

Clinical and Demographic Profile of Women with Uterine Fibroids Living in Puerto Rico

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Abstract

Introduction: Uterine leiomyomas, or fibroids, are prevalent benign tumors affecting up to 70% of reproductive-age women in the United States, significantly impacting productivity and quality of life. Despite their commonality, the epidemiology and clinical patterns of leiomyomas in Puerto Rico remain inadequately researched. **Methods:** This study conducted a secondary data analysis using clinical, menstrual cycle characteristics, and demographic data from self-administered questionnaires of women undergoing diagnostic laparoscopy for endometriosis in Puerto Rico. Chi-square tests and t-tests analyzed categorical and continuous variables, respectively ($p < 0.05$, R 4.1.0 software). **Results:** Among 1,610 endometriosis cases, 312 included uterine fibroids. Prevalence estimates were 10.3% (<30 years), 36.9% (30 - 40 years), and 52.6% (>40 years). Primiparous women averaged 22.14 years, with 40.71% having 2 - 3 pregnancies and 26.28% experiencing miscarriages. Symptoms included infertility (29.5%), dyspareunia (40.7%), severe pain (50%), and dysmenorrhea (75.6%). Comorbidities included ovarian cysts (52.2%) and abnormal uterine bleeding (37.8%). **Conclusions:** Advanced age, parity, and comorbidities like diabetes and hypertension were prevalent in our cohort. Understanding the epidemiological profile of women living in Puerto Rico with uterine fibroids is crucial for improving diagnostic awareness and enhancing patient care.

Keywords

Uterine Fibroids, Puerto Rico, Epidemiology, Dysmenorrhea, Abnormal Uterine Bleeding

1. Introduction

Uterine fibroids (UF), also known as uterine myoma or leiomyomas, are a significant health issue among women of reproductive age. These benign pelvic tumors, composed of smooth muscle fibers and an extracellular matrix [1], affect approximately 30% of women in the United States by age 35 and 70% by age 50, with a higher prevalence among women of color [2] [3]. Fibroids are a leading cause of hospitalizations for gynecological conditions, accounting for nearly 29% of cases among females aged 15 - 54 years [4], and the leading cause of hysterectomies, representing 40% - 60% of all cases [5] [6].

Symptoms of uterine fibroids can profoundly affect both physical and mental health, impacting fertility, social life, and work productivity [7]-[11]. Risk factors include obesity, age, nulliparity, family history, and race, with African American women being disproportionately affected [12]. Interestingly, some protective factors have been identified, such as the use of combined oral contraceptives, smoking in women with low BMI, and having children [13].

The prevalence of uterine fibroids varies across ethnic groups [13], with African American women experiencing the highest rates at 80%, compared to 70% in Caucasian women, 21.8% in Asian women, and 12.7% in Hispanic women [3] [14]. The increased incidence in African American women may be linked to elevated steroid hormone levels and genetic variations, including differences in the catechol-O-methyltransferase (COMT) gene, though the exact reasons are not fully understood [13].

Up to 50% of fibroid cases are asymptomatic, particularly those involving small tumors that are discovered during routine exams for other complaints [15]. However, when symptoms do occur, they are influenced by the size, location, and hormonal effects of the fibroids [7]. These tumors can increase the surface area of the endometrium and the overall size and bulk of the uterus, potentially compressing surrounding structures [16]. Clinical manifestations include abnormal uterine bleeding, pelvic pressure, bowel dysfunction, reproductive issues, and low back and pelvic pain, with menorrhagia being the most common symptom [17]-[20]. Less frequently, patients may experience increased urinary frequency and anemia [17]-[20]. However, only about 25% to 30% of women report clinical symptoms.

Diagnosis typically involves assessing symptoms and using ultrasound, with confirmation achieved through surgical excision and pathological analysis. Some patients remain asymptomatic and discover their condition incidentally during physical examinations or imaging. In fact, fibroids are often diagnosed as incidental findings in clinical settings, possibly due to a lack of awareness of characteristic symptoms [18]. Additionally, fibroid symptoms can overlap with those of other gynecologic conditions such as endometriosis, abnormal ovulatory function, or endometrial polyps [18].

