Original Article

Assessment of the Preconception Health Risks among Women at Reproductive Age

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1.ABSTRACT

Background: Preconception health risks assessment is a crucial issue especially among women at reproductive age to prevent health hazards for both the mother and the fetus. **Aim**: This study aimed to assess the preconception health risks among women at reproductive age. **Design**: A cross-sectional descriptive research design was used. **Subjects**: By purposive sampling, this study included 384 women at reproductive age who were referred to the Maternal and Child Health Center in Mansoura City. **Tool**: The women's general characteristics and preconception health risks were assessed using a self-administered questionnaire. **Results**: Among the non-modifiable preconception health risks, a family history of diseases was found in more than three-fourths of women; more than three-fifths of women were multipara and aged more than 30 years. Additionally, more than one-third measured less than 150 cm in height. Regarding the modifiable preconception risks, most women drank caffeine and ate frequently large meals, more than two-thirds were constantly exposed to passive smoking, and more than two-fifths had no regular exercise and dental care. **Conclusion**: The most non-modifiable preconception health risk was a family history of chronic diseases, and the most modifiable preconception behavioral health risks were drinking caffeine, eating frequently large meals, and being exposed to passive smoking constantly. Most women were also exposed to chemicals or radiation. **Recommendation**: All primary healthcare providers should screen all women for their intention for pregnancy and provide the appropriate *preconception services.*

Keywords: *Health risks, Preconception, Reproductive-age women.*

2.Introduction:

Preconception health refers to health and lifestyle before pregnancy, which is an important determinant of a healthy pregnancy and normal fetal development. It is an approach that focuses on actions that women can take to reduce risks, promote healthy lifestyles, and increase readiness for pregnancy **(Ragnar, Grandahl, Stern, and Mattebo, 2018)**. According to the American College of Obstetricians and Gynecologists (ACOG), various preconception health risks affect the developing fetus especially in the early stage when pregnancy may still be unrecognized. These risks include behavioral risks, chronic diseases, genetic disorders, surgical history, genital infections, and vaccinations. Behavioral risks are also called modifiable risks, which include smoking (either active or passive), domestic violence, unplanned pregnancy, low folic acid intake, unhealthy diet, decreased physical exercise, improper medicine use without a physician's prescription, chemical or radiation exposure, medical checkup neglect, poor oral health, and stress **(ACOG, 2019)**. In particular, passive smoking before conception appears to cause miscarriage, abruption placenta, low birth weight,

and premature birth **(American Pregnancy Association, 2021)**. Exposure to domestic violence can also harm overall health; it can lead to abortion, risky sexual health behavior, and sexually transmitted infections **(Semahegn and Mengistie, 2015)**.

According to the Centers for Disease Control and Prevention (CDC), pregnancy planning is an important health issue to ensure that the woman is prepared for pregnancy and to increase the chance of having a healthy baby **(CDC, 2020)**. Furthermore, folic acid supplementation before conception reduces the risk of fetal neural tube defects **(Ayalew et al., 2018)**. An unhealthy diet before pregnancy increases the risks of anemia, miscarriage, low birth weight, intrauterine fetal growth retardation, and maternal mortality **(Anh, 2019)**. Decreased physical activity during the preconception period is also associated with excessive weight gain and worse moods during pregnancy **(British Nutrition Foundation, 2020)**.

Certain risks can arise from some medicine abuse. These risks can vary from abortion to fetal birth defects. Unnecessary medications must be discontinued if a woman plans for pregnancy

(Food and Drug Administration, 2019). Moreover, exposure to chemical hazards and radiation has been linked to impaired fetal neurodevelopment, recurrent miscarriage, low birth weight, and infections. This exposure also encompasses contact with body fluids, animals, and substances such as lead in paints, mercury from seafood consumption, pesticides in the soil, very high temperatures, and air pollution (Wang et al., 2016).

