



Teratogenic Effect Of Antibiotics In Pregnancy: A Review

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Abstract:

Pregnancy is a very crucial period of foetal development, and exposure to certain antibiotics can have harmful results. Teratogenic effect of some antibiotics in pregnancy can lead to miscarriage, birth defect, and long-term health problems. Now days it founds that the physicians are prescribing different antimicrobial agents to the Pregnancy women to tackle the multi-resistant microorganism. This review article aims to provide a list of teratogenic effect of some common antibiotics in pregnancy and including the teratogenic risk factors involves with it. And also, it intends to assists the physicians and pharmacist during prescription and dispensing respectively. As well as we can reduce the effect of teratogenicity.

Key words: Antibiotics, Pregnancy, fetus, teratogenic effect

Introduction

The benefits of antibiotics treatment must be weighed against the potential risk to the fetus. Health care provider must be aware of the potential teratogenic effect of such agents and prescribe them judiciously during pregnancy. The fetus is most vulnerable to teratogenic effect of the antibiotics during the first trimester, when major organ system are forming. Pregnancy is a critical period for both maternal and fetal health. During this period exposure to various substances can have significant implications for fetal development. Antibiotics are most commonly prescribed agent during pregnancy, primarily due to infections are frequently occurs and can cause serious risk to both the mother and fetus if untreated. For instance, urinary tract infection, respiratory infection and sexually transmitted infection are mostly treated by antibiotics. However the capacity of certain antibiotics to cross the placenta and enter the fetal bloodstream so that the fetus is in contact with the agents. Since the fetus undergoes critical stages of development throughout pregnancy and exposure to such teratogenic agents during this time may lead to severe consequences such as congenital malformations, functional abnormalities and long term health problems. To better understand the teratogenic effect of antibiotics requires an awareness of the potential risk and mechanisms by which these drugs affect the fetal development like placental transfer or disruption of fetal development or effect on maternal physiology. Antibiotics show their effects by targeting bacterial functions but all antibiotics are not equally safe to use in pregnancy. Many antibiotics possess higher degree of teratogenicity. The potency of teratogenic effect varies with type of antibiotics, its pharmacokinetics (how drug is absorbed, distributed, metabolized, and eliminated) and timing of exposure in pregnancy. The first trimester, in which the early stages of organogenesis is particularly affected by teratogenic effects. During this period, the fetal organs and biological system are developing and any disruption can lead to irreversible abnormalities. For example certain antibiotics like tetracycline and sulfonamides are causes bones and teeth defects, while aminoglycosides are linked to causes hearing loss and kidney damage. In the second and third trimesters where less sensitive to structural

malformation occur but still there is risk for functional impairments. Therefore, while in first trimester is the most critical, care must be taken to avoid the use of teratogenic antibiotics and alternatives should consider whenever possible. The teratogenic potential of antibiotics not only fetal toxicity but also increases the risk of preterm labor, low birth weight and many adverse maternal outcomes. It is observed that in many cases the harm caused by an untreated infection may outweigh the risk posed by the antibiotics, so antibiotics must be taken on consultation with healthcare providers. The safety of antibiotics during pregnancy is guided by classification system, with the U.S. Food and Drug Administration (FDA) having established categories based on known risks. In recent year, there has been increasing interest to understanding the implications of antibiotic use during pregnancy. As the antibiotic resistance increases, researchers are beginning to explore long term effect of antibiotics on maternal and fetal health. This introduction provides a broad overview of teratogenic effect of antibiotics in pregnancy.

Review of literature:

The Aminoglycosides like Streptomycin, during 3 to 5 months of pregnancy when administered for a long time period, it can pass through the hematoplacental barrier and causes deafness and violation of the skeletal bones of the unborn child. The use of Tetracycline group such as Tetracycline, Doxycycline and Minocycline shows a wide range of effect against gram positive and gram-negative microorganism. Due to its good lipophilic nature, it easily penetrates the placenta and can disrupt the normal development of teeth and inhibit the growth of fetal skeletal bones. And also, there is a risk of fatty liver infiltration. Therefore, treatment with tetracycline is contraindicated during pregnancy.

In Macrolide antibiotics class, Erythromycin leads to liver damage as well as with possible pathologies of the birth of completely deaf offspring, kidney underdevelopment and impaired contractile function of the heart. Hence such agent is used when its action to mother does not exceed the potential risk to fetus.

Metronidazole the class of nitroimidazole derivative increases the chromosomal aberrations frequency in human lymphocytes, exerting a carcinogenic effect on the fetus. So that in the first trimester metronidazole derivatives are not used due to it have an embryotoxic effect and in second and third trimester these are prescribed with great caution.

Antibiotics having phenolic group like Chloramphenicol can also have a teratogenic effect. Their use brings gray syndrome of new born and inhibit the process of tissue respiration.

Macrolides such as clarithromycin, azithromycin, roxithromycin and similar drugs produce teratogenic effect. They cause the development of hyperbilirubinemia and inhibition of embryogenesis.

Sulfonamide class of drugs exert teratogenic effect. Long acting sulfonamide drugs like sulfadimethoxine, sulfalen and the combined preparation co-trimoxazole (sulfamethoxazole + trimethoprim) are not prescribed to pregnant women due the fact that they a teratogenic effect at the end of the gestational period and exhibit in the fetus and / or new born in the form of nuclear jaundice, methemoglobinemia, hemolysis of red blood cells, bilirubin encephalopathy. Trimethoprim blocks the exchange of folic acid in mother and fetus. So, additional folic acid or calcium folate 5 mg per day is prescribe when co-trimoxazole is used.

In postpartum period the use of Nitro furantoin drugs like furadonin, furagin, furazolidine, furacillin can cause blood hemolysis and hyperbilirubinemia.

When it is necessary to treat the infections with the antibiotics the cephalosporins shows less teratogenic effect than others. However the absolute use of cephalosporin is not clinically verified adequately. These antibacterial drugs can be prescribed to pregnant women only in limited case of infectious inflammation: ENT organs and respiratory tract (pharyngitis, sinusitis, bronchitis, pneumonia; abdominal and pelvic organ (endometritis); urinary tract and kidneys (cystitis, urethritis, nephritis); genital tract (gonorrhoea, cercevititis, chlamydia); biliary tract (cholangitis); joints and periarticular tissues.

Table 1 : Antibiotics not to be used by pregnant women. (Obtained from [1])

Aminoglycosides	Gentamicin
	Streptomycin
	Tobramycin
Antimycotics	Amphotericin B
	5-flucytosine
	Griseofulvin
5-nitroimidazoles	Metronidazole
Polymyxins	Colistin
	Polymyxin
Tetracyclines	Minocycline
	Doxycycline
	Tetracycline

Future perspective:

As per the understanding the complex interaction between antibiotics and pregnancy , there are several critical areas where research and clinical practice can evolve to ensure safety of both mother and developing fetuses. Advances in safety assessment , education and awareness for health care practitioners and there is a need for strong and well-conducted clinical trials to better assess the safety of antibiotics during pregnancy.

Conclusion:

Pregnancy is a critical period for fetal development and exposure to certain antibiotics can causes risk to both fetus and mother. The teratogenic effect including birth defect, abnormalities and long-term health issue. It is essential to balance the benefit of infection treatment with the potential risk of teratogenicity. This review has outlined the teratogenic effect of various antibiotics and involved risk factors and providing valuable guidance for health care professionals in making informed decision. By considering the teratogenic effect the physician can ensure safer out comes for both mother and unborn child.

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