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THE FREQUENCY OF PRE-GESTATIONAL DIABETES MELLITUS (PGDM) IN PREGNANT WOMEN PRESENT WITH MISCARRIAGES

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ABSTRACT

The aim of this study is to determine the frequency of pre-gestational diabetes mellitus (PGDM) in pregnant women present with miscarriages. This is Cross-sectional study conducted in Sobhraj Maternity Hospital, Karachi, Pakistan. The hospital medical record of pregnant ladies was reviewed who was enrolled in the prenatal care routine program of Sobhraj Maternity Hospital before twelve gestational weeks and in a similar hospital, who gave birth. 159 pregnant ladies with miscarriage were selected by using consecutive sample techniques. Data was analysed by SPSS version 20. Frequencies and percentages were calculated for age, parity, pre-gestational age and frequency of pre-gestational diabetes mellitus. According to this study 35% of patients with miscarriage incidence were having "pre-gestational diabetes mellitus". Moreover, around 40% of patients have gestational age less than 12 weeks. The early pregnant women screening provides an early pre-gestational diabetes mellitus diagnosis. Patient compliance, close monitoring, pre-conceptual care and intensive glycaemic control decrease the malformations and fetal demise risks.

KEYWORDS: Pre-gestational diabetes mellitus, PGDM, Miscarriage, Pregnant Women.

INTRODUCTION

There is a nine to fourteen percent miscarriage rate in all women present with pre-existing diabetes mellitus (PGDM).[1] It was suggested by current data that a strong relationship is present between the miscarriage rate and the glycemic control degree before pregnancy.[1] According to the research in women present with diabetes, the suboptimal glycemic control is

double the rate of miscarriage.[2] Also, a correlation exists between miscarriage rates and more advanced diabetes. Women with poorly controlled diabetes and long-standing diabetes have been reported to have a rate of miscarriage up to forty-four percent.[1] Conversely, the miscarriage rate is normalized by the excellent glycemic control.[2]

Gestational diabetes mellitus is a term defined as variable degree's glucose intolerance with first recognition and onset during pregnancy. According to a study this condition is associated with the lasting metabolic dysfunction in females at three years after delivery, distinct from other risk factors.[2] Gestational diabetes mellitus occurs only during pregnancy.[2,3] In gestational diabetes, like type-2 diabetes, the body could not use the insulin supply effectively formed by the pancreas. All pregnant women nearly have some deterioration of their capability of effectively using glucose because of pregnancy's natural hormonal changes, however not all would develop gestational diabetes.[3] Just around two to ten percent of pregnant women would develop pre-gestational diabetes mellitus in Pakistan.[4] The risk factors of pre-gestational diabetes are the same as those for diabetes of type-2 however also include: being over thirty-five years at the pregnancy time; history of a large infant (more than eight pounds); and high blood pressure history.[4] Babies of the mother, who have pre-existing diabetes experience a high risk of severe injury at the time of birth, quadruple the occurrence of admission at NICU and triple the possibility of cesarean delivery. Elevated insulin resistance and blood sugar levels in women could complicate ovulation and also make unpredictable the menstrual cycles. It was reported by the UK Diabetes Association that high levels of glucose increase the chance in women of early miscarriage by thirty to sixty percent[5]. It means that the high levels of glucose could prevent the "embryo" from inserting into the "uterus" before even a woman got to know that she is pregnant. Increased glucose could affect negatively testosterone, progesterone, and estrogen levels- all are essential for pregnancy to happen and to be continued until delivery. Moreover, in men with diabetes, high levels of glucose might contribute to sperm DNA damage and erectile dysfunction. DNA damage can cause birth defects and miscarriage.[5,6]

Abnormal glucose levels and pre-gestational diabetes could cause health problems for the mother as well as the baby. During pregnancy poor control of blood sugar could increase the chance of birth defects, miscarriage, and other severe problems. Moreover, uncontrolled pre-gestational diabetes could lead to a high risk for hypoglycemia and pre-eclampsia in the babies, c-section, and extra-large baby.[7] Pre-gestational diabetes in pregnant women not just

affects adversely the neonate and the fetus, but it has also the long-term effects, including metabolic syndrome, diabetes in adult life, and childhood obesity.[7] Many years ago in the UK, women with uncontrolled pre-gestational diabetes or blood sugar were communicated that it will not be secure to get pregnant; however, having a healthy baby is possible now with monitoring the levels of blood glucose within a safe range and medical support.[8]

Diabetes is among the common chronic disease in pregnant women. Among all pregnancies around "0.5 to 1 percent" are complex by pre-gestational diabetes. The PGDM prevalence in Pakistan is around seven percent. In pre-gestational diabetes diagnosis, examination for HbA1c is usually used by emphasizing information about the level of blood sugar of the last eight to ten weeks. Furthermore, this test of HbA1c is significant because the high level of HbA1c causes the problems like stillbirth, congenital abnormalities, and abortion.[9,10] In medical research, there are various alternatives for controlling hyperglycemia in pregnant women, for example, insulin and hypoglycemic agents. Hyperglycemia could be handled by early detection of pre-gestational diabetes, and future problems could be prevented. Controlling increased Hb1AC could decrease the miscarriage rate. Before pregnancy, precautions could be taken if higher levels like ten percent reference are diagnosed.[10] Moreover, for diagnosed early pregnancy in women with higher levels of HbA1c certain medications could be proposed also. There was less research done to evaluate the pre-gestational diabetes rate in pregnant women with miscarriages in Pakistan and miscarriage in developing states, is among the increasing and common problems of pregnancy. Therefore, the main objective of this study is to determine the frequency of pre-gestational diabetes mellitus in pregnant women with miscarriages.

