



ADOPTION EDUCATION LLC

SUMMARY - PRENATAL DRUG EXPOSURE

1. Introduction
2. Drug Abuse in Sending Countries
3. Effects of Prenatal Drug Exposure
4. Perinatal Effects of Maternal Drug Use
5. Long-Term Effect of Prenatal Drug Exposure
6. Protective Effects of Adoption on Drug-Exposed Children
7. Prenatal Drug Exposure and Later Addiction
8. Monitoring the Drug-Exposed Child After Adoption
9. Key Points for Internationally Adopted Children

SUMMARY - PRENATAL EXPOSURE TO MATERNAL SMOKING

1. Introduction
2. Epidemiology of Tobacco Use
3. Long-term Neurobehavioral Effects of Prenatal Exposure to Maternal Smoking
4. Key Points for Internationally Adopted Children

TO ACCESS THE QUIZ:

After reading this course, please sign back on to www.adopteducation.com. Go to the table of contents and click on the last page (#4-Maternal Smoking). Click the NEXT arrow at the bottom of the page to begin question 1 of the quiz.

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PRENATAL DRUG EXPOSURE

INTRODUCTION

The prevalence of prenatal exposure to illicit drugs among international adoptees is unknown. Impoverished birth mothers who relinquish their children may lack the financial resources to purchase drugs. It is equally plausible to speculate that maternal drug abuse increases the likelihood of child relinquishment. In other circumstances, birth mothers hoping for a specific gender child (i.e., a male in China or India) may be unlikely to abuse drugs during pregnancy. In the United States, it is estimated that about 11% of newborns are affected to some degree by prenatal substance exposure (including drugs and/or alcohol.) Among children residing in U.S. foster care, a group with sociologic and demographic similarities to abandoned children in other countries, it is estimated that about 70% of those in the system for at least 17 months have substance-involved parents.

Adoption referrals rarely contain information regarding maternal drug use during pregnancy. Lack of information should not be construed to indicate that drug use did not occur. Referrals from Eastern Europe occasionally include the term "narcomania," indicating narcotic addiction. Sometimes, there is a notation that the birth mother is listed on the "narcologic registry," indicating that at some time she was treated for drug abuse. Occasionally, the term "abstinent syndrome" is listed, indicating that the newborn experienced drug withdrawal. Court-ordered termination of parental rights or abandonment of previous children may suggest maternal drug abuse. Hepatitis C infection, prematurity, small size of gestational age, and/or congenital microcephaly all may result from prenatal drug exposure, although alternative explanations exist.

The possibility of prenatal drug exposure raises several questions for internationally adopted children. Most important are concerns about the effects of prenatal drug exposure on the child's growth, development, and behavior and whether adoption ameliorates these effects. In addition, adoptive parents often wonder if prenatal drug exposure increases the likelihood that the child will later become involved with drugs.

In this course, information about drug abuse in sending countries will be reviewed. Current knowledge of the effects of prenatal drug exposure on the child will be described, with a focus on adoption studies. Adoption studies that address the possibility of drug addiction in the offspring of drug-abusing mothers will be reviewed, along with recommendations for prospective pediatric monitoring of drug-exposed children.

DRUG ABUSE IN SENDING COUNTRIES

Accurate information about drug abuse in different countries is difficult to obtain. Many countries do not collect such information, nor do they wish it to be publicized. Underreporting is widespread, and outside verification of information is rarely available.

EFFECTS OF PRENATAL DRUG EXPOSURE

The effects of prenatal drug exposure cannot be isolated from many other factors affecting developmental outcome. Furthermore, accurate history of all exposures during pregnancy is difficult if not impossible to ascertain. For example, in an anonymous prevalence study in an inner-city Maryland teaching hospital, 18% of mothers admitted drug use, but 48% of infants had symptoms indicating recent drug exposures. Half had evidence of exposure to more than one drug.

In a similar survey, 38% of women reported cocaine use during pregnancy, but 60% had positive results by hair sample analysis. Multiple exposures are also common. For example, in a survey of 65 Swedish mothers evaluated for amphetamine use during pregnancy, 30% also used heroin, 80% abused alcohol, and 80% smoked. Ninety-four percent of drug-abusing mothers in Holland used multiple drugs (methadone, heroin, cocaine, amphetamines, tranquilizers), and all smoked. Regardless of the primary drug of choice, tobacco and alcohol are frequently combined. Combinations of drugs may be more devastating than single agents for the developing fetus. Tobacco smoke and cocaine combine synergistically to increase the risks of prematurity and intrauterine growth retardation. Cocaine and alcohol together form cocaethylene, which is more neurotoxic than cocaine alone.

