

## Correlation of Serum Prolactin and Thyroid Hormone in Female Infertility

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### ABSTRACT

**Background:** Infertility is a growing problem with adverse medical, social and psychological consequences globally. Apart from several causes of infertility, hormonal imbalance especially thyroid dysfunction and hyperprolactinemia can lead to female infertility. Both these conditions are treatable so Proper management of hormonal imbalance can result in restoration of normal fertility. **Aims and objectives:** Correlation of serum Prolactin and Thyroid hormone in female infertility. **Materials and methods:** Descriptive hospital based study was conducted at Nepalgunj medical college and teaching hospital, Nepalgunj, Banke, Nepal. The data was collected from September 2018 to August 2019. Total 30 cases of females of primary and secondary infertility attending outpatient department of gynecology department of Nepalgunj medical college were included in the study. A detailed history and clinical evaluation was done along with estimation of serum Prolactin and Thyroid hormone profile. **Result:** Hormonal status of subjects showed 15 i.e. 50% participants were thyroid whereas 11 (36.33%) were hypothyroid and 4 (13.33%) were hyperthyroid. Serum Prolactin was raised in 17 (57%) and normal in 13 (43%). Serum TSH and prolactin were found to be significantly positively correlated in female infertility ( $r=0.507$ ,  $p=0.004$ ). **Conclusion:** There is a high incidence of hyperprolactinaemia and thyroid dysfunction in female infertility.

**Keywords:** *Infertility, Prolactin, Subfertility, Thyroid*

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### INTRODUCTION

The World Health Organization defines infertility as follows<sup>1</sup>.

Infertility is the inability to conceive a child .A couple may be considered infertile if after two year of regular sexual intercourse, without contraception, the women has not become pregnant and there is no other reason, such as breastfeeding or postpartum amenorrhea.

Similarly, In the UK, the NICE guideline defines infertility as failure to conceive after regular unprotected sexual intercourse for two year in the absence of known reproductive pathology<sup>2</sup>. Infertility is a growing problem virtually almost all over the world .The WHO estimates that 8-12 % of couples around the world experience difficulty conceiving a child<sup>3</sup>. The major cause of infertility among couples include ovulatory dysfunction (15%), tubal and peritoneal pathology (30-40%) and male factor (30- 40%) and rest is unexplained<sup>4</sup>. Apart from several cause of infertility hormonal imbalance is one of the major causes of infertility. In a study conducted by O.S. Philippov et al with the aim to find out epidemiology and causes of infertility found that 32.8% of cases female infertility was due to endocrinal cause<sup>5</sup>. It has been seen that hypogonadism in hyperprolactinaemic women is due to high circulating level of prolactin interfering with the action of gonadotrophin at the ovarian level and impaired gonadal steroid secretion, which intern alters positive feedback

effects at the hypothalamic and pituitary levels. This leads to lack of gonadotrophin cyclicity and to infertility<sup>6</sup>. Apart from role of prolactin, thyroid hormone has profound effects on reproduction and pregnancy. Thyroid abnormalities, among women with infertility, particularly in countries like Nepal, considered as areas with endemic goiter are not uncommon<sup>7</sup>. In study conducted by B.Rijal et al, found that about 1/4<sup>th</sup> of women with infertility had some types of thyroid dysfunction<sup>9</sup>. Hypothyroidism can also be associated with an increased risk of polycystic ovaries, which is also associated with decrease fertility<sup>8</sup>. In our study hormonal assay was done with the aim to correlate the level of serum prolactin and thyroid hormone in infertile female and to determine relation of serum prolactin and thyroid hormone in female infertility.

### MATERIALS AND METHOD

This is a hospital based descriptive study conducted at Nepalgunj medical college and teaching Hospital Nepalgunj, Banke for 12 months from September 2018 to August 2019. Total of 30 cases of primary and secondary infertility attending outpatient department of gynecology of Nepalgunj Medical College were included, A detailed history and clinical evaluation was done and blood sample was collected and sent for laboratory test for serum prolactin and thyroid hormone profile by Chemoilluminescence enzyme immune assay by LUMAX- CLIA stripe reader. Prolactin, thyroid function test

were assayed using standard and sensitive immune assay method using monobinInc. The data were analyzed using the SPSS.

