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Effect of Uterine Fibroid on Maternal and Perinatal Outcomes among Pregnant Women

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Abstract: *Uterine fibroids are benign tumor of uterine muscle. They are present in approximately 20-50 % of women in reproductive age, and they may adversely affect the pregnancy outcomes.*
The aim*: this study aims to examine the effect of uterine fibroid on maternal and perinatal outcomes among pregnant women.*
Research design: *a prospective cohort study was used in this study.*
Settings*: this study was carried out in antenatal clinic and labor ward in Obstetrics and Gynecology Department at Zagazig University Hospitals.*
The sample*: the sample in this study consists of 174 pregnant women. Women were assigned to one of the two groups. The first group (study group) consists of 58 pregnant women with fibroid. The second group (control group) consists of 116 pregnant women without fibroid. Patients were considered for inclusion if they underwent first-trimester ultrasonography examination and went on to deliver at Zagazig Obstetrics and Gynecology Hospital.*
Tools*: the first part is a structured questionnaire constructed by the investigators to collect baseline demographics and fibroid characteristics. The second part is a maternal assessment sheet. The third part includes neonatal assessment sheet.*
Results: *patients in the fibroid group demonstrated a higher maternal age (P < 0.001), higher pre-pregnancy body mass index (P=0.01) and higher rate of assisted reproductive technology use (P=0.03). The presence of fibroids was not associated with any change in obstetric outcomes included threatened spontaneous abortion, premature rupture of membranes, antepartum bleeding, abdominal pain needing admission, cesarean deliveries, postpartum hemorrhage and blood transfusion. Neonatal outcome was acceptable with no perinatal mortality. The obstetric outcomes were unaffected by the number, size, location and type of fibroids (all P > 0.05).*
Conclusion*: fibroids were not a risk factor for any adverse obstetric outcomes among pregnant women with fibroid with singleton pregnancies.*
Recommendation*: women should carefully screen during the antenatal period through regular follow-up. Most of the fibroids were asymptomatic but may adversely affect the path of pregnancy and labor dependent on their location and size.*
Keywords*: fibroid tumor, pregnancy outcomes, women health.*

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I. Introduction

Uterine fibroids are the most commonly benign tumors of the female reproductive system, affecting 20%–60% of women in reproductive age **(Qidwai et al., 2006)**. However, the true prevalence of fibroids is likely much higher owing to most fibroids being asymptomatic **(Guo & Segars., 2012)**. Fibroid incidence increases with age, approaching 70%–80% by the time individuals reach the age of 50 **(Baird et al., 2003)**.

The incidence of fibroids in pregnancy reported ranges from 0.1 to 10.7% of all pregnancies and increases as women choose to delay pregnancy until later in life **(Eze et al., 2013)**. Fibroids have been reported to be associated with 10%–40% of prepartum complications in patients who are pregnant **(Cook et al., 2010)**. Uterine fibroids can be single or multiple and can vary in size, location and perfusion. Fibroids are commonly classified into 3 subgroups based on their location: subserosal (projecting outside the uterus), intramural (within the myometrium), and or submucosal (projecting into the cavity of the uterus) **(Munro et al., 2011)**.

Flake et al (2003) found that the risk factors of uterine fibroids which include nulliparity, early menarche, increased frequency of menses, history of dysmnorrhea, family history of uterine fibroids, obesity, and age (peak incidence at 40 to 50), and other factors which increase risks of fibroids that are linked to hypertension and diabetes.

Klatsky et al., (2008) investigated the impact of uterine fibroids on obstetric outcomes, specifically evaluating the impact of large uterine fibroids on the frequency of short cervix, preterm premature rupture of membranes (PPROM), preterm delivery (PTD), estimated blood loss (EBL) at delivery, and need for postpartum blood transfusion, as well as other adverse obstetric outcomes. Most women with uterine fibroids have a regular pregnancy, and they are associated with a higher risk of spontaneous miscarriage up to 40%, preterm labor, placenta previa, placental abruption, fetal malpresentation, intrauterine growth restriction, labor dystocia, cesarean delivery, retained placenta and postpartum hemorrhage and hysterectomy **(Vilos et al., 2015 and Lee et al., 2010)**.

Shobhitha et al., (2016) claimed that fibroids are associated with various complications during pregnancy. They may increase in size, undergo degeneration or torsion. Most fibroids remain uncomplicated and do not increase in size. Up to 10% undergo degeneration typically in the second trimester and is usually a self-limiting process, occasionally requiring bed rest, adequate hydration and analgesia. The variation in size of fibroid is the result of increase in progesterone level during pregnancy which actually may decrease apparent fibroid size. Rarely retention of urine and torsion of uterus can occur. Risk of post-partum sepsis may be increased due to extensive necrotic degeneration of fibroid attributed to hormonal changes of pregnancy and puerperium.

