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Comparison Of Serum Prolactin Levels In Women With And Without Endometriosis

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Abstract
Background: *Endometriosis is a significant gynecological condition affecting lots of women globally, repeatedly connected with chronic pelvic pain and infertility. In Bangladesh, it remains underdiagnosed due to inadequate consciousness and diagnostic facilities, highlighting the necessity for manageable biomarkers like serum prolactin for early detection.*
Aim: *To find out the comparison of serum prolactin levels among women with and without endometriosis.*
Methods: *A case-control study was conducted from January to March 2024 at a tertiary hospital in Bangladesh to comparison serum prolactin levels in women with (n=40) and without (n=40) endometriosis. Women aged 20-30 years were selected using purposive sampling. Exclusion criteria involved endocrine disorders, PCOS, psychiatric sickness, renal disease, pregnancy, and lactation. Data on socio-demographics, BMI, and contraceptive use were collected. Statistical analysis was performed using SPSS 26.0, and ROC analysis applied. A p-value <0.05 was measured significant.*
Results: *Women with endometriosis had a significantly advanced frequency of high BMI, adnexal mass, pelvic tenderness, dyspareunia, and infertility associated to controls. Serum prolactin levels, TSH, and hormonal contraceptive use showed significant associations with endometriosis (p=0.000). The odds of having endometriosis were 3.35 times higher among those with high serum prolactin and 2.7 times higher among hormonal contraceptive users. Infertility was also significantly associated (OR=2.29, p=0.002). ROC curve reinforced the diagnostic value of serum prolactin levels.*
Conclusion: *Raised serum prolactin levels were suggestively related with endometriosis and may help as a potential adjunct biomarker for its early identification. More extensive studies are necessary to confirm its diagnostic effectiveness in clinical practice.*
Key Words: *Endometriosis, Serum Prolactin level, Infertility, Hormonal Contraceptives, Diagnostic Marker*

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I. Introduction

Endometriosis is a chronic inflammatory gynecological condition marked by the ectopic attendance of endometrial tissue external of the uterine cavity, mostly touching women of reproductive age [1]. It is associated with pelvic pain, dysmenorrhea, dyspareunia, and infertility [2,3]. The global prevalence is almost 10%, but it may reach 35-50% among infertile women [4,5].

Though the exact etiology of endometriosis remains unclear, hormonal, immunological, and genetic issues are concerned [6]. Prolactin, a hormone mostly recognized for its part in lactation, also inspirations

reproductive and immune function [7]. Raised prolactin levels have been related with anovulation, luteal phase faults, and infertility all common structures in endometriosis [8,9].

Current studies recommend prolactin might play a role in the pathophysiology of endometriosis via angiogenesis, neurogenesis, and immune modulation [10,11]. Enhanced prolactin may act on ectopic endometrial cells, indorsing their survival and development [12]. Moreover, hyperprolactinemia can stimulate estrogen production, thus contributing to the estrogen-dependent nature of endometriosis [13,14].

Serum prolactin has been proposed as a potential biomarker for endometriosis, particularly in symptomatic women [15]. Nevertheless, differing indication exists, and no consent has been reached concerning its diagnostic correctness [16,17]. Classifying consistent, non-invasive biomarkers could recover early diagnosis and decrease the necessity for invasive laparoscopy [18].

Moreover, thyroid function, mainly thyroid-stimulating hormone (TSH), has exposed relations with endometriosis. TSH can effect ovarian and endometrial function and may indirectly move prolactin secretion [19,20]. Hormonal contraceptive use is also stated as both a potential danger transformer and a managing tool for endometriosis [21].

