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Original Research Article

Correlation of CA 125 and CA 19-9 Levels with the Severity of Endometriosis in a Tertiary Care Hospital

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Abstract: ***Background*:** Endometriosis is a chronic gynecological condition characterized by the presence of endometrial-like tissue outside the uterus. Serum biomarkers such as CA 125 and CA 19-9 have been proposed as diagnostic tools, though their correlation with disease severity remains unclear. The aim of this study was to evaluate the correlation between serum levels of CA 125 and CA 19-9 with the severity of endometriosis, and to assess their potential as noninvasive biomarkers for predicting the stage of the disease. ***Methods*:** This cross-sectional study was conducted at the Department of Obstetrics and Gynecology, BSMMU, Dhaka, from June 2019 to December 2020. A total of 80 patients diagnosed with endometriosis were included. Serum levels of CA 125 and CA 19-9 were measured and correlated with the clinical stage of the disease. ***Results*:** The mean age of the participants was 29.24±5.11 years. Serum CA 125 was elevated in 50% of patients, with a mean value of 70.59±74.108 IU/ml, while CA 19-9 was elevated in 48.8%, with a mean value of 58.40±77.67 IU/ml. A positive correlation was observed between serum CA 125 and CA 19-9 levels with the severity of endometriosis (r_s=0.531, $p<0.001$ for CA 125; r_s=0.435, $p<0.001$ for CA 19-9). ***Conclusion*:** Serum CA 125 and CA 19-9 levels are significantly correlated with the severity of endometriosis. These markers can serve as valuable noninvasive tools for assessing disease stage and severity in clinical practice.

Keywords: Endometriosis, CA 125, CA 19-9, Serum Markers, Disease Severity, Noninvasive Diagnosis.

INTRODUCTION

Endometriosis, defined as the presence of endometrial glands and stroma outside the uterine cavity, is a common gynecological condition affecting up to 10% of women of reproductive age [1]. It is associated with significant morbidity, including chronic pelvic pain, dyspareunia, dysmenorrhea, menstrual irregularities, and infertility, which can severely impact quality of life [2, 3]. Despite being a benign condition, the diagnosis of endometriosis is often delayed due to its reliance on invasive procedures such as laparoscopy, which remains the gold standard for confirming the disease through direct visualization and histological examination [1].

Laparoscopy, while essential for assessing the presence and severity of endometriosis, is not feasible for widespread use due to its invasiveness, cost, and associated risks [4]. Alternative diagnostic methods, such as ultrasonography and physical examination, have limitations in detecting certain forms of endometriosis, such as deeply infiltrative lesions [5, 6]. Consequently, there is a growing need to identify non-invasive diagnostic tools that can accurately predict the severity

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of the disease [7].

Serum biomarkers like CA 125 and CA 19-9 have shown potential in aiding the diagnosis and staging of endometriosis [8]. CA 125, a high molecular weight glycoprotein expressed in tissues derived from embryonic coelomic epithelium, is elevated in moderate-to-severe endometriosis and other gynecological conditions such as ovarian tumors and pelvic inflammatory disease [9]. Despite its specificity being over 94%, the sensitivity of CA 125 remains low, especially for early-stage endometriosis, limiting its utility as a standalone diagnostic marker [10].

CA 19-9, another high molecular weight glycoprotein, is widely recognized for its role in diagnosing gastrointestinal malignancies [11]. In gynecology, elevated serum CA 19-9 levels have been reported in patients with endometriosis, with levels increasing in correlation with disease severity [12]. It has also been observed to decrease following treatment, suggesting its potential use in monitoring therapeutic response [13, 14].

This study aimed to evaluate the correlation between serum CA 125 and CA 19-9 levels and the severity of endometriosis in patients undergoing laparoscopic or surgical diagnosis. By analyzing these biomarkers, we seek to determine their diagnostic value in predicting disease severity and explore their potential as non-invasive tools in a tertiary care setting.

