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Uterine fibroids and their effect on pregnancy: An updated review

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Abstract
Uterine fibroids, also known as *leiomyomas*, are the most common benign tumors of the female reproductive system, affecting a significant proportion of women of reproductive age. Although often asymptomatic, *fibroids* can have profound implications for pregnancy, influencing fertility, gestational outcomes, and delivery. The impact of *fibroids* on pregnancy depends on their size, number, and location within the uterus. Submucosal and intramural *fibroids* are particularly associated with implantation failure, recurrent pregnancy loss, and an increased risk of obstetric complications. Pregnant women with *fibroids* are at higher risk of miscarriage, preterm labor, fetal malpresentation, and cesarean delivery. Additionally, *fibroids* may contribute to placental abnormalities, such as placental abruption and placenta previa, which can lead to maternal and fetal morbidity. Hormonal changes during pregnancy can also cause fibroid growth, leading to pain, degeneration, and *uterine* contractility. Recent advancements in imaging techniques, such as ultrasound and magnetic resonance imaging (MRI), have improved the diagnosis and monitoring of *fibroids* during pregnancy. Management strategies depend on symptom severity, with conservative approaches preferred during gestation. However, in cases of severe pain or complications, medical or surgical interventions may be required. Emerging therapies, including minimally invasive procedures, offer promising options for women planning pregnancy. This review highlights recent findings on the relationship between *uterine fibroids* and pregnancy outcomes, emphasizing the need for individualized management strategies to optimize maternal and fetal health. Further research is essential to refine treatment approaches and improve reproductive outcomes in affected women.

Keywords: *Uterine fibroids*, pregnancy, infertility, obstetric complications, miscarriage, fetal outcomes

Introduction
Uterine fibroids constitute a public health issue due to the morbidity associated with it. This study aims to evaluate the influence of *fibroids* and other risk factors on pregnancy outcomes. The prevalence of *uterine fibroids* is reported to range between 25-77% in reproductive-aged group. In the age group of 30-39, approximately 20% of the people are expected to experience symptoms due to *fibroids*. Any fibroid causing distortion of the *uterine* cavity can have significant effect on fertility (G.A *et al.*, 2016) [1]. Apart from the genitourinary symptoms, adverse obstetric outcome due to *fibroids* is also common. It is reported that women with *fibroids* are at an increased risk of spontaneous abortion, preterm labor and delivery, post-partum hemorrhage, placenta previa, breech presentation, cesarean sections, etc. Therefore, evidence-based research on *fibroids* in relation to pregnancy outcome is exceedingly important (Vitagliano *et al.*, 2018) [2]. However, the collection and analysis of such evidence can be a difficult proposition since *fibroids* vary in size, site, and number and hence a standardized approach is a challenge. Also, the investigations on treatment methods for *fibroids* to prevent the adverse effect on pregnancy outcome are still in nascent stages. This underscores the need for a thorough study of *fibroids* and pregnancy outcomes, which could be translated into medical practice for better and improved healthcare. It is also important for patients to possess such information which could aid in making well-informed choices concerning their health. Thus the importance of current research on *fibroids* and their association with pregnancy outcome cannot be undermined (Sefah *et al.*, 2023; Ukaonu *et al.*, 2022; Ahmad *et al.*, 2023; Li *et al.*, 2021) [3-6].

Definition and Types of *Uterine Fibroids*
Most women will have *uterine fibroids* at some point in their life. This high prevalence. They are the commonest benign gynaecological tumor in women of reproductive age.

Although the topic of *uterine* fibroid is not new, the effect of their types on pregnancy remains unclear. Thus, general study and analysis of the latest research on types and effect of *fibroids* on pregnancy is of great value and significance (Freytag *et al.*, 2021) [7]. *Uterine leiomyomas* are the result of monoclonal proliferation of smooth muscle cells in the myometrium. Recent studies show that *uterine fibroids* reduce fertility and have a negative effect on the health of gestation and the fetus. They increase the risk of infertility, miscarriage and preterm birth. The purpose of this literature review was to investigate the effect of *fibroids* on pregnancy. It also presented their influence on infertility and the delivery mode. Additionally, it examined the correlation of the size and position of *leiomyomas* to their degeneration as well as the influence of these factors both on pregnancy and delivery treatment (Coutinho *et al.*, 2022; Navarro *et al.*, 2021; Don *et al.*, 2023; Henshaw *et al.*, 2022; Akhatova *et al.*, 2023) [8-12].

