West Midlands Confidential Enquiry into Pre-gestational Type 1 and Type 2 Diabetes in Pregnancy : analysis of perinatal deaths.

Dr Neil Shah[1], Pat Brydon [2], Professor Jason Gardosi[3]
1 Consultant in obstetrics & Maternal-Fetal Medicine, Heart of England NHS Trust, Bordesley Green, Birmingham B9 5SS
2 Lead Investigator, West Midlands Perinatal Institute, Birmingham
3 Director, West Midlands Perinatal Institute, Birmingham

Introduction

As part of an ongoing and developing diabetes in pregnancy project within the West Midlands (WM), in 2005, the West Midlands Perinatal Institute facilitated a region-wide Confidential Enquiry (CE) analysing pre-selected cases (poor pregnancy outcomes) and controls (good pregnancy outcomes) involving pre-gestational Type 1 and Type 2 maternal diabetes. This was performed as part of the national CEMACH enquiry into type 1 and type 2 diabetes in pregnancy 2002-03 but also separately to analyse our own region's cases and to be able to make recommendations for the provision of care pertinent to our own diabetic population.
Pregnancies complicated by pre-gestational diabetes result in higher rates of fetal loss, stillbirth, early neonatal death and/or congenital malformations (poor pregnancy outcome) than pregnancies in the general maternity population. The perinatal mortality rate for mothers with type 1 or 2 diabetes in WM is >4 fold higher than the local background maternity population. This study specifically analysed stillbirths or early neonatal deaths included in the CE.

Aims

- To identify risk factors for the prediction of stillbirth and early NND in pregnancies complicated by maternal type 1 or type 2 diabetes
- To compare glycaemic control across pregnancy in pre-selected cases (SB/NND) and controls (live birth with no congenital anomaly at 28 days) from the CE

Methods

Within the WM Confidential enquiry 77 individual pregnancies were examined by an expert panel (obstetrician/diabetes physician/ midwife/ DSN) with access to the full, anonymised case notes plus any relevant other documentation. The care provided was assessed from pre-pregnancy through to the postnatal period using a specialised CEMACH proforma collated and the panel's comments and opinions were documented for each case or control. In this study all data pertaining to SBs or NNDs (n=18) from the larger CE was analysed and compared to the control group (n=38) for whom there was a good pregnancy outcome.

Results

There were 15 SBs within WM in 2002-03 in association with pre-gestational maternal diabetes and 3 early NNDs.

Maternal Characteristics

Table 1: Pregnancy details on SB/NND and controls

	Stillbirth (n=15) /%	Neonatal Death (n=3 / %) /%	Controls (n=38) /%
Type 1 DM	8 (53)	1 (33)	20 (53)
Type 2 DM	7 (47)	2 (66)	18 (47)
Preterm delivery	9 (60)	2 (66)	9 (24)
Fetal CA	3 (20)**	0	0
EFW>90th centile	6 (40)	1 (33)	17 (45)
Multiparous	8 (53)	3 (100)	32 (84)
Previous Preterm delivery	5 (53)	2 (66)	4 (11)
Diabetic complications	4 (27)	0	8 (21)
Med/Surgical complications	7 (47)	2 (66)	19 (50)
IMD 1	1 (7)		2 (5)
2	3 (20)	1 (33)	5 (13)
3	2 (14)		7 (18)
4	1 (7)		8 (21)
5	8 (53)	2 (66)	16 (42)

** Major Congenital anomalies – Hypoplastic left heart / Friedricks Ataxia / Hydrocephalus

There was no difference between the groups in respect of maternal demographics or pregnancy events in each of the categories in Table 1 except for a history of previous preterm delivery. Maternal age, duration and type of diabetes and smoking rates were the same for each group

Table 2: Perinatal Mortality Rate: WM Cohort

Ethnic Group	Perinatal deaths	Registerable Births after 24 wks (n=390)	PNH rate (per 1000 live & stillbirths)
European	11	292	37.2
Non-European	9	98	91.8

'Within the full WM Cohort of pregnancies complicated by pre-gestational diabetes, the PNMR was significantly higher for non-Europeans (predominantly Asians) compared to the European group (RR=2.5). 50% of SBs occurred prior to 37 weeks. Those occurring after 37 weeks occurred equally for each completed week of gestation up to 40 weeks.

