

Women and Medicine

Pregnancy Complications of Physicians

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Studies indicate an increased risk of adverse late pregnancy events, such as preterm labor and preterm delivery, for practicing physicians. These adverse pregnancy outcomes also occur among pregnant women who work long hours with high levels of psychological stress, a mechanism most likely related to catecholamine and posturally mediated alterations in uterine blood flow. Further evaluation and research into the epidemiology of physicians' pregnancies are needed because of the increasing number of women physicians in their childbearing years.

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Greganti and Fletcher, in an editorial on physician pregnancies, said, "We are concerned that the number of complicated pregnancies among women on our housestaff may have been more than expected."¹ This sentiment has been held by obstetricians throughout the medical community. As the number of women physicians has increased, the number of published reports verifying the accuracy of that concern has also increased.

Analyzing physician pregnancies is important for several reasons. First, the number of physician pregnancies in the United States alone makes for a numerically significant "high risk" group. Additionally, physician pregnancies are a model for understanding the effect a person's environment can have on health and disease. An understanding of the problems of physician pregnancies may elucidate important aspects of the pathophysiology that can be extrapolated to other pregnant women. Finally, confronting the fact that physicians may have more problems with pregnancy than most other women disturbs the facade of immunity to disease that pervades the medical profession. We review current information about physician pregnancies and make some suggestions about solving the problems these physicians may face.

The Number of Physician Pregnancies

A growing number of physicians are women. Half of the residents in training in Canada and Great Britain are women, as are nearly 40% of physicians in training in the United States.^{2,3} Schwartz calculated that by 1991 there will be 80,000 physicians in their childbearing years.⁴ Surveys project that as many as 90% of women physicians desire children, and two thirds of currently practicing physicians have children.⁴⁻⁶ A recent study reported that the average married physician has between two and three children and that half of women physicians had a child during training.⁷ We estimate that during a three-year residency, at any given time one of

every six married women will be pregnant; between 10,000 and 15,000 physician pregnancies will occur in the United States per year by 1991. If the percentage of women in training in the US rises to 50% (as has been projected) the number of physician pregnancies will increase proportionally. Thus, physicians represent a substantial subgroup of the pregnant population.

Are Physicians at High Risk for Adverse Pregnancy Outcomes?

The question of whether physicians are at increased risk for adverse pregnancy outcomes has not been answered satisfactorily. A large prospective analysis of hundreds of physician pregnancies has not been done. Information concerning pregnancy outcomes of physicians is available only from retrospective studies, surveys, and questionnaires, with their inherent methodologic limitations. Almost all of these reports do, however, reflect an increased risk of complications for pregnant physicians.^{4,8-11}

Schwartz retrospectively studied 72 pregnancies among 34 physicians and medical students during a four-year period and found a rate of abruptio placentae ten times greater than expected and a 12% incidence of preterm labor.⁴ Through a questionnaire, Grunebaum and co-workers studied 454 pregnancies among obstetricians.⁸ When the pregnancies were separated into categories of resident and nonresident, these investigators found an 11.6% rate of low birth weight and an 8% incidence of intrauterine growth retardation among residents. These rates are much higher than would be expected in a population matched for age and socioeconomic status. These rates also compared with a 2.6% incidence of low birth weight and 1% incidence of intrauterine growth retardation for babies born to women physicians after residency. Birth weights were significantly lower for those babies born during a woman physician's residency than either before or

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after training. As a result, these infants would be more susceptible to neonatal illness.

In a prospective analysis of the relationship between occupation and pregnancy outcome, McDonald and associates surveyed 56,000 pregnancies.¹⁰ There was a decreased risk of miscarriage and stillbirth among 295 physicians and dentists compared with the overall population.

Miller and colleagues did a historical cohort study of a ten-year period at a university hospital obstetric practice to determine if physician pregnancies were associated with more adverse pregnancy events than pregnancies of women of similar socioeconomic status.¹¹ A total of 67 pregnancies of practicing physicians were matched one to three with 201 nonphysicians' pregnancies for age, race, educational level, parity, and date of delivery. Alcohol and tobacco use and adequacy of prenatal care were controlled for in statistical analysis. Adverse events were defined as preterm labor, preterm delivery, low birth weight, abruptio placentae, toxemia, and perinatal mortality.

Overall, physicians were at a 1.8 times increased risk for at least one adverse outcome in pregnancy. These included, for physicians, a 4.0 times increased risk of preterm labor, defined as contractions and documented cervical change, and a 2.3 times greater likelihood of preterm delivery. The cesarean delivery rate, incidence of fetal distress in labor, mean birth weight of term infants, and Apgar scores of less than 7 at five minutes were found to be similar between the physician and nonphysician groups, however. Physician pregnancies showed a trend ($P < .1$, $P > .05$) towards more meconium-stained fluid. There was no difference between the two groups in the use of obstetric technologies, with the exception of the number of ultrasound examinations.¹¹

Thus, the available literature regarding physicians' pregnancies seems to show an increase in the late pregnancy complications of preterm labor, preterm delivery, low birth weight, and abruptio placentae. Of special interest is the outcome of preterm labor because this can lead to preterm delivery with its attendant neonatal morbidity and mortality. Although eight physicians and six nonphysicians in the Miller study had preterm labor, only three physicians delivered preterm infants. All other infants were delivered at term after successful treatment of the preterm labor.¹¹ This underscores the importance of close obstetric monitoring and treatment.

