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Understanding Endometriosis: An Analysis of the Clinical and Epidemiological Profile in a Single Private Hospital

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Abstract

Background: Endometriosis is a chronic gynecological disease affecting women of reproductive age and presents heterogeneous clinical manifestations, with deep endometriosis representing a more severe phenotype.

Objective: The primary objective was to characterize the clinical and epidemiological profile of women diagnosed with endometriosis in a private hospital in São Paulo, Brazil. The secondary objective was to explore differences in clinical characteristics, with particular emphasis on body mass index (BMI) and documented thyroid dysfunction, by anatomical subtype and, separately, by documented recurrence status.

Methods: This retrospective observational study included 126 women aged ⩾18 years with a documented diagnosis of endometriosis. Demographic, clinical, anthropometric, laboratory, and comorbidity data were extracted from electronic medical records. Comparative analyses used the available data for each variable. Deep and non-deep endometriosis were defined by the anatomical subtype documented by the treating physician. Overall disease severity was not assessed. Recurrence was defined as physician-documented recurrent endometriosis after treatment during available follow-up. The study was approved by the Research Ethics Committee of Hospital Moriah (approval number: 70654723.9.0000.8054).

Results: The mean age of the 123 participants with available age data was 37.23±6.93 years. Among the 104 women with available subtype classification, 74 (71.2%) had non-deep endometriosis, whereas 30 (28.8%) had deep endometriosis. Magnetic resonance imaging was documented as a diagnostic method in 42 of 78 women with available data (53.8%). Among the 115 women with available obesity data, 101 (87.8%) were classified as non-obese. Women with deep endometriosis had a higher mean body weight than those with non-deep disease (73.11±11.53 kg (n=27) vs. 65.13±10.59 kg (n=69)), with an unadjusted mean difference of 7.99 kg (p=0.002). Hypothyroidism was identified in five of 125 women with available data (4%). Among the 60 women with available recurrence data, hypothyroidism was documented in two of nine women with recurrence (22.2%) and one of 51 women without documented recurrence (2%). This exploratory comparison included three cases of hypothyroidism and did not reach statistical significance (two-sided Fisher's exact test; p=0.056).

Conclusions: Higher mean body weight was observed in women with deep endometriosis in this exploratory analysis. The comparison of hypothyroidism by recurrence status was based on only three documented cases of hypothyroidism and did not reach statistical significance.

Categories: Obstetrics/Gynecology, Pain Management, Quality Improvement
Keywords: body mass index, endometriosis, epidemiology, hypothyroidism, recurrence

Introduction

Endometriosis, a chronic and debilitating condition affecting millions of women of reproductive age globally, is defined by the presence of endometrial-like tissue outside the uterine cavity [1]. This ectopic implantation of endometrial cells is driven by estrogen, leading to abnormal cell proliferation, reduced apoptosis, and increased inflammatory responses [2]. Although considered a benign comorbidity, it affects adjacent organs and is susceptible to recurrence [3]. Its anatomical presentations include superficial peritoneal endometriosis, ovarian endometriomas, and deep endometriosis [4-6]. In addition, this gynecological disorder is linked to a series of clinical manifestations that have a significant impact on women's quality of life, such as chronic pelvic pain, dysmenorrhea, dyspareunia, dysuria, and altered bowel habits, and may also be responsible for infertility [7,8].

In the global context, it is estimated that 5-10% of women are affected by endometriosis, especially women of reproductive age; according to studies, this percentage may be even higher, representing an important public health issue [1,9]. In Brazil, epidemiological data indicates a prevalence similar to the world average, despite the fact that diagnosis is generally late, since many women are oligosymptomatic or have non-specific manifestations, making it difficult to manage patients properly and, consequently, negatively affecting the prognosis of the disease [10].

Observational studies have examined body mass index (BMI) and endocrine or autoimmune comorbidities in women with endometriosis. Findings vary according to whether studies examine symptoms, infertility, lesion distribution, or surgical stage [11]. Studies of thyroid dysfunction and autoimmune thyroid disease have also yielded inconsistent findings [12]. Population-based analyses have reported higher odds of some concomitant autoimmune conditions in women with endometriosis, although methodological limitations and risk of bias constrain interpretation [13]. These findings leave open two distinct questions among women with established endometriosis: whether BMI and documented thyroid dysfunction differ between anatomical subtypes and whether they differ according to documented recurrence after treatment. Examining these comparisons separately can help characterize the patients seen in clinical practice and identify patterns for prospective investigation.

