ORIGINAL

CASE MANAGEMENT SURVEY OF DIABETES IN PREGNANCY

DIABETES E GRAVIDEZ: AVALIAÇÃO DE SERVIÇO DE OBSTETRÍCIA

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ABSTRACT

Objective

To survey the diabetes management care offered to pregnant women at Institute of Mother and Child Health of Pernambuco, Recife, Brazil.

Methods

This was a case note review involving 216 diabetic pregnant patients and their perinatals, who were assisted at the Institute. In order to assess the quality of care offered to the diabetic pregnant women, the survey considered all care procedures and events - such as screening, diagnosis, treatment, delivery type, pregnancy and perinatal complications -, in the light of each patient's diabetes classification.

Results

Diagnosis using 100g Oral Glucose Tolerance Test was performed in 205 patients (94.9%). The screening for submission to the Oral Glucose Tolerance Test was

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done only through risk factors. The results of Oral Glucose Tolerance Test were: 150 patients (69.4%) had impaired glucose tolerance, 49 (22.7%) presented gestational diabetes, and 12 (5.6%) had non-insulin dependent diabetes mellitus, type II. The diabetes treatment started at 33 weeks of gestation in 75% of the patients. Fifty-four patients (25%) needed insulin. The incidence of pregnancy--induced hypertension (24%), preterm labour (14%) and polyhydramnios (13%) were not significantly different between the impaired glucose tolerance and gestational diabetes mothers. The high labor-induction rate (69%) contributed to an increase in the number of caesarean sections. The relative risk of cesarean section for induction of labor was 2.77 (95% CI 1.73 – 4.44). The perinatal mortality was 1.8% and there was no maternal death. The neonatal complications were macrosomia (10.1%), hypoglycemia (8.3%). Thirty-one neonates (14.4%) were admitted to the neonatal unit. The incidence of malformations was 5.5%. Two hundred five neonates (94.9%) were discharged in good health, being exclusively breastfed.

Conclusion

The maternal and perinatal outcomes were satisfactory, despite the late onset of diabetes treatment for some patients.

Index terms: pregnancy, diabetes, pregnancy in diabetes, pregnancy complications.

RESUMO

Objetivo

Avaliação da assistência à grávida diabética no Instituto Materno-infantil de Pernambuco, Recife, Brasil.

Métodos

Estudo retrospectivo envolvendo 216 pacientes: grávidas, com diabetes, e seus recém-nascidos. Avaliou-se a assistência oferecida à grávida diabética no que concerne o rastreamento, diagnóstico, tratamento, tipo de parto e complicações obstétricas e neonatais.

Resultados

O diagnóstico foi obtido empregando-se o teste oral de tolerância à glicose com 100g em 205 pacientes (94.9%). O rastreamento para a indicação do teste foi baseado em fatores de risco. Os resultados foram: 150 pacientes (69.4%) tinham intolerância à glicose, 49 (22.7%) apresentavam diabetes gestacional, e 12 (5.6%) tinham diabetes mellitus tipo 2 non-insulin dependent diabetes mellitus. O tratamento do diabetes foi iniciado na 33ª semana de gravidez em 75% das pacientes. Necessitaram de insulina, 25% das pacientes. A incidência de pré--eclâmpsia (24%), de parto prematuro (14%) e de polidrâmnio (13%) não foram significativamente diferentes entre os grupos com intolerância à glicose e diabetes gestacional. A elevada incidência de indução de trabalho de parto (69%)

contribuiu para o aumento da incidência de cesarianas. O risco relativo de cesariana para os partos induzidos foi de 2.77 (95% CI 1.73 – 4.44). A mortalidade perinatal foi de 1.8% e não houve mortes maternas. As complicações neonatais foram a macrossomia (10.1%) e a hipoglicemia (8.3%). Trinta e um recém-nascidos (14.4%) foram admitidos na unidade neonatal. A incidência de malformações foi de 5.5%. Duzentos e cinco recém-nascidos (94.9%) receberam alta em boas condições e com aleitamento materno exclusivo.

