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# Current trends in drugs avoided in pregnancy

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## ABSTRACT

During pregnancy several drugs are having contraindication, hence their use is less and dangerous to mother along with fetus .Drugs play an important role in improving the health and promoting well-being. However to produce desired effect, they have to be safe, efficacious and have to be used rationally. During pregnancy medication is less preferred but in some times cannot be escaped to treat the ailments in mother. Avoiding medications may be desirable, it is often not possible and may be dangerous because some women enter pregnancy medical conditions that require continuous and episodic treatment (e.g. asthma, hypertension, epilepsy). So here we discussed the medication that can be used safely during pregnancy along with unsafe and highly contraindicated for both mother and fetus. Certain drugs given during pregnancy may prove harmful to unborn child is one of the classical problem in the medical treatment. The main purpose of this review is to prepare a list of safe medications which can be taken during pregnancy with unsafe and highly contraindicated drugs. And also a quick reference for health care professionals.

**Keywords:** Current, Pregnancy, Drugs, Fetus

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## INTRODUCTION

Pregnancy occurs when sperm meets an egg. Pregnancy is a period in which a fetus is developed into a women's womb it contains one or more than one fetus [1]. It is known as gestation period in the blood (or) urine pregnancy is confirmed symptoms of early pregnancy are-nausea, vomiting, mood swing, missed period, tender breast [1]. It contains three trimesters, first trimester from 1-12 weeks, in this stage conceiving takes place and also miscarriage. Second trimester from 13-28 weeks, in this stage fetus movement can be felt. Third trimester from 29-40 weeks, in this sage parental care is very essential [2]. It has been reported that 8% of pregnant women need drug due to various chronic diseases and pregnancy related problems [3]. About 59% of pregnant women are needed a medication other than a vitamin or mineral supplements [4]. About 13% of pregnant women's are taking dietary herbal supplements. More than 90% of pregnant women take prescription or nonprescription drugs or use social drugs such as tobacco or alcohol or illicit drugs at sometime during pregnancy [4]. Pregnant women are normally excluded from clinical trials and results from animal studies need not apply to human population [5]. Hence providing treatment to pregnant women is a problem. Fear of causing fetal harm and death by a given drug in pregnancy has raised many challenges to clinical research about the safety use of drugs in pregnancy [5]. Medication safety information in pregnancy is usually obtained from case reports, epidemiological studies and animal studies; all of which have some limitations that make determining risks of a drug use during pregnancy difficult [6]. The use medications in pregnancy should be evaluated by the benefits and risks to the mother and fetus [7]. Upon evaluation, some medications may be used sparingly during some trimesters contraindicated in others. All efforts should be made to optimize the risk-benefit ratio. It's very important for the pregnant mothers to follow up of do's and don'ts during the gestation period [7]. The most important thing is the medication containing the mixture of chemicals, when interact together may cause the teratogenic effect to the baby [8]. So it is very important for the health care professionals and pregnant woman to know which drugs can be take and which should not take during this period [8].

### Principles of therapy in pregnancy: [9]

Prescribe drugs only when clearly indicated, through weighing benefits to mother against the risks to the fetus, based on the stage of pregnancy and drug information the drug should be selected, give the drug wih low effective doses and for the shortest effective time, an older and safe drug is preferred over a newer drug during first trimester,

provide counseling to pregnant women about the use of immunizations during pregnancy, should be avoided Live vaccines-possible harmful effects to fetus. (measles, mumps, polio, rubella). Toxoids (diphtheria, tetanus) and inactive virus vaccines ( influenza, rabies, hepatitis B ) are considered safe for use, Who are attacked by hepatitis B, rabies, tetanus, or varicella, hyper immune globulins (IGIVs) can be given to pregnant women, IV administration of hyper immune globulins reduce the risk of infection.[19]

## Principles of therapy in lactation: [10, 11]

Give drugs only when needed, avoid taking the contraindicated drugs or stop breast feeding, drugs taken by the systemic route can reach the infant in breast milk, lowest effective doses and for the shortest effective time should be prescribed, Stopping the breast feeding during maternal drug therapy is not recommended unless necessary, Women with HIV infection should not breast feed. Transmitted to the nursing infant, in some cases, mother may discard milk while receiving therapeutic drugs, to maintain lactation.