The primary objective of this study was to characterize the clinical and epidemiological profile of women with endometriosis treated at a single private hospital in São Paulo, Brazil. The secondary objective was to explore differences in clinical and demographic characteristics, with particular attention to BMI and documented thyroid dysfunction, between women with deep and non-deep endometriosis and, separately, between women with and without documented recurrence after treatment. Deep and non-deep endometriosis were analyzed as anatomical categories, and recurrence was assessed separately as a post-treatment outcome.

Materials And Methods

Study design and setting

This was a single-center, observational, retrospective, analytical study based on the review of electronic medical records of adult women diagnosed with endometriosis and treated at Hospital Moriah, a private hospital in São Paulo, Brazil. The study included records from patients evaluated during the period from July 2017 to February 2023. This period defined the window for identifying eligible patients. Individual clinical follow-up varied according to the care documented in each patient's record. Because data were obtained retrospectively from routine clinical records, no study-related interventions or changes in patient management were performed.

The study protocol was reviewed and approved by the Research Ethics Committee of Hospital Moriah (approval number: 70654723.9.0000.8054). The requirement for individual informed consent was waived by the Research Ethics Committee because of the retrospective nature of the study and the use of previously collected clinical data. All study procedures were conducted in accordance with applicable ethical and institutional standards, and patient data were handled confidentially.

Study population and sampling

The study population consisted of women aged 18 years or older who received care at Hospital Moriah during the study period and had a diagnosis of endometriosis documented in their electronic medical record. All patients who met the eligibility criteria during the study period were included.

Patients were eligible if they (1) were aged 18 years or older, (2) had sufficient documentation to establish a recorded clinical diagnosis of endometriosis, (3) had clinical follow-up at Hospital Moriah during the study period, and (4) had sufficient demographic information to establish eligibility. Duplicate records and records with insufficient information to establish the diagnosis or eligibility were excluded. Missing data for individual descriptive or comparative variables did not, by themselves, lead to exclusion from the study.

Patients were excluded if their medical records contained insufficient information to confirm the diagnosis of endometriosis, represented duplicate records, or lacked essential demographic information required for study inclusion. Variables that were not essential for study eligibility, including endometriosis subtype, laboratory parameters, and selected clinical characteristics, were treated as missing data when incompletely documented rather than serving as grounds for patient exclusion. Consequently, patients without documented endometriosis subtype remained included in the overall descriptive analyses but were excluded only from subgroup analyses according to disease subtype because the necessary information to classify endometriosis as deep or non-deep was unavailable in their medical records. The participant selection process is summarized in Figure *1*.