Pregnant women with fibroids are at increased risk of cesarean delivery, breech presentation, malposition and preterm delivery. Fibroid <5 cm in diameter tend to remain stable or decrease in size, and larger fibroids (>5 cm) tend to grow during the pregnancy **(Akhtar et al., 2010)**. The risk of adverse events in pregnancy increases with the size of the fibroid. Different complications with variable rates of incidence have been reported in pregnancy with fibroids which include antepartum hemorrhage, acute abdomen, laparotomy, preterm labor, feto-pelvic disproportion, malposition of the fetus, retention of the placenta, postpartum hemorrhage (PPH), red degeneration, dysfunctional labor, retained placenta, retained products of conception, and intrauterine growth restriction. These complications are more commonly seen with large submucosal and retro-placental fibroids (**Ciavattini et al., 2015**).

Fibroid may cause some adverse outcomes during pregnancy, delivery and the postpartum period. Women with uterine fibroids are more likely to have pregnancies complications by fetal mal-presentations, preterm birth, preterm premature rupture of membranes (PPROM), placenta praevia, placental abruption, caesarean delivery, and severe postpartum hemorrhage **(DeVivo et al., 2011)**.The two most important factors in determining morbidity are size and locations **(Laughlin & Stewart, 2011)**. Proximity to the placental implantation site is equally important, specifically in cases of miscarriage, placental abruption, preterm labour, and postpartum hemorrhage. These health problems can have a significant impact on a woman's life taking a social, economical , and emotional toll **(Ahmed & Alok, 2011)**. This study was carried out to investigate the effects of uterine fibroids during pregnancy on obstetrics outcomes. More specifically, to evaluate any effect of different fibroid characteristics on obstetric outcomes in singleton pregnancy. Furthermore, changes in fibroids during pregnancy were recorded.

Aim of the study

To examine the effect of uterine fibroid on maternal and perinatal outcomes among pregnant women.

Research questions

- What is the impact of uterine fibroid on maternal outcomes during pregnancy?
- What is the impact of uterine fibroid on fetal outcomes?

Subjects and methods

Research design*:* prospective cohort study design.

Setting

This study was carried out in antenatal clinics, and labor ward in Obstetrics and Gynecology Department at Zagazig University Hospitals

Subjects:

The sample consisted of 174 pregnant women; their ages ranged from 20-45 years old. Women were assigned to one of the two groups. The first group (study group) consisted of 58 pregnant women with fibroid. The second group (control group) consisted of 116 pregnant women without fibroid. The ratio between case and control

group was calculated 2:1. Patients group who attended first-trimester ultrasonography examination which was diagnosed by the antenatal clinics at Obstetrics and Gynecology Department at Zagazig University Hospitals, between first of March 2016 and end of September 2018. Patients were included if they underwent both subsequent prenatal care and delivery at the hospitals within the study period.

Inclusion criteria:
Criteria for the selection of participants included:
- Single pregnancy.
- Prime gravid and multi gravid.
- Any gestational age.
- Patients with at least one fibroid measuring above 1 cm in diameter.

Exclusion criteria:
Exclusion criteria included women who were complaining from: -
- Past history of cesarean delivery, myomectomy.
- Uterine septum resection.
- Uterine malformation, uterine adenomyosis (uterine adenomyoma).
- Cardiovascular or cerebrovascular diseases.
- Diabetes mellitus, renal insufficiency.
- Hematopoietic system diseases or any other serious condition.

II. Method of data collection

A structured interview questionnaire sheet was prepared by the researchers including patient assessment sheet that was designed and used to collect the relevant data including: -

1-The demographic characteristic of the pregnant women were: age, body mass index (BMI), pregnancy history, duration of menstrual cycle/day, duration of menstrual period and method of conception.

2- Maternal assessment sheet:
A- Maternal outcomes during antenatal period as: -
Threatened miscarriage (vaginal bleeding occurring at <28 weeks of pregnancy), premature rupture of membranes (PROM), antepartum bleeding (placenta previa, placental abruption), abdominal pain needing admission, cesarean section, estimated blood loss (bleeding volume within 24 hours of delivery), postpartum hemorrhage (estimated blood loss ≥1000 mL for cesarean deliveries or≥500 mL for vaginal deliveries), and postpartum blood transfusion.

B- Pregnancy outcomes as: -
Spontaneous abortion, premature delivery (delivery at 28–36+6 weeks of pregnancy), delivery at 37–42 weeks, and duration of hospital admission.

3-Neonatal assessment sheet
Variables of birth weight, Apgar scores at 1-, 5-, and 10-minute, any congenital anomalies and the neonatal complications such as neonatal admission (NICU) and neonatal death were also determined.