## Physiological changes: [12]

Weight increases and changes body shape (due to increases in breast tissue, blood volume in the extra vascular and extra cellular fluid), the average weight gain in pregnancy is 12.5 Kg. During normal pregnancy 1 Kg weight due to protein,[13] The rate of albumin production increased but, plasma albumin levels are decreased( due to increased plasma volume), fibrinogen levels are increased and total body fat also increased. The ratio of LDL and HDL increases in pregnancy. [14] Renal blood flow increased and glomerular filtration rate secondary to increased to cardiac output.

## Pharmacokinetic changes: [15, 16]

The drug effect can be changed by the changes pharmacokinetic in pregnancy, hydrophilic drugs are more diluted and distributed In non pregnant women than pregnant women, Increased dose may require, Hydrophobic are more soluble in pregnant women, The free drug have therapeutic or adverse effects on the mother and for placental transfer to the fetus, excretion of drugs increased by kidneys, mainly which are excreted primarily unchanged in the urine (digoxin, lithium), In the pregnancy, the increased size of uterus decreased renal blood flow in supine position, This results in decreased excretion and prolonged effects of renally excreted drugs.

## Drug effects on the fetus: [17, 18, 19, 20]

The rate transfer drug depends on the chemical properties of drug such as protein binding, pH difference, lipid solubility and molecular weight of drug, only free unbound drug crosses the placenta, during pregnancy maternal albumin level are decreases while fetal albumin increases. As a result concentration of free drug increases which cross the placenta to reach the fetus, Fetal pH is slightly more acidic than maternal pH and so weak bases are more likely crossed the placenta, Lipid soluble drugs can easily diffuse across the placenta, Drug with low molecular weight (<500 g/mol )diffuse freely across the placenta, Drugs with low molecular weight ( 500-1000 g/mol ) cross the placenta les easily, Drugs with high molecular weight (>1000 g/mol )do no cross he placenta, Trans placental transfer drugs increase in the third trimester due to increased maternal and placental blood flow, decreased thickness and increased surface of placenta, During first trimester, drug teratogenicity most likely occurs, when fetal organs are formed, During the second and third trimesters, drug adverse effects are: growth retardation, respiratory problems, infection, or bleeding.

## Drug categories in pregnancy:

Drugs are teratogenic only at specific times during embryogenesis. Teratogenicity is a condition when any drug of chemical substance which produce deviations or abnormalities in the development of embryo. Therefore to avoid such problems it is very important to know which drugs should be prescribed during pregnancy [21]. Food and drug administration (1979) of America enforce the rule for the categorization of the drug that is contraindicated during pregnancy so a classification has been carried out as following.

The FDA has categorized the potential teratogenic risk of m edications by an A, B, C, D, X system [22, 23, and 24].

**Category A:** Controlled studies in women have failed to demonstrate a risk to the fetus in the first trimester and there is no evidence of risk in later trimesters. The pos sibility of fetal harm appears remote. Medications in this cl ass are considered safe to use in pregnancy. Examples of m edications in this class are vitamins and levothyroxine.

**Category B:** Either animal reproduction studies have not demonstrated a fetal risk but there are no controlled studies in pregnant women, or animal studies have demonstrated risk to the fetus that was not confirmed in controlled studies in pregnant women in the first trimester and there is no evidence of a risk in later trimesters.
Medications in this class are generally considered safe. Examples of medications in this class are acetaminophen and amoxicillin.

**Category C:** Studies in animals have revealed adverse effec ts on the fetus and there are no controlled studies in wome n, or studies in women and animals are not available. Drugs from this class can be given to pregnant women if the bene fit to the mother outweighs the risk to the fetus. Examples of medications in this class are diltiazem and spironolacton e.

**Category D:** Evidence of human fetal risk has been docume nted, but the benefits to the mother may be acceptable des pite the risk to the fetus. Drugs in this class may be used in pregnancy if the benefits to themother outweigh the risk to the fetus (i.e. a life threatening situation or a serious diseas e for which safermedication cannot be used or are not effic acious). Examples of medications in this class are phenytoi n and valproic acid.

**Category X:**
Studies in animals or humans have demonstrated teratogen ic effects. The risk to the fetus clearly outweighs any potential benefit to the mother. Drugs in this category are contraindicated in pregnancy. Examples of medications in this class are thalidomide and warfarin.

