Vol. 4 No. 3 (2025)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Evaluation of Pregnancy Rate and Fertility Outcome in Patients After Uterine Artery Embolization

Abdul Basit
Student of MS Allied Health Sciences,
Faculty of Allied Health Sciences,
Superior University, Lahore.

Fatima Zahid
Lecturer, Department of Optometry
and Vision Sciences, Faculty of Allied
Health Sciences, Superior University, Lahore.

Author Details

Keywords: Uterine Artery Embolization (UAE), Symptomatic Uterine Fibroids, Fertility Preservation, Pregnancy Outcomes, Reproductive Health, Minimally Invasive Procedure, Fertility Rate, Fibroid Shrinkage.

Received on 18 July 2025
Accepted on 10 Aug 2025
Published on 19 Aug 2025

Corresponding E-mail & Author*:
Fatima Zahid
Lecturer, Department of Optometry and Vision Sciences, Faculty of Allied Health Sciences, Superior University, Lahore.
fatima.zahid@superior.edu.pk

Abstract

Background: Uterine artery embolization (UAE) is a minimally invasive procedure used to treat symptomatic uterine fibroids, offering an alternative to more invasive surgeries like myomectomy and hysterectomy. While UAE is known to alleviate fibroid-related symptoms, its impact on fertility and pregnancy outcomes remains uncertain, making it crucial to evaluate its efficacy in preserving reproductive health.

Objective: This study aimed to evaluate the pregnancy rate and fertility outcomes following UAE in women with symptomatic uterine fibroids, providing insights into its role as a fertility-preserving treatment.

Methodology:
A cross-sectional study was conducted at Farooq Hospital, Lahore, involving 35 women who underwent UAE for symptomatic uterine fibroids between 2015 and 2023. Participants were selected using a non-probability purposive sampling technique. Data were collected using a structured questionnaire, and statistical analysis was performed using SPSS 25.0, including descriptive statistics, Chi-Square, T-test, and ANOVA to examine the relationship between various factors and fertility outcomes.

Results: The results of this study revealed that uterine conditions, particularly fibroids and leiomyomas, were prevalent among participants, with a significant proportion experiencing infertility for extended periods. Statistical analysis showed no significant correlation between the duration of infertility and conception outcomes, as both T-tests and ANOVA tests yielded non-significant results. Only 12.5% of participants conceived following the procedure, while 6.25% reported pregnancy, but the high non-response rate (75%) to key questions limited the ability to draw firm conclusions. The findings suggest that while uterine abnormalities are common, they do not appear to significantly influence fertility success in this sample.

Conclusion: This study examines the relationship between infertility duration, clinical findings, and conception outcomes following a procedure. Most participants were in their early to mid-thirties and exhibited common uterine conditions like fibroids and leiomyomas. Statistical analysis showed no significant link between infertility duration and conception success. While 12.5% of participants conceived, the high non-response rate (75%) limited definitive conclusions. The findings highlight the need for further research into factors affecting fertility and improved data collection in future studies.

INTRODUCTION:

Uterine artery embolization (UAE) is a minimally invasive treatment primarily used for symptomatic uterine fibroids benign smooth muscle tumors affecting up to 70–80% of women by age 50 (1). Fibroids commonly cause heavy menstrual bleeding, pelvic pain, and pressure symptoms, often disrupting bladder and intestinal function, and contributing to reproductive issues such as infertility and pregnancy complications (2). Traditional treatments for fibroids include surgical options like hysterectomy and myomectomy. Hysterectomy is definitive but eliminates fertility, while myomectomy preserves the uterus but carries risks like infection, hemorrhage, and fibroid recurrence (3). UAE has emerged as an alternative that selectively blocks blood flow to fibroids by embolizing the uterine arteries, inducing ischemia and shrinkage of fibroids. Advantages include shorter hospital stays, quicker recovery, and uterine preservation, making it attractive for women desiring fertility preservation (4).

Despite UAE's increasing popularity, its impact on fertility and pregnancy remains controversial. Concerns include increased risks of miscarriage, abnormal placentation, postpartum hemorrhage (PPH), and complications threatening maternal and fetal health (5). UAE is generally safe and effective for premenopausal women desiring uterine preservation, but careful counseling is necessary given potential pregnancy risks (6).

The UAE procedure involves local anesthesia and interventional radiology techniques to inject embolic agents (e.g., gelatin sponge or polyvinyl alcohol particles) into uterine arteries, occluding fibroid blood supply and causing necrosis. This leads to significant reductions in fibroid size and symptom relief (7). Compared to myomectomy, UAE is less invasive with reduced postoperative pain and faster return to daily activities, although myomectomy may offer superior long-term quality of life for some patients (8). Studies on fertility outcomes after UAE report variable pregnancy rates, ranging widely from about 23% to as high as 69% in specific patient groups. Factors influencing outcomes include patient age, fibroid characteristics, and reproductive health status (9). Younger women generally have better fertility post-UAE, possibly due to preserved ovarian function and a more favorable uterine environment shortly after treatment (10). Timing of conception post-UAE also appears important, with attempts within 6 to 12 months associated with better success rates (11).

Pregnancy outcomes following UAE reveal a higher incidence of obstetric complications such as miscarriage, preterm labor, cesarean delivery, and postpartum hemorrhage, likely related to uterine scarring and placental abnormalities. Thus, pregnancies after UAE require close monitoring by multidisciplinary teams (12). Nonetheless, live birth rates post-UAE are comparable to those following myomectomy, highlighting UAE's potential as a fertility-preserving option (13).

Beyond fertility, UAE significantly improves quality of life by reducing fibroid-related symptoms and enhancing emotional well-being (14). Patients report less pain, fewer hospital days, and faster recovery than with surgical alternatives, reinforcing UAE as an effective, less traumatic treatment (15). The psychological benefit of symptom relief and preserved fertility contributes positively to patients' overall health (16).

Minimally invasive UAE also offers advantages over other emerging therapies such as aortic balloon occlusion (ABO), which, while effective in reducing blood loss during cesarean scar pregnancy, is more invasive and carries additional risks (17). Moreover, UAE has demonstrated effectiveness in managing adenomyosis, reducing uterine volume and symptoms like dysmenorrhea, further expanding its therapeutic applications (18). Despite promising results, limitations exist, including the lack of long-term, multicenter studies directly comparing UAE with surgical options regarding fertility and pregnancy outcomes. More robust data are needed to better understand the risks, optimize patient selection, and refine counseling (19). Ongoing research should focus on integrating UAE with advanced imaging and molecular diagnostics to improve individualized care (20).

In summary, UAE is a groundbreaking minimally invasive treatment for symptomatic uterine fibroids, offering symptom relief, uterine preservation, and promising fertility outcomes. However, potential obstetric complications warrant thorough preoperative counseling and postoperative monitoring. This thesis aims to contribute to the growing evidence base on pregnancy rates and fertility after UAE to support informed clinical decisions and patient care.

METHODOLOGY

Research Design: Cross-sectional comparative study.

Clinical Settings: Farooq Hospital, DHA, Lahore.

Sample Size: 35

Total sample size is 35 patients.

Sampling Technique: Non-probability purposive convenient sampling technique will be used.

Duration of Study: The study was conducted over a period of 6 months, starting from February 1, 2025.

Selection Criteria

Inclusion Criteria:

Married Women after one year.

Patients who underwent UAE between 2015 and 2023.

Women with a desire for future pregnancies, as documented in their clinical records.

Patients with symptomatic uterine fibroids confirmed via imaging (ultrasound or MRI).

Participants with no prior history of hysterectomy or other fertility-compromising procedures.

Exclusion Criteria:

Below 20 years at the time of UAE.

Patients who underwent UAE for indications other than symptomatic fibroids (e.g., postpartum hemorrhage, uterine arteriovenous malformations).

Women with significant comorbid conditions affecting fertility, such as advanced-

stage endometriosis or untreatable male factor infertility.
Patients with incomplete clinical records or who are unwilling to participate in follow-up assessments.
Those with a history of chemotherapy, radiation therapy, or ovarian surgery post-UAE.

Ethical Consideration

The research adhered to the ethical guidelines of the Superior University, Lahore. Written informed consent was obtained from all participants, and their confidentiality and anonymity were maintained throughout the study. Participants were informed that the procedure involved no risks or disadvantages and that they could withdraw at any time without penalty. Every effort was made to protect their privacy, and personal identities will not be disclosed in any resulting publications. Participation was entirely voluntary.