Conclusão

Os resultados maternos e perinatais foram satisfatórios, apesar do início tardio do tratamento do diabetes em algumas pacientes

***Termos de indexação**: gravidez, diabetes, gravidez em diabéticas, complicações na gravidez.*

INTRODUCTION

The association between diabetes and pregnancy has been a subject of concern since the beginning of the last century. In the 1920s, the introduction of the therapeutic use of insulin improved the prognosis for pregnant women with previously established diabetes; however, the foetal morbidity and mortality remained high[1]. Most studies on Gestational Diabetes (GD) date from the 1950s, when the policy of screening for diabetes was accepted based on the fact that early detection would identify women who years later would develop *diabetes mellitus*; then, the concept of "pre-diabetes" was considered[2].

In 1964 O'Sullivan and Mahan studied the three-hour Oral Glucose Tolerance Test (3h-OGTT) in a population of pregnant women and determined its normal values in pregnancy. They defined GD as a condition in which two or more abnormally high values of the 3h-OGTT are first identified during pregnancy[3]. Only in 1973 O'Sullivan *et al*.[4] linked a maternal abnormal glucose tolerance test, overweight and age over 25 years to perinatal mortality. After recognition of GD as a defined condition and its association with perinatal mortality, the diabetic patients received more intensive obstetric attention; this resulted in a decline in foetal mortality, which, in some services, reached rates close to those for the normal population[5,6].

Initially, some authors recommended that pregnant women who had any risk factors or previous clinical history should be screened for GD by the 3h-OGTT[7]. However, other researchers have shown that, limiting the screening only to these patients would miss up to 50% of GD[8]. Most of the "previous clinical histories" are related to adverse outcomes in previous pregnancies, a factor that would not be applicable to nulliparous women. Furthermore, "clinical risk factors" can happen quite late in pregnancy, dangerously delaying the diagnosis. The WHO recommends that all pregnant women be submitted to a "simplified OGTT" with 50g of oral glucose load as a preliminary test for 100g-3h-OGTT[9]. Most researchers reinforce the WHO recommendation[8,10].

Two decades after the definition of GD, some controversies still persisted. The criteria advocated in 1964 by O'Sullivan & Mahan[3] was accepted in 1979 by the National Diabetes Data Group (NDDG), with values corrected to plasma[11]. Another criterion, recommended by the World Health Oraganization (WHO), considers a pregnant woman to have an impaired glucose tolerance, when she presents the value of 2h-75g-OGTT between 144mg% and 198mg%, and to have diabetes, when such value is equal to or greater than 198mg%[12]. Li *et al*. tested the WHO criteria and confirmed that the test with a 75g glucose load is sufficient to diagnose carbohydrate intolerance in pregnancy, besides being

better tolerated than a 100g test[13]. The WHO criterion is employed by 84% of the obstetric services in Britain[14].

In Brazil, the national guidelines for prenatal care from the Ministry of Health recommend that a screening with fast glycemia should be performed in every pregnant woman at the first prenatal visit; if screening result is positive, it should be followed by a 75g OGTT[15,16].

As a consequence of the great variety of diagnostic criteria some services are probably overdiagnosing GD while others are underdiagnosing. Both situations have implications for mothers and babies. The former probably leads to a waste of money and unnecessary anxiety. The latter might increase the perinatal morbidity and mortality[17]. The diagnosis of gestational diabetes is important not only because of the repercussion to the foetus in the index pregnancy, but also because, according to many studies, 30% to 50% of such women will develop *diabetes mellitus* 6 to 10 years later[18,19]. Therefore, a diagnosis of GD could identify patients at risk of developing *diabetes mellitus*[20,21].

In spite of treatment, the rate of macrosomic babies in diabetic pregnant women is two to three times higher than in normal pregnant woman; once established, such condition cannot be reversed[22]. As a consequence, there is an increased rate of birth trauma and caesarean section[5,23]. Furthermore, it can also cause later chronic morbidity to the offspring by inducing obesity and diabetes in later life[22].

Other important topic is the incidence of congenital malformations, which is higher in women with pre-existing diabetes than in normal women[5]. In patients with *diabetes mellitus*, a tight glucose control before conception is necessary to reduce the risk of foetal malformation. Due to such possibility, it is recommended that formal prenatal counseling be provided at all services that deal with diabetes and pregnancy[5]. However such recommendation does not seem easy to be put in practice, since even in England only 12% of the clinics have formal prenatal counseling as a routine[14].