A preconception checkup is essential to make sure that the woman is well prepared physically, psychologically, and emotionally before conception. It is more indicated especially if the woman had previous prenatal or perinatal risk conditions, such as preterm birth, birth defect, neglect of medical checkup or advice during pregnancy, abortion, and stillbirth. Therefore, improper preconception checkup is another health risk for women planning for pregnancy (U.S. Department of Health and Human Services, 2018). Poor oral hygiene is also a preconception health risk because it increases the risk of preterm birth, fetal growth restriction, and low birth weight (Komine et al., 2019). Another preconception health risk is stress because it can negatively affect women's conception ability, pregnancy state, and postpartum psychological adjustment. When the stress level exceeds one's ability, the risk of developing depression and anxiety increases, and baby bonding is also disrupted (American Psychological Association, 2020).

Uncontrolled chronic illnesses before pregnancy represent another health risk because the symptoms may worsen during pregnancy. For example, diabetes can result in a large baby and low fetal blood sugar. Hypertension can also cause seizures or even fetal death (Mae, 2017). In addition, hypothyroidism can result in miscarriage and low child mental capacity. The presence of blood clotting disorders can lead to recurrent miscarriage or preeclampsia during pregnancy. Obesity or undernutrition can also cause preterm birth, low birth weight, abortion, gestational diabetes, fetal growth disorders, or unexplained stillbirths (National Library of Medicine, 2020).

Genital infections such as syphilis, herpes, pelvic inflammatory disease, hepatitis B, and other STDs have serious complications such as ectopic pregnancy, preterm labor, miscarriage, stillbirth, infertility, genital cancer, and even death (World Health Organization, 2020). Pregnant women are also at risk for rubella infection, which is associated with miscarriage and varied birth defects unless they received the measles, mumps, and rubella (MMR) vaccine before pregnancy (CDC, 2020). Moreover, the non-modifiable preconception health risks include genetic disorders, advanced maternal age, high parity, and a history of a previous surgery that may affect future pregnancy (Dasa, Okunlola, and Dessie, 2022). Genetic disorders which can be passed down from parents to their offspring include sickle-cell anemia, cystic fibrosis, Down syndrome, congenital heart defects, convulsions, Alzheimer's disease, and hearing or visual impairment. Some of these diseases are associated with risks of fetal structural defects, low birth weight, and mental retardation (American Society for Reproductive Medicine, 2020). Pre-pregnancy surgeries are associated with the risk of neonatal abstinence syndrome in future pregnancies because of the prescribed opioids for postsurgical pain (Auger et al., 2019). Previous gynecologic surgeries, including surgeries for fibroids or abnormal pap smears, may affect pregnancy management (Gaither, 2018).

2.1 Significance of the study

Identifying the preconception health risks provides an opportunity to assist women in recognizing the key determinants of a healthy pregnancy and adopting healthy behaviors such as taking folic acid supplements, maintaining a healthy diet, attaining an optimal weight, maintaining regular physical activity, undergoing certain health screenings, and managing chronic diseases appropriately. Acting on health issues before pregnancy will prevent problems that may affect women and their babies in the future. Through this action, economical costs will be reduced (Adina, Cheryce, and Jacqueline 2019). However, planning for pregnancy has received poor attention from women, and it is considered a neglected medical health issue by any primary level of prevention services. Although the adoption of optimal preconception health behaviors improves pregnancy outcomes, these behaviors and other preconception health risks are insufficiently assessed in Mansoura City. Therefore, this study was conducted.

2.2 Aim of the study

This study aimed to assess the preconception health risks among women at reproductive age.

2.3 Research Question

What are the preconception health risks among women at reproductive age?

3. Methods

3.1 Research Design

A cross-sectional descriptive research design was used. In this observational study, the potential preconception health risks were measured among women at reproductive age who were referred to the Maternal and Child Health (MCH) Center in Mansoura City between March 2021 and August 2021.

3.2 Study Setting

This study was conducted in the Family Planning Clinic at the MCH center in Mansoura City, Egypt. This center has 18 rooms including family planning clinics, a pharmacy, a dental clinic, a laundry, a store, a vaccination room, and a laboratory. Reception and waiting areas with an adequate number of seats for women are also present.

