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Understanding Uterine Fibroids Amongst Black Women & The Diaspora

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Abstract

Uterine fibroids are the most common type of benign pelvic tumor amongst reproductive age women. They have a disproportionate impact on not only African American women but the diaspora as well. While fibroids are known to be more common and more severe amongst this population, there isn't a clear understanding on what accounts for this disparity. Uterine fibroids should be considered a global health concern, considering the extent of morbidity and the burden on the quality of life of these patients. In this review article, we will assess the epidemiology, clinical presentation, diagnosis, management, and obstetrical impact of uterine fibroids with a focus on how they may differ depending on race and while also focusing on the psychological and socioeconomic toll on this population.

Introduction

Uterine leiomyomas, often referred to as "fibroids", are the most common benign hormone sensitive gynecologic neoplasm that occurs in up to 80% of women. The tumor is made of uterine smooth muscle layer. While benign and often asymptomatic, uterine fibroids are a major cause of morbidity and the source of quality-of-life concerns for women leading to a considerable amount of physical, physiological, and economic impacts. Clinical presentation varies but may include pelvic pain, anemia secondary to heavy menstrual bleeding, urinary incontinence, bleeding during pregnancy and postpartum hemorrhage.

Symptomatic fibroids may require medical or surgical interventions and increased medical attention. In the United States, uterine fibroids are the leading cause of hysterectomies amongst women ages 18-44 years. The rates of alternative surgical interventions such as myomectomies and uterine artery embolization has also increased. Due to the disproportionate rate of disease manifestation, it is no surprise that African American women are seen to have a greater number of hysterectomies than their white counterparts. Despite the substantial impact on the quality of life, relatively little is known about the etiology of uterine leiomyomas, yet the racial disparity remains apparent and well documented.

Epidemiology and Risk Factors

The tumor may affect up to 70% of women of all races by menopause.[1] The exact prevalence of uterine fibroids has not been determined primarily due to studies being conducted mostly on symptomatic patients or patients undergoing surgical interventions, such as myomectomies or hysterectomies and thus not accurately depicting the general population. However, there have been studies conducted in attempt to overcome this shortcoming, where they have found a higher prevalence of uterine fibroids amongst black women when compared to white women. Notably, the burden of fibroids is seen three to four times more in women of African descent. The prevalence of uterine fibroids vary greatly among Africa countries (Fig. 1). Keaton et. al investigated the association of geographic variation of uterine fibroids in genetic ancestry

[1] Baird, D. D., Dunson, D. B., Hill, M. C., Cousins, D., & Schectman, J. M. (2003). High cumulative incidence of uterine leiomyoma in black and white women: ultrasound evidence. *American journal of obstetrics and gynecology*, *188*(1), 100–107. https://doi.org/10.1067/mob.2003.99

between black women and white women and found that amongst black women West and East Africans were associated with an increased risk while, European ancestry amongst white women was a protective factor against fibroids. It is worth mentioning, that while Sub-Saharan Africa has the largest population of black people and thus the largest population of black people with uterine fibroids, most of the research that have been conducted to study fibroids have been done outside of this geographic region.[2]

It is no surprise that African descent is a risk factor for leiomyomas (Tab. 1). Age is also a significant risk factor. The incidence of pathologic fibroids increases with age with a peak at 50 years.[3] They tend to not occur before puberty and decrease in number by menopause. Studies suggest that those of African descent develop fibroids at an earlier age than those of European descent. It was found that 60% African American women had uterine fibroids by age 35, whereas Caucasian women had an incidence of 40% by 35.[1] Many studies have indicated that increased parity is a protective factor on the development of fibroids. Women beginning hormone therapy are at an increased risk of fibroids due to the unopposed estrogen. High body mass index is also associated with increased risk acting through either hormonal or inflammatory mechanisms. Moreover, central obesity, hypertension, hyperlipidemia, and insulin resistance are all factors of metabolic syndrome and associated with a higher risk of uterine leiomyomas. Lifestyle and diet tend to modulate signaling pathways that can affect the

[2] Keaton, J. M., Jasper, E. A., Hellwege, J. N., Jones, S. H., Torstenson, E. S., Edwards, T. L., & Velez Edwards, D. R. (2021). Evidence that geographic variation in genetic ancestry associates with uterine fibroids. *Human genetics*, *140*(10), 1433–1440.

