

# DIABETES IN PREGNANCY: A RETROSPECTIVE STUDY AT ST. FRANCIS HOSPITAL PERINATAL CENTER 1976-1980

James L. Swingler, M.D., M.S.\* and M. A. A. Khan, M.D., FACOG, FACS\*\*

## Abstract

A retrospective study was done at our Perinatal Center between the years of 1976-1980 to evaluate our experience with diabetic pregnancy as compared to other reporting centers. A small group of 49 patients emerged which was large enough to identify certain trends. As a whole the Center has comparable outcome to other centers but particular areas of concern was the group of primigravidas who experienced more fetal distress (30.7% had distress) as compared to 2.0% of controls. Class B diabetics also had more problems. Tighter control is necessary. Antepartum surveillance is improving in this area. Our experience with other factors relating to diabetic pregnancy is discussed.

## Introduction

Diabetes in pregnancy is associated with a greatly-increased perinatal morbidity and mortality. It has been reported that tight metabolic control of pregnancy can result in a much better outcome in regard to both of the above parameters.<sup>1</sup>

The sorts of complications that occur can start at the outset of pregnancy with a much increased risk of congenital anomalies (11%) being detected especially in younger mothers.<sup>2</sup> This may well relate to poor control being present in gestational or overt diabetes early in pregnancy. The incidence of malformations is generally two to four times that seen in normal pregnancies, accounting for as much as 54% of all perinatal deaths in diabetic pregnancies.<sup>3</sup> Insulin and carbohydrate control may be only part of the picture if an early pregnancy is thought of as a sort of tissue culture where many other nutrients may also be permuted by this metabolic disorder.<sup>4</sup> Possibly the spontaneous abortion rate could be reduced with better control of diabetes early in pregnancy, additionally, good control of diabetes optimizes the pregnancy until such time, if it occurs, that the pregnancy undergoes fetal jeopardy on a uteroplacental basis.<sup>1 5 6</sup> The latter can be followed by careful monitoring of placental

function. The modalities for the latter include non-stress, stress, OCT, and estriol levels as predictive antepartum surveillance that can identify the fetus in trouble.<sup>7</sup>

Even after delivery the infants are exposed to a higher incidence of respiratory distress syndrome<sup>8</sup>, neonatal hypoglycemia and hypocalcemia and hyperbilirubinemia<sup>9</sup>.

It is evident hence that every physician and every regional center should attempt to maximize diabetes control as early as a pregnancy is identified with good antepartum surveillance and appropriate obstetric intervention. It is the purpose of this paper to review our own Perinatal Center's experience with this problem. Our Center covers as a referral base a 23 county area in Illinois with approximately 18,000 deliveries per year. Complicated from this region, though often at a late stage of gestation or extent of problem.

## Materials and Methods

This is a retrospective chart study of patients admitted both for pregnancy gestational and/or overt diabetes from July 1976 thru December, 1980. Any case lacking such coding will not have appeared for analysis. Charts of the infants of the identified diabetic mothers were also reviewed to determine the outcome before discharge. Various factors and outcomes related to these pregnancies were then examined and the results were compared, when feasible, to a similar regional outcome study from Finland<sup>10</sup>.

## Results

First, the annual incidence of diabetic pregnancies was calculated based on the total number of deliveries in the hospital even though a few regional pregnancies were present. A total of 49 cases were identified in this study. These data is presented in Table I.

The incidence of diabetic pregnancy at our center, despite inclusion of some regional referrals, was 0.31%. The incidence reported elsewhere is roughly 1.0%. This may suggest that the incidence in our area for some reason, is lower or that many cases are being missed, especially Class A diabetics,

\*2nd OB Resident

\*\*Clinical Assistant Professor of OB/GYN  
Peoria School of Medicine

TABLE I

## The Incidence of Diabetes in Pregnancy

Year	No. Cases	Deliveries	Incidence
1976 (July to Dec) (whole year)	6	3299	0.18%
1977	11	3502	0.32%
1978	9	3382	0.27%
1979	10	3540	0.28%
1980	13	3593	0.36%
TOTALS	49	17316	0.31%

or improperly coded. An examination of perinatal mortality revealed 2 deaths among the 49 identified diabetic deliveries, a rate of 4.1%. Mortality reported in the literature is about 1.0%. However, our numbers are too small to draw any meaningful conclusions.

