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TITLE SONOGRAPHICAL EVALUATION OF UTERINE FIBROID AND THEIR ASSOCIATED RISK FACTORS AT MARDAN MEDICAL COMPLEX MARDAN (MMC) (A DESCRIPTIVE CROSS SECTIONAL STUDY)

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Abstract

METHODOLOGY: *A descriptive cross-sectional study was conducted on 246 female patients at the Radiology Department of Mardan Medical Complex. Data were collected through ultrasound examination. Variables including age, BMI, parity, family history, and contraceptive use were recorded. Data analysis was performed using SPSS version 26. Chi-square test was applied to determine association between variables, and p-value <0.05 was considered statistically significant.*

RESULTS: *The mean age of participants was 29.69 ± 8.21 years, and the mean BMI was 30.94 ± 6.60 kg/m². The prevalence of uterine fibroids was found to be 20.3%. A significant association was observed between fibroids and age ($p < 0.01$), with higher frequency in the 35–44 years age group. BMI also showed a significant association ($p = 0.018$), with higher prevalence among obese women. Family history also shows significant association with fibroids ($p < 0.01$). However, parity ($p = 0.086$) and hormonal contraceptive use ($p = 0.395$) did not show statistically significant association.*

CONCLUSION: *Uterine fibroids are relatively common among women and are significantly associated with increasing age, higher BMI, and positive family history. Early screening and awareness can help in timely diagnosis and management. However, parity and contraceptive use were not found to have a significant relationship in this study.*

CHAPTER: 1
INTRODUCTION

1.1 BACKGROUND

Uterine fibroids, which are also called leiomyoma, are the most common benign tumor affecting reproductive age females. They are composed of monoclonal smooth muscle cells and fibrous connective tissue, and vary widely in size, location and growth patterns among individuals. Although not malignant significant morbidity can result from fibroids. Female patients may experience heavy menstrual bleeding which leads to anemia as well as pelvic bulk symptoms and pain due to fibroids thereby prompting frequent outpatient visits, emergency department assessments, and hospitalizations that frequently conclude in invasive surgical treatment(1). Notably many uterine fibroids go undetected by women and are small and asymptomatic. Although many researches have been performed it is still unclear that what is the cause that some fibroids are asymptomatic and

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other is symptomatic. It is hypothesized that fibroid size and location play a role. (2). The prevalence and incidence of uterine fibroid-associated imaging changes were measured among 33,915 women aged 15 and older who undergo uterine imaging as part of routine health examinations, according to a large population-based study carried out in Western China. A total of 8,539 cases with fibroid-associated imaging changes were confirmed among the study population through expert-consulted identifications of 18 imaging descriptors related to uterine fibroids. This yielded a crude prevalence of 25.18% overall, which was 21.48% when standardized to the age distribution of the national female population. (3)

The study also revealed a distinct age-related rise in fibroid prevalence in females of reproductive age, with the greatest rate of 45.38% seen in the 45–49 age groups. This was followed by a fall after menopause and gradually decreasing prevalence in younger age groups. (4) This work highlights a considerable illness burden in this community by showing that uterine fibroid-associated imaging abnormalities were prevalent in reproductive age women within this large Chinese cohort and that prevalence showed a notable rising trend with advancing reproductive age(5).

Ultrasound is the first line imaging modality despite its drawbacks because it is accessible, simple to use, radiation free and reasonably priced with sensitivity rate between 90% and 99%.Transabdominal ultrasonography and particularly transvaginal ultrasonography is an effective method for identifying fibroids. Additionally, it offers crucial details about the existence of adnexal structure pathology .Additionally its dynamic nature aids in mapping and categorizing the different types of fibroids using the leiomyoma's classification system.(6)

Fibroids usually have asymmetric uterine walls, well-defined borders, and a regular or lobulated uterine shape. They are round, oval, or smooth, and they frequently have uniform echogenicity and edge shadowing(7). About 5% to 10% of cases of infertility are caused by uterine fibroids ,which also have a significant impact of reproductive health .The location of fibroid growth may be the cause of this , as it may obstruct the fallopian tubes and prevent the gamete from passing through. (8)

However many pregnant women tend to experience large growth of their fibroids because of the increased hormones during pregnancy .Crucially 70% of postpartum women report that their fibroids shrink after giving birth .This shrinkage is thought to be brought on by uterine ischemia, which occur when the placenta tears away from the uterine wall, resulting in a significant loss of blood. The uterus clots to stop this blood loss which lowers blood flow and stops the myomas blood supply, which causes them to shrink.

