Alcohol abuse in pregnancy

Hermann Grinfeld

INTRODUCTION

Alcohol in the form of beverages is a licit drug for consumption. It is found throughout the world, and has been consumed for centuries by both men and women on different occasions. Even so, alcohol is known to cause dependency among people that have a tendency to become alcoholic, and/or the ones who are exposed to bouts of depression and stress, frequent use, as well as personal motivations leading to alcohol consumption.

The consumption of alcohol during pregnancy is the most common cause of births of mentally delayed children among mothers who are drinkers, and the principal cause of fetus malformation in the Western Hemisphere\(^1\). The excessive consumption of alcohol by women during pregnancy constitutes one of the most frequent problems found during pregnancy, and can lead to Fetal Alcohol Syndrome (FAS) endangering the neural-psychiatric well-being of the progeny of alcoholic women\(^2,3\).
Even though the effects of alcoholic consumption during pregnancy have been known for centuries, it has only come to be recognized in medical circles during the last 40 years after the French pediatrician, Lemoine⁴ published his 1968 paper entitled, Physical Anomalies Encountered in Children of Alcoholic Women. An important factor in the study of alcohol consumption during pregnancy is considering what exactly constitutes the limiting factors of consumption that would compromise fetal development. What comprises regular consumption, occasional drinking? One glass per day or one glass per week?

Recent studies show that the cost of alcohol abuse to the economy of the United States is around $48 billion US of which $19 billion US is for medical expenses⁶. In Australia, where 50% of pregnant women consume alcohol,⁸ the cost of dealing with alcoholics is 1% of the Gross National Product (GNP).⁷ In Brazil the state of São Paulo spends a million dollars a month on alcohol abuse alone, according to the Secretary of Health of the state of São Paulo.

ALCOHOLIC DEPENDENCY IN WOMEN

It has been known since biblical times that the consumption of alcohol during pregnancy can cause deformity of the fetus. Ancient civilizations prohibited brides from drinking during their wedding ceremonies for fear that if the bride conceived on her wedding night it would affect her pregnancy.

While restrictions on male consumption of alcohol have never existed, female alcohol abuse has been reported for almost 2 centuries, but registered cases of alcoholic dependency in women are rarely found. It is no wonder then that case studies on female alcohol abuse have only been registered for the last 50 years, and treatments for this abuse in women started about 20 years ago. Alcoholism during pregnancy is more associated with social and economic factors such as poor schooling, multiple births and being over 25 years old and simultaneously to malnutrition, infectious diseases, and drug use, than it is associated with clinical factors⁹.

The occurrence of alcohol abuse among females is significantly less than that found among males, and runs around 5.7%. Even though this finding is rare,
alcohol abuse among women results in many negative consequences for their health and the daily lives.\textsuperscript{10,11,12}

Women that suffer from substance abuse of the alcoholic nature require different treatment methods than those used to treat alcoholism in males. Therefore, researchers propose the development of specific programs for the treatment of alcoholism in women and the fundamental principle in developing these programs is the utilization of strategies that respond to the necessities of female alcoholics.\textsuperscript{9}

Women begin to drink alcoholic beverages much later in life than men, but drinking related problems arise much earlier in women’s lives. This fact becomes apparent when a comparison of the drinking lifespan of the two is made – a phenomenon known as the “telescope effect” best describes this fact. Cultural factors influence more compulsive drinking among females than compulsive male drinking. Cultural mores dictate that women initiate drinking habits much later than men, however, women suffer more from the social pressure exerted for them to stop drinking alcohol, in case of excessive use of the substance. Women are severely reprimanded by society when the consumption of alcohol is out of control, but men are not reprimanded for their excess. The rare accounts of female alcoholism in ancient history give evidence to the moral and social aspects that kept women from abusing alcohol. Women that presented alcohol abuse in ancient times were considered to be libertines and promiscuous.