Despite the high incidence and prevalence of uterine fibroids worldwide, there is limited data on their epidemiology among Hispanic women [13] [19]. Some studies suggest Hispanic women are twice as likely to be diagnosed with uterine fibroids

compared to White women [21] [22]. One study revealed that Hispanic women, who comprised nearly one-third of the cohort, had significantly higher symptom severity compared to White and Black women [11]. Given the barriers to care and symptoms caused by uterine fibroids, there is a lack of awareness about fibroids and their potential health impacts among the Hispanic/Latino population [11].

In Puerto Rico, as in many regions, fibroids pose substantial challenges to women's health, affecting fertility, quality of life, and healthcare utilization. Despite their prevalence and impact, there is a notable gap in research focusing on the specific demographics, clinical presentations, and socioeconomic factors influencing fibroid prevalence and management in women living in Puerto Rico. This paper aims to address these critical aspects, providing a comprehensive overview to guide future research and enhance clinical care strategies tailored to this unique population.

2. Methods

2.1. Study Cohort

Our study group consisted of women residing in Puerto Rico who were enrolled in a patient registry focused on benign gynecological disorders. This registry includes data from 1610 women, collected from various private hospitals in the southern region of Puerto Rico over several years, including the years of 2005 - 2011. The participants had suspected endometriosis, fibroids, dysfunctional bleeding, or other pelvic conditions and underwent diagnostic laparoscopy.

The study population consisted of biological females aged 17 and older from all socioeconomic backgrounds in Puerto Rico. Clinical and demographic data were gathered using self-administered questionnaires, which were completed as part of the hospital pre-admission process. The collected data included gynecologic and obstetric history, menstrual cycle characteristics, uterine fibroid-related symptoms, clinical history, and lifestyle factors.

The Ponce Health Sciences University IRB committee approved this patient registry, ensuring ethical standards and protection for all participants.

2.2. Secondary Data Analysis

The Institutional Review Board of the San Juan Bautista School of Medicine approved this study (EMSJBIRB-12-2022). From the existing database of 1610 women, we identified 312 participants who were diagnosed with uterine fibroids (cases). The control group consisted of 1298 women without a diagnosis of uterine fibroids, including those with endometriosis and other benign gynecologic conditions. All patient information was de-identified in accordance with HIPAA standards.

Statistical analyses were performed using R Statistical Software (v4.1.2; R Core Team 2021) [23]. Descriptive statistics included means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. To compare sociodemographic, obstetric, and clinical characteristics between the cases and controls, we used Chi-square tests and contingency tables for categorical variables, and t-tests for continuous variables (e.g., age of menarche,

menstrual cycle length, number of pregnancies, and para-gravida status). Statistical significance was set at $p < 0.05$.

3. Results

3.1. Demographics

We identified 312 cases of uterine fibroids from a total of 1610 questionnaires in the database, resulting in an estimated point prevalence of 19.4% in this clinical cohort. The mean age of the cases was 40 years (range 17 - 74 years), compared to a mean age of 32 years (range 17 - 68 years) for the controls ($p < 0.001$). Women without uterine fibroids (controls) were generally younger, with 69.6% between the ages of 20 and 39, and only 14.6% in the 40 - 49 age group, compared to 48.4% of the cases.

Most women with uterine fibroids in the study had 1 to 4 years of college education (61.9%), were married (57.2%; $p < 0.05$), and had private health insurance (74.4%). Additionally, there were more single women (31.7%) in the group not reporting uterine fibroids compared to those reporting uterine fibroids (23.4%). No statistically significant differences were observed in educational level and medical insurance coverage between the two groups (**Table 1**).

Table 1. Demographic characteristics of patients with uterine fibroids (cases) and without uterine fibroids (controls) in Puerto Rico.

