Original Article

Pre-Pregnancy Risk Factors for Miscarriages; A Prevalence Study

Faiza Murtaza[1], Zaib Un Nisa[2], Sidra Kiran[3], Sidra Anam[4], Wajeeha Shafique[5], Fouzia Baluch[6]

[1]Consultant Gynecologist, Ahmed Medical Complex, Rawalpindi,
[2]Consultant Gynecologist, Medical Frequency and Healthcare Clinic, DG Khan
[3]Consultant Gynecologist, Tehsil Headquarter Hospital (THQ) Hazro, Dist. Attock
[4]Consultant Gynecologist, Shareef Medical Centre, Multan, [5]Consultant Gynecologist, Medicsi Hospital, Rawalpindi
[6]Consultant Gynecologist, Qadir Ali Hospital, Layyah

Correspondence: Dr. Faiza Murtaza0
Consultant Gynecologist, Ahmed Medical Complex, Rawalpindi
r.faizazahid@gmail.com

Abstract

Objective: To determine the frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages.
Methodology: A cross-sectional descriptive study was done at the Department of Obstetrics and Gynecology, Benazir Bhutto Hospital, Rawalpindi from October 2022 to April 2023. Total 234 women were presented with miscarriage and 18 to 40 years of age were included. Various pre-pregnancy modifiable risk factors (drinking coffee/tea No. of cups/day, obesity, smoking, short inter-pregnancy interval, iron deficiency anemia, genital infections, hyperthyroidism and hypothyroidism) were studied.
Results: The patient's mean age was 27.72±4.29 years. 65.4% patients were between the age of 18 to 30 years. The frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages were as follows; drinking coffee ≥ 5 cups/day was 64.9%, obese 45.3%, smoking 29.9%, short interpregnancy interval 33.8%, iron deficiency anemia 38.5%, genital infections 22.2%, hyperthyroidism 15.4% and hypothyroidism was 9.4%.
Conclusion: This study concluded that there is significant impact of modifiable pre-pregnancy risk factors on the high incidence of miscarriages.
Keywords: Abortion, Spontaneous; Obesity; Pregnancy; Smoking.

Cite this article as: Murtaza F, Nisa ZU, Kiran S, Anam S, Shafique W, Baluch F. Pre-Pregnancy Risk Factors for Miscarriages; A Prevalence Study. J Soc Obstet Gynaecol Pak. 2024; 14(2):101-105.

Introduction

Miscarriages are the most common results of pregnancy. Literature shows that 10% to 25% of clinically recognized pregnancies end in miscarriages.[1] However, the actual pregnancy rate is much higher i.e., 31%, meaning that many women become pregnant very early without realizing they are pregnant.[2] For a successful delivery, prevention is the only way to intervene, which can lead to harmful psychological consequences for women and their partners, delaying a successful delivery. Therefore, every potential cause of miscarriage should be investigated.[3]

Risk factors for a normal first-trimester transition to a long-term pregnancy are well established. The common risk factors include increasing maternal age, pre-pregnancy body mass index, and low level of serum progesterone.[4] Recently, lifestyle factors such as caffeine intake, exercise, stress, exposure to smoking, and alcohol consumption have been implicated as risk factors.[5] The researchers believe that avoiding these risk factors could lead to a 13%-15% reduction in miscarriages.[6-8]

According to a study, one-hour Hukka smoke is equal to 10 to 100 times of the smoke from a single cigarette. The other factors include short inter-pregnancy interval is 29.6%, iron deficiency anemia 36.5%, genital infections 16.2%, hyperthyroidism 6.5% and hypothyroidism is 5.8%.[9] It is also known that geographical, cultural

Authorship Contribution:[1,3]concept/research design and did data collection, statistical analysis and manuscript writing, manuscript and project management, critical revision of the manuscript for important intellectual content, takes the responsibility and is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding Source: none
Conflict of Interest: none

Received: Dec 11, 2023
Accepted: May 21, 2024

and climatic conditions also have great impact on different risk factors for miscarriages.[7]

The aim of this study was to determine the prevalence of several modifiable maternal pre-pregnancy risk factors that may lead to miscarriages. This goal guided the study's framework.