**Command problems in pregnancy:** [25, 26] Anemia, Constipation, Gastro esophageal reflux, Gestational diabetes, Nausea and vomiting, Hypertension.

**Table 1: List of Antibiotics used in pregnancy:** [27, 28, 29]

| Generic (brand) | Pregnancy Category | Crosses placenta | Reported adverse effects to mom or baby use in pregnancy | Place in therapy |
|---|---|---|---|---|
| Nitrofurantoin | B | Yes | Fetus: Hemolytic anemia | ---- |
| Sulfamethoxazole / trimethoprim | C | SMX: Unknown TMP: Yes | Fetus: SMX: jaundice, hemolytic anemia, an d possibly kernicterus TMP: neural tube de fects (NTD), oral clefts, cardiac defects, and urinary tract defects | Not recommended in pregnancy |
| Meronidazole (Flagyl) Topical:- (metro gel) | B | Yes | Fetus: Low birth weight babies, spontaneous abortions, and carcinogenic possibilities. Not mutagenic or teratogenic | Safe for use only in 2nd and 3rd trimester Contraindicated in 1st trimester |
| Tetracycline's | D | Yes | Fetus: Hypo spadia (1st trimester only), inguinal hernia, limb hypoplasia, teeth discoloration (2nd ,3rd) Cataracts, cleft palates, spine bifida, polydactyl, Maternal: liver toxicity, irreversible shock | No recommended in pregnancy |
| Fluoroquinolones | C | Yes | Erosion of weight bearing cartilage in rats and dogs, but no human reports | Not recommended in pregnancy |
| Macrolides | Azithro, Erythro: B Claritro: C | Yes | Fetus: Cardiovascular abnormalities and cleft palate with clarithromcin | |
| Clindamycin | B | Yes | Fetus: Increase in neonatal infection and low birth weight seen with vaginal preparation | For BV as oral alternative, but not the topical Group B strep. disease in patients with penicillin allergy |
| Cephalosporin's | B | Yes | None reported | Generally considered safe in pregnancy unless penicillin allergic |
| Penicillin's +/-Beta-lactamase inhibitor | B | Yes | None reported | Safest class of abx in pregnancy if not allergic for syphilis |
| Amino glycosides (Amikacin, Gentamycin and Tobramycin) | D | Yes | Fetus: ototoxicity/ deafness Neuromuscular weakness, respiratory depression with concomitant gentamicin and Magnesium sulfate | Do not use in pregnancy not unless the benefit out weight the risk to the fetus. |

**Carbapenems:** [30] Category B/C/B in pregnancy, likely cross the placenta, Very little human data

**Lactation:** Excreted into breast milk in low amount, Unknown effects but likely low clinical significance

**Linezolid:** Pregnancy Category C, No human data available

**Lactation:** Unknown, myelo suppression in animals

**Chloramphenicol:** Risk during pregnancy It is an antibiotic which is useful in serious infections such as typhoid fever. Not have any adverse effect but can cause 'grey baby syndrome' and reversible bone marrow when it is given just before the delivery.

**Anti tubercular Agent:** [31]

**Streptomycin:** Anti tubercular drug. It causes a minor effect to the fetus after crossing the placenta. It is mainly given to whom are resistant to rifampicin.

**Miscellaneous: Tetanus injection:** Injectable preparation is administered during second and third trimester of pregnancy to prevent tetanus [31].