Inclusion criteria: Females of primary and secondary infertility.

**Exclusion criteria:**

1. Abnormal Semen Analysis
2. Participants under treatment of thyroid disorder and hyperprolactinaemia.
3. History of drug intake which block dopamine receptors as phenothiazine, metoclopramide etc.

**RESULT**

Total 30 cases of female infertility were included in our study. Majority of participants i.e.; 17(56%) were from age group 20 – 24 yr followed by 11 (36.7%) from age group 25 – 29 yr and only 2(6.7%) participants were from age group 15 – 19 yr. Out of 30 participants majority i.e.; 19 (63.3%) found to seek medical help after 3-5 yr of their marriage followed by 5 (16.7%) , 4 (13.3%), 1(3.3%) and 1(3.3%) participants came 6-8 yr and 9-11yr, 1-2yr and 12 – 15yr after their marriage. In our study 50% participants were Euthyroid whereas 11(36.33%) were hypothyroid and 4 (13.33%) were hyperthyroid. Among euthyroid group, the mean value of serum TSH, Ft4, Ft3 and Prolactin were 3.136+-1.39mIU/L, 1.142+- 0.214ng/dl, 2.436+-0.707pg/ml, 16.79+-10.11ng/ml respectively. In hypothyroid group, the mean values of serum TSH, FT4, FT3 and Prolactin were 32.29 +- 14.59 mIU/L, 0.59+-0.17 ng/dl, 1.19+ -0.564pg/ml, 34.03+-13.26 ng/ml respectively. In hyperthyroid group, the mean values of serum TSH, FT4, FT3 and prolactin were 0.105 +-0.026 mIU/L, 4.48=-1.36ng/dl, 8.85=-2.645 pg/ml, 23.27=-10.76 ng/ml respectively. Serum Prolactin was raised in 17 (57%) and normal in 13(43%) Both serum TSH and Prolactin were found to be significantly positively correlated (r = 0.507, p= 0.004).

|                          | Categories | Frequency (%) |
|--------------------------|------------|---------------|
| Age of patient           | 15-19 yrs  | 2(6.7)        |
|                          | 20-24 yrs  | 17(56.7)      |
|                          | 25 -29 yrs | 11(36.7)      |
| Duration of married life | 1-2 yrs    | 1(3.3)        |
|                          | 3-5 yrs    | 19(63.3)      |
|                          | 6-8 yrs    | 5(16.7)       |
|                          | 9-11 yrs   | 4(13.3)       |
|                          | 12-15 yrs  | 1(3.3)        |

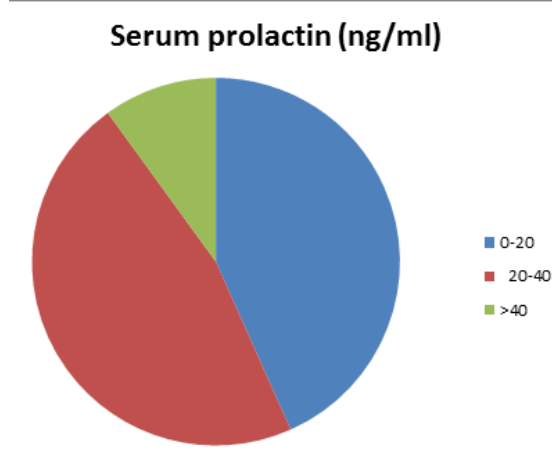
**Table I: Age of marriage and duration of married life**

| TSH (mIU/L)      | Euthyroid (n=15)15% | Hypothyroid (n=11)36.33% | Hyperthyroid (n=4)13.33% |
|------------------|---------------------|--------------------------|--------------------------|
| FT4(ng/dl)       | 3.136+-1.39         | 32.29+-14.59             | 0.105+-0.026             |
| FT3(pg/dl)       | 1.142+-0.214        | 0.59+-0.17               | 4.48+-1.36               |
| Prolactin(ng/ml) | 2.436+-0.707        | 1.19+-0.564              | 8.85+-2.645              |
|                  | 16.79+-10.11        | 34.03+-13.26             | 23.27+-10.76             |

