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This information should not be construed as dictating an exclusive course of treatment or procedure to be followed.

Methamphetamine Abuse in Women of Reproductive Age

ABSTRACT: Methamphetamine abuse has continued to increase in the United States since the late 1980s with its use spreading from the West Coast to areas across the country. Methamphetamine use in pregnancy endangers the health of the woman and increases the risk of low birth weight and small for gestational age babies and such use may increase the risk of neurodevelopmental problems in children. All pregnant women should be asked about their drug and alcohol use. Urine toxicology screening may be useful in detecting methamphetamine and other substance abuse during pregnancy, but this screening should only be done with maternal consent after counseling regarding the potential ramifications of a positive test result. Women reporting continuing use of methamphetamine in pregnancy should be referred for treatment and followed up with serial ultrasound examinations to assess fetal growth.

Trends in Use of Methamphetamine

The abuse of methamphetamine has been increasing in the United States since the late 1980s. After alcohol and marijuana, methamphetamine is the drug most frequently abused in many western and midwestern states (1). Methamphetamine is the only illegal drug that can be easily made from legally obtained ingredients (2). The availability is fueled by the low cost of methamphetamine compared with other illicit drugs of abuse, its production in large and small clandestine laboratories in the United States, and its importation from Mexico. According to the 2008 National Survey on Drug Use and Health, 5% of the U.S. population older than 12 years have tried methamphetamine at some time in their lives, with 0.3% (850,000) reporting use in the past year, and 0.2% (314,000) reporting use in the past month (3). The Drug Abuse Warning Network reported a 126% increase in the number of emergency department visits related to methamphetamine abuse from 1995 to 2002 (4). The treatment admissions for methamphetamine abuse have increased from approximately 1% in 1992 to more than 9% of admissions in 2006 (5). Among pregnant women, admissions for the treatment of methamphetamine abuse increased from 8% of federally funded treatment admissions in 1994 to 24% by 2006, with 73%

of these admissions occurring in the western states (6). Obstetrician–gynecologists need to be aware of the prevalence of methamphetamine use to improve identification of women who are using methamphetamine and to provide adequate care and referral for treatment.

Physiology of Use

Methamphetamine is a more potent stimulant drug than its parent compound, amphetamine. Amphetamines were widely prescribed in the 1950s and 1960s for depression and obesity, but were changed to Schedule II of the Controlled Substances Act in 1971 after the potential for abuse and addiction was recognized (1). Medical indications for methamphetamine are narcolepsy and attention deficit disorder, but it should only be used when these disorders are unresponsive to other treatments and at much lower doses than those typical for recreational use (7). Street names for methamphetamine include meth, speed, ice, crystal, chalk, crank, glass, black beauties, and bikers' coffee.

Methamphetamine can be smoked, snorted, injected, or ingested orally or anally (7, 9). When methamphetamine is smoked or injected, the user experiences an intense rush that lasts only a few minutes. Snorting or oral use of the drug produces euphoria but not the intense

high that is experienced if it is smoked or injected. The effects of snorting are felt within 3–5 minutes and within 15–20 minutes when ingested orally. Methamphetamine has a longer half-life than cocaine and has additional mechanisms of action in the central nervous system. Both cocaine and methamphetamine block re-uptake of dopamine at nerve endings, but methamphetamine also increases the release of dopamine, leading to higher concentrations of dopamine in the synapse, which may be toxic to nerve terminals. The half-life of methamphetamine is approximately 12 hours compared with approximately 1 hour for cocaine (7). Besides the euphoria, the short-term effects of methamphetamine use include increased wakefulness and energy and decreased appetite. Potential complications of methamphetamine use include arrhythmias, hypertension, seizures, and hyperthermia. Increased sexual activity related to methamphetamine use may increase the risk of human immunodeficiency virus (HIV) and other sexually transmitted infections. Consequences of long-term use include addiction, a chronic, relapsing disease characterized by compulsive drug seeking, anxiety, confusion, insomnia, memory loss, weight loss, severe dental problems (“meth mouth”), depression, and violent behavior (8). Long-term users may display psychotic symptoms, including paranoia, visual and auditory hallucinations, and delusions, including the sensation of insects crawling under the skin (formication). Psychotic symptoms may persist for months or years after stopping use and may recur over time. Brain imaging studies of long-term methamphetamine users have shown severe structural and functional changes in areas of the brain associated with emotion and memory, which may be reversible over months to years after stopping use. Withdrawal symptoms from methamphetamine use include depression, anxiety, fatigue, and intense drug cravings.

