

ORIGINAL ARTICLE

FREQUENCY OF PRE-GESTATIONAL DIABETES MELLITUS AMONG PREGNANT WOMEN WITH MISCARRIAGE

Maria Ghafoor¹, Najma Farhat¹, Firdous Khatoon², Asifa Ghazi³, Fauzia Anbreen¹, Qandila Irum¹

Departments of Gynecology and Obstetrics, ¹Gomal Medical College, D.I.Khan, ²DHQ Hospital, Jamshoro,

³Karachi Institute of Medical Sciences, Karachi, Pakistan

ABSTRACT

Background: In developing countries, miscarriage is one of the common and increasing problems of pregnancy. The objectives of this study were to determine the frequency of pre-gestational diabetes mellitus among pregnant women with miscarriage in our population.

Materials & Methods: This descriptive, cross-sectional study was conducted in the Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar, Pakistan from 3rd November 2015 to 2nd May 2016. Sample size was 268 pregnant women with miscarriage selected through consecutive sampling technique. Inclusion criteria were all pregnant women with miscarriage. Exclusion criteria were molar pregnancy, ectopic pregnancy and diabetics. HbA1c levels of $\leq 6\%$ was taken as normal, whereas a level > 6 was taken as raised level or pre-gestational diabetes. Variables were age, pre-gestational diabetes mellitus, number of pregnancies and duration of pregnancy (≤ 24 , > 24). Mean and SD were calculated for quantitative while frequency and percentages for qualitative variables. Descriptive analysis was performed by using SPSS version 16.

Results: Mean age of the patients was 27.66 ± 4.93 years. Out of 268 participants, 81 (30.22%) were having pre-gestational diabetes mellitus and 187 (69.78) were normal, 234 (87.31%) were having first pregnancy whereas 34 were having > 1 pregnancies, the pre-gestational age ≤ 24 weeks were 130 (48.51%) and > 24 weeks were 138 (51.49%).

Conclusion: One third of the patients with miscarriage were having pre-gestational diabetes mellitus. Almost half of the patients were having gestational age of < 24 weeks.

KEY WORDS: HbA1c; Miscarriage; Pre-gestational diabetes.

This article may be cited as: Ghafoor M, Farhat N, Khatoon F, Ghazi A, Anbreen F, Irum Q. Frequency of pre-gestational diabetes mellitus among pregnant women with miscarriage. Gomal J Med Sci 2019 Jan-Mar;17(1):15-8. <https://doi.org/10.46903/gjms/17.01.1919>

INTRODUCTION

Miscarriage is one of the commonest problems in early pregnancy which is increasing in developing countries. There are many causes of miscarriage like chromosomal abnormalities, infections, uterine & cervical abnormalities and endocrine disorders. Out of these many causes, pre-gestational diabetes and gestational diabetes are the two causes due to which women are at higher risk of miscarriage, preterm labor, hypertensive disorders and operative deliveries.^{1,2} The new born to a diabetic mother is mostly reported with an increased rate of complica-

tions such as congenital anomaly, growth disorder, birth trauma, and respiratory distress. Out of these hyperglycemia is the major cause which alters the fetal development.

Diabetes is one of the commonest chronic diseases in women of child bearing age. Pre-gestational diabetes complicates 0.5-1 % of all pregnancies. The prevalence of pre-gestational diabetes in Pakistan is about 7% in which population with reference. HbA1c test is used in the diagnosis of pre-gestational diabetes by highlighting information about blood sugar level of the last 8 to 10 weeks.^{3,4,5} This test is important as the increased level of HbA1c causes the problems like abortion, stillbirth and congenital abnormalities.^{6,7} There are many medical options for control of hyperglycemia in pregnancy like oral hypoglycemic agents and insulin. By early diagnosing pre-gestational diabetes we can control hyperglycemia and prevent future complications.

Corresponding Author:

Dr. Maria Ghafoor
Senior Registrar
Department of Gynecology and Obstetrics
Gomal Medical College, D.I.Khan, Pakistan
E-mail: marvelousme85@yahoo.com

Controlling raised Hb1Ac decreases the rate of miscarriage. Precautions can be taken before pregnancy, if higher levels more than 10% reference are diagnosed. Certain medications can also be proposed for early pregnancy diagnosed with higher levels of HbA1c in pregnant women.