Methodology

A cross-sectional descriptive study was done at the Department of Obstetrics and Gynecology, Benazir Bhutto Hospital, Rawalpindi from October 2022 to April 2023. Sample size of 234 cases was calculated using the WHO calculator, using a confidence level of 95%, alpha error 5% and a percentage of hypothyroidism of 5.8%.[9] The sampling technique was non-probability consecutive sampling. All women were presented with miscarriage, gestational age ≤ 20 weeks (assessed on last menstrual period (LMP)) and women ages 18-40 years were included. Pregnant women (pregnancy with abnormally swollen placental villi with or without placental abruption). Ectopic pregnancy (implantation of a fertilized egg outside the uterine cavity), and multiple pregnancy were excluded.

The study provided an operational definition of its words for consistency and clarity. The unintentional ending of a pregnancy before the 20th week was defined as a miscarriage, and this was verified by ultrasound when there was no fetal material visible inside the uterus. Before becoming pregnant, risk factors that may be changed included drinking excessive amounts of tea or coffee (defined as more than four cups daily) and waiting a short time between pregnancies (less than a year after the birth of a prior child). Personal medical histories that included prior first or second trimester losses were also included. Another risk factor, nicotine dependency, was measured using several metrics, such as smoking ten cigarettes a day, Hukka use for fifteen minutes a day, or having a spouse who smokes more than twenty cigarettes a day. The study also examined vaginal discharge varieties, ranging from milky white to curdy white or mixed unclean, as revealed by per-speculum exams, which were used to diagnose genital infections. Body mass index (BMI) ≥ 30kg/m^2 was considered obese. Hemoglobin levels below 10 g/dl and serum ferritin below 15 ng/ml at the time of presentation were the markers of iron deficiency anemia. The list included thyroid function abnormalities as well. Thyroid-stimulating hormone (TSH) thresholds larger than 5.2 mIU/L and less than 0.2 mIU/L, respectively, characterize hypothyroidism and hyperthyroidism.

After approval from ethics committee of institute, an informed consent was taken from each patient and various pre-pregnancy modifiable risk factors (drinking coffee/tea no of cups/day, obesity, smoking, short inter-pregnancy interval, iron deficiency anemia, genital infections, hyperthyroidism and hypothyroidism) was recorded. The data was included patients age, gestational age, parity and place of living. All data was recorded in a specially designed proforma.

The collected information was analyzed by SPSS v 23. The quantitative data namely age and gestational age were measured as mean and their standard deviations. The qualitative data namely place of living (rural/urban), and different pre-pregnancy modifiable risk factors were measured as frequencies and percentages. Effect modifier was adjusted by stratification. The chi-square test was applied after stratification to assess the effect on risk factors, and p-value ≤ 0.05 was considered significant.

Results

Two hundred and thirty-four (n=234) women with miscarriages were enrolled. The patient's mean age was 27.72±4.29 years. Mostly patients, 65.4% (n=153) were between the age of 18 to 30 years and 34.6% (n=81) were between the age of 31 to 40 years. The mean gestational age was 11.37±2.70 weeks and mean parity was 3.39±0.82 children. Distribution of patients according to gestational age, place of living and monthly income is shown in Table I. The frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages were measured in Table II. The stratification of different factors with respect to age, gestational age, and place of living are shown in Table III-V, respectively.

Table III shows the short interval interpregnancy, genital infection and hyperthyroidism are the most risk factors when stratified with age groups of patients, the risk ratio (RR) of short interval interpregnancy is RR: 1.62, 95% CI: 0.8-1.9,

genital infection RR: 1.1, 95% CI: 0.5-1.5, and hyperthyroidism RR: 1.7, 95% CI: 1.0-2.5, respectively.

