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# SERUM PROLACTIN LEVELS AND HYPERPROLACTINEMIA AMONG WOMEN UNDERGOING INFERTILITY EVALUATION IN BANGLADESH

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**Abstract**

**Introduction:** Hyperprolactinemia is a common, correctable endocrine disturbance that disrupts gonadotropin-releasing hormone pulsatility and contributes to ovulatory dysfunction and infertility. Excess prolactin suppresses luteinizing hormone and follicle-stimulating hormone release, impairing folliculogenesis. Population-specific data on serum prolactin distribution among Bangladeshi women undergoing infertility evaluation remain limited.

**Objective:** To determine the serum prolactin profile and prevalence of hyperprolactinemia and to examine its association with type of infertility and baseline clinical characteristics, among women attending an infertility clinic in Bangladesh.

**Methods:** This cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, from January to December 2010 and included 120 women undergoing infertility evaluation. Structured interview, clinical examination and fasting serum prolactin estimation were performed. Hyperprolactinemia was defined as a level above 25 ng/mL. Data were analyzed using SPSS version 16.0, with the independent samples t-test and chi-square test applied appropriately.

**Results:** Mean age was 29.4 ± 5.2 years and primary infertility was present in 74.2%. Mean serum prolactin was 17.4 ± 10.2 ng/mL and hyperprolactinemia were found in 16.7% of women. Prolactin levels and hyperprolactinemia prevalence were comparable between primary and secondary infertility ($p = 0.918$). No significant association was found between hyperprolactinemia and age, body mass index, menstrual pattern, or duration of infertility, though galactorrhoea showed a borderline association (30.0% vs. 13.0%, $p = 0.06$).

**Conclusion:** Hyperprolactinemia affected a substantial minority of women undergoing infertility evaluation, independent of menstrual pattern or infertility type, supporting routine prolactin screening in the basic infertility work-up.

**Keywords:** Hyperprolactinemia, Serum prolactin, Female infertility, Galactorrhoea.

## Introduction

Prolactin is a 199-amino-acid polypeptide hormone secreted by the lactotroph cells of the anterior pituitary gland under predominant tonic inhibitory control by hypothalamic dopamine [1,2]. Beyond its established role in lactogenesis, prolactin exerts a wide range of actions on gonadal steroidogenesis, folliculogenesis and luteal function, making it an important modulator of female reproductive physiology [1]. Hyperprolactinemia, defined as a persistent elevation of serum prolactin above the upper limit of the reference range, is one of the most frequently encountered endocrine disturbances in women of reproductive age and may arise from physiological states, pharmacological agents, or pathological conditions such as prolactin-secreting pituitary adenomas [3]. Excess prolactin interferes with the pulsatile secretion of gonadotropin-releasing hormone, thereby suppressing luteinizing hormone and follicle-stimulating hormone release, disrupting folliculogenesis and ovulation and ultimately contributing to menstrual irregularity and infertility [4].

Infertility, defined as the failure to achieve a clinical pregnancy after twelve months or more of regular unprotected intercourse, remains a major reproductive health concern worldwide [5]. Global estimates suggest that a substantial proportion of couples of reproductive age experience some form of infertility during their lifetime, with many never seeking formal medical care [6]. In South Asia and particularly in Bangladesh, infertility carries considerable psychosocial burden and population-based estimates have placed the overall prevalence of primary and secondary infertility among Bangladeshi women as high as fifteen percent [7]. Among the numerous identifiable causes of female infertility, endocrine disturbances of the hypothalamic-pituitary-ovarian axis, including hyperprolactinemia, constitute a clinically significant and potentially treatable category [8].

The reported prevalence of hyperprolactinemia among infertile women varies considerably across populations and diagnostic thresholds, reflecting differences in patient selection, sampling technique and assay methodology [8]. Menstrual disturbance is closely linked to prolactin excess; earlier clinical series have shown that elevated prolactin levels are considerably more common among women with amenorrhoea and oligomenorrhoea than among those with regular cycles [9]. Galactorrhoea, although considered a classical clinical marker of hyperprolactinemia, is present in fewer than half of affected women and therefore cannot be relied upon in isolation for screening [10]. Other constitutional factors, including advancing reproductive age and elevated body mass index, have also been implicated in ovulatory dysfunction and subfertility, although their relationship with prolactin excess specifically remains less well characterized [11,12,13].

