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Nutritional Impact on Endometriosis Development: A Single Centre Experience

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Abstract

Background: *Endometriosis affects 10% of reproductive-aged women, causing symptoms like pelvic pain and infertility. Diagnosis is challenging due to symptoms overlapping with other conditions. In Bangladesh, 1.2 million women have endometriosis, often diagnosed late due to low awareness. Treatment includes hormonal therapy and surgery, with growing interest in complementary approaches like diet modification and alternative medicine.*

Aim of the study: *This study aims to examines associations between endometriosis and dietary interventions.*

Methods: *This cross-sectional investigation was carried out at the Holly lab hospital, Brahmanbaria, Bangladesh. The study spanned one year from January 2023 to December 2023. Throughout the study, a total of 106 patients meeting the criteria were recruited and subjected to analysis. All participants received a diagnosis of endometriosis.*

Result: *The study included 106 individuals, with most aged 36-45. Over half had secondary education, and dysmenorrhea was the most common symptom (54.72%), followed by heavy menstrual bleeding (30.19%). The majority had symptoms for 4-10 years. Severe endometriosis (Stage IV) was most prevalent (37.00%), with moderate (Stage III) at 20.40% and minimal/mild (Stage I-II) at 42.60%. Progesterone-like and combined estrogen/progestogen medications were commonly used (32.70% each), with smaller proportions using menopause-inducing medications and pain relief drugs. Gluten-free diets were most prevalent (42.45%), followed by anti-inflammatory (18.87%) and Mediterranean (17.92%). Dysmenorrhea was reduced to 24.53% after three months of the study.*

Conclusion: *Research on endometriosis in Bangladesh reveals a high prevalence of severe cases and delays in diagnosis, necessitating improved diagnostic practices. The causes of endometriosis remain unclear, with hypotheses focusing on nutrition-related factors like metabolism and inflammation. Dietary interventions targeting inflammation may help manage symptoms, but further research is needed for validation.*

Keywords: *Nutrition, endometriosis, diagnosis and diet.*

1. Introduction

Endometriosis is a prevalent gynecological disorder affecting around 10% of women in their reproductive age, characterized by the presence of endometrium-like tissue outside the uterus and myometrium, often accompanied by inflammatory processes [1,2]. This complex condition leads to various clinical manifestations, such as dysmenorrhea, dyschezia, hematochezia, dysuria, hematuria, dyspareunia, chronic pelvic pain, and infertility. Its progressive nature significantly impacts mental, physical, and social well-being [2-4]. Endometriosis is considered a syndrome rather than a singular disease due to its multifaceted nature, emphasizing its systemic implications [4]. Diagnosing endometriosis is challenging, with symptoms overlapping with other conditions like irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and celiac disease (CD) [5]. While it is estimated to occur in 5% to 10% of Western populations, its prevalence is suspected to be higher in Asian women, affecting approximately 15% of them [6,7,8]. In Bangladesh, there are 12 lac patients with endometriosis, and a lack of awareness and

education often leads to delayed diagnosis and disease progression. Treatment strategies involve hormonal therapy, pain management, surgery, and assisted reproductive techniques (ART). However, these approaches may be insufficient or accompanied by side effects, prompting interest in self-management strategies [9-12]. Complementary and alternative medicine, including yoga, heat therapy, acupuncture, physiotherapy, and the use of cannabidiol (CBD) oil, has gained attention. Dietary measures, such as gluten-free, Low FODMAP, and endometriosis diets, are also implemented by women, reporting positive effects on quality of life (QoL) [5,12,13]. While the European endometriosis guidelines recognize the importance of discussing non-medical strategies, there is a scarcity of evidence supporting biochemical mechanisms for dietary interventions, particularly concerning gluten [1,4]. Recent systematic analyses and reviews on diet components and endometriosis need more causal relationships and thorough discussions of plausible mechanisms in the human context, relying heavily on in vitro and animal studies [15,16,19]. Transitioning to the nutritional impact on endometriosis development, it is crucial to recognize it as more than a localized pelvic issue [18,19]. The systemic nature of the condition necessitates a holistic understanding of its etiology and potential avenues for management [20,21]. Recognizing the diagnostic challenges and delayed identification emphasizes the need for exploring alternative approaches, including non-medical strategies and dietary interventions. This study aims to examines associations between endometriosis and dietary interventions.