METHODOLOGY & MATERIALS

This cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from June 2019 to December 2020. The study population included patients clinically diagnosed with endometriosis who underwent either laparoscopy or laparotomy. A convenient sampling technique was employed to recruit a total of 80 patients based on availability and fulfillment of the inclusion criteria. Patients included in the study were those with clinically confirmed endometriosis and who provided written informed consent. Patients receiving hormonal treatment within six months prior to surgery, those with polycystic ovarian disease, systemic illnesses such as diabetes, hepatic or renal disease, or other pelvic conditions like myomas, adenomyosis, or pelvic inflammatory disease, as well as patients with suspected malignancies, were excluded from the study.

The primary variables analyzed were serum CA 125 and CA 19-9 levels, which were assessed as markers of disease severity. A serum CA 125 level of ≥35.0 IU/ml and a serum CA 19-9 level of ≥37.0 IU/ml were considered elevated, based on previously established thresholds. The staging of endometriosis was classified according to the revised American Society for Reproductive Medicine (rASRM) criteria. Blood samples were collected from each participant, and serum levels of CA 125 and CA 19-9 were measured using standardized immunoassay techniques. Statistical analyses, including chi-square tests and correlation assessments, were performed using SPSS version 22.0. For data analysis, the correlation between serum CA 125 levels and the stage of endometriosis, as well as the correlation between serum CA 19-9 levels and the stage of endometriosis, was assessed using Spearman's rank correlation coefficient (rs). A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Socio-Demographic Characteristics of the Respondents (n = 80)

Characteristics	Frequency	Percentage (%)
Age (yrs)		
25 years or less	18	22.5
26-35 years	54	67.5
More than 35 years	8	10.0
Mean±SD	29.24±5.11	
Educational Status		
Illiterate	3	3.8
Primary	38	47.5
SSC	21	26.3
HSC	9	11.3
Undergraduate and above	9	11.3
Occupation		
Housewife	54	67.5
Student	5	6.3
Service Holder	21	26.3
Religion		
Islam	68	85.0
Hindu	12	15.0
Monthly Household Income (Taka)		
25,000 or less	8	10.0

26,000-50,000	54	67.5
More than 50,000	18	22.5
Mean±SD	43,986.11±13,083.15	

Table 1 summarizes the socio-demographic characteristics of the respondents. The mean age of participants was 29.24±5.11 years, with the majority (67.5%) aged 26-35 years. Nearly half (47.5%) of the women had primary education, and 67.5% were housewives. Most respondents (85.0%) were Muslim, and the average monthly household income was 43,986.11±13,083.15 Taka, with 67.5% earning between 26,000-50,000 Taka.

Table 2: Gynecological and Family History of the Respondents (n = 80)

Characteristics	Frequency	Percentage (%)
Family History of Endometriosis		
Yes	15	18.8
No	65	81.2
Use of Contraceptive		
Yes	32	40
No	48	60
Types of Contraceptive		
Oral Contraceptive Pill	18	22.5
Condom	12	15
Injectable	2	2.5
No Contraceptive	48	60
History of Infertility		
Yes	65	81.2
No	15	18.8
History of Pelvic Surgery		
Yes	13	16.2
No	67	83.8
History of Dysmenorrhea		
Yes	70	87.5
No	10	12.5

Table 2 presents the gynecological and family history of the respondents. Most participants (81.2%) had no family history of endometriosis. A majority (60%) did not use contraceptives, while 22.5% used oral contraceptive pills. Infertility was reported by 81.2% of respondents, and 83.8% had no history of pelvic surgery. Dysmenorrhea was common, affecting 87.5% of participants.

Table 3: Distribution of CA 125 and CA 19-9 among the Respondents (n = 80)

Characteristics	Frequency	Percentage (%)
CA-125		
Normal (<35.0 IU/ml)	40	50
High (≥35.0 IU/ml)	40	50
Mean ± SD	70.59 ± 74.108	
CA-19-9		
Normal (<37.0 IU/ml)	41	51.2
High (≥37.0 IU/ml)	39	48.8
Mean ± SD	58.40 ± 77.67	

Table 3 shows the distribution of serum CA 125 and CA 19-9 levels among the respondents. Half of the participants (50%) had elevated CA 125 levels (≥35.0 IU/ml), with a mean of 70.59 ± 74.108 IU/ml. Similarly, 48.8% had elevated CA 19-9 levels (≥37.0 IU/ml), with a mean of 58.40 ± 77.67 IU/ml.