3.3 Sampling

This study included a purposive sample of 384 women at reproductive age admitted to the Family Planning Clinic at the MCH center in Mansoura City to remove the family planning method with the following criterion: planning for pregnancy within the following year. Women with previous infertility issues were excluded.

3.4 Sample Size Calculation

Based on data from related literature **(Shadab et al., 2017)**, the sample size with a precision/absolute error of 5% and type 1 error of 5% is calculated as follows: sample size = [(Z $1-\alpha/2)^2$×P (1−P)]/d², where Z $1-\alpha/2$ = is the standard normal variate, and at 5% type 1 error ($p < 0.05$), it is 1.96; *P* is the expected proportion in population according to previous studies, and *d* denotes the absolute error or precision. Thus, the calculation is as follows: sample size = [(1.96)². (0.477). (1−0.523]/ (0.05)² = 383.3. Based on the abovementioned formula, the sample size required for the study was 384.

3.5 Data Collection Tool

This study used a self-administered questionnaire adapted from the tool for preconception care consultation (the Arabic version) developed by **Erfocentrum and MC, (2013)**. It has two parts: part I includes the women's demographic data such as age, education level, employment, residence, and consanguinity. Part II includes the preconception health risks assessment sheet which assesses the preconception health risks among women such as reproductive risks, behavioral risks, environmental risks, general health conditions and medicines, and immunizations. It consists of 30 questions with yes/no answers (close-ended questions). Of these, 4 assess the reproductive risks (uterine/cervical abnormalities, venereal diseases, previous maternal and fetal problems), 11 assess the behavioral risks (constant exposure to passive smoking, exposure to domestic violence, unplanned pregnancy, frequently large diet, inattention to weight management, inattention to physical exercise, inattention to take folic acid, drugs without physicians' order, caffeine intake, inattention to seek medical advice and blood tests, and inattention to dental caring), 8 assess the environmental risks (exposure to chemicals or radiation, infection, raising animals at home, night shifts during work, strenuous physical effort, pollution, and extremely high temperature and high vibrations), and 7 assess the general health conditions, medicines, and immunizations (chronic diseases, genetic diseases, gynecological or obstetric surgeries, teeth decay, prescribed medications, and full vaccinations and booster doses for measles, rubella, flu, and mumps). Scoring system: each question was scored as 1 for yes and 0 for no answer.

3.6 Validity and reliability of the tool

The validity of the questionnaire was evaluated by a panel of five nursing experts in the field of woman's health and midwifery nursing. Their suggestions were made, such as rearranging and rephrasing some sentences. Cronbach's alpha value for the reliability (internal consistency) of the preconception health risk assessment sheet was 0.856. Hence, the study tool is considered highly reliable.

3.7 Pilot study

A pilot study was carried out on 10% (38 women) of the study sample to test the clarity of the study tool and to estimate the time needed to answer it. Women in the pilot study were excluded from the actual study.

3.8 Ethical Considerations

Ethical approval to conduct the study was duly attained from the Faculty of Nursing ethical committee of Mansoura University. Formal permission was obtained from the director of the MCH center in Mansoura. A written consent was obtained from every participant involved in the study after clarifying the purpose of the research. All participants were reassured about the confidentiality of the collected data and told that they had the right to withdraw from the study at any time.

3.9 Research Process

The present study was conducted between March 2021 and August 2021 through two phases: the preparatory and implementation phases. In the preparatory phase, the researcher obtained an approval letter from the authority of the previously mentioned setting. The data collection tool was designed after reviewing the national and international related literatures. Then, before collecting the actual sample, a pilot study was conducted on 38 women. In the implementation phase, the researcher attended the MCH center 3 days per week. At first, the researcher introduced herself to the women, and those women who fulfilled the inclusion criterion were invited to participate in the study. The study's aim was clarified, and women's written consent was obtained. The researcher guided the women to fill in the self-administered questionnaire by themselves. The women had to complete the entire questionnaires and return them to the researcher on the same day. Each woman completed the questionnaire for 10–15 minutes.