2. Methodology & Materials

This cross-sectional investigation was carried out at the Holly lab hospital, Brahmanbaria, Bangladesh. The study spanned one year from January 2023 to December 2023. Throughout the study, a total of 106 patients meeting the criteria were recruited and subjected to analysis. All participants received a diagnosis of endometriosis. Throughout the study, a total of 106 patients meeting the criteria were recruited and subjected to analysis. All participants received a diagnosis of endometriosis. A semi-structured questionnaire was employed to gather self-reported sociodemographic information encompassing age, educational level, and employment status. Before data collection, explicit consent was obtained from each participant, and the confidentiality of the data was ensured.

Inclusion Criteria:

Encompassed participants aged over 18 years, limited to females.

Exclusion Criteria:

Pregnant women were excluded.

Participants were asked to self-report the stage of their endometriosis diagnosis, if known, according to the classification system of the American Society of Reproductive Medicine (ASRM) [22], which includes four stages:

1. Stage I (Minimal),
2. Stage II (Mild),
3. Stage III (Moderate),
4. and Stage IV (Severe).

Following the classification of the patients' endometriosis stages, they underwent a prescribed dietary regimen for a duration of three months. Upon completion of the dietary intervention period, we conducted follow-up assessments to evaluate any nutritional effects on endometriosis based on symptom changes.

Data were organized and presented in appropriate tables and graphs based on relevance. Statistical analysis was executed using the Statistical Package for Social Science (SPSS) program on Windows. Continuous parameters were compared using Student's t-test, while categorical parameters were subjected to the Chi-Square test. A significance level of $P<0.05$ was adopted, considering values below this threshold as statistically significant.

3. Results

The demographic characteristics of our study population consisted of 106 individuals. Almost 45% of the study participants were from the age group 36-45 years, 34.50% were from the age group 25-35 years and only 8(8.10%) participants aged between 18-25 years, respectively (Table 1). Regarding educational level, more than half of the study participants had secondary education and only 7(6.60%) patients were illiterate. According to Table 2, Dysmenorrhea emerged as the most prevalent symptom (54.72%), and heavy menstrual bleeding was also common in 30.19% of individuals, retrospectively. Regarding the duration of symptoms, the majority fell within the 4-10 years duration category (33.30%), followed by those with durations of 11-15 years (17.20%) and >20 years (17.90%). Furthermore, a notable proportion reported durations of 1-3 years (13.60%) and 16-20 years (13.90%). The