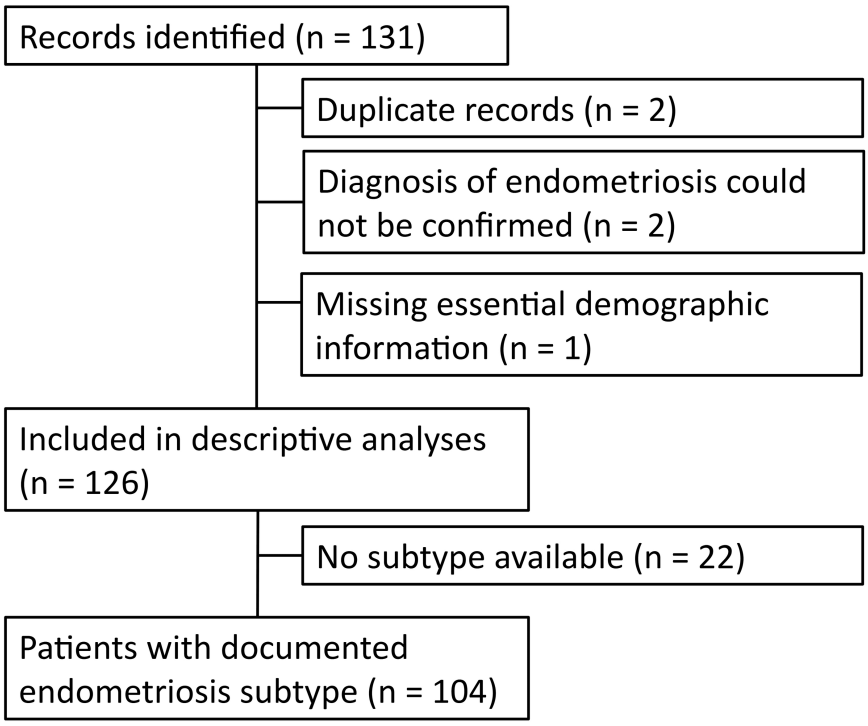


FIGURE 1: Flow diagram of participant selection and subgroup availability

Clinical variables and data collection

Data were retrospectively extracted from electronic medical records using a standardized data collection approach. Variables included demographic characteristics, anthropometric measurements, clinical characteristics of endometriosis, disease subtype, diagnostic methods, treatments, surgical procedures, laboratory findings, recurrence, and documented comorbidities. Measurements and assessments were obtained during routine clinical care, and their timing was not standardized. No additional measurements were performed for the study.

Anthropometric variables included body weight, height, and BMI. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2) when both measurements were available. BMI and thyroid dysfunction were examined in relation to endometriosis subtype and recurrence status.

Endometriosis was classified as deep or non-deep according to the subtype documented by the treating physician. The classification reflected the diagnostic information available during routine care, including imaging, operative findings, or previous specialist documentation, when available. For the analysis, a patient was assigned to the deep or non-deep group only when the corresponding subtype could be established from the recorded clinical classification. The study did not independently review imaging or operative findings, apply a uniform lesion-depth threshold, or adjudicate discrepancies between sources. Records with insufficient documentation to establish the subtype were coded as missing for that variable.

Recurrence was defined as physician-documented recurrent endometriosis after a previous therapeutic intervention during the available clinical follow-up. The comparison group comprised patients with an available recurrence assessment and no documented recurrence. Records with insufficient information to determine recurrence status were treated as missing for that variable. Follow-up duration and treatment strategies varied across patients, and the study did not use a fixed post-treatment assessment interval or require a specific imaging or surgical test to establish recurrence. The recurrence analysis therefore compared documented status during the available follow-up.

Diagnostic procedures and surgical interventions were recorded as documented in the electronic medical record, irrespective of when they occurred during clinical follow-up. Laboratory results were extracted from routine clinical records when available. There was no study-specific schedule for sample collection or laboratory testing. Thyroid dysfunction, including hypothyroidism, was identified from physician-documented diagnoses. Individual laboratory results were not used independently to establish or reclassify thyroid diagnoses. Smoking history, alcohol consumption, and physical activity were considered for data

collection but were omitted from comparative analyses because documentation was incomplete.

Potential confounding factors and missing data

Potential confounders included age, reproductive history, hormonal therapy, previous surgical treatment, comorbidities, lifestyle characteristics, family history of endometriosis, and socioeconomic factors. Several of these variables were inconsistently documented. Multivariable analyses were considered but were not performed because of incomplete data, the limited sample size, and the small number of recurrence events. The resulting comparisons were unadjusted and exploratory, and residual confounding was possible.

Missing values were not imputed. Descriptive summaries used the available observations for each variable. Each subgroup comparison included only patients with data for both the variable being analyzed and the relevant grouping variable. Percentages were calculated using the number of patients with available data for that variable in the overall sample or within the corresponding group. Variable-specific and group-specific sample sizes are reported in the Results tables. Missingness patterns by subtype or recurrence status were not formally assessed.

Sample size

No a priori sample size calculation was performed. The sample size was determined by the number of patients meeting the eligibility criteria during the study period. The final cohort consisted of 126 women. Endometriosis subtype was available for 104 women, and recurrence status was available for 60 women, including nine with documented recurrence. The number of observations contributing to individual comparisons varied according to data availability. Comparisons involving small groups or few events were interpreted as exploratory, and a nonsignificant result was not taken as evidence of equivalence.

Data management and statistical analysis

Data were entered into a study-specific Microsoft Excel database (Microsoft Corporation, Redmond, Washington, United States) and analyzed using SPSS Statistics for Windows, Version 15.0 (SPSS Inc., Chicago, Illinois, United States). Continuous variables were summarized as mean±standard deviation (SD) and categorical variables as counts and percentages. The distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. The SPSS independent-samples test output included Levene's test to assess the equality of variances.

Comparisons were performed between women with deep and non-deep endometriosis and between women with and without documented recurrence. Approximately normally distributed continuous variables were compared using an independent-samples t-test. The Mann-Whitney U test was used for continuous variables analyzed nonparametrically. Categorical variables were compared using Pearson's chi-squared test or Fisher's exact test, taking expected cell frequencies into account.