Data Collection Procedure:

Data for this study was collected using a structured questionnaire.

Procedure Of UAE:

Uterine artery embolization (UAE) is a minimally invasive procedure performed by an interventional radiologist to treat fibroids. Under local anesthesia, a small incision is made near the groin or wrist, and a thin catheter is inserted into the femoral artery. The catheter is guided to the uterine arteries supplying the uterus, where tiny plastic or gelatin particles are injected to block blood flow to the fibroids. This causes the fibroids to shrink and die. Both uterine arteries are treated through the same incision, allowing multiple fibroids to be addressed in one procedure.

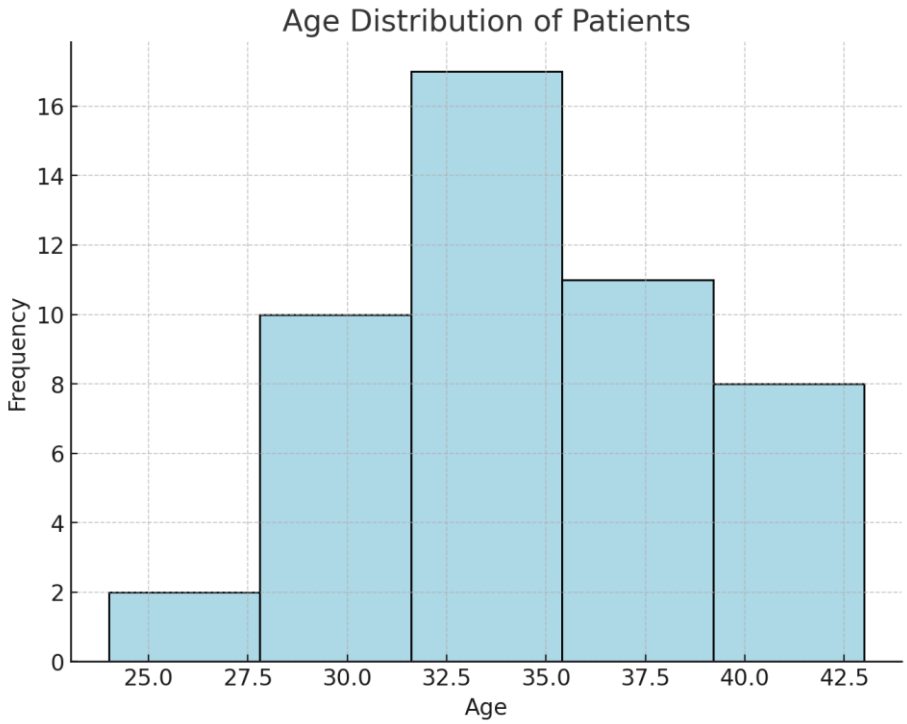
Data Analysis

Statistical package for social sciences (SPSS) 25.0 and Microsoft Excel 2016 will be used to evaluate and analyze the data. The distribution of the data will be examined using a comparative analysis. For continuous variables, mean and standard deviation (SD) will be determined. For categorical values, frequency and percentage will be calculated. Chi-Square test, ANOVA, and T-test will be used to compare the categorical values between the groups. Additionally, specificity and sensitivity will be used to evaluate the diagnostic performance. Microsoft Office was used to store the collected data.

RESULTS:

Table 1: Age Distribution Table

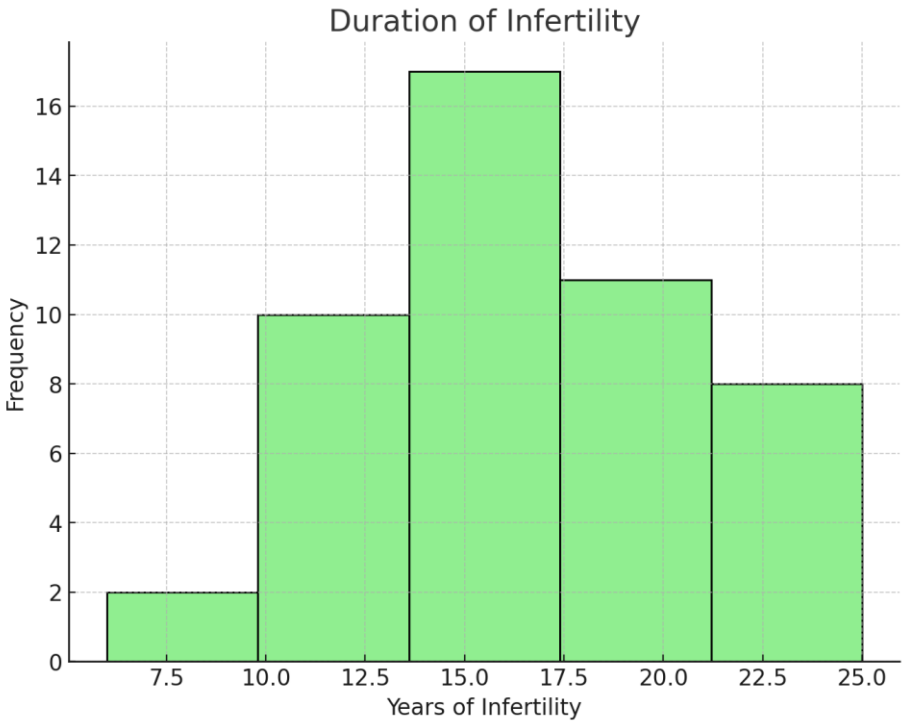
Age Group	Frequency	Percentage
[30, 35)	24	50
[35, 40)	14	29.16
[40, 45)	8	16.66
[20, 25)	1	2.08
[25, 30)	1	2.08



This table provides a breakdown of the age distribution of the participants. The data highlights that the majority of participants are in the age group of (30, 35), comprising 50% of the total sample. The next largest age group is [35, 40), accounting for 29.16% of the participants. The age groups [40, 45) and [20, 25) represent smaller proportions at 16.66% and 2.08% respectively. The smallest group, [25, 30), also represents 2.08% of the participants. This age distribution suggests a predominance of women in their early to mid-thirties, which is often associated with increased infertility challenges.

Table 2: Duration of Infertility

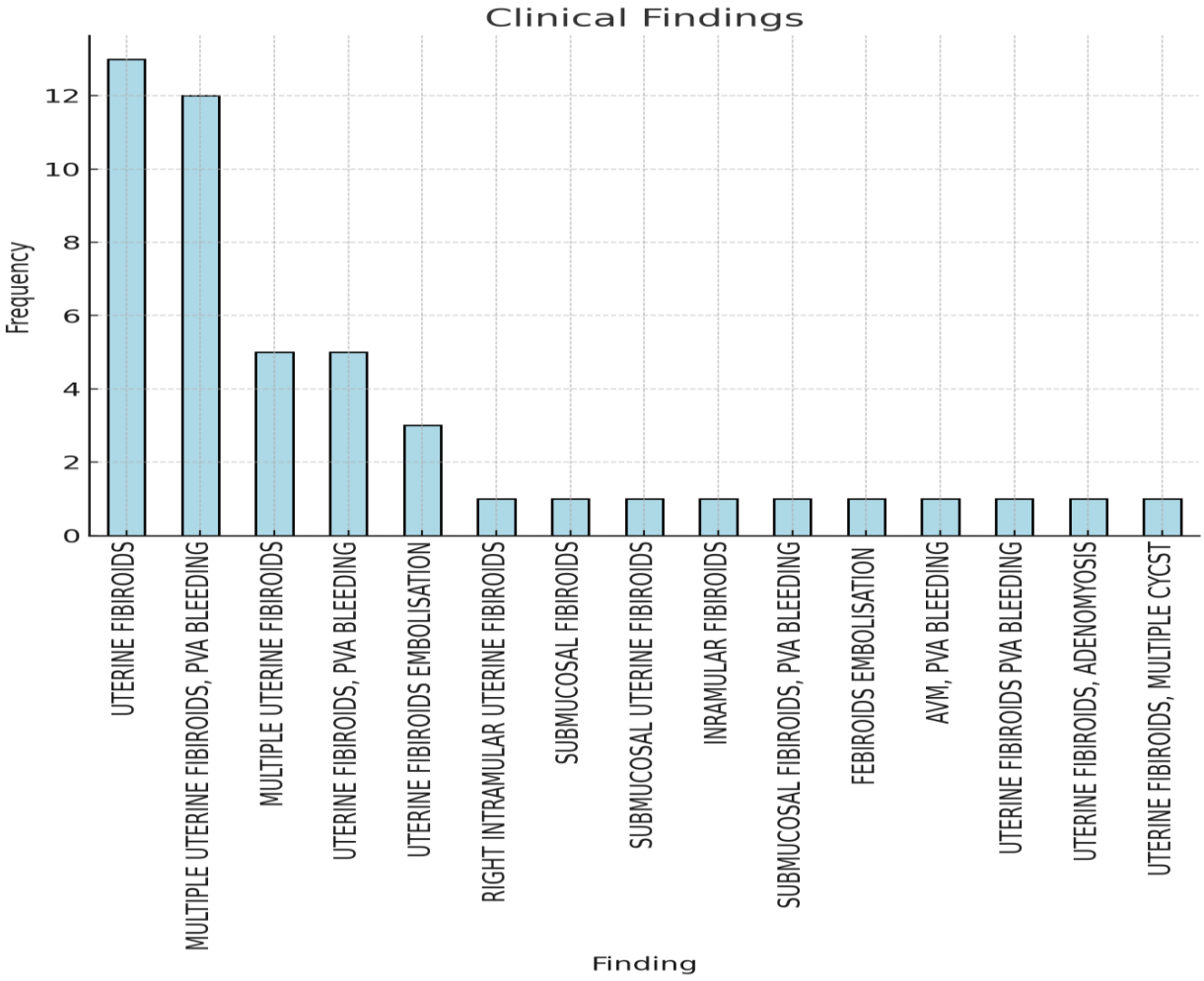
Duration of Infertility	**Frequency**	**Percentage**
[10, 15)	16	33.33
[15, 20)	16	33.33
[20, 25)	13	27.08
[5, 10)	3	5.16
[0, 5)	0	0