majority of 40(37.00%) individuals were classified as having severe endometriosis (Stage IV), and moderate endometriosis (Stage III) was also prevalent, comprising 20.40% of participants. Additionally, minimal (Stage I) and mild (Stage II) endometriosis were reported in 23.60% and 19.00% of participants (Table 3). Table 4 demonstrates the treatment and medication used for endometriosis in the study population, where progesterone-like medications and combined estrogen/progestogen medications are equally prevalent, accounting for 32.70% and 32.60%, respectively. A smaller proportion of individuals received menopause-inducing medications (2.00%). Regarding pain relief medication, painkillers, NSAIDs, and opioids were each utilized by a small percentage of individuals (5.80%, 5.30%, and 0.60%). Nutritional and PEA supplements were also used by a subset of individuals with 5.20% and 1.10%, respectively (Table 4). Figure 1 shows the dietary patterns followed by women with endometriosis; most of the responders chose a gluten-free diet (42.45%), 18.87% had an anti-inflammatory diet, 17.92% had a Mediterranean diet and a ketogenic diet 7.55% respectively. Table 5 shows the correlation between dietary models with endometriosis stage; a higher percentage (25.64%) of individuals with stage IV endometriosis followed an anti-inflammatory diet compared to those in earlier stages. Although the Mediterranean diet has no statistically significant correlation with the endometriosis stage (p=0.21), the lowest percentage (12.82%) of individuals with stage IV followed this diet. The Ketogenic diet did not exhibit a significant correlation with the endometriosis stage (p=0.11). In contrast, the Gluten-free diet showed a statistically significant association with the endometriosis stage (p=0.007). A higher proportion (48.72%) of individuals with stage IV endometriosis adhered to a gluten-free diet compared to those in earlier stages. The Low FODMAP diet, Vegetarian/Vegan diet, Low-calorie diet, and Elimination diet did not demonstrate significant associations with the endometriosis stage. After three months of the study period, Dysmenorrhea was reduced to 24.53%, where heavy menstrual bleeding was reported by 13.21% of participants. Other symptoms were reduced to 3.77% (dyspareunia), 2.83% (dyschezia), 1.89% (dysuria), 0.94% (functional bowel symptoms), and 2.83% (chronic pelvic pain) (Table 6).

Table 1. *Demographic characteristics of the study population (N=106).*

Variable	Frequency (n)	Percentage (%)
Age groups (in years)		
18-25	8	8.10
26-35	37	34.50
36-45	48	44.70
≥45	13	12.70
Educational level		
Illiterate	7	6.60
Primary	27	25.47
Secondary	55	51.89
Higher	17	16.04

Table 2. *Type of symptom and duration (N=106).*

Variable	Frequency (n)	Percentage (%)
Type of symptoms		
Dysmenorrhea	58	54.72
Dyspareunia	9	8.49
Dysuria	4	3.77
Dyschezia	6	5.66
Heavy menstrual bleeding	32	30.19
Functional bowel symptoms	3	2.83
Chronic pelvic pain	8	7.55
Years of symptoms (years)		
< 1	1	1.30
1-3	14	13.60
4-10	36	33.30
11-15	18	17.20
16-20	15	13.90
> 20	19	17.90
Did not answer	3	2.80

Table 3. *ARSM endometriosis stages of the study population (N=106).*

Stages	Frequency (n)	Percentage (%)
Minimal (Stage I)	25	23.60
Mild (Stage II)	20	19.00
Moderate (Stage III)	21	20.40
Severe (Stage IV)	40	37.00

Table 4. *Treatment and medication of endometriosis.*

Variable	Frequency (n)	Percentage (%)
Hormonal treatments		
Progesterone-like medications	35	32.70
Combined oestrogen/progestogen medications	35	32.60
Menopause-inducing medications	2	2.00
Pain relief medication		
Pain killers	6	5.80
NSAIDs	6	5.30
Opioids	1	0.60
Nutritional supplements*	6	5.20
PEA supplements	1	1.10

