Alcohol and Pregnancy

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This RISK||NEWSLETTER will focus on the teratogenic effects of alcohol during pregnancy.

The specific effects of alcohol consumption on the fetus are extremely variable. A review of the literature has shown that the effects are dependent on the time of the exposure and the amount of alcohol consumed. Deciphering cause and effect is compounded because reporting of quantities of alcohol consumed during a pregnancy is likely to be biased and inaccurate. These factors make it difficult to draw conclusions about alcohol and its effects on the fetus.

The Newsletter will examine the effects of alcohol exposure during pregnancy and their long-range implications for affected children. The controversial issue of how much alcohol is necessary to cause the effects described will be addressed as well.

FETAL ALCOHOL SYNDROME (FAS)

Fetal alcohol syndrome is a term coined by K.L. Jones and D.W. Smith in 1973 to describe the characteristic features of babies born to women who consumed alcohol during pregnancy (Alcohol Alert, 1991). In addition to mental retardation, growth retardation, and developmental delay, FAS children typically display the following facial characteristics: Short palpebral fissures, epicanthal folds, thin upper lip, elongated flattened midface, smooth philtrum, short nose, minor ear abnormalities, low nasal bridge, small chin, and microcephaly (Alcohol Alert, 1991; Streissguth, 1991).

Other abnormalities found in FAS are skeletal joint abnormalities, cardiac defects, female genital anomalies, and abnormal palmar creases (Blake, 1986).

The clinical effects of FAS can range from severe to moderate. Infants characterized with more subtle effects of FAS may have difficulties in basic daily tasks such as making judgments, solving problems, and memory abilities (Streissguth et al. 1989).

FETAL ALCOHOL EFFECTS (FAE)

Fetal alcohol effects is a term originally used by Sokol and Clarren (1989) to describe a possible association between prenatal alcohol exposure and characteristic birth defects. These researchers do not advocate using FAE to describe milder versions of the birth defects. They use this term to describe milder forms of FAS, which includes learning delays, growth retardation, facial abnormalities, low birth weight and developmental delays.

INCIDENCE OF FAS

According to a compilation of studies on the incidence of FAS (Abel and Sokol, 1987) the overall rate of FAS in the general population is 1.9 cases per 1,000 live births. The incidence is higher among the Native American and African American populations. The highest rate is found in Southwest Plains Indians where the prevalence is 1 case per 102 live births (May, 1983). Reasons for this variation may be differences in alcohol consumption, nutrition, and metabolism (Aase, 1981). The risk for FAS among the African American population is about sevenfold higher than whites (Sokol, 1986).

PREGNANCY RISKS AND SPONTANEOUS ABORTIONS

Kline et al (1989) found an association between drinking during pregnancy and spontaneous abortion. This study compared drinking habits before and during pregnancy in 616 women who aborted spontaneously and 632 women who delivered no earlier than 28 weeks gestation. Seventeen percent of the women who aborted spontaneously reported drinking two or more times a week; 8.1% of the women who carried to at least 28 weeks gestation reported drinking two or more times a week. This data suggests a strong association between spontaneous abortion and drinking during pregnancy. The amount of alcohol consumed on each drinking occasion was one ounce of absolute alcohol. One to two ounces of absolute alcohol is equal to 6 glasses of wine and beer or 3 mixed drinks. The conclusion was that drinking one ounce of alcohol two times a week is the minimum threshold for causing a spontaneous abortion. A follow-up, prospective study by Sokol et al (1980) challenged Kline's association between moderate drinking and spontaneous abortion by stating that quantitative drinking data must be interpreted cautiously because of denial and underreporting by those with heavy alcoholic intake. This underreporting clouds the issue of determining the minimum amount of alcohol ingestion predisposing toward a spontaneous abortion.

MENTAL AND BEHAVIORAL ABNORMALITIES

The mental and behavioral abnormalities produced from fetal alcohol exposure are among the most disturbing effects of FAS. Prenatal alcohol exposure is one of the leading causes of mental retardation in the western world (Abel, 1986). Streissguth (1991) conducted a study on the intellectual capabilities of 40 patients with FAS in order to determine if individual and mean I.Q. scores remained unchanged over an 8 year period. The results of this study showed that there were no changes in I.Q. scores during the period of time, demonstrating the severity of the long-term consequences of the developmental damage caused by FAS.

Previously published studies on four year old children of mothers who consumed moderate amounts of alcohol (2-3 drinks/days during pregnancy) found shorter attention spans and an increased number of episodes where they demonstrated the inability to pay attention (Landesman-Dwyer, 1981). In contrast, a more recent study concluded that fetal alcohol exposure does not affect sustained attention performance in preschool children (Boyd, 1990). The authors predicted that if there were any effect from the prenatal alcohol exposure the effect would be small.