The tables report the test applied, the corresponding statistic and degrees of freedom where applicable, and the associated p-value. For Fisher's exact test, the exact p-value is reported. All tests were two-sided. The nominal significance threshold was $p<0.05$. No adjustment for multiple comparisons was made. Findings were interpreted in light of the exploratory design, the variable-specific sample sizes, and the small number of observations in some subgroups.

Results

The study included 126 women diagnosed with endometriosis. Age was available for 123 women, with a mean of 37.23±6.93 years (Table *1*). Among the 104 women with available endometriosis subtype classification, 74 (71.2%) had non-deep endometriosis, and 30 (28.8%) had deep endometriosis. Among the 115 women with available obesity data, 101 (87.8%) were not classified as obese, and 14 (12.2%) were classified as obese. Magnetic resonance imaging was documented as a diagnostic method in 42 of 78 women (53.8%), while transvaginal ultrasound was documented in 41 of 73 women (56.2%). Hypothyroidism was identified in five of 125 women (4%). Additional clinical characteristics, comorbidities, diagnostic methods, and surgical procedures are presented in Table *2*.

Variable	Available n	Mean±SD
Age (years)	123	37.23±6.93
Weight (kg)	114	67.82±11.68
Height (cm)	114	162.68±5.94
BMI (kg/m²)	114	25.58±4.07
Leukocyte count	70	7337.86±2244.47
Platelet count	70	269485.71±44516.32
Urea	56	25.63±8.12
Creatinine	62	0.75±0.16
Glucose	47	91.55±10.85
CA-125	21	26.03±20.72
CA 19-9	6	16.70±9.26
Hemoglobin	72	12.80±1.20
AST	42	16.40±3.74
ALT	41	14.34±5.90

TABLE 1: Demographic, anthropometric, and laboratory characteristics of patients with endometriosis (overall N=126)

Available n is the number of women with data for each variable.

ALT: alanine aminotransferase; AST: aspartate aminotransferase; BMI: body mass index; CA-125: cancer antigen 125; CA 19-9: carbohydrate antigen 19-9; SD: standard deviation

Variable	Available n	Missing n	Present or category count, n (%)	Absent, n (%)
Endometriosis subtype				
Deep endometriosis	104	22	30 (28.8)	-
Non-deep endometriosis	104	22	74 (71.2)	-
Previous pregnancy	17	109	15 (88.2)	2 (11.8)
Comorbidities				
Obesity	115	11	14 (12.2)	101 (87.8)
Overweight	115	11	49 (42.6)	66 (57.4)
Hyperthyroidism	125	1	1 (0.8)	124 (99.2)
Hypothyroidism	125	1	5 (4)	120 (96)
Arterial hypertension	124	2	3 (2.4)	121 (97.6)
Other comorbidities	124	2	17 (13.7)	107 (86.3)
Diagnostic method				
Magnetic resonance Imaging	78	48	42 (53.8)	36 (46.2)
Transvaginal ultrasound	73	53	41 (56.2)	32 (43.8)
Laparoscopy	69	57	11 (15.9)	58 (84.1)
Surgical procedures				
Total hysterectomy	113	13	22 (19.5)	91 (80.5)
Partial hysterectomy	114	12	9 (7.9)	105 (92.1)
Oophorectomy	114	12	2 (1.8)	112 (98.2)
Oophoroplasty	114	12	13 (11.4)	101 (88.6)
Salpingectomy	114	12	21 (18.4)	93 (81.6)
Rectosigmoidoscopy/rectal resection	114	12	10 (8.8)	104 (91.2)
Cystectomy/vesical resection	113	13	6 (5.3)	107 (94.7)
Recurrence after intervention	60	66	9 (15)	51 (85)

TABLE 2: Clinical characteristics, comorbidities, diagnostic methods, and surgical procedures in patients with endometriosis (overall N=126)

Percentages are based on the available n for each variable. The subtype categories share the same 104 classified women and 22 women with missing subtype data.

In comparisons according to endometriosis subtype, women with deep endometriosis had a higher mean body weight than those with non-deep endometriosis (73.11±11.53 kg (n=27) vs. 65.13±10.59 kg (n=69)). This difference met the nominal significance threshold (t(94)=−3.240; p=0.002). BMI was also higher in women with deep endometriosis than in those with non-deep endometriosis (27.06±4.12 kg/m² (n=27) vs. 24.75±3.65 kg/m² (n=69), and the difference was statistically significant (Mann-Whitney U=497.500; p<0.001). No statistically significant differences were observed for age, height, leukocyte count, platelet count, urea, creatinine, glucose, hemoglobin, aspartate aminotransferase (AST), or alanine aminotransferase (ALT) (Table 3).