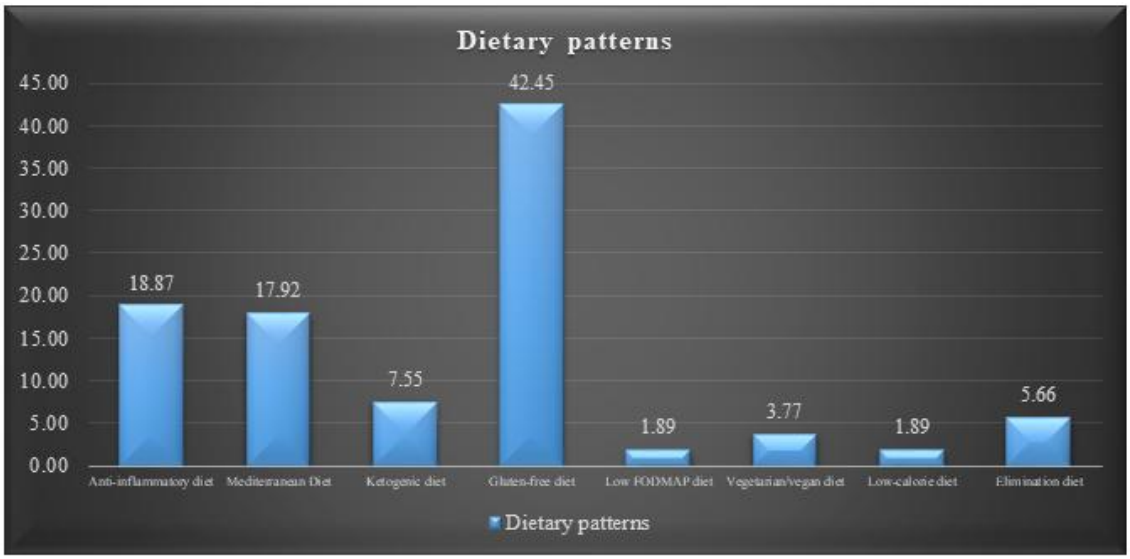

Figure 1. *Dietary patterns followed by women with endometriosis.*

Table 5. *Correlation between dietary models with endometriosis stage.*

Variables	Stage I (n = 25)		Stage II (n = 20)		Stage III (n = 22)		Stage IV (n = 39)		p-value
	n	%	n	%	n	%	n	%	
Anti-inflammatory diet	3	12.00	4	20.00	3	13.64	10	25.64	<0.001
Mediterranean Diet	5	20.00	4	20.00	5	22.73	5	12.82	0.21
Ketogenic diet	3	12.00	2	10.00	1	4.55	2	5.13	0.11
Gluten-free diet	9	36.00	8	40.00	9	40.91	19	48.72	0.007
Low FODMAP diet	1	4.00	0	0.00	1	4.55	0	0.00	0.14
Vegetarian/vegan diet	1	4.00	1	5.00	1	4.55	1	2.56	0.79
Low-calorie diet	1	4.00	0	0.00	0	0.00	1	2.56	0.51
Elimination diet	2	8.00	1	5.00	2	9.09	1	2.56	0.1

Table 6. *Outcome after 3 months of the study (N=106).*

Outcome	Frequency (n)	Percentage (%)
Dysmenorrhea	26	24.53
Dyspareunia	4	3.77
Dysuria	2	1.89
Dyschezia	3	2.83
Heavy menstrual bleeding	14	13.21
Functional bowel symptoms	1	0.94
Chronic pelvic pain	3	2.83