Only recently in modern times have studies been carried out on alcoholism in females.\textsuperscript{10,11,12}

Women have a lower tolerance for alcohol than men do. This is due to the fact that women absorb alcohol in the body much faster than men because of a higher fat content and lower levels of water in their bodies. In other words, if a man and a woman consume identical quantities of alcohol, blood alcohol concentrations would be higher in women than they would be in men.

In the initial stages of alcohol dependency, women who become alcoholics generally deny their problems with drinking, and the consumption of alcohol is not public. Alcoholism is usually accompanied by depression and a comorbidity with other mental health issues. These conditions can hide the real problem of
alcoholism and delay its proper treatment. During this phase, suspected diagnosis of alcoholism is made through gynecological examinations, and it is often not accounted for because many gynecologist are not prepared to give advice on its treatment.\textsuperscript{5,10}

Scientific research on pregnant women who use psychoactive substances and the consequences of their use on the newborn have finally started. Women who consume alcohol during pregnancy expose their babies to several health risks that have been already identified by clinical studies and clinical research in female alcoholism.\textsuperscript{2,13,14}

Even though the minimal dose of alcohol that could cause fetal harm is unknown, recent evidence suggests that one drink per week could cause the development of future mental problems in children that where exposed to alcohol during pregnancy. If fetal defects should occur, the mother is morally responsible for the outcome.\textsuperscript{2} It has been shown that children of alcoholic mothers are exposed to grave prenatal risks that can result in premature births, delayed prenatal and postnatal growth, physical deformities, and the fetus can also suffer from respiratory infections and neurological complications. The newborns of alcoholic mothers nurse poorly, are irritable, hypersensitive and hyperactive. They suffer from insomnia, hypotonic muscular tremors, and tend to sweat a lot, which leads to dehydration. The newborns of mothers who are drug addicts are also exposed to the risk of contracting AIDS, hepatitis B and C, syphilis, and other contagious diseases when both the mother’s and baby’s bloods mix through the umbilical cord.\textsuperscript{20}

**EPIDEMIOLOGY**

The importance in gathering data on Fetal Alcohol Syndrome (FAS) is based on the benefits it can bring to children identified with those symptoms. That procedure is essential to provide appropriate medical care, and for referring patients to proper social services that offer educational programs to orientate pregnant mothers and their children.
The various organizations that research FAS recommend a strategy of proactive vigilance that would gather data within diverse ethnic populations. It is also vital to develop work plans in this area along with health agents and researchers so that there is a reciprocal transfer of data that will allow the demographic occurrence of FAS to be noted and compared. A risk factor should be calculated and parameters for strategies for its prevention and treatment should be formulated.\textsuperscript{13} There are many challenges to be met regarding the achievement of trustworthy epidemic indices on FAS. This is because even though great advances have been accomplished in identifying and treating FAS in the last two decades, the syndrome is of global magnitude and verifiable data on it has never been compiled. Social workers, public health agents, as well as preschool teachers do not routinely identify symptoms of FAS in children and mothers that they interact with daily; therefore, reliable data does not exist on FAS. Depending on which population is being studied, data taken from birth certificates and medical records in the United States reveal great discrepancies in the identification of FAS\textsuperscript{1}.

The factors that involve the greatest risk of exposing the fetus to alcohol are:

- the frequency of alcoholic ingestion; binge drinking, casual drinking and daily drinking;
- the level of alcoholic ingestion; heavy drinker, moderate drinker or casual drinker;
- the reincidence of FAS in subsequent pregnancies, given that there is a 75\% chance of reoccurrence in mothers that have previously exposed a fetus to alcohol;
- cases of heavy drinkers in the family;
- the lack of prenatal care; this fact can be related to unemployment and social carelessness, which can also result in negligence related to childcare\textsuperscript{13,18}.

