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Association of Sociodemographic and Clinical Factors with Severity of Endometriosis Based on Laparoscopic Evaluation in Infertile Women

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Abstract

***Background*:** Endometriosis is a chronic inflammatory condition affecting women of reproductive age, with a notably higher prevalence in those experiencing infertility. Given this association, the study aimed to assess how socio-demographic and clinical factors relate to the severity of endometriosis based on laparoscopic findings in infertile women. ***Aim of the study*:** The aim of the study was to evaluate the association between socio-demographic and clinical factors with the severity of endometriosis based on laparoscopic evaluation in infertile women. ***Methods*:** This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at CARE, BIRDEM General Hospital, Dhaka (July 2013-June 2015) involving 127 infertile women. Data were collected regarding sociodemographic characteristics and clinical factors using a structured data collection sheet. BMI was calculated from weight and height and included in the data collection sheet. Laparoscopic diagnosis and staging used the Revised American Fertility Society criteria. Data analysis employed SPSS 20 (descriptive statistics, t-tests, chi-square tests). ***Results*:** In a study of 127 infertile women, Stage I endometriosis was most common, with Stage IV less frequent. Older age was linked to Stage I (p=0.016), and upper-class women had a higher prevalence (p=0.003). Lower BMI was associated with Stage IV (p=0.043). Severe stages, especially Stage IV, were significantly linked to dysmenorrhoea, menorrhagia, dyspareunia, and chronic pelvic pain. ***Conclusion*:** Socioeconomic background, age, BMI, and symptom profiles may serve as valuable indicators of endometriosis severity in infertile women undergoing laparoscopic evaluation.

Keywords: Socio-Demographic Factors, Clinical Correlates, Endometriosis Severity.

INTRODUCTION

Endometriosis is a long-standing inflammatory condition predominantly seen in women of reproductive age, defined by the growth of endometrial-like tissue in locations outside the uterus [1, 2]. This ectopic tissue can be found on the ovaries, fallopian tubes, and the peritoneal lining of the pelvis, leading to symptoms such as dysmenorrhea, dyspareunia, pelvic pain, and infertility [3-5]. The condition can severely affect the quality of life for those affected, with an estimated prevalence of 6-10% in the general population, and even higher rates observed in women experiencing infertility [6]. Several factors have been associated with an increased risk of developing endometriosis, including early onset of menstruation, heavy menstrual flow, a lean body type, and a family history of the disease [7]. However, the exact etiology remains uncertain [8], with various hypotheses proposing mechanisms such as metaplastic transformation or the spread of endometrial tissue through hematogenous or lymphatic pathways. T

The prevalence of endometriosis among women with infertility is significantly higher than in the general population, with estimates ranging from 30% to 50% [9-11]. Numerous studies have shown that

endometriosis is commonly found in women suffering from chronic pelvic pain, with its prevalence varying based on the diagnostic methods employed. Laparoscopy remains the gold standard for diagnosis, as it enables direct visualization of endometrial lesions, nodules, or cysts [12]. However, the prevalence and severity of endometriosis in infertile women can differ considerably, with some estimates suggesting that infertile women are 6-21 times more likely to have endometriosis compared to their fertile counterparts [13,14]. Factors such as pelvic anatomical distortions, endocrine and ovulatory disturbances, and immune system alterations are thought to contribute to infertility in women with endometriosis [15]. Interestingly, certain studies indicate that endometriosis may be equally prevalent in both fertile and infertile women, raising questions about whether the condition is the primary cause of infertility.

Endometriosis is a well-established cause of infertility, but the mechanisms through which it affects fertility are complex and multifactorial. Factors such as tubal obstruction, impaired ovulation, failure of sperm migration, and altered immune responses all contribute to the subfertility seen in women with the condition [16]. Diagnosing endometriosis is often difficult due to its symptoms overlapping with those of other disorders, leading to frequent underdiagnosis. While imaging techniques like ultrasound and MRI can provide valuable information, laparoscopy remains the gold standard for confirming the diagnosis and assessing the extent of the disease. Treatment options may include medical or surgical interventions, with laparoscopic surgery offering benefits such as minimal tissue damage, faster recovery, and potentially better fertility outcomes. Despite advances in diagnostic and treatment methods, endometriosis continues to pose significant challenges in clinical practice and patient care, primarily due to the variability in symptoms and the complexity of its management.