Variable	Deep n	Deep, mean±SD	Non-deep n	Non-deep, mean±SD	Test statistic	P-value
Age (years)	30	37.70±6.48	74	37.16±6.73	-0.373 (102)	0.710
Weight (kg)	27	73.11±11.53	69	65.13±10.59	-3.240 (94)	0.002
Height (cm)	27	164.30±5.37	69	162.01±5.69	-1.794 (94)	0.076
BMI (kg/m²)	27	27.06±4.12	69	24.75±3.65	U=497.500	<0.001
Leukocytes	22	7325.45±2256.42	39	7155.38±2333.71	-0.277 (59)	0.783
Platelet count	22	269363.64±51354.55	39	265102.56±37538.61	-0.372 (59)	0.711
Urea	16	25.50±6.14	34	25.41±8.06	-0.039 (48)	0.969
Creatinine	19	0.74±0.09	37	0.76±0.19	0.504 (54)	0.616
Glucose	19	92.63±14.17	24	89.75±7.04	-0.872 (41)	0.388
CA-125	6	20.03±10.24	11	31.95±24.93	0.726 (15)	0.462
Hemoglobin	22	12.66±1.07	40	12.90±1.15	0.792 (60)	0.432
AST	12	16.33±2.31	28	16.50±4.3	0.126 (38)	0.900
ALT	11	14.73±4.03	28	14.36±6.71	-0.171 (37)	0.866

TABLE 3: Comparison of demographic, anthropometric, and laboratory characteristics between patients with deep and non-deep endometriosis

ALT: alanine aminotransferase; AST: aspartate aminotransferase; BMI: body mass index; CA-125: cancer antigen 125; df: degrees of freedom; SD: standard deviation

Hypothyroidism was observed in two of 30 women with deep endometriosis (6.7%) and two of 74 women with non-deep endometriosis (2.7%), with no statistically significant difference between groups (p=0.577). Obesity was observed in six of 27 women with deep endometriosis (22.2%) and five of 70 women with non-deep endometriosis (7.1%). This difference did not reach statistical significance (p=0.067). Among surgical procedures, oophoroplasty was more frequently recorded in women with deep endometriosis than in those with non-deep endometriosis (7/30 (23.3%) vs. 5/70 (7.1%)). This exploratory comparison met the nominal significance threshold (p=0.040). No other categorical comparison reached the nominal significance threshold (Table *4*).

Variable	Deep endometriosis, n/N (%)	Non-deep endometriosis, n/N (%)	Statistical test	P-value
Comorbidities				
Obesity	6/27 (22.2)	5/70 (7.1)	Fisher's exact test	0.067
Overweight	11/27 (40.7)	30/70 (42.9)	Pearson's $\chi^2(1)=0.036$	0.850
Hyperthyroidism	0/30 (0)	1/74 (1.4)	Fisher's exact test	1.000
Hypothyroidism	2/30 (6.7)	2/74 (2.7)	Fisher's exact test	0.577
Arterial hypertension	0/30 (0)	3/73 (4.1)	Fisher's exact test	0.554
Diagnostic methods				
Magnetic resonance imaging	12/20 (60)	27/49 (55.1)	Fisher's exact test	0.793
Transvaginal ultrasound	9/16 (56.3)	25/48 (52.1)	Fisher's exact test	1.000
Laparoscopy	1/14 (7.1)	9/46 (19.6)	Fisher's exact test	0.427
Surgical procedures				
Total hysterectomy	9/30 (30)	11/70 (15.7)	Fisher's exact test	0.111
Partial hysterectomy	2/30 (6.7)	5/70 (7.1)	Fisher's exact test	1.000
Oophorectomy	0/30 (0)	2/70 (2.9)	Fisher's exact test	1.000
Oophoroplasty	7/30 (23.3)	5/70 (7.1)	Fisher's exact test	0.040
Salpingectomy	7/30 (23.3)	11/70 (15.7)	Fisher's exact test	0.401
Rectosigmoidoscopy/rectal resection	5/30 (16.7)	5/70 (7.1)	Fisher's exact test	0.161
Cystectomy/bladder resection	3/29 (10.3)	3/70 (4.3)	Fisher's exact test	0.355

TABLE 4: Comparison of clinical characteristics between patients with deep and non-deep endometriosis

n is the number of women with the characteristic. N is the number with available data for that variable within each group. All p-values are two-sided and unadjusted for multiple comparisons.