Two additional classes of symptoms abnormal uterine bleeding and pelvic pressure and pain, are linked to symptomatic fibroids. Menorrhagia or hypo menorrhea are terms used to describe abnormal bleeding that typically happens during menstruation. Women may need to change sanitary products every hour due to this prolonged and excessively heavy bleeding pattern. Because of their location, as previously mentioned, sub mucosal fibroids are the most common cause of this symptom. Uterine enlargement is the cause of pelvic pressure and pain. The uterus shape may be distorted by the placement of fibroids. Constipation and urinary problems have been associated with anterior fibroids .In rare cases, as previously noted ,pedunculated fibroids may be painful if they are torn(9).

Benign smooth-muscle tumors of the uterus, known as uterine fibroids, are frequently found in women of reproductive age and can even be discovered during pregnancy. Although many cases are asymptomatic, the reported prevalence of fibroids in pregnant women ranges from 1% to 10%. Nevertheless, fibroids have been linked to a number of unfavorable obstetric outcomes. (10) According to studies fibroids may raise the chance of issues such as pregnancy loss, preterm delivery, and early separation of placenta, low lying placenta, and improper fetal positioning. Because larger fibroids are more likely to result in issues including breech presentation and

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postpartum hemorrhage, the size of the fibroid can affect the outcome of a pregnancy. In certain situations, fibroid may also be a factor in fetal discomfort and obstructed labor. Pregnant women with fibroids should be closely monitored due to these possible dangers(11).

Due to their frequent occurrence in women of reproductive age, uterine fibroids are frequently seen during pregnancy .Numerous studies have found conflicting links between fibroids and unfavorable obstetric outcomes, despite the fact that many pregnant women with fibroids have uneventful pregnancies. In comparison to women without fibroids, uterine fibroids, particularly those that are numerous, intramural, or sub mucous, have been linked to a higher risk of early pregnancy loss. Compared to fibroids in the lower region of the uterus, those in the body seem to be more frequently linked to spontaneous miscarriages.

Additionally, fibroids raise the risk of impending miscarriage, especially if the placenta implants near a fibroid nodule. Compared to women without fibroids, women with fibroids often have an increased risk of preterm labor and preterm birth in late pregnancy(12).

The international federation of gynecology and obstetric system classifies uterine fibroids based on their exact position within the uterus. It keeps the original grouping of sub mucosal fibroids as types 0 to 2. Type 3 fibroids are completely located within the uterine muscle but are in contact with the endometrial lining. Type 4 fibroids are entirely present within the myometrium without touching either the inner or outer uterine surface. Types 5 and 6 are identified based on how much they extend toward the outer surface of the uterus. Type 7 fibroids are attached to the outer surface of the uterus by a stalk, while type 8 fibroids are found outside the usual uterine body, such as in the cervix.

In some cases, fibroids may extend across more than one layer of the uterus. In such situations, FIGO allows combined classification. For example, a fibroid that extends from the inner cavity toward the outer surface but has less than half of its portion within the uterine cavity can be labeled as type 2–5(15).

Ultrasound is widely used to detect fibroids and monitor their changes over time. On ultrasound, fibroids usually appear as well-defined masses that are darker (hypo echoic) compared to the surrounding tissue. However, in some cases, they may appear similar (isoechoic) or brighter (hyper echoic) than the myometrium.

Degenerative changes may also be seen. For example, calcification appears as bright (echogenic) areas with posterior shadowing. In contrast, areas of degeneration or necrosis may appear as fluid-filled (anechoic) regions, sometimes with internal echoes or posterior enhancement(17).

Rationale

Despite extensive international literature on uterine fibroids, limited local data exist regarding frequency of uterine fibroid and associated risk factors among women attending tertiary care hospital in Mardan. This study aims to provide local evidence and to evaluate the prevalence of fibroids using ultrasound and correlate their occurrence with reproductive and demographic factors in women aged (15-49 years). The findings are expected to provide valuable insight in to local prevalence and risk factors, aiding in early detection, management planning, and patient counseling.

1.13 OBJECTIVES OF THE STUDY

1. To evaluate the prevalence of uterine fibroids detected by ultrasound among women.
2. To find out the risk factors associated with fibroid occurrence.