[3] Pavone, D., Clemenza, S., Sorbi, F., Fambrini, M., & Petraglia, F. (2018). Epidemiology and Risk Factors of Uterine Fibroids. *Best practice & research. Clinical obstetrics & gynaecology*, *46*, 3–11. https://doi.org/10.1016/j.bpobgyn.2017.09.004

development of fibroids. Such factors include stress, cigarette use, caffeine intake, alcohol consumption, and physical activity. In addition, several studies have indicated that while preventable, vitamin D deficiency has been associated with an increased risk of uterine fibroids with individual fibroids showing lower levels of vitamin D receptors when compared to adjacent healthy tissue. Those of African descent tend to present more with vitamin D deficiency as higher melanin concentrations decreases the absorption of ultraviolet rays from sunlight and thus may explain the higher incidence of fibroids amongst this population.[3]

Pathogenesis and Biologic Differences

Fibroids arise from the uterine smooth muscle cells and fibroblasts of the myometrium. Their development and growth are dependent on estrogen and progesterone. They tend to be rare before puberty, with an increased prevalence during reproductive years and shrink during menopause. Aromatase is an enzyme found in fibroid tissue that increases the endogenous production of estradiol. Fibroids stem cells express progesterone and estrogen receptors. The receptors facilitate growth in the presence of these hormones.

While the molecular contributions behind the ethnic disparities of uterine fibroids is not well understood, there has been many studies that have assessed the racial and ethnic variation of estrogen dependent disorders. While white women have a higher incidence of endometrial and breast cancer, African American women have a higher rate of mortality rates from these conditions. This may be attributed to a greater frequency in adverse clinical and pathologic

features in the African American population such as advanced high-grade tumors with more aggressive pathology when compared to white women. From this data, it can be inferred that estrogen dependent diseases including uterine fibroids may have varying estrogen biosynthesis and metabolism exhibited by different races.

CYP17 and catechol-O-methyltransferase (COMT) are two notable genetic polymorphisms that has been found to be involved in estrogen synthesis and metabolism. CYP17 is a gene that codes for cytochrome enzyme that mediates 17alpha-hydroxlase and 17,20 lyase which functions a key mediator of steroidogenesis. A study was conducted that examined the role of the CYP17 gene polymorphism in African and Caucasian women suggested African women with homozygous CYP17 A2 alleles exposed their myometrium to higher estrogenic stimulation contributing to uterine leiomyomas.[4] COMT catalyzes the methylation of the hydroxyl groups of estrogen. Thus, regulation of the COMT activity may modulate the biologic effect of estrogen and play a role in the development of fibroids. Using multiple logistic models, a study showed that, the COMT (Val/Val) genotype is associated with a higher incidence of leiomyomas when compared to other genotypes like Val/Met and Met/Met genotype. The study further indicated that African American women had a higher frequency of Val/Val genotype while white women had a lower frequency of the Val/Val genotype and thus may be associated with the higher

[4] Amant, F., Dorfling, C. M., de Brabanter, J., Vandewalle, J., Vergote, I., Lindeque, B. G., & van Rensburg, E. J. (2004). A possible role of the cytochrome P450c17alpha gene (CYP17) polymorphism in the pathobiology of uterine leiomyomas from black South African women: a pilot study. *Acta obstetricia et gynecologica Scandinavica*, *83*(3), 234–239.

incidence of myomas in black women.[5] Thus, women from the African diaspora demonstrate a predisposition to fibroids on a genetic basis.