Recurrence status after intervention was available for 60 of the 126 women. Among these 60 women, nine (15%) had documented recurrence, while 51 (85%) had no documented recurrence. Comparisons between women with and without documented recurrence showed no statistically significant differences in age, weight, height, leukocyte count, platelet count, urea, creatinine, glucose, hemoglobin, AST, or ALT. The number of women with recurrence contributing to these comparisons ranged from 4 to 9 (Table *5*).

Variable	Recurrence n	Recurrence, mean±SD	No recurrence n	No recurrence, mean±SD	t (df)	P-value
Age (years)	9	34.33±7.35	51	37.02±6.75	1.087 (58)	0.281
Weight (kg)	9	67.59±10.65	47	68.45±12.86	0.189 (54)	0.851
Height (cm)	9	163.33±7.67	47	163.06±5.33	-0.129 (54)	0.898
BMI (kg/m²)	9	25.63±4.20	47	25.46±4.77	-0.039 (54)	0.969
Leukocytes	8	8058.75±3584.50	30	7439±2326.52	-0.595 (36)	0.556
Platelet count	8	246500.00±41355.60	30	269700±37536.33	1.522 (36)	0.137
Urea	6	22.00±5.97	24	26.67±8.53	1.257 (28)	0.219
Creatinine	7	0.71±0.13	27	0.81±0.20	1.221 (32)	0.231
Glucose	4	90.25±8.42	19	90.47±14.28	0.030 (21)	0.976
CA-125	3	18.45±11.72	9	29.33±17.89	0.558 (10)	0.244
Hemoglobin	8	13.21±0.75	31	12.76±1.24	-0.992 (37)	0.328
AST	4	15.75±4.92	22	16.86±4.04	0.492 (24)	0.627
ALT	4	13.00±6.78	22	15.05±6.36	0.587 (24)	0.563

TABLE 5: Comparison of demographic, anthropometric, and laboratory characteristics according to endometriosis recurrence

Continuous variables were compared using Student's t-test. Statistical significance was defined as p<0.05.

ALT: alanine aminotransferase; AST: aspartate aminotransferase; BMI: body mass index; CA-125: cancer antigen 125; df: degrees of freedom; SD: standard deviation

Hypothyroidism was recorded in two of nine women with recurrence (22.2%) and one of 51 women without documented recurrence (2%). This exploratory comparison was based on three documented cases of hypothyroidism and did not reach statistical significance (two-sided Fisher's exact test; p=0.056). Comparisons for obesity, overweight, hyperthyroidism, and arterial hypertension also did not reach statistical significance (Table *6*).

Comorbidity	With recurrence, n/N (%)	Without documented recurrence, n/N (%)	Statistical test	P-value
Obesity	2/9 (22.2)	7/47 (14.9)	Fisher's exact test	0.626
Overweight	2/9 (22.2)	21/47 (44.7)	Fisher's exact test	0.282
Hyperthyroidism	0/9 (0)	1/51 (2)	Fisher's exact test	1.000
Hypothyroidism	2/9 (22.2)	1/51 (2)	Fisher's exact test	0.056
Arterial hypertension	0/9 (0)	2/50 (4)	Fisher's exact test	1.000

TABLE 6: Comparison of comorbidities according to endometriosis recurrence

n is the number of women with the comorbidity. N is the number with available data for that variable within each group. All p-values are two-sided and unadjusted for multiple comparisons.

Discussion

Our findings demonstrate that women diagnosed with deep endometriosis presented higher body weight and BMI values compared with those with non-deep disease. Although several studies have reported an inverse association between BMI and endometriosis when disease severity is not considered, this relationship appears to vary according to disease phenotype and anatomical extent, highlighting the complexity of the association between adiposity and endometriosis presentation [11,14]. Previous

investigations have suggested that women with deep infiltrating endometriosis may exhibit distinct anthropometric profiles compared with other phenotypes, although the direction of this association remains inconsistent across studies [11,14]. Therefore, our findings should not be interpreted as evidence that higher BMI contributes directly to the development or progression of deep endometriosis, but rather as an observation of anthropometric differences within a specific clinical population. These results reinforce the importance of stratifying endometriosis according to subtype and anatomical involvement, as analyses combining superficial, ovarian, and deep disease may obscure clinically relevant heterogeneity [15].