Despite the clinical relevance of prolactin screening in the infertility work-up and its inclusion in standard diagnostic protocols for anovulatory and oligo-ovulatory women [14], population-specific data on serum prolactin distribution and the burden of hyperprolactinemia among Bangladeshi women undergoing infertility evaluation remain limited. Establishing local prevalence figures and clarifying the clinical correlates of hyperprolactinemia in this setting can help refine screening practices and guide judicious use of hormonal assessment in resource-limited infertility clinics. The present study was therefore undertaken to determine the serum prolactin profile and the prevalence of hyperprolactinemia and to examine its association with type of infertility and other baseline clinical characteristics, among women undergoing infertility evaluation at a tertiary-care university hospital in Bangladesh.

## Methodology

This cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, over a twelve-month period from January to December 2010 and included 120 women who presented for evaluation of infertility, defined according to standard criteria as failure to conceive after twelve months of regular unprotected intercourse [6]. Women aged between 20 and 42 years with primary or secondary infertility who consented to participate were enrolled consecutively, while women with a known pre-existing pituitary adenoma or other structural pituitary disease, those already receiving dopaminergic or antipsychotic medication known to alter prolactin secretion, women with clinically overt thyroid dysfunction, pregnant or lactating women and those unwilling to provide informed consent were excluded. After approval from the institutional ethical review committee and written informed consent from each participant, a structured, pretested questionnaire was used to record socio-demographic characteristics, menstrual history, duration and type of infertility and relevant clinical findings, including the presence of galactorrhoea, through direct interview and clinical examination performed by the investigating team. Height and weight were measured with calibrated instruments and body mass index was calculated and categorised according to standard cut-offs. Venous blood samples were collected between 8 and 10 a.m. under fasting, non-stressed conditions to minimize physiological variation in prolactin secretion, allowed to clot and the separated serum was analyzed for prolactin by a validated immunoassay method in the hospital's central laboratory, with hyperprolactinemia defined as a serum prolactin concentration exceeding 25 ng/mL. Strict confidentiality of participant information was maintained throughout the study, with data anonymized through coded identification numbers and used exclusively for research purposes. All collected data were checked for completeness and consistency, entered into a computer database and analyzed using the Statistical Package for Social Sciences (SPSS), version 16.0. Descriptive statistics were expressed as mean with standard deviation for continuous variables and as frequency with percentage for categorical variables. The independent samples t-test was used to compare mean prolactin levels between groups, while the chi-square test was used to examine associations between categorical variables and a p-value of less than 0.05 was considered statistically significant throughout the analysis.

## Results

**Table 1. Baseline characteristics of the participants (N=120)**

| Characteristic | | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age (years) | 20–24 | 18 | 15.0 |
| | 25–29 | 44 | 36.7 |
| | 30–34 | 38 | 31.7 |
| | ≥35 | 20 | 16.7 |
| | Mean±SD | 29.4 ± 5.2 years | |
| Type of infertility | Primary | 89 | 74.2 |
| | Secondary | 31 | 25.8 |
| Duration of infertility | ≤2 years | 42 | 35.0 |
| | 3–5 years | 52 | 43.3 |
| | >5 years | 26 | 21.7 |
| Menstrual pattern | Regular | 69 | 57.5 |

| | | | |
|---|---|---|---|
| | Irregular | 51 | 42.5 |
| BMI (kg/m2) | <25 | 50 | 41.7 |
| | ≥25 | 70 | 58.3 |
| Galactorrhoea | Present | 19 | 15.8 |
| | Absent | 101 | 84.2 |

Table 1 shows the baseline characteristics of the participants. Mean age of the study population was 29.4 ± 5.2 years. Most women were aged between 25 and 29 years and primary infertility was present in nearly three-quarters of the study population. A duration of infertility between three and five years was the most common category and more than half of the participants had a regular menstrual pattern. Over half of the women had a body mass index of 25 kg/m2 or above and galactorrhoea was present in a minority of participants.

