

Original Research

The Relationship of Some Teratogenic Factors to the Birth of a Teratogenic Child

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ABSTRACT

A congenital malformation is an anatomical or structural abnormality present at birth. Congenital malformations may be caused by genetic factors or environmental insults or a combination of the two that occur during prenatal development. Most common congenital malformations demonstrate multifactorial inheritance with a threshold effect and are determined by a combination of genetic and environmental factors. During the first two weeks of gestation, teratogenic agents usually kill the embryo rather than cause congenital malformations. Major malformations are more common in early embryos than in newborns; however, most severely affected embryos are spontaneously aborted during the first six to eight weeks of gestation. Teratology is the science that investigates the congenital malformations and their causes. Intrauterine exposure to a toxicant, particularly in early pregnancy, induces embryonic and fetal changes ranging from none up to malformations and stillbirths. The teratogenic agents include some viral, spirochetal and protozoal



infections, physical agents as ionizing radiations and excessive heat, pharmacological drugs as thalidomide, excessive vitamin A, corticosteroids, antiepileptic, antimalarial, anti leishmaniasis and antihypertensive agents, industrial pollutants as toluene and cadmium, alcohol and smoking abuse, and narcotics. Maternal health problems as diabetes mellitus, multiple sclerosis and rheumatoid arthritis may also add to the etiology list of teratogenesis. The prevalence of the congenital birth defects ranges from 2 to 5% throughout the first year of postnatal life in this study, about 170 cases were collected from the questionnaire in an attempt to study the factors causing the birth of a teratogenic child and the diseases and deformities that result from it. It was found that many medications and chemicals that the mother is exposed to during pregnancy cause the birth of a teratogenic child.

KEYWORDS: Teratogenic Agent, Congenital Malformation, Birth Defects, Teratogens.

INTRODUCTION

A teratogen is any substance, organism, or process that can potentially cause harm to a developing fetus during pregnancy. These harmful effects can manifest as physical or functional defects in the fetus after the pregnant woman is exposed to the teratogenic substance. The term "teratogen" comes from the Greek word "teratos," which means "monster." Teratogens can take various forms, including infectious agents, medications or drugs, and environmental exposures. Some examples of teratogens include certain viruses (such as rubella), certain medications (such as thalidomide), radiation, certain chemicals (such as lead or mercury), and illicit drugs (such as cocaine or methamphetamine). The effects of teratogens can range from minor abnormalities to severe birth defects, and in some cases, they may lead to the termination of the pregnancy. It's important for pregnant women to be aware of potential teratogenic exposures and take precautions to minimize their risks. It's

estimated that approximately 4 to 5 percent of birth defects are caused by exposure to teratogens during pregnancy. Additionally, teratogens can also influence pregnancies in other ways, such as increasing the risk of preterm labor or miscarriages (Chaudhary, Garima, and Amit Sehgal.2005). Teratogens are substances or conditions that can interfere with normal development and cause birth defects. They are classified into four main types: physical agents, metabolic conditions, infections, and drugs/chemicals. Teratology is the scientific field that studies and investigates birth defects and their causes (etiology). It aims to understand the factors that contribute to the development of congenital malformations and identify ways to prevent or mitigate their occurrence. The incidence of congenital malformations at birth is estimated to be around 2-3%. However, this incidence increases to about 5% by the end of the first neonatal year, indicating that some defects may become apparent or diagnosed after birth. When a developing embryo is exposed to a toxic agent, its response can range from no observable effects to severe outcomes such as

death or malformation. The severity of these effects, at a given dosage of the teratogenic agent, is often referred to as teratogenic or developmental toxic severity. The specific response depends on various factors, including the timing and duration of exposure, the type and concentration of the teratogen, and individual susceptibility. The factors that can induce congenital malformations are collectively referred to as "teratogenic factors." These factors encompass a wide range of influences, including infectious agents, physical factors (such as radiation or trauma), chemical substances, hormonal imbalances, and maternal health conditions. Understanding and identifying these teratogenic factors is crucial for preventing and minimizing the risk of birth defects (Dutta, Srijita.2015).

