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THE USE OF PENICILLIN ANTIBIOTICS DURING PREGNANCY: REVIEW ARTICLE

Nehad J. Ahmed[1*]

[1]Clinical Pharmacy Department, College of Pharmacy, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.

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Abstract:

Background : *Different types of infections affected pregnant women commonly, these infections may affect the growth and development of the fetus. As a result antibiotics are used commonly in pregnancy. Many antibacterial agents are safe , but some antibiotics can result in complications either to the mother or to the fetus. This Review aims to know the pregnancy category of the commonly prescribed penicillin antibiotics and the safety of their use during pregnancy*

Methodology: *The first part of this review includes searching web of science for the keyword "antibiotics" and "pregnancy" during the last 5 years and the second part includes reviewing 5 databases and 3 printed files to know the pregnancy category of the commonly prescribed penicillin antibiotic.*

Results and Discussion: *Penicillin antibiotics are generally safe to take during pregnancy but should be used as recommended. Additionally, All penicillin antibiotics are either pregnancy category B or no enough data available for their categories, so there are no adequate and well-controlled studies in pregnant women.*

Conclusion *: Penicillin antibiotics are safe to use during pregnancy but it is important to take penicillin according to the recommendations. In addition to that the treatment should be individualized because of the difference in the pharmacokinetics characteristics of the patients. The health care professionals should follow the guidelines recommendations, additionally, they should counsel their pregnant patients about their medications.*

Keywords: *Antibiotics, Penicillin, Use, Pregnancy.*

Corresponding author:

Nehad J. Ahmed,

Clinical Pharmacy Department, College of Pharmacy,
Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.
n.ahmed@psau.edu.sa, 00966543707806, 5886054.

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INTRODUCTION:

Different types of infections affected pregnant women commonly, these infections may affect the growth and development of the fetus, and have been associated with offspring autoimmunity. Furthermore, many disorders such as dental disorders may occur in pregnant women and if left untreated may lead to infectious complications. As a result antibiotics are used in pregnancy commonly. (1-7) Antibiotic therapy in pregnant women must be rational, so whenever possible pregnant women should use antibiotics with favorable risk-benefit ratio. To achieve this, health care providers must be well experienced in the subject of poisonousness and teratogenicity of the frequently used antibiotics. In addition to that, dosage of some antibiotics should be adjusted due to the change in several pharmacokinetic parameters during pregnancy. As well antibiotic therapy in perinatal period and in early childhood might raise the threat of increasing the atopy and obesity. (8)

Miller, JE et al reported that antibiotic exposure before or during pregnancy was related to enlarged risk of childhood hospitalized infections (9). Another study reported that the usage of antibiotics in the course of pregnancy is related to increasing the risk of otitis media and Ventilation Tube insertions in the offspring (10). Mulder, B et al showed that there was a small increased risk of asthma in preschool children if the pregnant women use antibiotics in the third trimester of pregnancy (11). Other study reported that antibiotic treatment for uncomplicated appendicitis in pregnancy may be a good therapeutic option without serious fetal and maternal complications. (12)

Kuperman, AA et al stated that Antibiotic use during pregnancy has a vital role in controlling and avoiding infections, Nevertheless, it may have undesired effects regarding the fetoplacental and maternal microbiomes. (13). As well the use of sulfadoxine-pyrimethamine and azithromycin in pregnant women having malaria could rise spread of antibiotic-resistant bacteria associated with serious infections in pediatrics. (14)

One of the most common infections is urinary tract infection (UTI) which can be either asymptomatic or symptomatic and occurs commonly during pregnancy. Pregnant women should be screened for asymptomatic bacteriuria. For the treatment of UTI, the safest antibiotics that can be used in pregnancy are cephalosporin, penicillin, fosfomycin trometamol and nitrofurantoin (15,16). Muanda, F showed that many antibiotics were linked to organ-specific malformations such as Clindamycin, doxycycline, quinolones, macrolides and phenoxymethyl penicillin. Nitrofurantoin, amoxicillin and cephalosporins were not associated with major congenital malformations. (17)

Muanda, FT et al stated that use of some antibiotics specially macrolides (excluding erythromycin), tetracyclines, quinolones, metronidazole and sulfonamides during early pregnancy was associated with a greater risk of spontaneous abortion (18) . additionally, finding of previous study reported that an increased risk of cerebral palsy or epilepsy associated with macrolide usage in pregnant women. (19) As a result, it is important to increase awareness of health care providers in order to follow the antibiotic prescription guidelines for the use of antibiotics during pregnancy. (20,21)

This review aims to know the pregnancy category of the commonly prescribed penicillin antibiotics and the safety of their use during pregnancy.