Effects on Pregnancy and Infant Outcome

The effects of methamphetamine use on pregnancy and the infant have been less well-studied than those of opiates, alcohol, and cocaine. In addition, women who use methamphetamine frequently use tobacco, alcohol, and other drugs, which may confound the birth outcomes (9). Because of unrestricted manufacturing processes and chemical additives used by dealers to expand drug volume, a potential risk of illicit drug use is teratogenicity. Case reports and retrospective analyses have suggested that maternal methamphetamine use may be associated with a possible increase of defects of the fetal central nervous system, cardiovascular system, gastrointestinal system, as well as oral cleft and limb defects (10–12). However, case-control and prospective studies have not confirmed these findings (13–15). The Teratogen Information System database has assessed the risk of teratogenicity after exposure to amphetamines during pregnancy as unlikely based on fair to good data (16).

The risk of small for gestational age (SGA) and low birth weight babies is consistently increased with methamphetamine use in pregnancy. In follow-up studies of a cohort of 65 children born to Swedish women who used amphetamines during pregnancy, their weight, height, and head circumference were all below those of an unselected sample at birth, 1 year, and 4 years of age (17). However, the women used many other substances and the control group was not matched for these exposures. More recent studies have been consistent in finding lower birth weights and increased rates of SGA infants in methamphetamine exposed pregnancies compared with controls (18, 19). In a prospective study specifically designed to enroll methamphetamine users and appropriate controls, the rate of SGA infants was 3.5 times higher with methamphetamine exposure, even after adjustment for such factors as alcohol and tobacco use and maternal weight gain (20). Whether or not methamphetamine use increases the risk of other pregnancy complications, such as hypertension, preterm birth, or placental abruption, is unclear (21).

In an ongoing prospective study of a cohort of children born to women who used methamphetamine during pregnancy and matched controls, prenatal methamphetamine exposure was associated with decreased arousal, increased stress, and poor quality of movement in the newborn (9). In a small study of 13 children with in utero methamphetamine exposure and 15 unexposed children aged 3–16 years, children with methamphetamine exposure scored lower on tests of attention, visual motor integration, verbal memory, and long-term spatial memory, but were similar in motor skills, short delay spatial memory, and nonverbal intelligence (22). Reductions in volumes in the putamen, globus pallidus, and hippocampus on magnetic resonance imaging among methamphetamine exposed children correlated with poorer performance on attention and memory tasks. Functional magnetic resonance imaging studies in methamphetamine-exposed and alcohol-exposed, alcohol-only exposed, and control children found more diffuse activation in the brains of the methamphetamine group during verbal memory tasks, suggesting recruitment of compensatory systems. These changes were not seen with alcohol only groups or control groups (23). In a recent study of 276 women who reported or tested positive for methamphetamine use during pregnancy, multiple risks of pregnancy complications were disclosed. Of the 276 women in the study, 78% were active tobacco smokers, 14% consumed alcohol regularly during the pregnancy, and 24% tested positive for multiple illicit substances at the time of presentation to the hospital (2). In comparing birth outcome for this cohort with controls, their babies had lower Apgar scores at 1 minute and 5 minutes, and higher neonatal mortality and maternal intensive care unit admissions (2).

Taken together, findings to date do not support an increase in birth defects with use of methamphetamine

in pregnancy, but methamphetamine use is consistently associated with SGA infants and appears to be associated with neonatal and childhood neurodevelopmental abnormalities. Continued surveillance of these children is indicated, especially considering the potential for multiple contaminants in the drug and concomitant substance exposure, but as stated, further follow-up and evaluation are required.