Fetal outcome (neonatal complications) was then reviewed. The results are summarized below in Table II.

TABLE II  
Fetal Outcome

Description	No. of Patients	%total	%reported
Respiratory Distress Syndrome	6	12.2%	5.3%
Asphyxia Transient	3	6.1%	-
Respiratory Problems	3	6.1%	-
Hypoglycemia	8	16.3%	10.6%
Hypocalcemia	2	4.1%	5.3%
Hyperbilirubinemia	10	20.4%	8.5%

As can be seen from the above, occurrence of RDS is higher in our sample as compared to other reported figures. All infants with distress were sent immediately to the Neonatal Intensive Care Unit for management. Even the mild degree of RDS would be reported. Only 3 of the above 6 cases were severe RDS. The metabolic complications of hypoglycemia and hypocalcemia appeared to occur at about expected frequencies. An excess of the occurrence of hyperbilirubinemia was discovered. More hyperbilirubinemia is seen in LGA babies<sup>9</sup> and the average weight of our babies was generally above the average. This may explain the increased incidence of hyperbilirubinemia.

In line with the above, some probable size-related complications were seen. One infant, weighing 8 lbs 6 oz. developed cephalhematoma (with forceps use) and two others, weighing more than 8 lbs. 11 oz. had clavicular fractures.

In general, pregnant diabetics at this Center achieved near normal lengths of gestation. The group as a whole went to 37.9 weeks gestation with maternal-fetal monitoring by individual physicians. Greater use of non-stress testing in general was noted over the 5 years with all 13 of the diabetic pregnancies in 1980 being so monitored.

Four infants had congenital malformations, a rate of 8.1%. The data is reported in Table III All but one were minor. The only infant who had a stormy course was one with pyloric stenosis.

TABLE III

## Congenital/Developmental Anomalies Among Infants of Diabetic Pregnancies

Pyloric Stenosis	1
Undescended right testicle	1
Bilateral congenital hip dislocation	1
Reduplication of right thumb	1
(4/49 gestations + 8.1% rate malformations)	

The rate for minor and major malformations was 8.1% in this group. The malformation rate for normal pregnancy is about 2 to 3%. The rate of malformation reported for diabetic pregnancies varies between 3% and 11%. The highest rate was reported in younger patients with uncontrolled diabetes.<sup>1</sup> Our numbers are small but the result appear to conform to the reported range.

Pregnancy wastage was also examined by compiling the information about past pregnancies of each of the patients. The 49 patients had had a total of 159 gestations. These included 19 first trimester spontaneous abortions, 5 stillbirths, and 3 neonatal losses (including the two in the present study). The total wastage was thus 17%, for this group of patients. No major difference was noted between Class A and B gestations. Reported wastage in diabetic pregnancies is about 10-11%. The wastage in our sample is clearly excessive and one can only speculate as to how much of this could be due to undiagnosed diabetes during previous pregnancies.

In our study there were 41 Class A gestational diabetics, 7 Class B diabetics and 1 Class D diabetic. The outcome of infants by diabetic class is illustrated in Table IV.

Though the numbers are small, a trend towards a lesser use of cesarean section in recent years is noted. The total incidence of Cesareans, 40.8%, becomes 24.4% when repeat sections are not counted.

The diabetic primigravidas were also studied as a group. Of the 13 primigravidas, 8 underwent Cesarean section, for a rate in this subgroup of 61.5%. Indications for the Cesarean were cephalopelvic disproportion (2 patients), abnormal

TABLE IV

## Fetal Outcome by Diabetic Class

Fetal Outcome	Class A	Class B	Class D
Deaths	1 (2.4%)	1 (14.3%)	0 (0)
Cong. Mal.	3 (7.3%)	1 (14.3%)	0 (0)
Asphyxia	3 (7.3%)	0 (0)	0 (0)
Transient Resp. Problems	1 (2.4%)	2 (28.6%)	0 (0)
RDS	4 (9.8%)	2 (28.6%)	0 (0)
Hypoglycemia	4 (9.8%)	3 (42.9%)	1 (100)
Jaundice	7 (17.1%)	2 (28.6%)	1 (100)
Size Related Complications	3 (7.3%)	0 (0)	0 (0)

The data reveals that Class B diabetics had an excess of mortality, RDS, transient respiratory problems, jaundice, and particularly hypoglycemia.