Method of data collection
The study was accomplished as follows:
- The permission to conduct the study was obtained from the Director of Hospital and the Head of Department to collect the data after explaining the aim of the study.
- The development of tool after reviewing recent relevant literatures.
- The content validity of the questionnaire was assessed by a panel of five experts for clarity, validity, and comprehensiveness of the questionnaire's items.
- A pilot study with 17 participants was conducted to determine the clarity and feasibility of the questionnaire which is followed by necessary modifications.
- The reliability of the tools was tested. The internal consistency of the tools ranged from 0.79 to 0.92, which indicates that the tool is reliable.
- Pregnant women who agreed to participate in this study and who fulfill the inclusion criteria were asked to sign a written informed consent form. After routine ultrasonography examination, the data were collected through individualized interviews with patients in the antenatal clinics at Obstetrics and Gynecology Department at Zagazig University Hospitals.

- All patients underwent routine ultrasonography examination at least three times during pregnancy (at 11–14 weeks, 22–24 weeks, and 28–32 weeks of pregnancy), except in cases of spontaneous or induced abortions; ultrasonography examinations were performed by expert obstetric and gynecologic sonographers at the study institution, and patients and their attending physicians were asked to report any obstetric outcomes and adverse events. During ultrasonography examinations, fibroid characteristics, including size, number, location, and type, were recorded and the 11–14-week measurements were used as reference values.
- Pregnant patients with >2 cm fibroid were taken in the study. Routine fundamental investigations were carried out for all. They were followed during antenatal period clinically and scanned by ultrasonogram which was carried out at booking visit and during subsequent visits to assess the change in the size of the fibroid and other obstetric complications. Maternal age, parity, size of fibroid, complications during pregnancy and mode of delivery were noted.

Ethical consideration:

The participants' rights were protected by explaining to them the purpose and significance of the study. Participants were reassured that their responses would remain anonymous, and no remarks were made that could identify any individual participants. The clients were informed that their participation was entirely voluntary and they could withdraw at any time. Participants' privacy was guaranteed as well as confidentiality. Written consent to take part in the study was obtained from the patients before data collection.

Statistical analysis:

Qualitative variables were expressed as frequency and percentage; quantitative variables were expressed as mean ± SD. Qualitative variables were compared using the Pearson $\chi 2$ test, continuity correction$\chi 2$ test, and the Fisher exact test. Quantitative variables were compared using the Student t test, Mann–Whitney U test, analysis of variance, and the paired Student t test. Multivariable logistic regression analysis was used to adjust for potential confounding factors when examining associations between variables and obstetric outcomes. All data were analyzed using SPSS version 17.0 (SPSS) and $P< 0.05$ was considered statistically significant.

III. Results

Table 1 demonstrates demographic characteristics of the studied subjects. The table shows that the mean age of the women who had fibroid were 33.90 ± 4.15 compared to 31.28 ± 3.51 of control group. Differences observed are statistically significant (P = 0.001*). Also the women who had fibroid were more likely to have pre-pregnancy body mass index than women who had normal pregnancy with a mean 23.75 ± 3.46 vs. 21.11 ± 2.52 respectively. Meanwhile, no other significant differences were observed between the two studied groups regarding pregnancy history, menstrual history, duration of menstrual period. Moreover, the percentage of women with fibroid was higher using assisted reproductive technology (65.5%) compared to (46.6%) of control group, Differences observed are statistically significant (p=0.001*).

Data concerning the maternal outcomes during antenatal period are presented in **Table 2.** The multivariate logistic regression analysis controlled for age, pre-pregnancy body mass index, and method of conception as confounding variables, and found no associations between patients having fibroids at 11–14-week ultrasonography and any of the maternal outcomes included threatened spontaneous abortion, premature rupture of membranes, antepartum bleeding, abdominal pain needing admission, cesarean deliveries, postpartum hemorrhage and blood transfusion.

Figure 1: Presents the total of 452 women with single gestation at the study for first-trimester ultrasonography examinations during the study period; fibroids were identified and 78 patients and 374 had no fibroids. 13 patients were excluded from the fibroid group due to deviation from the inclusion criteria; four had previous cesarean sections, one had previous myomectomy, two had uterine malformation, one had uterine adenomyosis and five had medical disorder (three had history of diabetes mellitus and two had history of chronic hypertension).The follow-up of the 7 cases was lost. So, data were included from 58 patients only. On the other hand, 38 patients were excluded from the control group (23 patients had previously undergone a cesarean delivery, four had a history of myomectomy, two had uterine adenomyosis, three patients had a history of diabetes mellitus, five had a history of chronic hypertension and one patient had uterine malformation)based on the inclusion criteria. To maintain a 2:1 ratio between the sizes of the case/control groups, data from 220 randomly selected women in the control groups were excluded; this resulted inobstetric-outcomes data being included from 58 patients in the fibroid group and 116 pregnant women in the control group.

