**Research Article**

# Gestational Diabetes and Early Materno-Foetal Outcome: A Report on 101 Cases in the Creil Health Centre -

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## ABSTRACT

**Aim of the study**: Evaluate the early maternal-foetal outcomes in cases of gestational diabetes

**Methods**: This was a descriptive cross-sectional study carried out at the maternity of Creil Health Centre (CHC henceforth) from January to June 2012. The study included patients for gestational diabetes followed up; while cases of chronic diabetes as well as patients with incomplete files were excluded. Data were collected parturients' files with gestational diabetes during pregnancy.

**Results**: The prevalence of gestational diabetes was 14.3%.The average age of patients was 29.3 ± 3 years. The management of gestational diabetes required the administration of insulin to 26.7% of patients. Only 25% of patients had given birth between 38 and 39 weeks and 74.2% delivered through the vagina. The mean birth weight was 3401 ± 501 grams. Only 12.8% of new-born babies were macrocosmic. Perinatal tears were the main maternal complication with 16 cases representing 69.5% of complications. A case of preeclampsia was recorded.

**Conclusion**: The increase of gestational diabetes prevalence results from the extension of screening. Childbirth in cases of gestational diabetes is associated with high morbidity in term of caesarean sections performed in emergency or not. The balance of diabetes through diet and / or insulin therapy reduces neonatal morbidity and mortality.

**Keywords:** Diabetes Mellitus; Stillbirth; Oligoamnios; Polyhydramnios

## INTRODUCTION

The World Health Organisation (WHO) defines gestational diabetes as a disorder of glucose tolerance leading to hyperglycemia of variable severity, which starts or is diagnosed for the first time during pregnancy, regardless of the treatment required and the changes in the postpartum period**.** This definition brings together under one prism two different situations: the unrecognised type 2 diabetes revealed in the first or early second trimester of pregnancy, with persistent glucose intolerance after delivery and the true gestational diabetes; revealed lately and followed by a return to the normal glucose regulation in the immediate postpartum period. This heterogeneity of the population and the lack of consensus on the diagnostic criteria partly explain the widely varying estimates of the prevalence throughout the world: from 0.56% to 15.7%. In European populations, the prevalence of gestational diabetes is 3 to 6% of all pregnancies. In the United States, the prevalence is higher among African, Hispanic and Asian populations than in Caucasian ones. There is currently a large increase of the impact of diabetes in the world. In the United States, a child out of two children born in this century will be diabetic. However, as concerns gestational diabetes and despite specific recommendations, obstetric care is very diverse with regard to of specialists and local customs.

## MATERIALS AND METHODS

The study was carried out at the Creil Health Centre which is level III maternity. This was a descriptive cross-sectional study. The study was carried out within 6 months: from January 2012 to June 2012. The population consisted of parturients followed for gestational diabetes and who gave birth at Creil health centre.

- Inclusion criteria: Any patient with a recorded gestational diabetes.

- Exclusion criteria: Patients with chronic diabetes and Incomplete files

The Recruitment was consecutive. We collected patients records with gestational diabetes diagnosed during pregnancy. The diagnosis of diabetes could have been done in the first three months for patients with risk factors for fasting glucose or between the 24th and 28th week by the glucose tolerance tested orally. The following variables were studied:

- The mean age

- Diabetes Treatment modalities

- Gestational age at delivery

- The Terms of occurrence of the delivery labor period

- Terms of delivery

- Postpartum complications

- The Average Apgar score

- The weight at birth of babies born to diabetic mothers.

Data were analysed with the computer using the spike info software to calculate averages and percentages which were then presented in histograms, pie charts and tables
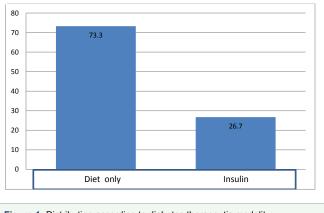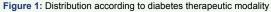
## RESULTS

### Demographic characteristics of the population of the study and treatment modalities of the diabetes

The average age of patients was 29.3 ± 3 years. The most represented age group is that between 25 and 35 years. Multiparous represented 49.5% of patients. Only 26.7% of the patients had been on insulin (Figure 1).