Characteristics	Control (no uterine fibroids) (n = 1298)	Cases (with uterine fibroids) (n = 312)	p-value
Age group, mean (range)	32 (17 - 68)	40 (17 - 74)	<0.001
<19 years	5.5	1.0	0.19
20 - 29 years	30.6	9.3	0.33
30 - 39 years	39.0	36.9	<0.001
40 - 49 years	14.6	48.4	<0.001
>50 years	2.5	4.2	0.14
Education level, %			
High School	18.5	22.0	0.16
1 to 4 years of college	64.5	61.9	0.44
Graduate education	13.8	14.0	0.95
Civil status, %			
Single	31.7	23.4	0.64
Married	55.4	57.2	<0.05
Consensual	4.9	4.8	0.31
Divorced	6.3	11.2	0.99
Widowed	0.6	1.3	0.38
Medical insurance, %			
Private	59.8	74.4	0.78
Public health system	13.9	19.9	0.69
No insurance	0.8	1.3	0.59

3.2. Patients Gynecologic and Obstetric Characteristics

Regarding menstrual cycle characteristics, the age of menarche was similar in both cases and controls, at 12 years (range 8 - 18 years) versus 12 years (range 7 - 17 years), respectively. The average menstrual cycle length was 26.13 days for cases compared to 41.07 days for controls. A higher proportion of women with uterine fibroids reported having a regular menstrual cycle (76.6%) compared to controls (61.0%); $p < 0.05$. However, there were no significant differences in menarche age and menstrual cycle length between the cases and the controls.

The length of menses was assessed by comparing the mean number of days between women with uterine fibroids and those without fibroids. Our results showed that the mean number of days was significantly longer ($p < 0.05$) for the cases (7.5 days) compared to the controls (6.0 days). When stratified into short, average, and long durations, there were no significant differences observed between the two groups.

A higher proportion of cases (25.6%) reported primiparous age as ≤ 20 years compared to controls (14.64%) ($p < 0.05$). Additionally, more cases reported having two or more pregnancies (40.71% vs. 27.12%; $p < 0.001$) and four or more pregnancies (16.35% vs. 8.09%; $p < 0.001$). The nulliparity rate was higher in the controls (36.57%) compared to those with uterine fibroids (25.96%) ($p < 0.05$).

Patients with uterine fibroids were more likely than controls to report miscarriages (26.28% vs. 15.56%; $p < 0.05$). A higher proportion of cases reported previous use of oral contraceptive pills (OCPs) compared to controls (71.47% vs. 59.17%; $p < 0.05$). Current use of OCPs was less likely reported in patients with uterine fibroids than controls (7.37% vs. 9.40%; $p < 0.05$). Compared to controls, parity, miscarriage, and current OCP use showed statistical significance (**Table 2**).

Table 2. Characteristics of 1,610 women and the distribution of uterine fibroids among variables.

Characteristics	Control (no uterine fibroids) (n = 1298)%	Cases (with uterine fibroids) (n = 312) %	p-value
Primiparous age, mean (SD)	21.6 (4.5)	22.9 (4.9)	<0.001
Parity			
0	36.57	25.96	<0.05
1	13.10	12.82	0.97
2 - 3	27.12	40.71	<0.001
≥ 4	8.09	16.35	0.04
Miscarriages	15.56	26.28	<0.05
Miscarriages, number			
0	26.17	33.33	0.01
1	9.65	20.47	0.02
2	2.05	4.82	0.03
≥ 3	0.73	2.78	0.02
Previous OCP use			

Continued

Yes	59.1	71.47	<0.05
No	9.39	19.16	0.006
Current OCP use			
Yes	9.40	7.37	<0.05
No	27.22	61.70	<0.001
Age at menarche, mean (range)	12 (7 - 17)	12 (8 - 18)	0.15
<8 years	1.6	0.6	0.30
9 - 11 years	40.2	36.2	0.16
12 - 13 years	43.6	45.2	0.66
>14 years	13.6	17.3	0.12
Cycle, %			
Regular	61.0	76.6	<0.05
Irregular	25.7	22.4	0.12
Length of menses, mean (range)	6.0 (2 - 18)	7.5 (1 - 18)	<0.05
Short (1 - 4 days)	5.36	17.47	0.38
Average (5 - 6 days)	13.64	32.72	>0.001
Long (≥ 7 days)	13.6	17.3	0.15
Menstrual cycle length, mean (range)	41.07 (15 - 120)	26.13 (15 - 125)	0.31
<21 days	4.9	4.8	0.99
22 - 26 days	6.1	8.0	0.32
27 - 30 days	56.9	69.9	0.76
>31 days	14.2	12.5	0.50

