

The Effects of Teratogens on the Health of Developing Human Beings

BY

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Abstract

The study employed qualitative approach and investigated the effects of teratogenic agents on the life of the developing human beings. Qualitative researchers seek to gather answers and information from the events they see and hear from people and read from literature. The unborn child, although seemed to be protected, comfortable in the womb environment is not completely immuned to some external and internal influences surrounding the mother, that can cause serious and debilitating effects at different developmental stages of the individual. Literatures reviewed explained the negative effects of teratogenic agents on both prenatal and postnatal lives. Teratogens are agents that can cause abnormalities and such agents include: drugs, chemical, infections, alcohol, and tobacco in different types of cigarette, pollutants, maternal health state, as well as maternal age and nutrition. Most literature reviewed indicated that the danger of structural defects caused by teratogens is greater in embryonic stage. Studies also showed that the teratogenic agents can be disastrous to the developing human being from the moment of conception to birth and/or through life. The study reported two, teratogenic cases.

Introduction

Pragmatically, there are some external and internal influences that can have serious and debilitating effects on the life of unborn human beings. The unborn child, although seem to live in a protected, comfortable environment is not totally immuned to the larger world surrounding the mother. The environment can affect the child in many well-documented ways. Teratogenic agents affect genes and protein production in several ways. They may damage genes and make them incapable to operate by substituting themselves in the genetic code. Santrock (2006) observe that thousands of babies born deformed or mentally retarded every year are the results of events that occur in the mother's life and such events are classified as teratogens.

Berger and Thompson (1998) Haustein (1999) Dacey and Travers (2002) Santrock (2006) observe the teratogens are any agents that can cause abnormalities and such agents include: drugs, chemicals, infections, maternal health state, alcohol, smoking and pollutants. Prenatal period is a very sensitive period in the life of the human organism, and the danger of structural defects caused by teratogens is greater in the embryonic stage. (Zanden, 1993, Little 1992, Preston 1998, Dreotsi 1993, kumar 1982, Lambers and Clarke 1996).

Studies of effects of teratogenic agents on the unborn baby (e.g. Dacey and Travers 2002, Ashmead 2003, O'Leary 2004, Lewis, Misra, Johnson and Rosen 2004, Santrok 2006 & Oladele 1989) during the prenatal period are many and diverse and can be very disastrous to the developing human being; and the risk incorporate a continuum of biological and environmental conditions, which range from a very serious genetic defects to mild oxygen deprivation at birth. It is observed that teratogens can be present in the woman's body before conception takes place and it can affect the unborn baby at birth during delivery or manifest later in the life of the individual child.

Over the years psychologists have devoted keen interests in studying the effects of maternal physical health condition on the unborn baby. For instance, Dacey and Travers (2002), Blackman (1997) Moore and Persaud (1998), Santrock (1995, 2006) Byer and Shainberg (1991) discovered that maternal infectious diseases such rubella (German measles), Syphilis, Genital herpes, toxoplasmosis and the universal HIV/AIDS scourge can be easily transfused into the unborn baby's blood stream through the connecting device, the placenta. Statistics show that the outbreak of rubella in 1964-1965 recorded 30,000 prenatal and neonatal deaths and more than 20,000 infants were born with malformations, including mental retardation, cataracts or blindness, deafness and serious congenital heart disorder and others. Blackman (1997) observed that the infectious risk is high if the disease appears early in the pregnancy as the third and fourth weeks and the second month and may result in spontaneous abortion. Blackman (1997) further discovered that one-thirds of babies delivered through birth canal affected by genital herpes die at

birth and one fourth of such babies' manifest serious brain damage later. With syphilis, Blackman observe that such disease can damage already formed organs of the unborn babies.

Another teratogenic agent which is harmful to unborn babies is toxoplasmosis, which is transmitted by many animals especially cats. Olds, London and Ladewig (1996) stated that, this infection may be harmless to adults, but can cause serious problems to unborn babies, such as spontaneous abortion, premature deliveries and neurological problems like mental retardation, blindness and cerebral palsy. As well as low birth weight, a large liver and spleen and anemia.

Statistics (U.S. Census Bureau, 1999) estimated that since 1980, 12 million adults and children died of AIDS and as many as 33 million adults and children are living with HIV/AIDS. Moran (2000) observed that 1000 are affected every day and about 350,000 children die every year with HIV/AIDS. Moran further observed that in the United States 7,000 to 8,000 women infected with HIV virus give birth to babies. However, statistics show that only one out of four babies born to mothers infected with HIV develops AIDS, studies also show that these figures are directly related to the amount of the virus that the mother was carrying (Altman, 1994).