Preterm Delivery

A significant association was found between a history of previous preterm delivery (under 37 weeks gestation) and a poor pregnancy outcome in this index pregnancy.

Fig1.

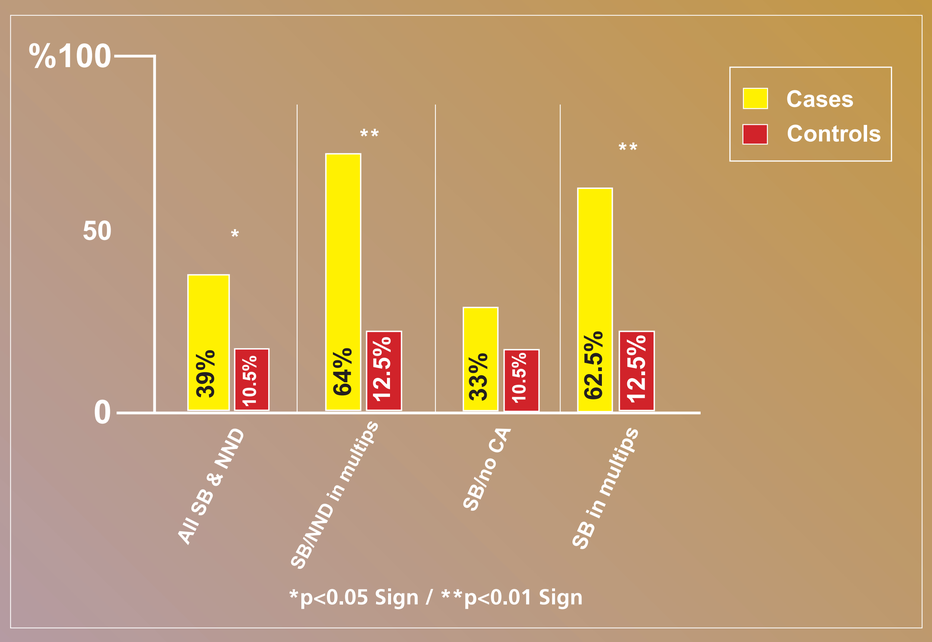

Table 3: Glycaemic Control assessed during pregnancy

Glycaemic Control

		SB/NND (no anomaly)	Panel control	Cohort - live excl. NND and anomaly
		A	C	D
HbA1c Values		*n=12*	*n=38*	*n=350*
Prepregnancy	Mean	13.6	7.4	7.9
	Median	13.6	7.6	7.7
10 week	Mean	8.1	7.2	7.1
	Median	7.8	7.2	7.1
20 week	Mean	6.6	6.3	6.3
	Median	6.6	6.3	6.2
34 week	Mean	7.4	6.3	6.4
	Median	7.1	6.3	6.3

Glycaemic control was assessed pre-pregnancy and within each trimester and mean & median HbA1c values recorded. In the selected cases of SB/NND with no CA there was significantly higher HbA1c's in the first and third trimesters in comparison to the control group or the larger main WM cohort of livebirths.

Discussion

Perinatal mortality excluding and in association with CA is significantly greater in mothers with pre-gestational diabetes than the general population. In the WM the PNM rate is 4.5 times higher than the local maternity population.
There is no effective fetal monitoring to identify fetuses at increased risk of SB which contributes the majority of perinatal deaths. Maternal and diabetic risk factors can be used to identify those pregnancies which may be at higher risk of perinatal loss than others complicated by maternal type 1 or type 2 disease.
In this case-control CE study broad ethnicity and a history of previous preterm delivery were associated with SB/NND in the absence of fetal CA. In allayed work within the WM Diabetes in Pregnancy project poor glycaemic control has been seen to be associated with poor pregnancy outcomes. Again, in this study, SB/NND was significantly higher with poorer glycaemic control, particularly in the first and third trimesters, compared to a good pregnancy outcome group (controls). Other risk factors such as maternal diabetic complications (hypoglycaemic episodes, retinopathy, nephropathy) and previous maternal medical conditions (asthma, depression) were not associated with a poor pregnancy outcome in this group.

Conclusion

Antenatal risk factors including ethnicity and previous preterm delivery together with suboptimal glycaemic control can be used to help identify pregnancies at increased risk of perinatal loss and to target diabetic & obstetric interventions to reduce this risk.