PSYCHOLOGICAL CHARACTERISTICS RELATED TO COCAINE USE DURING PREGNANCY: A POSTPARTUM ASSESSMENT

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This study assessed four psychological factors that have been suggested by previous research to be highly correlated with drug use. Twenty-one postpartum urban African-American women served as the research participants. At parturition, 10 infants tested positive for cocaine and 11 did not. Measures of depression (Beck Depression Index), anxiety (Spielberger Trait Anxiety Inventory), anger/self-control (Self-Analysis Questionnaire), and sociopathy (California Personality Inventory subscale) were obtained from the mothers within 6 weeks of delivery. Women who gave birth to cocaine-positive infants were significantly more depressed and had significantly higher sociopathy scores than their cocaine-negative counterparts. No differences with respect to anxiety and anger were obtained. The implications of these findings, as well as the potential adverse effects of cocaine use during pregnancy, are discussed. (*J Natl Med Assoc.* 1993;85:758-760.)

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Cocaine, especially its more potent derivative, "crack," continues to be one of the most abused psychoactive substances in the United States.[1] Recent epidemiological data estimate 5 million regular users of cocaine, and at least 30 million more have experimented with the drug.[2,3]

Given cocaine's broad general use in the United States, it is not surprising that cocaine use during pregnancy also has increased dramatically.[4] Because of its high water and lipid solubility, cocaine has the ability to diffuse swiftly across mucous membranes and thus poses a particular threat to the developing fetus. This risk is enhanced by the slower rate of fetal metabolism and slower drug clearance. Animal[5] and human[4,6,7] studies involving subtoxic levels of cocaine have demonstrated teratogenic outcomes. These studies reveal that cocaine promotes a range of harmful obstetrical outcomes such as spontaneous abortion, abruptio placentae, and stillborn infants. In addition, cocaine was found to produce placental vasoconstriction, which decreases blood flow to the fetus and increases norepinephrine levels and uterine contractility in pregnant women. These effects have been implicated in increased risk for lower gestational age, decreased birthweight, fetal hypertension, and tachycardia as a result of in utero exposure to cocaine.[8,9]

Cocaine use also is associated with neuropsychiatric disorders in the mother, including anxiety, major depression, psychosis, and organic brain syndromes. In

addition, cocaine use and abuse frequently is associated with antisocial personality disorder.[10]

The degree of psychiatric disturbance is dependent on drug dosage, length of drug use, and overall health and nutritional status, as well as premorbid personality and psychological functioning. Additionally, neuropsychological problems are particularly evident in chronic cocaine users with attention and concentration, verbal and visual memory, problem-solving, abstraction, and behavioral disinhibition frequently being observed.[10,11] However, depression is the most frequent accompaniment of long-term cocaine use and may result from either cocaine withdrawal or cocaine's direct pharmacological effects on principally the neurotransmitter systems, dopamine, serotonin, and norepinephrine.[12]

The purpose of this pilot investigation was to evaluate specific psychological characteristics of women who had used cocaine during pregnancy. It was hypothesized that cocaine-abusing mothers would be significantly more depressed, anxious, evidence higher levels of sociopathy, and exhibit more anger and hostility than their noncocaine-abusing counterparts.

METHOD

Subjects

The study was conducted at the Biobehavioral Research Center, Drew University of Medicine and Science. All subjects were recruited from the Pediatric Perinatal Care Unit at the King/Drew Medical Center. Twenty-one African-American women who had recently given birth (within 6 weeks) served as the study participants. Ten mothers met *DSM-III-R* criteria for cocaine abuse and were identified as the cocaine-positive group; 11 mothers did not meet clinical criteria for use or abuse and were designated as cocaine-negative controls. The age of the subjects ranged from 16 to 31 (mean: 24.8 years for the cocaine-positive group and 20.4 years for the cocaine-negative group). Urine toxicology at parturition indicated that 11 infants were drug-free and 10 tested positive for cocaine.

Measures and Procedure

After the mothers were discharged from the Medical Center, they were contacted by telephone and prescreened for their appropriateness and willingness to participate in the study. After signing the informed consent statement, a neuropsychologist or psychiatrist performed a detailed structured clinical interview that addressed birth control behaviors, attitude toward pregnancy, substance use behavior, method of administration of any drugs, knowledge of the drug-related complications during pregnancy, and the nature of interpersonal relationships. All interviews were tape recorded. Next, the Beck Depression Inventory,[13] the Spielberger Trait Anxiety Scale,[14] the Self-Analysis Questionnaire, and the Sociopathy subscale of the California Personality Inventory[15] were administered. At the completion of the testing, each subject was paid $10 for their participation.

TABLE. PSYCHOLOGICAL SCORES OF COCAINE-POSITIVE MOTHERS AND CONTROLS

Psychological Scale	Group*	
	Cocaine-Positive	Controls
Depression	19.1 ± 7.62	11.2 ± 9.40
Anxiety	49.7 ± 7.54	45.2 ± 9.40
Anger	65.6 ± 14.30	64.5 ± 15.27
Sociopathy†	25.7 ± 3.09	32.5 ± 5.01

*Mean ± standard deviation.
†As the score on this measure decreases, there is a corresponding increase in purported antisocial behavior.

RESULTS

The results on the psychological measures are presented in the Table. A series of ANOVAs were conducted, testing for group differences on sociopathy, depression, anger, and the trait anxiety.

A significant difference on sociopathy was found ($P<.002$; $F=13.48$), with cocaine-positive mothers scoreing higher than cocaine-negative mothers. A significant difference on depression also was found ($P<.05$; $F=4.44$), with cocaine-positive mothers scoring higher than cocaine-negative mothers. No significant differences on trait anxiety scale and anger/hostility were obtained. However, in both cases, cocaine-positive mothers had higher mean levels of both anxiety and anger.