Table 3 shows pregnancy and neonatal outcomes between two studied group. According to the findings, the mean duration of hospital admission between the women with fibroid and control group were 6.67 ± 2.55 &5.95 ± 1.54 respectively with no significant differences observed between the two studied groups. As regards to Pregnancy outcomes, no differences were observed regarding spontaneous abortion, premature

delivery and delivery at 37–42 weeks between two studied groups. Concerning neonatal outcome, the average fetal weight was 2687.37± 462.87 & 2978.15-372.36 respectively between the two studied groups, and there was no statistically significant difference. On the other hand, only 2 neonates of the women with fibroid had neonatal congenital anomalies compared to 4 neonates of control group and there wasn't statistically significant difference (p=0.334). Finally, there were neonates with good Apgar score, no neonatal needed admission to (NICU) and no perinatal mortality between the two studied groups. No differences were observed in the obstetric outcomes between the two studied groups.

Table 4 describes the obstetric outcomes between patients with single or multiple fibroids. There were no significant differences between patients with single or multiple fibroids in relation to the obstetric outcomes.

Table 5illustrates the obstetric outcomes between patients with different types of fibroid either intramural or subserosal. There were no significant differences between patients with intramural or subserosal fibroids in relation to the obstetric outcomes.

Comparisons of obstetric outcomes between patients with different fibroid sizes are presented in **Table 6.** There were no significant differences between patients' different fibroid sizes in relation to the obstetric outcomes.

Table 7 demonstrates the fibroid size across the three ultrasonography examinations that were analyzed. A significant increase in fibroid size was observed not only between the 11–14-week and 22–24-week examinations, but also between the 11–14-week and the 28–32-week examinations when only fibroids below 3 cm in diameter were considered. However, no significant differences were observed when comparing the 22–24-week and 28–32 week evaluations among fibroids below 3 cm in diameter. Additionally, no significant differences were recorded for fibroids of at least 3 cm in diameter and no significant differences were observed among all fibroids.

IV. Discussion

Uterine fibroids are benign growths of uterine muscle that occur commonly in women of reproductive age. Uterine fibroids have long been implicated as a cause of adverse pregnancy events. Some cases don't affect outcome of pregnancy. In many cases, it leads to problems like abortion, preterm labour, other complications being premature rupture of membranes, placental abruption, uterine dysfunction, obstructed labour, retained placenta, post-partum hemorrhage, pain, degeneration and IUGR **(Quyang et al., 2006)**. So the aim of the study was to assess the effect of uterine fibroid on maternal and perinatal outcomes among pregnant women.

The current study revealed that the mean age of the women who had fibroid were 33.90 ± 4.15 compared to 31.28 ± 3.51 of control group. Differences observed are statistically significant. Also the women who had fibroid were more likely to have pre-pregnancy body mass index than women who had normal pregnancy with a mean 23.75 ± 3.46 vs. 21.11 ± 2.52 respectively. Moreover, the percentage of women with fibroid was higher using assisted reproductive technology. Similar study was conducted by **Wang et al., (2016)** who reported that the mean maternal age was 34.90 ± 4.17, with higher pre-pregnancy body mass index (P= 0.01), and greater use of assisted reproductive technology were recorded among patients in the fibroid group, the significant differences were observed between the two patient groups. However, **Poovathi & Ramalingam (2016)** found that the mean maternal age was 28.9 years and the uterine fibroids occurred in second and third decades of life.

The present study found no significant difference observed between the two studied groups regarding pregnancy history, menstrual history, and duration of menstrual period. These results were supported by **Saleh et al., (2018)** who emphasized that the duration of menstrual cycle/day were 29.68±3.10, and duration of menstrual period/day 6.46 ± 1.12, gravidity 2.63 ± 1.21, and parity 1.26 ± 1.03. Furthermore, **Poovathi & Ramalingam(2016**) suggested that the fibroids were less frequent in the first primigravida compared to multigravida. Additionally, **Sarwar et al., (2012)** estimated that 63% of studied groups were multigravida and 37% primigravida.

The current study found no associations between women having fibroids at 11–14week ultrasonography and any of the maternal outcomes included threatened spontaneous abortion, premature rupture of membranes, ante-partum bleeding, abdominal pain needing admission, cesarean deliveries, postpartum hemorrhage and blood transfusion. This was in the same line with **Klatsky et al., (2008)** who showed that 10% of women with fibroids had a spontaneous abortion, and 23% had abdominal pain, also women with fibroids were at a 3.7-fold increased risk of cesarean delivery. This is in agreement with the results from **Poovathi & Ramalingam (2016**) who reported that pain is the most commonly complaint and is seen most often in women with larger fibroids (more than5 cm) during 2nd and 3rd trimesters of pregnancy, and 59.2%Lower segment cesarean section (LSCS). Another study that was carried out by **Incebiyik et al., (2014)** who showed that the women with fibroids are associated with an increased risk for cesarean birth (OR 3.7; 95% CI, 3.5–3.9), preterm delivery (OR 1.5; 95%CI, 1.3–1.7) especially for subserous and submucosal fibroids, premature rupture of membranes, pelvic pain, placental abruption, dysfunctional birth, dystocia and postpartum hemorrhage.