Despite the well-established association between endometriosis and infertility, limited data exist on how socio-demographic and clinical factors correlate with disease severity as confirmed by laparoscopy. Understanding these associations could enhance early recognition and individualized management strategies in infertile women. Therefore, the purpose of this study was to assess the association between socio- demographic and clinical factors with the severity of endometriosis in infertile women as determined by laparoscopic examination.

Objective

- The aim of the study was to evaluate the association between socio-demographic and clinical factors with the severity of endometriosis based on laparoscopic evaluation in infertile women.

METHODOLOGY & MATERIALS

This cross-sectional descriptive study was conducted at the Center for Assisted Reproduction (CARE), Department of Obstetrics and Gynaecology, BIRDEM General Hospital, Dhaka, Bangladesh, from July 2013 to June 2015. A total of 127 consecutive infertile women who underwent diagnostic laparoscopy between January 2014 and December 2014 were included, selected based on specific inclusion criteria.

Inclusion Criteria:

- Female patients with infertility (both primary and secondary) selected for diagnostic laparoscopy for the evaluation of infertility at CARE, BIRDEM General Hospital
- Age between 20 and 40 years

Exclusion Criteria:

- Infertility due to male factor
- Patients with medical disorders such as severe heart disease contraindicating anesthesia
- Infertility caused by chromosomal disorders or primary amenorrhea

Data were collected using a structured data collection form that included demographic, anthropometric, and clinical variables. After obtaining informed consent and explaining the study objectives, a detailed medical history and thorough clinical examinations were performed for each patient. Diagnostic laparoscopy was conducted, and findings were documented systematically. Endometriosis was diagnosed primarily through visual inspection during laparoscopy and classified according to the Revised American Fertility Society (rAFS) staging system into four categories: minimal (Stage I), mild (Stage II), moderate (Stage III), and severe (Stage IV). Characteristic laparoscopic findings included powder-burn lesions, red flame-like areas, yellow-brown patches, and chocolate cysts. Body mass index (BMI) was calculated as weight in kilograms. Socioeconomic status was assessed based on monthly household income and grouped as low, middle, or upper income. All collected data were entered, cleaned, and analyzed using SPSS version 20. Descriptive statistics were expressed as mean, standard deviation, and proportions, while inferential statistics including t-tests and chi-square tests were employed to determine associations, with a p-value of <0.05 considered statistically significant. Ethical approval was obtained from the Ethical Review Committee of BADAS, and confidentiality and voluntary participation were ensured throughout the study.

RESULTS

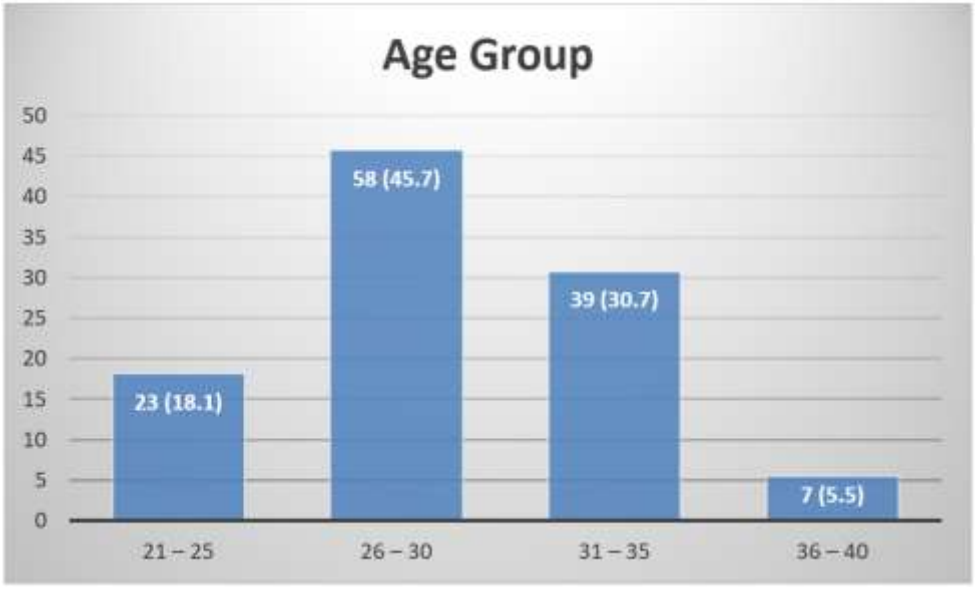

Figure 1: Age Distribution of the Study Population (N=127)

The majority of the study participants were in the 26–30 years age group (58 women, 45.7%), followed by 39 women (30.7%) aged 31–35 years. A total of 23 participants (18.1%) were aged 21–25 years, while only 7 women (5.5%) were in the 36–40 years age group. The mean age was 29.31 ± 4.08 years.