3.3. Patients Clinical Profile

In relation to clinical symptoms, a significant number of women in the control group reported dysmenorrhea, incapacitating pain, dyspareunia, and difficulties in conceiving. These symptoms were also commonly reported by women with uterine fibroids (**Table 3**). Statistically significant differences were observed between the groups in the prevalence of all symptoms, with only incapacitating pain being statistically significantly higher in women with uterine fibroids (50%) compared to the control group (46.3%).

The most common gynecological comorbidities reported by women with uterine fibroids included ovarian cysts, abnormal uterine bleeding, gynecological infections, and abnormal Pap smears (**Table 4**). Additionally, women with uterine fibroids had a statistically significant higher prevalence of migraines ($p < 0.001$), high blood pressure ($p < 0.03$), hypothyroidism ($p < 0.001$), polycystic ovarian syndrome ($p < 0.001$), and fibromyalgia ($p < 0.001$).

Table 3. Most common symptoms associated with uterine fibroids compared to controls.

Characteristics	Control (no uterine fibroids) (n = 1298) %	Cases (with uterine fibroids) (n = 312) %	p-value
Dysmenorrhea	81.7	75.6	0.03
Incapacitating pain	46.3	50	0.01
Dyspareunia	45.6	40.7	0.01
Problems to conceive	38.0	29.5	0.002

Table 4. Medical findings in women with uterine fibroids compared to controls.

Medical disease	Control (no uterine fibroids) (n = 1298) %	Cases (with uterine fibroids) (n = 312) %	p-value
Gynecological infections	19.3	32	<0.001
Abnormal PAP smear	10.6	25.3	<0.001
Ovarian cysts	34.6	52.2	<0.001
Abnormal uterine bleeding	14.8	37.8	<0.001
Migraines	3.5	8.0	<0.001
Cancer	1.3	1.9	0.58
High blood pressure	3.0	9.9	<0.001
Diabetes	2.1	4.5	0.03
Hypothyroidism	5.9	13.5	<0.001
Irritable bowel syndrome	3.2	4.8	0.21
Polycystic ovarian syndrome	2.9	7.4	<0.001
Sinusitis	1.5	1.9	0.74
Asthma	11.2	16.7	0.01
Pelvic inflammatory disease	2.2	3.5	0.027
Fibromyalgia	4.5	10.3	<0.001

4. Discussion

This study is the first to evaluate the clinical and demographic profile of women with uterine fibroids in Puerto Rico. By analyzing an existing clinical research database, we found a prevalence of uterine fibroids at 19.4%. This may be due to many women being undiagnosed or experiencing delayed diagnosis, underscoring the urgent need for increased awareness and education. Delayed diagnosis, often due to a lack of awareness of clinical profiles, results in higher medical expenses. Consequently, it is recommended that routine patient-provider evaluations include assessments for signs and symptoms of uterine fibroids, even in younger women.

In the US, studies have shown that by age 49, over 70% of women have surgically confirmed fibroids, with rates varying among racial groups [24]. The prevalence of self-reported and ultrasound-detected uterine fibroids is higher among non-Hispanic Black women (50%) compared to non-Hispanic White women (25%) [18]. In a systematic review study examining racial disparities in the

prevalence of uterine fibroids and endometriosis in the United States, Katon et al. found that among women aged 18 - 30 with no symptoms of fibroids, 26% of Black women and 7% of White women had ultrasound evidence of uterine fibroids [25].

However, there is limited information regarding Hispanic/Latino women in the US or Latin America. Marsh et al., found that only 47% of Hispanic women in their cohort had heard of fibroids compared to 60% of Black women [11]. Consistent with other studies, many women delay seeking a diagnosis because they believe their symptoms are normal [17]. Borah et al. found that in their large survey study of U.S. women living with uterine fibroids, waited an average of 3.6 years after experiencing symptoms before seeking a diagnosis, with 32% waiting more than 5 years before seeking treatment [17]. Cultural perceptions, economic status, health literacy, healthcare system, and other psycho-biosocial factors specific to Latin American communities may limit access to care and diagnosis, leading to underestimation of the true prevalence of uterine fibroids [25]. This further establishes the importance of awareness and education about uterine fibroids.