Epidemiology and Prevalence

Uterine fibroids are benign neoplasms that develop from the smooth muscle of the myometrium, exhibiting variable growth rates (Li *et al.*, 2023) [13]. Approximately 20-40% of affected individuals exhibit clinical symptoms, including abnormal *uterine* bleeding, abdominal pain or discomfort, fatigue, and reproductive dysfunction. Although *fibroids* are hormone dependent, the biological triggers for their growth are still not completely elucidated (Kirschen *et al.*, 2021; Lin *et al.*, 2022; Pinto, 2024; Di *et al.*, 2022; Russo *et al.*, 2022) [14-18].

Pathophysiology of *Uterine Fibroids*

Uterine fibroids are non-cancerous growths of the uterus that are clinically and histologically different from other gynaecological disorders, such as *adenomyosis*, leiomyosarcoma, and sarcoma. These tumours arise from a neoplastic (clonally distinct) growth of smooth muscle cells, fibroblasts, and other cell types. Similar to what happens with cervical and *uterine* cancer, *fibroids* might arise from a clonal expansion of residual, proto-oncogenic, or pericytoid (modified fibroblasts serving as a coat) stem cells of the myometrium or from lymphoid bone marrow stem cells that migrate in the *uterine* parenchyma. Moreover, like other tumours, *fibroids* seem to be characterized by chromosomal anomalies, from once that appear to be rather common in them, such as t (12;14), t(12;6), loss of 7q, and translocation of 6p, and can drive tumour genesis. For example, benign meningiomas of the dura mater of the skull base that surrounds the pituitary appear during the fertile age only in the women (Ciavattini *et al.*, 2013) [19]. These lesions have been found to be associated in overrepresentation with loss of the complete chromosome 22 or submitosis of the q portion of this chromosome, while do not have other modifications that primarily differentiate them from their malign counterparts, that is anaplastic meningiomas and sarcomas. The aetiopathology of *fibroids* remains unclear and is likely to be multifactorial. Classic studies showed the steroidal dependence of myomas for their growth and development as well as the interactions between growth factors and steroids. However, more recent data can be roughly grouped into three major pathways. The first model postulates that *fibroids* represent 'normal' myometrium that starts to overproduce collagens and other proteins. A second hypothesis is that *fibroids* start from residual mesonephric duct cells. According to a third model, *fibroids* arise, like cancers, from a pathologic growth of stem cells. Each of these three perspectives is able to explain some of the existing experimental data (P Flake *et al.*, 2003) [20]. Importantly, while the first hypothesis is fully compatible with the widely accepted theory that *fibroids* make their extra-cellular environment (ECM) stiffer and less vascularised, the other theories reject this paradigmatic belief. On the other hand, recent findings have illuminated, from at least some points of view, the pathogenesis of these common tumors, exploring also the crosstalk between tumors and the adjacent myometrium (Nwonuma *et al.*, 2024; Ahmed *et al.*, 2022; Ara *et al.*, 2023; Adawe *et al.*, 2022; Falahati *et al.*, 2022; El Said *et al.*, 2025) [21-26].

Cellular Origin and Growth Factors

Uterine fibroids, also known as *leiomyomas*, are benign monoclonal tumors arising from the smooth muscle cells (myometrium) of the uterus. They are the most common tumors of the female reproductive system. The extracellular matrix (ECM) component of *fibroids* is abnormal and appears to both promote fibroid growth and be dysregulated because of changes in cellular interactions. The concurrent normal myometrium also undergoes massive changes with the development of *fibroids*; normal function is disrupted and a tumor-enabling microenvironment develops with complex intracellular and intercellular systems. Abnormal cellular interactions involving the smooth muscle cells in the ECM may be a significant factor in promoting fibroid growth. Many growth factors have been identified in the fibroid system that may promote fibroid growth. Oxidative stress and inflammation may be important in the fibroid microenvironment. Any of these abnormalities could be a treatment target, but more experimental work is needed to identify specific candidate genes/proteins to target (P Flake *et al.*, 2003) [20]. *Uterine fibroids* are monoclonal tumors arising from the smooth muscle cells (myometrium) of the uterus. However, many of the cellular and molecular mechanisms involved in fibroid growth are poorly understood. A better understanding of fibroid biology is necessary to develop effective therapeutic strategies. The development and growth of *fibroids* are thought to be the result of a complex interaction between genetic susceptibility, sex steroid hormones, growth factors, and a supportive extracellular matrix (ECM). It has been hypothesized that *fibroids* arise from a localized mutation in a smooth muscle cell (Kirschen *et al.*, 2021; Tu *et al.*, 2023) [14, 27]. Multiple disparate *fibroids* may result from independent pelvic field effects, similar to cancer theory. No specific gene mutations have been identified with the common fibroid variants, though a translocation abnormality has been found in a rare kidney fibroid *uterine* variant. Studies examining fibroid cytogenetics and gene expression have been conflicting. Despite having near-identical genomic DNA, monochorionic cotwins are discordant for fibroid growth, indicating that the process is stochastic. Abnormalities in mitochondrial DNA (mtDNA) have been recently linked to fibroid pathogenesis, though more work is needed (Bhat *et al.*2023; Yang *et al.*, 2022; Saad *et al.*, 2024) [28-30].