**Table II: Hormonal status in the whole study groups (values are expressed in mean +-SD)**

| Serum prolactin (ng/ml) | Frequency | Percentage |
|-------------------------|-----------|------------|
| 0-20                    | 13        | 43         |
| 20-40                   | 14        | 47         |
| >40                     | 3         | 10         |

**Table III: Distribution of population according to serum prolactin levels (n=30)**



**Figure 1**

Data showed that majority of participants i.e; 17(57%) had Hyperprolactinaemia and 13(43%) had normal prolactin level.

| Parameters        | Pearson correlation value | P-value |
|-------------------|---------------------------|---------|
| Serum TSH (mIU/L) | 0.507                     | 0.004   |
| Prolactin (ng/ml) |                           |         |

**Table IV: Correlation between serum TSH and Prolactin levels**

Serum TSH levels were found to be significantly positively correlated with prolactin levels (r=0.507, p =0.004).

**DISCUSSION**

The result of the present study have revealed that the majority of participants i.e.; 17(56.7%) were from age group 20-24 yr followed by 11 (36.7%) age group 25-29 yr and around 2/3rd i.e.; 63.3% of participants came for treatment in between 3-5 yr of their marriage. similar age group was found in study by Shrewastwa et al in which the mean age was 25.3+-3.5 yr<sup>10</sup> and another study by B. Rijal et al in which mean age was 26.3+-3.1 yr<sup>9</sup>. Hormonal study of subjects in our study showed 15 i.e.; 50% participants were euthyroid, 11(36.33%) were

hypothyroid and 4 (13.33%) were hyperthyroid. Almost similar findings were revealed in other study done by Shriwastwa, M.K et al (2013) found that out of 635 infertile cases where 447 (70.39%) were euthyroid and 29.6% had different type of thyroid dysfunction ( $P < 0.05$ )<sup>10</sup>. In other study by Rahman D et al found 33.3% of sub fertile female were suffering from thyroid dysfunction<sup>17</sup>. Our study also had a similar result done by Shevaleela M Biradar et al where 42% of infertile female had thyroid dysfunction<sup>11</sup>. Significant proportion of population in our study i.e.; 17(57%) had hyperprolactinaemia and 13(43%) had normal prolactin level. The finding is almost similar to M Poonam et al who found that incidence of hyperprolactinaemia in infertile women was 52%<sup>12</sup> overall hyperprolactinaemia was noted in 41% by Pratibha D et al, 69.5% by Kalsum A et al and 46% by Awasthi et al<sup>13,18</sup>. Study done by A kumkum and B Goswami et al also revealed positive correlation between TSH and prolactin in infertile female<sup>15,16</sup>.

### CONCLUSION

Infertility is a growing problem almost all over the world. A couple is considered infertile if after two yr of regular sexual intercourse without contraception the woman has not been pregnant. The WHO estimates that 8-12% of couples around the world experience difficulty conceiving a child. There are several causes of infertility among them hormonal imbalance is one of the major causes of female infertility. Prolactin and thyroid dysfunction have profound effect on reproduction and pregnancy. In our study 30 cases of primary and secondary infertile female were included. Hormonal study of participants showed 15 (50%) were Euthyroid, 11 (36.33%) were hypothyroid and 4 (13.33%) were hyperthyroid. And serum prolactin was raised in 17 (57%) and normal in 13 (43%) cases. Both serum prolactin and TSH P value ( $r=0.507$ ,  $P = 0.004$ ) levels were found to be significantly positively correlated in infertile female. Hence it is recommended that the assessment of serum TSH and Prolactin levels should be routinely be done in the work up of all infertile women.

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