3.10 Statistical analysis

All statistical data were analyzed using SPSS for Windows, version 25.0 (SPSS, Chicago, IL, USA). All continuous data were normally distributed and are expressed in mean ± standard deviation (SD), whereas the categorical data are expressed in numbers and percentages. As mentioned above, the reliability (internal consistency) test for the used tool was calculated.

4. Results

Table 1 illustrates the general characteristics of the studied women. Their mean age was 31.3 ±5.6 years. More than half (54.4% and 57.6%) of them had attained university or higher education and were housewives respectively. Furthermore, 67.4% were from urban residences. More than two-fifths (45.1%) of them were overweight, and 65.1% did not have enough monthly income.

Figure 1 shows that the majority (85.2%) of women didn't receive preconception counseling or screening for preconception risks.

Figure 2 demonstrates that more than three-quarters (76.0%) of women had a family history of chronic diseases. More than three-fifths (60.4% and 60.2%) of them were aged above 30 years and were multipara respectively. In addition, more than one-third (35.2%) of them have heights below 150 cm and 19.5% had consanguinity with their husbands.

Table 2 shows that 43.5% and 20.8% of the women had a history of venereal diseases and uterine or cervical abnormalities (such as fibroids, polyps,

and adhesions) respectively. In previous pregnancies, the most common maternal problem was anemia (74.5%) followed by cesarean section (60.6%), obesity (41.3%), some sort of infection (19.6%), and gestational diabetes (19.5%). Regarding fetal problems, miscarriage, low birth weight, and preterm labor were reported (26.1%, 20.2%, and 20.8%) respectively.

In terms of preconception behavioral health risks (Table 3), most women had been drinking caffeine and eating frequent large meals (96.1% and 90.4%), respectively. Approximately, three-quarters (74.2%) of them had constant exposure to passive smoking. Furthermore, 46.4% and 42.6% didn't pay attention to regular physical exercise and dental care respectively. Moreover, 33.1% of women didn't pay attention to weight management, 54.9% and 63.5% didn't seek medical advice, and didn't take folic acid supplements before conception respectively.

Regarding environmental risks before conception, almost all women (98.4%) were exposed to chemicals or radiation, roughly three-fourths (78.6%) were exposed to auditory noise pollution, and more than one-quarter (32.6%) were exposed to strenuous physical efforts at work (Table 4).

Table5 shows that 98.7% of the women were fully vaccinated (for diseases such as tuberculosis, hepatitis B virus, measles, tetanus, …etc.), and 77.6% had received booster doses. Tooth decay and a history of chronic diseases were found in 64.8% and 46.6%, respectively. Furthermore, more than two-fifths (43.2%) took medications without physicians' order.

5. Discussion

The present study assessed the preconception health risks among women at reproductive age. These risks are classified into modifiable and non-modifiable risks. Concerning the non-modifiable risks, a family history of chronic diseases such as diabetes and hypertension was the most reported, accounting for more than three-fourths of the women. It is known that family health history affects both the pregnant mother and the baby. Thus, this risk should be assessed before pregnancy to address potential health problems early and take proactive steps to ensure the healthiest pregnancy possible. This finding is congruent with a retrospective study conducted by **Lang et al. (2019)** to investigate the relationship between pregnancy preparation and lifestyle-related preconception health behaviors on 223 Australian pregnant women. In this previous study, roughly

three-fourths of women had a family history of diabetes and hypertension.

The present study further found that more than three-fifths of the studied women were more than 30 years old and were multipara. This issue is important because pregnant women at an advanced age are more at risk for complications such as miscarriage, preeclampsia, gestational diabetes, and congenital disorders which may need additional tests and management. In addition, approximately three-fourths of the studied women had anemia in their previous pregnancies. This finding may be attributed to anemia which is a common condition in women at reproductive age because of recurrent pregnancies, blood loss during menstruation, and poor diets. Furthermore, more than one-third of women measured less than 150 cm in height. This risk is an important determinant of obstructed labor and may need an immediate cesarean section in some women. In the same context, **Gund, Bhide, and Kar, (2016)** assessed the prevalence of periconception risk factors for adverse pregnancy outcomes and found that half of the participants had anemia and that less than one-fourth of them had short maternal stature.