There are four factors that lead to the improper diagnosis of FAS that can result in the underestimation of its occurrence:
• the available diagnostic criteria, such as the minimum number of facial defects or the degree of delayed growth in children of alcoholic mothers is not specific enough and is not uniformly accepted;
• the diagnosis of FAS is based on encountering clinical characteristics of the syndrome, which in most cases, not all children with FAS display stereotyped afflictions;
• social workers with lack of clinical knowledge and misconceptions regarding FAS, such as believing that this anomaly only affects children of alcoholic mothers from lower class neighborhoods, or consider that FAS is common among racial minorities;
• the lack of diagnostic criteria that would differentiate FAS from other related conditions caused by alcohol: Alcohol Fetal Effect (not in current use), Traumatic Fetal Effects of Alcohol, and Traumatic Fetal Neurological Effects of Alcohol\textsuperscript{15}.

**OCCURRENCE**

International disease indices put FAS between 0.5 to 3 cases per thousand births in several populations.\textsuperscript{1} These indicators are above other child developmental disorders such as Down syndrome, and spina bifida.\textsuperscript{13} In the United States it is presumed that a total of 6,000 to 18,000 children are born each year with FAS; in Brazil the total could be anywhere from 3,000 to 9,000 cases of FAS a year, if the occurrence of 1 to 3 in a thousand live births can be confirmed, since the national birth rate is over 3 million a year\textsuperscript{16}.

Studies taken of particularly vulnerable populations (North American Indians, South Africans, Italians living in vineyard regions, and among some minority groups, all coupled with conditions of poor living standards) demonstrate that higher tendencies of FAS occur in these groups and the range could be as high as 6 in a thousand live births. Recent data on epidemics show that the incidence of FAS in South Africa could be as high as 68 to 89 cases of FAS in a thousand live births.\textsuperscript{17} If these indicators are observed among pregnancies of alcoholic women,
the risk of developing FAS during pregnancy would be even higher. In 1999 more than 50% of American women at a reproductive age related the occasional consumption of alcohol, and 15% of these could be classified as moderate to heavy drinkers. During this study 13% of the women interviewed reported the consumption of more than five drinks on any given occasion.\textsuperscript{18} Given that almost half of these pregnancies could be unwanted (there are over a million fertile and sexually active women who do not use contraceptives), it is estimated that close to 2% of these women expose their fetuses to alcohol every year.

More recently, higher indicators were found in rehab centers among women undergoing alcohol rehabilitation and in prisons where women were serving time.\textsuperscript{15}

**ORIGIN AND PATHOLOGY**

The alcohol content of the principal types of beverages are presented in Table 1, as well as their corresponding units:

<table>
<thead>
<tr>
<th>Drink</th>
<th>Concentration (%)</th>
<th>Grams (g)</th>
<th>Units of alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 can of beer</td>
<td>5</td>
<td>17</td>
<td>1.5</td>
</tr>
<tr>
<td>1 glass of beer</td>
<td>5</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>1 jigger of liquor</td>
<td>50</td>
<td>25</td>
<td>2.5</td>
</tr>
<tr>
<td>1 glass of wine</td>
<td>12</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>1 glass of brandy</td>
<td>40 to 50</td>
<td>20 to 25</td>
<td>2 to 2.5</td>
</tr>
</tbody>
</table>


The harmful effects of alcohol on fetuses are well represented in teratogenic studies. The placenta of pregnant women who drink are totally permeable and the alcohol ingested by the mother passes through to the fetus. The effect of the alcohol in the blood stream is similar for both the fetus and the mother. However, a unique mechanism of exposure cannot explain all the harmful effects of alcohol exposure in utero on the fetus or even determine the action of alcohol on fetal tissues.
In the organism, alcohol is initially metabolized by the liver and transformed into acetaldehyde or ethanal. Therefore, acetaldehyde is the first substance that circulates in the blood streams of both mother and fetus. Cell biology experiments with acetaldehyde show that it inhibits the growth of astrocytes that have origin in the central nervous system, and it also inhibits neuron migration resulting in Microcephaly. Acetaldehyde can also cause the death of brain cells by necrosis or apoptosis PCD (programmed cell death) as well as provide the oxidation that increases cell death. These conditions render alteration in growth factors and cause insufficient levels of glucose to arrive at the brain (IGF–1 and IGF–2).