Thus studies that purport to show the effect of a single type of drug exposure on the fetus may be misleading. Accurate information on the type, potency, amount, frequency, and duration of drug use during pregnancy is essentially unavailable outside of laboratory animal settings.

PERINATAL EFFECTS OF MATERNAL DRUG USE

Regardless of the difficulties cited above, there are some consistent findings in infants after in utero drug exposure. Prematurity intrauterine growth retardation, microcephaly, and neurologic abnormalities have been reported after heroin, amphetamine, and cocaine exposure (even after controlling for tobacco use). Withdrawal syndrome and less severe neurologic signs such as irritability, restlessness, and abnormalities in posture and tone occur after exposure to several types of drugs. Internationally adopted children are seldom, if ever, placed as newborns, thus the immediate effects of prenatal drug exposure are unlikely to be observed by American parents or doctors. Toxicology screens are not helpful after the newborn period.

LONG-TERM EFFECTS OF PRENATAL DRUG EXPOSURE

Evaluation of long-term consequences of prenatal drug exposure is confounded by multiple factors; attribution of outcome to drug use alone is problematic. Inner city children are at risk for adverse developmental outcome regardless of in-utero exposures. Poor outcomes are strongly associated with poverty, unstable home conditions, violence in the home environment, and inadequate interaction with adult caregivers.

Language, behavior, attention, and emotional regulation are particularly vulnerable to prenatal drug exposure, perhaps in the context of other risk factors. A systematic analysis of 36 selected studies of the outcome of children with prenatal cocaine exposure found no consistent negative associations with physical growth, developmental or language test scores, or behavior, but possible associations with decreased attentiveness, emotional expression, and "soft" neurophysiologic findings were found. A meta-analysis of 101 studies of the effect on offspring of cocaine use during pregnancy revealed a slight reduction in IQ and significantly lower scores for receptive and expressive language among cocaine-exposed children.

PROTECTIVE EFFECTS OF ADOPTION ON DRUG-EXPOSED CHILDREN

Studies which evaluate drug-exposed children after adoption bypass many of the factors that contribute to poor outcome. However, such studies rarely account for the child's age at placement, circumstances of care prior to adoption, and new factors within the adoptive home.

In an "all adoption" study, 233 children were evaluated approximately 8 years after domestic adoption. Compared to those without prenatal drug exposure, those with a history of prenatal drug exposure were twice as likely to be enrolled in classes for the learning disabled. However, their parents reported similar closeness, quality of family relations, and satisfaction with the adoption to that of parents of non-drug-exposed children.

A series of Canadian studies compared 23 children adopted at birth after prenatal cocaine exposure to 23 non-cocaine-exposed, non-adopted children. Adoptive mothers and control group mothers were matched for IQ and socio-economic status. The children were studied between 14 months and 6.5 years. Children with prenatal cocaine exposure had lower birth weights and younger gestational age than those without prenatal drug exposure. At birth and at follow-up, drug exposed children had smaller head circumferences. Although no differences between groups were found for global IQ, the cocaine-exposed group had poorer receptive and expressive language performance on the Reynell language test, higher activity levels, less persistence and increased distractibility on temperament tests.

Adopted 5- to 6-year-old Israeli children exposed prenatally to heroin performed as well developmentally as non-adopted, non-exposed controls, and outscored heroin-exposed children who remained with their birth mothers. However, other studies have failed to show improvement after removal from the birth family. One-year-olds living in adoptive or foster homes after prenatal exposure to cocaine or opiates scored similarly to exposed children living with their birth parents. Thus, research in this area is inconclusive, but adoption likely provides some benefits to drug-exposed children.

PRENATAL DRUG EXPOSURE AND LATER ADDICTION

Adoptive parents may wonder if prenatally drug-exposed children are at increased risk of themselves becoming addicts as adolescents or adults. Few studies address this directly; much more is known about susceptibility to alcohol abuse among children of alcoholics. Predisposition to alcoholism is specific and separate from tendency toward other types of drug abuse. However, biologic, psychologic, and environmental factors may predispose the child of a drug-abusing parent to become involved with drugs. Some evidence of a genetic predisposition to cocaine dependency has been suggested.

Adoption removes the child from the drug-abusing environment. Researchers in Iowa examined drug abuse among adults adopted at birth and characteristics of their birth parents. Complex statistical analysis was used to isolate many factors, including variables within the adoptive family. Among 443 young adult adoptees, 15% of the men and 7% of the women were drug abusers. Drug abuse was highly correlated with an antisocial personality, which was predicted by an antisocial birth parent (information retrieved from adoption agency records). Drug-abusing adoptees without antisocial personalities were likely to have had alcoholic birth parents. It is important to note that environmental factors in the adoptive family (divorce, psychiatric disturbances) were strongly associated with increased drug abuse among the adoptees. It was not determined if some of the problems in the adoptive families occurred as a result or cause of the drug-abusing child's behavior.