**Probenecid:** It is administered along with the penicillin and it is safe to be used during pregnancy.

**Calcium and Vitamin-D:** These can be safely given in the deficiency states and in accurate doses.

**Table 2: List of Anti epileptic drugs** [32, 33, 34, 35]

| Generic (brand) | Pregnancy Category | Crosses placenta | Reported adverse effects to mom or baby use in pregnancy | Place in therapy |
|---|---|---|---|---|
| Carbamazepine (Tegretol) | D | Yes: levels 50-80% of maternal, highest in fetal liver and kidneys | Fetus: dysmorphic facial feature, cranial defects, cardiac defects, spina bifuda, fingernail hypoplasia, developmental delay, mild mental retardation, neural tube defect | Compatible – Maternal Benefit >> Embryo/Fetal Risk If drug is required during pregnancy it should not be with held because the benefits ofpreventing seizures outweigh potential fetal hard. |
| Ethosuximide (Zarontin) | C | Unknown | Fetus: spontaneous hemorrhage, patent ductus arteriosus, cleft lip/palate, mongoloid facies, short neck, altered palmar crease and accessory nipple, hydrocephalu | Limited human data. Probably compatible. Succinamide anticonvulsants: DOC for tx of petit mal epilepsy in 1st Trimester. |
| Felbamate (Felbatol ) | C | Unknown | Fetus: mental retardation. Maternal: aplastic anemia, acute liver failure | Limited Human Data – Animal Data Suggest Moderate Risk. Drug crosses placenta in animals, not yet described in humans. But should occur because of LMW |
| Phenytoin (Dilatin) | D Dose related teratogenic effect | Unknown | Fetus: congenital abnormalities, hemorrhage at birth, neurodevelopment abnormalities Maternal: folic acid deficiency | Compatible – Maternal Benefit >> Embryo/Fetal Risk Significant Risks: major/minor congenital abnormalities, hemorrhage at birth, neurodevelopment Maintain lowest level required to prevent seizures in order to lessen risk of fetal anomalies |
| Fosphenatyoin (Cerebyx) | D | Unknown | Fetus: congenital malformations, orofacial clefts, cardiac defects, minor anomalies, mental deficiency Maternal: An increase in seizure frequency may occur during pregnancy because of altered phenytoin pharmacokinetics | Benefits from use in pregnant women may be acceptable despite the risk (e.g., if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective) |
| Gabapentin (Neurontin) | C | Unknown | Limited human data does not allow an assessment as to the safety of gabapentin | Limited Evidence: If required, benefits appear > fetal risk |
| Lomotrigine (Lamictal) | C | Yes | Fetus: frequency of major defects among 1st trimester monotherapy exposure was 2.9% (12 of 414) | Human data Suggest Low Risk; Adjust dose maintain clinical respons |
| Levitiracetam(keppra) | C | Unknown | Risk to human fetus/embryo unknown | Risk to human embryo/fetus is unknown |
| Oxcarbamazepine (Trileptal) | C | Yes | Fetus: no major congenital malformations reported, mild facial defects observed in one cas | No epoxide metabolites: lower risk of teratogenicity compared to other agents, Supplement with folic acid |
| Phenobarbital (Luminal sodium) | D | Yes | Fetus: congenital defects, hemorrhage at birth, addiction, AE of neurobehavioral development Maternal: Benefit > Risk | Benefits >Risk during at lowest effective level |
| Pregablin (Lyrica) | C | Unknown | Fetus: congenital defects, hemorrhage at birth, addiction, AE of neurobehavioral development Maternal: Benefit > Risk | Use only if maternal benefit>fetal risk |
| Tiagabine (Gabitril) | C | Unknown | Fetus: one incidence with unspecified malformations, otherwise unknown | Safest course: Avoid in 1st trimester; later trimesters unknown |
| Primidone (Mysoline) | D | Unknown | Newborn: neurologic manifestations | If benefits > risks (e.g., drug needed in life- |

| | | | | |
|---|---|---|---|---|
| | | | (overactivity /tumor); mechanism for hemorrhagic effects is due to suppression of VitK-dependent clotting factors, recommend administration of VitK to infant immediately after birth | threatening situation or serious disease with no safer drug) |
| Topiramate (Topamax) | C | Yes | Hypospadias in males (relationship not established); Data too limited to assess embryo/fetus risk | Avoid if possible in 1st trimester |
| Valproic acid(Depakene) | D | Yes | Fetus: neural tube defects, minor facial defects, defects of the head, face, digits, urogenital tract, mental and physical growth. | Benefits > Risks (e.g., drug needed in life- threatening situation or serious disease with no safer drug) |
| Zonisamide (Zonegran) | C | Unknown | Congenital anomalies possible | Avoid if possible in 1st trimester |
| Trimithadione | D | Unknown | Fetus: mental retardation, craniofacial defects, genitourinary defects, malformed hands, clubfoot | Contraindicated in 1st trimester |
| Clonazepam (klonopin) | D | Unknown | Human data suggest low risk; fetal and neonatal toxicity has been reported | Safest course is to avoid during the 1st trimester; however, if indicated, it should not be withheld because of pregnancy |
| Lorazepam (Ativan) | D | Yes | Fetus: high IV doses may cause "floppy infant" syndrome, higher incidence of respiratory distress | Benefits > Risks (e.g., drug needed in life- threatening situation or serious disease with no safer drug) |
| Carbamazepine(Tegretol) | D | Yes | Fetus:minor craniofacial defects, fingernail hypoplasia, developmental delay, mild mental retardation | If required, Benefits > risks |