4. DISCUSSION

The study involved a significant cohort comprising 106 participants, establishing a solid foundation for comprehensive data analysis. The noteworthy predominance of women aged 36 to 45, making up 44.70% of the majority, hints at a typical age range for diagnosis or when women typically seek medical assistance [21]. Moreover, the 37% prevalence of women in the severe stage (stage IV) indicates a substantial representation of individuals grappling with the most challenging issues related to endometriosis [21-25]. The discovery of a delay in diagnosis exceeding seven years for 39% of the participants emphasizes the critical importance of timely and accurate diagnosis in endometriosis cases. This delay aligns with observations in other studies, where the average time from initial symptoms to a definitive diagnosis ranged from 4.4 years in the United States to 10.4 years in Germany [26,27]. The primary factors contributing to such delays include intermittent contraceptive use, self-treatment of pain with over-the-counter analgesics, and misdiagnosis. The finding that 66.4% of women altered their dietary habits after an endometriosis diagnosis suggests a significant impact of the disease on how women perceive nutrition and health [28]. The range of reported dietary preferences, including gluten-free, anti-inflammatory, Mediterranean, and ketogenic diets, indicates a diverse exploration of dietary approaches to manage symptoms and enhance overall well-being. Notable differences in dietary preferences based on the disease stage emerged upon analysis. Women diagnosed with severe endometriosis (stage IV) seemed to more frequently adopt an anti-inflammatory diet, avoiding foods high in saturated fats and simple sugars. These findings suggest a potential effort to address inflammation associated with severe endometriosis. Simultaneously, the heightened adherence to an anti-inflammatory diet may signify a response to the severity of symptoms and the necessity to tackle inflammatory processes. Alternatively, distinctions in dietary choices could also stem from women's heightened awareness of the impact of nutrition on health. In an Italian retrospective study, the impact of a gluten-free diet on symptoms associated with endometriosis was investigated [29]. After a 12-month follow-up, 52% of patients reported significant improvements in pain compared to their baseline condition [29]. Notably, around 30% of patients needed to adhere to a gluten-free diet [29]. While a gluten-free diet may be beneficial for those experiencing gastrointestinal-related symptoms like abdominal pain, constipation, bloating, and suspected visceral hypersensitivity, adherence can be compromised by financial constraints and inherent difficulties. The Mediterranean diet potentially provides relief from endometriosis-related pain through synergistic mechanisms. Its antioxidant effects, rich fiber content, and magnesium may positively impact pelvic pain and inflammation [30,31]. Recent preclinical and clinical studies have supported the efficacy of Mediterranean diets and their bioactive compounds in preventing and mitigating various chronic diseases, such as arthritis, asthma, cancer, neurodegenerative disorders, and cardiovascular conditions [32,33]. Consequently, these diets hold promise in alleviating the inflammatory effects associated with endometriosis. This diet promotes the production of endogenous ketones as an alternative metabolic fuel source [34]. Preclinical studies have demonstrated the positive effects of the ketogenic diet on oxidative stress markers and inflammation, which are relevant to endometriosis [35-38]. However, there is currently insufficient scientific evidence to support the use of this dietary protocol for endometriosis. A prospective controlled study demonstrated the anti-inflammatory effects of a nutraceutical containing vitamin B3, omega-3/6, quercetin, calcium salt, 5-methyltetrahydrofolate, parthenium, and turmeric in women with endometriosis [39]. This study revealed significant reductions in pain symptoms and serum levels of CA-125, PGE2, and 17β-estradiol in the group treated with the nutraceutical [39]. Significant pain relief, including improvements in general pain, dysmenorrhea, dyschezia, dyspareunia, and overall condition, was observed in other study as well as our research after providing specific nutrition based on disease stages [40]. A small proportion (5%) of women in our questionnaire reported using this nutraceutical for pain relief. However, prolonged use cannot be recommended due to the unclear long-term safety of dietary antioxidant supplementation beyond six months [41,42]. Notably, the correlation between dietary habit changes, endometriosis stage, and symptom duration suggests that some dietary adjustments may be adaptive responses to symptom severity or disease progression. The results from our study underscore the necessity of providing specific nutritional guidance to women with

endometriosis. There are no established nutritional guidelines for this clinical condition, highlighting the need for clinical trials to identify the optimal nutritional strategies for alleviating endometriosis symptoms.

Limitations of the Study: This cross-sectional study on endometriosis highlights its comprehensive nature but acknowledges limitations. Self-reported data introduces recall bias and the single-center design in Bangladesh limits generalizability. The small sample size may not represent diverse experiences, and the study's cross-sectional design hinders establishing causal relationships, suggesting a need for longitudinal studies.

5. Conclusion And Recommendations

In conclusion, our research provides insights into the demographic, clinical, and dietary aspects of endometriosis among people in Bangladesh. We found a high prevalence of severe cases and significant delays in diagnosis, highlighting the need for improved diagnostic practices. While various hypotheses have been proposed to explain the causes of endometriosis, more conclusive evidence supporting these theories is still needed. Nutrition-related factors such as metabolism, inflammation, and immune function may play a role in the development and symptoms of the disease. Still, more research is needed to validate these claims. We recommend dietary interventions aimed at reducing inflammation and managing pain for individuals with endometriosis. Additionally, further studies are necessary to develop personalized nutritional guidelines that consider individual differences and the severity of the disease.

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