sheet and thusly brought into SPSS variant 20.0 with the end goal of real request. We used factual measurements like mean, standard deviation, recurrence, and rate to introduce the graphic discoveries for data that followed an ordinary distribution. The interquartile range and the middle were utilized to show the information that didn't squeeze into an ordinary distribution. For straight out information, the Fisher careful test was used, and for parametric information, the autonomous example t-test was run. A 95% confidence interval (CI) and a p-esteem criterion of under 0.05 were utilized to decide the measurable importance.

Inclusion criteria

The following are the inclusion criteria for this study: every patient must attend the hospital on a regular basis.

Patients exhibit the capacity to make an educated decision and voluntarily consent to take part in the study.

Exclusion criteria

Every patient has to skip a few doctor's appointments.

People who are being studied do not consent to take part in it.

Results

The review bunch consisted of 200 individuals, of whom 154 (72%), had essential infertility and the leftover 28% had secondary infertility. Around 66% of the participants were in the 30-to 40-year-advanced age section. The heft of the participants (90; 42%) had an obesity-showing BMI, with typical weight individuals (37%) and overweight individuals (18%) coming in second and third, separately. (Table 1).

Table 1. Study participant characteristics (n=200)

Age (years)	37.7±4.0
Duration of infertility	2.0±2.0
Type of infertility	
Primary	154 (72%)
Secondary	59 (28%)
Menstruation irregularity	
Present	78 (36%)
Absent	135 (64%)
BMI (kg/m ²)	24.1±2.5
BMI category	
Underweight	9 (3%)
Normal	75 (37%)
Overweight	39 (18%)
Obese	90 (42%)
Hormone levels	
Prolactin (ng/mL)	5±1.0
FT ₃ (pmol/L)	13±2.0
FT ₄ (pmol/L)	3±2.0
TSH (μIU/ml)	19±8.0

18% of members (40 out of 200) had a thyroid condition, according to the survey, with 13% (30 out of 200) having hypothyroidism and 4% (11 out of 200) having hyperthyroidism. Subclinical hypothyroidism was the most often seen condition among the cases, with a prevalence of 10% (21/200) (Table 2). 34 out of 213 people had hyperprolactinemia, which had an incidence of 17%.

Table 2. Hormone issues related to the thyroid and prolactin (n=200)

Thyroid hormone	
Euthyroid	174 (81.6%)
Subclinical hypothyroidism	21 (10%)
Overt hypothyroidism	7 (3%)
Subclinical hyperthyroidism	5 (2%)
Overt hyperthyroidism	5 (2%)
Prolactin hormone	
Hyperprolactinemia	34 (17%)

The participants' ages went from 30 to 40 years of age, with a typical period of 37.7 ± 4.0 years (Table 1). The typical age in instances of secondary infertility (28) was viewed as fundamentally higher than in instances of essential infertility (72) when the typical distribution was analyzed according to the kind of infertility. With a typical BMI of 24.1 ± 2.5 kg/m², obesity was shown. According to the current study, obese women accounted for 37% of instances of hypothyroidism, the greatest frequency. On the other hand, women with normal BMIs accounted for 60% of occurrences with hyperthyroidism. There was no statistically significant correlation discovered when analyzing the association between BMI and hyperprolactinemia (Table 4). A p-value of less than 0.01 indicates a substantial positive connection between prolactin and thyroid-stimulating hormone (TSH).

Table 3. How excess body fat, hyperprolactinemia, and thyroid disorders are related.

Variables	Euthyroid n=175 (87.5%)	Hypothyroidism n=30 (15%)	Hyperthyroidism n=11 (5.5%)	p-value*
BMI category				
Underweight	9 (4)	-	-	0.01
Normal	58 (36)	12 (4)	6 (60)	
Overweight	30 (16)	6 (20)	3 (30)	
Obese	78 (44)	12 (37)	2 (10)	
Prolactin				
Normal	149 (85)	23 (75)	1 (10)	0.01
Hyperprolactinemia	26 (15)	7 (25)	10 (100)	
Menstruation irregularity				
Yes	66 (37)	10 (30)	5 (40)	0.8
No	109 (63)	20 (70)	6 (60)	

Discussion

The typical age of the review's participants was thirty years of age, which is consistent with prior research discoveries. Given its selection standards, it isn't to be expected that the mean time of secondary infertility was altogether more noteworthy than that of starting infertility and tantamount to past research.11 most of the review population (72%) had essential infertility, rather than secondary infertility (28%), which is in accordance with other examinations. 3, 7. Menstrual disturbances might result from both hyperthyroidism and hypothyroidism, according to the study. In particular, irregular menstruation was reported by 40% of women with hyperthyroidism and 31% of women with hypothyroidism. Notably, though, is that there was no statistically significant correlation seen between thyroid issues and irregular menstruation.