The contradictory findings reported in the literature regarding BMI and endometriosis phenotype deserve consideration. While some studies have identified higher BMI among women with deep disease or advanced phenotypes, others have reported an inverse association between obesity and endometriosis, including lower BMI among patients with deep infiltrating endometriosis [11,14]. A case-control study reported significantly lower BMI among women with deep infiltrating endometriosis compared with control participants, suggesting that the association between adiposity and endometriosis phenotype may be complex and not necessarily follow a linear relationship [14]. Similarly, other studies have suggested that lower BMI may be associated with increased risk of endometriosis diagnosis, particularly when disease occurrence rather than anatomical severity is evaluated [11,16]. These discrepancies may reflect differences in study populations, diagnostic criteria, disease classification systems, treatment pathways, and the possibility of selection or diagnostic biases. Therefore, the association between BMI and endometriosis remains complex and likely depends on the interaction between biological, clinical, and methodological factors.

From a biological standpoint, adipose tissue plays an important role in estrogen metabolism, acting as an endocrine organ capable of producing and storing estrogens, which are central components of endometriosis pathophysiology [17,18]. Increased adiposity may influence systemic hormonal environments through altered estrogen metabolism, inflammatory signaling, and adipokine production [19]. Estrogens synthesized in adipose tissue, including estrone and estradiol, contribute to peripheral estrogen exposure; however, direct evidence linking adiposity-related hormonal changes to the development of deep endometriosis remains limited [17,20]. Accordingly, the biological mechanisms proposed to explain the association between BMI and endometriosis phenotype should be considered plausible hypotheses rather than demonstrated pathways in the present study.

Alternative explanations should also be considered. Hong and Yi suggested that the inverse association between obesity and endometriosis observed in some studies may partly result from diagnostic bias, as obese women with pelvic pain may experience delayed diagnosis due to differences in clinical evaluation, imaging interpretation, or likelihood of undergoing laparoscopy [21]. Consequently, women with higher BMI who ultimately receive a diagnosis of deep endometriosis may represent a subgroup in whom diagnosis occurred later in the disease course rather than individuals in whom obesity directly contributed to lesion development. Additionally, obesity may influence diagnostic accuracy because increased adiposity can present technical challenges for pelvic imaging and clinical examination, potentially affecting disease recognition [22,23].

Regarding anthropometric components, no statistically significant differences in height were observed between deep and non-deep endometriosis groups, suggesting that the BMI difference observed in this cohort was primarily related to variations in body weight rather than stature. However, BMI remains an indirect measure of adiposity and does not distinguish between fat mass, lean mass, or fat distribution. Therefore, future studies incorporating more detailed assessments of body composition may provide additional insight into the relationship between metabolic characteristics and endometriosis phenotype [15].

The relationship between endometriosis and thyroid dysfunction has also received increasing attention because of possible shared inflammatory and immune-mediated pathways. In a prospective observational study involving 102 women, Şerifoğlu et al. reported differences in thyroid-related parameters among specific endometriosis subgroups, including lower free thyroxine levels and higher anti-thyroid peroxidase antibody levels among women with bilateral endometriomas compared with those with unilateral disease [24]. However, these findings were phenotype-specific and do not establish a causal relationship between thyroid dysfunction and endometriosis progression. Similarly, previous studies have proposed that autoimmune alterations may occur as a consequence of chronic inflammation associated with endometriosis rather than representing an initiating mechanism [13,25].

In the present study, hypothyroidism was numerically more frequent among women with endometriosis recurrence; however, this difference was not statistically significant. Importantly, this analysis included only three patients with documented hypothyroidism and nine recurrence events, substantially limiting statistical precision and increasing the possibility of an unstable estimate. Therefore, this finding should be interpreted exclusively as a preliminary exploratory observation and should not be considered evidence that hypothyroidism is associated with recurrence risk or has prognostic value. Furthermore, thyroid dysfunction was identified based on physician-documented diagnoses in electronic medical records rather than standardized laboratory evaluation; therefore, it was not possible to differentiate autoimmune from non-autoimmune hypothyroidism or assess thyroid antibody status.