CHAPTER 2:
MATERIALS AND METHODS

This study was designed as a descriptive cross-sectional study conducted in the Radiology Department of Mardan Medical Complex, a tertiary care hospital in Mardan. The study duration was approximately four months. Women of reproductive age (15–49 years) attending for pelvic ultrasound were included using a non-probability convenience sampling

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technique. Women with prior hysterectomy, major uterine surgery, or known gynecological malignancy were excluded to avoid distortion of uterine anatomy and confounding results.

The sample size was calculated using the prevalence formula ($n = Z^2 \times P (1-P) / d^2$), with a 95% confidence level ($Z = 1.96$), expected prevalence of 20%, and margin of error of 5%. The total population of Mardan was considered 413,000, and the final calculated sample size was 246 participants.

Ethical approval was obtained from the relevant institutional committees, and verbal informed consent was taken from all participants. Pelvic ultrasound was performed using a 2.5–5 MHz curvilinear transducer, and findings including number, size, and location of uterine fibroids were recorded. A structured questionnaire collected demographic and clinical data such as age, BMI, parity, marital status, family history, and contraceptive use.

Data were analyzed using SPSS version 26. Quantitative variables (age, BMI, fibroid size) were expressed as mean ± standard deviation, while categorical variables (fibroids, parity, family history, contraceptive use, marital status) were presented as frequencies and percentages. The chi-square test was applied to assess associations between uterine fibroids and categorical variables, including age groups and BMI categories. Results were presented in tables and graphs, and a p-value < 0.05 was considered statistically significant.

CHAPTER 3:
RESULTS

Demographic characteristics of study participants

Table 1 presents the demographic characteristics of the study participants. A total of 246 women were included in the study. The mean age of participants was 29.69 ±8.21 years, indicating that most women were within the reproductive age group. The mean body mass index (BMI) was 30.94 ± 6.61kg/m^2, suggesting that a considerable proportion of the participants were obese. Regarding marital status, the majority of the participants were married (83.7%), while smaller proportions were single (16.3%). In terms of parity, most women were multiparous (67.9%), whereas 32.1% were nulliparous. Most participants had no family history of fibroid (79.3%), while (20.7%) reported a positive family history. Regarding contraceptive use, the majority of participants were not using hormonal contraceptives (82.1%), whereas (17.9%) reported using them.

Table 1 Demographic characteristics of study participants

Variable		Mean ± SD / Frequency (%)
Age (years)		29.69 ± 8.21
BMI (kg/m^2)		30.94 ± 6.61
Marital Status	Single	40 (16.3%)
	Married	206 (83.7%)
Parity	Nulliparous	79 (32.1%)
	Multiparous	167 (67.9%)
Family history of fibroid	Yes	51(20.7%)

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	No	195(79.3%)
Hormonal contraceptive use	Yes	44(17.9%)
	No	202(82.1%)

Prevalence of uterine fibroid among study participants (n=246)

Table 2 illustrates the prevalence of uterine fibroids among the study participants. Out of a total of 246 women, 50 (20.3%) were found to have uterine fibroids, while 196 (79.7%) did not have any fibroids. This shows that approximately one fifth of the study population was affected by uterine fibroids.

Table 2 Prevalence of uterine fibroid among study participants (n=246)

Fibroid Status	Frequency	Percentage (%)
Present (Yes)	50	20.3%
Absent (No)	196	79.7%
Total	246	100%

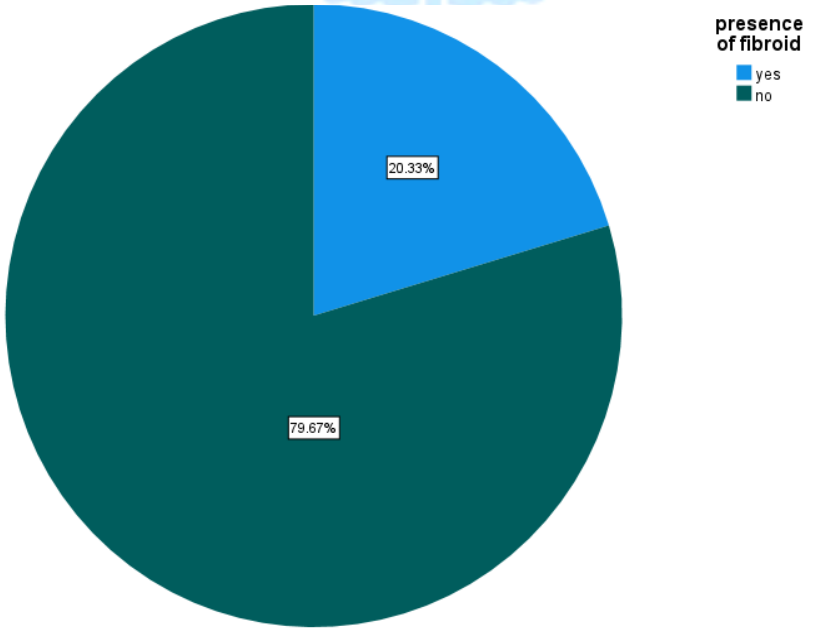


Figure 1 Pie chart showing percentage distribution of uterine fibroid among study participants