**Table 3: List of Diabetes mellitus [36]**

| generic (brand) | class | pregnancy category | crosses placenta | reported adverse effects to mom or baby from use in pregnancy | place in therapy |
|---|---|---|---|---|---|
| Glyburide (Giabeta, Micronase, Glynase) | Sulfonylurea | C | Yes | Possible ear defects in 1st trimester, fetal hypoglycemia | Insulin is recommended first line by the ADA; ACOG recommends use of this agent in D2 or GDM |
| Glipizide (Glucorol) | Sulfonylurea | C | Yes | Possible ear defects in 1st trimester, no teratogenicity in animal studies | Not recommended; limited human data |
| Glimipiride (Amaryl) | Sulfonylurea | C | Unknown | Skeletal malformation in high doses | Not recommended; No human data |
| Metformin (Glucophage,Fortamet,Glumeza) | Biguanide | B | Unknown | Neural tube defects in animals at high doses. Few abnormalities in humans at normal doses and likely due to poor BG control | Insulin is recommended first line by the ADA; ACOG recommends use of this agent in D2 or GDM |
| Sitagliptin (Januvia) | Dipeptidyl peptidase IV inhibitor | B | Unknown | No good studies in humans; animal studies show no defects/complication at high dose | Possible; No human data |
| Pioglitazone (Actos) | TZD | C | Unknown | Developmental delay, decreased fetal weight in animals | Not recommended |
| Rosiglitazone (Avandia) | TZD | C | Yes | Fetal death/retardation was seen in animal studies | Not recommended |
| Exenatide (Byetta) | Incretin mimetic | C | Unknown | Decreased fetal growth, skeletal malformations in animal studies | Not recommended |
| Pramlintide (Symlin) | Amylino mimetic | C | Unknown | Animals: neural tube defects, cleft palate at high doses | Not recommended |
| Regular insulin | Short acting | B | NO | None reported | Drug of choice |

| | | | | | |
|---|---|---|---|---|---|
| (HumulinR,Novolin R) | insulin | | | | |
| Lispro insulin (Humalog) | Rapid acting insulin | B | NO | Case reports: sudden neon atal death, growth retardation; controlled stu dies: as efficacious as regular insulin | Recommended |
| Glulisine insulin (Apidra) | Rapid acting insulin | C | Unknown | No available studies | Not recommended unles s benefits > risks |
| NPH insulin (Humulin N, Novolin N) | Intermediae acting | B | NO | None reported | Recommended |
| Glargine insulin (Lantus) | Long acting | C | Unknown | No available studies | Not recommended unless benefits > risks |
| Detemir insulin (Levemir) | Intermediae long acing | C | Unknown | Visceral abnormalities were seen in animals | Not recommended |