The hypothalamo-pituitary-gonadal axis can be disrupted by obesity, which can result in irregular monthly cycles and decreased fertility.11 Even after receiving reproductive care, the prognosis for obese and overweight women remain negative.11 It is therefore advised that in addition to getting conclusive treatment, overweight or obese infertile women lose weight. This will eventually

improve the efficacy of the medication by assisting in resolving their hormone imbalance. The study unequivocally showed that a sizable percentage of women who were infertile also had high BMIs. In particular, 18% of participants were overweight, and 42% were obese, making up 60% of the sample. Moreover, the subjects were classified as overweight due to their average BMI of 24 ± 4 kg/m². A past report showed that a more prominent body mass index (BMI) in the optional infertility gathering could be related with collected load from past pregnancies or progressed age.¹¹ A few examinations have seen that as 4% to 25% of infertile women have thyroid brokenness; notwithstanding, the ebb and flow research observed that the rate is 18%. numbers 2-10

Hypothyroidism, the most continuous thyroid illness, was predominant with 13% of cases, which is like the results displayed in the concentrate by Sharma et al. (17%).¹⁴ Disregarding this, a few examinations have found lower and more prominent pervasiveness rates.³ Reliable with other assessment discoveries, subclinical hypothyroidism was more normal than clear hypothyroidism.⁶⁻⁹ Obesity and an ascent in body weight are habitually associated with hypothyroidism; nonetheless, scarcely any examinations have found a strong linkage.¹² According to the ongoing review, large women represented 37% of occurrences of hypothyroidism, the best recurrence. Besides, 58% of hypothyroidism patients were overweight or large, which is equivalent to an earlier report in which 52% of cases were relegated to this category.¹⁴ According to the review, 4% of individuals have hyperthyroidism. Other examinations, be that as it may, have seen as both more noteworthy (5%) and lower (1%) commonness rates. 10–14

Due to its interference with the regular release of GnRH, hyperprolactinemia negatively impacts fertility by hindering ovulation.¹¹ The current study found that 15% of cases were hyperprolactinemia. Previous studies have shown higher prevalence rates of 24%, 41%, 28%, and 46%. The current study found that primary infertility cases had a greater frequency of hyperprolactinemia than secondary infertility cases, which is in line with previous research. According to Sharma et al., primary infertility cases had an average prolactin level that was substantially greater than secondary infertility cases.¹⁴ In contrast to this investigation, Sheth et al.'s study produced no statistically significant differences.¹¹

Hyperprolactinemia is the consequence of high prolactin levels brought on by hypothyroidism and elevated TSH levels. Therefore, prolactin and TSH are directly correlated, with increases in TSH levels being directly correlated with increases in prolactin levels.⁴ Additionally, a strong positive association between prolactin and TSH was found in this investigation. When a condition exists where the blood levels of prolactin are unusually high

Hyperprolactinemia was also present in 7 of 22 individuals (or 24% of the women with hypothyroidism) when the condition was being evaluated. These outcomes are consistent with those of another review.⁹ Women who suffer from hypothyroidism experience worsening symptoms and reduced treatment effectiveness due to high prolactin levels. Consequently, treating hypothyroidism should be the primary goal of treatment for infertile women who also have hyperprolactinemia. Prior to looking into other possible reasons for high prolactin levels, this should be done because appropriate thyroid supplementation can regulate ovulatory function and raise prolactin levels again.¹⁰

Another investigation discovered that fat tissue can deliver prolactin. The review found a powerful certain relationship between blood prolactin levels, body weight, and body mass index (BMI) in individuals experiencing optional infertility. A relationship seems to exist among hyperprolactinemia and obesity.¹¹ Nevertheless, there was no real way to see a relationship among hyperprolactinemia and BMI in this review. It is basic that almost 50% of the women with hyperprolactinemia analyze were overweight or stout in view of their body weight. The outcomes are in accordance with those of another review that tracked down a comparative level of 43%.¹⁴⁻¹⁶

Conclusion

Endocrinological issues like hyperprolactinemia and thyroid problems are common in infertile women. Regular thyroid function and PRL level assessment is crucial as part of the initial infertility test because of their association with monthly irregularities and infertility. No significant relationship was found between hyperprolactinemia or thyroid disorders and BMI. The majority of the research population was hefty, recommending that the relationship between increasing weight and infertility ought not be overlooked.

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