Clinical Presentation

Although fibroids are often asymptomatic, patients may experience symptoms that can negatively impact the daily living and the quality of life of women suffering with the disease. Women with uterine fibroids often have more than one symptom. Most commonly heavy menstrual bleeding occurs in about one third of patients. As a result, secondary anemia and fatigue may also be seen. A retrospective study found that uterine fibroids caused bleeding in 48% of patients discharged with a diagnosis of heavy menstrual bleeding and severe anemia (hemoglobin < 5g/dL).[6] In addition to heavy bleeding, associated pain is also frequently reported. The location and size of the fibroid(s) impact pain during menstruation, but generally have no impact during sexual intercourse or prior to menses. However larger fibroids, exceeding 10cm in diameter, can lead to bulk related symptoms such as pelvic pressure and pain; abdominal protrusion; dyspareunia; urinary urgency and incontinence; and constipation.[7]

[5] Catherino, W. H., Eltoukhi, H. M., & Al-Hendy, A. (2013). Racial and ethnic differences in the pathogenesis and clinical manifestations of uterine leiomyoma. *Seminars in reproductive medicine*, *31*(5), 370–379. https://doi.org/10.1055/s-0033-1348896

[6] Nelson, A. L., & Ritchie, J. J. (2015). Severe anemia from heavy menstrual bleeding requires heightened attention. *American journal of obstetrics and gynecology*, *213*(1), 97.e1–97.e6. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.ajog.2015.04.023

[7] David, M., Pitz, C. M., Mihaylova, A., & Siedentopf, F. (2016). Myoma-associated pain frequency and intensity: a retrospective evaluation of 1548 myoma patients. *European journal of obstetrics, gynecology, and reproductive biology*, *199*, 137–140. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.ejogrb.2016.02.026

A study was conducted that investigated the racial difference in severity, symptoms, and age at diagnosis of uterine leiomyomas. They found that black women have larger and more numerous leiomyomas and are often more symptomatic in presentation that white women despite a younger age at diagnosis. Ultrasound screening has indicated age of onset earlier by 10 to 15 years in African Americans.[8] Thus, with an earlier onset and greater symptomatic presentation, it comes as no surprise that women of color with fibroids tend to have a greater impact on their quality of life.

The chronic and progressive nature of uterine fibroids tends to negatively effect patients' daily activities and quality of life. This can make it difficult for patients to maintain a healthy self-image, sexuality, physical and emotional well-being.[9] Although women of different ethnic groups report work-associated symptoms, black women have a disproportionately higher incidence with more severe symptoms than white women. African American women are 77% more likely to miss work with a decrease in overall work productivity because of fibroids.[10] Thus black women experience a significantly higher symptomatic disease burden.

Diagnosis

[8] Laughlin, S. K., & Stewart, E. A. (2011). Uterine leiomyomas: individualizing the approach to a heterogeneous condition. *Obstetrics and gynecology*, *117*(2 Pt 1), 396–403. https://doi.org/10.1097/AOG.0b013e31820780e3

[9] Fortin, C., Flyckt, R., & Falcone, T. (2018). Alternatives to hysterectomy: The burden of fibroids and the quality of life. *Best practice & research. Clinical obstetrics & gynaecology*, *46*, 31–42. https://doi.org/10.1016/j.bpobgyn.2017.10.001

[10] Downes, E., Sikirica, V., Gilabert-Estelles, J., Bolge, S. C., Dodd, S. L., Maroulis, C., & Subramanian, D. (2010). The burden of uterine fibroids in five European countries. *European journal of obstetrics, gynecology, and reproductive biology*, *152*(1), 96–102. https://doi.org/10.1016/j.ejogrb.2010.05.012

There are multiple factors that lead to diagnostic and thus treatment delays in women with leiomyomas. Firstly, many women with fibroids are asymptomatic and thus are not aware they have the disease. On the contrary, symptomatic women may disregard their symptoms due to the perception that it is normal or lack of knowledge of the tumors (Fig. 2).[11] Additionally, because many of the presenting symptoms of uterine fibroids coincide with other gynecologic conditions such as endometriosis and adenomyosis, the diagnosis of fibroids is often substantially prolonged.[11] Such delay is not isolated from Sub-Saharan Africa.[12] Many factors including lack of knowledge, poverty, limitations on transportation, fear, and cultural beliefs lead to diagnostic delays African women. In addition, women of lower socioeconomic status lack access and resources to have a proper diagnosis. Thus, African American women and women in impoverished communities (e.g. Africa) may delay care and diagnosis at a greater rate than white women.