All the large babies that had size related complications discussed above were Class A, Class C and some other groups were entirely missing from our sample. The mode of delivery used in our patients, is summarized in the figure 1 and Table 6 and 7.

lie (2 patients) and fetal distress (4 patients). There were only 5 instances of fetal distress in the entire group of 49 (10%) yet 4 of these occurred in the much smaller primigravida group. One of the 2 preinatal deaths in the study also occurred in this group. Other complications were not different from the non-primigravida group.

Mothers on insulin were also compared to those not on insulin. 15 patients were on variable amounts of insulin (8 from Class A, 6 from Class B, and the sole Class D diabetic). The major difference noted was that the insulin dependent Class B diabetics' infants weighed a bit less - 6 lbs. 6 oz. as opposed to 7 lbs. 3 oz. in Class A and had a shorter gestation 35.6 weeks (38 weeks for Class A). The Class B infants had more RDS, 33% (25.0% for Class A) and more hypoglycemia 50% (0% for

Class A). Maternal complications are summarized in Table VIII.

TABLE 8

## Maternal Complications

- 1 Postpartum hemorrhage - controlled
- 1 Urinary tract infection - controlled
- 2 Third degree tears with large infants
- 1 Superficial thrombophlebitis
- 1 Thrombosed external hemorrhoids
- 4 Hypertension/Pre-eclampsia

## Discussion

Our experience with diabetes in pregnancy was in many respects similar to experiences of others. There were some differences. A limiting factor in the study was proper chart completeness. Nonetheless, several conclusions can be drawn.

Our incidence of diabetic pregnancy is only about  $\frac{1}{3}$  the expected. This probably indicates that some of the Class A diabetic patients in our Center were not diagnosed as such. If so, our screening procedures will have to be more rigorous. Alternatively, the figures reported in the literature may be higher than the actual incidence reflecting greater concentration of diabetic pregnancies in the reporting tertiary care referral centers.

Apparently higher incidence of perinatal mortality in our study will need further study with a larger sample. Fetal outcome in general was comparable to the outcome reported from other centers except for the increased incidence of RDS and hyperbilirubinemia. The lengths of gestations were near normal except for Class B pregnancies in which the infants were born about  $2\frac{1}{2}$  weeks early and weighed 13 ounces lighter. These latter infants had RDS

TABLE 6

## Fetal Outcome after Cesarean Section

No. of Patients	Deaths	RDS	Axphyxia	Trans. Resp. Distress
20	1	2	3	3
%	5%	10%	15%	15%

TABLE 7

## Mode of Delivery and Reasons for Choosing Cesarean Section

NSVD	Reason for CS	Repeat CS	Documented CPD	Distress Monitor	Failed Induct	Unusual Lie
29	20	8	4	5	1	2+
+ 1 Primp breech 1 Transverse lie						

and hypoglycemia more often than the general group. A possibly increased incidence of congenital malformations were also noted. Total incidence of pregnancy wastage also appeared to be higher, indicating the need for a prospective study of this facet. As expected, our Class B patients as compared to Class A, appeared to be more susceptible to moidity and mortality. All of the infants with the large size were from Class A. This may reflect a tendency towards macrosomia in this group.

Fewer Cesarean deliveries are being done in this Center. They appear to be concentrated in the primigravida group with the major indication being fetal distress especially when compared to the general group. This may reflect a tendency towards uteroplacental insufficiency in this subgroup. Cesarean section in the multiparous group were done often for reasons of cephalopelvic disproportion

or abnormal lie (which itself may be related to CPD) or repeat sections.

The best type of study in diabetic pregnancy would certainly be a prospective study but it is our opinion that each center should monitor its own experience with diabetic pregnancy so as to elucidate its own outcomes, strengths, and areas of weakness. Appropriate goals for improvement can then be instituted. Here the goal will be improved screening methods leading to more thorough and *early identification* of the diabetic pregnancies and effective antepartum *surveillance* including home monitoring and self-monitoring by patients, better *control* through treatment with newer techniques such as the insulin pump, and judicious use of NICU. Future studies will show if these means will improve the eventual outcome as has been noted by others Tables I, II.