Malformations may be single or multiple and have major or minor clinical significance. Single minor malformations are observed in approximately 14% of newborns. These malformations are usually of no clinical consequence and may include features such as a simian crease or ear tags. Specific minor malformations suggest the possibility of an associated major malformation. For instance, the finding of a single umbilical artery should suggest the possibility of associated congenital heart problems. The greater the number of minor malformations, the greater the likelihood of an associated major malformation. The more severe and the greater the number of major malformations, the greater the likelihood of a spontaneous miscarriage or shortened life span (Dagg, C. P. 1966). Teratogens that causes defects in fetus during pregnancy. They can be different type of chemicals, physical agents, metabolic conditions or different infections. They can

cause problems like preterm labors, spontaneous abortions, or miscarriages. There are different factors which influence the working of teratogens. These factors include timing, genetic variation and type of exposure. Various studies have been made to study the effects and working of teratogens, but till date the exact mechanism of action of most teratogens are unknown (Shepard, T. H.1984). Teratogenic agents: there are many known teratogens that have been associated with an increased risk of birth defects or teratogenesis. Some examples of common teratogens include:

Physical agents: These include factors such as radiation, heat, and mechanical forces. For example, exposure to high levels of ionizing radiation during pregnancy can increase the risk of birth defects.

Metabolic conditions: Certain metabolic disorders in the mother, such as uncontrolled diabetes or phenylketonuria (PKU), can increase the risk of birth defects in the developing fetus.

Infections: Certain infections can pose a risk to the developing fetus. Examples include rubella (German measles), cytomegalovirus (CMV), toxoplasmosis, and Zika virus. These infections can be transmitted from the mother to the fetus and cause a range of developmental abnormalities.

Drugs and chemicals: Various medications, recreational drugs, and environmental chemicals can be teratogenic. Examples include certain prescription medications (e.g., some anti-seizure medications), illicit drugs (e.g., cocaine, methamphetamines), and certain chemicals (e.g., lead, mercury). Exposure to these substances during pregnancy can increase the risk of birth defects.

Alcohol: Consumption of alcohol during pregnancy can lead to a range of birth defects known as fetal alcohol spectrum disorders (FASDs). These can include physical, behavioral, and cognitive abnormalities.

Tobacco: Smoking during pregnancy is associated with various adverse effects on fetal development, including low birth weight, premature birth, and an increased risk of certain birth defects such as cleft lip and palate.

Certain medications: Some prescription and over-the-counter medications, when taken during pregnancy, can increase the risk of birth defects. It is important for pregnant women to consult with their healthcare providers regarding the safety of any medications they are taking.

Illicit drugs: The use of illicit drugs during pregnancy, such as cocaine, heroin, or methamphetamine, can have serious consequences for the developing fetus, including increased risk of preterm birth, low birth weight, developmental delays, and birth defects.

Environmental toxins: Exposure to certain environmental toxins, such as lead, mercury, or certain pesticides, can pose a risk to the developing fetus and may increase the likelihood of birth defects or developmental abnormalities (Keen, C. L. 1992).

The study aims to raise awareness among pregnant mothers about the consequences of taking medication, antibiotics, exposure to chemicals, or radiation that can lead to the birth of a teratogenesis child.

MATERIALS AND METHODS

In this a study or survey was conducted to assess the exposure of pregnant women to potential teratogens. The questionnaire was intended to be administered during the first

trimester (MT1) and the second/third trimester (MT2) to gather information about various factors that could contribute to teratogen exposure but The questionnaire after teratogen child birth

The study aimed to collect data on pregnant women who were taking medications, exposed to chemicals in their daily lives, or working in environments where they could be exposed to radiation or chemicals. The objective was to determine the number of registered births with teratogen exposure and record relevant information about these pregnancies.