Evaluation of fibroids is based mainly on clinical presentation. Because many women do not experience any symptoms, incidental discovery is relatively common.[13] In general, fibroids are clinical detectable on routine pelvic exam in 25% to 80% of women, thus many women who have the disease go undetected. In the United States, ultrasonography is the preferred initial

[11] Ghant, M. S., Sengoba, K. S., Vogelzang, R., Lawson, A. K., & Marsh, E. E. (2016). An Altered Perception of Normal: Understanding Causes for Treatment Delay in Women with Symptomatic Uterine Fibroids. *Journal of women's health (2002)*, *25*(8), 846–852. https://doi.org/10.1089/jwh.2015.5531

[12] Sabry, M., Halder, S. K., Allah, A. S., Roshdy, E., Rajaratnam, V., & Al-Hendy, A. (2013). Serum vitamin D3 level inversely correlates with uterine fibroid volume in different ethnic groups: a cross-sectional observational study. *International journal of women's health*, *5*, 93–100. https://doi.org/10.2147/IJWH.S38800

[13] Giuliani, E., As-Sanie, S., & Marsh, E. E. (2020). Epidemiology and management of uterine fibroids. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, *149*(1), 3–9. https://doi.org/10.1002/ijgo.13102

imaging modality for fibroids. However, there is a lack of consensus on how and what to reports on image findings. The Federation of Gynecology and Obstetrics (FIGO) created a subclassification system for uterine fibroids that has not been used routinely, however this classification includes important factors that influences efficacy of certain treatment options.[14] Despite this need for improvement on ultrasound interpretations, it has been reported on sonography, black women often present with a larger uterus with more abundant fibroids leading to more severe clinical presentation.[1,15]

Management/ Rate of Surgeries/ Outcomes

Despite the prevalence of uterine fibroids amongst women, there are no long-term, cost-effective treatment options that leaves fertility intact. Treatment is dependent on clinical presentation. Asymptomatic patients are often expectant with clinical surveillance due to the minimal concern for malignancy of the tumors. For symptomatic postmenopausal women, hysterectomy and myomectomy are often used as they have passed the childbearing age and are the more definitive treatment options. However, premenopausal women may wish to preserve fertility thus seeking less invasive treatment options such as medical intervention such as nonsteroidal anti-inflammatory drugs, hormonal intrauterine device, oral contraception,

[14] Stewart, E. A., Laughlin-Tommaso, S. K., Catherino, W. H., Lalitkumar, S., Gupta, D., & Vollenhoven, B. (2016). Uterine fibroids. *Nature reviews. Disease primers*, *2*, 16043. https://doi-org.ezproxy2.library.drexel.edu/10.1038/nrdp.2016.43

[15] Kjerulff, K. H., Langenberg, P., Seidman, J. D., Stolley, P. D., & Guzinski, G. M. (1996). Uterine leiomyomas. Racial differences in severity, symptoms and age at diagnosis. *The Journal of reproductive medicine*, *41*(7), 483–490.

progesterone modulator, and gonadotropin releasing agonist (Fig. 3). [16] On the other hand, symptomatic premenopausal women who do not desire to preserve fertility or who have experienced refractory symptoms may seek surgical and definitive intervention.

Hysterectomy is one the most common surgical procedures in women in the United States.[17] Because symptomatic fibroids are more common in premenopausal women and there's a higher prevalence of disease in black women, there is a greater number of African American women who undergo hysterectomies.[18] Treatment in many African countries include, expectant management, surgery, uterine artery embolization, ablative techniques, and medical management and from these options, surgery is most often used – with myomectomy being the most common.[19] The high rate of surgical intervention for uterine fibroids in Africa could be due to many reasons including larger fibroids at clinical presentation, reducing the possibility of alternate treatments. Alternatively, many of the non-surgical treatment interventions (e.g., hormonal, and non-hormonal options) used in developed countries, are too costly for many Africans to afford. A study in the United States, found that the surgical cost of uterine fibroids

