

# "Pregnancy Complicating Diabetes" (1949), by Priscilla White

In 1949, Priscilla White published "Pregnancy Complicating Diabetes," which described the results and implications of a fifteen-year study about pregnant diabetic women. Published in the American Journal of Medicine, the article details possible causes of and ways to prevent the high fetal mortality rate associated with pregnant diabetic women. Diabetes is a disease in which the body's ability to produce or respond to the hormone insulin is impaired, and it can be particularly dangerous during pregnancies. In her article, White reported that prematurely delivering infants for diabetic pregnant women reduces infant and maternal mortality rates. "Pregnancy Complicating Diabetes" helped make premature delivery of infants the standard of care for diabetic pregnant women, and it has contributed to the increased survival rate of infants born from diabetic mothers from less than fifty percent in the 1940s to over ninety percent in 2017.

White cared for over 2,000 diabetic patients throughout her career and studied how diabetes affects women who become pregnant and their infants. She conducted the study discussed in "Pregnancy Complicating Diabetes" while working at the George F. Baker Clinic in Boston, Massachusetts, where she cared for diabetic women and children. White spent most of her career studying the effects of diabetes in young children and in pregnant women, as well as the effects that diabetes has on infants born from diabetic mothers. The survival rate of infants born from diabetic mothers was below fifty percent when White started working at the George F. Baker Clinic.

Her article is a summary of a study done at the George F. Baker Clinic of the New England Deaconess Hospital in Boston, Massachusetts which was conducted to determine possible causes and the means to prevent the high fetal wastage in diabetic pregnancies. It was a fifteen-year study that lasted from 1934 to 1949. The study included 439 viable diabetic pregnancy cases.

In her article, White discusses the study itself and analyzes data into four different tables. The first table displays the medical conditions that were associated with fetal fatalities. The second table depicts the amount of time the patients in the study had been living with diabetes, and how it was associated with vascular complications. The third table in the article describes the amount of cases in which pregnant women had abnormal, corrected, or normal amounts of sex hormones. The final table in the article divides the patients into classes A through F, which corresponds to fetal and maternal risks. Class A had the lowest risk, and Class F had the highest risk of complications to both the pregnant women their fetuses. Based on which class the patients were placed in, the researchers gave specific dosages of sex hormones such as stilbestrol and proluton.

In the beginning of her article, White describes the patients who participated in the study. Next, White moves on to her findings and discusses a table that contains data about infant mortalities, the conditions associated with fetal deaths, and the frequency of those conditions. As White details, "Table 1: Relative Frequency of Conditions Associated with Seventy-Eight Fetal Deaths" shows that fetal fatality occurred in seventy-eight of the 439 cases, or eighteen percent of those times. Of those seventy-eight fetal deaths, thirty-four were stillbirths and forty-four occurred in the neonatal period, which is the period that extends to a month after birth. Conversely, maternal fatality only occurred in one woman out of 439. According to White, the only maternal death occurred fifty days after delivery, and was caused by infectious hepatitis. White concludes that the main concern should be the fetus, not the mother.

Next, White discusses whether the length of time a person had lived with diabetes caused vascular complications, or complications that affect the vessels that carry blood throughout the body. The

section includes a second table, "Table II: Duration of Diabetes and Vascular Complications." White details how a survey was conducted as part of the study, given to the pregnant women that were diagnosed with diabetes before age fifteen and then lived at least twenty years with the disease. According to White, the survey showed that ninety-three percent of those patients had symptoms of vascular disease. From the survey data, White concludes that long duration of diabetes and early onset of the disease are associated with more than half of the fetal fatalities. White also notes that sixty-eight percent of the thirty-four stillbirths occurred late in pregnancy. From that, White argues that further research should be done on delivering the infant earlier in pregnancy, rather than letting it go its full course in order to avoid the death of an infant. Because a large percentage of the stillbirths occurred late in pregnancy, White considered that prematurely delivering the fetus was a possible treatment option for diabetic pregnant mothers.

A year prior to the publishing of the paper was the invention of the clinical grading scale of diabetic patients. This grading scale went from Class A through E, corresponding to the least fetal risk, or Class A, to the most fetal risk, or Class E. Class A is the one corresponding to the highest chance for fetal survival, and patients classified in Class A did not need dietary regulation or any insulin injections. Class F included all patients with nephritis, which is swelling or inflammation of the kidneys. Of the 439 cases, five percent were Class A, twenty-nine percent were Class B, forty-four percent were Class C, fourteen percent were Class D, seven percent were Class E, and one percent were Class F. The most common classification was Class B, which indicates a fairly moderate risk.