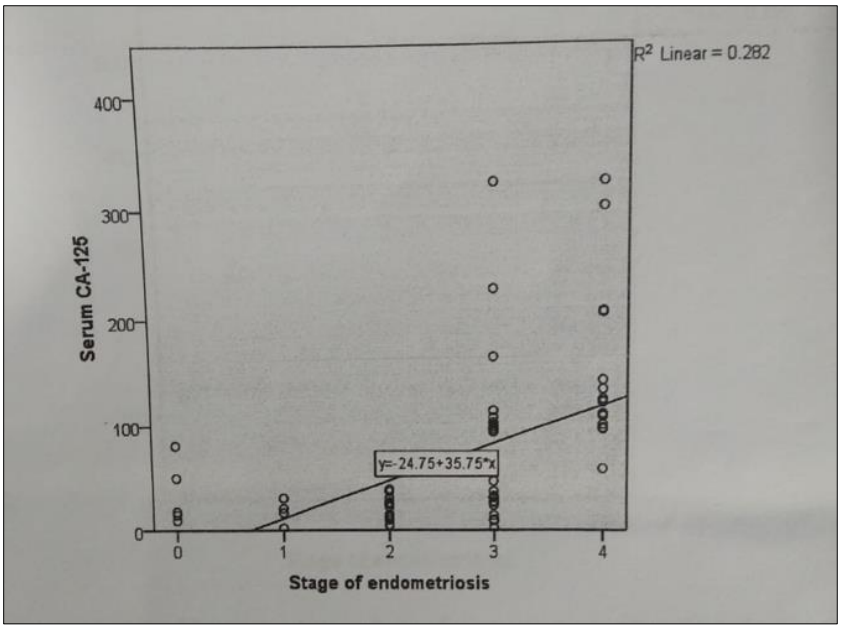

Figure 1: Correlation between Stage of endometriosis and serum CA 125

Correlation between serum CA 125 level and stage of endometriosis is shown in figure 1 where positive correlation is observed (r_s=0.531, p<0.001).

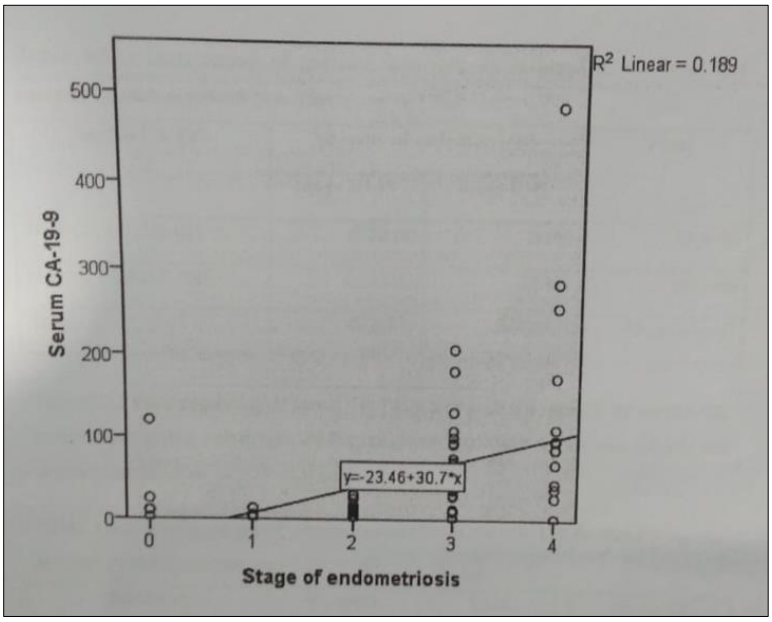

Figure 2: Correlation between Stage of endometriosis and serum CA 19-9

Correlation between serum CA 19-9 level and stage of endometriosis is shown in figure 2 where positive correlation is observed (r_s=0.435, p<0.001).

