Follicle Stimulating Hormone, Luteinizing Hormone and Prolactin Levels in Infertile Women in North Chennai, Tamilnadu

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Abstract

The aim of the study was to determine the studies follicle stimulating hormone, luteinizing hormone and prolactin levels in infertile women in north chennai, Tamilnadu, India. The present investigation was carried out at JPM Diagnostic Centre in Chennai, Tamil Nadu the data were collected from 70 women patients and grouped them into infertility (n = 30) and control (n = 40). The patients referred by a Gynecologist for infertility investigation. The details pertaining to the patients regarding age, height, weight, no of years after marriage is furnished. The blood was collected during mid cycle 14 – 16 day on a fasting by venipuncture. The blood was allowed to clot, the serum was decanted and used for analysis. FSH, LH and Prolactin were estimated by Immuno enzymatic assay by Elisa Reader. FSH hormonal levels of the infertile women when compared to control groups statistically significant were found to be lower level of serum FSH mean±SD 3.46±0.73 (P<0.001) in the infertile group. serum LH concentration was lower in the infertile group than in the control group. The LH mean±SD 2.97±0.64 (P<0.001), serum Prolactin concentration was increased in infertile group compared with control group. The serum Prolactin mean±SD 55.80±23.44 (P<0.001). Regression analysis revealed obese to be strongly associated with infertility observed. BMI mean ± SD 29.05±1.80 (P<0.001). The level of FSH on 3rd of the cycle is within the normal range. However they are on the lower side. This reflect a decrease in the ovarian reserve. The decrease level of LH in the midcycle clearly indicates that there is a possibility of anovulation, which results in infertility. The elevated prolactin values in some of the infertile women clearly shows that there is a mechanism operating at the anterior pituitary level which shows an abnormal distribution of FSH and LH which may further explain the abnormal /delay ovum maturation. The present study indicates obese associated with infertility.

Key words: Infertility, hormones, obese, ovulation, hyperprolactinemia

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Abbreviation  FSH-follicle stimulating hormone ; LH-luteinizing hormone; PRL- prolactin

Introduction

Infertility is generally defined as one year of unprotected intercourse without conception. Approximately 85-90% of healthy young couples conceive within one year. Infertility affects 10 -15 % of couples, is an important part of investigation and helps the couple to have children (Mosher, et al., 1991). Many people may be infertile
during their reproductive years. They may be unaware of this infertility. Many parameters are outlined for the cause of infertility like age, lifestyle and physical problems etc.

Greater focus on education and careers among women has triggered other trend in modern society, less frequent, early and late marriages and more frequent divorce are among the most striking cases of delayed childbirth. Expanding contraceptive options and access to family planning and legalized abortion services have markedly contributed to the declined birthrate (Norton, et al., 1992).

The infertility problems are more common phenomenon among the women now a days and has increased over past 30 years (Stephen and Chendon, 2000). An ongoing epidemic of sexually transmitted infection, associated with increased risk of subsequent infertility of chlamydial infection and 650,000 gonorrhea infections was recorded in the US each year (Cates, et al., 1999).

The major causes of infertility includes ovulatory dysfunction (15%), tubal and peritoneal pathology(30-40%), and male fact(30-40%) and uterine pathology. To some extent the prevalence of each varies with age. Ovulatory dysfunction is more common in younger than old couples, tubal and peritoneal factors have a similar prevalence (Miller, et al., 1999).

The infertility causes due to insufficiency or imbalance hormones. Ovarian cyst may indicate advanced endometriosis; it may cause rigid webs of scar tissue between uterus, ovary, and fallopian tubes. This may prevent the transfer of the egg to the fallopian tube. The ovaries are enlarged by many cysts beneath by ovarian capsule. Small follicles that start to grow but can’t mature to ovulation remain with in the ovary. The lack of ovulation may lead to mild enlargements of ovaries especially in obese patient.