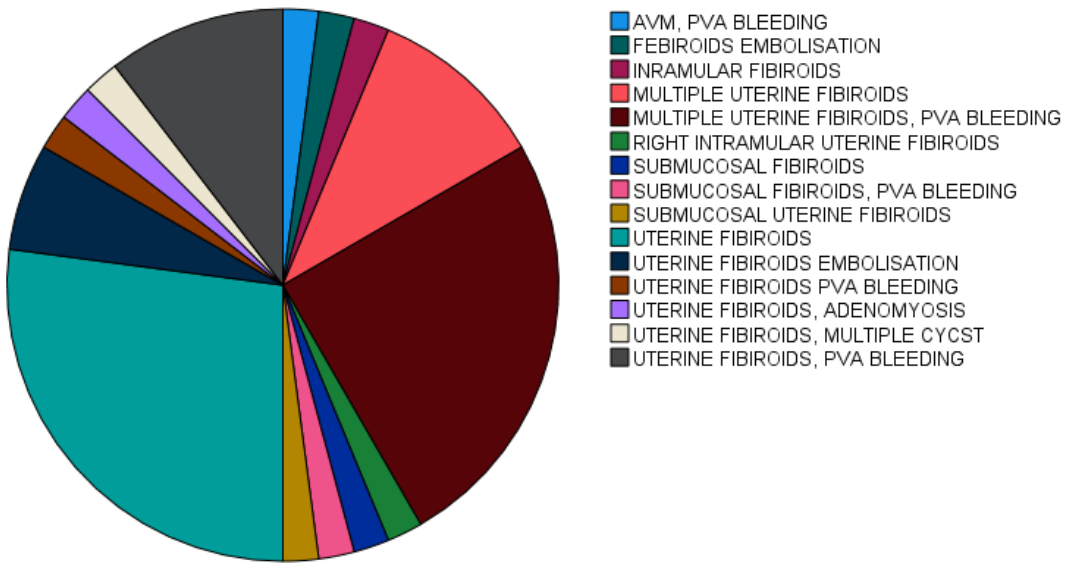


This table details the duration of infertility experienced by the participants. The [10, 15) and [15, 20) categories each represent 33.33% of the participants, suggesting that the majority of individuals have been experiencing infertility for a significant period. [20, 25) comes next with 27.08%, while a smaller percentage of participants fall within the [5, 10) range (5.16%). Notably, no participants reported having infertility for less than 5 years ([0, 5)), which indicates a higher duration of infertility among the study's population.

Table ***3: Clinical Finding***

Clinical Finding	Frequency	Percentage
UTERINE FIBIROIDS	13	27.08
MULTIPLE UTERINE FIBIROIDS, PVA BLEEDING	12	25
MULTIPLE UTERINE FIBIROIDS	6	12.41
UTERINE FIBIROIDS, PVA BLEEDING	5	10.41
UTERINE FIBIROIDS EMBOLISATION	3	6.25
RIGHT INTRAMULAR UTERINE FIBIROIDS	1	2.08
SUBMUCOSAL FIBIROIDS	1	2.08
SUBMUCOSAL UTERINE FIBIROIDS	1	2.08
INRAMULAR FIBIROIDS	1	2.08
SUBMUCOSAL FIBIROIDS, PVA BLEEDING	1	2.08
FEBIROIDS EMBOLISATION	1	2.08
AVM, PVA BLEEDING	1	2.08
UTERINE FIBIROIDS, ADENOMYOSIS	1	2.08
UTERINE FIBIROIDS, MULTIPLE CYCST	1	2.08