Table I: Descriptive statistics of patients sociodemographic. (n=234)

Sociodemographic		%	%
Gestational age	≤ 10 weeks	71	30.34
	11-20 weeks	163	69.64
Place of living	Rural	95	40.60
	Urban	139	59.40
Monthly income	≤ 20,000 PKR	54	23.08
	20,000-40,000 PKR	92	39.32
	≥ 40,000 PKR	88	37.61

Table II: Frequency of risk factors for miscarriages. (n=234)

Factors N(%)	Yes	No
Drinking coffee ≥ 5 cups/day	152 (64.96%)	82 (35.04%)
Obese	106 (45.30%)	128 (54.70%)
Smoking	70 (29.91%)	164 (70.09%)
Short interpregnancy interval	79 (33.76%)	155 (66.24%)
Iron deficiency anemia	90 (38.46%)	144 (61.54%)
Genital infections	52 (22.22%)	182 (77.78%)
Hyperthyroidism	36 (15.38%)	198 (84.62%)
Hypothyroidism	23 (9.83%)	211 (90.17%)

Table III: Different factors after stratification with age groups. (n=234)

Factors		18-30 years (n=153)	31-40 years (n=81)	P-value
Drinking coffee ≥ 5 cups/day	Yes	97	55	.492
	No	56	26	
Obese	Yes	71	35	.640
	No	82	46	
Smoking	Yes	44	26	.595
	No	109	55	
Short interpregnancy interval	Yes	68	11	.0001
	No	85	70	
Iron deficiency anemia	Yes	63	27	.241
	No	90	54	
Genital infections	Yes	25	27	.003
	No	128	54	
Hyperthyroidism	Yes	36	00	.0001
	No	117	81	
Hypothyroidism	Yes	16	07	.657
	No	137	74	

Table IV shows the obesity, smoking, short interval interpregnancy, iron deficiency anemia, and hypothyroidism are the most risk factors when stratified with gestational age groups of patients, obesity RR: 1.74, 95% CI: 0.9-2.2, smoking RR: 1.34, 95% CI: 0.9-1.6, short interval interpregnancy is RR: 1.62, 95% CI: 0.9-2.1, iron deficiency anemia RR: 1.22, 95% CI: 0.8-1.6, and hypothyroidism RR: 1.57, 95% CI: 1.0-2.0, respectively.

Table IV: Different factors after stratification with gestational age groups. (n=234)

Factors		≤ 10 weeks (n=71)	11-20 weeks (n=163)	P-value
Drinking coffee ≥ 5 cups/day	Yes	48	104	.575
	No	23	59	
Obese	Yes	12	94	.0001
	No	59	69	
Smoking	Yes	06	64	.0001
	No	65	99	
Short interpregnancy interval	Yes	39	40	.0001
	No	32	123	
Iron deficiency anemia	Yes	18	72	.007
	No	53	91	
Genital infections	Yes	18	34	.447
	No	53	129	
Hyperthyroidism	Yes	13	23	.413
	No	58	140	
Hypothyroidism	Yes	00	23	.001
	No	71	140	

Table V: Stratification of different factors with respect to place of living, (n=234)

Factors		Rural (n=95)	Urban (n=139)	P-value
Drinking coffee ≥ 5 cups/day	Yes	77	75	.0001
	No	18	64	
Obese	Yes	07	99	.0001
	No	88	40	
Smoking	Yes	23	47	.115
	No	72	92	
Short interpregnancy interval	Yes	28	51	.252
	No	67	88	
Iron deficiency anemia	Yes	52	38	.0001
	No	43	101	
Genital infections	Yes	39	13	.0001
	No	56	126	
Hyperthyroidism	Yes	19	17	.106
	No	76	122	
Hypothyroidism	Yes	00	23	.0001
	No	95	116	

Table V shows the drinking coffee, obesity, iron deficiency anemia, genital infection, and hypothyroidism are the most risk factors when stratified with place of living of patients, drinking coffee RR: 2.2, 95% CI: 1.5-2.7, obesity RR: 1.74, 95% CI: 1.0-2.5, iron deficiency anemia RR: 1.3, 95% CI: 0.7-1.8, genital infection RR: 1.2, 95% CI: 0.5-1.5, and hypothyroidism RR: 1.6, 95% CI: 1.1-2.1, respectively.