The main goal in managing diabetes in pregnancy is to reach a tight glucose control. This control can be achieved through a diet and, in some cases, also by insulin intake. The level of glucose to start an insulin treatment varies among services[5,6,22]. However, some authors recommend beginning insulin therapy as early as possible because its liberal use has improved the neonatal outcome[6,24]. Presently, the diabetes treatment in pregnancy is usually home-based[6,25,26,27]. "Day care obstetrics" is an alternative for managing high-risk pregnancy in patients who lack resources to control glycemia at home with good outcomes[28].

Presently, there is a consensus that, in those patients with good glycemia control and no obstetric complications, the pregnancy should progress to term[6,14,24,26,27]. Most authors believe that, with such strategy, they will contribute to reduce the high rate of caesarean section in diabetic pregnant women[14,28]. Evaluating the care offered to mothers and their infants probably is the best way to improve its quality. Therefore, this survey on diabetes care during pregnancy at Institute of Mother and Child Health of *Pernambuco* (CAM-IMIP), in *Recife*, was performed, to map our standing in comparison to the best practices.

METHODS

This was a retrospective case series study, including patients who delivered at CAM-IMIP between January 1st 1993 and May 31st 1995 and who had been admitted to the high-risk ward with the diagnosis of either gestational diabetes or pregnancy associated with *diabetes mellitus*. There were 216 cases of diabetes in pregnancy and 218 perinates included in the study. Data collection occurred from July to September 1995 through identification of patients from the registration books. A pilot study was conducted in 30 patient records, in order to assess the structured form and to change it accordingly.

The variables included in the study referred to the socio-demographic profile (age, education

level, number of pregnancies and parity), diabetes management (screening, diagnose of diabetes, classification, time when treatment started, use of insulin), obstetric data (antenatal care, assessment of foetal well-being, complications during pregnancy, onset of labour, mode of delivery, indications for caesarean sections, puerperal complications), foetal/ neonatal outcomes (Apgar score, birth weight, adequacy of weight to gestational age, neonatal complications, admission to neonatal unit, perinatal mortality rate, breastfeeding.

The data were analyzed with Epi-Info 6.0 version. Statistical methods included Chi-square with Yates correction when appropriate. P values less than 0.05 were considered significant.

RESULTS

The age of the 216 diabetic pregnant women ranged from 17 to 44 years, with a mean of 29 years.

Table 1. Some socio demographic characteristics of 216 diabetic pregnant women.

Characteristics	n	%
Age		
15 - 19	11	5.1
20 - 29	109	50.4
≥ 30	96	44.5
Education level		
Illiterate	11	5.1
Primary	123	57.0
Secondary	76	35.2
University	3	1.4
Not recorded	3	1.4
Number of pregnancies		
1 - 2	129	59.8
3 - 4	51	23.6
≥ 5	36	17.4
Parity		
0	83	38.4
1	73	33.4
2	29	13.4
≥ 3	31	14.4
Total	216	100.0

Most of them (82.9%) were married, had a low education level and had at least one prior delivery (Table 1).

Two hundred-six patients (95.4%) had one or more clinical or history risk factors leading to investigation of diabetes; 3.2% were known to suffer from non-insulin-dependent *diabetes mellitus* (NIDDM). In three patients, it was not possible to identify the reason why diabetes was investigated. The history risk factors most frequently identified were family history of diabetes (49.5%), followed by infant oversize in previous pregnancy (21.8%). The most identified clinical risk factor was suspicion of foetal oversize for the gestational age, which happened in 36.6% of the cases. Excessive weight gain during the index pregnancy occurred in 28.2% of mothers and obesity in 16.7%. The fourth most frequent clinical risk was age, 23.1% of the patients being 35 years old or older.

The diagnosis of diabetes was performed by the 100g-3h-OGTT in 94.9% of the patients; 3.2% had NIDDM known before pregnancy;1.4% had the diagnosis of diabetes done by a fasting glucose test. For 0.5% of the patients, it was not possible to identify how the diagnosis of diabetes was established. The beginning of treatment ranged from the 12th to the 41st gestation week, with a mean in the 33rd gestation week. Antenatal care started before the 23rd gestation week in 56.4% of women. Only eight of the 216 patients were considered as not having received previous antenatal care, once they sought for the hospital's service by the first time just after the 34th gestation week.