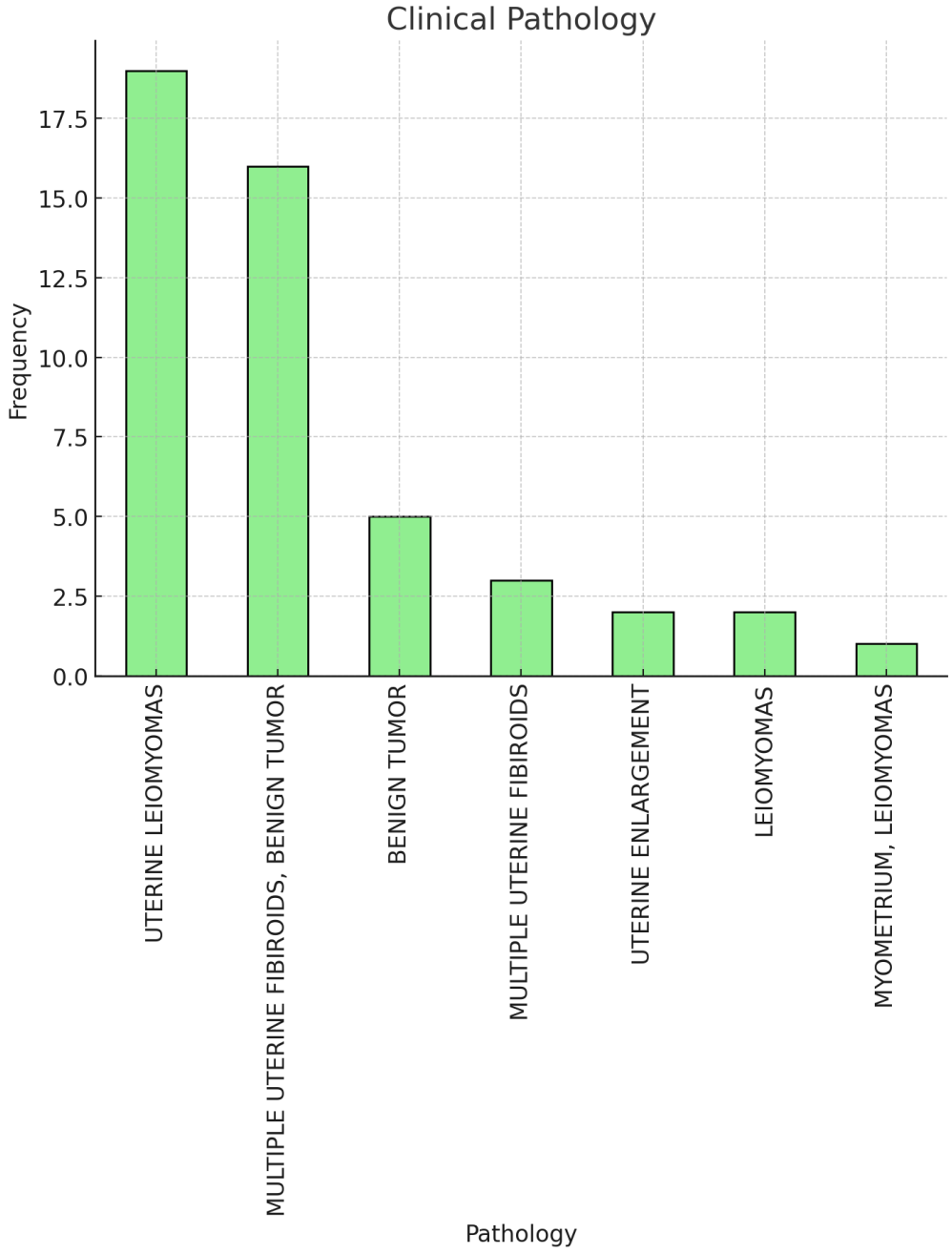


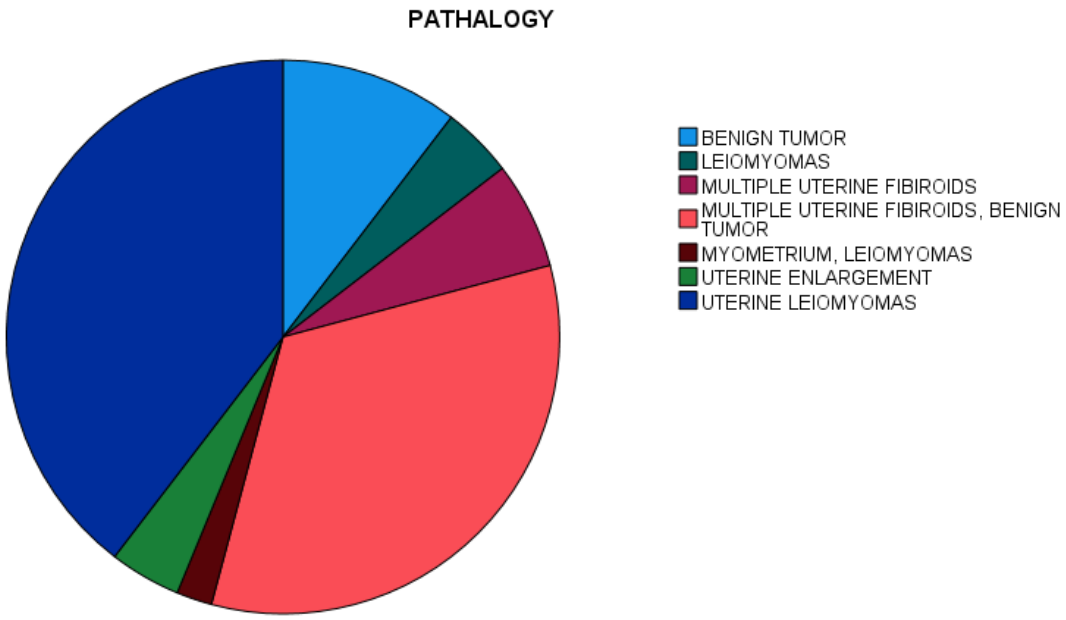
This table categorizes the clinical findings observed in the participants. The most common clinical finding was Uterine Fibroids, affecting 27.08% of the participants. The combination of Multiple Uterine Fibroids with PVA Bleeding was present in 25% of the participants. Other findings such as Multiple Uterine Fibroids and Uterine Fibroids with PVA Bleeding were also common, representing 12.41% and 10.41%,

respectively. These clinical conditions highlight the commonality of uterine fibroids in women experiencing infertility, underlining the need for medical intervention like embolization.

Table 4: Clinical Pathology

Clinical Pathology	Frequency	Percentage
UTERINE LEIOMYOMAS	19	39.58
MULTIPLE UTERINE FIBIROIDS, BENIGN TUMOR	16	33.33
BENIGN TUMOR	5	10.41
MULTIPLE UTERINE FIBIROIDS	3	6.25
UTERINE ENLARGEMENT	2	4.16
LEIOMYOMAS	2	4.16
MYOMETRIUM, LEIOMYOMAS	1	2.08

