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ORIGINAL RESEARCH

Diabetic Retinopathy in pregnancy

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Abstract
Aim and objectives: to assess the progression of diabetic retinopathy among pregnant diabeticwomen during gestational period and its correlation with glycemic control.
Materials and method: this was a cross-sectional observational cohort study conducted at a tertiary eye care of solan H.P. and included 37 pregnant females with pre-existing DM forthe presence and progression of DR. The history of the pregnant women was taken and all necessary routine investigations were done during each of the 3 trimesters and 3 months postpartum. The data was compared between those with progressive (in which diabetic retinopathy progressed post-partum) and non-progressive (in which diabetic retinopathy did not progress post-partum)
Results: The mean age of the study population was 32.91±5.02 years. The mean duration of diabetes (years) was 6.59±3.19 and mean HbA1c (%) was 7.85±1.06. Diabetic retinopathy was present among 7 (18.9%) women with 4 cases each of Mild NPDR, 1 cases of Moderate NPDR, Pre-proliferative NPDR and Proliferative retinopathy each. Age more than 30 years, Duration of diabetes for more than 5 years and HbA1c (%) ≥ 7 were significantly (p-value < 0.05) associated with occurrence of Retinopathy
Conclusion: Our findings raise the issue of poor visual outcomes among older pregnant femaleswith long-standing DM. Guidelines need to be developed for managing the pregnancy in women with untreated and advanced PDR.
Keywords: Diabetic retinopathy, Diabetes Mellitus, pregnant

Introduction

DM is a chronic disorder with multiorgan involvement having many microvascular and macrovascular complications.[1] Microvascular complications are caused by chronic hyperglycaemia, whereas macrovascular complications are caused by both chronic hyperglycaemia and the consequences of insulin resistance.[2] Diabetic Retinopathy (DR) is the most common microvascular complication of Diabetes Mellitus (DM).
Pregnancy is a major risk factor for the progression of retinopathy and is definitely associated with increased prevalence and severity of retinopathy compared to non-pregnant diabetic women. Women with type I diabetes are particularly vulnerable to ocular changes during

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pregnancy.[3] The risk of progression of diabetic retinopathy during pregnancy is generally regarded to be similar for type 1 and type 2 diabetic patients, but data supporting this assumption are few. The prevalence and progression of diabetic retinopathy in pregnancy complicated by type 2 diabetes have hardly been investigated [4-6]

In the past, prognosis for pregnancy in diabetic women with microvascular changes was so poor that many physicians advised either avoidance or termination of pregnancy, but currently due to the meticulous control of the blood sugar levels there has been a decrease in the incidence of foetal comlication. The risk factors for the progression of retinopathy in pregnancy are severity of retinopathy at conception, adequacy of treatment, duration of diabetes, metabolic control before pregnancy, and the presence of additional vascular damage (i.e. pre-existing or concomitant hypertensive disorder).[7]

Numerous studies have been done in developed nations and progression of DR during pregnancy has been documented very well.[8-12] In some cases, DR can accelerate quickly to advanced stages requiring surgery. For these reasons, screening protocols have been developed for sequential observation of pregnant females with DM, though these are not universal and are surrounded by controversies.[8-12] The presence of retinopathy has also been analyzed for its association with poor outcomes of pregnancy.[12-14]

The main predictors of the progression of DR during pregnancy include diabetes duration,[15,16] baseline severity of DR,[17] poor glycemic control at the time of conception,[18,19] high baseline HbA1c level, marked HbA1c reduction[3], hypertension and preeclampsia.[20,21]

Current care of pregnant women with pre-existing diabetes focuses on ascertaining the presence of microvascular complications, monitoring their progression and screening for pregnancy complications.[9] In order to plan pregnancy and optimize the antenatal management in women with preexisting diabetes and microvascular disease, both healthcare professionals and women need robust information on the magnitude of expected maternal and perinatal risks and the factors associated with deterioration of microvascular disease during pregnancy.[22]

The objective of this study was to assess the progression of diabetic retinopathy among pregnant diabetic women during gestational period and its correlation with glycemic control.

Materials and method

This was an cross-sectional observational cohort study conducted at a tertiary eye care center of solan H.P India. The written informed consent was obtained from all the patients.