Figure 1 illustrates the percentage distribution of uterine fibroids among the study participants. It can be observed that 20.3% of the women were diagnosed with uterine fibroids, whereas the majority, 79.7% did not have fibroids.

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Descriptive statistics of fibroid size among patients with uterine fibroids

Table 3 presents the descriptive statistics of fibroid size among patients diagnosed with uterine fibroids. A total of 50 patients were included. The minimum fibroid size observed was 1.1 cm, while the maximum size was 6.8 cm. The mean fibroid size was 3.81 ± 1.42 cm.

Table 3 Descriptive statistics of fibroid size among patients with uterine fibroids(n=50)

Variable	N	Minimum(cm)	Maximum(cm)	Mean±SD
Fibroid size(cm)	50	1.1	6.8	3.8±1.42

Association between age group and uterine fibroids (n=246)

Table 4 summarizes the association between age group and the presence of uterine fibroids among the study particiants.The highest number of fibroid cases was observed in the age group 35-44 years (35.7%) followed by 45-49 years (33.3%), while the lowest proportion was seen in the 15-24 years age group (7.2%).

Table 4 Association between age group and uterine fibroids (n=246)

Age group (years)	Fibroid Yes n (%)	Fibroid No n (%)	Total	P-value
15-24	5 (7.2%)	64 (92.8%)	69	
25-34	19 (18.4%)	84 (81.6%)	103	
35-44	20 (35.7%)	36 (64.3%)	56	
45-49	6 (33.3%)	12 (66.7%)	18	
Total	50 (20.3%)	196 (79.7%)	246	<0.01

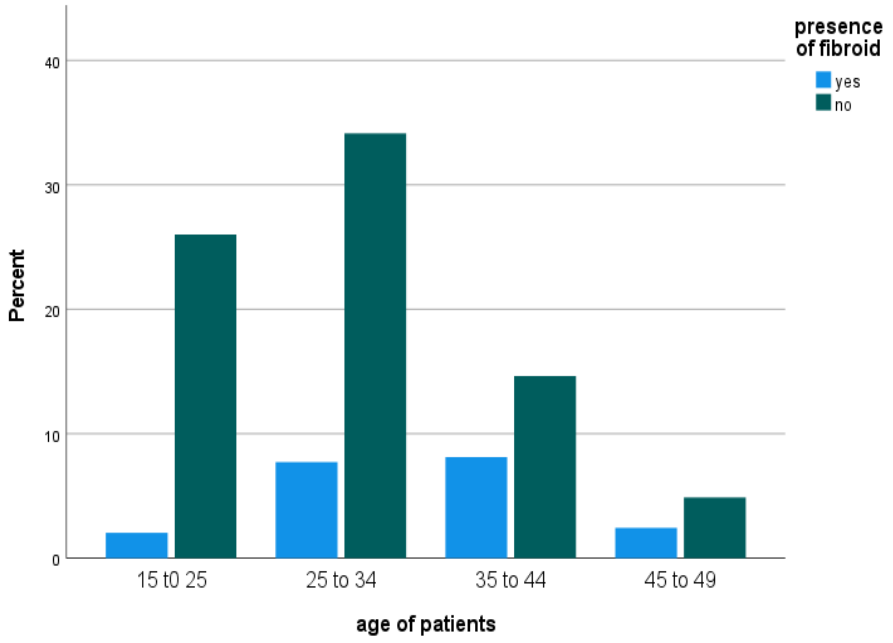


Figure 2 bar chart showing association between age group and uterine fibroids

Figure 2 illustrate an increasing trend of fibroid cases with age, with the highest proportion in the 35-44 years group.

Frontier in Medical & Health Research

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Association between BMI and fibroid

Table 5 shows that no cases were observed in the underweight group (0%), while 9.1% of normal-weight, 14.8% of overweight, and 27.0% of obese women had fibroids. This association was significant statistically (p = 0.018), indicating that fibroid risk increases with higher BMI.

