from fermented juices of fruits, grains, vegetables, and other plants.

See also Beers and Brews.

BIBLIOGRAPHY


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FETAL ALCOHOL SYNDROME

Fetal alcohol syndrome (FAS) is a constellation of behavioral, growth, and facial abnormalities resulting from prenatal alcohol exposure. Diagnosis is made by a specially trained physician and is based on the presence of three criteria: a pattern of distinct and specific facial abnormalities; growth deficiency; and central nervous system (CNS) damage, with or without confirmed maternal alcohol consumption. FAS is at one end of a spectrum, now termed "fetal alcohol spectrum disorders" (FASD). FASD is used as an umbrella term. If a child has some, but not all, of the criteria for FAS, they have one in a spectrum of disorders, covered by the terms ARBD, alcohol-related birth defects, and ARND, alcohol-related neurodevelopmental disorder. Use of the term FAE, fetal alcohol effects, is discouraged because of non-specificity. FASD, short of full FAS, requires documentation of prenatal alcohol exposure.

HISTORY

The term *fetal alcohol syndrome* was first used in 1973 to describe the physical problems seen in the offspring of alcoholic women. There have been admonitions against women drinking during pregnancy for literally thousands of years—at least as interpreted from biblical verses and in the writing of the ancient Greeks. The physical and social implications of women drinking during pregnancy first became highly noticeable during the gin epidemic of the 1750s. At that time, gin became a cheap and easily accessible beverage among low-income women. It was noted that there was a correlation between women who were consuming large amounts of gin and problems among their offspring.

A formal study was conducted in the 1890s by William Sullivan, a physician in England. He identified the offspring of 120 female "drunkards" in the Liverpool jail and compared them to the children of their non-drinking female relatives. From this study, Sullivan noted a perinatal mortality rate that was two and one-half times higher in the offspring of the female alcoholics.

In 1968, Paul Lemoine published a study on the children of female alcoholics in a French medical journal. This article did not receive much attention until the landmark articles published in the *Lancet* by Jones, Smith, Ulleland, and Streissguth in 1973, in which the term *fetal alcohol syndrome* (FAS) was first used. Since 1973, about twenty thousand articles have been published detailing the effects of prenatal alcohol exposure from birth through middle age. In the early twenty-first century it has been commonly accepted that alcohol is a powerful teratogen (causative agent in fetal malformations) with lifelong consequences and that the severity of effects is associated with the amount and pattern of drinking. In particular, children who were exposed in utero to one or more drinks per day or to binge-like exposure (five or more drinks per occasion) tend to show adverse effects. These effects cannot be attributed to alcohol with certainty at lower levels of exposure, but there is strong evidence of differing susceptibility/vulnerability, so it is reasonable to advise women not to drink at all during pregnancy.

Figure 1. (Grapes. Illustration by GGS Information Services. Globe Images Laboratory.)

ENCYCLOPEDIA OF DRUGS, ALCOHOL & ADDICTIVE BEHAVIOR, 3RD EDITION
DISTRIBUTION
The prevalence of FAS ranges widely from community to community and is determined by the number of women consuming alcohol in any particular community. Every year in the United States, 500,000 women report drinking alcohol during pregnancy, with nearly one in five of those admitting to binge drinking. These statistics translate into a prevalence rate of nearly 13 percent for any consumption, and 6 percent for frequent and binge drinking. As of 2008, FAS was thought to be the leading cause of mental retardation in the United States, surpassing Down syndrome and spina bifida. It is estimated that approximately 1 to 4.8 of every 1,000 children born in the United States has FAS, with as many as 9.1 per 1000 (or nearly 1 in 100) born with FASD. However, few prevalence studies have been conducted as of 2008, and experts have different views as to the accuracy of the prevalence figures available. Additionally, prevalence rates vary widely by region and community, as well as by surveillance methodology. Some studies from the Centers for Disease Control and Prevention (CDC) suggest that drinking during pregnancy may be increasing despite public-health information designed to prevent FAS.

PHYSICAL EFFECTS
Drinking alcohol during pregnancy produces different effects, depending on the amount and when the alcohol is consumed. During the first trimester, there is a chance of major physical abnormalities (ARBDs) and CNS damage. During the first and second trimester, alcohol consumption leads to an increased rate of spontaneous abortion and CNS damage, as well as more subtle physical abnormalities. During the third trimester, alcohol consumption can lead to pre- and postnatal growth restriction and CNS damage.

Three major criteria must be met for a diagnosis of FAS. The common facial abnormalities include short palpebral (eye-slit) fissures; a long smooth philtrum (upper lip groove); and thin upper lip. Other common physical problems associated with prenatal alcohol use are cardiac (heart) malformations and defects; pectus excavatum (hollow at the lower part of the chest due to backward displacement of xiphoid cartilage); clinodactyly and camptodactyly (permanent curving or deflection of one or more fingers); fusion of the radius and ulna at the elbow; scoliosis (lateral curvature of the spine); kidney malformations; and cleft lip and palate. Indeed, a large range of anatomic abnormalities in almost all body systems have been reported to be associated with prenatal alcohol exposure.