The available literature regarding thyroid dysfunction and endometriosis remains inconsistent. Petta et al. found no significant differences in thyroid disorders, thyroid dysfunction, or thyroid autoantibody positivity between women with surgically confirmed endometriosis and controls, and thyroid abnormalities were not associated with disease stage [12]. Similarly, Şerifoğlu et al. did not identify significant differences in thyroid-stimulating hormone or anti-thyroid peroxidase antibody levels between women with and without endometriosis, although differences were observed in specific clinical subgroups [24]. A recent review by Kirkegaard et al. highlighted substantial methodological heterogeneity among studies investigating endometriosis and thyroid disease, emphasizing that current evidence remains insufficient to establish a consistent association [26].

More recent population-based studies have further expanded this discussion but have produced conflicting results. Shih et al., in a large retrospective cohort study involving 118,360 women after propensity score matching, reported an increased risk of hypothyroidism among women with endometriosis compared with controls (HR=1.19; 95% CI: 1.13-1.25) [27]. However, this study evaluated the subsequent occurrence of thyroid disorders after endometriosis diagnosis and did not investigate recurrence after treatment. Conversely, Shi et al., using bidirectional Mendelian randomization combined with an independent clinical cohort, found no robust evidence supporting a causal relationship between autoimmune hypothyroidism and endometriosis [28]. Similarly, a multicenter observational study reported a positive but statistically inconclusive association between endometriosis and autoimmune thyroid disease [29]. Collectively, these findings suggest that thyroid dysfunction and endometriosis may coexist in some populations, but whether thyroid abnormalities influence disease persistence or recurrence remains unknown.

Interpretation of recurrence findings also requires consideration of methodological limitations related to recurrence assessment. According to the European Society of Human Reproduction and Embryology (ESHRE) guidelines, recurrence may be defined according to the reappearance of symptoms, radiological findings, or surgically confirmed lesions, among other criteria [30]. Differences in definitions, treatment strategies, and follow-up duration may substantially influence recurrence estimates. A systematic review and meta-analysis by Veth et al. demonstrated that recurrence rates after surgery for ovarian endometriomas vary considerably according to postoperative management and observation time, emphasizing the importance of standardized longitudinal assessment [31]. In the present study, follow-up duration was not standardized, and recurrence information depended on available documentation in medical records. Therefore, the higher frequency of hypothyroidism among women with recurrence should be interpreted as a hypothesis-generating finding rather than a clinically established association.

The interpretation of these findings should take into account certain methodological considerations. First, the retrospective observational design prevents causal inference, and the observed associations between BMI, hypothyroidism, and endometriosis phenotype should be interpreted as exploratory rather than predictive or prognostic relationships. Second, the single-center design involving women treated at a private hospital may limit external validity and generalizability to broader Brazilian populations, particularly those receiving care in different healthcare settings or with different socioeconomic characteristics. Selection bias cannot be excluded because patients treated in referral private institutions may differ systematically from the general population of women with endometriosis.

Additionally, several relevant potential confounders, including lifestyle habits, socioeconomic characteristics, hormonal therapy, reproductive history, and family history of endometriosis, were not consistently available in medical records and could not be incorporated into adjusted analyses. Missing information regarding endometriosis subtype classification also limited subgroup comparisons, and available-case analyses may introduce selection bias if missingness was related to clinical characteristics. Furthermore, recurrence assessment may have been influenced by variability in follow-up duration among patients, as standardized longitudinal monitoring was not available in this retrospective dataset. Finally, the small number of recurrence events reduced statistical power and prevented robust multivariable modeling. Consequently, the principal findings should be considered descriptive observations that contribute to the clinical characterization of women with endometriosis rather than evidence of causal mechanisms or clinically applicable prognostic markers.

Although biological mechanisms involving adiposity, hormonal regulation, inflammation, and immune dysfunction may plausibly contribute to differences observed among endometriosis phenotypes, the present study does not provide mechanistic evidence to confirm these pathways. Larger prospective multicenter studies incorporating standardized disease classification, detailed metabolic and endocrine evaluation, and longitudinal follow-up are necessary to clarify the clinical relevance of these associations.

Conclusions

Women with deep endometriosis in this cohort exhibited higher body weight and BMI values than those with non-deep endometriosis. A higher frequency of hypothyroidism was observed among women with disease recurrence; however, this finding was not statistically significant and should be considered preliminary. Given the retrospective observational design, these results should be interpreted as descriptive and exploratory rather than prognostic or causal. This study contributes to the characterization of the clinical and epidemiological profile of women with endometriosis treated in a specialized private hospital setting.

Larger prospective studies incorporating standardized disease classification, longitudinal follow-up, and comprehensive assessment of potential confounding factors are needed to further investigate these associations.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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