The word abortion is taken from the Latin word “aboriri” which mean to miscarry. The World Health Organization defines abortion as pregnancy termination prior to 20 weeks gestation or fetus born weighing less than 500 grams.⁸ The estimated prevalence of spontaneous miscarriage which is the commonest early pregnancy complication occurs in approximately 15-20% of all pregnancies.⁹ About 80% of the miscarriages occur in the first twelve weeks of pregnancy.¹⁰ To an estimate almost 8, 90,000 cases of missed miscarriage or incomplete miscarriage occur in Pakistan each year with a miscarriage rate of 29/1000 women of age 15-49 years.¹¹ Diabetes is one of the commonest chronic diseases in women of childbearing age. Pre-gestational diabetes complicates 0.5-1 % of all pregnancies.¹² According to The National Institute for Health and Clinical Excellence 2008, up to 5% of pregnancies are diagnosed with diabetes out of approximately 650,000 pregnancies in England and Wales each year.¹³ The pregnancies which are complicated due to diabetes are about 87.5% and are caused mainly by pre-gestational diabetes. Among those about 7.5% were due to type I diabetes and the 5% were due to type 2 diabetes. There is evidence supporting that pre-gestational diabetes increases the risk of spontaneous abortion, preterm labor, and hypertensive disorder as well as cesarean section/ forceps Deliveries.^{14,15} The objectives of this study were to determine the frequency of pre-gestational diabetes mellitus among pregnant women with miscarriage in our population.

MATERIALS AND METHODS

This descriptive, cross-sectional study was conduct-

ed in the Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar, Pakistan from 3rd November 2015 to 2nd May 2016. Sample size was 268 pregnant women with miscarriage selected through consecutive sampling technique, using online sample size calculator, Raosoft, with margin of error of 4.99%, confidence level of 90%, estimated population size of 20,000/- and response distribution of 50%. Inclusion criteria were all pregnant women with diagnosis of miscarriage.¹⁶ Exclusion criteria were molar pregnancy, ectopic pregnancy and diabetics.

The study was approved by Research and Ethics review board of the hospital. Data collection sites were OPD, ward and emergency of DHQ Teaching Hospital. Diagnosis of miscarriage was made by detailed history, examination, urine pregnancy test and ultrasound and recorded on Performa. Blood sample collections was made for HbA1c assessments on all patients HbA1c levels of ≤6% was taken as normal, whereas a level >6 was taken as raised level or pre-gestational diabetes. Variables were age in years, pre-gestational diabetes mellitus (yes, no), number of pregnancies (first pregnancy, > 1 pregnancies) and duration of pregnancy in weeks (<24, >24). Means and standard deviation were calculated for quantitative variable while frequency and percentages were calculated for qualitative variables. Descriptive analysis was performed by using SPSS version 16.

RESULTS

Mean age of the patients was 27.66 ± 4.93 years. Out of 268 participants, 81 (30.22%) were having pre-gestational diabetes mellitus and 187 (69.78%) were normal. Out of 268 patients, 234 (87.31%) were having first pregnancy whereas 34 (12.69%) were having >1 pregnancies as shown in Table 1 & 2.

Out of 268 patients, the pre-gestational age of ≤ 24 weeks was 130 (48.51%) and > 24 weeks was 138 (51.49%). Table 3

Table 1: Frequency of pre-gestational diabetes mellitus in patients with miscarriage in KTH, Peshawar, Pakistan (n=268)

Pre-gestational diabetes mellitus	Frequency	Percentage	95% CI for proportion
Yes	81	30.22	25.03-35.97
No	187	69.78	64.03-74.97
Total	268	100.0	

Table 2: Number of pregnancies among patients with miscarriage in KTH, Peshawar, Pakistan (n=268)

Number of Pregnancy	Frequency	Percentage	95% CI for proportion
Patients having 1 st pregnancy	234	87.31	82.97-90.77
Patients having >1 pregnancy	34	12.69	09.23-17.21
Totalqa1	268	100.0	