It's worth noting that not all exposures to chemicals or radiation necessarily pose a risk to the developing baby. Some substances, such as strong acids, strong bases, or strongly irritating chemicals, are less likely to harm the baby if the mother is working with them. Additionally, some exposures may be too brief or too small to create a significant hazard.

Patients: 170 cases of teratogenesis births in the city of Tobruk. In general, it was grouped according to the child's sex, and the teratogen type.

Statistical analysis: Prepared statistics and graphs using excel sheet Microsoft Office 2019 is a version of Microsoft Office.

RESULTS AND DISCUSSION

There are a variety of causes of congenital malformations including: environmental factors drugs, toxins, infectious etiologies, see the fig 1. Through this study, we noticed from our results that there is a close relationship between medications and some diseases such as heart disease, as well as the mother's use of medications and many chemical elements at home or in its work. The effect of a teratogenic agent on a child is similar in its effect on the lungs and intestines. Teratogens

factor, frequency case and type defect found that (56%) of cases were abortion with toxoplasmosis. About 1% of births with Drug Macrolides teratogen and antibiotics was 18% as the (graph 1) In this study, there were several factors identified as causes for the birth of a malformed child with various deformities. One of these factors is toxoplasmosis, which resulted in most cases in do not early detection and termination of pregnancy due to late treatment of the mother. Additionally, medications taken by the mother during pregnancy, such as urinary tract infection medications, that occur due to weakened immunity. This prompts the mother to resort to antibiotic treatment without consulting a doctor, in the long run can result in deformities in the heart and kidneys. In some cases, the child may be born without intestines. Moreover, excessive use of vitamin A by the mother has led to the emergence of various deformities in some cases. Some mothers working in chemical laboratories or using chemical cleaners excessively at home have also resulted in deformities in the lungs or other deformities. Additionally, poor maternal nutrition is one of teratogenesis child.

Drug Macrolides	1	Cardiovascular abnormalities
Vit A	4	Defect neural tube , abortion
Aspirne drug	5	Heart problems Kidney proplem
Chemical substance at home	13	Asthma , lung defect Absent esophgues Heart problems, Kidney problem,
Antibiotics UT	33	Absent., esophagus, inguinal hernia and hypoplasia of limb
Radition	12	Kidney proplem
Rubella	3	Heart problems Blindeness

Table:(1). Distribution teratogens factor , Frequency case and type defect

Teratogens factor	Frequency case	Defect type
toxoplasmosis	100	Abortion
Hydrocortisone	6	cleft lip death from
Malanutrient	2	cardiovascular and chronic lung disease

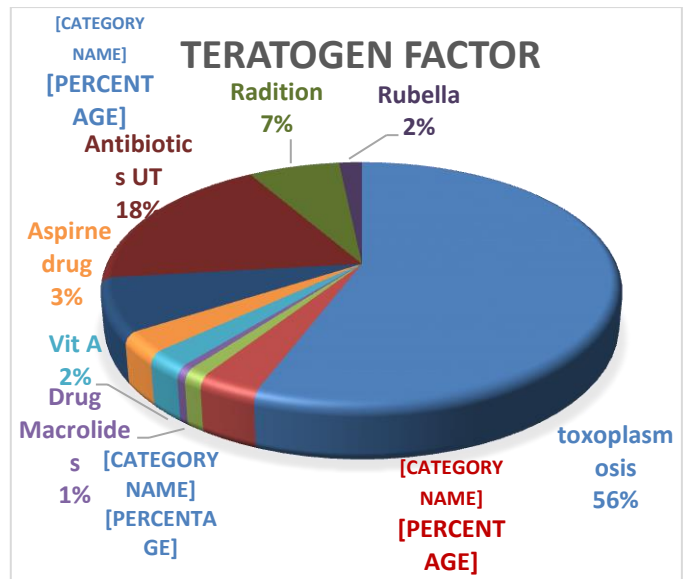


Figure: (1). Distribution teratogens factor, Frequency case and defect type found that majority (56%) of cases were abortion with toxoplasmosis about 1% of births with Drug Macrolides teratogen.