The harmful effects of alcohol at conception and in the first few weeks after that can be of cytotoxic or mutagenic nature, and can cause severe modifications of the chromosomes. In the first trimester of pregnancy, there is risk of facial dimorphism happening during this initial phase of organic genesis. In the second trimester, there is a higher risk of spontaneous abortion. In the third trimester, alcohol damages the brain tissue and other tissues of the central nervous system. Damage is caused in the cerebellum, the hippocampus, and the pre-frontal cortex. Other than these brain damaging conditions, alcohol consumption during pregnancy can also delay intra-uterine growth and compromise birth as well as increase the risks of infection during birth resulting in premature dislocation of the placenta, uterine hypertonia (Ballard maturation), premature birth, and the presence of meconic acid in the amniotic fluids, which constitutes a strong indication of fetal suffering.

Alcohol is also transferred to the mother’s milk, but only in proportions of 2% or less depending on the elimination of alcohol from the blood and milk of each individual mother. Alcoholic mothers might produce excellent quality milk, but they might also experience periods when they are not able to produce enough milk. Children nursing from alcoholic mothers experience somnolence, difficulties in neural-motor control, and later on in childhood, difficulties in learning. For this reason it is recommended that mothers not nurse their babies in the hours after ingesting alcohol.
FAS can also increase the probability of Sudden Infant Death Syndrome by a factor of from 3 to 7 times, and this contributes to a higher degree of infant mortality in some ethnic groups and minorities\textsuperscript{22}.

**ALCOHOL AND THE PLACENTA**

The primary effect of alcohol on the fetus is in the constriction of the blood vessels in the umbilical cord and placenta of the mother. This constriction can result in a longer exposure of the fetus to alcohol because of a reduction in blood flow. The exposure of the fetus to alcohol causes many complex reactions in the placenta and to the growth of the fetus. Alcohol arrives at the placenta through the circulatory system of the mother, crosses it and enters the liquid in the amniotic sac. Within an hour the levels of alcohol in the amniotic liquid reach the same levels as found in the blood of the mother. Acetaldehyde permeates the placenta and reaches the fetus, but levels of this substance in the mother’s blood stream are variable. The human placenta has a limited capacity to metabolize acetaldehyde and the liver of the fetus has not developed enough to metabolize alcohol; therefore, the reduction of alcohol in the blood stream of the fetus is only accomplished by the mother when the fetus returns it to the maternal circulatory system.\textsuperscript{25}

In the first 20 weeks of pregnancy alcohol can be absorbed through the skin of the fetus – although evidence of this absorption is difficult to prove. However, it is known that after 24 weeks the skin of the fetus becomes more impermeable due to the presence of keratin, making the absorption through it limited. After this stage in fetal development the fetus begins to ingest the amniotic liquid and if alcohol is present in this fluid, it is absorbed into the blood stream of the fetus and from there it is passed back to the mother where only then it is eliminated.

Therefore, a time frame of three hours is involved in which alcohol freely circulates in the mother’s blood stream and enters the amniotic liquid where it is ingested by the fetus before it can be entirely eliminated from the fetus and the mother. This can occur even in small amounts of alcohol ingested by the mother. Therefore, it is very probable that with alcoholic mothers, the amniotic sac serves
as a deposit for alcohol, because its level remains higher and for a longer time in the amniotic liquid than in the mother’s blood.22,25

**TERATOGENIC DIAGNOSTIC CRITERIA IN CHILDREN OF ALCOHOLIC MOTHERS**

Based on recent studies, children that have been exposed to alcohol during pregnancy must show the following symptoms of FAS or its variations, Fetal Alcohol Disorder (FAD), and other denominations that present the following deformities:

1. Craniofacial abnormalities taking into account ethnic facial variations present three evident characteristics:
   - the nasal filter is missing or indistinct, nostrils are inverted increasing the distance between the nose and the upper lip, which is thinner compared with the lower lip (Figure 1A), differently from the other child (Figure 1B); hemangioma (non-localized) (Figure 2); convergent strabismus (Figure 3); small dents or folds in the eyelids of 10th percentile or less, and are coupled with a small flat nose, epichantic folds, retrognathia, microcephaly, and a flat face (Figure 4).