DISCUSSION

This study assessed some of the psychological characteristics of mothers who used cocaine during pregnancy. It was hypothesized that cocaine-abusing mothers would be more anxious, depressed, antisocial, and angry than their noncocaine-abusing counterparts. The results partially supported this hypothesis.

As noted, mothers who used cocaine during pregnancy were significantly more depressed than mothers who did not. Whether the depression was secondary to dopamine depletion as a result of the direct pharmacologic effects of cocaine or whether mothers who abuse cocaine are more likely to be subject to the postdelivery

neurohormonal changes associated with gestation is unknown. During pregnancy, this heightened state of central nervous system and endocrine arousal may have consequences for the pregnancy outcome. Perhaps these factors were additive as cocaine-induced depression is well established in both males and females.

Additionally, in Los Angeles, a positive toxicology screen for illicit drugs results in a potential legal problem, and the newborn is typically removed from the custody of the mother. As a result, we cannot rule out that some of the mothers may have been depressed due to the loss of custody of their newborns as a result of their drug use behavior in addition to the negative social stigma associated with such behavior.

Antisocial personality disorder, as previously stated, frequently is associated with drug abuse. It is characterized by a chronic pattern of irresponsible interpersonal and social conduct that is often evinced in childhood and persists through adulthood. Individuals manifesting this disorder demonstrate an inability to identify meaningfully with others, difficulty developing and sustaining close familial and interpersonal relationships, difficulty experiencing guilt, conflict or anxiety, have inconsistent work histories, engage in illegal activity, demonstrate more self-destructive behavior, and have been linked consistently to the use of psychoactive substances.[10] In particular, cocaine use, due to its powerfully addictive and reinforcing properties, dominates an individual's way of life and requires cocaine users to spend so much of their time seeking drugs that they abandon all semblance of a normal productive life, including the concern for a significant other such as a developing fetus.

However, relative to the human data on perinatal cocaine use, care must be taken in interpreting these research findings since cocaine users frequently have lifestyles characterized by poor eating habits, increased risk of trauma, and indifferent prenatal care, each of which can lead to poor obstetrical outcomes. Nevertheless, current evidence suggests that cocaine, either directly through its pharmacological properties or indirectly as a result of the lifestyle of cocaine abusers, can adversely affect the psychological and physical health of both the mother and developing fetus.

Another intriguing explanation for the continuance of drug use during pregnancy is organic brain impairment secondary to the neurotoxic and vasoconstrictive influence of cocaine on the microvasculature of the brain. Members of our group have demonstrated significant cerebral blood flow compromise in the frontal region of the brain in long-term cocaine abusers.[11] This blood flow compromise correlated highly with neuropsychological deficits observed in these patients. As a result, the poor planning, impulsivity, and lack of self-control associated with persistent drug use in our sample during pregnancy may be related to the compromise of select subcortical-frontal system circuits of the brain that are responsible for judgment, impulse control, planning, sequencing, mental flexibility, and the organization and modulation of other complex higher cortical functions and behaviors.[11,12]

Literature Cited

1. Abelson HI, Miller JD. A decade of trends in cocaine use in the household population. *NIDA Res Monogr.* 1985;61:35-49.
2. Fishburn PM. *National Survey on Drug Abuse: Main Findings: 1979.* Rockville, Md: National Institute of Drug Abuse; 1980. US Dept of Health and Human Services publication ADM 80-976.
3. Adams EH. *Abuse/Availability Trends of Cocaine in the United States: Drug Surveillance Reports.* Vol 2. Rockville, Md: NIDA Division of Epidemiology and Statistical Reports; 1982.
4. Chasnoff J, Burns KJ, Schnott SH, Burns KA. Cocaine use in pregnancy. *N Engl J Med.* 1985;313:666-669.
5. Mahalik MP, Gautiere RF, Mann DE. Teratogenic potential of cocaine hydrochloride in CF-1 mice. *J Pharm Sci.* 1980;69:703-706.
6. Bingol N, Fuchs M, Diaz V, Steve RK, Gromisch DS. Teratogenicity of cocaine in humans. *J Pediatr.* 1987;110:93-96.
7. Chasnoff IJ. Perinatal effects of cocaine. *Contemporary Ob/Gyn.* 1987;5:163-179.
8. Isner JM, Estes NAM III, Thompson PD, Costanzo-Nordin MR, Subramanian R, Miller G, et al. Acute cardiac events temporally related to cocaine abuse. *N Engl J Med.* 1986;315:1438-1443.
9. MacGregor SN, Keith LG, Chasnoff IJ, Rosner MA, Chisum GM, Shaw RN, et al. Cocaine use during pregnancy: adverse perinatal outcome. *Am J Obstet Gynecol.* 1987;157:686-690.
10. Rounsaville BJ, Anton SF, Carroll K, Budde D, Prusoff BA, Gawin F, et al. Psychiatric diagnoses of treatment-seeking cocaine abusers. *Arch Gen Psychiatry.* 1991;48:43-51.
11. Strickland TL, Mena I, Meyer J, Miller B, Mahringer M, Satz P, et al. Cerebral perfusion and neurocognitive consequences of chronic cocaine use. *J Neuropsychiatry Clin Neurosci.* In press.
12. Manscherck TC, Margert L, Schneyer C, Weisstien C, Laughery J, Rosenthal J, et al. Freebase cocaine and memory. *Compr Psychiatry.* 1990;31:369-375.
13. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry.* 1961;4:561-571.
14. Spielberger CD. *Manual for the State-Trait Anxiety Inventory.* Palo Alto, Calif: Consulting Psychologists Press; 1983.
15. Megargee EL. *The California Psychological Inventory Handbook.* San Francisco, Calif: Jossey-Bass Inc; 1972.