### Gestational age at Delivery

Only 25% of patients delivered between the 38th and 39th week. No patient delivered beyond 42 weeks (Figure 2).



**Figure 1:** Distribution according to diabetes therapeutic modality

## Terms of delivery

In total 74.2% of patients delivered vaginally. Instrumental delivery was performed on 4 patients representing 3.9% of cases. Ten Caesarean sections out of 26 have been programmed. Perinatal tears were the main maternal complication with 69.5% of complications (Table 1).

## Gestational age at the time of triggering

Among patients who received an artificial triggering, 14 on 30 underwent it between the 38th and 39th week representing 46.6%. Three patients were initiated between the 41st and the 42nd week (Figure 3).
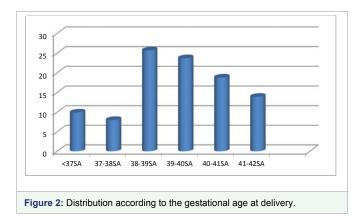
## Indication of caesarean section

The main indication for elective caesarean section was the scar uterus being 26.9% of cases while the major indication of the emergency caesarean was abnormal foetal heart rate with 30.4% of cases. (Table 2)**Distribution according to foetal parameters**

The mean birth weight was 3401 ± 501 grams. Only 12.8% of newborns were macrosomic. In total, 97% of newborns had an Apgar score in the 5th minute beyond 7. (Table 3)

## DISCUSSION

Among the 706 consulted parturients files during the study period, 28 had chronic diabetes and 101 patients had gestational diabetes representing 14.3% of gestational diabetes prevalence. Data from the literature report a prevalence that is between 0.56 and 15.7% [1]. In European populations, the prevalence of gestational diabetes is 3 to 6% of all pregnancies [2].In India, Thomas et al. [3] reported a prevalence of 5%, according to Wahi [4] it would be 6.94% and for Ramachandran [5] it is 0.87%.It is important to note that our population of study is mainly consisted of Africans and Asians**.** Already in 1985, Hadden [6] notes that the prevalence of gestational diabetes varies according to geographical origin and
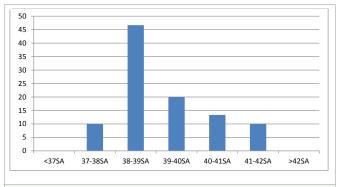

**Figure 3:** Gestational age at the time of triggering.

**Table 2 :** Distribution according to the indication of caesarean section.

| Indications for c-section | | Number of cases/26 | Percentage (%) |
|---|---|---|---|
| Elective | Scar uterus | 7 | 26.9 |
| | Macrosomia | 1 | 3.8 |
| | Placenta praevia | 1 | 3.8 |
| | Transverse presentation | 1 | 3.8 |
| Emergency | Failed Induction | 2 | 7.6 |
| | Arrest of descent | 4 | 15.2 |
| | Acute foetal distress | 8 | 30.4 |
| | Others | 2 | 7.6 |

**Table 3 :** Distribution regarding neonatal parameters.

| Parametres | Number of cases /101 | Percentage(%) |
|---|---|---|
| Average weight (SD) (range) | 3401 (501) (1870-4440) | |
| < 4000 | 88 | 87.1 |
| ≥ 4000 et < 4500 | 9 | 8.9 |
| ≥ 4500 | 4 | 3.9 |
| Average Apgar score after 1 minute (SD) (range) | 9.06 ± 0.8 | |
| Average Apgar score after 5e Minute (SD) (range) | 9.48 ± 0.4 | |
| ≤ 7 | 3 | 2.9 |
| > 7 | 98 | 97.0 |

that Asian and North African women would be the most affected. Furthermore, the prevalence of gestational diabetes varies depending on screening conditions**.** This also explains the disparity in prevalence according to series**.** The diagnosis of gestational diabetes was done on our patients according to the recommendations of the HAPO study. The HAPO study [7] (Hyperglycemia and Adverse Pregnancy Outcome), published in 2008, defines a new consensus for screening and diagnosis of gestational diabetes. The former diagnostic criteria focused on the subsequent risk of developing type 2 diabetes and not on the risk of adverse peri-natal events. The new agreement provides a screening in the first three months with a measure of blood glucose at fasting in the presence of risk factors. The risk factors considered were: age beyond 35 years, the Body Mass Index (BMI) more than 25 kg / m², prior personal history of gestational diabetes, type 2 diabetes prior history of first degree relatives and prior history of macrosomia. If fasting glucose is obviously more than or equal to 0.92 g / l, Oral