Table 3: Pregnancy duration in patients with miscarriage in KTH, Peshawar, Pakistan (n=268)

Duration of Pregnancy	Frequency	Percentage	95% CI for proportion
Pregnancy duration ≤ 24 weeks	130	48.51%	42.89-54.47
Pregnancy duration of more than 24 weeks	138	51.49%	45.34-57.59

DISCUSSION

A study in Poland in 2013 concluded that suboptimal metabolic control predisposes to first-trimester loss with pre-gestational diabetes. Maternal hyperglycemia remains the major risk factor and the most widely studied factor altering fetal development but other maternal factors might also have adverse effects. Adverse pregnancy outcome, namely, complications in early pregnancy such as first-trimester loss and maternal hyperglycemia are contributing factors reinforcing the fact that diabetes is attributable to a significant proportion of pregnancy loss.¹⁷ A review on poor glycated hemoglobin control and adverse pregnancy outcomes in both types of diabetes mellitus shows that the risk of miscarriage was mainly due to poor glycemic control with ratio of 3.23 (95% CI, 1.64-6.36).

The diabetes mellitus has an impact on the embryo and fetus during pregnancy and increases the risk of spontaneous miscarriages, premature births, malformations, fetal and neonatal complications. However, intensive glycaemic control and pre-conceptual care have been shown to decrease the rate of fetal demise and malformations.¹⁹ The preexisting diabetes mellitus complicates the pregnancy and are related to high rate of miscarriages, preterm delivery, preeclampsia, perinatal mortality and congenital malformations. Hemoglobin A1c (HbA1c) was higher in the miscarriage group compared with the good outcome group (8.2% ±1.9% vs. 7.2% ±1.8%; P <0.001). The increasing age and metabolic control are the most common risk factors for miscarriages in first-trimesters of pregnancy. Therefore, it is increasingly being recognized that the apparent increased risk of miscarriages is preventable. Nonetheless, limited evidence exists in resource-poor population settings, such as Pakistan. Simple and clinically feasible cost-effective strategy to identify at-risk maternal pregnancies such as measuring HbA1c levels is easily accessible even in resource-poor health care settings.

CONCLUSION

One third of the patients with miscarriage were having pre-gestational diabetes mellitus. Almost half of the patients were having gestational age of <24 weeks.

REFERENCES

1. Gunton JE, Morris J, Boyce S, Kelso I, McElduff A. Outcome of pregnancy complicated by pre-gestational diabetes--improvement in outcomes. *Aust N Z J Obstet Gynaecol* 2002 Nov;42(5):478-81. <https://doi.org/10.1111/j.0004-8666.2002.00478.x>
2. Inkster ME, Fahey TP, Donnan PT, Leese GP, Mires GJ, Murphy DJ. Poor glycated haemoglobin control and adverse pregnancy outcomes in type 1 and type 2 diabetes mellitus: systematic review of observational studies. *BMC Pregnancy Childbirth* 2006; Oct 30;6:30. <https://doi.org/10.1186/1471-2393-6-30>
3. Nielsen GL, Møller M, Sørensen HT. HbA1c in early diabetic pregnancy and pregnancy outcomes: a Danish population-based cohort study of 573 pregnancies in women with type 1 diabetes. *Diabetes Care* 2006 Dec;29(12):2612-6. <https://doi.org/10.2337/dc06-0914>
4. Florkowski C. HbA1c as a diagnostic test for diabetes mellitus - Reviewing the Evidence. *Clin Biochem Rev* 2013 Aug;34(2):75-83.
5. Weykamp C. HbA1c: a review of analytical and clinical aspects. *Ann Lab Med* 2013 Nov;33(6):393-400. <https://doi.org/10.3343/alm.2013.33.6.393>
6. Bookchin RM, Gallop PM. Structure of hemoglobin A1c: nature of the N-terminal beta chain blocking group. *Biochem Biophys Res Commun* 1968 Jul 11;32(1):86-93. [https://doi.org/10.1016/0006-291X\(68\)90430-0](https://doi.org/10.1016/0006-291X(68)90430-0)
7. Bunn HF, Haney DN, Gabbay KH, Gallop PM. Further identification of the nature and linkage of the carbohydrate in hemoglobin A1c. *Biochem Biophys Res Commun* 1975 Nov 3;67(1):103-9. [https://doi.org/10.1016/0006-291X\(75\)90289-2](https://doi.org/10.1016/0006-291X(75)90289-2)
8. World Health Organization. Department of reproductive health and research. Maternal mortality in 1995 estimates developed by WHO, UNICEF and UNFPA. [cited 2017 Mar 20]. Available at: www.who.int/reproductivehealth/publications/monitoring/RHR-01-9/en/
9. Everett C. Incidence and outcome of bleeding before the 20th week of pregnancy: prospective study from general practice. *BMJ* 1997 Jul 5;315(7099):32-4. <https://doi.org/10.1136/bmj.315.7099.32>
10. Chen BA, Reeves MF, Creinin MD c, Gilles JM, Barnhart K, Westhoff C, et al. Misoprostol for treatment of early pregnancy failure in women