A study by Caldwell and Rogers (1991) revealed three major ways through which mother with AIDS can infect her offspring. These include: First during gestation, across the placenta, secondly during delivery, through contact with maternal blood or fluids and third during postpartum, through breast feeding. Caldwell and Rogers however indicated that babies born to AIDS infected mothers can show symptoms of HIV/AIDS or may not. But later in life develop HIV/AIDS.

Studies have shown that the age of the mother may affect the unborn baby. There can be high rate infant mortality with mother below twenty years and above 35 years. Mothers approaching the menopause may have endocrine disorder which may slow down the development of the embryo and the fetus, thereby causing developmental irregularities like cretinism, mongolism, and heart malformation and may also involved physical and mental defects (Santrock 1995 & Oladele 1989).

Studies also show that mother's emotional state and stress can affect the unborn baby, as well as the nutrition of the mother (Oladele 1989, Santrock 1995, 2006 & Dacey and Travers 2003). The relationship between an expectant woman and the unborn child is so tight that what happens to one affects the other. Other teratogenic agent that is harmful to the unborn baby is substance of all types, drugs, smoking, and alcohol of all sorts.

Many definitions have been given to drugs. Miller (1992), Aguwa and Ogbuokua (1998) see drugs as any medical substance and chemical used in the diagnosis, prevention, treatment or cure of diseases. Broadly speaking, a drug is any chemical substance that when taken and when absorbed into the body of a living organism alters normal bodily functioning. Stanwood and Levitt, (2004) see drug as a chemical substance administered to a person or animal to prevent or cure disease or otherwise enhance physical or mental welfare. Lanchester (1988), Arthur (2006) stated that drug are those chemical teratogenic agents that can cause permanent alternations of the fetus in form or in function during prenatal development. It is observed that the period of pregnancy is nine months which is divided into three (first, second and third) trimesters. Each trimester is a period of approximately 13 weeks (3months) and different developmental milestones are specific in each phase.

Basically, there are many different kinds of drugs some are legal and some are illegal. Legal drugs are those types that are not prohibited by law/government of any particular country, such drugs include paracetamol, smoking, (tobacco), and alcohol while illegal drugs are the types prohibited by law/government, and such include: cocaine, heroin, marijuana inhalants.

Categories of Drugs:

Drugs may be categorized as depressants, stimulants and hallucinogens. Depressants are the type of drug that slow down the body into a relaxed state. Such drugs like barbiturates (with different street names as blue devils, red devils, yellow jacket), tranquilizers (such as valium, Librium, miltown). Stimulants are the types of drugs that make people feel awake and energetic. Such drugs speed up the central nervous system. Hallucinogens, these types of drugs make people not to be in touch with reality, they hallucinate feel they see visions of angles (Stanwood and Levitt, 2004, & Santrock 2006).

Drug and their effects on the unborn babies:-

As teratogenic agent, the effect of any kind of drugs on the unborn babies depends of the types, the dosage and the developmental stage of the fetus. The effect of drug may be positive or negative, but for the purpose of this study, the concentration is on the negative effect on the unborn babies, whether the drugs are prescribed by the medical physicians or not. It is observed, that some pregnant women can take both prescribed and non prescribed drugs without considering the negative effects on the unborn babies. (Tyler & Johnson, 2006).

Addis, Magrini and mastroiacovo (2001), Zanden (1993) observe that sometimes, deformed babies are born, showing the damage drugs can be on a developing fetus. For instance, the thalidomide tragedy in the early 1960s awakened the medical professions and the public alike to the potential dangers of drugs for pregnant women. It was stated that pregnant women took the popular tranquilizer thalidomide as a sleeping pill and an antinausea measure that produced no adverse reactions in the women, but physicians discovered a sizable increase in children born with either partial or no limbs. In some cases, feet and hands were directly attached to the body. At other times the outcomes were dumbness, deafness blindness and mental retardation these conditions are devastating. Stimmel (1991) observed that in the United States many women of childbearing age use more of the following teratogenic

agents; alcohol, cocaine, marijuana or nicotine. 15% of these women use drugs with sufficient frequency to cause damage to a fetus during pregnancy. Statistic showed that 30 to 40% of pregnant women smoke, 60 to 90% use analgesic during pregnancy, 20 to 30% use sedative and an undetermined number continue to use illicit drugs. Dacey and Travers (2002), observed that a number of women continue to use drugs before they realize they are pregnant.