Hormonal Influence

Uterine fibroids are the most common benign tumors found in the female reproductive tract. They are usually hormone-sensitive through estrogen and progesterone. *Fibroids* are hormonally programmed and during periods of normal endocrinological activity, in the menstrual cycle and pregnancy, these hormones promote the growth of the myoma tissue but the volume increase is limited by mechanical aspect of the surrounding normal myometrium. The symptom-producing rate depends on the bulk size of the *fibroids* mostly, but some *fibroids* that are small in comparison with the total myoma

volume can cause significant symptomatology due to their particular anatomic localization. Therefore, the location in the uterus is an important element in evolution and symptom production (Donnez, 2020) [31]. There is a growing body of evidence to suggest that the size of the *fibroids* fluctuates during the menstrual cycle. The link between hormonal influences and the development and growth of *fibroids*, which are hormone-sensitive solid benign tumors. Estrogen activates the estrogen receptor, inducing fibroid cell growth by increasing the expression of growth factors. Progesterone increases the volume of tissue through upregulation of the production of factors that increase extracellular matrix deposition. These products by fibroid cell activity lead to an increase on fibroid size, density and stiffness (Lin *et al.*, 2022; Freytag *et al.*, 2021) [15, 7]. On the other hand, during some periods, such as during the menopause when ovarian production of sex hormones gradually diminishes, *fibroids* eventually diminish in size and some macroscopically disappear, probably driven by such tissue turnover, through apoptosis, fibrosis, and calcification. Identification of the mechanism underlying the hormonal influences on *fibroids* is of great importance in tailoring treatment strategies for women with *fibroids*. This is relevant and of clinical importance to gynecologists and endocrinologists according to the currently available treatment regimens. Hormonal therapies provide a targeted and sustained alleviation of specific symptoms that may be related to hormonal changes, such as the use of a progestogen to regulate symptoms associated with menstruation (Kirschen *et al.*, 2021; Ahmad *et al.*, 2023; Yang *et al.*, 2022; Navarro *et al.*, 2021) [14, 5, 9, 29].

Diagnosis of *Uterine Fibroids*

Common clinical presentations exist that may indicate the presence of *uterine fibroids*. Subfertility may also be due to *fibroids*. Postulated mechanisms include myometrial contractility, disordered anatomy of the pelvis, or changes in the endometrium or fallopian tubes. *Uterine fibroids* are characterized by the presence of more than 20 smooth muscle cells in a single viewpoint (T Khan *et al.*, 2014) [32]. *Fibroids* can result in a variety of symptoms that are dependent on size, location, and number. The most common presentation is abnormal *uterine* bleeding and this includes menorrhagia, inter-menstrual blood loss, and post-menopausal bleeding. Pelvic pain and bulk symptoms may also be seen. Inability to conceive or recurrent miscarriage may also be due to *fibroids*. There are many methods to investigate *fibroids*. Ultrasound is the first choice imaging modality to investigate *fibroids*. There are many types of ultrasound. 2D transabdominal or transvaginal ultrasound are appropriate for screening. Three-dimensional (3D) and 4D ultrasound technologies also enable volume calculation of *fibroids*. Power Doppler ultrasound allows visualization of vascularity of fibroid implants. However, if the fibroid is isointense to the myometrium, often it may not be seen (Bonanni *et al.*, 2023; Freytag *et al.*, 2021) [33, 7]. Magnetic resonance imaging (MRI) is an alternative imaging modality to diagnose *fibroids*. T2-weighted MRI gives good anatomical definition and reflects tissue relaxation with clear delineation between *fibroids* and normal myometrium. Reaching a confident diagnosis of a mass as fibroid is very valuable as it determines the need for any further investigation and whether conservative management is appropriate. Improvements in technology have increased use of magnetic resonance imaging (MRI), which is likely to supersede imaging using ionizing radiation (Don *et al.*, 2023; Donnez *et al.*, 2024) [10, 34]. Hysteroscopy has excellent accuracy for diagnosing submucosal *fibroids*. Detection of *fibroids* depends on the visual field of view of the hysteroscope which is only approximately one-third of the *uterine* cavity. Other methods of submucosal fibroid detection include the use of color, or power, Doppler and assessment of changes in the refraction of light passing through saline, hydroflotation or dextranometry, fluid, carbon dioxide, methylene blue, gelatine, L-arginine gel, corn starch, or oil; sound or liquid vasoconstriction, radiofrequency ablation, or confirmed electrical impedance (Alkhrait *et al.*, 2023; Mishra *et al.*, 2023; Turkgeldi *et al.*, 2024) [35-37].