[16] De La Cruz, M. S., & Buchanan, E. M. (2017). Uterine Fibroids: Diagnosis and Treatment. *American family physician*, *95*(2), 100–107.
[17] Whiteman, M. K., Hillis, S. D., Jamieson, D. J., Morrow, B., Podgornik, M. N., Brett, K. M., & Marchbanks, P. A. (2008). Inpatient hysterectomy surveillance in the United States, 2000-2004. *American journal of obstetrics and gynecology*, *198*(1), 34.e1–34.e347. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.ajog.2007.05.039
[18] Moorman, P. G., Leppert, P., Myers, E. R., & Wang, F. (2013). Comparison of characteristics of fibroids in African American and white women undergoing premenopausal hysterectomy. *Fertility and sterility*, *99*(3), 768–776.e1. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.fertnstert.2012.10.039
[19] Akinola, O. I., Fabamwo, A. O., Akinola, R. A., Ottun, T. A., Akinniyi, A., & Akpan, A. E. (2009). Uterine artery ligation for the treatment of fibroids. *Acta obstetricia et gynecologica Scandinavica*, *88*(1), 59–62. https://doi.org/10.1080/00016340802632366

was overall more affordable than medical intervention. [20] This reemphasizes the financial toll that nonsurgical intervention may have on those in underdeveloped countries along with those of low socioeconomic status.

Obstetrical Concerns

Some women with fibroids are able to conceive and have successful full-term pregnancies and deliver healthy well developed babies without complications or necessary interventions. However, for others, fibroid pose a significant impact on reproduction, as they are associated with infertility, early pregnancy complications, and adverse obstetrical outcomes. They are sole cause of infertility in 2-3% of women and are associated with 10% of infertility cases.[21]

Studies have shown that whether fibroids are located within the endometrial cavity or the muscular layer, there are still poorer reproductive outcomes than those without fibroids. There are multiple mechanisms that may lead to fertility concerns. Uterine fibroids can disrupt the normal anatomy and physiologic myometrial motility and interfere with sperm migration and progression and proper embryonic implantation. Fibroids have been seen to impact the uterus on a histological level leading to malformed glands and possible ulcerations. Fibroids may also

[20] Carls, G. S., Lee, D. W., Ozminkowski, R. J., Wang, S., Gibson, T. B., & Stewart, E. (2008). What are the total costs of surgical treatment for uterine fibroids?. *Journal of women's health (2002)*, *17*(7), 1119–1132. https://doi.org/10.1089/jwh.2008.0456

[21] Donnez, J., & Jadoul, P. (2002). What are the implications of myomas on fertility? A need for a debate?. *Human reproduction (Oxford, England)*, *17*(6), 1424–1430. https://doi-org.ezproxy2.library.drexel.edu/10.1093/humrep/17.6.1424

disrupt normal local hormones leading to subfertility.[22] Uterine fibroids is not only associated with fertility difficulty but also associated with higher rates of preterm delivery and need for cesarean delivery. With the understanding that fibroids often have a substantial impact on fertility, it is simple to conclude that the obstetrical outcomes disproportionately impact women of color.[23]

Socioeconomic Impact & Disparity

Socioeconomic status and race influence access to adequate healthcare. Despite controversy it he United States healthcare system, this is disparity remains significant. The decision on certain therapeutic options can directly be impacted by cost of procedure and insurance coverage. For example, when hysterectomy is the treatment of choice, white women are more likely to undergo minimally invasive laparoscopic procedures, on the other hand, African American women are more likely to undergo more invasive abdominal procedures due to limited health coverage.[24] Amongst women who have relatively equal access to health care, there are race-based difference in outcomes and response to treatment that remains to be poorly understood.[25]

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[22] Zepiridis, L. I., Grimbizis, G. F., & Tarlatzis, B. C. (2016). Infertility and uterine fibroids. *Best practice & research. Clinical obstetrics & gynaecology*, *34*, 66–73. https://doi.org/10.1016/j.bpobgyn.2015.12.001