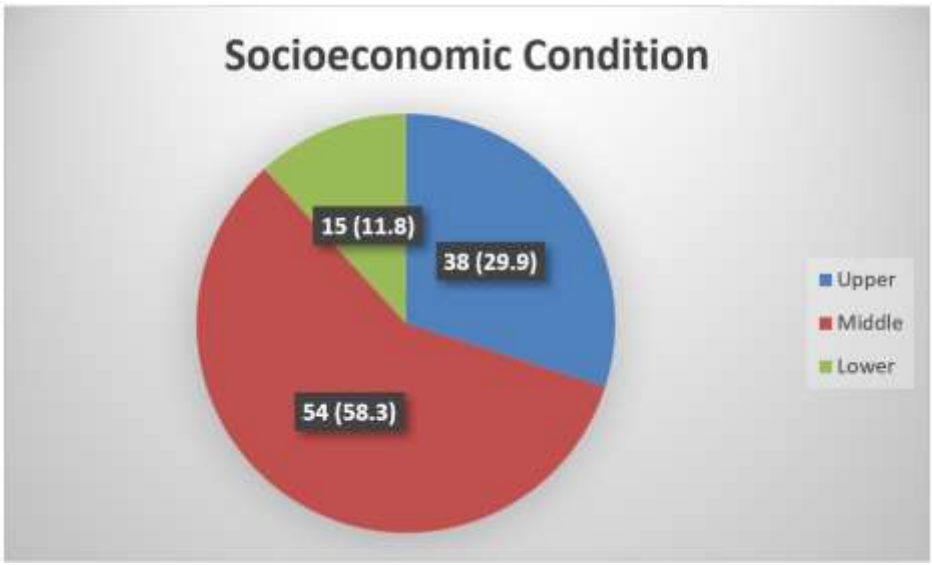

Figure 2: Socioeconomic Status of the Study Population (N=127)

Among the 127 infertile women studied, the majority belonged to the middle socioeconomic class (74 women, 58.3%), followed by 38 women (29.9%) in the upper class and 15 women (11.8%) in the lower socioeconomic group.

Table 1: Distribution of the study population according to severity of endometriosis on laparoscopy (N = 24)

Stage of Endometriosis	Frequency (n)	Percentage (%)
Stage I (Minimal)	9	7.1%
Stage II (Mild)	4	3.1%
Stage III (Moderate)	4	3.1%
Stage IV (Severe)	7	5.5%

Table 1 shows the laparoscopic staging of endometriosis among the study population. Stage I (minimal) was observed in 9 participants (7.1%), Stage IV (severe) in 7 (5.5%), and both Stage II (mild) and Stage III (moderate) in 4 participants each (3.1%).

Table 2: Association of Age of the Respondents with Different Stages of Endometriosis

Stage of Endometriosis	Endometriosis	Mean Age (Years)	Standard Deviation	p-value
Stage I (Minimal)	Yes	32.44	3.712	0.016
	No	29.08	4.026	
Stage II (Mild)	Yes	28	4.243	0.571
	No	29.36	4.089	
Stage III (Moderate)	Yes	30	4.397	0.735
	No	29.29	4.091	
Stage IV (Severe)	Yes	31.43	5.255	0.165
	No	29.19	3.999	

Table 2 summarizes the association between the age of the respondents and the laparoscopic stages of endometriosis. In cases of minimal (Stage I) endometriosis, the mean age at presentation was 32.44 ± 3.71 years, compared to 29.08 ± 4.03 years in those without Stage I disease, showing a statistically significant difference ($p = 0.016$). However, for Stage II, III, and IV endometriosis, no significant differences in mean age were observed between those with and without the respective stages ($p > 0.05$).

Table 3: Association of Endometriosis with Different Socioeconomic Conditions

Endometriosis	Upper Class	Middle Class	Lower Class	p-value
Yes	58.3%	33.3%	8.3%	0.003
No	23.3%	64.1%	12.6%	

Table 3 shows that the majority (58.3%) of respondents with endometriosis belonged to the upper socioeconomic class, while only 23.3% of those without endometriosis were from this group. In contrast, a higher percentage of respondents without endometriosis (64.1%) were from the middle class. This difference was statistically significant ($p = 0.003$), indicating a potential association between higher socioeconomic status and the presence of endometriosis.