DISCUSSION

Endometriosis is a complex and often enigmatic disease, with several serum markers being proposed for its diagnosis. However, despite advances in diagnostic tools, no ideal non-invasive method has yet been developed to reliably diagnose the condition. The results of studies comparing serum markers like CA 125 and CA 19-9 levels in patients with endometriosis are inconsistent. While some studies show contradictory results, others suggest a significant role for these markers, especially CA 125, in evaluating the disease's severity.

In our study, the socio-demographic characteristics of the respondents revealed that the mean age of the participants was 29.24±5.11 years. This finding is consistent with previous studies where the mean age of patients with endometriosis ranged between 25 to 30 years [15]. The majority of participants were aged between 26 and 35 years, which aligns with the general age range of endometriosis diagnosis, as the

condition predominantly affects women during their reproductive years.

The study also found that serum CA 125 levels increased progressively with the severity of endometriosis. Specifically, patients with higher stages (III and IV) of the disease exhibited significantly elevated CA 125 levels. This finding supports previous studies, which have demonstrated that serum CA 125 is significantly elevated in patients with moderate to advanced endometriosis' [16, 17]. Elevated CA 125 levels are often observed in other benign gynecologic conditions, such as ovarian cysts and endometriomas, but they are also seen in normal tissues, including the endometrium [15, 18]. This suggests that while CA 125 may not be specific to endometriosis, it could be useful in conjunction with clinical findings to assess disease severity.

Similarly, the mean serum CA 19-9 levels in our study also showed a progressive increase as the stage of endometriosis advanced. This aligns with the findings of some previous studies, which reported higher serum CA 19-9 levels in patients with stage III and IV endometriosis [13-19]. However, this result contrasts with other studies that found no significant association between serum CA 19-9 levels and endometriosis [16, 17]. The discrepancies across studies could be attributed to differences in study design, sample sizes, or patient populations. Nonetheless, our study suggests that serum CA 19-9 may have a role in reflecting the severity of endometriosis, particularly in advanced stages.

The correlation between serum CA 125 and the stage of endometriosis in our study revealed a positive relationship, with serum CA 125 levels increasing significantly in patients with stage III and IV endometriosis. This is consistent with the findings of other studies, which also demonstrated higher serum CA 125 levels in advanced stages of the disease [20]. Similarly, our study found a positive correlation between serum CA 19-9 and endometriosis stage. These findings were also in line with studies by Toki *et al*., and Harada *et al*., which showed elevated serum CA 19-9 levels in patients with severe endometriosis [13, 19].

However, some previous studies did not find a significant correlation between CA 19-9 and endometriosis [16, 17]. This discrepancy may be due to different methodologies, sample sizes, or diagnostic criteria used in those studies. The fact that both CA 125 and CA 19-9 showed a positive correlation with endometriosis severity in our study further supports their potential role as biomarkers for disease progression.

Limitations of the Study

The limitations of this study include its cross-sectional design, which limits the ability to establish causal relationships. Additionally, the sample size may not fully represent the broader population of women with endometriosis. Finally, reliance on serum markers like CA 125 and CA 19-9 alone may not capture the complete clinical picture of endometriosis severity.

CONCLUSION

In conclusion, this study demonstrated that serum levels of CA 125 and CA 19-9 are significantly elevated in patients with higher stages of endometriosis. Both markers showed a positive correlation with disease severity, indicating their potential as noninvasive tools for assessing endometriosis. The findings suggest that measuring CA 125 and CA 19-9 levels could aid in the diagnosis and management of endometriosis. Further research with larger sample sizes is recommended to validate these markers. These results contribute to a better understanding of the role of serum biomarkers in endometriosis assessment.

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