Clinical Presentation

Uterine fibroids, also known as leiomyoma or myoma, are benign (non-cancerous) tumors of the uterus. They can have an effect on women of childbearing age, as well as pregnant women, and are the most frequent benign gynecological tumors in women of childbearing age. *Fibroids* are histologically rated as well-differentiated smooth muscle in nature (T Khan *et al.*, 2014) [32]. *Uterine fibroids* typically originate during the fertile years, with the prevalence highest in ethnicities that include Africans; they are twice more likely to be symptomatic in Africans than Caucasians. Overall figures suggest that *fibroids* will occur in around 61% of the population of African descent and 77% of Caucasian descent. *Fibroids* are among the most frequent indications for hysterectomy, being on a 3 in 10 women by the age of 45. There is inadequate data on *fibroids* in pregnancy, although available figures are about 10%. It is important for the health care provider to recognize the clinical symptoms and risk variables of *fibroids* as they increase the likelihood of being able to counsel the patient regarding the choices available (Adawe *et al.*, 2022; Lin *et al.*, 2022) [24, 15]. The majority of *fibroids* are asymptomatic benign growths. Signs of *fibroids* vary this is influenced by location, size, and quantity of *fibroids*. However, the most prevalent presentation of a leiomyoma is heavy menstrual bleeding. Other common symptoms include lower pelvic pressure, frequent urination, pelvic pain, constipation, dysmenorrhea, and backache. Pain, being a frequent result of *fibroids*, arises from degeneration or twisted pedunculated leiomyoma. Symptomatology varies significantly by age, with the most frequent mechanism being that those who are symptomatic until menopause are more likely to be symptomatic age 40-45. Lesions are usually multiple and develop at a younger age. Statistically, the greatest odds of developing a symptom such as heavy menstrual bleeding lie in the period from menarche to first pregnancy. Viewing the psychological aspect is also essential when it comes to the side effects of *fibroids*. Women living with *uterine* fibroid-related symptoms can encounter stress and distress. Variations in the presentation of *fibroids* are widely observed between people of different age groups and ethnicities; therefore, the healthcare provider must also understand this aspect of *fibroids* (Viva *et al.*, 2021; Yu *et al.*, 2024; Nougaret *et al.*, 2021; Moini *et al.*, 2021) [38-41]

Imaging Techniques

Although *uterine* artery embolization (UAE) has gained ground as an acceptable option for those with symptomatic *fibroids* who wish to maintain fertility, its use is still off-put by some providers because it is not in accordance with traditional treatments. This view, however, is not supported by the (T Khan *et al.*, 2014) [32]. UAE also avoids the potential complications of surgery, such as adhesion formation, and it can be performed as an outpatient procedure. Therefore, understanding UAE is important. One of the requisites in deciding whether UAE is the

right choice for management of symptomatic *fibroids* requires a thorough understanding of how and why they occur. This reviews the pathogenesis of *fibroids* and their effect on fertility. This also provides an update on patient presentation, options for imaging detection, medical/surgical management, and UAE, both to non-ACR members and to the seasoned radiologists/ACR members, focusing on the data that exists that is applicable specifically to the radiologist. The data for this summary was obtained using a search as well as various research articles including review articles on *fibroids*, their treatment, and their effect on fertility; several articles were then chosen. Symptomatic myomas are one of the most common problems that affect reproductive-aged women. A myoma is defined as a benign monoclonal neoplasm of smooth muscle origin occurring within the muscular wall of the uterus; it is an extrinsic mass until it has grown to a size at which it distorts the inner cavity.