Furthermore, **Shokeir et al., (2009)** stated that most pregnancies are unaffected by the presence of uterine fibroids, the large submucosal and retro-placental fibroids seem to impact a greater risk for complications such as miscarriage, ante-partum hemorrhage, and uterine fibroids may cause a significant amount of pain during pregnancy for some patients if they undergo red degeneration. Additionally, **Pritts et al., (2009)** reported that 5–15% of women with fibroids are subject to hospitalization during pregnancy for pain control, with the risk increasing for fibroids larger than 5cm.

Regarding obstetric complications, there was no difference observed regarding spontaneous abortion, premature delivery, and delivery at 37–42 weeks between the two studied groups. The results were similar to **Saleh et al., (2018)** who reported that women with fibroids did not have significant adverse effects on obstetric outcomes either maternal or neonatal. Moreover, **Stout et al., (2013)** found no significant relations between the adverse effects of fibroid on pregnancy. Also, **Poovathi & Ramalingam (2016)** highlighted that 13.3% patients had threatened preterm labor during pregnancy, (10%) had spontaneous miscarriage and (90%) of women were crossed 37 completed weeks of gestation.

Concerning neonatal outcome, the average fetal weight was 2687.37± 462.87 & 2978.15-372.36 respectively between the two studied groups, and there was no statistically significant difference. On the other hand, only two neonates of the women with fibroid had neonatal congenital anomalies compared to 4 neonates of control group and there wasn't any statistically significant difference (p=0.334). Finally, there were neonates with good Apgar score, no neonatal needed admission to (NICU) and no perinatal mortality between the two studied groups. No differences were observed in the neonatal outcomes between the two studied groups. This result coincided with **Saleh et al., (2018)** who stressed that only one neonate had congenital anomaly in the form of cleft palate. The average fetal weight was 2978.15±374with good Apgar score with no perinatal mortality. On the same line, **Hummeida et al., (2015)** who addressed that neonatal birth weight at delivery was lower in women with fibroids compared to women without fibroids, although the likelihood of fetal growth restriction was similar among those with and without fibroids and there were no differences in perinatal outcomes regarding to delivery at term, living births, birth weight and preterm birth. Moreover**, Cook et al., (2010)** observed that there were no significant differences in perinatal outcomes regarding to living babied, IUGR, admission to NICU. Furthermore, **Shobhitha et al., (2016)** found that there was one neonatal death due to pre-maturity 1.2 kg –from 28 weeks gestation and one still birth due to scar rupture.

In the present study, there were no significant differences between patients with single or multiple fibroids as regards the obstetric outcomes. Results were similar to **Saleh et al., (2018)** who found that there was no significant difference in the occurrence of adverse effects in pregnancy with single or multiple fibroids. In alignment with the findings of this study, **Lam et al., (2014)** indicated that a higher rate of preterm delivery among patients with multiple fibroids compared with those with a single fibroid. Likewise, **Ciavattini et al., (2015)** monitored raised preterm delivery and cesarean delivery among women with multiple fibroids compared with single fibroids or no fibroids. Similarly, **Vergani et al., (2007)** reported that multiple fibroids, large fibroids and fibroids in the lower uterine segment are predisposing factors for cesarean delivery. Also, **Qidwai et al., (2006)** confirmed that no correlation between increased numbers of fibroids and adverse obstetric outcomes. Moreover, **Lai et al., (2012)** recorded no relationship between preterm delivery and fibroid number. However, **De Vivo et al., (2011)** observed that the peripartum outcomes did not differ from women with one or multiple fibroids.

In respect to different types of fibroid (intramural and subserosal), there was no significant differences between patients with intramural or subserosal fibroids and obstetric outcomes. These findings are in agreement with **Saleh et al., (2018)** who found no association between the fibroid types with adverse obstetric outcomes. Similarly, **De Vivo et al., (2011)** stated that the location of the fibroid did not influence the obstetric outcomes.

In this study, there were no significant differences between different fibroid sizes and obstetric outcomes. These findings are in accordance with **Stout et al., (2010) who** demonstrated that no relationship between fibroid size and adverse obstetric outcomes such as premature rupture of membranes, placental abruption, breech presentation, preterm birth and cesarean delivery. Also, this was asserted by **Qidwai et al**., **(2006)** who noted that no differences in preterm birth, PPROM, placenta praevia, placental abruption, caesarean delivery, or postpartum hemorrhage of women with fibroids < 10 cm. On the other hand, **Lam et al., (2014)** reported that the size of fibroid is associated with increased admissions for pain, postpartum hemorrhage, postpartum blood transfusions, or increased blood loss. Similarly, **Shavell et al., (2012)** considered the preterm delivery as significantly more frequent among patients with fibroids larger than 5 cm in diameter; and there is an association with greater risk of adverse obstetrical outcomes based on the size of fibroids.