Table 5 Association between BMI and fibroid

BMI Category	Fibroid Present n (%)	Fibroid Absent n (%)	Total	p-value
Underweight	0(0.0%)	7(100%)	7	
Normal	4(9.1%)	40(90.9%)	44	
Overweight	8(14.8%)	46(85.2%)	54	
Obese	38(27.0%)	103(73.0%)	141	
Total	50(20.3%)	196(79.7%)	246	0.018

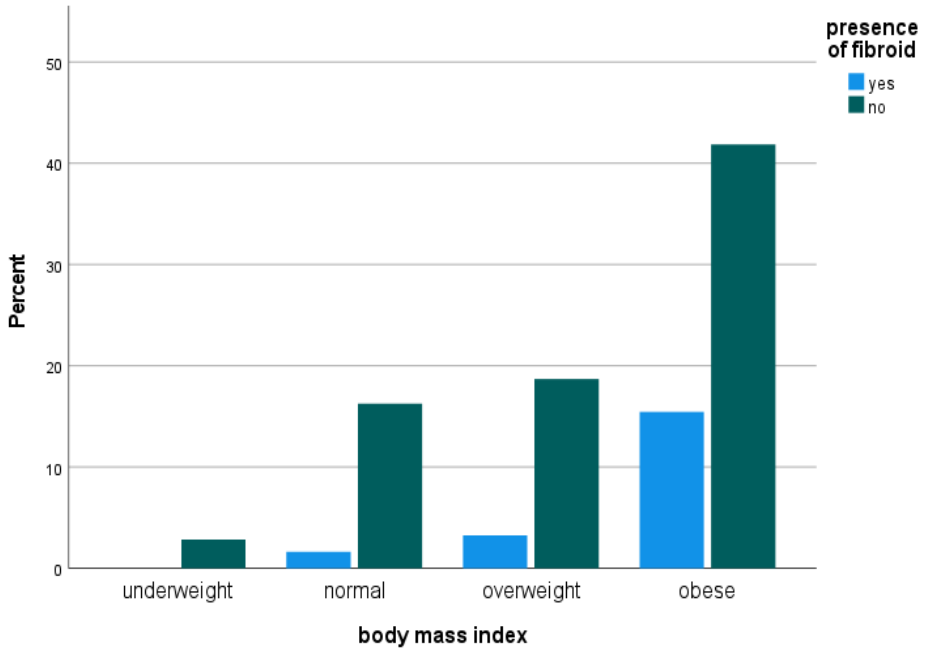


Figure 3 bar chart showing association between BMI and uterine fibroids

Figure 3 demonstrates the distribution of fibroid presence across different BMI categories. The highest numbers of fibroid cases were recorded in the obese group, followed by overweight and normal BMI categories, while no cases were observed in the underweight.

Association between parity and fibroid

Table 6 depicts relationship between parity and fibroid. Among nulliparous women, 13.9% had fibroids, while among multiparous women 23.4% were affected. The association was not statistically significant (p = 0.086). This indicates that parity did not show a significant relationship with fibroid in this study.

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Table 6 Association between parity and fibroid

Parity	Fibroid present n(%)	Fibroid absent n (%)	Total	p-value
Nulliparous	11(13.9%)	68(86.1%)	79	
Multiparous	39(23.4%)	128(76.6%)	167	
Total	50(20.3%)	196(79.7%)	246	0.086

