Global Scientific JOURNALS

GSJ: Volume 7, Issue 10, October 2019, Online: ISSN 2320-9186

www.globalscientificjournal.com

Morbidity and mortality of newborns born to mothers with or without diabetes at EHS " Nouar Fadela " in Oran,ALGERIA

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Abstract

Introduction: Maternal diabetes is one of the factors that influences birth weight. However, there are few data on complications in neonates from diabetic mothers. **The objective** of this work is to compare the morbidity and mortality of newborns of mothers with and without diabetes**. Material and methods**: This is a retrospective and analytical study of all term newborns born to mothers with or without diabetes from April 15, 2015 to March 15, 2017 inclusive. We identified the maternal characteristics, the existence of an old diabetes. With regard to neonatal characteristics: birth weight, birth status, presence of traumatic lesions or other perinatal complications and become immediate. The data were analyzed using the chi (2) test and Fisher's exact test. Logistic regression analysis was also performed. **Results**: 889 mother-newborn couples were included in the study (147 newborns of diabetic mothers (NMD) and 742 newborns of non-diabetic mothers (NMND). Maternal characteristics: mean age was 30 , 4 ± 6.1 years, diabetes was 19%, of which 15.3% gestational diabetes. Newborn characteristics: mean NMD weight was 3974 ± 578 and 3664.27 ± 512 gr in NMND (p <0.0001) .The incidence of hypoglycemia was 31.97% in NMD versus 11.3% NMND (p <0.0001). Hypocalcemia was 4.8% and 2%, respectively. , 2% NMD and NMND (p <0.05), 2% brachial plexus paralysis in NMD versus 0.9% NMND and macrosomia 66.7% vs. 44.1% (p. <0.0001) Conclusion: Our results suggest that newborns of diabetic mothers are at increased risk for hypoglycemia, hypocalcemia and macrosomia in the early neonatal period.

Keywords: birth weight; macrosomia; brachial plexus palsy; mothers overweight, gestational diabetes; obesity.

Introduction

The association of diabetes and pregnancy represents a potential risk for both the mother and the child. Babies born to diabetic mothers are at a significantly higher risk of perinatal morbidity and mortality [1] . In all cases, it is a risky pregnancy, which requires careful management [2] . Maternal diabetes is one of the factors that affects birth weight. However there is limited data on complications of newborns from diabetic mothers.

The objective of this work is to compare the outcomes of neonatal complications from mothers with and without diabetes.

Patients and methods

It is a descriptive, retrospective and analytical study. The work took place at the EHS "Nouar Fadéla " for the period from April 15, 2015 to March 15, 2017 inclusive . All term newborns from mothers with and without diabetes were included. Maternal characteristics: age, gestational status, parity, medical and obstetrical history, existence of chronic diabetes, or previous macrosomia, mother's weight and size , route of delivery presentation and maternal complications were collected on survey cards prepared for the study. Concerning the characteristics of the newborn: the weight, the size and the cranial perimeter at birth ; the presence of traumatic lesions or other metabolic (hypoglycemia , hypocalcemia, hyperbilirubinemia) and hematologic (polycythemia) complications were analyzed. The results were analyzed using Chi 2 and Fisher's exact test. Logistic regression analysis was also performed.

De fi nition of terms

- The macrosomia is defined by a birth weight greater than 4000 or 4500 grams is a simple index, but that does not involve gestational age.

• A birth weight above the 90th percentile for gestational age overcomes this defect. Sex, ethnicity and geographical environment influence birth weight, which requires the use of reference curves for each population

• Hypoglycaemia is de fi ned by a blood glucose lower than 0.30 g / L on the first day and less than 0.45 g / L beyond 24 hours. Capillary blood glucose is routinely done in newborns macrosomes at one hour of life. In case of normal initial blood glucose, the newborn is placed in the breast, monitored in maternity next to his mother, the blood glucose is redone to three hours of life before the next breast,

and every six hours during the first 24 hours. hours. If the initial blood glucose is low, the neonate is ho spitalised for management.

Results:

Our results show that **6741** deliveries were registered. The number of couples mother - newborn infants included in the study was **889** of which 147 couples mother newborn diabetic mother (15.3% and 3.7% gestational chronic) a hospital prevalence of **2.1** %. The maternal characteristics and those of the newborns are shown on Table 1.