**Table 1**: Distribution based on the terms of delivery.

| Modalities for delivery | | | Number / 101 | Percentage |
|---|---|---|---|---|
| Route of delivery | Vaginal delivery | normal | 71 | 70.3 |
| | | instrumental | 4 | 3.9 |
| | C-section | emergency | 16 | 15.8 |
| | elective | | 10 | 9.9 |
| Maternal Complications | Partum hemorrage | | 6 | 5.9 |
| | Perineal tears | | 16 | 15.8 |
| | Preeclampsia | | 1 | 0.9 |


**Figure 2:** Distribution according to the gestational age at delivery.

Glucose Tolerance Test (OGTT) is available immediately. Otherwise, a 75 g OGTT will be done between the 24th and 28th week of gestation with threshold values from HAPO study data.

The average age of our patients was 29.3 years and the most represented age group is that between 25 and 35 years with 58% of cases. Our result is similar to that of Odar [8] whose research shows a mean age of 28.6 years. Patients above 35 years represent only 29.7% of our sample reflecting the rejuvenating of the patient population with gestational diabetes .This can be explained by the changing of social and eating habits. It is therefore important to expand the targeted screening strategies during the first three months initially meant for patients beyond 35 years in this age group; hence the relevance of the recommendations of the HAPO study [7].

The average parity of our population of study is 2.7.Only 21.7% of patients were primiparous while 49.5% are multiparous. According to Ville [9], the risk of gestational diabetes increases with parity: 3% for a primiparous and up to 15% and even more for a woman who delivered four times.

The dietary management is the cornerstone of gestational diabetes treatment. The currently validated objective is to obtain fasting blood glucose less than 0.95 g / l. Insulin should be considered if glycolic targets are not achieved after 7 to 10 days of lifestyle and dietary rules. All patients underwent their screening test before the $32^{nd}$ weeks. Thus, 26.7% of patients received insulin treatment; in the meantime glycolic targets were met under diet only on 73.3% of cases. Our result is different from that reported in the study by Wong [10] with a starting treatment of 52.8%.That is attributable to the inclusion in this study of certain factors such as high body mass index, diagnosis in the first trimester and prior history of gestational diabetes for the initiation of insulin therapy.

In our series, the premature birth rate is 9.9%. These are patients who experienced premature rupture of membranes, severe preeclampsia and intrauterine growth restriction. Rehder [11] and Wahi [4] reported respective rates for preterm birth to 14.2% and 16.9%.Note that gestational diabetes is not a risk factor for preterm birth. Furthermore, no patient in our series delivered after 42 weeks. Indeed, gestational diabetes is associated with a high risk of maternal and foetal complications in a case of extended pregnancy; the decision of termination of pregnancy is usually taken as from the 38th week.

In cases of poorly controlled diabetes or with foetal echo, it is recommended to induce labor for a term which shall take into account the balance maternal-foetal risk-benefit. Our series reports a spontaneous labor rate at 66.3% whereas in 33.7% of cases, labor was induced. Our result is different from that of the Dutch team with respective rates of 25% and 48.2%. Apart from other triggering indications, most of our patients had a well-balanced diabetes and therefore did not require termination of pregnancy. However, for 46.6% of the patients triggered, gestational diabetes as the cause of triggering was well handled. The other triggering indications found in our series are: the extension of the term, macrosomia, hypertension, hepatic cholestasis and premature rupture of membranes. According to the National College of Gynecologists and Obstetricians of France [7], in cases of well-balanced gestational diabetes by diet alone or insulin, and without foetal echo, there is no argument that justifies cares that are different from a normal pregnancy and therefore a trigger principle. It is just that recommendations are not yet enough implemented by the team of caregivers.