Cocaine is an illegal drug in Nigeria, yet it may be smuggled in, but its use by pregnant women in Nigerian may not have been well established. The most consistent finding in literature is that cocaine exposure during prenatal development is associated with reduced birth weight, reduced length and head circumference. (Smith & others 2001). Also in a study, Addis and others (2001) established that prenatal cocaine exposure was associated with impaired motor development at 2 years of age. Lewis & others (2004) Crandal & others (2004) established in their study that children born to women who used cocaine during pregnancy are likely to have neurological and cognitive deficits.

Rodier, (2004), Sorokin (2002), Stanwood and Levitt, (2004) Andrade & others (2004), Kallen (2004) in their studies observed that some prescription drugs that can function as teratogens include, antibiotics such as streptomycin and tetracycline, some antidepressants, certain hormones like progestin and synthetic estrogen and accutane (which often is prescribed for acne). In addition, Cnattingius & others (2000) Fernande & others (1998), stated that no prescriptions drug like diet pills, aspirin and caffeine can be very harmful to the unborn babies. But a review of studies on caffeine consumption during pregnancy concluded that a small increase in the risks for spontaneous abortion and low birth weight occurs for pregnant women consuming more than 300 milligrams of caffeine per day.

In a study by Eskenazi & others (1999) pregnant women who drank caffeinated coffee were more likely to have preterm deliveries and newborns into a lower birth weight than their counterparts who did not drink caffeinated coffee. Taking into account such results, this study recommends that pregnant women should decrease from consuming caffeine or its equivalent. Also some malaria drugs like quinine can cause congenital deafness, while barbiturates a depressant may affect the oxygen supply to the fetus and result in brain damage. Zanden, (1993), Santrock (2006), observe that oral contraceptive can be harmful to the unborn babies and the birth defects involve the heart, limbs, anus, esophagus, vertebral column or the central nervous system.

Concerning alcohol, Obot (1993) observed that alcohol is consumed in different forms ranging from traditional beverages (e.g. Burukutu, pito, palm wine, ogogoro) through western lager beer and wine, to spirituous liquors. (Including brandy, whiskey and gin). Bookstein & others (2000) O' Leary (2004), observe that heavy alcohol consumption by pregnant women can be devastating to the unborn. Mothers who drink alcohol regularly and in large quantity are likely to give birth to offspring suffering from Fetal Alcohol Syndrome (FAS). Fetal Alcohol Syndrome (FAS) is a cluster of abnormalities that appears in the offspring. The abnormalities include facial deformities and defective limbs, face and heart. Most of such (FAS) children are below average in intelligence and some are mentally retarded. Due to the danger it poses, it is advisable that pregnant women do not take alcohol at all.

Cigarette smoking (Nicotine) by pregnant women can also adversely affect prenatal development, birth and postnatal development. Mathews, Menaker & MacDoman (2003) observe that fetal and neonatal deaths are higher among smoking mothers. Fried & Watkinson, (1990) in a study found out that exposure to cigarette smoking was related to poorer language and cognitive skills at 4 years of age. In another study, (Sawani & others 2004, Stocks & Dezateux 2003) observed that respiratory problems and Sudden Infant Death Syndrome (SIDS) also known as crib death) are common among the offspring of mothers who smoked during pregnancy. Thapar & others (2003) in a study revealed a link between maternal smoking during pregnancy and increased incidence of attention deficit, hyperactivity disorder in almost 3,000 children of 5 to 16 years of age. Klesges & others (2001) designed intervention programmes to help pregnant women stop smoking, result is not known.

An accumulating body of evidence suggests that Marijuana use by expectant mothers has detrimental effects on fetal development and neonatal behaviour, including infants' neurological development. National Drug Law Enforcement Agency (2003) and Fried (2002) review of marijuana concluded that babies born to mothers who used this drug during pregnancy, are smaller in size than babies born to mothers who did not use marijuana. In a longitudinal study Richardson and other (2002) established that prenatal marijuana exposure was related to learning and memory difficulties at the age of 11 years. Hulse & others (2002) observed that infant whose mothers were addicted to heroin show several behavioural problems such as tremors, irritability, disturbed sleep and impaired motor control.