The current study found a significant increase in fibroid size that was observed not only between the 11–14-week and 22–24-week examinations, but also the 11–14week and the 28–32week examinations when only fibroids below 3 cm in diameter were considered. However, no significant differences were observed when comparing the 22–24week and 28–32 week evaluations among fibroids below 3 cm in diameter. Additionally, no significant differences were recorded for fibroids of at least 3 cm in diameter and no significant differences

were observed among all fibroids. In the same line of this finding, **Wang et al., (2016)** reported that a significant increase in fibroid size was observed not only between 11–14 weeks and 22–24 weeks, but also between 11–14 weeks and 28–32 weeks of pregnancy among fibroids that were below 5 cm in diameter at first examination. Also, the size, number, location and type of fibroids were not significantly associated with adverse obstetric outcomes. Moreover, **Benaglia et al., (2014)** found that fibroids ≤ 2cm at first evaluation increased in size whereas fibroids that were ≥2 cm showed no change in size during the second trimester, significant fibroid growth during early pregnancy and explained human chorionic gonadotropin as an important contributing factor.

V. Limitations

There were some limitations to the current study. Firstly, the sample sizes were small for both the case and the control groups and some popular concepts could have resulted in a high cesarean delivery rate. Secondly, none of the patients included in the fibroid group had submucosal fibroids; women with submucosal fibroids choose to hysteroscopic fibroid resection prior to pregnancy and this could have affect on the results.

VI. Conclusion

Fibroids were not a risk factor for any adverse obstetric outcomes among patients with singleton pregnancies. Also, some significant growth was observed in smaller fibroids between the first and third ultrasonographic evaluations; so, close monitoring and management are necessary during the prenatal, intrapartum and postpartum periods to ensure that timely care is delivered if adverse obstetric outcomes occur.

VII. Recommendations

This study recommends for increasing the effort by healthcare providers to start further research about the effect of fibroids on pregnancy outcomes. Moreover, the health care provider should implement an educational program for women with fibroids about pregnancy outcomes and on how to pass pregnancy safely.

Table 1: Distribution of the studied women according to their demographic characteristics.

Variable	Study group (n = 58)	Control group (n = 116)	P value
Age, y	33.90 ± 4.15	31.28 ± 3.51	≤0.001
Pre-pregnancy body mass index	23.75 ± 3.46	21.11 ± 2.52	0.005
Pregnancy history Gravidity Parity	1.70 ± 1.13 0.22 ± 0.14	2.81 ± 1.01 1.07 ± 0.28	0.358 0.275
Menstrual history Duration of menstrual cycle/day	29.67 ± 3.11	30.58 ± 4.02	0.463
Duration of menstrual period	5.46 ± 1.22	6.45 ± 1.12	0.223
Method of conception Natural conception Conception using assisted reproductive technology	20 (34.5%) 38 (65.5%)	62 (53.4%) 54 (46.6%)	0.038

A Value is given as mean ± SD or number (percentage), unless indicated otherwise.
b Calculated as weight in kilograms divided by the square of height in meters.

