Original Article

# Differences in Clinical Management and Outcomes of American Indian and White Women Diagnosed With Endometriosis

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## Abstract

**Objective:** Endometriosis is a chronic, painful disease that can be disabling. There is a scarcity of research on the clinical management and outcomes of endometriosis in American Indian (AI) women. The aim of this study was to determine whether there are discrepancies between AI and White women in symptoms at presentation, initial diagnosis methods, clinical management, and long-term outcomes of endometriosis, in a rural state.

**Materials and methods:** This retrospective study described and compared the clinical management and long-term outcomes of AI and White women diagnosed with endometriosis. All statistical tests were two-tailed with p-value < .05 considered to be significant.

**Results:** 110 women diagnosed with endometriosis were included in the study, with 50% (n = 55) AI and 50% (n = 55) White. White women were more likely to have private insurance (80% vs. 42%; p < 0.001). AI women were more likely than White women to report abdominal pain at diagnosis (20.3% vs. 9%; p = 0.010), and be diagnosed with mild endometriosis symptoms at the initial visit, (44.4% vs. 10%; p = 0.051). White women were more likely to report a reduction or cessation of pain compared to AI women (63.3% vs. 34%; p = 0.004).

**Conclusion:** We found the majority of women continue to report pain long after endometriosis diagnosis. AI women were less likely to report a reduction or cessation of pain. Future research should investigate why pain is more persistent in AI women.

**Keywords:** Endometriosis; Race; Rural; Management; Outcomes; Epidemiology

## Introduction

Endometriosis is characterized by the presence of endometrial glands and stroma-like lesions outside of the uterus (1). The lesions can involve the ovaries, peritoneum, or other organs – either with superficial implants or deep infiltrating disease (2).

Endometriosis affects 10% to 15% of all women of reproductive age (1). The chief complaints of endometriosis are infertility and chronic pelvic pain. As high as 40% of infertile women and one-third of women who undergo laparoscopy for chronic pelvic pain have endometriosis (3).

Long diagnostic delays between initial symptoms and laparoscopic diagnosis of endometriosis has

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resulted in diminished quality of life (4). Women with endometriosis-associated symptoms achieved a mean of 0.809 quality-adjusted life years in a year. This corresponds to a decrease in quality of life of 19% when compared with a woman with the best possible health state (5).

Treatment usually begins with medication; this can be followed by surgery for unrelenting disease (6). Laparotomy and total abdominal hysterectomy had significantly longer hospital length of stay than other endometriosis related procedures. Lastly, laparotomy, total abdominal hysterectomy, and other operations on the uterus had significantly higher mean total charges than other procedures (7).

The incidence of endometriosis has been reported to vary by race and the data is conflicting. White women are at greater risk of developing endometriosis than Black women (8, 9, 10). Japanese women had a higher incidence than both White or Black women, 9.2% vs. 2.8% and 1.9% (11). A recent study (12) revealed that Black women had significantly higher risk for endometriosis (OR = 2.42; 95% CI: 1.65-3.55) than other racial/ethnic groups.

Several prevalence studies have also shown conflicting results regarding endometriosis in different race/ethnic groups. For example, Asian women undergoing infertility evaluation or laparoscopy for pelvic pain had a higher prevalence of endometriosis compared with White women (51% vs. 22%; P < .001) (10, 13). However, in the Nurses' Health Study II, Asian women did not show a difference in the risk of self-reported endometriosis compared to White women. Black and Hispanic women were 40% less likely to be diagnosed with endometriosis than White women (14), while other studies have found no differences in the prevalence of endometriosis between any racial/ethnic groups (15, 16). Lastly, in infertile women, the prevalence of endometriosis has been shown to be higher in White than Black women (33% and 23%; respectively) (17). To our knowledge, there are no data on prevalence, clinical management of endometriosis and outcomes among American Indian women.

Approximately 1% of the American population is comprised of American Indians with 43 tribes located in the Northern Plains (Montana, Nebraska, North Dakota, South Dakota, Wyoming). In this area, this race group comprises up to 6.5% of the population (18). American Indians experience poor health in most health categories as compared to other groups (19). Limited access to health care is a significant contributing factor to poor health (20). Access to healthcare facilities may be difficult due to travel difficulty resulting from distance, long-harsh winter conditions, and the absence of public transportation systems in rural areas. North Dakota's rural population represents 39.4% of the state's total population (21).