Among the 216 diabetic pregnant women, 22.7% were classified as having GD according to O'Sullivan's criteria; 5.6% were classified as non-insulin-dependent *diabetes mellitus* (NIDDM) patients; 69.4% fit into Mestman's criteria for impaired glucose tolerance (IGT) and 2.3% did not present enough recorded data. This classification and the need for insulin during pregnancy are shown on Table 2. The difference between the IGT and the GD groups was significant.

Table 2. Need for insulin therapy during pregnancy in 216 diabetic according to diabetes classification.

Class	With Insulin		Without Insulin		Total	
	n	%	n	%	n	%
IGT	22	14.7	128	85.3	150	69.4
GD	21	42.8	28	57.1	49	22.7
NIDDM	11	91.7	1	8.3	12	5.6
Not recorded	0	0	5	100.0	5	2.3
Total	54	25.0	162	75.0	216	100.0
	χ^2=15,7		p<0,001			

GD = gestational diabetes; IGT = impaired glucose tolerance; NIDDM = non-insulin-dependent *diabetes mellitus*.

Table 3. Pregnancy and neonatal complications in 216 diabetic pregnant women and their children.

Group	GD		IGT		NIDDM		NR		Total	
	n	%	n	%	n	%	n	%	n	%
Pregnancy complications										
Pregnancy-induced hypertension	17	34.7	31	20.7	3	25.0	1	20.0	52	24.1
Urinary tract infection	8	16.3	28	18.7	4	33.3	1	20.0	41	19.0
Preterm labour	4	8.2	23	15.3	3	25.0	-	-	30	13.9
Polihydramnios	5	10.2	17	11.3	4	33.3	2	40.0	28	13.0
Abruptio placentae	1	2.0	-	-	1	8.3	-	-	2	0.9
Placenta previa	-	-	-	-	1	8.3	-	-	1	0.5
Neonatal complications										
Transient taquipnea	4	8.2	10	20.4	1	8.3	4	80.0	19	8.8
Meconium aspiration	1	2.0	-	-	-	-	-	-	1	0.5
Hyaline membrane disease	-	-	-	-	1	8.3	-	-	1	0.5
Hyperbilirrubinaemia	4	8.1	11	7.3	2	16.6	4	80.0	21	9.8
Macrosomia	4	8.2	17	11.3	1	8.3	-	-	22	10.1
Hypoglycaemia	4	8.2	10	6.7	4	33.3	-	-	18	8.3
Hypocalcaemia	-	-	4	2.7**	1	8.3	1	-	5	2.3
Intravenous glucose	6	12.2	13	8.7	6	50.0	-	-	25	11.6
Admission to Neonatal Unit	6	12.2	16	10.7	7	58.3	2	40.0	31	14.4
Total	49	100.0	150	100.0	12	100.0	5	100.0	216	100.0

GD = gestational diabetes, IGT = impaired glucose tolerance; NIDDM = non-insulin-dependent *diabetes mellitus*; NR = not recorded.

Around 70.0% of the women started the antenatal care before 24 weeks of gestation. The foetal well being was assessed in 99.1% of the cases by US scan, in 68.5% by Non-stress test and in 24.5% with Doppler US. The mean number of US per patient was three.

The pregnancy complications according to the classification of diabetes are described in Table 3. The GD and IGT group did not have any significant difference with regard to pregnancy-induced hypertension, preterm labor or polyhydramnios. There was not any case of ketoacidosis or hypoglycemic coma. There was not any maternal death in the series.

The 216 women had 218 infants. One woman had triplets and two had stillbirths. The Apgar score

in the fifth minute was below seven in 12 (5.6%). The weights ranged from 1120g to 4600g, with a mean of 3086g (SD ± 529g). Among the 22 macrosomic neonates only one had more than 4500g. According to Lubchenko's classification, 4.2% of neonates were small for gestational age (SGA), 80.6% were adequate for gestational age (AGA) and 13.4% were large for gestational age (LGA). Twenty-three neonates (10.6%) were preterm.