Discussion

We determine the frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages in this study. The frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages were as follows; drinking coffee ≥ 5 cups/day was 64.9%, obese 45.3%, smoking 29.9%, short interpregnancy interval 33.8%, iron deficiency anemia 38.5%, genital infections 22.2%, hyperthyroidism 15.4% and hypothyroidism was 9.4%. In a study frequency of different maternal pre-pregnancy modifiable risk factors for miscarriages such as coffee/tea consumption, obesity and smoking are found to be 73%, 32.3% and 35.8%, respectively.[10] According to a study one-hour Hukka smoke is equal to 10 to 100 times of the smoke from a single cigarette. The other factors include short inter-pregnancy interval was 29.6%, iron deficiency anemia 36.5%, genital infections 16.2%, hyperthyroidism 6.5% and hypothyroidism 5.8%.[9]

In a cohort study in China, the miscarriage rate was 7.5%, prenatal loss was 12.7%, embryonic loss was 38%, and fetal loss was 49.4%.[3] In a multivariant analysis, hypertensive women had a family history of maternal abortion and had a significantly higher risk of preterm birth. The pre-pregnancy risk ratio of obese, overweight and non-obese compared to normal weight was about 2.01, 1.71 and 2.05 times higher at the end of pregnancy. Some physical examination parameters, such as leukorrhea pH value ≥ 4.5, RR = 2.13, red blood cell count ≤ 5 10(12)/L, RR = 1.52 and positive LgG antibody to human cytomegalovirus before pregnancy, RR = 1.45, are a good predictor of miscarriage.[11]

Miscarriage is the most common adverse outcome of pregnancy, and the identification of modifiable risk factors is important for public health.[5] El-Saidy revealed that by reducing all risk factors to a low level and based on modifiable risk factors before and during pregnancy, a quarter of pregnancies can be prevented. The researchers estimate that doing so could result in a 15% reduction and a 13% reduction, respectively.[9]

The modifiable risk factors reported in another study are work-related factors, lifestyle, obstetrical, and other factors.[12] Work stress leads to negative physical and emotional responses that occur when job demands exceed a woman's capabilities.[13] Women should be advised regarding the risks of work, especially who had high risk pregnancy. They should receive tailored individual counseling.[14]

A study by Weng et al stated that daily caffeine intake during pregnancy was associated with an increased risk of miscarriage compared to no caffeine intake, with caffeine intake below 200mg being 1.42 hazard ratio and 2.23 hazard ratio for intakes of 200 mg/day or more.[15] Another researcher found a positive association of second-hand smoke exposure, computer use (4 hours), cell phone use (1 hour), and caffeine consumption.[8] Several studies on smoking and obesity have confirmed that women who smoke and women exposed to secondhand smoke have a higher risk of spontaneous abortion, stillbirth, tubal ectopic pregnancy, and congenital abnormalities. Maternal obesity is associated with menstrual disorders, infertility, and miscarriage.[16] Generally, mother's health should be a priority to prevent miscarriage. Pregnant women should avoid (alcohol, drugs, smoking) and limit caffeine intake. Prenatal vitamins can help with the healthiest diet to ensure that a woman and her baby get all the nutrients they need. Regular moderate exercise can improve fetal health.

Conclusion

This study concluded that there is significant impact of modifiable factors such as excessive caffeine intake, obesity, smoking, short interval between pregnancies, anemia, genital infections, and thyroid disorders on the high incidence of miscarriages. So, we recommend that early screening and management of these factors should be done in every woman to prevent these miscarriages and improving the social life of these particular patients.