Table 4: Association of BMI with Severity of Endometriosis on Laparoscopy

Stage of Endometriosis	Endometriosis	Mean BMI	Standard Deviation	p-value
Stage I (Minimal)	Yes	25.56	5.81	0.439
	No	26.93	5.06	
Stage II (Mild)	Yes	27.6	5.67	0.769
	No	26.81	5.11	
Stage III (Moderate)	Yes	24.5	1.91	0.345
	No	26.91	5.16	
Stage IV (Severe)	Yes	23.05	3.17	0.043
	No	27.05	5.12	

Table 4 summarizes the association between body mass index (BMI) and stages of endometriosis via diagnostic laparoscopy. Respondents with stage I endometriosis had a mean BMI of 25.56, while those in stage II had a mean BMI of 27.60, and stage III respondents had a mean BMI of 24.50. No statistically significant association was found between BMI and these stages. However, in stage IV (severe endometriosis), those with endometriosis had a significantly lower mean BMI of 23.05 compared to 27.05 in those without endometriosis. A statistically significant association was found between stage IV (severe endometriosis) and BMI ($p = 0.043$), suggesting that patients with severe endometriosis tend to have a relatively lower BMI.

Table 5: Association of Clinical Presentations and Laparoscopic Staging of Endometriosis

Clinical presentation				
Dysmenorrhoea				
Staging of endometriosis	**Mild**	**Moderate**	**Severe**	**P value**
Stage I	2 (6.3%)	2 (5.3%)	4 (22.2%)	0.053
Stage II	1 (3.1%)	0 (0.0%)	3 (16.7%)	0.004

Stage III	1 (3.1%)	0 (0.0%)	1 (5.6%)	0.556
Stage IV	0 (0.0%)	4 (10.5%)	3 (16.7%)	0.016
Total	**4 (12.5%)**	**6 (15.8%)**	**11 (61.2%)**	
Menorrhagia				
Stage I	7 (11.7%)			0.057
Stage II	2 (3.3%)			0.991
Stage III	2 (3.3%)			0.991
Stage IV	7 (11.7%)			0.004
Total	**18 (30.0%)**			-
Dyspareunia				
Stage I	8 (32.0%)			0.085
Stage II	2 (8.0%)			0.121
Stage III	0 (0.0%)			
Stage IV	4 (16.0%)			0.010
Total	**14 (56.0%)**			-
Chr. pelvic pain				
Stage I	6 (27.3%)			0.000
Stage II	3 (13.6%)			0.002
Stage III	1 (4.5%)			0.680
Stage IV	5 (22.7%)			0.000
Total	**15 (68.1%)**			-

Table 5 summarizes the association between clinical presentations of endometriosis and the severity of the condition as assessed through diagnostic laparoscopy. Statistically significant associations were found between moderate to severe dysmenorrhoea and both mild (stage II) and severe (stage IV) endometriosis (p = 0.004, 0.016). A significant association was also observed between menorrhagia and dyspareunia with stage IV (severe) endometriosis (p = 0.004, 0.010), as well as chronic pelvic pain with stage II (mild) endometriosis (p = 0.002). However, no statistical association was noted between clinical presentations and other stages of endometriosis.

DISCUSSION

Endometriosis is a prevalent gynecological condition that significantly contributes to female infertility. It is characterized by the presence of endometrial-like tissue outside the uterine cavity, often resulting in chronic pelvic pain and subfertility. Laparoscopy continues to be the gold standard for diagnosing and staging endometriosis. The present study aimed to assess the association between socio-demographic and clinical factors with the severity of endometriosis in infertile women, based on laparoscopic evaluation. A total of 127 infertile patients were included, all of whom underwent diagnostic laparoscopy at the Center for Assisted Reproduction (CARE), BIRDEM General Hospital.

In the present study, the majority of participants were in the 26–30 years age group (45.7%), followed by 31–35 years (30.7%), with a mean age of 29.31 ± 4.08 years. These findings are comparable to the observations by Chandrika et al. [17] found that 40% of infertile women were aged between 26 and 30 years, 34% were over 30 years, and 26% were between 21 and 25 years, with a mean age of 28.74 ± 3.81 years. These findings suggest that endometriosis-related infertility is most prevalent in women in their late twenties to early thirties, emphasizing the importance of timely evaluation and management in this age group.

In this study, the majority belonged to the middle socioeconomic class (74 women, 58.3%), followed by 38 women (29.9%) in the upper class and 15 women (11.8%) in the lower socioeconomic group. This distribution highlights that most participants seeking care at the tertiary center were from middle-income backgrounds.