Management Options for *Uterine Fibroids*

Uterine fibroids (*leiomyomas*) are benign smooth muscle tumors of the uterus and pelvic connective tissue. They are the most common type of tumors in the female reproductive system. Most women experience at least a small number of *fibroids* during their reproductive years, but half of these cases are asymptomatic. *Uterine fibroids* have an incidence of 20% to 40% in women during their reproductive years (&, 2018). Furthermore, the cumulative incidence of clinically detectable *uterine fibroids* by age 50 is estimated to be above 80%. Black ethnicity, obesity, increasing age up to menopause, and nulliparity are known risk factors for this tumor. Current data in Britain indicate that the age-standardized incidence of *uterine fibroids* in women is increasing. Since the development and growth of *fibroids* are affected by estrogen and other female hormones, their size often increases proportional to these hormones and they can regress after menopause (Huang *et al.*, 2023; Ahmad *et al.*, 2023) [44, 5]. *Uterine fibroids* (also known as *uterine leiomyomas*) are benign growths arising from the smooth muscle of the uterus. They are commonly seen in the female population, with reported prevalence ranging from 20% to 40% of women in their fourth and fifth decades, although the rate appears to be even higher when certain imaging studies are performed. They can cause symptoms such as hypermenorrhea, dysmenorrhea, pressure symptoms like dyspareunia or constipation, and an increased risk of obstetric complications (MacGregor *et al.*, 2022) [45]. Whether *fibroids* are associated with infertility is still a matter of debate. It has become apparent, however, that they can have a negative effect on IVF. This is the indication for prospective meta-analysis of all available articles investigating the effect of *fibroids* located in different parts of the uterus and with different characteristics on fertility treatment. Data for *fibroids* located in the *uterine* cavity and cervical can vary in shape, number, and size. In agreement with (Seon Sohn *et al.*, 2018) [43], a detrimental effect was seen when the two larger diameters of each fibroid exceeded 3 cm or when the total volume of all *fibroids* exceeded 16 cm^3 (Gerema *et al.*, 2022; Park *et al.*, 2025; Ali *et al.*, 2023; Wang *et al.*, 2024; Krzyżanowski *et al.*, 2023) [46-50].

Medical Management

In general, the medical management of *uterine fibroids* focused on symptoms, which was the main reason for changes in therapy. This suggests that the benefit of hormonal therapy in shrinking *fibroids* is still uncertain. The benefit of *uterine* artery embolization is uncertain, as is the benefit of surgical treatment in the absence of cases of organic changes in *fibroids*. It is necessary to get knowledge about hormonal and surgical treatment of *fibroids*, and to monitor the patients' quality of life (Krzyżanowski *et al.*, 2024) [51]. Pharmaceutical options are available which can target the management of *fibroids*, although the benefit of these drugs should be weighed against the risks. Hormonal therapies include oral contraceptives and GnRH agonists. This group of drugs is effective in controlling symptoms; however, some publications show that the use of oral contraceptives may be associated with an increased risk of developing *fibroids* or the need for surgical or invasive treatment. Prevention of pain and reduction of excessive menstrual bleeding may be achieved by the use of non-hormonal medications (Dolmans *et al.*, 2021) [52]. The advantage of using non-hormonal drugs is supposed to avoid the potential growth of *fibroids* as oral contraceptives or other medications containing estrogens, or drugs such as GnRH agonists, which may promote recovery and growth of *fibroids* after treatment discontinuation. The continuing improvement in the quality of life and the unavailability of major surgical procedures encourage non-compliance. The difficulty lies in the fact that surgery may be the only therapeutic treatment (Vannuccini *et al.* 2024) [53]. Young women who have reproductive plans and are not eligible for endometrial ablation procedure are particularly at risk. Additionally, treatment with GnRH agonists may cause menopausal symptoms and justify withdrawal. However, because of these medications, the ever-increasing size of the enucleated woman's womb does not think about microscopic surgery of *fibroids* anymore. Adherence may also be a problem for the other proposed pharmaceutical options of fibroid management. Reported side effects may discourage the long-term use of medication. This includes abnormal bone resorption and osteoporosis in relation to GnRH agonists or significant weight gain in the case of danazol treatment after 1 year. The decision to recommend medical treatment depends on the individual circumstances of each patient and should take into account the benefits alongside the potential risks of the ongoing treatment (Ali *et al.*, 2022; Ciebiera *et al.*, 2023; Ahmad *et al.*, 2023; Leyland *et al.*, 2022; Sefah *et al.*, 2023) [48, 55, 56, 75, 5, 3].