Early pregnancy complications such as miscarriage or congenital anomalies are even less well studied than late ones. Studies of pregnant women's exposure to anesthetic gases, toxic chemicals, radiation, and a variety of infectious diseases suggest all cause an increased risk of adverse pregnancy events.¹²⁻¹⁷ Many of these studies are methodologically flawed, but most pregnant physicians are aware of the proposed associations and are likely to take precautions in these areas. Obstetric histories in patients studied by Miller, Schwartz, and McDonald and co-workers did not indicate increased miscarriage or stillbirth rates.^{4,10,11}

Why Physicians Might Be at Risk for Adverse Late Pregnancy Events

Several aspects of a physician's job might put her at risk for an adverse pregnancy outcome. Authors who have noted the increased incidence of adverse outcomes in late pregnancy have suggested that these may be caused in part by the amount of work that physicians do.^{4,8,11} While physicians are

likely to take precautions to avoid exposure to gases, chemicals, and infections, limiting exposure to strenuous work may be more difficult. Most pregnant physicians work long hours.^{4,6,8,11} One study indicated that women residents worked an average of 95 hours per week.⁶ After residency training, long hours and long shifts are still the norm rather than the exception.^{4,18} The relationship between maternal work and pregnancy outcome has been studied extensively. While no association has been found between employment that is not strenuous and adverse pregnancy events, pregnant women with strenuous jobs—excessive work hours, lifting, and being upright for long periods—have been found to be at increased risk for preterm labor, preterm birth, low birth weight, abruptio placentae, toxemia, intrauterine growth retardation, and perinatal mortality.¹⁹⁻²⁶ This is the constellation of adverse pregnancy outcomes particular to physicians. The severity and frequency of adverse outcomes increase as the number of hours and physical stress increase.^{8,10,20,21,24}

The emotional and physiologic stresses of medicine are incomparable to other occupations and add particular hazards to physician pregnancies. Not only is the job of being a physician stressful, but when a physician becomes pregnant, extra stresses are added.^{1,3,6,27,28} In a study by Sayres and associates, 67% of residents reported that their pregnancies had created resentment among their peers and 57% of physicians said that their pregnancies caused administrative difficulties as well.⁶ Psychological stress has been documented to be a risk factor for preterm labor and preterm delivery.²⁹⁻³² Thus, physicians' work can be considered both strenuous and stressful, two factors that are associated with prematurity, low birth weight, and placental abruption.

Pathophysiologic Mechanisms of Stress on Adverse Outcomes

The constellation of adverse pregnancy outcomes to which physicians seem susceptible is most likely caused by a decrease in uterine blood flow, mediated by catecholamines and postural effects. An upright posture leads to a decrease in cardiac output, with altered uterine blood flow. Blood is shunted to the extremities, and fluid tends to pool in the lower extremities during long periods of standing.³³⁻³⁵ Changes in the fetal heart rate pattern, an increased maternal heart rate, and decreased maternal blood pressure and venous return have been documented,^{33,34} as well as decreased uterine blood flow. The result is a decreased availability of nutritional substrates, leading to lower birth weights.

The magnitude of the changes in uterine blood flow is proportional to gestational age and is greatest at term. The theory that altered uterine blood flow is related to low birth weight is corroborated by studies that have shown that women who stopped working in the last weeks of pregnancy or who stopped exercising in the third trimester have had infants of greater birth weight compared with controls.^{36,37} Thus, decreases in uterine blood flow may be a significant factor contributing to low birth weight in many physician pregnancies.

When psychological stress is added to the long hours a physician works, a further decrease in uterine perfusion may occur. Occupational stress leads to a greater production of catecholamines. Timio and colleagues measured urinary excretion of adrenaline (epinephrine) and noradrenaline (norepinephrine) and observed an increase proportional to the

degree of psychological stress in the workplace.³⁸ Catecholamines cause vasoconstriction in the uterus by adrenergic receptors in uterine vessels.^{39,40} Excessive vasoconstriction is associated with abruption and placental infarction. Chronic vasoconstriction may lead to intrauterine growth retardation.⁴¹

The relationship between excessive work and premature labor may involve changes in the levels of progesterone.³² Progesterone is the primary hormone responsible for uterine relaxation. We also speculate that long periods of standing could lead to greater pressure on the uterine contents by the cervix, thus leading to increased uterine contractility and premature labor. The decreased plasma volume associated with being upright could stimulate increased production of oxytocin with decreased intravascular volume.³⁵ Thus, several factors of a physician's job have a negative impact on the uteroplacental unit.