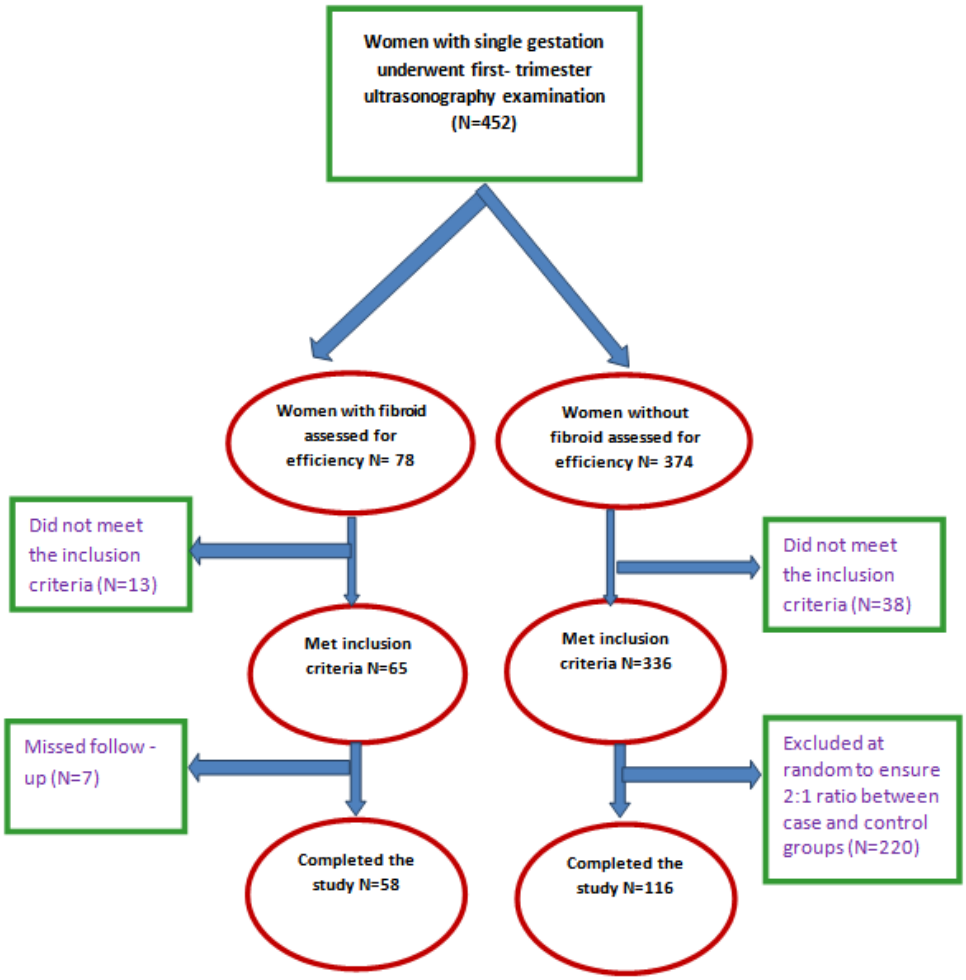

Figure 1: Participants of the study in flow chart.

Table 2: Distribution of the studied women according to their maternal outcome during antenatal period.

Maternal outcomes a	Study group (n = 58)	Control group (n = 116)	Unadjusted RR (95%CI)	Adjusted RRb (95%CI)	P value
Threatened spontaneous abortion c	21 (36.2)	35 (30.2)	1.14 (0.55–2.30)	0.69 (0.30–1.58)	0.429
Premature rupture of membranes	12 (20.7)	28 (24.1)	0.86 (0.38–1.97)	0.74 (0.29–1.92)	0.497
Antepartum bleeding—placenta previa	0	1 (0.8)	0.00	0.00	0.996
Placental abruption	0	0	NA	NA	
Abdominal pain needing admission	3 (5.2)	4 (3.5)	1.55 (0.34–7.14)	2.15 (0.39–11.89)	0.389
CS	53 (91.4)	97 (83.6)	1.12 (0.31-3.87)	1.13 (0.27-4.48)	0.841
Postpartum hemorrhage d	3 (5.2)	8 (6.9)	0.41 (0.08–2.02)	0.40 (0.07–2.65)	0.376
Blood transfusion	2 (3.4)	10 (8.6)	0.57 (1.13–2.79)	0.55 (0.12–3.22)	0.487

Abbreviations: RR, relative risk; CI, confidence interval; NA, not applicable.
a Values are given as number (percentage) unless indicated otherwise.
b The RR was adjusted for age, pre-pregnancy body mass index, and mode of conception.
c Vaginal bleeding occurring at <28 weeks of pregnancy.
d Estimated blood loss ≥1000 mL during cesarean deliveries or ≥500 mL during vaginal deliveries.

Table 3: Distribution of the studied women according to pregnancy and neonatal outcomes.

Variable	Study group (n = 58)	Control group (n = 116)	P value
Duration of hospital admission (day)	6.67 ± 2.55	5.95 ± 1.54	0.109
Pregnancy outcome			
Spontaneous abortion	2(3.5%)	4(3.5%)	0.755
Premature delivery	21(36.2%)	34(29.3%)	0.0015
Delivery at 37–42 weeks	35(60.3%)	78(67.2%)	0.001
Neonatal outcome			
Birth weight(g)	2687.37± 462.87	2978.15-372.36	0.412
Neonatal congenital anomalies	2 (3.4%)	4 (3.4%)	0.334
Apgar score			
Apgar score ≤ 7 at 1 minute	2 (3.4%)	0	0.335
Apgar score ≤ 7 at 5 minutes	1 (1.7%)	0	0.336
Apgar score at ≤ 7 at 10 minutes	0	0	0.336
Neonatal admission (NICU)	0	0	0.336
Neonatal death	0	0	0.336

Values are given as number, mean ± SD, or number (percentage), unless indicated otherwise

Table 4: Comparison of obstetric outcomes between patients with single or multiple fibroids.