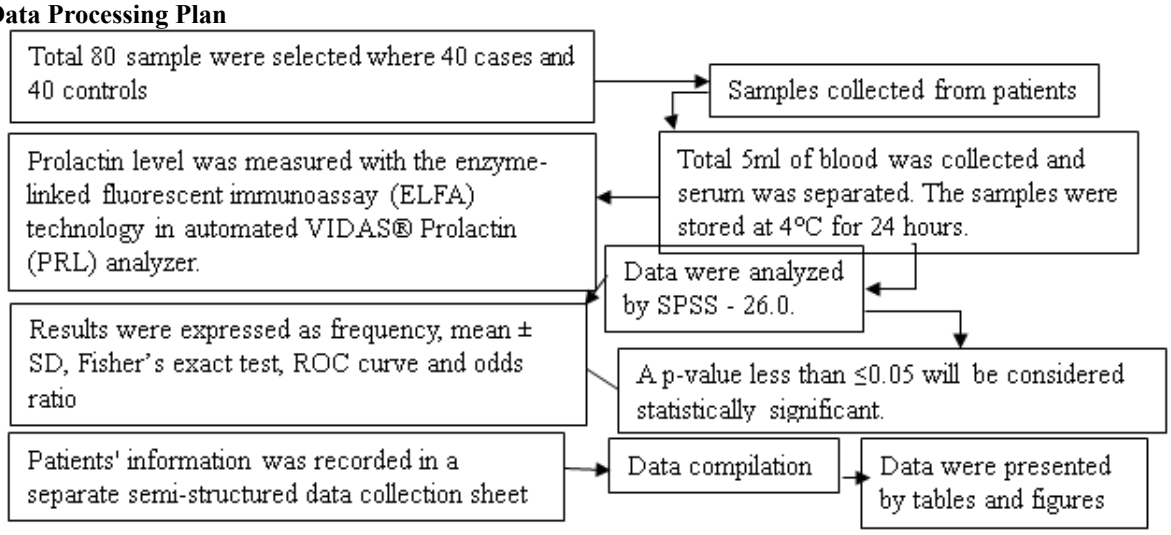
Obesity has appeared as a danger factor that alters the endocrine milieu, possibly prompting prolactin secretion and endometriotic lesion progression [22]. Infertility, a recurrent outcome of endometriosis, may more reflect fundamental hormonal disruptions, including altered prolactin levels [23].

Considering these interrelated mechanisms, evaluating serum prolactin levels in women with and without endometriosis may help clarify its diagnostic and pathogenic role. The current study aims to compare serum prolactin levels in endometriosis patients and controls and to explore associated factors with TSH levels, BMI, contraceptive use, and infertility history [24,25].

II. Methods:

A case control study was conducted from January to March 2024 at a tertiary care hospital in Bangladesh to compare serum prolactin levels between women with and without endometriosis. A total of 80 women aged 20-30 years were included, with 40 women identified clinically and ultrasonographically with endometriosis as the case group, and 40 age-matched women without clinical or sonographic evidence of endometriosis as controls. Participants were selected using purposive sampling. Women with pituitary disorders, thyroid disease under treatment, PCOS, psychiatric illness, chronic renal disease, or who were pregnant or lactating were excluded. Data on socio-demographics, medical and reproductive history, BMI, and contraceptive use were collected using a structured questionnaire and clinical examination. Blood samples were drawn during the early follicular phase (day 2-5 of the menstrual cycle) after overnight fasting. Serum prolactin and TSH levels were measured using electrochemiluminescence immunoassay (ECLIA). Ethical approval was obtained from the Institutional Review Board of Bangladesh Medical University, and informed written consent was collected from all participants. Data analysis was performed using SPSS version 26.0. Descriptive statistics, Chi-square and Fisher's exact tests were used where suitable. Odds ratio for factors associated with endometriosis, and ROC curve was directed to assess the diagnostic performance of serum prolactin. A *p*-value less than 0.05 was considered statistically significant.

Data Processing Plan



III. Result:

A case control study was conducted in a tertiary care hospital in Bangladesh to compare the serum prolactin levels between 40 women with endometriosis as case and 40 women without endometriosis aged 20-30 years**.**

Table 1: Distribution of the respondents by common characteristics

Characteristics	Endometriosis		Control	
	Frequency	Percent	Frequency	Percent
Age (years)				
20-30	40	100.0	40	100.0
BMI (kg/m²)				
Normal	09	22.5	40	100.0
High	31	77.5		
Presence of adnexal mass				
Yes	31	77.5		
No	09	22.5	40	100.0
Presence of pelvic tenderness				
Yes	26	65.0		
No	14	35.0	40	100.0
Dyspareunia				
Yes	21	52.5		
No	19	47.5	40	100.0
History of infertility				
Yes	09	22.5		
No	31	77.5	40	100.0
Total	**40**	**100.0**	**40**	**100.0**

Table 1 shows all respondents were aged 20–30 years. High BMI, adnexal mass, pelvic tenderness, dyspareunia, and infertility history were more common in the endometriosis group, whereas the control group had normal BMI and no such clinical findings.