Concerning the modifiable risks, the present study found that more than two-fifths of the studied women had a history of venereal diseases such as candidiasis and trichomoniasis. This finding may be because most women experience candida infection during their lifespan due to several causes, such as overuse of antibiotics, wearing of tight pants, use of sanitary towels, certain diseases, oral contraceptives, inappropriate underwear fabric, and the working environment.

Additionally, more than three-fifths of the women gave birth by cesarean section. This might be attributed to women's request for cesarean section because of being afraid of the associated pain and long hours of vaginal delivery. Moreover, more than two-thirds of the studied women were overweight during their last pregnancy. This might be due to unhealthy nutritional habits as well as a sedentary lifestyle. In the same context, a project was conducted at Uppsala University by **Joelsson, (2018)** to evaluate the extent to which women comply with the recommendations for lifestyle changes during the preconception period and pregnancy. It reported that less than one-fourth of the study participants were overweight or obese.

Regarding the history of previous fetal problems, more than one-fourth of the studied women had a history of miscarriage. Low birth weight and preterm labor were also reported. These results are similar to the finding of **Lang et al.,**

(2019) which indicated that more than one-fourth of women had a previous pregnancy loss.

Concerning the modifiable behavioral risks, nearly half of the studied women didn't pay attention to regular exercise or dental care before pregnancy. A congruent observational cross-sectional study was conducted by **Ramisetty-Mikler et al., (2018)** on 258 Saudi women to determine their preconception health behaviors found that only one-third of the women exercised regularly before pregnancy and that they visited their dentist only when they had dental problems. This finding was also confirmed in a study by **Bayrami, Taghipour, Ebrahimipoor, and Somayeh, (2014)** in which physical activity or exercise is not considered an element of women's lifestyle.

As for the additional modifiable behavioral risks, two-thirds of the studied women didn't take folic acid supplements before pregnancy, possibly attributed to financial insufficiency in almost two-thirds of the women. Along the same line, a study conducted by **Kasim, Draman, Kadir, and Muhamad (2016)** revealed that only one-fourth of the participants consumed folic acid supplements before pregnancy. Additionally, more than half of the studied women didn't seek medical advice or undergo blood tests during the preconception period, and more than two-thirds were constantly exposed to passive smoking. An Italian cross-sectional descriptive survey conducted by **Mastroiacovo et al., (2014)** on 7 maternity clinics concluded that more than half of the participants didn't visit the physician before pregnancy. These findings' similarity may be attributed to the negative attitude toward seeking medical advice, that is, patients are only concerned with the management of health hazards or certain diseases and not the primary level of prevention. In **Mastroiacovo et al.,** study, they reported that there was a higher proportion of participants who were active smokers. The similarity of this result between this study and the present study may be attributed to the increased number of smokers all over the world, either passive or active.

The present study revealed that more than one-fourth of women had unplanned pregnancies. Some women have large family sizes. Unfortunately, unplanned pregnancies are associated with more pregnancy complications. Therefore, improving services and economic levels in rural areas and enhancing the effective use of family planning methods could reduce the risks associated with an unplanned pregnancy. This finding is congruent with a systematic review and

meta-analysis of observational studies conducted by **Alene et al., (2021)** to assess the prevalence and determinants of unintended pregnancy in Ethiopia. This study found that the overall prevalence of unintended pregnancy was slightly more than one-fourth.

Additionally, the present study revealed that most studied women drink caffeine and eat frequent large meals. Along the same line, **Borges et al., (2016)** conducted a cross-sectional quantitative study on 807 Brazilian women to assess their preconception health behaviors and found that only a minority of the study sample performed healthy preconception behaviors. In contrast, the study of **Sharifi et al., (2020)** revealed that coffee consumption was reported by a small percentage of female students. The present study revealed that about one-third of women didn't pay attention to weight management. Along the same line, a web-based preconception study was conducted by **Pandolfi et al., (2014)** to determine the high prevalence of risk factors for adverse pregnancy outcomes, and results showed that one-fifth of their participants were overweight and controlling their weight gain.