Characteristics of diabetic mothers

- Maternal age ranged between 26 years and 45 years. The average age in our sample was: 30.33 ± 6.030 years. The predominant age group was between 26 and 35 years old, with 59.1% of mothers of newborns having macrosomes compared to 53.2% of mothers of newborns with no diabetes.
- Average term : 38,69 ± 1,25 SA
- The average parity was 3.2 ± 2 with extremes of 1 and 8. Fifty women or 13.7% were multiparous (4 deliveries and more).
- Obesity was predominant among non-diabetic mothers with 79.8% vs. 20.6% in diabetic mothers
- The average weight was 3974.21 ± 578.98 with extremes of 2700 and 5300 g
- There is a predominance of male dals NMD group

ATCD MEDICAL Mothers

- diabetic parturients , had a particular medical history. The macrosomia ATCD was the most recovered (26.9 %) followed by the hypertension (21.9 %) compared to the mothers of eutrophic neonates .
- The majority of diabetic patients had pre-gestational diabetes and 38% of them were treated with insulin. No patients received oral antidiabetic therapy.
- The delivery route was Caesarean section in the majority of diabetic parturients (82.9 %).

Table 1 : Maternal and Neonatal Characteristics

Characteristics of mothers	NMD N = 147	NMND N = 742	Meaning threshold P
multiparity	65 (13.7)	410 (86.7%)	**0.014**
BMI (Kg)			
<25	144 (11.3%)	344 (88.7%)	**0.0001**
> 25	103 (20.6%)	398 (79.8%)	**0.0001**
Weight gain (Kg)			
<15 Kg	126 (16.5%)	638 (83.5%)	
> 15 Kg	21 (16.8%)	104 (83.2%)	**NS**
Average weight of New born	3974.21 ± 578.98	3664.27 ± 512.15	**0.0001**
Sex			
Girl	15.7%	83.0%	0.62
Boy	17.0%	83.5%	

The neonatal complications:

Among the neonatal complications (**Table 2**), Macrosomia was the most common (over 66.7 %) followed by ' hypoglycemia was found in 32% of cases, hypocalcemia in 4.8% of cases, a congenital heart disease (MHC) in 0.2% and traumatic lesions were rare in our series (0.7%) .

Table 2: Morbidity and neonatal mortality

NEONATAL COMPLICATIONS	NMD		Meaning threshold P	Odds ratio
	Yes 147	No 742		
	NOT (%)	NOT(%)		
Hypoglycaemia (<0.40 g / l)	47 (32%)	84 (11.3%)	**0.0001**	**3.86 (2.43 to 5.57)**
Hypocalcemia (<80 mg / l)	7 (4.8%)	16 (2.2%)	**0.05**	**2.26 (0.31-5.61)**
Hyperbilluribenemie	28 (19%)	132 (17.8%)	NS	NS
polycythemia	**2 (1.4%)**	1 (0.1%)	0.01	**10 , 2 (0.92-113.46)**
Perinatal asphyxia	15 (10.2)	53 (7.1%)	NS	NS
Respiratory distress	31 (21.1%)	135 (18.2%)	NS	NS
Hypertrophic cardiomyopathy	3 (0.2%)	4 (0.5%)	0.05	3.84 (0.85 to 17.35)
Paralysis of the brachial plexus	3 (2%)	7 (0.9%)	NS	NS
Clavicle fracture	1 (0.7%)	3 (0.4%)	0.05	1.68 (0.17 to 16.33)
Humeral fracture	3 (2%)	2 (0.3%)	NS	NS
Blood bump	16 (10.9%)	79 (10.6%)	NS	NS
hematoma	6 (4.1%)	19 (2.6%)	NS	NS
death	**4 (2.7%)**	3 (0.4%)	**0,004**	**6.8 (1.52 to 31.11)**
macrosomia	**98 (66.7%)**	327 (44.1%)	**0.0001**	**2.5 (1,7-3,6)**

Table 3 : Maternal risk factors associated with neonatal hypoglycemia

Characteristics Diabetic mothers	**hypoglycemia (<0.40 gr / l)**	**Meaning threshold P**	**Odds ratio**
Age (years) <35 > 35	 9 (19.1%) 38 (80.9%)	 **NS**	 **NS**
BMI (Kg) <25 > 25	 9 (19.1%) 38 (80.9%)	 **0.005**	 **2.27 (0.98 to 5.23)**
Weight gain (Kg) <15 Kg > 15 Kg	 38 (80.9%) 9 (19.1%)	 **NS**	 **NS**
multiparous pauci	14 (29.8%) 33 (70.2%)	**0.016**	**2.45 (1.17 to 5.31)**
Gestational diabetes Chronic Diabetes	15 (11.5%) 43 (32.8%)	 **0.0001**	 **3.49 (2.28 to 5.34)**

Discussion

- **Diabetes is** a major public health problem on a global scale. The incidence of diabetes during pregnancy is constantly increasing in the current context of a pandemic of obesity and type 2 diabetes. About 3 to 10% of pregnancies are characterized by a disorder of glycemic regulation [1] . In our series, her hospital prevalence during pregnancy (2.1 %) is similar to

that reported by Firouzeh and Mahdaviani in Iran in 2004, and Kay Mcfarland and Ezzat in the United States (2.6%) [4,5] .