Our findings align with existing research showing that the prevalence of uterine fibroids increases with age during the reproductive years and decreases during post menopause [26]-[29]. In our cohort, fibroids were most common among women aged 40 – 49 years, with a notable decline of 4.2% among women over 50. Previous studies have established that uterine fibroid primarily develop during the reproductive years when estrogen and progesterone are cyclically secreted, with production decreasing after menopause [30]. These observations underscore the significant roles of ovarian hormones, particularly estrogen and progesterone, in promoting uterine fibroid growth [30]. Therefore, it appears that the occurrence of fibroids is influenced by age and hormone levels [31] [32].

Contrary to previous reports [33]-[36], our study found no association between the presence of uterine fibroids and age of menarche, menstrual cycle length, or duration of menstruation. These results align with earlier research that also did not identify an association between early menarche and the risk of developing uterine fibroids [37] [38]. Interestingly, a majority of women in our sample who had fibroids reported regular menstrual cycles and normal menstruation lengths, which contrasts with conventional understanding of how fibroids typically affect menstrual patterns. However, symptoms such as dysmenorrhea, dyspareunia, and challenges with conception were significantly prevalent among women without uterine fibroids in our cohort, highlighting their substantial impact compared to women with uterine fibroids.

While previous studies have indicated that higher parity may have a protective effect against uterine fibroids [39] [40], our findings revealed an unexpected trend. Within our cohort, women with uterine fibroids tended to have higher parity (≥ 2) compared to the controls. Several mechanisms potentially explain this inverse relationship between parity and uterine fibroids. Full-term pregnancies can lead to reduced menstrual cycling, alterations in sex hormone levels, and decreased estrogen receptor expression, thereby potentially modifying fibroid sensitivity to

hormonal stimulation and influencing uterine remodeling [41] [42].

Additionally, consistent with various studies, OCPs have been suggested as a protective factor against uterine fibroids [2] [43] [44]. Our study similarly indicated a significantly lower current use of OCPs among women with fibroids, potentially influenced by the predominance of women aged 40 - 49 years in this group, who typically decrease OCP usage. Interestingly, while not statistically significant, our observation of previous OCP use among women with uterine fibroids suggests a potential trend that warrants further investigation. This is particularly important given the conflicting results in existing literature regarding the relationship between OCP use and fibroid development [27].

Furthermore, our study identified a higher prevalence of miscarriages among women with uterine fibroids compared to controls [45] [46], consistent with findings from Pritts et al., 2009 review, which documented reduced clinical pregnancy and live births in women with uterine fibroids [31]. However, recent studies have reported no association between uterine fibroids and miscarriages [45], contrary to earlier research linking fibroids with adverse pregnancy outcomes [46] [47].

In our study, we found that gynecological infections were present in 32% of women with uterine fibroids, abnormal pap smears in 25%, ovarian cysts in 52% and abnormal uterine bleeding in 38%. These rates were notably higher compared to the control group, consistent with findings from previous studies [48] [49]. The association of uterine fibroids with conditions such as abnormal uterine bleeding aligns with current guidelines and diagnostics recommended by the American College of Obstetricians and Gynecologists (ACOG) [50]. This underscores the clinical relevance of our findings in understanding the broader impact of uterine fibroids on women's health.

Recent research has increasingly spotlighted diabetes and uterine fibroids, driving a deeper exploration into their common risk factors, such as obesity and insulin resistance, that may contribute to their co-occurrence. Insulin resistance, a characteristic of Type 2 diabetes, often leads to hyperinsulinemia, a key feature of metabolic syndrome [51]. Hyperinsulinemia is also linked to increased levels of serum insulin-like growth factor-1 (IGF-1) and epidermal growth factor, which are believed to play a role in the formation of uterine fibroids by increasing the secretion of ovarian hormones or promoting the proliferation of smooth muscle cells in the uterine lining [51]-[53]. Research has demonstrated that insulin can affect uterine fibroid maintenance by triggering a hormone cascade and disrupting the interaction between sex hormones and globulins, leading to elevated estrogen levels and other factors that promote fibroid persistence [51]-[53]. Interestingly, a study found that metformin, a first-line treatment for Type 2 diabetic patients, has been shown to reduce the risk of uterine leiomyomas in this patient population [54].