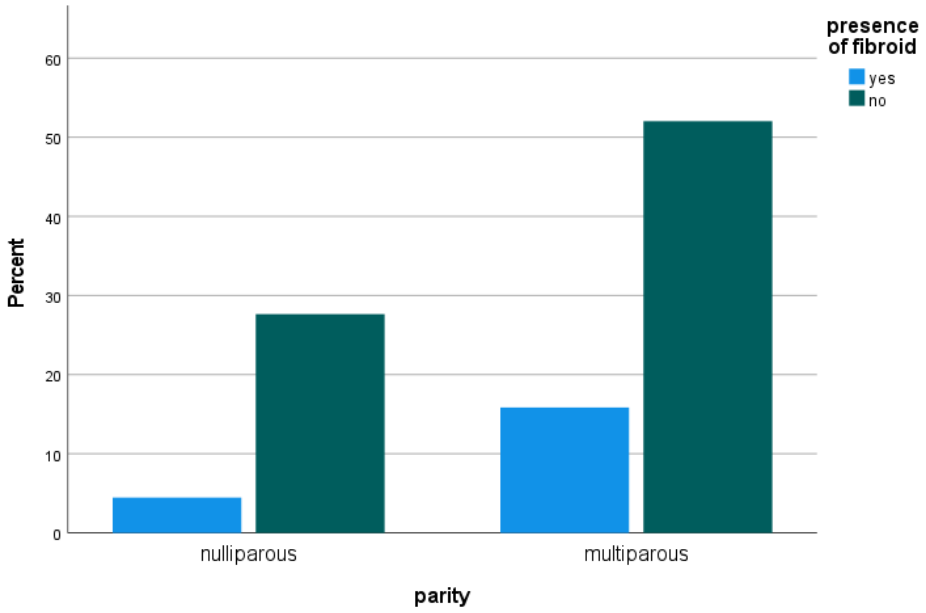


Figure 4 bar chart showing association between parity and uterine fibroids

Figure 4 presents that fibroid are more common among multiparous women compared to nulliparous. However, this difference is not statistically significant, indicating that there is no strong association between parity and fibroid occurrence.

Association between family history and uterine fibroids (n=246): Table 7 presents association between family history and uterine fibroids using the chi-square test.41.2% of women with a positive family history were affected by fibroids compared to only 14.9% among those without a family history. The findings indicate that fibroids were considerably more common in women with a family history. This association was found to be statistically significant ($p < 0.01$).

Table 7 Association between family history and uterine fibroids(n=246)

Family history	Fibroid present n (%)	Fibroid Absent n (%)	Total	p-value
Yes	21(41.2%)	30(58.8%)	51	
No	29(14.9%)	166(85.1%)	195	
Total	50(20.3%)	196(79.7%)	246	<0.01

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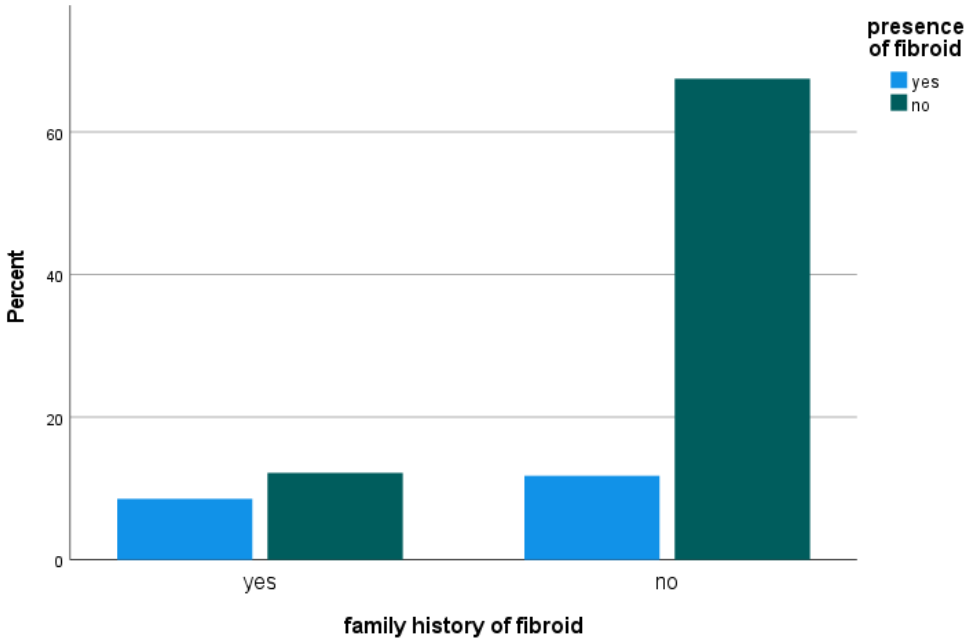


Figure 5 bar chart showing association between family history and uterine fibroids

Figure 5 illustrates that fibroid cases are more common among women with a positive family history compared to those without. This indicates a significant association between family history and uterine fibroids.

Association between contraceptive use and uterine fibroids (n=246) Table 8 demonstrates association between hormonal contraceptive use and uterine fibroid using chi-square test. Among women using hormonal contraceptives, 25.0% were affected from fibroids, compared to 19.3% among non-users. The association was not statistically significant (p = 0.395).