As her article continues, White discusses a third table, which depicts three classes of patients in regard to their sex hormone balance. The table is titled "Table III: Summary of 433 Cases Divided According to Sex Hormonal Balance." In the study, patients were classified based on their sex hormone balance as abnormal, corrected, and normal. According to White, nine of the pregnant women were classified as abnormal, 297 were classified as corrected, and the remaining forty-seven women as normal. White highlights that the survival rate for women in all three classifications was above fifty percent. The corresponding fetal survival rates for abnormal, corrected, and normal were fifty-eight percent, eighty-nine percent, and ninety-five percent. That proved that those with corrected sex hormones had a very high survival rate. Very few patients were classified as having an abnormal sex imbalance.

Next, White discusses the best ways to prevent fetal deaths in pregnant diabetic women. First, White says that proper treatment of the disease is the best way to prevent fetal death, which includes proper diet and exercise. Second, White argues that the use of hormone therapy was the most successful way to prevent fetal death, according to fetal survival rates obtained as part of the study. She then argues for the correction of two common conditions associated with pregnant diabetics, swelling, and hydramnios, or extra fluid that surrounds the fetus. Finally, White lays out two treatments directly relevant to the fetus, which are premature delivery and special care of the infant after birth.

After that, White discusses the amount of hormone therapy needed in each patient according to their clinical grade and number of weeks along in their pregnancy. The last table, titled "Table IV: Sex Hormonal Therapy in mg of Stilbestrol and Proluton According to Weekly Pregnancy and Clinical Classification." Administration of hormone therapy varied from oral, injections, and implantations of pellets. The dosage and frequency of hormone treatment depended on the clinical grade. Class A received no hormonal therapy, Class B and C received five to fifty mg of stilbestrol and proluton daily, Class D from ten to seventy-five mg, and Class E and F from 25 to 125 mg. However, that type of therapy was not required in the study and could be done by choice as early as the sixth week of pregnancy. Ironically, sex hormone therapy was the most favorable treatment, as the survival rate rose from fifty-eight to eighty-nine percent for those that received the treatment.

Finally, White includes the controversial issues that she argues arose because of the study. First, White writes that in patients who had been living with diabetes for twenty or more years, their fetal survival rates were only twenty percent. Critics of the study argued that it was pointless to conduct the study, because even if the survival rate was increased, it is unlikely that it would be by much. Furthermore, critics argued that if the patient had been living with diabetes for a long time and also had vascular disease complications, the survival rate was only ten percent. Next, White discusses that critics argued that it was unknown which organ in the body was responsible for the diabetes and

complications that arose because of that. The three suspects were the endocrine glands, pituitary glands, and the placenta. However, White concedes that her study did not determine if it was one, or a combination of the three glands in the human body that caused diabetes onset. At the end of the article, White states that although the fetal survival rate is ninety percent, diabetic pregnant women will not have the same experience during pregnancy as normal women.

When White published her article in 1949, it brought attention to the issue of pregnant diabetic women and the health outcomes of giving birth for both the pregnant woman and the infant. As of 2017, the article has been cited over 500 times. White took the treatments she used in the study and used those treatments at the Joslin Clinic where she worked. Those treatments became standard of care for pregnant women with diabetes and changed the treatment and outcomes of diabetic pregnant women and their infants, increasing the survival rate of both and infant and the mother to over ninety percent.

## Sources

1. Gellis, Sydney S., Priscilla White, and William Pfeffer. "Gastric suction: a proposed additional technique for prevention of asphyxia in infants delivered by cesarean section." *New England Journal of Medicine* 240 (1949): 533-7.
2. White, Priscilla, and Hazel Hunt. "Pregnancy complicating diabetes: A report of clinical results." *The Journal of Clinical Endocrinology & Metabolism* 3 (1943): 500-11.
3. White, Priscilla. "Pregnancy complicating diabetes." *The American Journal of Medicine* 7 (1949): 609-16.
4. White, Priscilla, Philip Koshy, and Janine Duckers. "The management of pregnancy complicating diabetes and of children of diabetic mothers." *Medical Clinics of North America* 37 (1953): 1481-96.