The same research group reported similar results in adult adoptees whose birth parents were alcoholics and/or had antisocial personalities (as determined from hospital and prison records). The role of genetic factors or prenatal exposures shared by both birth parents and their relinquished children remains unknown.

Missing from these and other studies are any assessment of the effect of the peer group and social milieu. Undoubtedly, these factors -- and availability of drugs - greatly influence the susceptibility of adolescents and young adults to abuse drugs. These little-studies aspects of drug addiction may overshadow any putative genetic or 'inborn' susceptibility. Overall, children prenatally exposed to drugs may have increased likelihood of behavioral, cognitive, and emotional disturbances that could contribute to an increased risk of drug dependency. However, it is also clear that many children from this background do well, and are indistinguishable from adopted children of non-drug-abusing birth parents.

MONITORING THE DRUG-EXPOSED CHILD AFTER ADOPTION

The child with a definite or probably history of prenatal drug exposure should be monitored carefully after adoption. Like all children, growth and developmental milestones at entry to the United States should be documented. Hepatitis B, hepatitis C, and HIV serology should be obtained at entry and again 6 months later. Language skills (including articulation), behavior, and attention span should be monitored at regular visits, and neurologic examination should be performed, including assessment of "soft signs" (finger-to-nose, rapid pronation-supination, heel-to-toe walking, balance on one foot, hop). The pediatrician should assess the child's arousal, attention, recognition memory, and impulse control, with the goal of providing supportive services if needed. Although prenatal drug exposure will usually not be known with certainty, anticipatory guidance will benefit many children.

KEY POINTS FOR INTERNATIONALLY ADOPTED CHILDREN

- ◆ Prenatal drug exposures are usually not known prior to adoption.
- ◆ Behavioral, cognitive, and social development may be adversely affected by prenatal drug exposures.
- ◆ Adoption likely improves the outcome of prenatally drug-exposed children.

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PRENATAL EXPOSURE TO MATERNAL SMOKING

INTRODUCTION

Accurate information about birth mothers' tobacco use during pregnancy is rarely available for international adoptees. Like prenatal exposure to illicit drugs or alcohol, maternal smoking during pregnancy is linked to many problems in the fetus, infant, and child. Maternal smoking during pregnancy has long-term effects on the child's attention, behavior, and cognition in infancy, childhood, and adolescence. Some effects may persist to adulthood. Such problems are common among international adoptees, although the causes are multifactorial. This section surveys the epidemiology of smoking among women in sending countries. The long-term neurobehavioral effects on offspring after maternal smoking during pregnancy are reviewed. The effects of environmental tobacco smoke on other organ systems have been reviewed.

EPIDEMIOLOGY OF TOBACCO USE

Tobacco use among women of child-bearing age varies considerably throughout the world. (See Table 1). Cultural, social and economic factors determine the frequency of smoking among relinquishing birth mothers. In some countries, birth mothers are usually impoverished and unable to afford costly cigarettes. In other countries, cigarettes are relatively inexpensive and smoking is socially acceptable among women. Accurate statistics are difficult to obtain; few countries collect data about smoking among pregnant women. However, many nations report rapid increases in smoking among teenage girls. Worldwide there is very little awareness about the potential ill effects of maternal smoking on the developing fetus. Tobacco use sometimes occurs with other forms of substance abuse, such as illicit drugs and alcohol.

LONG-TERM NEUROBEHAVIORAL EFFECTS OF PRENATAL EXPOSURE TO MATERNAL SMOKING

Investigations of the long-term effects of prenatal exposure to maternal smoking have inherent difficulties. Animal studies demonstrate conclusively that prenatal smoke exposure alters brain chemistry. Neuronal cell proliferation and differentiation, nicotine receptor gene expression, and cholinergic (*activated by or capable of liberating acetylcholine, which is involved in the transmission of nerve impulses in the body*), catecholaminergic (*has important physiological effects as neurotransmitters and hormones and include epinephrine, norepinephrine, and dopamine*), and peripheral autonomic pathways exhibit permanent changes after prenatal smoke exposure.

In human subjects, isolation of variable is problematic. Like studies of fetal alcohol or drug exposure, accurate ascertainment of dose, duration, and timing of maternal smoking exposure is difficult. Depending on the formulation of the cigarette, various compounds in addition to nicotine cross the placenta to enter the circulation of the fetus. Co-incident exposures, especially if covert, confound interpretation of outcomes.