BIRTH WEIGHT

Little et al (1986) studied the effects of weekly consumption of alcohol prior to the recognition of pregnancy. A decrease in birth weight of 225g was observed when consumption averaged one drink/day before pregnancy. Assessment of alcohol intake was made at the first prenatal visit, i.e., between 8 and 16 weeks gestation. The women reportedly ceased drinking upon learning they were pregnant. This study supported the conclusion of Wright et al (1983) who conducted a similar study at a London maternity clinic. Both studies reported that later ethanol intake, after the first prenatal visit, did not alter the risk of a low birth weight infant. Neither study examined the effect on birth weight of drinking in the last months of gestation.

A recent study by da Costa (1993) also examined the association between drinking in pregnancy and birth weight. The purpose of this study was not only to examine the association between drinking in pregnancy and birth weight but to examine the variability of self-reported maternal alcohol consumption according to the different methods of collecting information. The authors analyzed the implications of variability found through the self-reporting measures of alcohol consumption and applied these implications to the association found between drinking and birth weight. The results of this study showed a consistent reduction in birth weight with increasing consumption of alcohol. This study also concluded that different data collection methods showed significant differences in women's self-reporting of alcohol consumption.

FETAL GROWTH

There have been many studies on the effects of alcohol on fetal and postnatal growth. One of the most critical features of alcohol-induced growth retardation is the inability for these infants to catch-up during the postnatal period. In 1991, Greene et al analyzed the relationship between prenatal alcohol use and weight, stature and head circumference at birth and again on five subsequent occasions up to four years and ten months. The results of their study showed no association between catch-up in either weight or stature after birth and intake of alcohol during pregnancy.

A 10-year study by Spohr et al (1993) followed 60 patients diagnosed as having FAS in infancy and childhood. The study showed that some characteristic craniofacial malformations of FAS diminish with time but that microcephaly and, in the severe cases of FAS, short stature and underweight (in boys), persist. Microcephaly was the most distinguishing feature. At the first assessment, 88% of the children exhibited microcephaly and 10 years later, 65% were still microcephalic. While microcephaly does not predict mental retardation in FAS, further catch-up growth of the brain cannot be expected in FAS with advancing age. In contrast to Streissguth (1991) this study found no significant improvement in intelligence with time.

DOSE-RESPONSE AND TIMING

While it is known that heavy drinking during pregnancy causes congenital malformations, there is controversy over whether moderate or light drinking can cause mild or severe malformations. Heavy drinking is greater than 6 drinks or 2 ounces of absolute alcohol per day. Moderate drinking is 3 drinks or less than 1 ounce of absolute alcohol per day. A study on pregnant women in their first trimester reported that women consuming less than one drink per day or one to two drinks per day did not show a significantly higher malformation rate than women who were non-drinkers (Mills, 1987).

A cohort study by Ernhart et al (1987) analyzed 359 neonates whose mothers were chronic alcoholics. Craniofacial abnormalities were found associated with prenatal alcohol exposure in a dose-response manner. The number of head and facial abnormalities increased as the embryonic exposure increased, with the critical time period beginning around the time of conception. The abnormalities were found at the very minimum amount of alcohol intake, less than 1 ounce of alcohol a day during the first trimester of pregnancy, making it impossible to define a threshold or a cut-off level of a safe amount of alcohol consumed during pregnancy.

Mehl and Manchanda (1993), on the other hand, found that the effects of alcohol were evident only after 10 drinks per week (3 oz of absolute alcohol).

Defining a threshold for fetal risk may not be possible because of the range of defects that occur from prenatal exposure. Each abnormal outcome, from CNS defects to growth retardation, may have its own dose-response relationship (Clarren, 1987). Animal research has demonstrated that different alcohol-determined birth defects are related to critical periods in fetal development (Randall, 1987). Each organ may be most vulnerable to effects of alcohol at the time of the most rapid cell division (Weiner, 1989).

Another confounding variable in determining if there is a threshold effect with alcohol is the use of illicit substances during pregnancy, which may exhibit a synergistic effect.

CONCLUSIONS

Results from studies on FAS must be carefully interpreted, taking into consideration methodology used in determining the amount of alcohol consumed during pregnancy. Each study, for example, differs in defining infrequent, moderate and heavy amounts of alcohol. There are also different amounts of alcohol in the various beverages.

PREVENTION

Attention needs to be shifted to prevention of FAS. Halmesmaki et al (1988) examined the effect of alcohol counseling on 85 pregnant problem drinkers. The results of this study are encouraging. A significant reduction in the rates of FAS and FAE among women who were able to decrease their drinking between 12 and 32 weeks gestation was observed, with the most significant decrease seen in the women counseled between 21 and 20 weeks.

A study by Bruce et al (1993) found that moderate and heavy drinking during pregnancy is becoming rare due to prenatal counseling on the effects of alcohol. On the other hand, their study showed a higher prevalence of drinking three months prior to pregnancy. The authors concluded that there is a need for more research focused on finding a means to reduce drinking before pregnancy.

Counseling and education of women of childbearing years regarding potential risks to their fetuses from use of alcohol during pregnancy remain critically important approaches to preventing FAS and FAE.