Table 2: Comparison of serum prolactin levels among women with endometriosis and control

Serum prolactin level	Endometriosis	Control	*p*-value	OR
Normal	17	40	.000[f]	**3.353**
High	23	00		
Use of hormonal contraceptives				
Yes	17	00	.000[f]	2.739
No	23	40		
Serum FSH and LH levels				
Normal	40	32	.003[f]	.444
Abnormal	00	08		
Thyroid Stimulating Hormone (TSH) level				
Normal	40	11	.000[f]	.216
High	00	29		
Total	**40**	**40**	**80**	

Table 2 shows that there is a significant association between serum prolactin levels (p=0.000), use of hormonal contraceptives (p=0.000), and TSH (p=0.000) among women with endometriosis and control. OR =3.353 and 2.739 indicates that the chances of develop endometriosis is 3.35 times and 2.7 times higher among the high serum prolactin level and use of hormonal contraceptive than the controls.

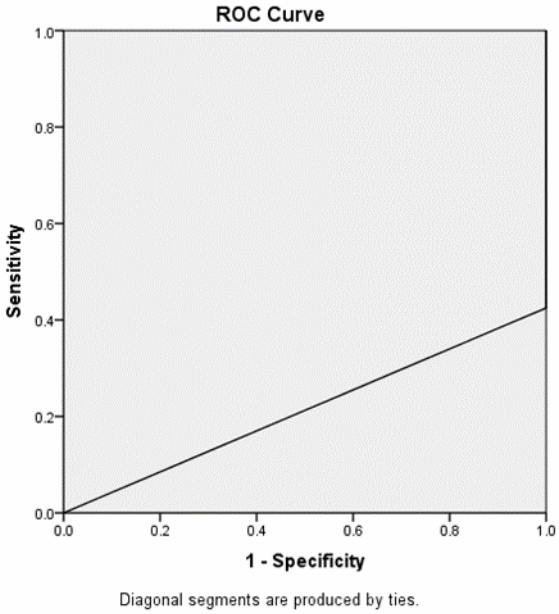


Figure 1: ROC curve

ROC curve indicates the diagnostic capability of serum prolactin levels in differentiating patients with and Without Endometriosis

Table 3: Association between endometriosis and control with other factors

Infertility	**Endometriosis**	**Control**	***p*-value**	***OR***
Yes	31	40	.002 [f]	2.290
No	09	00		
Use of hormonal contraceptives				
Yes	23	40	.000 [f]	2.739
No	17	00		
Total	**40**	**40**	**80**	

*Fisher's Exact Test. 2 cells (50.0%) have expected count less than 5.

Table 3 shows that there is a significant association between infertility and use of hormonal contraceptives (p=0.002), and (p=0.000) respectively among women with endometriosis and control. OR =2.290 and 2.739 indicates that the chances of develop endometriosis is 2.2 times and 2.7 times higher among the infertility and use of hormonal contraceptive than the controls.

IV. Discussion:

This study explored the association between serum prolactin levels and endometriosis among women aged 20-30 years, revealing significantly elevated prolactin levels in patients with endometriosis compared to controls. The findings support previous research that implicates prolactin as a potential contributor to the pathophysiology of endometriosis [8,10].

Prolactin plays a critical role in modulating immune responses, angiogenesis, and reproductive function, which are all central to the progression of endometriotic lesions [7,10,11]. Elevated prolactin levels may promote the survival of ectopic endometrial tissue by enhancing angiogenic factors and suppressing apoptotic mechanisms [12,13]. Furthermore, high prolactin may stimulate estrogen biosynthesis, reinforcing the estrogen-dependent growth of endometriotic implants [14].