In total, 74.2% of patients delivered vaginally. The prevalence of caesarean sections is 25.6%. There is a disparity in the prevalence of Caesarean sections in cases of gestational diabetes. In a Dutch series, Harold [12] comes up with a rate of 42.9% while for Rehder [11] in Portugal it is 62.3%. In France, the C-section rate is 20.3%. Our findings corroborate that of the research of Jacobsen [13] which reports a high incidence of C-section in cases of gestational diabetes. As for Caesarean sections, 42.8% were programmed in our series. Malek [14] reports a similar result. In Harold's series [12], the majority of Caesarean sections being 78% have been programmed. According to the author, the presence of gestational diabetes expands the caesarean indications. The instrumental delivery was performed on 3.9% of cases with the main indication based on the abnormal foetal heart rate in the expulsion phase.

Twenty-six patients delivered by caesarean including 10 elective and 16 emergency cases. The main indication of Elective Caesarean Section (ECS) is the double scar womb representing 74.2% of cases. In total, 7 scheduled caesarean sections out of 10 were carried out between 38 and 40 weeks. Gestational diabetes by itself is not an indication of Elective Caesarean Section [7]. Besides, the main indication for emergency caesarean section in our series is the abnormal foetal heart rate with 50% of cases. In the general population, abnormal foetal heart rate is the $3^{rd}$ indication of emergency caesarean section with a prevalence of 18.5%. In his research about changes of the placenta in cases of gestational diabetes, Gauster [15] reports that vascular abnormalities of placental villosity and changes in the secretion of vasoactive substances promote oxidative stress that may alter foetal oxygenation. According to Fadda [16], gestational diabetes would be responsible for the alteration of umbilical Doppler that can lead to heart rhythm abnormalities during labor period.

The average weight of newborns in our series is 3401.1 ± 501 grams with peaks of 1870 grams and 4440 grams. The prevalence of macrosomia, which is defined as a birth weight above 4000 grams, is 12.8%. Macrosomia occurs when the foetal placental blood sugar exceeds the capacity to purge the foetus from a glucose surplus. Thus, if the glycolic control is done by the diet alone or insulin therapy, the risk of macrosomia is reduced [7]. Macrosomia is due to a high triggering frequency (58% against 42% p≤0.05). On the other hand, in our series, insulin therapy does not reduce the risk of macrosomia (RR = 0.82, CI [0.2-3.16] $p \le 0.5$). Our result is different from that of Wahi [4] which shows a net profit of insulin therapy over diet alone with frequencies of 16.2% and 10% respectively. The author highlights the time of initiation of insulin therapy as a major element to reduce macrosomia risks

The mean Apgar score in the $1^{st}$ and $5^{th}$ minute is 9.5 ± 0.8 and 9.8 ± 0.4 with a minimum of 6 and 7; respectively. Only two infants had a pathological Apgar score (known as a score lower than 7) in the $5^{th}$ minute. According to Gasim [17], gestational diabetes does not increase the risk for a newborn to have a bad Apgar score. A newborn had a broken collarbone after delivery. Besides, we registered a case of in utero foetal-death at 38 weeks associated with a malformation syndrome including: a hexadactyly, nephromegaly, a right cardiomegaly and undescended tests. In literature, the prevalence of birth defects is 5.4% while foetal traumas represent 2.5% of cases [3].

As concerns maternal complications, we recorded a case of preeclampsia, 6 cases of postpartum hemorrhage and 16 cases of perineal tears. The rate of severe perineal tears and postpartum hemorrhage are not affected by gestational diabetes [7]. That is why

in our series, they cannot be assigned to gestational diabetes. On the contrary, gestational diabetes is associated with an increased risk of preeclampsia especially important when overweight or obesity is linked to it. This risk is positively and linearly correlated to the degree of initial hyperglycemia. Our patient who showed a preeclampsia syndrome was obese and had been screened at 32nd week.

To sum up, the HAPO study has enabled us to elaborate a gestational diabetes screening agreement which has as consequence the increase of the incidence of gestational diabetes. Childbirth in cases of gestational diabetes is associated with high morbidity with regard to Caesarean section performed in emergency or not. The balance of diabetes by diet alone and / or insulin therapy reduces neonatal morbidity and mortality.

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