In the present study, laparoscopic evaluation revealed that among infertile women with endometriosis, 7.1% had Stage I, 3.1% had Stage II, 3.1% had Stage III, and 5.5% had Stage IV disease. These findings are generally in line with those of Mishra *et al*. [18], who reported 66.3% with Stage I, 17.77% with Stage II, 8.33% with Stage III, and 7.6% with Stage IV endometriosis, highlighting the varied presentation of endometriosis are evident among infertile women, reinforcing the role of laparoscopy in accurate staging and clinical decision-making.

In the present study, the mean age of women with Stage I endometriosis was 32.44 years, followed by 28 years for Stage II, 30 years for Stage III, and 31.43 years for Stage IV, with a statistically significant association noted for Stage I (p = 0.016). These findings show a trend of increasing age with advancing stages of endometriosis, consistent with the observations of Radhika *et al*. [19], who reported that the majority (73%) of patients with moderate to severe endometriosis were in the 21–30 years age group, with a mean participant age of 29.6 years. This similarity reinforces the pattern

that endometriosis severity tends to increase with advancing reproductive age in infertile women.

In this study, a notable association was found between higher socioeconomic status and the presence of endometriosis, with 58.3% of affected women belonging to the upper class, compared to just 23.3% of women without the condition ($p = 0.003$). This finding is consistent with the research by Fyfe *et al*. [20], which indicated that women with endometriosis were more likely to come from higher socioeconomic backgrounds. These similarities suggest that greater health awareness, better access to specialist care, and timely diagnostic procedures such as laparoscopy in higher socioeconomic groups may contribute to the increased detection of endometriosis among these women.

In the present study, a significant association was noted between lower BMI and Stage IV (severe) endometriosis, with affected women having a mean BMI of 23.05 ± 3.17 compared to 27.05 ± 5.12 in women without severe disease ($p = 0.043$). Although no statistically significant associations were found for earlier stages, a trend of decreasing BMI with increasing disease severity was observed. This pattern aligns with findings from Yi *et al*. [21], who reported that women with moderate to severe endometriosis had significantly lower BMIs than those with minimal or mild disease, indicating a possible link between leanness and advanced endometriosis. Similarly, Liu *et al*. [22] suggested an inverse association, proposing that women with higher BMI may have a reduced risk of developing endometriosis. These observations support the hypothesis that lower BMI may be a contributing factor or marker for more severe forms of endometriosis in infertile women.

In this study, a clear trend was observed between clinical presentations—particularly dysmenorrhea, dyspareunia, and chronic pelvic pain—and increasing severity of endometriosis on laparoscopy, with symptoms more frequently reported in advanced stages. Dysmenorrhea demonstrated a statistically significant correlation in both Stage II ($p = 0.004$) and Stage IV ($p = 0.016$) of endometriosis, while symptoms such as dyspareunia and chronic pelvic pain were markedly more prevalent in the advanced stages, particularly Stage IV ($p = 0.010$ and $p = 0.000$, respectively). These findings are in line with those of Thakral *et al*. [23], who reported high prevalence rates of dyspareunia (73.3%), dysmenorrhea (65.2%), and chronic pelvic pain (63.2%) among women with endometriosis. Similarly, Riazi *et al*. [24] also identified significant associations between these hallmark symptoms and the presence of endometriosis. The consistency of these results across studies reinforces the role of these clinical symptoms as potential markers of disease progression, aiding in early suspicion and timely diagnostic laparoscopy among infertile women.

Limitations of the study

This study had some limitations:

- The study was conducted at a single tertiary care center, which may limit the generalizability of the findings to the broader population.
- Due to the time constraints associated with conducting this study as part of a thesis, the sample size was limited; a larger cohort could have yielded more robust and generalizable results.
- As laparoscopy is an invasive and costly procedure requiring specialized surgical expertise, its application may have been limited, potentially affecting the uniformity of diagnostic staging.

CONCLUSION

This study demonstrates that socio-demographic and clinical factors are distinctly associated with endometriosis severity in infertile women. Women with minimal disease tended to present at an older age, while those with severe disease were more likely to have lower body mass indices. Higher socioeconomic status showed a clear association with endometriosis presence. Clinical symptoms exhibited stage-specific patterns, with chronic pelvic pain more common in mild cases and severe pain symptoms predominating in advanced disease. These findings highlight how patient characteristics and symptom profiles may help clinicians anticipate endometriosis severity before laparoscopic evaluation, particularly in infertile populations.

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