Surgical Interventions

Surgical management options for *uterine fibroids* are varied. In most circumstances, *fibroids* can be managed conservatively. Only a minority of patients with *uterine fibroids* will ultimately need or request a surgical procedure. Patient selection for surgery is paramount and the size, location, and patient's desire for future fertility should all be considered. There are essentially two treatment options available: myomectomy or hysterectomy. While myomectomy is invariably the preferred choice for women seeking fertility preservation, hysterectomy is very effective and can be considered in older patients where treatment failure or subsequent fibroid growth is unlikely to occur. From a technical perspective, treatments involve non-invasive and minimally invasive modalities. The former includes video-assisted removal via a transvaginal or laparoscopic approach. The latter comprises a range of techniques that can achieve fibroid destruction or removal via a direct endoscopic or overlying approach. The risk of infertility or adverse obstetrics from such interventions should not be underplayed, and the market has heralded several innovations such as robotic or magnetic-assisted laparoscopic fibroid excision system among other high-tech equipment (T Khan *et al.*, 2014) [32]. Each of these surgical techniques comes with specific risks. In addition to procedure- and operator-specific complications, surgical risks are also inherent to the patient population. This patient

population is often older, heavier, and more socioeconomically deprived than the general obstetric population. Combined with high rates of social comorbidity and lifestyle-related conditions, many patients who undergo surgical intervention for *fibroids* have an increased baseline risk. As these patients also often have increased surgical complexity and a higher rate of conversion to more invasive surgical procedures, this makes the risks associated with surgery a serious consideration. Patients should be appropriately counseled and thorough consent which includes the risks and benefits should occur after a thorough preoperative evaluation, with the emphasis on the suggestion that all patients should have a postoperative obstetric follow-up (VanNoy *et al.*, 2021; Orellana *et al.*, 2022; Barbaresso *et al.*, 2024; Orellana *et al.*, 2024; Berman *et al.*, 2022; Dykstra *et al.*, 2023) [57-62]

Impact of *Uterine Fibroids* on Pregnancy

The incidence of *uterine fibroids* in the pregnant population is between 2.5% and 10%, compromising fertility, with significant risks for obstetric outcomes (Vitagliano *et al.*, 2018) [2]. *Uterine fibroids* affect fertility by inducing anatomic changes in the *uterine* cavity and impairing implantation, thereby interfering with nourishing angiogenesis and the placentation of the blastocyst. There is also decreased possibility for the sperm and ovum to meet owing to tubal transport interference, cervical mucus cervix-related tests, or the immunologic effects of the myoma (G.A *et al.*, 2016) [1]. *Uterine fibroids* contribute independently to adverse pregnancy risks, including early and late miscarriage, preterm premature rupture of membranes, preterm labor, placental abruption, placenta previa, postpartum hemorrhage, malpresentation, cesarean section, puerperal infection or medical illness, and maternal death. Fetal risks include growth restriction, fetal distress, anomalies, and intrauterine fetal mortality. Maternal healthcare costs are associated with the increased risk of placental complications, altered mode of delivery, prolonged gestational age, and higher odds of admission of the newborn to the NICU and treating newborn morbidity (Lou *et al.*, 2023; Cheng *et al.*, 2022) [63, 64]. The joint rate of maternal and fetal complications is higher for women with *fibroids* than for other pregnant women. These findings offer a comprehensive and novel understanding of the actual health burden of maternal and fetal complications estimate, shedding new light on the potential benefits and the cost-effectiveness of preventing or treating this condition during this special life period. A most challenging frontier involves the complex practical addressees of these new insights for clinical and health policymaking management. The psychosocial aspects of living with amyoma or *fibroids* during pregnancy, rather than symptomology or medical complications, might be addressed. Such a psychosocial aspect of myoma or *fibroids* represents a novel focus that remains unexamined empirically (Adawe *et al.*, 2022; Mercy & Lekpa, 2021; Morhason-Bello & Adebamowo, 2022; Ahmad *et al.*, 2023) [24, 65, 66, 5].