**Table 2. Serum prolactin levels among the participants (N=120)**

| **Parameter** | **Result** |
|---|---|
| Mean serum prolactin, ng/mL (± SD) | 17.4 ± 10.2 |
| Median serum prolactin, ng/mL (IQR) | 14.5 (10.8–21.3) |
| Range, ng/mL | 3.8–72.4 |
| Normal prolactin (≤25 ng/mL), n (%) | 100 (83.3) |
| Hyperprolactinemia (>25 ng/mL), n (%) | 20 (16.7) |

IQR: Interquartile range

Table 2 presents the serum prolactin levels among the participants. The mean serum prolactin level was 17.4 ± 10.2 ng/mL, with a median of 14.5 ng/mL and values ranging from 3.8 to 72.4 ng/mL. Hyperprolactinemia, defined as a serum prolactin level above 25 ng/mL, was identified in 20 women, corresponding to a prevalence of 16.7%.

**Table 3. Serum prolactin according to type of infertility**

| **Variable** | **Primary (n=89)** | **Secondary (n=31)** | **Total (N=120)** | **p-value*** |
|---|---|---|---|---|
| Mean prolactin ± SD (ng/mL) | 17.5 ± 9.4 | 17.3 ± 9.3 | 17.4 ± 10.2 | 0.918 |
| Hyperprolactinemia, n (%) | 15 (16.9) | 5 (16.1) | 20 (16.7) | 0.918 |

*p-value derived from independent samples t-test comparing mean prolactin levels between primary and secondary infertility.

Table 3 describes serum prolactin according to type of infertility. The mean prolactin level was comparable between women with primary and secondary infertility and this difference did not reach statistical significance. The prevalence of hyperprolactinemia was similarly comparable between the two groups.

**Table 4. Selected characteristics according to prolactin status**

| Characteristic | Hyperprolactinemia (n=20), n (%) | Normal prolactin (n=100), n (%) | p-value* |
|---|---|---|---|
| Age ≥35 years | 4 (20.0) | 16 (16.0) | 0.66 |
| BMI ≥25 kg/m2 | 12 (60.0) | 58 (58.0) | 0.87 |
| Irregular menstruation | 10 (50.0) | 41 (41.0) | 0.46 |
| Galactorrhoea | 6 (30.0) | 13 (13.0) | 0.06 |
| Infertility >5 years | 5 (25.0) | 21 (21.0) | 0.69 |

*p-values derived from chi-square tests.

Table 4 outlines selected baseline characteristics according to prolactin status. No statistically significant association was observed between hyperprolactinemia and age, body mass index, menstrual pattern, or duration of infertility. Galactorrhoea, however, showed a borderline association with hyperprolactinemia, occurring more frequently among women with elevated prolactin levels than among those with normal levels, approaching but not reaching statistical significance.

**Discussion**

In the present study, the mean serum prolactin level among women undergoing infertility evaluation was 17.4 ± 10.2 ng/mL and hyperprolactinemia, defined as a level exceeding 25 ng/mL, was found in 16.7% of participants. This figure lies within the wide range reported in earlier clinic-based series, where the prevalence of hyperprolactinemia among infertile women has varied considerably depending on the diagnostic threshold, patient population and assay method used [3]. Findings from Kars et al. estimated the population incidence and prevalence of clinically treated hyperprolactinemia to be considerably lower than clinic-based figures, reflecting the fact that hospital-based infertility cohorts, such as the present one, are enriched for endocrine causes of subfertility and therefore yield higher detection rates than community surveys [8]. Consistent with earlier descriptions by Biller and by Luciano, the clinical spectrum of hyperprolactinemia observed in the present cohort ranged from asymptomatic biochemical elevation to overt menstrual disturbance and galactorrhoea [15,16].