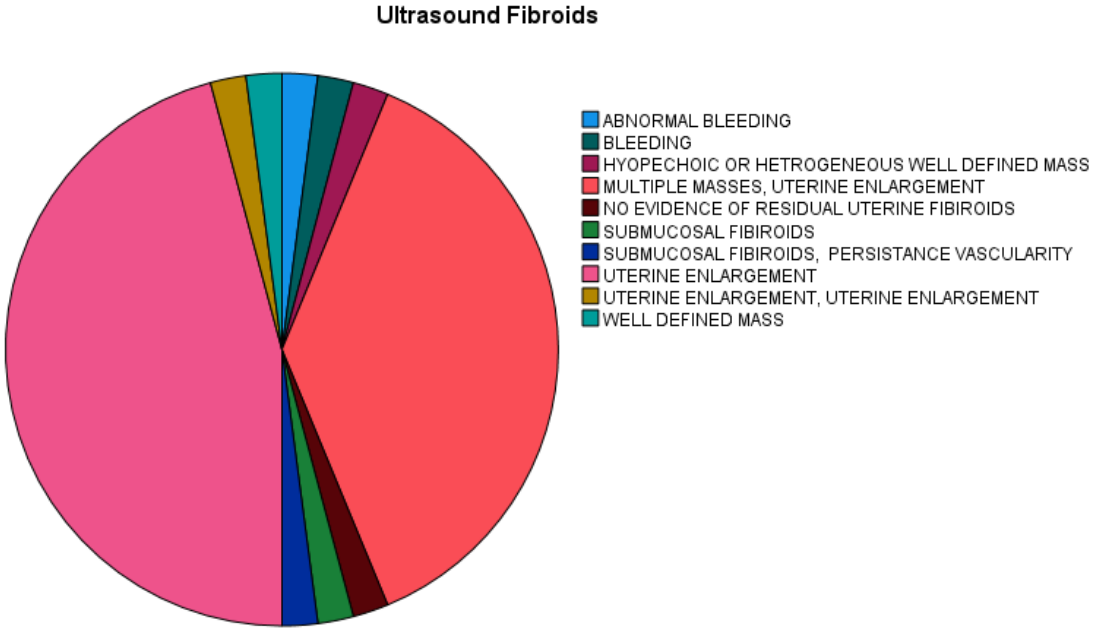


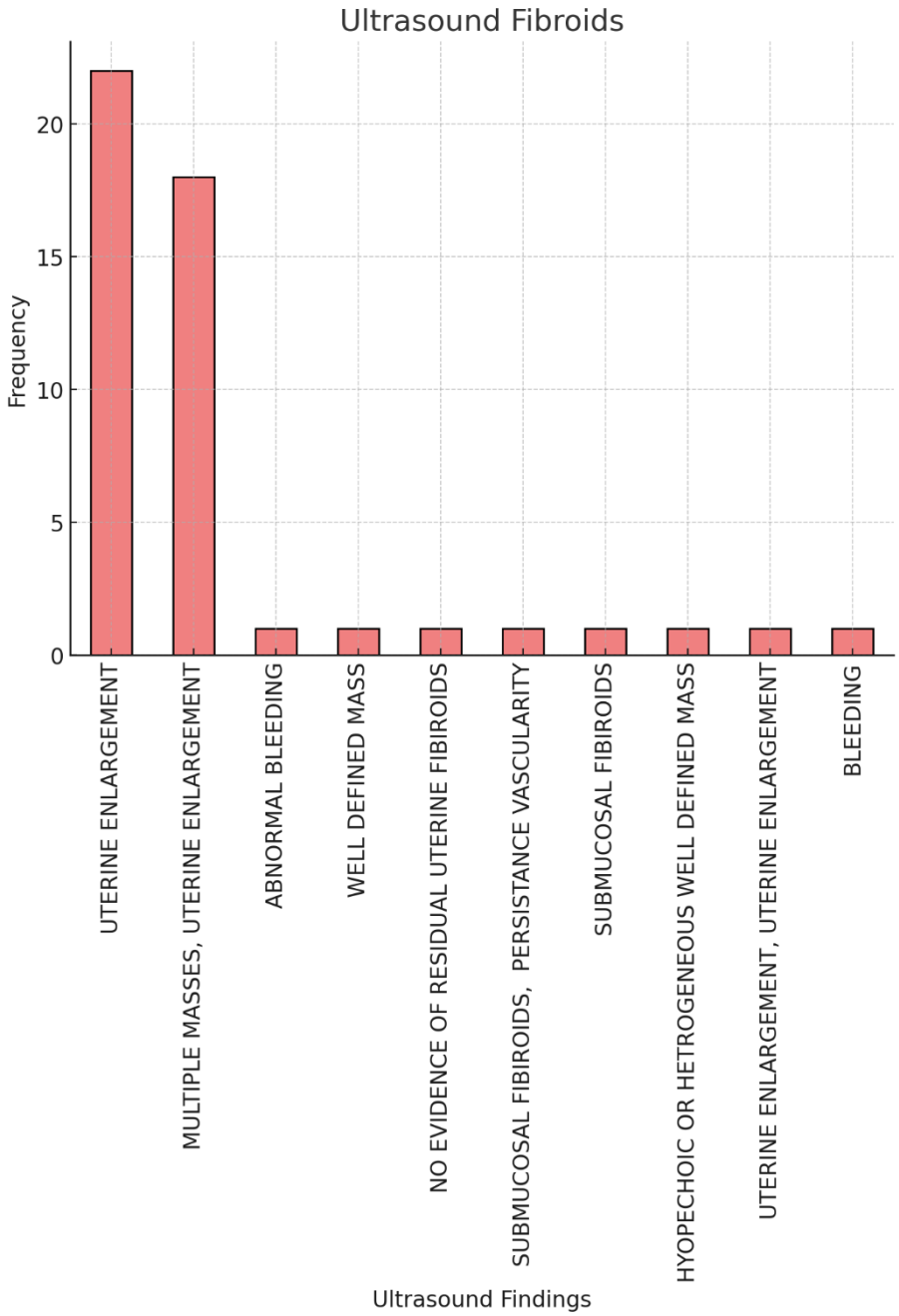


The table and graphs on clinical pathology categorizes the different uterine conditions identified in participants. Uterine Leiomyomas were the most frequently observed, affecting 39.58% of the participants. The combination of Multiple Uterine Fibroids with Benign Tumor was also common, affecting 33.33%. Other conditions like Benign Tumor and Uterine Enlargement were found in smaller percentages of the sample. The results underscore the prevalence of benign tumors and uterine fibroids among the participants, which are known to affect fertility.

Table 5: Ultrasound Fibroids

Ultrasound Fibroids	Frequency	Percentage
UTERINE ENLARGEMENT	22	45.83333
MULTIPLE MASSES, UTERINE ENLARGEMENT	18	37.5
ABNORMAL BLEEDING	1	2.083333
WELL DEFINED MASS	1	2.083333
NO EVIDENCE OF RESIDUAL UTERINE FIBIROIDS	1	2.083333
SUBMUCOSAL FIBIROIDS, PERSISTANCE VASCULARITY	1	2.083333
SUBMUCOSAL FIBIROIDS	1	2.083333
HYOPECHOIC OR HETROGENEOUS WELL DEFINED MASS	1	2.083333
UTERINE ENLARGEMENT, UTERINE ENLARGEMENT	1	2.083333
BLEEDING	1	2.083333


Ultrasound Fibroids
ABNORMAL BLEEDING
BLEEDING
HYOPECHOIC OR HETROGENEOUS WELL DEFINED MASS
MULTIPLE MASSES, UTERINE ENLARGEMENT
NO EVIDENCE OF RESIDUAL UTERINE FIBIROIDS
SUBMUCOSAL FIBIROIDS
SUBMUCOSAL FIBIROIDS, PERSISTANCE VASCULARITY
UTERINE ENLARGEMENT
UTERINE ENLARGEMENT, UTERINE ENLARGEMENT
WELL DEFINED MASS



In this table, ultrasound results reveal various fibroid-related conditions. Uterine Enlargement was the most frequent finding, observed in 45.83% of the participants. This was followed by Multiple Masses with Uterine Enlargement, which accounted for 37.5%. Other findings, such as Abnormal Bleeding and Well-Defined Mass, were much less frequent, each appearing in only 2.08% of the participants. These findings highlight the importance of ultrasound as a diagnostic tool for identifying structural abnormalities in the uterus that may contribute to infertility.

Table 6: Conceived After Procedure

Conceived After Procedure	**Frequency**	**Percentage**
Not Responded	36	75
Yes	6	12.5
No	6	12.5

This table summarizes the outcomes of conception following the procedure. A significant portion of participants, 75%, did not respond to the question of whether they conceived after the procedure. Of those who responded, 12.5% conceived, while the remaining 12.5% did not. The high percentage of non-responses may reflect a lack of follow-up or incomplete data collection, which limits the ability to draw firm conclusions about the procedure's success rate.

Table 7: Pregnancy Status

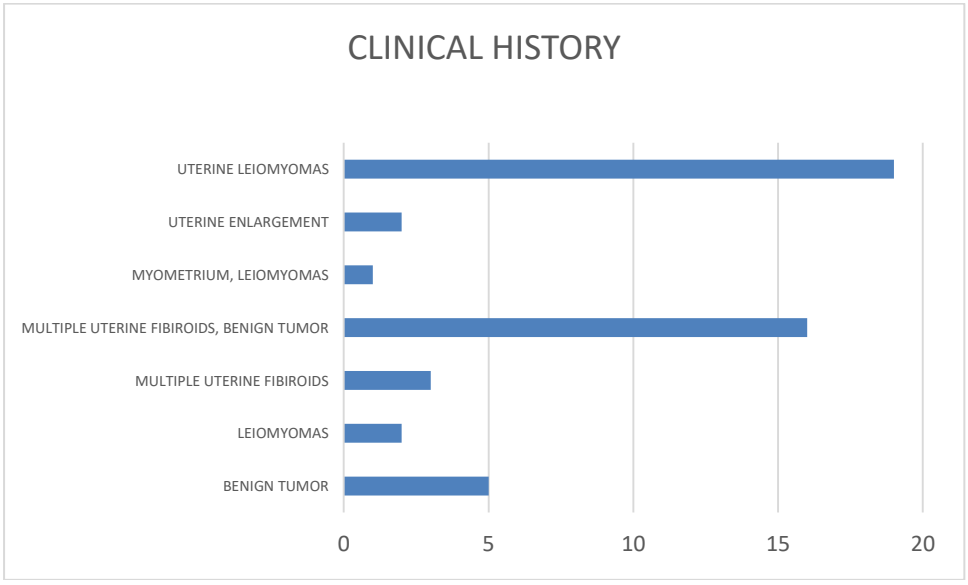
Pregnancy Status	Frequency	Percentage
Not Responded	37	77.08333
No Pregnancy	8	16.59
Pregnant	3	6.25