The study included 37 pregnant diabetic females during and after pregnancy for the presence and progression of DR from december 2020 to august 2022 . These patients were taken from the departments of obstetrics and gynecology, endocrinology, and ophthalmology. The study included pre-existing DM before the current pregnancy, while those with gestational DM were excluded from the study.

The history of the pregnant women was taken about the age of onset of diabetes and control of diabetes. Body mass index, systolic and diastolic blood pressure, hemoglobin, glycated hemoglobin (HbA1c), renal function tests (blood urea and creatinine), proteinuria, fasting and postprandial blood glucose values were noted for all the females at presentation, during each of the 3 trimesters and 3 months postpartum. The data was compared between those with progressive (in which diabetic retinopathy progressed post-partum) and non- progressive (in which diabetic retinopathy did not progress post-partum).

The fetal data was obtained for weight at birth, Apgar score at birth, and presence of any fetal defects. Ocular examination was carried out at presentation, during each of the 3 trimesters and 3 months postpartum. Visual acuity was noted, and dilated fundus examination and clinical fundus photography were done. DR and its progression were graded according to the early treatment of DR study classification (ETDRS).

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Statistical analysis

The main outcome measures were prevalence and progression of DR. Risk factors for DR, and maternal and fetal outcomes were also analyzed. The statistical analysis was done using the SPSS version 25.0. Descriptive statistics was performed by calculating mean and standard deviation for the continuous variables. Categorical variables are presented as absolutenumbers and percentage.

Results

The mean age of the study population was 32.91±5.02 years. The mean duration of diabetes (years) was 6.59±3.19 and mean HbA1c (%) was 7.85±1.06. (Table 1)

Table 1 shows the characteristics of the study population

Characteristic	Mean±SD
Age	32.91±5.02
Duration of diabetes (years)	6.59±3.19
HbA1c (%)	7.85±1.06

Diabetic retinopathy was present among 7 (18.9%) women with 4 case each of Mild NPDR and each case of Moderate NPDR, Preproliferative NPDR and Proliferative retinopathy.(Table 2)

Table 2 showing the prevalence of Diabetic Retinopathy

Diabetic Retinopathy	Frequency	
None	30	81.1%
Mild NPDR	4	10.8%
Moderate NPDR	1	2.7%
Preproliferative NPDR	1	2.7%
Proliferative retinopathy	1	2.7%

Age more than 30 years, Duration of diabetes for more than 5 years and HbA1c (%) ≥ 7were significantly (p-value < 0.05) associated with occurrence of Retinopathy. (Table 3)

Table 3

		Diabetic Retinopathy				p-value
		Absent (n=30)		Present (n=7)		
Age of	**< 30 years**	13	86.7%	2	13.3%	0.038*
	≥ 30 years	17	77.3%	5	22.7%	
Duration of Diabetes	**0-5 years**	12	92.3%	1	7.7%	0.004*
	> 5 years	18	75.0%	6	25.0%	
HbA1c (%)	**< 7**	14	87.5%	2	12.5%	0.037*
	≥ 7	16	75.0%	5	25.0%	

Discussion

In our study, the prevalence of Diabetic retinopathy was 18.9% women with with 4 caseseach of Mild NPDR, 1 case of Moderate NPDR, Preproliferative NPDR and Proliferative retinopathy each.

Makwana et al.[23] found that the overall prevalence of DR was 8% (4/50); 2 cases had NPDR while 2 had PDR. Worsening was seen in both the patients with PDR, whereas patientswith NPDR remained stable. None of the patients with NPDR converted to PDR.

Rasmussen et al.[24] evaluated 80 patients with type two diabetes and observed progression in 14%. Vestgaard et al.[25] evaluated 102 women with type one diabetes and notedprogression among 27%.). Rahman et al. [25] found that the progression of diabetic retinopathyin the study

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occurred in 24% patients with 9.1% patients had no diabetic retinopathy initially, 20% had non-proliferative diabetic retinopathy (NPDR) and 58.3% had proliferative diabetic retinopathy (PDR).