Outcomes a	Patients with single fibroid (*N*)	Patients with multiple fibroids (*N*)	P value
Threatened spontaneous abortion b	4	3	>0.98
Premature rupture of membranes	8	4	>0.98
placenta previa	0	0	
Placental abruption	0	0	
Abdominal pain needing admission	3	0	
CS	35	18	0.447
Postpartum hemorrhage c	0	3	0.089
Blood transfusion	0	2	0.134
Pregnancy outcome			
Spontaneous abortion	1	1	1.0
Premature delivery	15	6	0.583
Delivery at 37–42 weeks	20	15	0.122
Duration of hospital admission (day)	6.96 ± 3.19	6.21 ± 0.92	0.937
Neonatal outcome	2682.83 ± 441.62	2698.14 ± 504.76	0.908
birth weight (g)	1	1	0.992
Neonatal congenital anomalies			0.97
Apgar score	0	2	0.368
Apgar score ≤ 7 at 1 minute	0	1	0.368
Apgar score ≤ 7 at 5 minutes	0	0	
Apgar score at ≤ 7 at 10 minutes	0	0	
Neonatal admission (NICU)	0	0	
Neonatal death			

Values are given as number, number (percentage), or mean ± SD, unless indicated otherwise.
b Vaginal bleeding occurring at <28 weeks of pregnancy.
c Estimated blood loss ≥1000mL during cesarean deliveries or ≥500 mL during vaginal deliveries.

Table 5: Comparison of obstetric outcomes between patients with different types of fibroid.

Outcome	Patients with intramural fibroid (*N*)	Patients with Subserosal fibroid (*N*)	P value
Threatened spontaneous abortion	6	1	>0.98
Premature rupture of membranes	12	0	0.356
placenta previa	0	0	
Placental abruption	0	0	
Abdominal pain needing admission	2	1	0.405
CS	28	7	0.84
Postpartum hemorrhage	3	0	>0.98
Blood transfusion	2	0	>0.98
Pregnancy outcome			
Spontaneous abortion	2	0	>0.98
Premature delivery	16	5	0.76
Delivery at 37–42 weeks	28	7	0.84
Duration of hospital admission (day)	6.70 ± 2.58	6.63 ± 2.88	0.567
Neonatal outcome	2709.19 ± 474.83	2579.63 ± 520.27	0.561

birth weight (g)			
Neonatal congenital anomalies	2	0	>0.98
Apgar score			
Apgar score ≤ 7 at 1 minute	0	2	0.168
Apgar score ≤ 7 at 5 minutes	0	1	0.168
Apgar score at ≤ 7 at 10 minutes	0	0	
Neonatal admission (NICU)	0	0	
Neonatal death	0	0	

Values are given as number; $P< 0.05$ was considered statistically significant.

Table 6: Comparison of obstetric outcomes between patients with different fibroid sizes.

Outcomes	Fibroids ≤ 3cm in diameter at participation	Fibroids ≥ 3 cm in diameter at participation	P value
Threatened spontaneous abortion	2	5	0.063
Premature rupture of membranes	8	4	>0.98
placenta previa	0	0	
Placental abruption	0	0	
Abdominal pain needing admission	2	1	>0.98
CS	34	15	0.78
Postpartum hemorrhage	1	1	>0.98
Blood transfusion	1	2	>0.98
Pregnancy outcome			
Spontaneous abortion	0	2	0.97
Premature delivery	14	7	0.77
Delivery at 37–42 weeks	24	11	0.87
Duration of hospital admission (day)	6.56 ± 2.87	6.94 ± 1.98	0.148
Neonatal outcome			
birth weight (g)	2685.29 ± 482.62	2692.10 ± 421.55	0.946
Neonatal congenital anomalies	0	2	0.154
Apgar score			
Apgar score ≤ 7 at 1 minute	2	0	>0.98
Apgar score ≤ 7 at 5 minutes	1	0	>0.98
Apgar score at ≤ 7 at 10 minutes	0	0	
Neonatal admission (NICU)	0	0	
Neonatal death	0	0	

Values are given as number, mean ± SD, or number (percentage), unless indicated otherwise.

Table 7: Distribution of the studied women according to change in size of fibroid during pregnancy

	Evaluated at 11–14 weeks Of pregnancy	Evaluated at 22–24 weeks of pregnancy	Evaluated at 28–32 weeks of pregnancy	P value b	P value c	P value d
Fibroids <3 cm in diameter	2.86 ± 0.92	3.27 ± 1.35	3.35 ±0 .96	0.032	0.723	0.016
Fibroids ≥3 cm in diameter	5.96±1.19	4.82±1.06	4.54±1.24	0.524	0.112	0.153

a Values are given as mean ± SD unless indicated otherwise.
b Comparison between 11–14-week and 22–24-week evaluations.
c Comparison between 22–24-week and 28–32-week evaluations.
d Comparison between 11–14-week and 28–32-week evaluations.

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