**Table 4: List of Analgesics Drugs** [37, 38, 39, 40]

| Generic (brand) | Class | Pregnancy category | Crosses placenta | Reported adverse effects to mom or baby from use in pregnancy | Place in Therapy |
|---|---|---|---|---|---|
| Aspirin (Bufferin, Ecotrin) | NSAID | C | Yes | Fetal: increased perinatal mortality, teratogenic effects, pulmonary HTN, bleeding risk, premature ductus arteriosis closure Maternal: anemia, ante/post partu m hemorrhage, prolonged labour | Should not be used in pregnancy, consider acetaminophen |
| Ibuprofen (Advil, Midol) | NSAID | B D In 3rd trimester | UNKNOWN | Fetal: ductus arteriosis constrictio n,Pulmonary HTN in 3rd trimester, Maternal: prolonged labor, spontaneous abortion | Should be avoided when possible and completely avoided during the 3rd trimester. Consider acet aminophen |
| Naproxen (Aleve, Anaprox, Midol,Naprosy n,Pamprin) | NSAID | B; D In 3rd trimester | Yes | Fetal: ductus arteriosis constriction, intracranial hemorrhage, primary pulmonary HTN | Should be avoided when possible and completely avoided during the 3rd trimester. Consider acetaminophen. |
| Acetaminophe n | Analgesic antipyreti c | B | Yes | Fetal: overdose can lead to liver toxicity Maternal: overdose can lead to liver toxicity | Drug of choice for analge sia and fever during pregnancy |
| Butorphanol (Stadol) | Narcotic analgesic | C D if prolonged use | Yes | Fetal: sinusoidal fetal heart rate pattern, addiction, respiratory depression Maternal - addiction | Used for analgesia during labor |
| Morphine ( Duramorph,Ka dian. | Narcotic analgesic | C; D if prolonged use | Yes | Fetal: addiction, possible relation to inguinal hernia and respiratory depression Maternal: addiction | Should only be used when analgesia or anesthetic is clearly in dicated |
| Fentanyl (Actiq, Duragesic) | Narcotic analgesic | C; D if prolonged use | Yes | Fetal: respiratory depression, dependence and loss of fetal heart rate variability without hypoxia | Only use when benefits > risks |
| Hdromorphon e (Dilaudid) | Narcotic analgesic | C D if prolonged use | Yes | Fetal: respiratory depression | Only use when benefits > risks Manufacturer recommen ded CI in pregnancy |
| Tramado (ultram) | Narcotic analgesic | C | Yes | Fetal: dose related fetal toxicity in animals, respiratory depression and addiction | Should be avoided until further evidence concern ing the dose related fetal toxicity is available |
| Ergotamine[Er gomar] | Sympatho lytic | X | Yes | Fetal: increase uterine tone leading to fetal hypoxia, teratogenic and fetal toxicity | Do not use in pregnancy |

**Table 5: Cough and cold medications in pregnancy and lactation [41, 42, 43]**

| Drug or Drug Class | Pregnancy | Lactation |
|---|---|---|
| Decongestants | Pseudoephedrine, in the lowest dose and shortest duration possible is considered the decongestant of choice. However it may be prudent to avoid its use in the first trimester of pregnancy. Oxymetazoline and xylometazoline can be considered when used at appropriate doses for short durations. | Systemic decongestants are best avoided if breast milk production is poor or marginal. Oxymetazoline and xylometazoline are considered drugs of choice |
| Antihistamines | The first generation antihistamines, especially chlorpheniramine, are preferred If not tolerated or effective, second generation agents such as loratadine can be recommended. | Due to possible adverse effects on the infant from first generation antihistamines, second generation agents are preferred in lactating mothers. |
| Antitussives-Codeine | Codeine is best avoided during pregnancy. | Avoid or limit codeine use in lactation due to risk of infant toxicity. |
| Antitussives-Dextromethorphan | Dextromethorphan is the preferred antitussive in both pregnancy and lactation. Consider lack of evidence of efficacy. | Dextromethorphan is the preferred antitussive in both pregnancy and lactation. Consider lack of evidence of efficacy. |
| Expectorant | Guaifenesin is considered safe in pregnancy and lactation. Consider lack of evidence of efficacy. | Guaifenesin is considered safe in pregnancy and lactation. Consider lack of evidence of efficacy. |
| Analgesics-Aceaminophen | Acetaminophen is considered the analgesic/antipyretic of choice in both pregnancy and breastfeeding. | Acetaminophen is considered the analgesic/antipyretic of choice in both pregnancy and breastfeeding. |
| Analgesics-ASA and NSAIDS (naproxen and ibuprofen) | ASA and NSAIDs are considered compatible with pregnancy in the first and second trimester, but should be avoided in the third trimester.<br><br>Low-dose ASA is considered to pose lower risk during pregnancy and breastfeeding. | Non-aspirin NSAIDs are generally considered compatible during breastfeeding and ibuprofen is the NSAID of choice due to greatest safety data.<br>Low-dose ASA is considered to pose lower risk during pregnancy and breastfeeding. |
| Lozenges | Medicated throat lozenges are considered safe in pregnancy and breastfeeding. | Medicated throat lozenges are considered safe in pregnancy and breastfeeding. |
| Herbs for Cough and Cold | Echinacea and ginseng (all forms) should be avoided during pregnancy and breastfeeding. | Echinacea and ginseng (all forms) should be avoided during pregnancy and breastfeeding. |