Fertility can be negatively affected by obesity. In women, early onset of obesity favours the development of menses irregularities, Obesity in women can also increase risk of miscarriages and impair the outcomes of assisted reproductive technologies and pregnancy, when the body mass index exceeds 30 kg/m$^2$. The main factors implicated in the association may be insulin excess and insulin resistance. These adverse effects of obesity are specifically evident in polycystic ovary syndrome. Body mass index (obese) affects reproduction by causing menstrual disturbance and tobacco, alcohol, other drugs, birth defects, thyroid disorder, galactorrhoea, and physical examination (weight body mass index, breast secretion, thyroid enlargement, vaginal abnormality etc., (ASRM,2000).

An elevation in prolactin (hyperprolactinemia) levels may also indicate the presence of a pituitary tumor. In addition, some drugs can elevate levels of prolactin, effects the ovulation, and inhibition of hormones. Overall, disorders of ovulation account for approximately 15% of the problems identified in infertile couples. The female infertility are caused by ovulation disorders. Deficiencies in luteinizing hormone (LH), follicle stimulating hormone (FSH) and elevated prolactin level even slight irregularities in the hormone system can affect ovulation.

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The obesity influences the reproductive cycle by impaired estrogen metabolism Norman, et al., The present investigation evaluates the hormonal profile of infertile women. The aim of the present study was to estimate the mean value of FSH, LH, and Prolactin levels of infertile women as compared to the control group in the North Chennai area of Tamilnadu.

Materials and Methods
The present investigation was carried out at JPM Diagnostic Centre in Chennai, Tamil Nadu the data were collected from 70 women patients as referred by a Gynecologist for infertility investigation. The details pertaining to the patients regarding age, height, weight, no of years after marriage is furnished. The group of infertile women consisted of patient with regular menstrual cycle lasting between 28-30 days and with ovulation between the 12th and 16th day of the cycle, the clinical examination revealed that the women has normal uterus, ovary and fallopian tube and the semen analysis of their husband was also normal.

Anthropometric measurements
The physical examination of body weight was calculated by taking weight in kilogram(kg) (Verma et al., 1982) and height was measured in centimeters (Frisancho et al., 1984). The Body Mass index was calculated from the formula; BMI = weight in kilograms / (height in meters)² Patients were taken as obese if their body mass index was 29.9 (Olefsky et al., 1992).

Biochemical parameters
The blood was collected during mid cycle 14 – 16 day on a fasting by venipuncture. The blood was allowed to clot, the serum was decanted and used for analysis. Haemolysis sera was discarded and a fresh specimen was obtained. The serum was stored at −20 °C and assay were completed within three days.FSH, LH and Prolactin were estimated by Immuno enzymatic assay by Elisa Reader. The kits were obtained from Fortrees Diagnostic Limited, United Kingdom, Northern Ireland.(Odell et al., 1981), (Saxema et al., 1968)

Statistical Analysis
Statistical analysis was done by descriptive statistics, independent groups t-test between means, two sample t-test between percent, chi-square test, compared means by ANOVA. All analysis were done using the windows based Statpac Statistical package version 3.0.

Results
Table 1 gives the detailed anthropometric parameters viz., age in years, weight in kilograms (kgs), height in centimeters(cms), body mass index(BMI) of infertile groups and control groups. Infertile groups statistically increased the age mean ± SD 28.40 ±1.57 (P<0.001), weight mean ± SD 66.83 ±3.53 (P<0.001), body mass index mean ± SD 29.05-1.80 (P<0.001).

Figure 1: Anthropometric parameters of the subjects

Table 2 showed the hormonal characteristics of the infertile groups when compared to control groups statistically significant increase in the level of serum FSH concentration was lower in the infertile group than in the control group. The FSH mean±SD 3.46±0.73 (P<0.001), serum LH concentration was lower in the infertile group than in the control group. LH
mean±SD 2.97±0.64 (p<0.001), and serum PRL concentration was higher in the infertile group than in the control group, PRL mean±SD 55.80±23.44 (P<0.001).

Figure 2: FSH, LH, PRL levels in infertile and control group.