Effect on Fertility

Uterine fibroids are the most common benign smooth muscle tumours of the uterus. Understanding the nature of this disease and how it affects the physiology of the uterus during pregnancy can assist in providing the appropriate care for both mother and fetus. Consequently, the present subsection will seek to review the nature of *uterine fibroids* and assess their effect on some aspects of pregnancy. *Uterine fibroids* are the most common benign tumours in women. It is estimated that by age 50, about 70% of Caucasian and 80% of African American women exhibit *uterine* fibroid tumours. While many women with this condition may remain entirely asymptomatic, some (20-40%) may suffer symptoms that can have a significant quality-of-life impact (Tu *et al.*, 2023; Di *et al.*, 2022) [27, 17]. A fibroid is a growth of the smooth muscle and fibrous tissue, which can be found anywhere on the wall of the uterus. However, the physiology of *uterine fibroids* during pregnancy is still unclear. This lack of understanding is compounded by the varying differences in fibroid type, volume, growth rate, and location. Some *fibroids* develop in the lining of the uterus and are referred to as 'submucosal'. They can be close to the fallopian tubes (pedunculated subserosal *fibroids*). Subserosal *fibroids* are located under the perimetrium and can also develop from a pedunculated subserosal fibroid (Purohit & Vigneswaran, 2016) [1]. The exact effect of fibroid tumours on the uterus during implantation and gestation is not known. However, previous studies indicate that *fibroids* could lead to anatomical and cellular changes, altering the cellular matrix composition and reorganizing the muscle tissue (Russo *et al.*, 2022; Lin *et al.*, 2022; Pinto, 2024; Kirschen *et al.*, 2021) [18, 15, 16, 14].

Complications during Pregnancy

Uterine fibroids are the most common tumors of the female reproductive system, generally detected during women's reproductive years (Camelia Tîrnovanu *et al.*, 2022) [68]. They are benign smooth muscle tumors of the uterus which can vary from microscopic lesions to large bulky tumors that may reach considerable size. *Fibroids* are an important public health issue because of their high prevalence and large range of symptoms they produce in women, their association with potentially severe conditions and treatment interventions.

Complications and effect of *fibroids* on pregnancy have been extensively studied. The management of a pregnancy associated with *fibroids* has always been a challenge. Pregnant patients with *fibroids* are exposed to a high rate of complications during antepartum, intrapartum, and postpartum periods. The prevalence of *uterine fibroids* during reproductive years is even higher, with reported prevalence rates ranging from 5% to 59% depending on factors such as age, ethnicity, and the research method. The most common symptoms of *fibroids* are heavy menstrual bleeding, dysmenorrhea, menorrhagia and cyclic pelvic pain, with invasive quality of life of most patients (Coutinho *et al.*, 2022; Chen *et al.*, 2021) [8, 69]. Common complications during pregnancy include early and late miscarriage, premature birth, fetal malposition, placental abruption, postpartum, and increased incidence of abdominal delivery. Because of increasing awareness, sonographic examination is performed more frequently during pregnancy and thus more incidental *fibroids* are identified. Clinical studies, including parameters such as age, parity, and location of *fibroids* or number of *fibroids*, have been conducted to predict complications arising from *fibroids* during pregnancy (Vitagliano *et al.*, 2018) [2]. Most of these cases suggest an increased risk in certain situations; however, the exact mechanism of the increased risk of *fibroids* and associated pregnancy complications has not yet been elucidated. Since pregnant women are offered more prenatal care these days, family physicians, obstetricians, and midwives should have knowledge about the improved problem related to *fibroids* and pregnancy in order to provide adequate pregnancy care. Furthermore, it is clear from the research findings that in order to avoid complications, Gilboa's growth should be monitored throughout pregnancy (Tîrnovanu *et al.*, 2022; Datir *et al.*, 2022; Li *et al.*, 2024; Farland *et al.*, 2022) [68-72].

