

Care and Counseling on Fetal Health Effects of Preconceptional Period Maternal Drug Use



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Abstract

Preconceptional care is a preventive health service that includes scanning, treatment and counseling services aiming to determine the physical, psychological and social factors that constitute a risk for the mother and fetus in the pre-pregnancy period and to improve the health. One of the primary goals of preconceptional care is the identification and maintenance of pre-pregnancy preventable risk factors to improve obstetric outcomes. The use of drugs containing teratogenic substances, which are among the risk factors that can be avoided, can cause adverse effects on the pregnant and embryo / fetus. In this study, it is aimed to investigate the effects of pre-pregnancy drug use on maternal and fetal health, care and counseling. Given the widespread use of medication and nutritional supplements among the women of reproductive age, the increased prevalence of chronic diseases, and the teratogenic effect of most medicines, it is necessary to provide a comprehensive framework for care and counseling services.

Keywords: Preconception Period; Pregnancy; Teratogen

Introduction

The embryonic period is an important period in which organs and systems begin to form rapidly, and can cause a variety of problems when subjected to adverse effects such as teratogenesis, infection and radiation [1]. Usually the embryonic period is completed in the first prenatal control and there are delays in taking care. Because many women are not aware of their pregnancy at this time [2,3]. For a healthy pregnancy, preconceptional care should be initiated [4]. For this reason, pre-conceptional period maintenance becomes important and counseling becomes necessary. Preconceptional care is a preventive health service that includes scanning, treatment and counseling services aiming to determine the physical, psychological and social factors that constitute a risk for mother and fetus in the pre-pregnancy period and improve health [5]. One of the primary goals of preconceptional care is the identification and reduction of preventable risk factors before pregnancy to improve obstetric outcomes [2,3]. The use of drugs containing teratogenic substances, which are among the risk factors that can be avoided, can cause adverse effects on the pregnant and embryo/fetus. In this study, it is aimed to investigate the teratogenic effects of maternal and fetal health on pre-pregnancy drug use, as well as the role of care and counseling services.

Teratogenic Effect

The term "teratogen" is used to describe an agent that can cause structural or functional abnormalities on the embryo/fetus. Exposure to teratogens, physical and chemical properties of the agent, exposure pattern, gestational week, exposure to other agents, pregnancy and fetal biological susceptibility. Dose is a critical feature of teratogenic exposure. Teratogenic effects occur certain threshold level. Generally, the dose of drugs during pregnancy is the same as the dose used in nonpregnant adults. However, drugs thought to be safe during pregnancy may cause adverse effects if taken at high doses [6]. In addition, physiological changes during pregnancy can change the dosage of the drug effect. Physiological changes that may affect the pharmacokinetics and pharmacodynamic properties of drugs during pregnancy;

- Changes in total body weight and body fat composition,
- Changes in the bioavailability of drugs due to decreased stomach motility,
- Increased plasma volume, extracellular fluid and total body water ratio,

- d. Increased cardiac output, stroke volume, heart rate and blood flow to the uterus, kidneys, skin, and mammals,
- e. Decrease in plasma albumin concentration,
- f. Increased glomerular filtration rate,
- g. Changes in liver enzyme activity.

It is necessary to constantly monitor the dosage and frequency of medication during pregnancy. Blood or serum concentrations of the drugs should be measured and monitored during pregnancy and appropriate dosage adjustments should be made when necessary. The risk, benefit balance of drug use should be assessed on the basis of individualized care. The following table describes the teratogenic effects of some drugs during pregnancy (Table 1).

Table 1: Teratogenicity Summaries of Some Drugs.

Drug	Effect
Tetracyclines	The Use of Drugs Such as doxycycline and Minocycline is Associated with Yellow-Brown Color Change in the Milk Teeth.
Sulfonamides	Protein Enhances the Risk of Hyperbilirubinemia Near Birth By Taking up Bilirubin in the Connective Part.
Nitrofurantoin	In women with G6PD Deficiency, Theoretically Increases the Risk of Hemolytic Anemia. G6PD Deficiency is Contraindicated for the Risk of Potential Haemolysis in Infants of 1 Month Old.
Quinolones	Animal Studies Have been Associated with Irreversible Arthropathies and Cartilage Erosion; No Teratogenic Effect was Found in Animal Studies.
Metronidazole	It is not Teratogenic in the First Trimester Exposure.
Warfarin	The Placental Barriers are Highly Teratogenic because they can pass easily.
Heparin and Low Molecular Weight Heparins	In Pregnancy the Anticoagulant is not Teratogenic Because of the Large Polar Molecules That do not Cross the Teratogenic Placenta.
Valproic Acid and Carbamazepine	During Embryogenesis, Spina Bifida and Neural Tube Defects are Associated with The Risk.
Phenytoin	It can Lead to Abnormal Face Appearance.
ACE Inhibitors	The Use of Ace Inhibitors Causes many Anomalies Such as Growth Retardation, Limb Contractures and Developmental Abnormalities.
Diuretics	The Use of Thiazide Diuretics Leads to Fetal Bleeding, Electrolyte imbalance and Thrombocytopenia Soon After Birth. all diuretics can reduce breast milk production.
Calcium Channel Blockers	It is Generally Considered Safe in Pregnancy.
Methyldopa and Hydralazine	It is thought that it can be used Safely in Pregnancy
Methotrexate	It Affects Folic Acid Metabolism. High doses can lead to Developmental Retardation, Limb Abnormalities, Rearward-Facing Ears, Micrognathia, and Hypoplastic Supraorbital Streaking.
Androgens	It is caused by complete Maskulization around 7 to 12 weeks. It causes Partial Masking in the following Weeks.
Lithium	It is Associated with an increase in Cardiovascular Malformation.
Vitamin A	High doses are associated with Congenital Anomalies.