2. Delayed growth in the prenatal or postnatal stages of development are characterized by deficient weight and height in the 10th percentile or less, adjusted to age group, gender, pregnancy duration, and ethnic factors.

3. Central nervous system structural abnormalities:
   - the cephalic perimeter is in the 10th percentile or less, adjusted to gender and age, brain damage abnormalities found through CAT scans, and x-rays (that cannot be attributed to complicated births, fever). Finally, mental and physical development that is below standards set at each stage of growth, which also can be diagnosed by slow learning, speech defects, poor memory, slow social development, hyperactivity, and poor motor control.
It is important that at least three facial abnormalities be present to diagnose FAS along with proper documentation of any growth delays or neurological abnormalities. The correct diagnostic criteria should be consistent among clinical physicians, medical researchers and social workers. It is of supreme importance that these criteria be established so that children with FAS can be identified within the population and given the proper treatment and preventive orientation.

Figure 1  (a) Facial dismorfology. (b) Normal facial traits. (See coloured figure in Coloured Book.)
Source: Grinfeld & Trinca.26

Figure 2  Hemangiomas. (See coloured figure in Coloured Book.)
Source: Grinfeld & Trinca.26
Alcohol and its consequences: dealing with multiple concepts

Figure 3  Convergent strabismus. (See coloured figure in Coloured Book.)
Source: Grinfeld & Trinca.26

Figure 4  Cranofacial abnormalities. (See coloured figure in Coloured Book.)
Source: Family Empowerment Network – FEN.27
Many researchers have contributed to define necessary issues for the correct diagnosis of FAS and FAD. Two protocols have been widely disseminated, and can categorize and evaluate children exposed to alcohol during pregnancy.\textsuperscript{21}

The first protocol to be adopted was presented by the Medical Institute of the National Academy of Science in 1996. This protocol was developed due to the difficulty encountered in establishing the diagnostic criteria for children exposed to alcohol during gestation, and five diagnostic categories for FAS were proposed.\textsuperscript{13} This protocol was later refined in 2005 and finally six categories were used to define FAS.\textsuperscript{20}

- category 1: FAS with confirmed exposure of the fetus to alcohol during pregnancy;
- category 2: FAS with unconfirmed exposure of the fetus to alcohol during pregnancy;
- category 3: partial FAS with confirmed exposure of the fetus to alcohol during pregnancy;
- category 4: partial FAS with unconfirmed exposure of the fetus to alcohol during pregnancy;
- category 5: congenital deformity related to alcohol;
- category 6: neurological disturbances related to alcohol.\textsuperscript{13}

The above classification considers that, in most cases, the mother’s medical history is not available in regards to the suspected diagnosis.

The diagnosis of FAS is injured by the controversy over the definition of each of these categories, and it is pertinent to define which of these categories are the most appropriate. Since 1996, many recommendations have been published, but no consensus has yet been reached. This controversy reduces the potential interchange of data among the major research centers around the world making it difficult for professionals to diagnose properly this condition that affects large numbers.
TABLE 2 GUIDELINE - INSTITUTE OF MEDICINE REVISED\textsuperscript{21}

1. **FAS WITH EXPOSURE TO ALCOHOL DURING PREGNANCY**
   (Identification of all items from A to D)

A. Consumption of alcohol during pregnancy confirmed.

B. Evidence of characteristic minor facial abnormalities including more than two of the items listed below:
   1. small rents or folds in the eyelashes (equal to or less than 10\textsuperscript{th} percentile)
   2. thin reddened upper lip
   3. flat almost obstructed nose

C. Evidence of delayed growth during either prenatal or postnatal stages of fetal development:
   1. weight or height equal or less than 10\textsuperscript{th} percentile, corrected for variations between ethnic groups, if possible