Management of *Uterine Fibroids* during Pregnancy

Uterine fibroids constitute the most common benign neoplasms of the reproductive system in females. They can significantly impact fertility, conception, and negatively influence the pain (both intensively and duratively) and nausea during pregnancy if red degeneration occurs (Vitagliano *et al.*, 2018) [2]. When a fibroid is located in the *uterine* cavity, there is a risk of ongoing pregnancy and an increased rate of miscarriage, with a risk of them during pregnancy. Therefore, the care of such patients must be considered as clinical evidence could guide the management of *uterine fibroids* during pregnancy. Increasing knowledge of medical therapies, diagnostic technologies, and innovative invasiveness approaches has permitted a significant improvement in the management of women affected by symptomatic *fibroids*. A proactive approach to *uterine fibroids* has led to several expert guidelines and their implementation in clinical practice to enhance the quality of care for those affected (Coutinho *et al.*, 2022; Navarro *et al.*, 2021) [8, 9]. Despite all recommendations about the methods of monitoring the *uterine fibroids* after diagnosis, there is no guideline concerning how to follow pregnant patients who had a *fibroids* diagnosis before. Understanding this, there is little evidence on how the pattern of growth or course of individual *fibroids* during pregnancy and puerperium may change due to UFs' characteristics and women's features (heritage, diet, drugs intake etc.). In the light of the huge number of inadequate data, determination to conduct a systematic review of clinical studies in order to provide an evidence-based overview of *fibroids* modifications during pregnancy and puerperium to fill the existing gap. This study has been conducted in compliance with the PRISMA guidelines, and, to the best of the authors' knowledge, this paper is the first reliable summary of available evidence on the topic (Freytag *et al.*, 2021; Henshaw *et al.*, 2022; Akhatova *et al.*, 2023; Rodríguez *et al.*, 2021) [7, 11, 12, 73].

Guidelines and Recommendations

The impact of *uterine fibroids* on fertility and pregnancy outcome has been the subject of great interest and research in the past several years. Various studies have confirmed the negative effect of *uterine fibroids* on fertility through altering sperm transport, oocyte pick-up, embryo development, trophoblast invasion, and blood flow to the endometrium and *fibroids*. When a pregnancy is achieved, *fibroids* have been associated with a higher frequency of complications such as miscarriage, preterm labor, abnormal fetal position, cesarean section, and post-partum hemorrhage. Even with the increasing interest in this topic, the recommendations for managing *fibroids* during pregnancy are lacking and not all medical societies have addressed this issue (Vitagliano *et al.*, 2018) [2]. Therefore, this article presents an updated review of the impact of different fibroid characteristics on pregnancy outcome and the recommendations for the monitoring and interventions of pregnant patients with *fibroids* by different leading medical organizations (Coutinho *et al.*, 2022) [8]. Various considerations regarding the recommendations and management of *fibroids* during pregnancy will be discussed. Management of *fibroids* during pregnancy should be individualized, taking into account symptoms, risk of complications in pregnancy, considering also the high number of asymptomatic *fibroids* with an incidental finding in pregnancy (Chen *et al.*, 2021; Tîrnovanu *et al.*, 2022) [69, 68]. Medical guidelines on the management of *fibroids* during pregnancy are lacking. The recommendations for the monitoring of pregnant patients with *fibroids* are also from the European Society of Human Reproduction and Embryology and the European Society for Gynaecological Endoscopy, considering the lack of recommendations for interventions during pregnancy. It is the responsibility of various professionals involved in the care of pregnant patients with *fibroids* to reach a shared decision underlining the importance of patient involvement in building care (Freytag *et al.*, 2021; Li *et al.*, 2024; Sparić & Tomašević, 2021) [7, 71, 74].

Conclusion and Future Directions

In conclusion, in order to increase research on the impact of UFs on women's daily activities, patient risk reduction, and continued progression in the recognition and management of UFs, numerous strategic approaches must be implemented. Additionally, this work underscores the need to educate general care providers, OB/GYNs, and emergency department personnel about UFs through conference seminars and the accomplishment of a Web-based tool in order to correctly address patients' preliminary queries. Research conducted using machine learning and analysis of electronic health records is supporting attempts to improve these areas. It is hoped that these findings will contribute to the call for further research on the psychosocial consequences of UF. It has also been suggested that researchers investigate whether public efforts can help distinguish worry and fear from discourse. Further areas of inquiry might include understanding how women build confidence in their bodies after encountering health-related phenomena, articulating the value of collectivism among peers, and dissecting case series to extract common thematic elements. Research can be complemented by keeping updated on social media platforms and participating in workshops and other events. Such increased public involvement, it is hoped, will propel this practical stake, allowing healthcare providers to benefit disproportionately from the advances in modern medicine.

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