MATERIAL AND METHODS

This is a cross-sectional study conducted in Sobhraj Maternity Hospital, Karachi, Pakistan. We reviewed the hospital medical record of pregnant ladies who were enrolled in the prenatal care routine program of Sobhraj Maternity Hospital before twelve gestational weeks and in a similar hospital, who gave birth from January 31, 2021, to June 30, 2021. For sample size, the Raosoft calculator was used. 159 pregnant ladies with miscarriage were selected by using consecutive sample techniques. This research was approved by the "Research and Ethics review board of Sobhraj Maternity Hospital". Exclusion criteria were diabetics, ectopic pregnancy, and molar pregnancy. Pregnant females with the diagnosis of miscarriage were included in this study after informed consent. Data was collected by researcher. Miscarriage

diagnosis was made by ultrasound detail, urine pregnancy test, detail examination, and history. For HbA1c assessments, collections of blood sample were made on all patients, in which hbA1c level greater than six percent was taken as pre-gestational diabetes or raised level, and levels less than equal to six percent was taken as the normal level. Data was analysed by SPSS version 20. Frequencies and percentages were calculated for age, parity, pre-gestational ager and frequency of pre-gestational diabetes mellitus.

RESULTS

Among 159 patients 124 (78%) were age between 18 to 35 years as shown in table 1. Moreover, patients with primigravida out of 159 patients were 131 (82.3%) and patients with 2 or more pregnancies were 28 (17.7%) as shown in table 1. Among 159 patients, the patients with pre-gestational age less than 12 weeks were 64 (40.6%) and between 12-24 weeks were 95 (59.4%) as shown in table 1. 56 (35%) of patients out of 159 were having "pre-gestational diabetes" and 103 (65%) patients were normal as shown in table 2.

Table 1: Demographics characteristics of patients.

S.No.	Variable		Frequency (n)	Percentage (%)
1	Age	less than 18 years	26	16.2
		between 18 to 35 years	124	78
		greater than 35 years	9	5.8
2	Parity	primigravida	131	82.3
		2 or more	28	17.7
3	Duration of pregnancy	Less than 12 weeks	64	40.6
		12-24 weeks	95	59.4

Table 2: Frequency of patients with pre-gestational diabetes and miscarriages.

Pre-gestational diabetes	frequency	Percentage (%)
Yes	56	35
no	103	65

DISCUSSION

According to this study, 35% pregnant women with pre-gestational diabetes had suffered miscarriage incidence. Similar study was conducted in Peshawar, Pakistan titled "Frequency of pre-gestational diabetes mellitus among pregnant women with miscarriage" in which among 268 patients 30.22% pregnant women with pre-gestational diabetes had miscarriage.[10] This study's findings were near to our study's findings. In another study conducted in Pakistan titled "Diabetes in pregnancy in Pakistani women" in year 1996, there

was a sample size of 223 patients, among which 3.4% patients with pre-gestational diabetes had miscarriage.[11]

In women with miscarriage low progesterone levels may be related to the low insulin resistance increase during the 2nd and 3rd pregnancy trimester, followed by the low glucose intolerance incidence.[11] Our findings aid potentially in understanding complications of pregnancy with PGDM. The PGDM influence the fetus and embryo during pregnancy and it also increases the chance of neonatal and fetal complications, malformations, premature births, and spontaneous miscarriages.[10,11] Also this fact was described in a study conducted in Pakistan at Agha Khan Maternity Home titled "Prevalence of gestational diabetes and pregnancy outcome in Pakistan".[12] In this study the perinatal loss was 2.08% among pregnant female with pre-gestational diabetes. It was concluded by this study that early pregnant women screening provides an early PGDM diagnosis. Patient compliance, close monitoring, pre-conceptual care and intensive glycaemic control decrease the malformations and fetal demise risks.[12]

The pregnancy is complicated by pre-existing diabetes and is linked to the high rate of congenital malformations, perinatal mortality, preeclampsia, preterm delivery and miscarriages. In the miscarriage patients, the Hemoglobin Ale "HbA1c" was higher as compared to the good outcome patients.[13] The metabolic control and increasing age are the common miscarriage risk factors in 1st pregnancy trimester.[14] Thus the apparent miscarriage risk is preventable. Clinically feasible and simple cost-effective approaches to determine risky pregnancies like measuring levels of HbA1c are accessible easily.[15]

Regarding the weaknesses of this study, the small patient's sample size causes a small women population with PGDM, influencing our capability of assessing the PGDM rate in pregnant women present with miscarriages. However, 28% of patients did not follow up which cause the underestimation of the PGDM rate in pregnant women with miscarriages. Strengths incorporate the fact that the patients were examined for blood sugar levels and HbA1c tests as mentioned in the medical records of the hospital; samples of HbA1c were processed to the "international standards"; the 2nd test for confirmation was conducted in all patients who previously had "HbA1c $\geq$ 6.5 percent".

CONCLUSION

According to this study, 35% of patients with miscarriage incidence were having "pre-gestational diabetes mellitus". Moreover, around 40% of patients have gestational age less than 12 weeks. More population studies are required in Pakistan to conclude more valid and accurate estimates and acquire a better knowledge of the problem size in Pakistan.

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