The present study suggests that the preconception behavioral risks may be attributed to the lack of preconception counseling or screening for preconception risks in most women. The study findings support the need for evaluating women's preconception health risk behaviors and providing them with effective interventions to improve their health behaviors before pregnancy. This is corresponding to **Bayrami, Taghipour, Ebrahimipoor, and Somayeh, (2014)** who concluded that the majority of women hadn't attended pre-pregnancy care programs.

Regarding the environmental risks, most studied women were exposed to radiation or chemicals such as cleaning agents, pesticides, and paints. This is consistent with the findings of **Gund et al., (2016)**. They found that more than three-fourths of women reported exposure to household cleaners and detergents, and that three-fourths reported daily use of insect repellents before preconception. In the same line a web-based survey conducted by **Agricola et al., (2017)** partially agreed with the present study's finding; they found that almost one-fifth of participants were exposed to pesticides or herbicides, or professional paints.

In addition, the present study revealed that most studied women had received full vaccinations and booster doses. Furthermore, more than two-fifths were taking drugs without physicians' order. Some women may take drugs such as analgesics, antibiotics, and acne drugs without a medical prescription during the preconception period which may affect ovulation and pregnancy. This finding is similar to that of **Houben, Te Winkel, Steegers, and Herings, (2020)** which reported that nearly half of the participants used potentially harmful medications before conception.

6. Conclusion

The most non-modifiable preconception health risk was a family history of chronic diseases. Drinking caffeine, eating frequent large meals, and exposure to passive smoking constantly were the most modifiable behavioral health risks before conception. Most women were also exposed to chemicals or radiation.

7.Recommendations: the following are recommended:

1. All primary healthcare providers should screen all women for their intention for pregnancy and provide the appropriate preconception services Provide preconception counseling as part of primary healthcare services.

2. Further study to assess women's compliance with preconception lifestyle recommendations.

8.Acknowledgment

9.Conflicts of interest

The researchers declare no conflict of interest.

10.References

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Table 1: General characteristics of the studied women (N = 384)

| Items	NO.	%
Age (years)		
20–29	152	39.6
30–34	194	50.5
35-40	38	9.9
mean ± SD	31.3 ± 5.6	
Education		
Read and write	19	4.9
Basic	57	14.8
Secondary	99	25.8
University or higher	209	54.4
Occupation		
Not working	221	57.6
Working	163	42.4
Residence		
Urban	259	67.4
Rural	125	32.6
BMI categories		
Normal weight	95	24.7
Overweight	267	69.5
Obesity	22	5.7
Mean ± SD	27.9 ± 4.2	
Monthly income		
Not enough	250	65.1
Enough	90	23.4
Enough and save	44	11.5
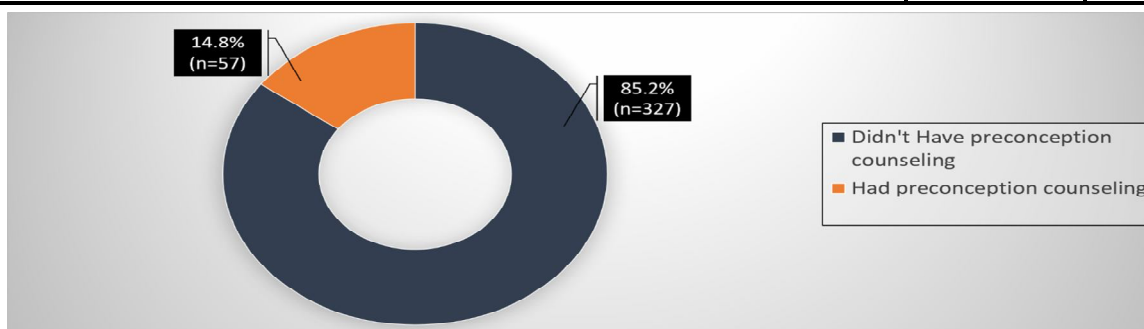
Figure 1. Percentage of the studied women receiving preconception counseling or screening for preconception health risks
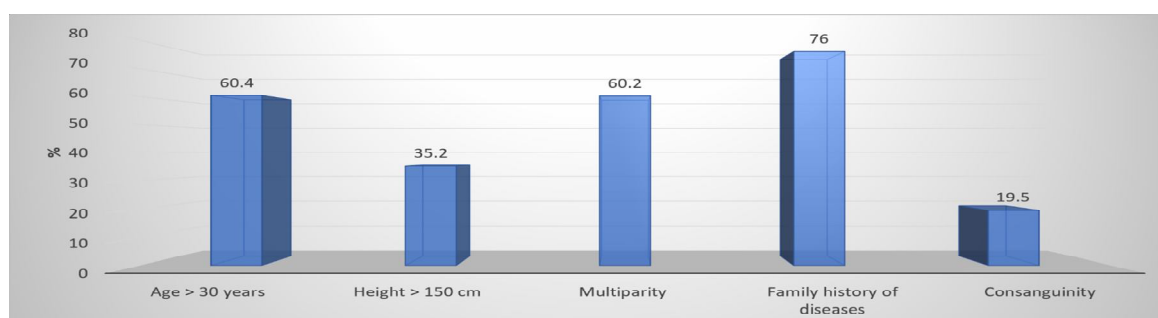
Figure 2. Non-modifiable preconception health risks among the studied women (N=384)