- **For diabetic pregnancy, childbirth** is usually scheduled for 38-39 weeks. However, many teams are easily interventionist in gestational diabetes and induce premature birth to prevent late fetal death or shoulder dystocia in case of macrosomia [6] . The data in our study are consistent with those of the literature with a mean gestational age at delivery of 38.69 ± 1.25 SA
- **The caesarean section rate** is generally around 69.6 % compared to 17 % in the non-diabetic population. It seems that the knowledge of diabetes in the pregnant woman in fl uence the delivery terms [2] . In our series, the t to of cesarean was 82.9 % among diabetic mothers against 66.9% in non-diabetics. The increase in the caesarean section rate had already been reported by other authors: Abdelmoneim (84%) [7] and Peace Opara et al. (80.8%) [8] .
- **Among neonatal complications** in NMD compared to NMND , macrosomia is one of the most common with a high incidence of 66.9 % [1] . In case of maternal diabetes, macrosomia is classically attributed to reactive fetal hyperinsulinemia at maternal hyperglycemia, due to the anabolic effect of insulin. In addition to maternal glucose, other substrates such as amino acids, triglycerides, and free fatty acids are positively correlated with birth weight [9] .
- **Regarding metabolic complications** , hypoglycaemia was predominant and signi fi cantly associated with mothers whose BMI > 25 Kg

  (p = 0.005) and OR = 2.27 (CI : 0.98-5.23) , in mothers with diabetes (p = 0.0001) and OR = 3.49 (CI: 2.28-5 , 34) and pauciparas (p = 0.016) and OR = 2.45 (1.17-5.31) in our series.

  It is more prevalent in gestational diabetes than in gestational diabetes, as shown by the work of Firouzeh and Mahdaviani in India, where neonatal hypoglycemia was found in 42% for pre-gestational diabetes and 22.9% for gestational diabetes [4] . Macrosomia is a risk factor for hypoglycaemia, as is the poor control of maternal blood glucose in the peripartum [6].

- **The prevalence of congenital malformations** varies between 2 and 7% in the literature [6]. Cordero et al. [12] , report 5% congenital malformations. The risk is higher in patients with pre-gestational diabetes but the malformations described in gestational diabetes are similar to those reported in pre-gestational diabetes: cardiac, skeletal and cerebral [2,6]. The epidemiological analysis of cohorts of diabetic patients (pre-existing diabetes, types I or II, or gestational diabetes) establishes the teratogenic role of diabetes: for women with diabetes before pregnancy, the probability of having a child with diabetes 'a malformation is multiplied, according to the studies, by 2 to 5 (up to more than 16% of the

births), or even 7 to 10 for the most severe malformations, and this, whatever the type of diabetes, the risk being reinforced by poor control of the disease [13] . N ur study reported a rate of 3.3 % of birth defects.

- **Obstetric trauma** is attributable to macrosomia, which increases the risk of shoulder dystocia regardless of the cause of overgrowth [1,6] . The incidence of shoulder dystocia is 0.2 to 2.8% in the general population, depending on the de fi nition used. This figure can reach 9% in diabetic pregnancies. The risk increases with the weight of the child, but at equal weight, the frequency of shoulder dystocia appears twice as high in macrosomes born to diabetic mothers. This is related to the increase of the thoracic volume and the biachromial diameter. This situation explains the increased frequency of elongation of the brachial plexus with more or less significant paralysis of the arm [14] . Obstetric trauma in our series was represented by brachial plexus palsy (2%) and clavicle fracture (0.7%) and serum bump (10.9%) in NMD.
- **The mortality rate** in NMD compared to NMND observed in our series (2.7 % vs. 0.4%) is comparable to that of other authors such as Abdel-moneim et al. in 2012 in Sudan [7] , Peace Opara et al. in 2010 in Nigeria [8] . Our results are significantly better than those of Ranade et al. in India 1989 (20%) [15]. Certainly because of progress in care.

Conclusion

Diabetes during pregnancy is a known morbidity factor for both mother and child . Our findings suggest that neonates macrosomes of diabetic mothers were at a greater risk of metabolic, traumatic and early neonatal-related mortality than neonates born to non-diabetic mothers. Scheduling and regular medical monitoring of diabetic pregnancy and newborn are important. The need for education and motivation of the diabetic woman remains paramount in order to improve the maternal-fetal prognosis.

Declaration of interest

The authors declare that they have no links of interest

Morbidity_and_mortality_of_newborns_born_to_mothers_with_or_without_diabetes_at_EHS_Nouar_Fadela_in_Oran_ALGERIA

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