[23] Levy, G., Hill, M. J., Beall, S., Zarek, S. M., Segars, J. H., & Catherino, W. H. (2012). Leiomyoma: genetics, assisted reproduction, pregnancy and therapeutic advances. *Journal of assisted reproduction and genetics*, *29*(8), 703–712. https://doi-org.ezproxy2.library.drexel.edu/10.1007/s10815-012-9784-0

[24] Abenhaim, H. A., Azziz, R., Hu, J., Bartolucci, A., & Tulandi, T. (2008). Socioeconomic and racial predictors of undergoing laparoscopic hysterectomy for selected benign diseases: analysis of 341487 hysterectomies. *Journal of minimally invasive gynecology*, *15*(1), 11–15. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.jmig.2007.07.014

[25] Weiss, G., Noorhasan, D., Schott, L. L., Powell, L., Randolph, J. F., Jr, & Johnston, J. M. (2009). Racial differences in women who have a hysterectomy for benign conditions. *Women's health issues : official publication of the Jacobs*

In the Sub-Saharan African communities, there is an extensive list of challenges and barriers faced by women suffering with uterine fibroids. Many lack access to adequate healthcare facilities, lack of properly trained providers, poor service, inability to afford care, and poor nutrition. Treatment options are often limited in these countries, in contrast to developed countries where there are wide array of therapy options including uterine embolization and minimally invasive myomectomies and hysterectomies. In fact, most treatment options for uterine fibroids in Africa involve myomectomies under subpar procedural conditions that may jeopardize the safety and health outcomes of the patients leading to increased morbidity and mortality. These rates arise from suboptimal preoperative assessments, intraoperative complications (e.g., poor facility infrastructure, hemorrhage, extrauterine injury, and poor anesthetic use), and postoperative complications (e.g., shock, fever, hemorrhage, and infection).[26] As previously mentioned, the alternative, if appropriate, may include hormonal medical intervention which can become costly as many African women do not have health coverage to offset such and expense. For black women and the diaspora, physiologic, genetic, cultural, and socioeconomic factors contribute to the disparities seen.

Summary

Institute of Women's Health, *19*(3), 202–210. https://doi-org.ezproxy2.library.drexel.edu/10.1016/j.whi.2009.03.001

[26] Adesina, K. T., Owolabi, B. O., Raji, H. O., & Olarinoye, A. O. (2017). Abdominal myomectomy: A retrospective review of determinants and outcomes of complications at the University of Ilorin Teaching Hospital, Ilorin, Nigeria. *Malawi medical journal : the journal of Medical Association of Malawi*, *29*(1), 37–42. https://doi.org/10.4314/mmj.v29i1.8

Understanding Uterine Fibroids Amongst Black Women and the Diaspora

The burden of disease from uterine fibroids is substantially higher for black women than other racial groups. In the United States, the incidence is three times greater among black women compared to white women. Black women develop uterine fibroids as a much younger age with larger and greater number of fibroids contributing to a higher risk of complications.

The impact of leiomyomas on women's health and their quality of life can be detrimental. While current investigations have identified various risk factors and genetic characteristics of the tumors, there remains a significant gap in understanding how these factors impacts symptomatic fibroids and the role they play in the increase in black women and the diaspora. Further investigation needs to be done to elucidate pathological areas of the disease and tumor characteristics that may be associated with symptom development and disease progression. By having collaboration amongst researchers assess global health disparity and provide necessary and beneficial comparative data. Such studies may create a solution for unmet clinical needs by providing a framework for new therapeutic targets and alternative curative solutions other than hysterectomies and may also serve to assist in the development of ways to mitigate healthcare gaps and potentially reduce the burden of uterine fibroids and improve the quality of life of black women and the diaspora.

Many black women live symptomatic fibroids without seeking clinical care. For many, limited knowledge regarding the condition and normal menses lead to a distorted view of what is deemed normal uterine bleeding. In addition, it is imperative that health care providers offer patient centered community-based education opportunities to counsel their patients

thoroughly on the risks of uterine fibroids, the typical clinical symptoms, and varying treatment options to allow black women to be treatment so that they can live better lives and improve their quality of life. Healthcare providers should maximize the quality of care for women with uterine fibroids using practice-based evidence and best practices. By educating women on the disease, providers can encourage early evaluation, diagnosis, and timely intervention can occur and potentially reduce morbidity and mortality rates.