Breastfeeding and Amphetamines

Amphetamine use inhibits prolactin release and can reduce breast milk supply (24). The concentration of amphetamines found in breast milk is 2.8–7.5 times higher than those found in maternal plasma (25). It is reported that infants who ingest the breast milk of women using amphetamines exhibit increased irritability, agitation, and crying (26). Amphetamines purchased illegally often contain a mixture of substances with unpredictable harmful effects on the woman and her infant. Therefore, women who are actively using methamphetamine should not breastfeed.

Identification of Methamphetamine Use

Given the potential risks to maternal, fetal, and infant health with methamphetamine use in pregnancy, identification of use is important. All pregnant women should be asked about past and recent smoking, alcohol, and other drug use as part of the prenatal history. Asking about partner substance use may aid patient disclosure of personal drug use (27). Studies have shown that pregnant methamphetamine users are more likely to be white, young, and unmarried (28, 29). Women using methamphetamine often seek prenatal care late in pregnancy and experience poor weight gain. Signs of methamphetamine use include track marks from intravenous injection, malnutrition, severe dental decay, and skin abscesses from skin picking secondary to formication (8). Urine toxicology screening is an adjunct to detect or confirm suspected substance abuse. However, screening should only be done with consent, and the pregnant woman must be informed of the potential ramifications of a positive test result, including any mandated reporting requirements (30, 31). Screening for substance abuse should be seen as part of complete obstetric care but should be done in partnership with women to maintain care and allow for appropriate referral to treatment. Obstetricians should be aware of laws and regulations in their practice locations regarding reporting of maternal toxicology testing (31). Meconium testing for methamphetamine use also may be used after parental consent, but immunoassay positive test results should be confirmed by methods such as gas chromatography-mass spectrometry because false positive test results are frequent (32). Testing of infant hair or umbilical cord specimens has been evaluated but is not routinely available (33).

Treatment

All women reporting methamphetamine use should be counseled and offered help to discontinue use. An excellent model of screening and brief intervention strategies for the clinician can be found in the American College of Obstetricians and Gynecologists' Committee Opinion No. 422 "At-Risk Drinking and Illicit Drug Use: Ethical Issues in Obstetric and Gynecologic Practice" (30). Women who are unable to stop using methamphetamine or other drugs during pregnancy or who desire treatment when they are not pregnant should be referred for treatment. Given the intensity of treatment required and the urgency of treatment in pregnancy, it is highly recommended that pregnant women seek care voluntarily at a residential treatment center whenever possible. If outpatient treatment is used, intensive schedules of three to five visits per week are needed for the first several weeks with two to three sessions per week continuing for at least 90 days after initiation (34). Cognitive-behavioral therapy, such as the Matrix Model, which includes behavioral therapy, family education, individual counseling, 12-step support, and drug testing is recommended (35, 36). Contingency management interventions, which provide tangible incentives in exchange for engaging in treatment and maintaining abstinence, also have been shown to be effective (37). No pharmacologic treatments have been shown to be effective thus far.

Pregnant women using methamphetamine should receive comprehensive prenatal care, including nutritional assessment and social support services. They should be tested for sexually transmitted infections and HIV. Given the increased rate of fetal growth restriction with methamphetamine use, baseline ultrasonography for clinical dating should be obtained early in pregnancy with follow-up ultrasound examinations for growth determination in the third trimester. Additional assessments such as fetal surveillance should be done as clinically indicated. Appropriate follow-up and support of the woman and her infant after delivery are important because the stresses of the postpartum period may increase the risk of relapse.

Resources

The following resources are listed for information purposes only. Listing of these resources and web sites does not imply the endorsement of the American College of Obstetricians and Gynecologists. This list is not meant to be comprehensive. The inclusion or exclusion of a source or web sites does not reflect the quality of that source or web site. Please note that web sites are subject to change without notice.

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