Table 8 Association between hormonal contraceptive use and uterine fibroid(n=246)

Contraceptive use	Fibroid present n (%)	Fibroid Absent n(%)	Total	P- value
Yes	11(25.0%)	33(75.0%)	44	
No	39(19.3%)	163(80.7%)	202	
Total	50(20.3%)	196(79.7%)	246	0.395

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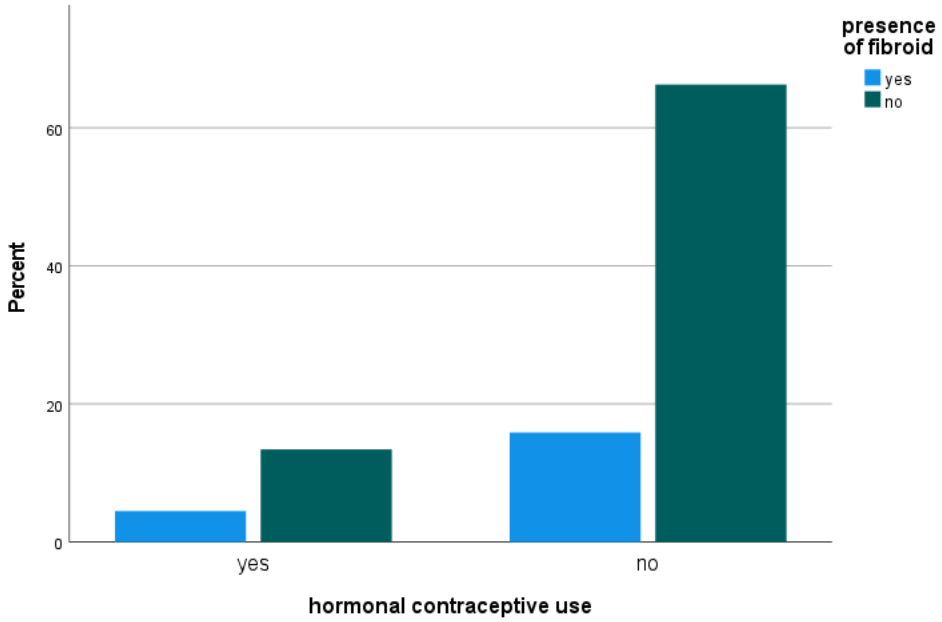


Figure 6 bar chart showing association between hormonal contraceptive use and uterine fibroids

Figure 6 illustrates a slight difference in fibroid occurrence between contraceptive users and non-users. However, this difference is not statistically significant, indicating no strong association.

CHAPTER:4
DISCUSSION AND RECOMMENDATIONS

The present study was conducted to determine the prevalence of uterine fibroids and to determine the associated risk factors including age, body mass index (BMI), parity, family history, and hormonal contraceptive use among women undergoing pelvic ultrasound at a tertiary care hospital.

In our study the prevalence of uterine fibroid was found to be 20.3%.This finding is comparable to other studies, which have reported prevalence ranging from 15 to 30% among women of reproductive age. The similarity in findings may be due to the use of ultrasound as a diagnostic tool and inclusion of women in same age groups. However differences in prevalence may be due to variations in study population, diagnostic methods, and study duration.

The study found significant association between BMI, age, and family history with uterine fibroids, while no association was observed with hormonal contraceptive use and parity.

The current study showed a significant association between age and uterine fibroids ($p < 0.01$), with higher frequency observed in women aged 35–44 years. This finding is consistent with previous hospital based cross sectional study conducted in Qatar by Wafa Mohammad Ahmed et aI. (2025), which reported that the mean age of women diagnosed with uterine fibroids was 40.5 years, indicating that fibroids are common in women approaching the later reproductive years. This clearly shows that age increases, the like hood of developing fibroids also increases, as women grow older, their bodies are exposed to estrogen and other hormones for a longer period of time, and these hormones play a major role in the growth of fibroids. In addition, with increasing age, small fibroids that may have been present earlier can gradually increase in size and become more easily detectable on ultrasound.

Frontier in Medical & Health Research

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The similarity between the findings further strengthens the evidence that age is an important risk factor for uterine fibroids. However, minor differences between studies may be due to variations in population characteristics, lifestyle, and study design (28).