The data related to labour, delivery and postpartum are shown in Table 4. Eighteen patients (26.9%) out of the 67 who had a spontaneous labour onset ended up in caesarean section. Ninety-one patients (61.1%), out of the 149 who had an induced labour, underwent caesarean section. This difference was highly significant (Chi-Square = 20.29 $p < 0.0001$). The relative risk (RR) of caesarean delivery for induced labour was 2.77 (95% CI = 1.73 - 4.44).

Table 4. Characteristics of labour, delivery, indication for Caesaren section and post partum contraception of 216 diabetic pregnant women - CAM-IMIP.

Characteristics	n	%
Gestation week at Delivery		
< 37 weeks	35	16.2
37-38 weeks	119	55.1
≥ 39 weeks	62	28.7
Onset of delivery		
Induced	149	69.0
Spontaneous	67	31.0
Mode of Delivery		
Vaginal	107	49.5
Caesarean	109	50.5
Anesthesia*		
Spinal	96	89.7
Epidural	10	9.3
General	1	0.9
Indication for Cesarean section**		
Previous caesarian section	32	29.4
Foetal distress	22	20.2
Failed induction	15	13.8
Breech presentation	13	11.9
Unfavourable cervix	9	8.3
Severe pregnancy induced hypertension	3	2.8
Cephalo-pelvic disproportion	3	2.8
Dystocia	3	2.8
Premature rupture of membranes	2	1.8
Abruptio placentae	2	1.8
Placenta previa	1	0.9
Prolonged pregnancy	1	0.9
Meningomyelocele	1	0.9
Foetal macrossomia	1	0.9
Triplets	1	0.9
Total	216	100.0

* 107 cases ** 109 cases *** all performed during a C-section

The caesarean section rate for this sample was 50.5% and the main indications were: previous caesarean scar, foetal distress, failed induction and breech presentation.

There were 11 patients (5.1%) with puerperal complications. Five had puerperal infections, three had headache following spinal puncture, and three had postpartum haemorrhage due to placenta accreta, adherent placenta and uterine atony, respectively. The incidence of malformation in the series was 5.5%, affecting 12 children as described in Table 5. The infant who had left ventricle hypoplasia died on the 19th day of life. There were four deaths: two stillbirths (one with 31 weeks, before starting any therapeutics for diabetes, and one at term, after the delay in care for the mother's diabetes control and the foetal well-being) and two neonatal deaths (one from metabolic disorders and another from complications due to prematurity after a caesarean section provoked by placenta previa)

Table 3 also describes the complications and the need for admission to the neonatal unit according to the mother diabetes group. There was not significant difference in the incidence of macrosomia between neonates of mothers with IGT and GD. (Chi-squares = 0.27, p = 0.61). The incidence of transient tachipnea was 3.8% in vaginal deliveries and 14.2% in caesarean sections (Chi-Square = 5.78, p = 0.016). There was no significant difference in the incidence of hypoglycemia among neonates from mothers with IGT and those from mothers with GD. Twenty-eight neonates among those who were admitted to the neonatal unit were doing well at discharge from the unit. Two hundred-five neonates (94.9%) were being exclusively breastfed at the time of discharge.

DISCUSSION

The mean age of 29 years for diabetic pregnant women seen in this study is consistent with the literature[6,29]. Antenatal care is ideally supposed to begin as soon as the woman is aware of the pregnancy. This is particularly relevant when diabetes is associated to pregnancy, because, if diabetes is controlled at an earlier stage, the chance of the foetus developing malformations is the same as for the general population[30]. In the present study, only 18.5% of patients began their antenatal care in the first twelve weeks of pregnancy, even though 70.8% were under care by the 23rd gestation week. Few patients may have had benefit from early diagnosis

Table 5. Congenital malformations among 218 newborns of 216 diabetic pregnant women - CAM-IMIP.