Prolactin exerts its antifertility effect chiefly through suppression of hypothalamic gonadotropin-releasing hormone pulsatility and this mechanism underlies the well documented association between hyperprolactinemia and menstrual disturbance [3]. In the present study, however, no statistically significant association was found between hyperprolactinemia and menstrual pattern, with irregular menstruation present in half of the hyperprolactinemic women compared with 41% of those with normal prolactin levels. This contrasts with the classical findings of Bahamondes et al., who show that elevated prolactin was present in 55% of amenorrhoeic women, 37% of those with oligomenorrhoea, but only 9% of women with normal cycles, indicating a stronger relationship between menstrual irregularity and hyperprolactinemia than observed here [9]. The comparatively modest degree of prolactin elevation within the hyperprolactinemic subgroup may partly explain this divergence, since the strength of the prolactin-menstrual relationship in earlier work was closely tied to the severity of hyperprolactinemia rather than its mere presence [3].

Galactorrhoea, although traditionally regarded as a cardinal feature of hyperprolactinemia, occurs in fewer than half of affected women, a proportion consistent with the finding in the present study, where galactorrhoea was present in only 30.0% of hyperprolactinemic participants [4]. This proportion approached, but did not reach, statistical significance when compared with the 13.0% prevalence

among women with normal prolactin ($p = 0.06$), a pattern broadly in keeping with the report from Eftekhari et al., who similarly describe galactorrhoea as more frequent, though not universal, among women with hormonally confirmed hyperprolactinemia [10].

The present study found no significant difference in mean prolactin level or hyperprolactinemia prevalence between women with primary and secondary infertility ($17.5 \pm 9.4$ vs. $17.3 \pm 9.3$ ng/mL, $p = 0.918$), suggesting that prolactin disturbance is not preferentially linked to a particular reproductive history. This aligns with Boivin et al., who note that endocrine causes of infertility tend to distribute similarly across primary and secondary infertility subgroups, unlike structural and infective causes, which are disproportionately represented among women with secondary infertility [6].

Body mass index did not show a significant association with hyperprolactinemia in the present cohort, a finding that departs somewhat from work by Zain and Norman, who describe a graded relationship between elevated body mass index and ovulatory dysfunction, an association attributed principally to disturbances of the leptin-gonadotropin axis rather than to prolactin excess specifically [11]. Rich-Edwards et al. similarly demonstrate a U-shaped relationship between body mass index and ovulatory infertility risk, while Pandey et al. show that adiposity impairs fertility treatment outcomes through mechanisms distinct from lactotroph function, suggesting that metabolic and prolactin-related pathways to subfertility, though frequently coexisting, are not interchangeable [12,17]. Age at presentation showed no significant relationship with prolactin status, broadly consistent with the observation that reproductive ageing chiefly affects ovarian reserve and oocyte quality rather than pituitary lactotroph function [13].

Women with clinically overt thyroid dysfunction were excluded from the present study, a precaution supported by the work of Hekimsoy et al., who show that both overt and subclinical hypothyroidism are associated with a raised prevalence of hyperprolactinemia through compensatory thyrotropin-releasing hormone drive [18]. Blood samples were also collected under fasting, non-stressed conditions, in line with the observation by Ferriani and Silva de Sá that venipuncture-related stress can transiently elevate circulating prolactin and confound single-sample estimation [19], strengthening confidence that the values reported here reflect true baseline endocrine status.

Taken together, these findings support serum prolactin estimation as a routine component of the basic infertility work-up in this population, given the meaningful prevalence of hyperprolactinemia identified even without overt galactorrhoea or marked menstrual disturbance, consistent with recommendations from Verhelst and Abs, the Endocrine Society guideline of Melmed et al. and the diagnostic evaluation opinion of the American Society for Reproductive Medicine, all of which endorse prolactin screening as an integral, low-cost step in evaluating the infertile woman [14,20,21].

**Limitations And Recommendations**

This study was limited by its single-center, cross-sectional design and modest sample size, which restricted subgroup analysis and generalizability. A single prolactin measurement without confirmatory repeat testing may have overestimated true prevalence. Larger, multicenter studies with repeated hormonal assessment and follow-up of treated women are recommended to strengthen these findings.

## Conclusion

Hyperprolactinemia was identified in a clinically meaningful proportion of women undergoing infertility evaluation in this study, without significant association with menstrual pattern, body mass index, age, or type of infertility. These findings support the inclusion of serum prolactin estimation as a routine, low-cost component of the basic infertility work-up, enabling early identification and appropriate management of an otherwise correctable endocrine contributor to female infertility.

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