Growth deficiency in FAS is specifically noted in three parameters: height, weight, and head circumference. At birth, children with FAS and FASD tend to be small for gestational age with deficits in all three parameters, though deficiencies in all are not required for diagnosis. In addition, while some growth catch-up has been described, by puberty the vast majority of children with FAS/FASD still have growth retardation; they are generally short and thin. Significant changes in weight are noted as females enter puberty; although the growth deficiency remains in height and head circumference across the lifespan, females frequently gain weight and are plump. Males seem to remain comparatively short and slender until their late twenties or thirties.

CNS damage is frequently manifested in cognitive and memory deficits, sleep disturbances, developmental delays, hyperactivity/distractibility, a short attention span, an inability to understand cause and effect, lower levels of academic achievement, impulsivity, and difficulty in abstract thinking. The difficulties noted in infancy and early childhood are often precursors to later psychosocial deficits.

PSYCHOSOCIAL AND EDUCATIONAL ISSUES
Based mostly on caretaker experience and clinical observation (rather than clinical studies), the following describe the development patterns in FAS individuals.

Birth to Age Five Years. Diagnosis of FAS/FASD is possible at birth, but many physicians are either not trained to identify the characteristics or do not consider the possibility. Post-natal behavioral manifestations of FAS/FASD include the following: poor habituation, an exaggerated startle response, poor sleep/wake cycle, poor sucking response, and hyperactivity. Failure to thrive, alcohol withdrawal, and cardiac difficulties are medical concerns sometimes noted in those born with FAS. Also, developmental delays in walking, talking, and toilet training may be observed. Concerns such as hyperactivity, irritability, difficulty in following
directions, and the inability to adapt to changes are commonly reported. The damage done to the brain by the prenatal alcohol exposure makes it problematic for children with FAS to learn in a timely and consistent fashion. The more abstract the task, the more apparent this learning gap becomes, particularly in adolescence and adulthood.

Recommended interventions before the age of five focus on the family as well as the child. Children with FAS/FASD are sometimes removed from the care of the biological mother owing to abuse, neglect, and/or maternal death. Newborns and infants with FAS/FASD often have trouble feeding, when this difficulty is coupled with a mother who may be deeply involved in substance abuse and not attentive to the needs of her infant, it can lead to medical crises. It may be necessary to provide the following services and interventions:

- Health and medical monitoring
- Safe, stable, structured residential placement
- Establishment of clear and reasonable expectations, goals, limits, and boundaries
- Directions given to the caregivers in a simple, concrete fashion, one at a time; directions given to the child in similar fashion
- Directional adaptation of the environment to fit the child's ability to handle stimulation
- Setting by caregivers of appropriate goals and expectations for the child
- Respite care and ongoing support for caregivers

**Ages Six to Eleven Years.** Some of the problems noted earlier, primarily health issues, become less severe as others become more severe, with greater implications for negative social functioning. Hyperactivity, impulsivity, memory deficits, and inappropriate sexual behavior may emerge, as may difficulty predicting and/or understanding the consequences of behavior, difficulties in abstracting abilities, and poor comprehension of social rules and expectations. These are all common among children with FAS/FASD. Children with FAS/FASD may show decreasing ability to function in school as they get older. The abstracting deficits become more apparent when the child reaches the third and fourth grades and is expected to perform multiplication and division. Suggested interventions at this stage include the following:

- Safe, stable, structured residential placement
- Establishment of clear and reasonable expectations, goals, limits, and boundaries
- Consistent structuring of leisure time and activities
- Education of parents, caregivers, and the patient regarding age-appropriate sexual and social development
- Appropriate educational placement that focuses on an activity-based curriculum, development of communication skills, development of appropriate behavior, and basic academic skills embedded with functional skills, in a structured environment, in which competing stimuli are avoided

**Ages Twelve to Seventeen Years.** Children with FAS/FASD have the same emotional needs as others do at this age, but adolescents with FAS/FASD may also exhibit cognitive deficits, impulsivity, faulty logic, low motivation, lying, stealing, depression, suicidal thoughts and attempts, and significant limitations in their adaptive behavior skills. Social deficits include financial/sexual exploitation and substance abuse. It is frequently difficult for people with FAS/FASD to articulate their feelings and needs, which typically occurs as these individuals reach their intellectual and academic ceiling. Despite these problems and deficits, adolescents with FAS/FASD should be treated age appropriately within the limits of their developmental ability. The following are some interventions that may help them reach their social, emotional, and adaptive potential:

- Changing the focus from academic to vocational and daily-living skills training
- Structuring of leisure time and activities, such as involvement in organized sports and social activities
- Educating patients, parents, and caregivers regarding sexual development and the need for birth control or protection against sexual exploitation and sexually transmitted diseases (STDs)
- Planning for future vocational training and placements, financial needs, and residential placement
- Increasing responsibility based on the patient’s skills, abilities, and interests
Ages Eighteen through Adulthood. The problems, deficits, and difficulties seen prior to the age of eighteen are precursors to those seen in early adulthood and middle age. An additional problem experienced by people with FAS/FASD is the increased expectations placed on them by others. Not only can people with FAS often not meet these expectations but their impulsivity and poor judgment have more serious consequences than during their younger years. Issues such as poor comprehension of social rules and expectations, aggressive and unpredictable behavior, and depression coupled with impulsivity may lead to suicide attempts, antisocial behavior, hospitalization, and/or incarceration. Many can benefit from structured assisted living arrangements.

Other concerns noted in adults with FAS/FASD include social isolation and withdrawal, difficulties in finding and sustaining employment, poor financial management, problems accessing and paying for medical treatment or child care, and a need for help with social/sexual exploitation and unwarranted pregnancy. The hyperactivity and distractibility seen in small children with FAS/FASD manifest in the adult’s not being able to learn job skills or meet the requirements of many jobs. The following list contains suggested ways to help adults with FAS/FASD and their families deal with problematic issues in a productive fashion:

- A guardianship for or assistance with finances
- Residential placements or community housing to help ensure physical safety while allowing them to live as independently as possible
- Support for medical care, along with birth control planning
- Child-care and parenting classes, as needed
- Education for others about FAS/FASD, including its limitations and skills, to foster acceptance
- Long-term residential/vocational/psychosocial support for patient and/or caregivers

PREVENTION

The American College of Obstetricians and Gynecologists and the American Academy of Pediatrics recommend alcohol abstinence for both pregnant and pre-conception women because no safe threshold for consumption has been identified, and there is evidence of varying susceptibility/vulnerability to the effects of prenatal alcohol exposure. Prenatal practitioners are advised to question all women of reproductive age, and all pregnant women at their first prenatal visit about current and past alcohol use and to use a formal screen for risk-drinking, such as the T-ACE. Questioning again later in pregnancy is also recommended. For women identified as being at risk, intervention is indicated. For most pregnant women, a brief in office intervention may be all that is needed to reduce the risk of an alcohol-exposed pregnancy. Brief interventions are evidence-based, low-cost, time-efficient, and effective self-help treatments involving counseling that can be delivered by health professionals who are not specialists in the treatment of alcohol use or dependence. Two randomized clinical trials and several other studies have shown that brief interventions, delivered as part of prenatal care, can significantly reduce rates of pregnancy drinking and consequent FAS/FASD neonates. However, for women with exceptionally high rates of consumption or who are diagnosed as alcoholics, more intensive intervention along with referral to specialized treatment programs is recommended.

FAS/FASD is a preventable birth defect; however, once it exists it has lifelong consequences. Special programs involving planning for the future vocational, educational, and residential needs of affected individuals should be implemented as early in childhood as possible. Education on the harmful effects of alcohol use and assistance for women prior to and during pregnancy is critical to help prevent or at least reduce this significant public health problem.

See also Alcohol- and Drug-Exposed Infants; Alcohol: History of Drinking in the United States; Attention Deficit Hyperactivity Disorder; Fetus, Effects of Drugs on the; Pregnancy and Drug Dependence.

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**FETUS, EFFECTS OF DRUGS ON THE**

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The pregnant substance-abusing or drug-dependent woman subjects her developing infant to a host of problems. When assessing the effects of drugs, whether illicit or appropriately administered (not abused) prescription drugs, on newborn infants (neonates) and young children, two factors must be considered: (a) the duration and concentration of the drug exposure on the developing fetus, and (b) any preexisting medical complications in the mother. These factors are interactive and together will influence, in varying ways, the eventual health, learning challenges, and potential capabilities of the child. Therefore, the long-term outcome of children exposed to drugs during fetal development should be assessed.

As cited by Dr. Nancy Young in her presentation on substance-exposed infants, the 2002 and 2003 Substance Abuse and Mental Health Administration (SAMHSA) Office of Applied Studies National Survey on Drug Use and Health (NSDUH) had a specific focus on substance use among pregnant women. It indicated that the reported incidence of pregnant women using any drug was highest in the first trimester, and decreased steadily thereafter: 7.7 percent of mothers affecting 315,161 infants in the first trimester, 3.2 percent of women affecting 130,976 infants in the second trimester, and 2.3 percent of women affecting 94,139 infants in the third trimester reported using any drugs whatever. Similar patterns were found for binge alcohol and alcohol use. For alcohol use the statistics were 19.6 percent of women affecting 802,228 infants in the first trimester, 9.8 percent of women affecting 315,161 infants in the second trimester, and 2.0 percent of women affecting 94,139 infants in the third trimester.

**References**


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