Likewise, hypertension has been recognized as a possible risk factor for uterine fibroid development. A longitudinal cohort study revealed that individuals with newly diagnosed hypertension had a 45% higher risk of reporting fibroids [55].

Fischer and colleagues further demonstrated the link between hypertension and uterine fibroids through the angiotensin-converting enzyme (ACE) pathway, which regulates blood pressure [56]. By comparing women with hypertension, with or without coexisting uterine fibroids, and the use of ACE inhibitors, they found that those prescribed ACE inhibitors had a more than 30% reduced risk of fibroid diagnosis [56]. These findings suggest a complex interaction between hypertension and fibroid growth, with potential involvement from hormonal factors like estrogen, whose effects may be more pronounced during hormonal fluctuations such as pregnancy or menopause [57].

It has been established that a considerable number of women with uterine fibroids are asymptomatic [18] [28], highlighting the challenge of accurately estimating prevalence and incidence through clinical symptoms alone. Therefore, epidemiologic studies utilizing ultrasound screening should provide more reliable estimates. A limitation of our study is its reliance on self-reported surveys, which may result in underestimation if participants are unaware of their condition until symptomatic or diagnosed by a physician. Additionally, retrospective data collection is susceptible to recall bias, impacting the accuracy of reported medical histories. Despite these challenges, self-reported data remains a valuable tool in initial epidemiological assessments across various disciplines due to its cost-effectiveness and adaptability [11] [19].

For instance, Myers *et al.* conducted a study comparing self-reported and ultrasound measurements of uterine fibroid status, highlighting the method's high sensitivity in epidemiological contexts [38]. Despite these acknowledged limitations, our study's findings align with previously reported prevalence rates ranging from 5% to 35%, consistent with studies like Flores *et al.*, which found a 12% prevalence among Latin American women [2] [11] [19] [20] [27] [58].

Furthermore, a significant limitation of our study was the lack of access to participants' medical records, which would have provided critical clinical details such as uterine size, fibroid characteristics, and surgical findings. However, it is essential to recognize the valuable roles of descriptive studies like ours in identifying epidemiological variations among different demographic groups. Such studies offer valuable insights into the diverse clinical presentations of uterine fibroids across populations.

5. Conclusions

In conclusion, this study provides a comprehensive analysis of the clinical, demographic, and gynecological profiles of women with uterine fibroids residing in Puerto Rico compared to those without uterine fibroids. With a documented prevalence of 19.4% among women living in Puerto Rico, including those under 40 years old, our findings underscore the significant impact of factors such as age, parity, and comorbidities such as diabetes and hypertension within our cohort.

Our research underscores the urgent need to address underdiagnosis resulting from inadequate awareness of the typical signs and symptoms of uterine fibroids.

By examining the epidemiological profile of affected women living in Puerto Rico, our study contributes to a better understanding of its impacts on women's health, quality of life, and overall well-being. These insights highlight the critical importance of recognizing and addressing uterine fibroids as a significant public health concern, paving the way for improved diagnostic strategies, patient care, and health outcomes.

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Data Availability Statement

Generated Statement: The data analyzed in this study is subject to the following licenses/restrictions: The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request. Requests to access these datasets should be directed to mcolondiaz@sanjuanbautista.edu.

Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

MC, IF, ES, SA, GM, GR. PC, AN and AJ contributed to the conception and design of the study. ES organized the database. MC, AJ and ES performed the statistical analysis and wrote the first draft of the manuscript. IG, SA, AJ, ES, GR, GM and PC wrote sections of the manuscript. All authors contributed to manuscript revision, editing, and approved the submitted version.

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Disclosure

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