Table 2: Preconception reproductive health risks among the studied women

Items	NO.	%
N = 384		
Uterine/cervical abnormalities such as fibroids, polyps, and adhesions	80	20.8
History of venereal diseases such as candidiasis and trichomoniasis	167	43.5
History of previous maternal problems (N = 322)		
Preeclampsia/eclampsia	61	18.9
Anemia during last pregnancy	240	74.5
Gestational diabetes	63	19.5
Hyperemesis gravidarum	12	3.7
Postpartum hemorrhage	47	14.6
Cesarean section	195	60.6
Infection	63	19.6
Obesity during last pregnancy	133	41.3
History of previous fetal problems (N = 322)		
Miscarriage	84	26.1
Stillbirth	40	12.4
Distorted fetal growth	14	4.3
Fetal/neonatal distress	9	2.7
Premature labor	65	20.2
Low birth weight	67	20.8

Table 3: Preconception behavioral risks among the studied women (N = 384)

Items	NO.	%
Constant exposure to passive smoking	285	74.2
Exposure to domestic violence	127	33.1
Unplanned pregnancy	121	31.5
Having a frequent large diet	347	90.4
Taking drugs without physicians' order	124	32.3
Inattention to take folic acid supplements	244	63.54
Inattention to seek medical advice and blood tests	211	54.9
Inattention to weight management	127	33.1
Inattention to dental caring	164	42.7
Caffeine intake	369	96.1
Inattention to regular physical exercise	178	46.4

Table 4: Preconception environmental risks among the studied women (N = 384)

Items	NO.	%
Exposure to chemicals or radiation (cleaning agents, pesticides, paints, ink, etc.)	378	98.4
Exposure to infection (handling blood, body fluids, waste, or secretions)	69	18.0
Raising animals (e.g., cats) at home	45	11.7
Night shifts during work	58	15.1
Strenuous physical effort during work	125	32.6
Exposure to extremely high temperatures	102	26.6
Exposure to auditory noise pollution	302	78.6
Exposure to high vibrations	35	9.1

Table 5: General health conditions, medicines, and immunizations among the studied women (N = 384)

Items	NO.	%
Chronic diseases	179	46.6
History of genetic disorders	20	5.2
History of gynecological or obstetric surgeries	184	47.9
Teeth decay and didn't visit the dentist	249	64.8
Taking medications as prescribed by the physician	166	43.2
Receiving full vaccinations	379	98.7
Taking booster doses	298	77.6