Discussion

The level of FSH on 3rd day of the cycle is within the normal range. But they are on the lower side such a decrease in the ovarian reserve causes infertility. The level of FSH falls within the lower (2.06-4.28mIU/ml) limit of normal range (6.0-24.0mIU/ml). Among them 30 (42.9%) patients are at lower side of the normal range.

The LH results of 30 patients (42.9%) were below normal (5.0-24.0mIU/ml). The decreased level of LH in the midcycle clearly indicates possibility of anovualation, causing infertility.

The serum Prolactin concentration was increased (22.08 – 95.05 ng/ml) for 30(42.9%) patients. This present studies indicated hyperprolactinemia as the cause for infertility in female. The incidence of hyperprolactinemia has reported to 42% by 

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was found to be 62.16% (Rajan, et al., 1990) and 90%(Avasthi kun Kum Kum, et al., 2002).

The levels of FSH, LH and Prolactin gonadotropin hormones in infertile women were evaluated by many researchers. According to Moltz, et al., (1991) higher level of FSH, LH in infertile women with a proper menstrual cycle is rarely found. However lower concentration of those hormones observed only in 8% of cases. Moltz et al, (1991) also states that 65.5% of infertile women with proper two-phase menstrual cycles suffered from luteal phase defects but in 28.7% of cases lower values of FSH and LH were noticed. Kohler (Givens et al.,1986)states that women with higher values of prolactin and luteal phase defects have lower levels of FSH, and LH during their menstrual cycle.

Both luteinizing hormone (LH) and follicle-stimulating hormone (FSH) are required for follicle development and oestrogen production. Due to elevated of prolactin the follicle-stimulating hormone, luteinizing hormone are decreased and causes infertility. The obesity influences the reproductive cycle by impaired estrogen metabolism causing menstrual disturbance and anovulation. The present study clearly indicates all the obese patients increased in serum prolactin level and decreased FSH, LH levels.

Conclusion

The present study on FSH,LH and Prolactin levels in infertile women evaluates the hormonal profile of infertile women with anovulatory menstrual cycle. The hormone studied were pituitary derived FSH, LH and PRL. The examination involved a group of 70 women.

The level of FSH on 3rd of the cycle is with in the normal range. However they are on the lower side. This reflect a decrease in the ovarian reserve. The decrease level of LH in the midcycle clearly indicates that there is a possibility of anovulation, which
results in infertility. The elevated prolactin values in some of the infertile women clearly shows that there is a mechanism operating at the anterior pituitary level which shows an abnormal distribution of FSH and LH which may further explain the abnormal /delay ovum maturation.

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Table 1: Anthropometric parameters of the subjects.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control group n = 40</th>
<th>Infertile group n = 30</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.73±1.68</td>
<td>28.40±1.57</td>
<td>4.232</td>
<td>0.0001**</td>
</tr>
<tr>
<td>Height</td>
<td>153.35±3.08</td>
<td>151.73±2.88</td>
<td>2.239</td>
<td>0.0285*</td>
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<tr>
<td>Weight</td>
<td>48.85±2.65</td>
<td>66.83±3.53</td>
<td>24.357</td>
<td>0.0000**</td>
</tr>
<tr>
<td>BMI</td>
<td>20.79±1.34</td>
<td>29.05±1.80</td>
<td>22.023</td>
<td>0.0000**</td>
</tr>
</tbody>
</table>

Values are mean ± SD (Standard Deviation), * P<0.05, ** P<0.001

Table 2: The hormonal variables of the study groups

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control group n = 40</th>
<th>Infertile group n = 30</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSH</td>
<td>7.53±1.41</td>
<td>3.46±0.73</td>
<td>14.410</td>
<td>0.0000*</td>
</tr>
<tr>
<td>LH</td>
<td>17.82±4.09</td>
<td>2.97±0.64</td>
<td>19.672</td>
<td>0.0000*</td>
</tr>
<tr>
<td>PRL</td>
<td>11.47±4.03</td>
<td>55.80±23.44</td>
<td>11.759</td>
<td>0.0000*</td>
</tr>
</tbody>
</table>

Values are mean ± SD (Standard Deviation), * P<0.001