- with previous uterine surgery. *Am J Obstet Gynecol* 2008 Jun;198(6):626.e1-5. <https://doi.org/10.1016/j.ajog.2007.11.045>
11. Ngai SW, Chan YM, Tang OS, Ho PC. Vaginal misoprostol as medical treatment for first trimester spontaneous miscarriage. *Hum Reprod* 2001 Jul;16(7):1493-6. <https://doi.org/10.1093/humrep/16.7.1493>
 12. Buchanan T. Pregnancy in preexisting diabetes. In: Harris M, editor. *Diabetes in America*. 2nd ed. NIH Washington: National Diabetes Data Group;1995:719-33.
 13. Gabbe SG, Graves CR. Management of diabetes mellitus complicating pregnancy. *Obstet Gynecol* 2003 Oct;102(4):857-68. <https://doi.org/10.1097/00006250-200310000-00031>
 14. National Collaborating Centre for Women's and Children's Health (UK). *Diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period*. NICE Clinical Guidelines, No. 63. London: RCOG Press; 2008 Mar. Available at: www.ncbi.nlm.nih.gov/books/NBK51920/
 15. Sibai BM, Caritis SN, Hauth JC, MacPherson C, VanDorsten JP, Klebanoff M, et al. Preterm delivery in women with pregestational diabetes mellitus or chronic hypertension relative to women with uncomplicated pregnancies. The National Institute of Child Health and Human Development Maternal- Fetal Medicine Units Network. *Am J Obstet Gynecol* 2000 Dec;183(6):1520-4. <https://doi.org/10.1067/mob.2000.107621>
 16. Raosoft® sample size calculator. Seattle, WA, USA: Raosoft Inc.; 2004. [cited 2017 Mar 20]. Available at: www.raosoft.com/samplesize.html
 17. Melamed N, Hod M. Perinatal mortality in pregestational diabetes. *Int J Gynaecol Obstet* 2009 Mar;104 Suppl 1:S20-4. <https://doi.org/10.1016/j.ijgo.2008.11.024>
 18. Gutaj P, Zawiejska A, Wender-Ożegowska E, Brązert J. Maternal factors predictive of firsttrimester pregnancy loss in women with pregestational diabetes. *Pol Arch Med Wewn* 2013;123:21-8. <https://doi.org/10.20452/pamw.1585>
 19. Cundy T, Gamble G, Neale L, Elder R, McPherson P, Henley P, et al. Differing causes of pregnancy loss in type 1 and type 2 diabetes. *Diabetes Care* 2007 Oct;30(10):2603-7. <https://doi.org/10.2337/dc07-0555>

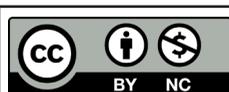
CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MG, NF
Acquisition, Analysis or Interpretation of Data:	MG, NF, FK, AG, FA, QI
Manuscript Writing & Approval:	MG, NF, FK, AG, FA, QI

All the authors agree to be 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.



Copyright © 2020 Maria Ghafoor, et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non Commercial 4.0 International License, which permits unrestricted use, distribution & reproduction in any medium provided that original work is cited properly.