D. Evidence of neurological deficiencies during fetal development or craniofacial abnormalities equal to or greater than listed below:
   - abnormal cerebral structure defect
   - cranial circumference equal to or less than 10\textsuperscript{th} percentile

2. **FAS WITH EXPOSURE TO ALCOHOL DURING PREGNANCY UNCONFIRMED**
   1B, 1C and 1D, previously cited

3. **PARTIAL FAS WITH EXPOSURE TO ALCOHOL DURING PREGNANCY CONFIRMED**
   (identification of all items from A to C required)

A. Consumption of alcohol during pregnancy confirmed.

B. Evidence of characteristic minor facial abnormalities including more than two of the items listed below:
   1. small rents or folds in the eyelashes (equal to or less than 10\textsuperscript{th} percentile),
   2. thin reddened upper lip,
   3. flat almost obstructed nose.

C. One of the characteristics listed below:
   1. evidence of delayed growth during either prenatal or postnatal stages of fetal development,
      a) weight or height equal or less than 10\textsuperscript{th} percentile corrected for variations between ethnic groups if possible.
   2. Evidence of neurological deficiencies during fetal development or craniofacial abnormalities equal to or greater than listed below:
      a) abnormal cerebral structure defects,
      b) cranial circumference equal to or less than 10\textsuperscript{th} percentile.
   3. Evidence of complex cognitive and behavioral abnormalities that are inconsistent with known levels of child development that cannot be explained through genetics, inheritable traits, or childís surrounding:
      a) this diagnosis includes deficiencies in the performance of complex tasks (solving of problems, planning, judgment, abstract thought, recognition, and mathematical abilities);
      b) the diagnosis should also include language deficiencies in speech and self expression as well as behavioral disturbances; slack personal habits, emotional instability, and lack of social skills
### Table 2 (Cont.) Guideline - Institute of Medicine Revised

#### 4. Partial FAS with Exposition to Alcohol During Pregnancy Unconfirmed

3B and 3C, previously cited

#### 5. Congenital Deformities Related to Alcohol Consumption During Pregnancy

(CDRA) (identification of all items from A to C required)

A. Consumption of alcohol during pregnancy confirmed.

B. Evidence of characteristic minor facial abnormalities including more than two of the items listed below:
   1. small rents or folds in the eyelashes (equal to or less than 10th percentile),
   2. thin reddened upper lip,
   3. flat almost obstructed nose.

C. Congenital facial deformities of the nature of one or more of the following categories: structural deformities and dysplasias (if the child presents only minor abnormalities, at least two should be present).
   a) cardiac: defects in the atrial septum, conglomerations of large blood vessels, defects in the venticle septum, and cardioconotruncal defect;
   b) skeletal: radial-ulnar synotisis, columnar vertabrae defects, articular contractures, scoliosis;
   c) renal: aplastic/hypoplastic/dysplastic kidneys, kidneys that U-shaped /double ureters
   d) eyes: estrabismus, ptosis, vascular anomalies in the retina, hypoplasia of the optic nerve;
   e) ears: loss of conductive hearing and loss of neural-sensorial hearing;
   f) minor abnormalities: hypoplastic finger and toenails, short fifth finger, clinodactilia of the five fingers, pectus carinatum/escavatum, camptodactilia, ‘golf-club’ palms, refraction errors, ‘railroad track’ ears.

#### 6. Neurologic Disorders Related to Alcohol

(identification of items A and B required)

A. Consumption of alcohol during pregnancy confirmed.

B. At least one of the following:
   1. Evidence of neurological deficiencies during fetal development or craniofacial abnormalities equal to or greater than listed below:
      a) abnormal cerebral structure defects,
      b) cranial circumference equal to or less than 10th percentile.
   2. Evidence of complex cognitive and behavioral abnormalities that are inconsistent with known levels of child development, which cannot be explained through genetics, inheritable traits, or child’s surroundings.
      a) This diagnosis includes deficiencies in the performance of complex tasks (solving of problems, planning, judgment, abstract thought, recognition, and mathematical abilities);
      b) this diagnosis also includes language deficiencies in speech and self expression as well as behavioral disturbances (slack personal habits, emotional instability, and lack of social skills).