Malformation	Age of the mother	Diabetes class
1. Congenital hip dislocation	24 y	IGT
2. Congenital hip dislocation	20 y	GD
3. Congenital hip dislocation	27 y	GD
4. Congenital hip dislocation	38 y	GD
5. Congenital hip dislocation	34 y	NIDDM
6. Larsen's syndrome	29 y	IGT
7. Cystic tumour in the tongue	25 y	IGT
8. Left colon hypoplasia	27 y	IGT
9. Down's syndrome	44 y	NIDDM
10. Meningomyelocele	34 y	IGT
11. Single umbilical artery	34 y	IGT
12. Left ventricle hypoplasia	39 y	GD
Total	12	5,5%

GD = gestational diabetes; IGT = impaired glucose tolerance; NIDDM = non-insulin-dependent *diabetes mellitus*.

to prevent anomalies, but at least most of them must have had some benefit in reducing the incidence of macrosomia[27].

The rate of 25.0% insulin-treated patients was low as compared with others studies. They had some different criteria to add insulin to treatment and an incidence of insulin therapy from 53.0% to 74.0%[6,31]. The low number of insulin-treated patients in our study was due to the high number of patients with IGT whereof only 14.7% had need insulin. The cornerstone of diabetes treatment is the glucose control. Even though glucose home monitoring is employed by some services in developed countries[6,14,22], this assessment is done weekly or fortnightly at hospital in most places, mainly in developing countries[32]. In this study the glycaemic control was not done regularly in all patients probably because some patients abandoned treatment for social reasons or just underestimated their disease only returning in the week of delivery.

The 24.0% incidence of pregnancy-induced hypertension in this series was high as compared with the 5.3% to 17.0% reported by others[6,29]. In spite of the high incidence, most cases were mild. The incidence of polyhydramnios in this study was 13.0%, while other studies reported an incidence from 0.7 to 16.0%[29,33]. This rate of polyhydramnios is probably due to the delay in beginning treatment in some patients. The absence of severe complications or deaths in the mothers' group was probably due to the reduced number of patients with *diabetes mellitus* in the series.

Ultrasound scan has been recommended to confirm gestational age, to detect macrosomia or polyhydramnios and to assess fetal well being[26,27]. This study revealed that the ultrasound was performed three or more times in 88.8% of the patients; in 40.7% of the patients, who were receiving insulin, this test was performed 7 or more times. A very useful and cheap test is the non-stress test, which was employed in 68.0% of the patients. Such data reflect a close monitoring of those patients.

Forty-three percent of the centres that deal with diabetes in pregnancy in the UK agree that, with good blood glucose control and no obstetric complication, pregnancy associated to diabetes should be allowed to progress to term[14]. This is a trend in other services around the world[22,27]. In our study, only 29% of the patients reached 39 or more weeks of gestation. Sixty-nine percent of the patients had an induced labour onset. This is a high level of intervention, considering that most of our patients had only IGT or GD. Thompson *et al*.[6], in a series of 150 patients with gestational diabetes, had an induction rate of 32% and a caesarean section rate of 27% without any perinatal mortality.

The high rate of induction certainly contributed to the 50.5% rate of caesarean sections in the present study, considering that failed induction and unfavourable cervix, together were the reasons for 22.0% of the caesarean sections. The main reason, however, was previous caesarean section, contributing with 29.0% of the caesareans. The latter reflects the high rate of caesareans in the general Brazilian population; in 2001, it reached 31.0% of the cases in public hospitals and 72.0%, in private hospitals[34]. Nevertheless, in the present series, several other conspicuous obstetrical or medical conditions, namely foetal distress, breech presentation, severe pregnancy-induced hypertension, cephalo-pelvic disproportion, abruptio placentae, placenta previa, meningomyelocele, foetal macrosomia, and triplets, accounted for 43.0% of the indications for caesarean sections and reflected the tertiary pattern of the institution.

In this study, there was only one neonate with more than 4,500g. The rate of LGA infants was 13.7%., while the incidence reported by Thompson *et al*.[6] was 10.7%. The incidence of SGA, of 4.2%, was lower than that reported by Thompson *et al.*[6] of 9.3% in the diabetic group and 5.3% in their own controls –results that were ascribed to a very tight glucose control.