**Table 6: List of Drugs during Immunizations [44]**

| generic (brand) | Class | pregnancy category | crosses placenta | reported adverse effects to mom or baby from use in pregnancy | place in therapy |
|---|---|---|---|---|---|
| Human papillomavirus (Gardasil) | Inactivated vaccine | B | Unknown | Currently under study | Do not use during pregnancy |
| Hepatitis B (Engerix-B, Recombvivax HB) | Inactivated vaccine | C | Unknown | No risk to the mom or baby have been reported | The vaccine should be given pre or post exposure in women at risk for infection. |
| Influenza (injection)(Afluria, Fluarix, Flilaval,Fluvirin, Fluzone) | Inactivated vaccine | C | Unknown | Studies of immunization of over 2000 women showed no fetal adverse effects associated with vaccination | ACOG recommends the vaccine be given to pregnant women in the 2nd and 3rd trimesters during flu season. All at risk for pulmonary complications should be vaccinated, regardless of trimester |
| MMR (M-M-R II) | Live vaccine | C | Unknown | Fetal infection with live attenuated virus may occur | Do not use during pregnancy, Avoid pregnancy for 12 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | weeks after injection |
| Pneumococcal Vaccine (Pneumovax) | Inactivated vaccine | C | Maternal Ab yes | Risk to the fetus in the 1st trimester is unknown. | Use if indicated in hig h risk patients |
| Td (Decavac) | Toxoid | C | Unknown | No evidence of teratog enicity | Use if indicated |
| TdP (Adacel, Boostrix) | Toxoid | C | Maternal Ab yes | Antibodies may also in terfere with the infant' s immune response to infant doses of DTaP, s o infant may not be pr otected. | Use if at high risk for pertussiss |
| Varicella Vaccine | Live vaccine | C | Unknown | Fetal infection may occur | Do not use during pregnancy |

**Social drugs:** In addition to counsel the pregnant women regarding use of various prescribed and non- prescribed medications during pregnancy. They should be informed about risk of using following substances during pregnancy [45].

**Cigarette smoking:** Maternal smoking is one of the few known preventable cause's prenatal morbidity and mortality [46]. The most consistent effect of smoking on the fetus during pregnancy is reduction in birth weight. Birth defects of heart, brain and face are also more common among babies of smokers. Risk of sudden infant death syndrome (SIDS), Mis-located placenta (placenta previa), premature detachment of placenta, premature rupture of the membranes, preterm labor, uterine infections, miscarriages, stillbirths, premature births are increased[47]. Changes in uterine and placental oxygenation may be the causes of infant death, pre-maturity or spontaneous abortions. Therefore all women's should be informed of the risk of smoking on the fetus and encouraged to quit smoking during pregnancy [48].

**Alcohol:** Fetal alcohol syndrome is one of the most serious consequences of drinking during pregnancy [49]. Risk of miscarriage almost doubles for women who drink alcohol in any form during pregnancy and birth weight of babies is substantially below normal [50]. This syndrome includes inadequate growth before or after birth, facial defects, a small head, mental retardation and abnormal behavioral development.

**Caffeine:** Caffeine is found in various quantities in many beverages, analgesics, diet aids and stimulants; hence it is the most commonly ingested drug during pregnancy. Evidence suggests that consuming caffeine during pregnancy possess little or no risk to the fetus. Caffeine contained in coffee, tea, and some sodas and some drugs is a stimulant that readily crosses the placenta to the fetus [51]. If taken in high dose it may stimulate the fetus increasing heart and breathing rate. Caffeine also may decrease blood flow across placenta and decreases the absorption of iron, increasing risk of anemia.

## CONCLUSION

The safe and unsafe medications during pregnancy is a very important prospective of life as it carries the two lives conjoined for the certain period of time. During that time period both the mother and fetus should be safe, sound and grow healthily. This review summarizes the safe and unsafe list of drugs during pregnancy it is the responsibility of all clinicians including pharmacists to counsel patients with complete, accurate and current information on the risks and benefits of using medications during pregnancy. The first safe methods to refrain from such interaction during pregnancy are always consulting the medical practitioners and prescribe the drugs even of OTC category especially during the pregnancy as there are so many complications in it. It is the important that the benefits and risk of stopping treatment to be explained and informed properly. Drug may also be less effective during pregnancy because of pharmacokinetic changes such as increased metabolism. Doses of these drugs may need to be adjusting during pregnancy. Also when selecting drugs to be used in pregnancy effectively, drugs that have been in use for a long time are often preferable because fetal safety has been established even through newer alternatives may be available.

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