Progression of diabetic retinopathy during pregnancy is reported to occur among 17.4- 41.5% cases.[27-31] Toda et al.[32] found that the progression of diabetic retinopathy during pregnancy and up to 1 year after delivery, occurred among 17.0% patients, and few patients had sight-threatening progression. This is probably due to the fact that sudden tight glucose control is associated with worsening of diabetic retinopathy.[10,11] A previous report suggests that the rapid improvement in glucose control that often occurs in early pregnancy may result in an increased risk for the progression of diabetic retinopathy and that it is important that patients with diabetes who may become pregnant establish good glucose control before conception.[4]

Chew et al.[29] reported that ‘‘progression of retinopathy was seen in 10.3, 21.1, 18.8 and 54.8% of patients with no retinopathy, microaneurysm only, mild non-proliferative retinopathy and moderate-to severe non-proliferative retinopathy at baseline, respectively.

Age

In our study, the mean age of the study population was 32.91±5.02 years and Age more than 30 years was associated with higher prevalence of Diabetic Retinopathy. Hota et al.[2] found that 25-30 and >30 years age groups had progression of retinopathy occur more frequently. As the age progresses, 43.4% showed progression among >30 years as compared to 12.5% among 25-30 age group. Makwana et al.[23] stated that the median age was higher among DR patients (31 years vs. 29 years).

Duration of DM

In current study, the mean duration of diabetes (years) was 6.59±3.19 with higher duration of diabetes associated with significantly higher chances of occurrence of Diabteic Retinopathy. Makwana et al.[23] stated that the assessment of risk factors for DR revealed significantly higher duration of DM in patients with worsening of PDR during pregnancy. Higher diastolic blood pressure was found in the last trimester in patients with DR.

Hota et al.[2] demonstrated that there was no significant association of duration of DM and progression of retinopathy among pregnant group. In the research by Temple RC et al.,[33] Progression of retinopathy was significantly increased in women with duration of diabetes 10-19 years compared with duration < 10 years.

Toda et al.[2] demonstrated that a longer duration of diabetes mellitus had the highest statistical association with the progression of diabetic retinopathy. No association was found between rates of progression and age. Our result is the same as previous studies.[31,34] Compared with patients who did not show progression, the patients with progression were characterized by presence of retinopathy before pregnancy. This indicates that patients with a long history of diabetes mellitus need especially strict ophthalmic examination, and those showing presence of diabetic retinopathy before pregnancy need frequent examination.

Rasmussen et al.[24] found that Pregnancy-induced progression of retinopathy was associated with indicators of more severe type 2 diabetes as reflected by increased diabetes duration and the need for insulin treatment prior to pregnancy. This relation to diabetes duration is also seen in type 1 diabetes.[35,36] Taking into account that the known duration of diabetes was shorter in this population of pregnant women with type 2 diabetes and comparing the retinopathy data of a population of pregnant women with type 1 diabetes investigated by the same method in the same centre.[30]

HbA1C

In our study, HbA1c (%) ≥ 7 was associated with more chances of Retinopathy in both

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progressive and non-progressive groups. Prepregnancy HbA1C was a major predictor of DR development. The importance of prepregnancy glucose control optimization should be highlighted, because it is associated with less DR progression.[37]

Hota et al.[2] showed that among pregnant women having HbA1C8, 70% showed progression of retinopathy. There was strong correlation between glycemic control & retinopathy progression. Mathiesen ER et al.[38] stated that low incidence of severe progression of retinopathy during pregnancy observed by us in women reaching an average HbA1c of 5.6% from pregnancy week 20 is reassuring for continuing a strategy of strict metabolic control.

Worsening of DR during pregnancy is well documented among women with pregestational DM.[39] Most of the previously done studies on progression of DR in such cases have been done in developed nations and show high rates of progression of retinopathy.[23]

The recommendations for retinopathy screening and management in pregnancy varies significantly. The American Diabetes Association advises an eye examination in the first trimester with close follow-up throughout pregnancy. The National Institute for Health and Clinical Excellence (NICE) in the United Kingdom recommends retinal assessment following the first antenatal clinic appointment and again at 28 weeks if the first assessment is normal. If any diabetic retinopathy is present, an additional retinal assessment should be performed at 16–20 weeks.[19]

A limitation of the study is that we do not have postpartum evaluations to determine thelong-term progression of retinopathy.

Conclusion

Pregnant females with PDR and those with long duration of pre-existing DM should be carefully monitored during pregnancy. PDR should be treated as early possible. Guidelines need to be developed for managing the pregnancy in women with untreated and advanced PDR. Our findings raise the issue of poor visual outcomes among older pregnant females with long-standing DM.

References