The aim of this study was to determine whether there are discrepancies between American Indian and White women in the symptoms at presentation, the initial diagnosis, clinical management, and long-term outcomes of endometriosis, in a rural state.

## Materials and methods

***Data sources:*** We conducted a retrospective electronic medical charts review of females diagnosed with endometriosis between January 1, 2012 and December 31, 2016 at Sanford Health which serves North Dakota, South Dakota and part of Minnesota. It is the largest, rural, not-for-profit health care system in the nation employing more than 1300 physicians in more than 80 specialty areas of medicine. The American Indian (AI) population is the largest minority in North Dakota and South Dakota, representing approximately 6% and 9% of the state population, respectively.

***Study design***: The inclusion criteria were White and AI women with endometriosis diagnosed between 2012 and 2016 using a report present in the electronic medical records. The exclusion criteria included race other than Whites and AI. Medical records indexed during the study period under International Classification of Diseases codes for endometriosis (ICD-9: 617.x and ICD-10: N80.x), infertility (ICD-9: 628 and ICD-10: N97), pelvic pain (ICD-9: 625.x and ICD-10: R10, R10.2), and stromal (236.0).

Overall, there were 149 women diagnosed with endometriosis. There were 56 AI women diagnosed with endometriosis out of which we randomly selected 55 women. These were age-matched with 55 White women, out of the total 93 White women diagnosed with endometriosis. Author AS abstracted all the data from the medical charts.

Women with a clinical history suggestive of endometriosis but no recorded physician's diagnosis were excluded because the variable symptomatology of endometriosis overlaps with that of other diseases.

The diagnosis of endometriosis was made either surgically (with histological confirmation or the visualization of gross lesions) or clinically in women presenting with at least one of the following signs and symptoms: dysmenorrhea, dyspareunia, chronic pelvic pain, acute pelvic pain, or menstrual problems

(menorrhagia and/or metrorrhagia).

Women's socio-demographic characteristics, reported endometriosis-related symptoms, diagnostic method of endometriosis, disease management, and outcomes information were abstracted using electronic medical records. All the variables are listed in the tables of the results section.

We used the American Society for Reproductive Medicine (22) to categorize endometriosis stages into: (I-minimal, II-mild, III-moderate, and IV-severe) depending on location, extent, and depth of endometriosis implants; presence and severity of adhesions; and presence and size of ovarian endometriomas.

***Statistical analysis:*** Median and range values were assessed for continuous variables, and frequency distributions were determined for categorical variables. We compared AI to White women, all of whom were diagnosed with endometriosis, on demographic and clinical variables using Wilcoxon signed-rank test for non-normally distributed continuous variables and Chi-square or Fisher's exact tests for categorical variables. All statistical tests were two-tailed with $p < .05$ considered to be significant. Statistics were performed using SAS v 9.4 (SAS Institute, Cary, NC).

## Results

The study population consisted of 110 women diagnosed with endometriosis, with 50% (n = 55) self-identified as American Indian (AI) and 50% (n = 55) Whites (Table 1).