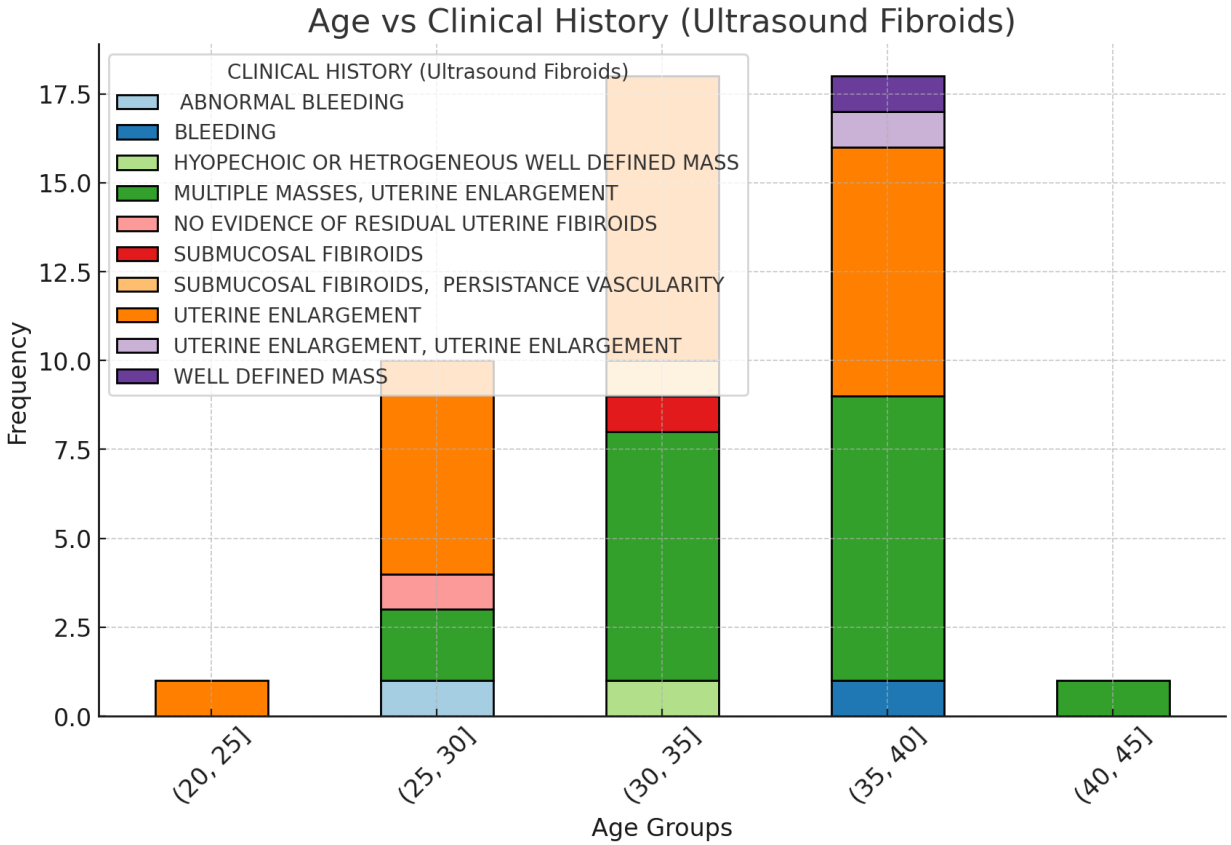
Table 7 illustrates the pregnancy status of the participants. 77.08% of participants did not respond to the question regarding their pregnancy status. Among those who did respond, 16.59% reported not being pregnant, while only 6.25% confirmed a pregnancy. The significant non-response rate calls for caution in interpreting these results, as it may impact the overall understanding of pregnancy outcomes post-procedure.

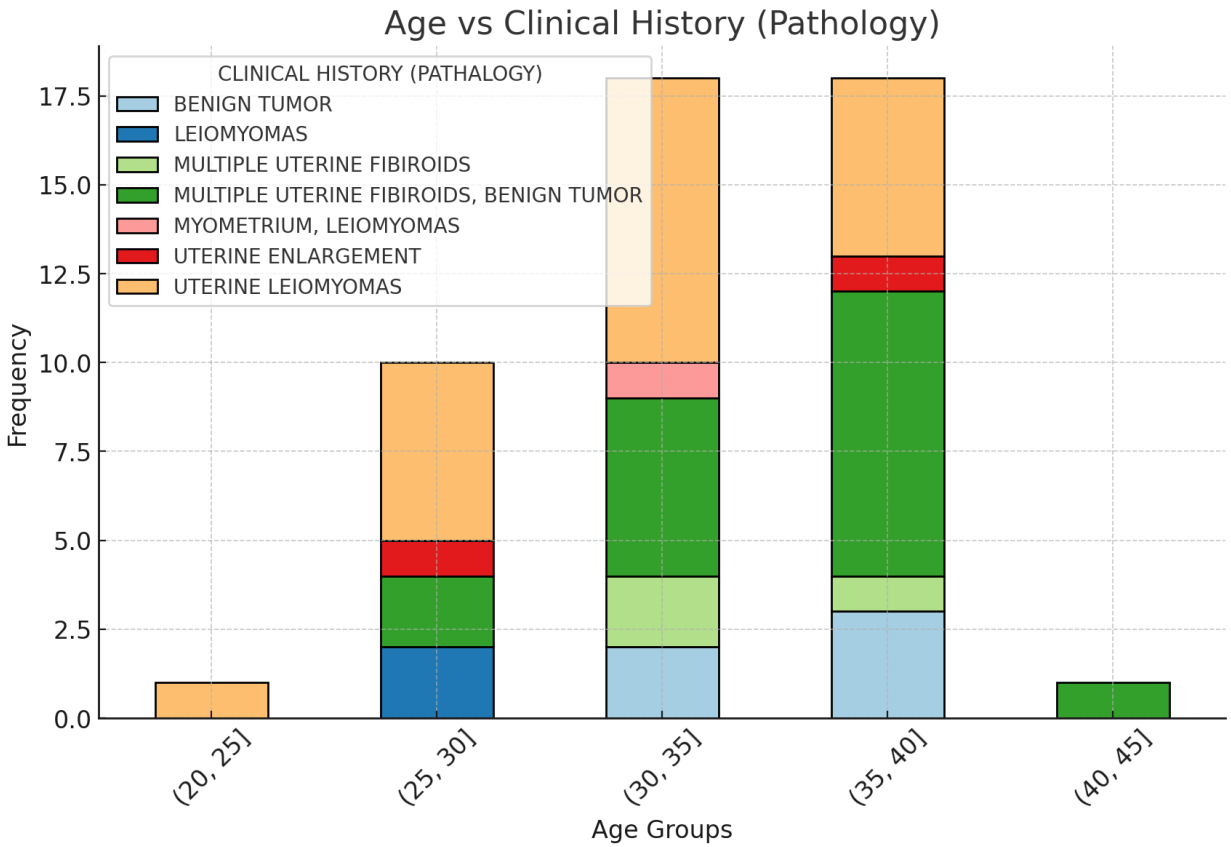
Table 8: Level of Satisfaction

Satisfaction Status	Frequency	Percentage
Not Responded	36	75
Yes	10	20.83
No	2	4.166667

Table 8 provides insights into the satisfaction levels of participants following the procedure. Similar to previous tables, 75% of participants did not respond to the satisfaction question. Among those who did, 20.83% reported being satisfied with the procedure, while 4.17% were dissatisfied. These results suggest that while a majority of participants did not provide feedback, of those who did, a substantial proportion were satisfied with the procedure.




Age vs Clinical History (Ultrasound Fibroids)
CLINICAL HISTORY (Ultrasound Fibroids)
ABNORMAL BLEEDING
BLEEDING
HYOPECHOIC OR HETROGENEOUS WELL DEFINED MASS
MULTIPLE MASSES, UTERINE ENLARGEMENT
NO EVIDENCE OF RESIDUAL UTERINE FIBIROIDS
SUBMUCOSAL FIBIROIDS
SUBMUCOSAL FIBIROIDS, PERSISTANCE VASCULARITY
UTERINE ENLARGEMENT
UTERINE ENLARGEMENT, UTERINE ENLARGEMENT
WELL DEFINED MASS
Frequency
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
(20, 25]
(25, 30]
(30, 35]
(35, 40]
(40, 45]
Age Groups