A significant association was also observed between BMI and uterine fibroids (p = 0.018), with higher prevalence among obese women. This result is similar to the systematic review by Alieke L. Keizer et al. (2023), which showed that BMI is a modifiable risk factor for developing fibroids. The review explained that higher BMI increases the risk of fibroids mainly because fat tissue produces more estrogen, and this hormone helps fibroids to grow. In addition, obesity can also affect insulin levels and cause inflammation in the body, which may further support tumor growth. Therefore, the findings of the present study agree with previous studies and show that BMI plays an important role in the development of uterine fibroids(36).

In this study, parity did not show a statistically significant association with uterine fibroids (p=0.086). However, some previous studies have reported that higher parity may have protective effect against fibroid development. The difference between present study and previous findings may be due to variations in sample size, differences in reproductive pattern, and population characteristics.

A strong and statistically significant association was found between family history and uterine fibroids (p<0.01). Women with a positive family history had a markedly higher frequency of fibroids. This finding is in agreement with the study conducted in Poland by Katarzyna Kwas et al.(2021), which also highlighted family history as an important risk factor in the development of uterine fibroids. The study reported that women with affected relatives were more likely to develop fibroids, suggesting a strong genetic predisposition. There may be a link between a family's medical history and the development of fibroids, as evidenced by the fact that 27.4% of patients in one study group reported having a positive family history of the disease, and over half of them received a diagnosis. The consistency between the findings of the present study and previous literature strengthens the evidence that family history is a significant and non-modifiable risk factor for uterine fibroids. Therefore, women with a positive family history should be considered at higher risk and may benefit from early screening and monitoring(37).

In the present study, no significant relationship was found between hormonal contraceptives use and uterine fibroids (p=0.395). However, findings from the systematic review by Alieke L. Keizer et al. (2023) suggest that hormonal and lifestyle-related factors, including contraceptive use, may influence the development of fibroids, although the evidence remains inconsistent. However, another study conducted by Katarzyna Kwas et aI. (2021) reported different results and showed that contraceptive use may actually protect against the development of uterine fibroids. In their study, fewer cases of fibroids were seen in women who were using hormonal contraceptive compared to those who were not using them, and this difference was statistically significant (p<0.05).The study further explained that hormonal contraceptives may lower the risk of fibroids by keeping hormone levels especially estrogen and progesterone more stable as these hormones play an important role in fibroid growth. They also found that this protective effect was more noticeable in certain age groups, especially women aged 30-40 years, showing the importance of reproductive and hormonal factors. The differences between the findings may be due to the difference between the type and duration of contraceptive use, different hormonal methods, differences in study design, sample size, and population characteristics, In addition, the present study was conducted over a shorter period and in a hospital based setting ,which may not fully show the long term effects of hormonal contraceptives. Therefore, although some studies suggest that contraceptives may have protective role, the findings of the present study show that this relationship is not the same in all population(37).

Overall, the findings of the present study highlight the importance of both modifiable and

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non-modifiable risk factors in the development of uterine fibroids.

This study has certain limitations. It was conducted at a single center with a relatively short duration and limited sample size. Additionally, as a hospital-based study, the findings may not be generalizable to the general population. Despite these limitations, the study provides valuable insight into the prevalence and risk factors of uterine fibroids in the local population.

RECOMMENDATIONS

Awareness programs should be conducted to educate women about uterine fibroid and their associated risk factors. A large scale and multicenter studies are recommended so generalization of results will be possible. Lifestyle modifications are recommended including weight management and healthy diet, to reduce the risk associated with obesity because obesity has strong correlation with fibroid. Regular pelvic ultrasound screening is recommended for early detection of fibroid for women presenting with related symptoms.

CHAPTER: 5
CONCLUSION

The present study was conducted to find the prevalence of uterine fibroids and to evaluate the associated risk factors among women undergoing pelvic ultrasound at a tertiary care hospital. The overall prevalence of uterine fibroids was found to be 20.3%, indicating that fibroids are relatively common among women of reproductive age.

The study demonstrated a significant association between age and uterine fibroids, with higher frequency (35.7%) observed in women aged 35–44 years, suggesting that with advancing age the risk increases. Similarly, body mass index (BMI) showed a significant relationship, with a higher prevalence (27.0%) of fibroids among obese women, indicating the role of obesity as an important risk factor.

Furthermore, fibroids were highly correlated with family history with higher prevalence (41.2%), showing the significance of genetic predisposition. There were no statistically significant correlations between parity and the use of hormonal contraceptives.

Overall, the findings suggest that uterine fibroids are influenced by multiple factors, particularly age, obesity, and family history. Early identification of these risk factors can help in timely diagnosis and management, and reduces the complications associated with uterine fibroid.

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