Table:(2). Frequency of defect type.

Defect type	Frequency(f)	Percentage (%)
cleft lip	6	3
Asthma	13	7
Rubella	3	1
Absent esophagus	46	25
Abortion	100	55
Defect neural tube	4	2
Blindness	3	0
Heart problems	43	24
Kidney problem	50	27
Lung disease	15	8

Table:(3). Frequency of defect type

Sex	Frequency(f)	Percentage (%)
Boy	29	26
Girls	50	27
Abortion	100	55

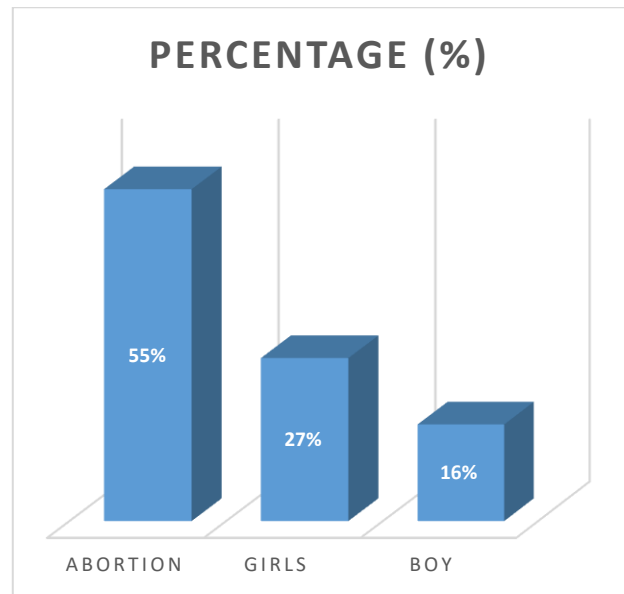


Figure: (1). Frequency of abortion.55% and girls was 27% and boys was 16% Cases of abortion with toxoplasmosis were more Due to the delay in diagnosing the condition and early treatment for the mother

Zomerdijk, I. M., *et al* (2015) Five percent of the pregnancies received a potentially teratogenic drug during pregnancy sixteen percent of the pregnancies received a potentially teratogenic drug in the 12-month period before a frequently received during pregnancy by 1.01% and 0.85% of women, respectively; 0.66% of the women received a risk category X drug during pregnancy which most frequently consisted of teratogenic drug during pregnancy in our this study (Zomerdijk, I. M., *et al* 2015).

We noticed from our results that there is a close relationship between medications and some diseases such as heart disease.

Keen, C. L., *et al* (1992) that maternal nutritional status can be an important modulator of the developmental toxicity of a number of agents in the environment. pregnancy outcome, it has been difficult to identify

specific nutrient deficiencies as causative factors of abnormal development in child (Keen, C. L., *et al* 1992) we agree with this study because the malnutrition of pregnant women result birth child with cardiovascular defect.

Knothe, H., & Dette, G. A. (1986) he damage related to drug use, antibiotics the frequency of anomalies of the fetus. malformations of the fetus amount to 2%. About 30% of all observed congenital malformations (Knothe, H., & Dette, G. A. 1986).

The present study agrees with this study because use, antibiotics of pregnant women result birth child with Heart problems, Kidney problem, Absent esophagus and inguinal hernia and hypoplasia of limb.

Lopes, F. M. R., *et al* (2007) toxoplasmosis is caused severe systemic disease, because if the mother is infected for the first-time during gestation, she can present a temporary parasitemia that will infect the fetus.

Many of the clinical symptoms are seen in congenitally infected children, from a mild disease to serious signs, such as mental retardation (Lopes, F. M. R., *et al* 2007). In our study the most cases with toxoplasmosis were Abortion.