Uterine fibroids are a global health issue that would benefit from general attention, investigation, development of further surgical and medical treatment options, and change by policymakers. Combined with efforts to reduce bias, increase awareness, and promote of provider and patient education are essential to empower patients to manage symptoms of uterine fibroids while reducing and potentially mitigating the burden and disruption on their quality of life.

Appendix

Figure 1

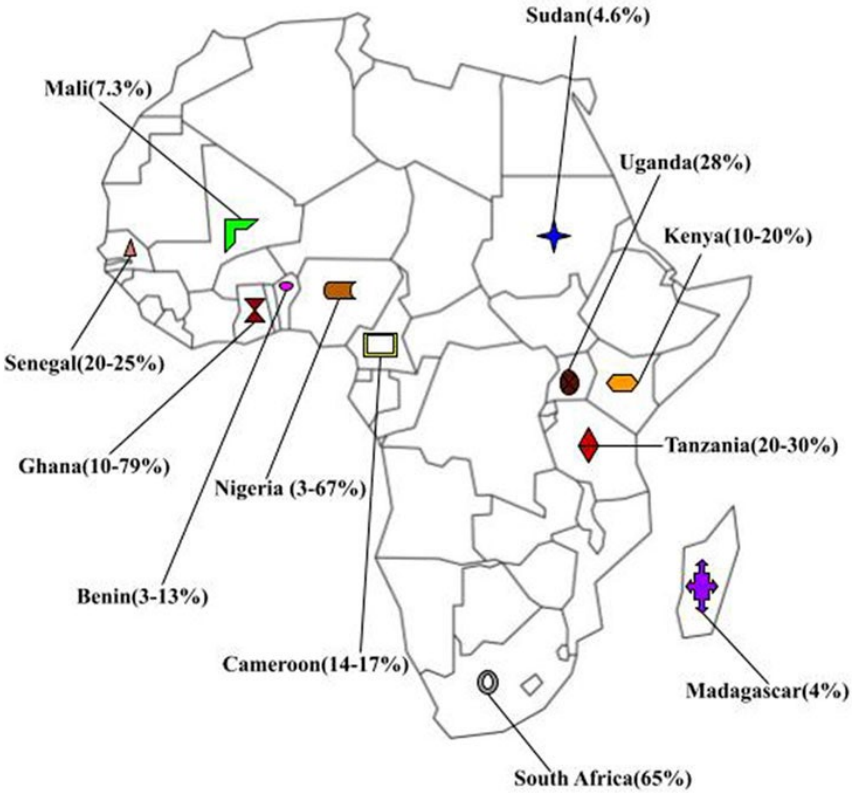

Figure 1: Map of Fibroid prevalence across Africa[27]

Table 1

Table 1: Risk Factors of Uterine Fibroids

Factors of Uterine Fibroids	
Risk Factors	**Protective Factors**
African descent	Increased parity
Obesity	Late menarche
Nulliparity	Use of contraception
Family History	Cigarette Smoking
Early Menarche	
Age > 40 years old	
Unopposed estrogen exposure	

[27] Sefah, N., Ndebele, S., Prince, L., Korasare, E., Agbleke, M., Nkansah, A., Thompson, H., Al-Hendy, A., & Agbleke, A. A. (2023). Uterine fibroids - Causes, impact, treatment, and lens to the African perspective. *Frontiers in pharmacology*, *13*, 1045783. https://doi-org.ezproxy2.library.drexel.edu/10.3389/fphar.2022.1045783