METHODOLOGY:

The first part of this review includes searching web of science (22) for the keyword "antibiotics" and "pregnancy" during the last 5 years including only original articles, 21 articles were found. The second part includes reviewing 5 databases (23-27) and 3 printed files (28-30) to know the pregnancy category of the commonly prescribed penicillin antibiotics and the safety of their use during pregnancy.

RESULTS AND DISCUSSION:

Penicillin antibiotics are generally safe to take during pregnancy but should be used as recommended. the U. S. Food and Drug Administration divide medications to 5 main pregnancy categories. The categories are: category A, category B, category C, category D and category X.

Penicillin pregnancy categories:

1.1. Amoxicillin: US FDA category: B
1.2. Ampicillin US FDA category: B
1.3. Carbenicillin US FDA category: B
1.4. Piperacillin US FDA category: B
1.5. Ticarcillin US FDA category: B
1.6. Amoxicillin / clavulanate US FDA category: B
1.7. Ampicillin / sulbactam US FDA category: B
1.8. Piperacillin / tazobactam US FDA category: B
1.9. Clavulanate / ticarcillin US FDA category: B
1.10. Penicillin G benzathine US FDA category: B
1.11. Penicillin V potassium US FDA category: B
1.12. Penicillin G benzathine / procaine penicillin US FDA category: B

1.13. Procaine penicillin US FDA category: B
1.14. Oxacillin US FDA category: B
1.15 Dicloxacillin US FDA category: B
1.16. Nafcillin US FDA category: B
1.17. Cloxacillin US FDA category: B
1.18. Bacampicillin US FDA category: B
1.19. Cyclacillin No Data in US FDA or in AU TGA
1.20. Methicillin No Data in US FDA or in AU TGA
1.21. Flucloxacillin No Data in US FDA, AU TGA category: B1
1.22. Pivampicillin No Data in US FDA or in AU TGA
1.23. Hetacillin No Data in US FDA or in AU TGA
1.24 Metampicillin No Data in US FDA or in AU TGA
1.25. Talampicillin No Data in US FDA or in AU TGA
1.26. Epicillin No Data in US FDA or in AU TGA
1.27. Temocillin No Data in US FDA or in AU TGA
1.28. Mezlocillin US FDA category: B
1.29. Azlocillin No Data in US FDA category, AU TGA category: B3
1.30. Almecillin No Data in US FDA or in AU TGA
1.31. Adicillin No Data in US FDA or in AU TGA
1.32. octanoylpenicillin No Data in US FDA or in AU TGA
1.33. pivmecillinam No Data in US FDA or in AU TGA

Drugs in Pregnancy and Lactation book 9th edition stated that penicillin antibiotics are considered low risk in pregnancy (28). These results showed that all penicillin antibiotics were either Pregnancy Category B or no enough data available for their categories. Although Animal reproduction studies have failed to demonstrate a risk to the fetus, there are no adequate and well-controlled studies in pregnant women.

CONCLUSION:

Penicillin antibiotics are safe to use during pregnancy but it is important to take penicillin according to the recommendation (the appropriate dose, dosage form, time, frequency and for the appropriate duration). In addition to that the treatment should be individualized because of the difference in the pharmacokinetics characteristics for the patients. It is also important to know the adverse effects of penicillin antibiotics and to know if the drug causes allergy to the patients or no.

The health care professionals should follow the guidelines recommendations, also they should counsel their patients about the appropriate use of their medications, particularly for specific patients such as geriatrics, pediatrics and pregnant women.

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