Unlike drugs or alcohol, post-natal exposures can continue via secondhand smoke. Potential confounding variables include socioeconomic disadvantage, impaired child-rearing behaviors, and emotional disturbances. In adults and adolescents, smoking is strongly associated with anxiety, depression, ADHD, and other psychiatric disorders. It is not known if individuals with these problems are more likely to smoke, or if smoking contributes to these difficulties. These conditions are in part genetically mediated. Prenatal exposure to anxiety and depression may have long-lasting effects as well.

TABLE 1 – SMOKING STATISTICS FOR FEMALES IN FREQUENT SENDING COUNTRIES

Country	Women Smokers (%)	Female Youth Smokers (%)^a	Comments
ASIA			
Cambodia	Rural Women 10 Urban Women 2-3	Rural Children 20-30	
China	Most Regions 3-7	5	Some areas women smokers as high as 45% (Tibet, Tianjin)
India	7	1	About 33% of women smoke occasionally
Korea (S.)	8	16	
Nepal	15	7	Some areas women smokers as high as 72%
Philippines	18	Ages 10-14 – 19 Ages 15-19 – 38	
Thailand	2-6	0	Rate is higher in north
Vietnam	4		
EUROPE			
Belarus	5	4	
Kazakhstan	40 ^b		
Lithuania	9	2	17% of women ages 25-29 smoke; 41% of 15-year-old girls have tried smoking
Moldova	3	<1	
Russia	14	6	In some regions, about 25-30% of women and 25-40% of adolescents smoke
Romania	15	8	70% of women factory workers and 25% of women ages 25-44 smoke
Ukraine	21	2	10% of 12-13 year olds, 40% of 16-17 year olds, 75% of students at technical college, and 61% of 20-29 year olds (M/F not differentiated)
AMERICAS			
Bolivia	18-33	9 ^b	
Brazil	29-42	2	
Colombia	19-21	<1	
Ecuador	17-28	4-15	
Guatemala	6-26	3	
Paraguay	6	N/A	
Peru	13-42	14 ^b	
United States	10-28	6	

N/A – Not available; M/F – male-to-female ratio

^a Note: “Youth” defined differently in each study. Could include any cluster from age 9-16 years.

^b Males and females combined

Source: Data from Centers for Disease Control and Prevention and World Health Organization

Thus, smoking may indicate a cluster of risk factors for the infant. Some investigators have speculated that smoking during pregnancy is symptomatic of other maternal behaviors such as certain lifestyle and norm-breaking behavior, but does not directly contribute to adverse fetal outcomes. Regardless, maternal smoking is a proxy for a disturbed prenatal milieu.

Attempts to isolate the effects of prenatal exposure to maternal smoking rely on special study designs and statistical methods. Because prenatal tobacco exposure often results in low birth weight and head circumference, some observed effects may be secondary to these growth disturbances. Maternal smoking may also induce fetal hypoxia (*the unborn child's brain is starved of oxygen*), increase the likelihood of maternal complications, alter placental function, or act as a direct neuroteratogen (*affects the nervous system*). Few studies are able to differentiate prenatal from postnatal exposure to maternal smoking. Many adverse effects relate to the home environment of the child.

Regardless of these study complications, numerous neurobehavioral problems are reported with increased frequency among children born after prenatal exposure to smoking (See Table 2). Attentional problems, mild cognitive difficulties, and conduct disturbances occur more frequently in children born after exposure to maternal smoking. Children exposed to heavy smoking early in gestation fare worst.

TABLE 2: Long-term neurobehavioral effects of prenatal exposure to maternal smoking

Behavioral Problems

Attention deficit disorder, hyperactivity
Externalizing (aggressive) behaviors (almost double that of children of nonsmokers)
Various problem behaviors
Criminal behavior (violent and nonviolent crimes)
Conduct disorder
Depression
Substance abuse (drugs/alcohol)
Impulsive behavior

Cognitive and Learning Problems

Auditory processing deficits
Reduced IQ (although most investigators disagree with this)
Impaired cognitive function
Language disabilities
Decreased visuoperceptual function
Impaired executive function
Reading disabilities
Disturbed memory function
Hypertonicity (*having extreme muscular or arterial tension*), increased CNS excitation at 1 month of age
Mental retardation

KEY POINTS FOR INTERNATIONALLY ADOPTED CHILDREN

- Information about possible maternal smoking during pregnancy is rarely available
- Maternal smoking during pregnancy may adversely effect neurobehavioral outcome
- Problems with attentional regulation, behavior, mental function, and learning may occur in children exposed to maternal smoking during pregnancy

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