TABLE 1. TERATOGENS, THEIR EFFECTS, AND TIME OF RISK

AGENT	POSSIBLE EFFECTS	TIME OF RISK
Alcohol	Fetal Alcohol Syndrome (FAS) growth retardation, cognitive deficits	Through out pregnancy
Aspirin	Bleeding problems	Last month & at birth
Diethyl-stilbestrol (DES)	Cancer of female reproductive system	From 3 to 20 weeks
LSD	Isolated abnormalities	Before conception
Lead	Death, anemia, mental retardation	Throughout pregnancy
Marijuana	Unknown long-term effects, early neurological problems	Throughout pregnancy
Thalidomide	Fetal death, physical and mental abnormalities	First month
Cocaine	Spontaneous abortion, neurological problem	Throughout pregnancy
AIDS	Growth failure, low birth weight, developmental delay, death from infection	Throughout pregnancy during delivery; during breast feeding
Rubella	Mental retardation, physical problem, possible death	First three months, may have effects during later months.
Syphilis	Death. Congenital syphilis pre-maturity	From five months on.
Cytomegalovirus (CMV)	Central Nervous system (CNS) damage & Pre-maturity	Potential risks throughout pregnancy and at birth
	Source: Dacey J.S & Travers J.F (2002) Human development across the life span. (Teratogenic Agents and Effects)	

It is observed supported by literatures that the listed teratogenic agents are capable of causing certain uncertain types of damages in the life of the individual both during the prenatal and postnatal periods (e.g. Kumar, 1982) observe that alcohol which is the oldest state altering drug has many components, which include ethanol and methanol. When fermented or brew, ethanol produces ethyl. Alcohol and methanol produces mythel alcohol. From these, alcohol in forms of beers, ales, wines and distilled spirits are produced and eah has its own effect.

Cigarette also has active ingredients that are harmful to the unborn. Lambers and Clarke (1996) observe that Nicotine which is an active ingredient of tobacco is introduced into the blood stream either by smoking, snuffing or chewing. Further processing of tobacco is displayed in different brands of cigarette, all with devastating effect on the unborn.

It is also observed that smoking and alcohol can negatively affect the mechanism of sperm life span; whether the man smokes or inhales the smoke from the smokers.

In summary, all the teratogenic agents have their different teratogenic effects at prenatal and postnatal stages. Many studies concerning the health of the unborn baby revealed that complications usually arise on the grounds that mothers knowingly or unknowingly take drugs which appear dangerous to the fetus. Many teratogenic agents such as mother's health, diet (nutrients) age and physical environmental living conditions, chemical like toxic waste can have devastating effect on the unborn babies (Baleinskil 2008). Some cases of babies affected by teratogens.

Case 1

The researcher once visited a prolife centre. An elderly woman was carrying a baby wrapped in clothes. On closer observation the researcher saw that the baby was so small with wrinkled body, small head, small mouth and tinny nose. At first one could not make the difference, whether it was a human being or inordinate object. On interviewing the woman it was discovered that her teenage daughter owned the baby and disappeared after delivery.

On further investigation concerning what could be responsible for the condition of the baby. The manager of the prolife centre told the author that, the teenage mother attempted abortion several times and took different types of drugs, including local gins. She took whatever method that was dangerous to destroy the baby, but could not succeed. Finally, she put to bed this monster (using the woman's word) and disappeared. However, the baby later died at the age of eight months.

Case 2

In this case, a 24 year old man, Mr. Mark, Nork born to the family of Emego (real names with held). Was born dumb, on interviewing his parents, it was revealed that his mother was terribly ill when she was expecting Mark Nork, almost throughout the period of the pregnancy. They never knew that the woman would survive that pregnancy as well as the unborn. The researcher asked the parents, what they did when they discovered that the child was dumb. They said they took him to Speech Therapy Centres and sent him to Special education school yet he cold not speaks.

The researcher asked the parents if they had any dumb disorder in their families. The answer was no. so the idea of probable genetic/hereditary influence was ruled out. Then, the conclusion is that the probable cause of the disorder could be teratogenic agents, since the mother disclosed that she was sick from the time she took in to time she put to bed.

Conclusion

Teratogens have negative effects on the developing human beings. The adverse effects can be at both prenatal and postnatal stages of human development. It is observed that teratogens can be present in the woman's body before conception takes place and it can affect the unborn baby at birth during delivery or manifest later in the life of the individual child. It is therefore necessary for women of child bearing age to take medical examination before getting married and bearing children. Pregnant women should be very careful with what they ingest in the name of drugs both prescription and non-prescription drug. Reviewed studies showed that traditional beverages such as brukutu, pito, palm wine and ogogoro can have adverse effects on the developing human beings. The study suggested that expectant women should be careful from eating, drinking or any act that is harmful to the unborn, should take frequent medical examination, and live in a healthy and conducive environment and take adequate nutrient for safety sake.

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