**Table 1:** Characteristics of women diagnosed with endometriosis by race

| Variables | White | American Indian | P value |
|---|---|---|---|
| | 100% (n = 55) | 100% (n = 55) | |
| Age, years Median [Range] | 29 [15-46] | 26 [15-49] | 0.146 |
| Insurance status | | | < 0.001 |
| None | 5.5 (3) | 10.9 (6) | |
| Medicaid/Medicare | 14.5 (8) | 41.8 (23) | |
| Indian Health Service | 0.0 (0) | 7.3 (4) | |
| Other including private | 80.0 (44) | 42.0 (22) | |
| Symptoms at first visit[¶] | | | 0.010 |
| None | 0.8 (1) | 0.0 (0) | |
| Pelvic pain | 35.2 (43) | 34.1 (42) | |
| Dysmenorrhea | 20.5 (25) | 14.6 (18) | |
| Abdominal pain | 9.0 (11) | 20.3 (25) | |
| Menorrhagia | 5.7 (7) | 8.9 (11) | |
| Dyspareunia | 11.5 (14) | 11.4 (14) | |
| Metrorrhagia | 2.5 (3) | 3.3 (4) | |
| Infertility | 9.0 (11) | 2.4 (3) | |
| Back pain | 1.6 (2) | 4.9 (6) | |
| Other[†] | 4.1 (5) | 0.0 (0) | |
| Symptom severity[§] | | | 0.239 |
| Mild | 20.0 (3) | 3.6 (1) | |
| Moderate | 40.0 (6) | 53.6 (15) | |
| Severe | 40.0 (6) | 42.8 (12) | |
| Stage of endometriosis at diagnosis | | | 0.051 |
| Minimal (I) | 35.0 (7) | 16.7 (3) | |
| Mild (II) | 10.0 (2) | 44.4 (8) | |
| Moderate (III) | 20.0 (4) | 27.8 (5) | |
| Severe (IV) | 35.0 (7) | 11.1 (2) | |
| Diagnosing Physician | | | 0.367 |
| Gynecologist | 75.7 (31) | 88.6 (28) | |
| Primary care | 16.2 (3) | 8.5 (6) | |
| General surgeon | 8.1 (1) | 2.9 (3) | |
| Diagnostic method | | | 0.782 |
| Clinical | 6.5 (3) | 10.6 (5) | |
| Laparoscopy | 82.6 (38) | 83.0 (39) | |
| Hysterectomy | 4.4 (2) | 4.3 (2) | |
| Other[‡] | 6.5 (3) | 2.1(1) | |

P values were calculated excluding missing and using Fisher's exact test when indicated
[¶] n > 55 due to multiple responses; [§] n < 55 due to missing
[†] Dyschezia, amenorrhea, painful abdominal mass; [‡] Another surgery or ultrasound

White women were more likely to have private insurance (80% vs. 42%; p = .000) (Table 1). Conversely, AI women were more likely to report abdominal pain at diagnosis (20.3% vs. 9%; p = .010) and be diagnosed with mild endometriosis symptoms at the initial visit (44.4% vs. 10%; p = .051) (Table 1). White women were more likely to report a reduction or cessation of pain compared to AI women (63.3% vs. 34%; p = .004) (Table 2).

No association was found between race and age, symptom severity, diagnosing physician, diagnostic method, initial treatment, pharmacology therapy, time from medication to surgery and if a hysterectomy is performed.

## Discussion

This study found that the majority of women reported continued pain. American Indian (AI) women were less likely to report a reduction or cessation of pain. This finding could be due to differences in pathophysiology, response to therapy, provider bias, or drug seeking behavior. Significant disparities exist across many health dimensions between American Indians (AIs) and their White counterparts (23). With few urban centers, access to care is a challenge for many people in the Northern Great Plains, especially AIs who often live in the most rural and medically underserved areas (24). Some specialty clinics can be hours away from a patient's residence. Indian Health Services improves access to health care but with limited success. Zuckerman et al. (24) found that over half of AIs have reported difficulty obtaining appointments in primary care, this is likely even more challenging to receive specialty care services such as gynecology.

Affordability of health care could be another factor contributing to the observed differences. We found White women were more likely to have private insurance and AI women government insurance. It has been noted that populations without insurance are significantly more likely to have poor outcomes related to chronic disease (25). This may help to explain our finding regarding difference in long-term outcomes, in that AI women were less likely than White women to report a reduction or cessation of pain. Even with symptom control, recurrence is common and estimated as 20% to 50% at 2-years and 40% to 50% at 5-years post-surgery (26). Differences in pathophysiology between races could contribute to this discrepancy. However, the genetic impact of race on disease pathophysiology is likely overestimated; and this conjecture should be deemphasized because this attribute is closely interconnected with social and cultural beliefs (27). Lastly, this persistent pain among AI women may be due to a difference in presenting symptoms.