References

1. Hussein SM, Al-Ogaili SS. Risk factors associated with spontaneous abortion at Al-Najaf City. Int J Sci Res Public. 2017;7(8):433-444.
2. Kamble G, Bhattacharya BM. Miscarriage and associated risk factors in India: a brief review. MOJ Womens Health. 2017;4(4):84-86. https://doi.org/10.15406/mojwh.2017.04.00090
3. Zhou H, Liu Y, Liu L, Zhang M, Chen X, Qi Y. Maternal pre-pregnancy risk factors for miscarriage from a prevention perspective: a cohort study in China. Eur J Obstet Gynecol Reprod Biol. 2016;206(11):57-63. https://doi.org/10.1016/j.ejogrb.2016.07.514
4. Tan TC, Neo GH, Malhotra R, Allen JC, Lie D, Ostbye T. Lifestyle risk factors associated with threatened miscarriage: a case-control study.

JFIV Reprod Med Genet. 2014;2(2):123.
5. Feodor Nilsson S, Andersen PK, Strandberg-Larsen K, Nybo Andersen AM. Risk factors for miscarriage from a prevention perspective: a nationwide follow-up study. BJOG: J Obstet Gynecol. 2014;121(11):1375-1385. https://doi.org/10.1111/1471-0528.12694
6. Qu F, Wu Y, Zhu YH, Barry J, Ding T, Baio G, et al. The association between psychological stress and miscarriage: a systematic review and meta-analysis. Sci Reports. 2017;7(1):1731. https://doi.org/10.1038/s41598-017-01792-3
7. Frant AE. The link between environmental factors and abortion. J Pub Admin Fin Law. 2015;2015(07):158-163.
8. Hyland A, Piazza KM, Hovey KM, Ockene JK, Andrews CA, Rivard C, et al. Associations of lifetime active and passive with spontaneous abortion, still birth and tubal ectopic pregnancy: a cross-sectional analysis of historical data from the Women's Health Initiative. Tob Control. 2015;24(4):328-335. https://doi.org/10.1136/tobaccocontrol-2013-051458
9. El-Saidy TM, Amr TE. The modifiable and nonmodifiable risk factors for miscarriage. Egypt Nurs J. 2016;13(3):169-177. https://doi.org/10.4103/2090-6021.200178
10. Andersen AM, Andersen PK, Olsen J, Grønbæk M, Strandberg-Larsen K. Moderate alcohol intake during pregnancy and risk of fetal death. Int J Epidemiol. 2012;41(2):405-413. https://doi.org/10.1093/ije/dyr189
11. Klebanoff MA, Levine RJ, DerSimonian R, Clemens JD, Wilkins DG. Maternal serum paraxanthine, a caffeine metabolite, and the risk of spontaneous abortion. N Engl J Med. 1999;341(22):1639-1644. https://doi.org/10.1056/NEJM199911253412202
12. Cai C, Vandermeer B, Khurana R, Nerenberg K, Featherstone R, Sebastianski M, et al. The impact of occupational activities during pregnancy on pregnancy outcomes: a systematic review and meta-analysis. Am J Obstet Gynecol. 2020;222(3):224-238. https://doi.org/10.1016/j.ajog.2019.08.059
13. De Smet P, Sans S, Dramaix M, Boulenguez C, De Backer G, Ferrario MA, et al. Gender and regional differences in perceived job stress across Europe. Eur J Public Health. 2005;15(5):536-545. https://doi.org/10.1093/eurpub/cki028
14. Bonde JP, Jørgensen KT, Bonzini M, Palmer KT. Risk of miscarriage and occupational activity: a systematic review and meta-analysis regarding shift work, working hours, lifting, standing and physical workload. Scand J Work Environ Health. 2013;39(4):325-334. https://doi.org/10.5271/sjweh.3337
15. Weng X, Odouli R, Li DK. Maternal caffeine consumption during pregnancy and the risk of miscarriage: a prospective cohort study. Am J Obstet Gynecol. 2008;198(3):279.e1-279.e8. https://doi.org/10.1016/j.ajog.2007.10.803
16. Darney BG, Weaver MR, Stevens N, Kimball J, Prager SW. The family medicine residency training initiative in miscarriage management: impact on practice in Washington State. Fam Med. 2013;45(2):102-108.