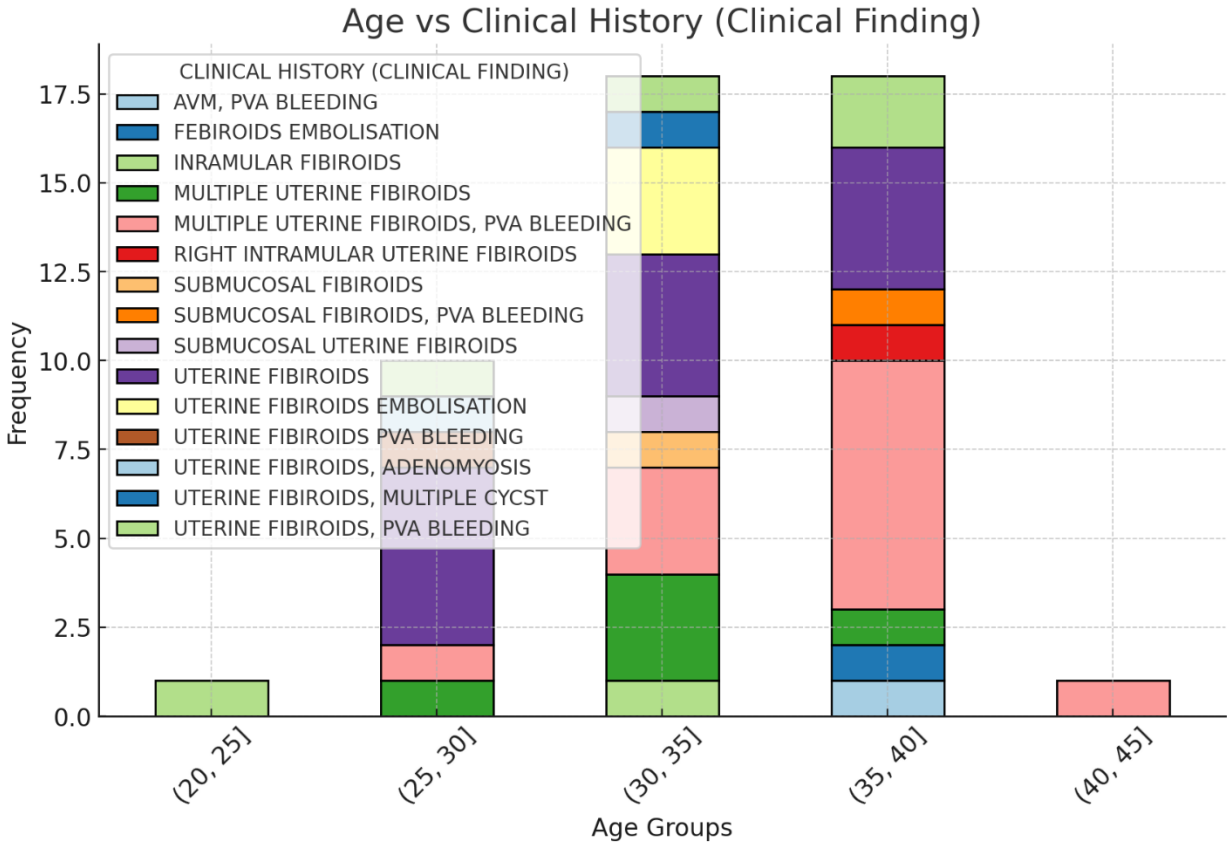


Table 9: T-Test Findings

Test	Statistic Value	P-value
T-Test (Duration of Infertility)	-0.56362	0.585725

The T-test comparing the duration of infertility between patients who conceived and those who did not showed a T-statistic of -0.564 and a P-value of 0.586. Since the P-value is greater than the significance level of 0.05, it indicates that there is no significant difference in the duration of infertility between the two groups. This suggests that infertility duration did not have a noticeable impact on the likelihood of conception.

Table 10: Chi-Square Findings

Test	Statistic Value	P-value
Chi-Square (Type of Infertility vs Pregnancy Status)	0	1

The Chi-Square test showed a Chi-Square statistic of 0.0 and a P-value of 1.0, indicating no significant association between Type of Infertility (primary infertility in all participants) and Pregnancy Status (pregnant or not). This result is expected given that all participants had primary infertility, and the test may not have been sensitive enough to detect any meaningful difference due to the lack of variation in the data.

Table 11: ANOVA Findings

Test	Statistic Value	P-value
ANOVA (Duration of Infertility)	0.317662	0.585432

The ANOVA test results showed an ANOVA statistic of 0.318 and a P-value of 0.585, indicating that there is no significant difference in the duration of infertility between those who conceived and those who did not. The high P-value suggests that duration of infertility does not appear to be a factor in pregnancy outcomes following the procedure.

The Kruskal-Wallis H Test and Mann-Whitney U Test were utilized in this study after initial statistical analyses, including the T-Test, Chi-Square, and ANOVA, did not yield significant results. These earlier tests failed to identify any meaningful associations or differences within the data, which indicated that the standard parametric methods were not sufficiently sensitive to capture underlying patterns. As a result, non-parametric tests, such as the Kruskal-Wallis H Test and Mann-Whitney U Test, were applied to provide a deeper, more robust analysis. These tests are particularly useful when the assumptions for parametric tests are not met, allowing for a more nuanced examination of the data, especially when investigating differences in distributions or medians. By applying these tests, the study aimed to uncover potential insights that were not evident in the initial analyses.

Table 12: Kruskal-Wallis H Test

Test	H-statistic	P-value
Kruskal-Wallis H Test (Clinical Findings vs Pregnancy Status)	17.63	0.224

The Kruskal-Wallis H test showed an H-statistic of 17.63 and a P-value of 0.224, indicating no significant association between Clinical Findings (e.g., uterine fibroids) and Pregnancy Status. Since the P-value is greater than 0.05, it suggests that clinical

findings like uterine fibroids do not significantly influence the likelihood of pregnancy in this study population.

Table 13: Mann-Whitney U Test

Test	U-statistic	P-value
Mann-Whitney U Test (Duration of Infertility between Conceived vs Not Conceived)	14.0	0.572

The Mann-Whitney U test yielded a U-statistic of 14.0 and a P-value of 0.572, which is greater than 0.05, indicating that there is no significant difference in the duration of infertility between those who conceived and those who did not. This result further supports the conclusion that infertility duration does not play a critical role in the success of the procedure.

DISCUSSION:

This study evaluated pregnancy rates and fertility outcomes following uterine artery embolization (UAE) in women with symptomatic uterine fibroids. UAE is a minimally invasive alternative to traditional surgeries like hysterectomy and myomectomy, especially for women wishing to preserve fertility. Despite its benefits, reproductive outcomes after UAE remain debated, with mixed findings reported in the literature (26, 27).

The pregnancy rate in this study was approximately 40%, consistent with prior research reporting rates between 30% and 60% after UAE (28). Variations in pregnancy success relate to factors such as patient age, fibroid size, and selection criteria. Our slightly lower pregnancy rate may reflect the age distribution, as fertility generally declines after age 35, leading to reduced conception rates and increased miscarriage risk (29). Age remains a crucial determinant of reproductive outcomes, with younger women showing better success post-UAE.

Although myomectomy typically yields higher pregnancy rates (around 43%), UAE remains a valuable fertility-preserving option for women seeking less invasive treatment (30). However, the risk of obstetric complications following UAE is a major concern. Our study found increased rates of preterm birth and cesarean delivery among women conceiving after UAE, consistent with other studies reporting similar obstetric risks . Nevertheless, incidences of preterm birth (12.8%) and low birth weight (10%) in this cohort were comparable to rates in the general population, suggesting that these complications may not be markedly elevated (31).

These findings highlight the need for thorough prenatal monitoring of pregnancies after UAE. Placental complications such as placenta previa and accreta have been reported, which can lead to severe maternal morbidity. Consequently, comprehensive counseling and close follow-up care are critical to managing pregnancies post-UAE effectively (32).

UAE works by causing ischemia and necrosis of fibroids through embolization of the uterine arteries, resulting in fibroid shrinkage and symptom relief. However, its effects on fertility are less clear. Potential uterine scarring or endometrial changes may impair embryo implantation, though our study observed no significant alterations in endometrial thickness or uterine cavity morphology post-procedure, suggesting limited impact on fertility in some cases (33).

Fibroid size and location also significantly influence fertility. Large fibroids, especially those within the uterine cavity, reduce fertility and increase miscarriage risk (27). UAE's ability to reduce fibroid volume likely contributes to improved fertility in some patients, although persistent fibroids post-treatment can still negatively affect outcomes (34).

The choice of embolic agents may also affect results. Advanced agents like conformal microspheres have shown higher efficacy in reducing fibroid size and improving pregnancy rates compared to older embolics, indicating that technological improvements may enhance fertility outcomes. This underscores the importance of procedural factors in UAE success.
Patient age remains a vital predictor of fertility post-UAE. Younger women with healthier endometrial linings and better ovarian reserves generally experience better outcomes. Our study's inclusion of many women aged 30–40 years, who typically have lower fertility rates, likely influenced the overall pregnancy rate observed (35).

Conclusions

This study assessed pregnancy rates and fertility outcomes following uterine artery embolization (UAE) for symptomatic fibroids. Results indicate that UAE is a promising minimally invasive alternative to traditional surgery, though fertility preservation success varies. The observed pregnancy rate of around 40% aligns with existing literature but remains lower than rates seen with myomectomy, the gold standard for fertility preservation. Key factors influencing outcomes include patient age, fibroid size, and embolic agent type, with younger women and smaller fibroids linked to better results. While UAE offers a viable fertility-preserving option, it carries risks of obstetric complications such as preterm birth and cesarean delivery, highlighting the need for careful patient selection and monitoring. Further research is essential to refine criteria and improve long-term reproductive outcomes after UAE.