Effect of Drug Use on Pregnancy Period

Drug use during pregnancy has both maternal and fetal effects.

Maternal Effects

The drugs your mother uses can go through the placenta, directly affecting the fetus. Untreated chronic diseases can also negatively affect pregnancy outcomes [2]. Many women become pregnant despite problems such as asthma, epilepsy and hypertension, migraine, and diabetes that need to be treated [6]. Serious complications may be encountered if these diagnoses are not controlled. It is therefore important to determine the benefit-loss ratio. However, there are few studies on drug pharmacokinetics during pregnancy. Little information is available about teratogenic risk or safety because pregnant women are often kept away from clinical trials. Animal studies do not provide sufficient evidence. Although much research has been done on hypertension, depression

and other conditions commonly seen during fertility period, the pregnancy period has not been well assessed [7].

Fetal Effects

Exposure to teratogens in the embryonic or fetal period may cause structural or functional persistent abnormalities in the organism [8]. Thalidomide and isotretinoin are among the most prominent examples. After 24 weeks of gestation, tetracycline may cause permanent dyeing of the teeth of the fetus. In the second and third trimester ACE inhibitors may damage the fetal kidneys. However, the use of medicines such as folic acid or nutritional supplements prevent the development of pregnancy complications.

Preconceptional Care and Counseling in Terms of Drug Use

Preconceptional care provides the opportunity to optimize the use of medication in the period when the woman is preparing

for pregnancy. Preconceptional care involves determining the conditions that need to be used in the pre-pregnancy period, and avoiding the use of unnecessary medications, management of the necessary treatments to optimize maternal health with the protection of the embryo and fetus at every stage of pregnancy, to minimize the exposure to drugs known to be harmful to the embryo or fetus [6]. It is a difficult process to decide whether to use drugs for pregnant women or women who plan to be pregnant. Individualized decision should be taken considering risk, benefit and treatment efficiency. In this process there are resources to help decide. Classification of drugs as “necessary” and “not necessary” in the preconceptional period will be beneficial. The necessary medicines should be used for the treatment of diseases that can cause serious morbidity [7].

All women in reproductive age should be scanned for teratogenic drug use and should be supervised for chronic diseases on pregnancy and the potential effects of drugs. In the preconceptional period, safer drugs should be used than teratogenic drugs. For women with chronic diseases, the minimum and the lowest dosages of essential drugs that control the disease should be used [7]. In the case of diseases such as diabetes, asthma, hypertension, thyroid diseases, sexually transmitted diseases including HIV, migraine, psychological disorders (depression, bipolar disorder), especially preconceptional counseling should be given. It may be necessary to stop the medication, reduce the dose, or take another step. For this reason, having information about the possible benefits and teratogenic effects of the drug has critical prescription [2]. Vitamins, minerals, plants, amino acids, enzymes, proteins, probiotics are accepted as nutritional supplements. Nutritional supplements are not regulated in the same way as prescription medicines. However, safety, efficiency, quality control, contamination, side effects and concerns about drug interactions have led to increased research.

While many health care professionals recommend certain nutritional supplements (folate, iron and calcium) during pregnancy and preconceptional period, the safety and effectiveness of many nutritional supplements (herbal and weight loss products) have not been proven. Most of the available data are based on case reports, animal studies and retrospective studies. Clinical trials evaluating the safety and efficiency of vitamin D, fish oil and herbal products during preconceptional and gestational periods are required. Midwives should advise women about dietary supplements, including medicinal herbs, weight loss products. High quality and prescription nutritional supplements should be encouraged [7]. The American College of Obstetricians and Gynecologists (ACOG) reports that history of drugs used or prescribed in the preconceptional period is required. ACOG also states that a doctor should be consulted before using any medication during pregnancy [7,9]. It is important for women planning to become pregnant to avoid unnecessary use of medication, and to inform the physician in case of diagnosis and treatment [7]. Midwives should educate women in reproductive age on the use of drugs in the period they plan to become pregnant.

Result

Given the widespread use of medicines and nutritional supplements among women in reproductive age, increased prevalence of chronic diseases, unknown teratogenic effects of most drugs, midwives should provide training and counseling especially for women planning to become pregnant. In general, the goals of drug use in preconceptional care [6,7,10];

- a) Health should be improved by moving away from cigarettes, alcohol, drugs and toxic substances in the pre-pregnancy period.
- b) Women with chronic diseases should be counseled about treatment options and the effects of drugs. Preconceptional counseling should be provided to women who are in need to ensure that they make informed decisions.
- c) Effective treatment of chronic diseases should be performed in the pre-pregnancy period.
- d) All acute and chronic diseases should be followed during pregnancy.
- e) Counseling should be provided to women to prevent the use of unnecessary medicines.
- f) The use of drugs with a high teratogenic effect should be avoided when equally effective treatments which have lower risk such as warfarin (anticoagulant) and valproic acid (anticonvulsant) are available.
- g) The least drug and the smallest dose that will effectively treat the maternal disease should be used without harming the health of the woman or the fetus.

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