The study detected those women with high serum prolactin levels had 3.35 times higher odds of having endometriosis, aligning with previous studies that reported similar associations [15,16]. These findings suggest that serum prolactin may serve as a promising non-invasive biomarker for the early detection of endometriosis [17,18]. While laparoscopy remains the gold standard for diagnosis, reliance on invasive techniques repeatedly delays definitive diagnosis by several years [1,4]. Hence, identifying reliable serum markers like prolactin can facilitate earlier diagnosis and intervention.

Another significant result was the strong association between endometriosis and TSH levels. Thyroid dysfunction, mostly elevated TSH, has been stated to influence ovarian reserve and endometrial receptivity, which may not directly affect endometriosis pathogenesis [19,20]. Reformed thyroid function can stimulate pituitary prolactin secretion, providing a hormonal link between TSH and prolactin in endometriosis [19].

The study also starts a statistically significant association between hormonal contraceptive use and endometriosis. Women using hormonal contraceptives had 2.7 times greater odds of having endometriosis. While hormonal therapy is usually used to achieve symptoms and suppress ovulation in endometriosis patients [21], some literature proposes that long-term use may mask symptoms or alter disease presentation [21,5]. So, the relationship between hormonal contraceptive use and endometriosis needs cautious interpretation and more investigation.

Remarkably, BMI was advanced among women with endometriosis, while all control participants had normal BMI. Though obesity is conventionally measured protective due to lower estrogen bioavailability, emerging data indicate a more complex role, with adipose-driven inflammation and hormonal dysregulation potentially exacerbating disease severity [22]. Obesity may also influence prolactin secretion, contributory to hormonal imbalance [22,23].

Infertility was another important correlate. A significant proportion of women with endometriosis in the study had a history of infertility, which is reliable with the established literature [2,3]. Endometriosis can impair fertility through multiple mechanisms, with altered tubal function, endometrial receptivity, and inflammatory damage to oocytes [4,6]. The detected association between infertility and raised prolactin may reflect an interrelated hormonal dysfunction common in both situations [9,23].

The results also bring into line with prior work on the potential utility of combination prolactin with other markers to recover diagnostic sensitivity [17,18]. The ROC curve in the study cares this diagnostic potential, strengthening the role of serum prolactin in the non-invasive identification of endometriosis.

The strength of the study lies in its emphasis on a well-defined age group and clear variation between symptomatic patients and matched controls. Nevertheless, limits include the small sample size, which limits causal inference, and the absence of laparoscopic validation in all cases. Coming longitudinal studies are necessary to explore the predictive value of serum prolactin in greater and more diverse populations.

In conclusion, raised serum prolactin levels are meaningfully associated with endometriosis, along with altered TSH levels, improved BMI, contraceptive use, and infertility. These results reinforce the potential role of prolactin in the pathogenesis and diagnosis of endometriosis [10,15,18,24]. Including hormonal profiling into routine gynecological evaluation may increase early detection and personalized managing of this compound condition [25].

V. Conclusion:

This study proves a statistically significant association between raised serum prolactin levels and the presence of endometriosis among women of reproductive age. Women with high prolactin levels had decidedly enlarged odds of being diagnosed with endometriosis, supportive the hormone's potential role in disease pathophysiology and its utility as a diagnostic marker. Moreover, the robust associations detected with hormonal contraceptive use and infertility underscore the multifactorial nature of endometriosis. Though serum prolactin alone may not be sufficient as a standalone diagnostic tool, it can be used in combination with clinical evaluation and imaging to recover diagnostic accuracy. Forthcoming prospective studies with greater and more diverse populations are needed to confirm these results and discover the mechanistic links between hyperprolactinemia and endometriosis growth.

Declaration of Interest:
The authors declare no competing interests.

Conflict of Interest: No Conflict of Interest.

Authors Contributions:

Prof. Dr. Tripti Rani Das and Dr. Sabiha Islam conceptualized the study and designed the methodology. Dr. Dipika Majumder and Farah Noor contributed data management and statistical analysis. Dr. Shah Noor Sharmin, Dr. Jinat Fatema and Dr. Bidisha Chakma assisted in manuscript drafting and critical revisions. Prof. Dr. Tripti Rani Das and Dr. Tanzina Iveen Chowdhury supervised the research and provided final manuscript approval. All authors reviewed and approved the final version.

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