Source: Hayme et al.10
The behavioral profile of children with FAS includes speech and communication problems (e.g. the child talks too much or too fast, and interrupts the conversation of others), the child is also very disorganized and loses things, is emotionally unstable and has changes of humor, poor motor control (e.g., in sports), does poorly in school, has difficulty in beginning and completing simple tasks, has a poor attention span, poor social skills, and presents an inability to assess the consequences of his or her actions. The child also suffers from insomnia, hyperactivity and hyperacusia.\textsuperscript{21,22}

Clinical experience shows that the suspicion of Fetal Alcohol Spectrum Defects should always be a diagnosis of exclusion. Many genetic syndromes with deformities present the same characteristics as FAS and children with genetic defects and deformities are born from alcoholic mothers as well as from nonalcoholic mothers. Therefore, a diagnosis of FASD should not be automatic in children displaying neurological-cognitive-emotional problems just because they were born from mothers that consumed alcohol during pregnancy.

The diagnosis of FAS and of FASD in all its varying degrees of gravity can be corroborated by cerebral image tomography, but can also be detected in the examination room by an inspection of the ganglia at the base of the neck. However, in the cerebellum, in the callous body and the hippocampus, where there are regions that have been directly affected by the consumption of alcohol during pregnancy and embryonic development, other detection processes are needed. Therefore, the resources offered through PET scans (positron emission tomography), CAT scans (computer axial tomography), and SPECT scans (single photon emission computed tomography) are invaluable in the correct diagnosis of FAS.\textsuperscript{20}

FAS has characteristics very similar to Williams syndrome, which is caused by the microdeletion of chromosome 7q11, which delays growth in children, causes microcephaly, short rents in the eyelashes, long and flat nasal features, and later on in the child’s development, learning difficulties and odd behavior. Other syndromes that could be confused with FAS are: the syndromes of Aarskog, Noonan, Dubowitz, Bloom, Turner and Opitz.\textsuperscript{13} It is important to point out that
alcoholic mothers that continue to drink heavily during pregnancy will continue to bear children with FAS, and subsequent children will have more complex problems than the firstborn.22

EVOLUTION

Studies show that 50% of children born with FAS are mentally delayed and have IQs that range from 20 to 100 with an average of 65.23 As the child grows, attention deficits become more apparent as well as hyperactive behavior. Facial defects begin to appear between the 5 and 7 years of age and make the possible diagnosis earlier. Speech becomes difficult and difficulties in understanding are common at this age because of an anatomic alteration of the maxilla. A motor dysfunction in the oropharyngeal muscle that causes hearing problems is also present.

It is important to emphasize that FAS is a condition that causes problems during the whole life of the child and the deformities caused by exposure to alcohol during pregnancy also last a lifetime. The combination of physical defects and the stress caused by them suggests that many children with FAS will have problems adjusting in adult life. Emotional instability with family members, alcohol and substance abuse, mental problems, inappropriate sexual behavior, unemployment, victimization, legal problems, and finally, premature death can be the legacies left by exposing the fetus to alcohol in the womb.23 The facial deformities that characterize this syndrome usually disappear or become less apparent in adulthood. Death from complications of this disease can be as high as 2.8%,22 making FAS related deaths an important factor in assessing infant mortality due to epidemics.

TREATMENT

CLINICAL DIAGNOSIS

Even though both early diagnosis and intervention are beneficial to children that have FASD, the diagnosis of this disease poses a veritable challenge for pediatricians because outward physical signs of this disease and its symptoms are
difficult to detect in newborns. North America leads the field of clinical diagnosis and treatment of this disease. As previously cited, the detection of signs that the fetus suffered exposure to alcohol in the womb is very difficult for untrained health workers.