Miller, R. K., *et al* (1998) vitamin A (retinol and retinyl esters) is teratogenic at dosages commonly used by women living in industrialized countries. Published human

and animal data and research developed by the authors are reviewed.

It is well known that vitamin A is essential for normal reproduction and development. Although doses of 10,000 IU/d or less of preformed vitamin A (retinyl esters and retinol) are considered safe, doses > 10,000 IU/d as supplements have been reported to cause malformations t is true that vitamin A is considered one of the factors that cause the birth of a teratogenic child In our study, there are cases of malformations with Defect neural tube, abortion, but small doses may not affect the fetus.

CONCLUSION

Teratogenic agents usually kill the embryo rather than cause congenital malformations.

Major malformations are more common in early embryos than in newborns; however, most severely affected embryos are spontaneously teratogenic agents are more likely to cause major congenital malformations.

It's important to note that the impact of teratogens can vary depending on the specific circumstances and individual factors.

Not all individuals exposed to teratogens will experience birth defects, and the severity of the effects can range from mild to severe.

Additionally, some teratogens may have different effects depending on the timing of exposure during pregnancy.

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ETHICS

We have ethical approval from the research studies office of Tobruk University.

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المخلص

التشوه الخلقي هو خلل تشريحي أو بنيوي موجود عند الولادة. قد تنجم التشوهات الخلقية عن عوامل وراثية أو عوامل بيئية ضارة أو مزيج من الاثنين، وتحدث هذه التشوهات خلال التطور الجنيني. تُظهر معظم التشوهات الخلقية الشائعة نمط وراثي متعدد العوامل مع تأثير عتبة، وتتحدد بمزيج من العوامل الوراثية والبيئية. خلال الأسبوعين الأولين من الحمل، عادةً ما تؤدي العوامل المشوهة إلى موت الجنين بدلاً من التسبب في تشوهات خلقية. تُعد التشوهات الكبرى أكثر شيوعاً في الأجنة المبكرة منها في حديثي الولادة؛ ومع ذلك، فإن معظم الأجنة المتأثرة بشدة تُجهض تلقائياً خلال الأسابيع الستة إلى الثمانية الأولى من الحمل. علم التشوهات الخلقية هو العلم الذي يبحث في التشوهات الخلقية وأسبابها. يُحظر التعرض داخل الرحم لمادة سامة، وخاصة في المراحل المبكرة من الحمل، تغييرات جنينية تتراوح من عدم وجود تغييرات إلى تشوهات وولادة جنين ميت. تشمل العوامل المسببة للتشوهات الخلقية بعض العدوى الفيروسية واللولبية والطفيلية، وعوامل فيزيائية كالإشعاعات المؤينة والحرارة الزائدة، وأدوية مثل الثاليدوميد، والإفراط في تناول فيتامين أ، والكورتيكوستيرويدات، ومضادات الصرع، ومضادات الملاريا، ومضادات الليثمانيا، وخافضات ضغط الدم، والملوثات الصناعية كالتولوين والكادميوم، وإدمان الكحول والتدخين، والمخدرات. كما قد تساهم مشاكل صحة الأم، مثل داء السكري والتصلب المتعدد والتهاب المفاصل الروماتويدي، في قائمة أسباب التشوهات الخلقية. يتراوح معدل انتشار العيوب الخلقية بين 2 و5% خلال السنة الأولى من عمر الطفل في هذه الدراسة، حيث جُمعت حوالي 170 حالة من خلال استبيان لدراسة العوامل المسببة لولادة طفل مُصاب بتشوهات خلقية والأمراض والتشوهات الناتجة عنها. تبين أن العديد من الأدوية والمواد الكيميائية التي تتعرض لها

الأم أثناء الحمل قد تؤدي إلى ولادة طفل مصاب بتشوهات خلقية.

الكلمات المفتاحية: عوامل مشوهة للأجنة، تشوهات خلقية، عيوب خلقية، مواد مشوهة للأجنة.