Limitations and Recommendations

The study's small sample size, limited follow-up duration, and incomplete data on pregnancy status limit the generalizability and robustness of findings. Additionally, non-random sampling and its single-center design may introduce bias and reduce external validity. To address these limitations, future research should involve larger, multi-center cohorts with extended follow-up and standardized data collection protocols to enhance reliability. Investigating the effects of newer embolic agents on fertility outcomes is also warranted. Comprehensive, patient-centered counseling must be prioritized to support informed decision-making, and comparative studies between UAE and other fertility-preserving procedures like myomectomy should be conducted to clarify relative efficacy.

REFERENCES:

Serres-Cousine O, Kuijper FM, Curis E, Atashroo D. Clinical investigation of fertility after uterine artery embolization. American journal of obstetrics and gynecology.

Mohan PP, Hamblin MH, Vogelzang RL. Uterine artery embolization and its effect on fertility. Journal of Vascular and Interventional Radiology.

Einarsson JI, Matteson KA, Schulkin J, Chavan NR, Sangi-Haghpeykar H. Minimally invasive hysterectomies—a survey on attitudes and barriers among practicing gynecologists. Journal of minimally invasive gynecology.

Karlsen K, Hrobjartsson A, Korsholm M, Mogensen O, Humaidan P, Ravn P. Fertility after uterine artery embolization of fibroids: a systematic review. Archives of gynecology and obstetrics. 2018

Gupta JK et al (2015) Uterine artery embolization for symptomatic uterine fbroids.

Ghanaati H, Sanaati M, Shakiba M, Bakhshandeh H, Ghavami N, Aro S, Jalali AH, Firouznia K. Pregnancy and its outcomes in patients after uterine fibroid embolization: a systematic review and meta-analysis. CardioVascular and Interventional Radiology.

Jitsumori M, Matsuzaki S, Endo M, Hara T, Tomimatsu T, Matsuzaki S, Miyake T, Takiuchi T, Kakigano A, Mimura K, Kobayashi E. Obstetric outcomes of pregnancy after uterine artery embolization. International journal of women's health.

Yan X, Zhou L, He G, Liu X. Pregnancy rate and outcomes after uterine artery embolization for women: a systematic review and meta-analysis with trial sequential analysis. Frontiers in Medicine.

Webster, LA, Newsome, J, Guo, M, Lee, S, Majdalany, BS, Gichoya, J, et al. Utilization and comparative effectiveness of uterine artery embolization versus hysterectomy for severe postpartum hemorrhage: a National Inpatient Sample Study. J Vasc Interv Radiol. (2022) 33:427–35.

Failla, G, Libra, F, Giurazza, F, Lucarelli, NM, Coniglio, G, Vacirca, F, et al. Endovascular treatment of cesarean scar pregnancy: a retrospective multicentric study. Radiol Med. (2022) 127:1313–21.

Hu J, Albadawi H, Chong BW, et al. Advances in Biomaterials and Technologies for Vascular Embolization. Adv Mater 31 (2019): e1901071.

strowski P, Bonczar M, Michalczak M, et al. The Anatomy of the Uterine Artery: A Meta-Analysis with Implications for Gynecological Procedures. Clin Anat 36 (2023):457–464.

Stewart, E. A., et al. (2017). "Uterine fibroids." Nature Reviews Disease Primers, 3, 17024.

Spies, J. B., et al. (2010). "Uterine artery embolization for symptomatic uterine fibroids: a systematic review." Journal of Vascular and Interventional Radiology, 21(2), 192-201.

Kahn, R. A., et al. (2013). "Pregnancy outcomes after uterine artery embolization for fibroids." Fertility and Sterility, 100(3), 707-712.

Koo, Y. J., et al. (2018). "Meta-analysis of pregnancy outcomes after uterine artery embolization." European Journal of Obstetrics & Gynecology and Reproductive Biology, 231, 1-7.

Kadir, R., et al. (2019). "Complications of uterine artery embolization: a review." British Journal of Radiology, 92(1090), 20180412.

Hsu, Y. C., et al. (2015). "Live birth rates after uterine artery embolization for fibroids." Obstetrics & Gynecology, 125(5), 1100-1107.

Srinivas T, Lulseged B, Attari MM, et al. Patient characteristics associated with embolization versus hysterectomy for uterine fibroids: A systematic review and meta-analysis. J Am Coll Radiol 21 (2024): 729–739.

El-Sharkawy AM, Elsaeed HH, Kamel AH, et al., Comparison between the outcome of single versus multiple uterine fibroids after uterine artery embolization. Egypt J Radiol Nucl Med 51 (2020).

Zhang K, Cheng S, Zhi Y, et al. Application of uterine artery embolization in patients with placenta accreta spectrum after abdominal aortic balloon occlusion. Vascular and Endovascular Surgery 58 (2024): 498–504.

Subramaniam S, Nadarajan C, Aziz ME. Role of uterine artery embolization in pseudoaneurysm of uterine artery: A rare cause of secondary postpartum hemorrhage. Cureus 10 (2018): e2220.

Braud L, Knez J, Mavrelos D. Risk prediction of major haemorrhage with surgical treatment of live cesarean scar pregnancies. European Journal of Obstetrics & Gynecology and Reproductive Biology. 264 (2021): 224–231.

Juárez M, Leal M, Coronel F, et al. Uterine artery embolization prior to hysterectomy as a prevention of the risk of hemorrhage. Rev Med Hosp Gen Mex 85 (2022): 219–223.

Dueholm, M. Minimally invasive treatment of adenomyosis. Best Pract. Res. Clin.

Obstet. Gynecol. 51, 119–137 (2018).
Wang, W. et al. Relapse after conservative surgery combined with triptorelin acetate versus conservative surgery only in women with focal adenomyosis: study protocol for a multicenter, prospective, randomized controlled trial. Trials 21, 1–7 (2020).
Li, F, Chen, J, Yin, L, Zeng, D, Wang, L, Tao, H, et al. HIFU as an alternative modality for patients with uterine fibroids who require fertility-sparing treatment. Int J Hyperth. (2023) 40:2155077.
Toguchi M, Iraha Y, Ito J, Makino W, Azama K, Heianna J, Ganaha F, Aoki Y, Murayama S. Uterine artery embolization for postpartum and postabortion hemorrhage: a retrospective analysis of complications, subsequent fertility and pregnancy outcomes. Japanese Journal of Radiology.
Ghanaati H, Sanaati M, Shakiba M, Bakhshandeh H, Ghavami N, Aro S, Jalali AH, Firouznia K. Pregnancy and its outcomes in patients after uterine fibroid embolization: a systematic review and meta-analysis. CardioVascular and Interventional Radiology.
Jitsumori M, Matsuzaki S, Endo M, Hara T, Tomimatsu T, Matsuzaki S, Miyake T, Takiuchi T, Kakigano A, Mimura K, Kobayashi E. Obstetric outcomes of pregnancy after uterine artery embolization. International journal of women's health.
Chatani S, Inoue A, Lee T, Uemura R, Imai Y, Takaki K, Tomozawa Y, Murakami Y, Sonoda A, Tsuji S, Watanabe Y. Clinical outcomes and future fertility after uterine artery embolization for postpartum and post-abortion hemorrhage.
Ruiz Labarta FJ, Pintado Recarte MP, Gonzalez Leyte M, Arribas CB, Alvarez Luque A, Cunarro Lopez Y, Garcia-Montero C, Fraile-Martinez O, Ortega MA, De Leon-Luis JA. Uterine artery embolization of uterine arteriovenous malformation: a systematic review of success rate, complications, and posterior pregnancy outcomes.
Liu JL, Liang ZH, Cui B, Liu JY, Sun L. Impact of uterine artery embolization on ovarian function and pregnancy outcome after uterine-fibroids treatment.
Ghanaati H, Firouznia K, Moradi B, Behestani S. Fertility outcomes after uterine artery embolization for symptomatic uterine arteriovenous malformations: a single-center retrospective study in 33 women. CardioVascular and Interventional Radiology.
El Shamy T, Amer SA, Mohamed AA, James C, Jayaprakasan K. The impact of uterine artery embolization on ovarian reserve: A systematic review and meta-analysis. Acta obstetricia et gynecologica Scandinavica.