**Table 2:** Clinical management and outcomes of endometriosis by race

| Variables | White | American Indian | P value |
|---|---|---|---|
| | % (n = 55) | % (n = 55) | |
| Initial treatment | | | > 0.999 |
| Pharmacologic | 95.0 (38) | 95.0 (38) | |
| Surgical | 5.0 (2) | 5.0 (2) | |
| Pharmacology therapy† | | | 0.822 |
| None | 2.5 (2) | 3.4 (3) | |
| NSAIDs | 20.3 (16) | 14.9 (13) | |
| Oral contraceptives | 34.2 (27) | 31.0 (27) | |
| GnRH analogues | 13.9 (11) | 13.8 (12) | |
| IUD | 7.6 (6) | 5.7 (5) | |
| Nexplanon | 5.1 (4) | 6.9 (6) | |
| Injectable contraceptives | 13.9 (11) | 23.0 (20) | |
| Aromatase inhibitors | 2.5 (2) | 1.1 (1) | |
| Time (in years) from medication to surgery | 5.5 [1-16] | 4.0 [1-10] | 0.096 |
| Hysterectomy performed‡ | | | 0.176 |
| Yes | 74.2 (23) | 59.1 (26) | |
| No | 25.8 (8) | 40.9 (18) | |
| Long-term Outcome | | | 0.004 |
| Reduction/cessation of pain§ | 63.3 (31) | 34.0 (16) | |
| Continued level of pain | 36.7 (18) | 66.0 (31) | |

P values were calculated excluding missing and using Fisher's exact test when indicated
† n > 55 due to multiple responses; ‡ n < 55 due to missing
§ Reduction/cessation of pain: defined either as a decrease in subjectively described pain, decrease in pain on the pain scale or no further visits for pain

We found that AI women were more likely to report abdominal pain at initial presentation and dysmenorrhea for White women. Expression of pain, including pelvic pain (28), is known to be influenced by psychosocial and ethnic variables (29, 30, 31). It is possible that presentations of endometriosis associated pain may vary by ethnicity.

Unsurprisingly, we found no difference in AI and White women initially receiving pharmacological treatment. This finding conforms to the current American College of Obstetricians and Gynecologists guidelines (6). We found no association between symptoms severity at diagnosis and race, which is congruent with findings previously reported by Apostolopoulos et al. (32). The majority of AI and White women were diagnosed by a gynecologist using a laparoscopy which is the gold standard tool for endometriosis (14).

Interestingly, time from medication to surgery was slightly, but not significantly, longer for White women than compared to AI women. Non-specific symptoms have been known to delay definitive diagnosis by 6 to 11 years and there are no guidelines for how long to treat medically before surgery but one could speculate that this delay could be the result of better medical treatment received by White women, staving off the need for surgery (33, 34). A recent study (35) found that mean time from symptom onset to first consultation was significantly longer among White women than other women (i.e., those who identified as neither White nor Black) respondents, and mean time from first consultation to diagnosis was significantly shorter among Black women than White women.

This study has some limitations that consists of a small sample size, self-reported information, missing information in the medical charts for some clinical variables, potential for selection and diagnostic biases. Furthermore, defining pain as an outcome measurement is subjective. We have noticed that few clinicians document consistently and clearly pain scales in their notes. As a result, continued pain was defined as return office visits for a chief complaint of a previously reported endometriosis symptom involving pain. If patients do not seek continued care for their pain or receive services at another health system, the results would be significantly affected. Other confounders such as the presence of other underlying chronic pain disorders or addiction to pain medication may have influenced the interpretation of pain as an outcome for endometriosis treatment. Additionally, the symptoms of endometriosis can be highly variable and pain is not present in every case (34, 36). Finally, the designation "American Indian" excludes Native Hawaiians and Alaskan Natives, therefore the findings in this study may not apply to these groups.

The strengths of this study resides in the fact that the focus was not on assessing incidence or prevalence of endometriosis but rather on patients' symptomatology and disease experience. Symptoms of endometriosis reported at diagnosis differ by women's race, as shown here, and may have various treatment preferences. To the best of our knowledge, this is the first study to assess clinical management as well as long-term outcomes of AI women diagnosed with endometriosis.

## Conclusion

This study found that the majority of women continue to report pain long after diagnosis. American Indian women were less likely to report a reduction or cessation of pain. Future studies should include a large sample size of AI women to investigate endometriosis symptoms impact on outcomes and explain why there is less reduction or cessation of pain among AI women compared to White women. If the disparities are confirmed, greater resources will be needed to address this chronic and debilitating disease among AI women.

## Conflict of Interests

Authors have no conflict of interests.

## Acknowledgments

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