Many of the outward manifestations of FAS could also be of genetic origin and confused with other syndromes that show the same facial deformities. This, coupled with uncertain information on whether alcohol was consumed by the mother during pregnancy, makes a correct diagnosis even more difficult.\textsuperscript{15,23}

Surveys carried out by health professionals in the field of pediatrics show considerable generalization and lack of knowledge about the clinical characteristics and evolution of FAS.\textsuperscript{15} In the United States pediatricians are better trained to diagnose this disease. Europe, Oceania and Latin America must train pediatricians in the diagnostic techniques of FAS. Pediatricians all over the world need more resources to be able to diagnose correctly this disease that afflicts so many children worldwide. Resources that could benefit pediatricians are:

- more information about FAS in medical congresses on genetics, pediatrics, and obstetrics supported by the medical societies that work in those fields;
- precise and appropriate diagnostic tools;
- training of health workers regarding social services which the patient can be referred to;
- medical records of pediatricians experienced in FAS diagnosis;
- government support in municipal and state health prevention programs;
- support from NGOs and other organizations that deal with alcohol abuse and drug addiction.

In 2008 a study was undertaken by a group of researchers from Australia,\textsuperscript{15} in which 33 diagnostic clinics around the world collaborated. The clinics were staffed with pediatricians, neural pediatricians, geneticists, and psychologists, but not all counted on the services of nurses, social workers, dentists, or public health officials. All the clinics adopted the same procedures as the ones recommended
by the Centers of Disease Control and Prevention in the United States, which entail periodic behavioral evaluations of the neurological nature. The diagnostic criteria used was the same for all clinics and this allowed data to be assessed by all collaborators, which consequently, resulted in comparisons and more FAS research in this important area of pediatrics.

**EDUCATIONAL PLANNING**

For children that have FASDs, the school environment can be daunting and the learning process negative if the school is not prepared to cope with students with the disease.

The key to success requires individual evaluation of the student’s defects and how they interfere with the educational process. In most cases these children have to be sent to special schools where there is an appropriate atmosphere for them to grow in security and comfort within their limited capacities. This atmosphere would allow the physical and mental limitations caused by FAS to be overcome, and in this way, the child could develop certain skills and begin to feel more competent and become useful in society, therefore, having the chance to lead a better life.

With the correct individual diagnosis of each child’s limitations and capacities, special educational programs can be devised to create a positive school experience for children with FAS. Special educational tools that are specific to the individual learning needs of each child could be devised and then revised when needed according to constant progress evaluations made for each student’s progress. This would make the learning process a dynamic experience.

Experimental research clinics about the relationship between structural cranial deformities and mental health should open the doors for a wider exchange of knowledge between these clinics so that centers of reference can be formed that would allow early diagnosis of FASDs cases. In the future it is hoped that the occurrence and diagnosis of FAS will lead to more positive results in its identification and prevention.
PREVENTION

The physical and mental alterations caused by FAS/FASD in the womb of the mother are entirely preventable if the mothers abstain from drinking during pregnancy and the months preceding conception. The period in which the fetus is most susceptible to alcohol in the womb is in the first 4 to 6 weeks of its life.

The American Pediatric Academy and the American College of Gynecologists and Obstetricians recommends complete abstention from alcohol regardless of the quantity during the 9 months of pregnancy.

The harm caused by alcohol in the womb of mothers that drink is irreversible and permanent. However, there are means to reduce the consequences of alcohol abuse, and medical professionals can reduce the permanent effects of FAS on children and prepare them for a better future.

The prevention of FAS, and the disorders and deformations that the exposure of the fetus to alcohol in the womb causes is of great importance to public health. Many prevention programs have been implemented in obstetric and prenatal clinics with success, which have reduced the risks of alcohol consumption among pregnant mothers. Obstetricians and pediatricians should encourage the training of qualified professionals so that early and correct diagnosis of FAS can even further reduce these risks.\textsuperscript{1,5,13} The proper referral of pregnant women that show signs of alcohol or substance abuse to competent professionals trained in the correct diagnosis is the most promising manner to reduce the harmful effects of Fetal Alcohol Syndrome.

REFERENCES