Areas for Future Research

Several areas of research are needed to confirm the hypothesis that the increased incidence of late adverse pregnancy outcomes among physicians is related to strenuous work and increased stress.

- An evaluation is needed of physicians' pregnancy outcomes that quantifies work hours, call schedules, and subspecialties in an effort to determine actual work intensity. Such a study must be appropriately matched with a control group for factors known to affect pregnancy outcomes.
- A similar evaluation concentrating on physicians' pregnancies during residency training is also necessary.
- A comparative evaluation of biochemical markers of stress—urinary catecholamines, for example—may help substantiate the role of stress in pregnancy outcomes. Similarly, evaluating the placentas of pregnant physicians, looking for histologic changes due to chronic hypoxia and chronic vasoconstriction, would add to our understanding.

Recommendations

Several recommendations have been made to help decrease the risks for adverse pregnancy outcomes in physicians.^{4,8,11} These call for decreased work hours, changes in night call schedules, and lengthened maternity leave, all justified and appropriate recommendations. As stated previously, the greatest factor leading to poor pregnancy outcomes among physicians seems to be time spent working, particularly during late pregnancy. Unfortunately, changes in schedules are often difficult to enact in the milieu of a training program or with a physician just starting practice.

There are several simple suggestions that we give to pregnant physicians in our practice. At the University of North Carolina at Chapel Hill, we consider pregnant physicians at high risk for adverse outcomes and follow them more closely than low-risk pregnant patients. At the initial prenatal visit, we discuss what is known about physicians' pregnancy outcomes. We explain the increased risk of prematurity and preterm labor and emphasize the relationship of prematurity to long working hours and increased stress. We make a point of documenting gestational age as early as possible by both ultrasound study and cervical examination. Physicians receive a cervical examination at 24 to 26 weeks' gestation to detect silent dilatation. The cervix is inspected at that time, and the vaginal flora is evaluated. If abnormal vaginal flora or discharge is found, it is treated.

Physicians are counseled again at the end of the second trimester regarding signs of premature labor. Early premature labor—contractions before cervical change—is usually treatable, whereas premature labor once cervical dilatation has occurred is a much more difficult process to interrupt. We attempt, therefore, to sensitize pregnant physicians to uterine contractility. If there seems to be an increase in contractions, we ask them to notify us. We ask residents to try to schedule their least stressful rotations during a pregnancy's "window of vulnerability"—26 to 34 weeks. We recommend elevating the legs whenever possible during the day and tell pregnant physicians to take a lunch break with their feet up. If contractions occur at a rate of greater than four per hour during the late second or early third trimester, we ask these women to take a few days of bed rest and stop night call. After uterine irritability stops, they may resume an 8 AM to 5 PM schedule with careful observation.

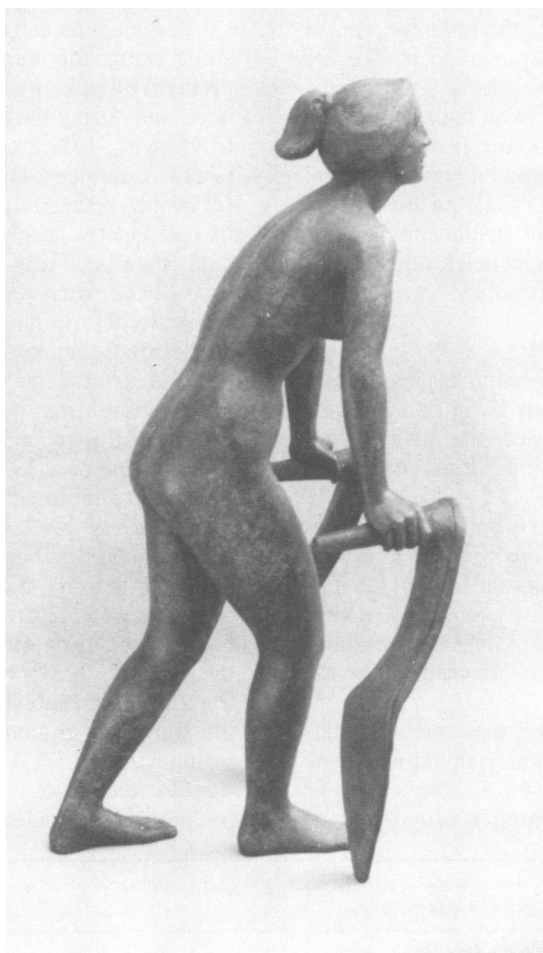
Another problem for physicians is decreased oral intake during the working day. Because relative dehydration can cause an increase in uterine contractility, we ask our patients to drink 6 to 8 ounces of liquid, not coffee, per hour. We ask physicians to drink from a water fountain every time they pass one. If bleeding or decreased growth occurs at any time, bed rest is recommended.

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Cinderella

Medium: Bronze

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