The incidence of hypoglycemia in neonates of diabetic women reported by other studies varies from 0.7% to 19.0%[6,22]. In this study, the incidence was 8.3% and there was no statistical significance between the IGT group and the GD group. This fact

could suggest that, at least in our sample, the O'Sullivan criteria for diagnosis of GD is very high and the threshold for gestational diabetes should be lower. The group of IGT fit in criteria established by Coustan[17], thus justifying no differentiation between the groups.

The 9.7% incidence of hyperbilirubinemia in this study is in agreement with other studies[29]. However, the frequency of this complication ranges from 2.0%, as reported by Thompson *et al*.[6] in Canada, to 16.0%, as reported by Hod, in Israel[22]. Maybe, such great variation is due to differing definition criteria. The 5.5% incidence of congenital malformations in this study is consistent with the literature[22,29]. The association of diabetes in pregnancy with foetal heart anomalies and foetal skeletal anomalies has been reported in other studies[35]. In this series, there were 5 major anomalies and they occurred in all groups (IGT, GD, NIDDM)

Oakley states that women with diabetes are able to breastfeed if they are encouraged to do so[25]. In our study, the 94.9% rate of breastfeeding cases at discharge was not surprising, because IMIP has a policy of encouraging breastfeeding. Among those 114 mothers who attended the outpatient clinic in the postpartum period, 20 (17.5%) were exclusively breastfeeding their babies at 3 months. This rate is fairly high, as compared with the 4.0% exclusive breastfeeding rate for infants up to 3 months in Brazil, in that same period[36]. However, currently, the rate of exclusive breastfeeding is already higher in Brazil: 60.0% for babies at two months[37] and 24.6%, at 6 months[38].

The perinatal mortality in this study was 1.8%. In the literature, it ranges from 0% to 10.0% for diabetes in pregnancy[6,29]. Certainly, the perinatal mortality rates vary according to the proportion of women with gestational diabetes or *diabetes mellitus* in the sample. In one case of perinatal death, there was not any time to assess the need of insulin, because intra-uterine death occurred just after the patient's admission. In other two cases, the causes of death were not clarified, but both patients probably were not in a good glycemic control, given that their last glucose profile, despite normal, had been performed several days before delivery. The fourth perinatal death, after an anticipated delivery due to placenta praevia, was due to hyaline membrane disease in a baby with very low birth weight. The glycemic control after delivery may be considered satisfactory because most patients just had IGT or GD and, in the majority of cases, were treated solely with diet.

In this study series, there was not any difference between GD and IGT, in the incidence of pregnancy complications such as PIH and polyhydramnios, as well as neonatal complications, such as macrosomia, hypoglycemia, hypocalcemia and congenital malformation. Perhaps the O'Sullivan values for diagnosing GD is too high for the studied population and an intermediate criterion between O'Sullivan's[3] and Mestman's[5] should be found. Later, Carpenter and Coustan published their classification, changing O' Sullivan's values.

The perinatal mortality was low, in spite of the glycemic control being done irregularly in some patients. Probably this outcome was due to the fact that, once the majority of women had IGT, the level of glycemia was not so high to cause deaths.

This study aimed to evaluate the assistance to the diabetic pregnant women in the high-risk ward at CAM-IMIP. The maternal and perinatal outcomes were satisfactory despite the late onset of antenatal care and the delay in the diabetes treatment in some patients. The high rate of labour induction contributed to an increase in the number of caesarean sections. The results have demonstrated a necessity to reduce the high percentage of caesarean sections among such patients. There is also a need for a better criteria definition for diabetes in this service. Actually, at IMIP the diagnosis of gestational diabetes is based on Carpenter and Coustan criteria. The good outcome of these pregnancies, however, should not avert the feeling that there is always room for improvement.

Therefore, some recommendations are in line to change practices in dealing with gestational diabetes: To allow patients with good glycaemic control to progress to term delivery, thereby reducing

labor induction and caesarean section rates; to perform glucose profile in the week of delivery and glycemia assessment during labour to have a better glycemic control and to prevent hypoglycemia in neonates; to perform OGTT during the puerperium; to set up a specific team for outpatients' diabetes management in pregnancy; to create a "day obstetric care" unit, where diabetic pregnant patients would have a glucose profile and fetal assessment weekly or fortnightly, in order to reduce the number of admissions in the high-risk ward.

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