Figure 2

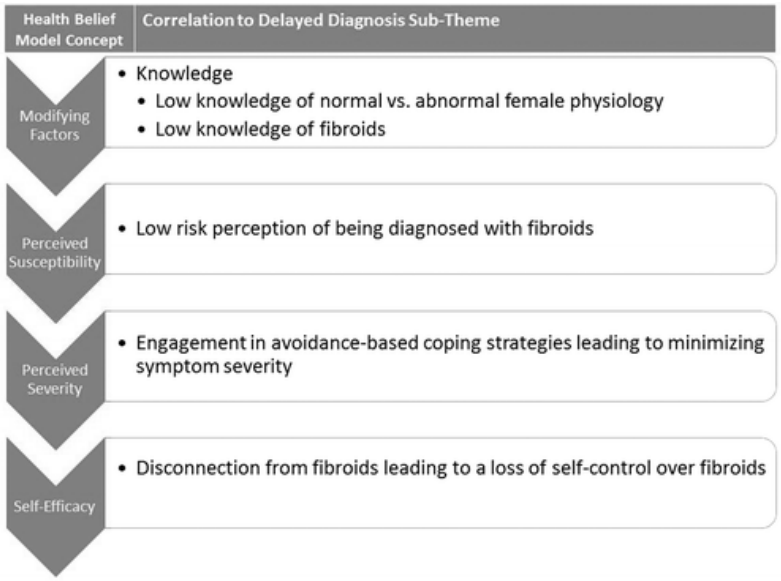

Figure 2: Belief Model Related to Delayed Diagnosis[28]

Figure 3

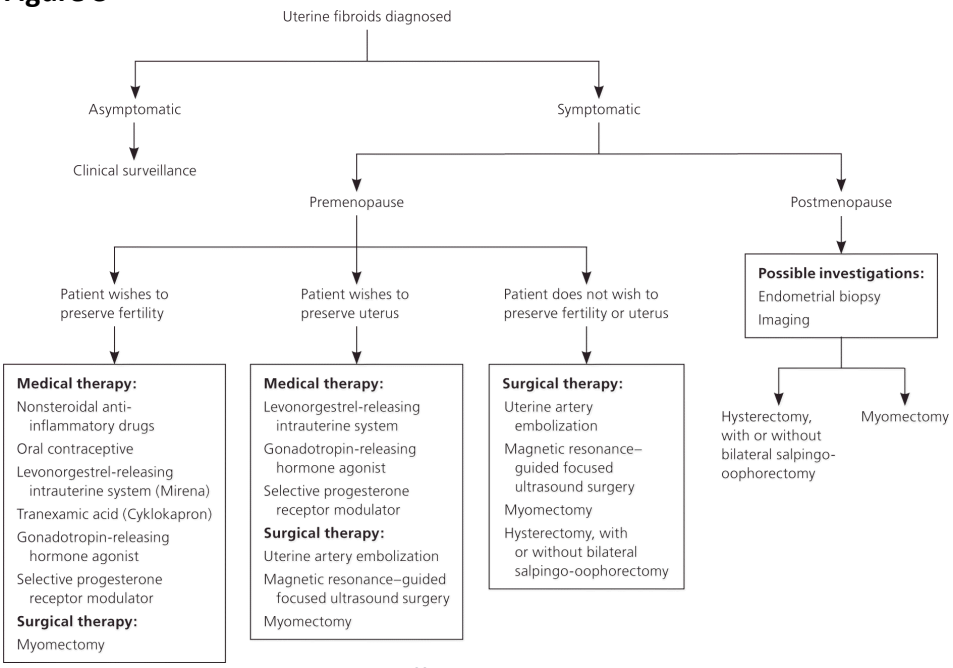

Figure 3: Management of Uterine Fibroids[29]

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[28] Ghant, M. S., Sengoba, K. S., Vogelzang, R., Lawson, A. K., & Marsh, E. E. (2016). An Altered Perception of Normal: Understanding Causes for Treatment Delay in Women with Symptomatic Uterine Fibroids. *Journal of women's health (2002)*, *25*(8), 846–852. https://doi-org.ezproxy2.library.drexel.edu/10.1089/jwh.2015.5531

[29] De La Cruz, M. S., & Buchanan, E. M. (2017). Uterine Fibroids: Diagnosis and Treatment. *American family physician*, *95*(2), 100–107.

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