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Young educated adult awareness regarding drug utilization and chemical composition during pregnancy

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ABSTRACT

Pregnancy is a unique biological condition where medicine intake makes people worry because of the changing pharmacokinetics and medication crossing the placenta, which may cause impairment to the growing fetus. However, treatment and medication during the prenatal period cannot be completely avoided because many pregnant ladies may have chronic medical conditions that need uninterrupted medication, some of whom had serious medical complications related to pregnancy. Neglect in controlling these conditions may possibly affect the mother and the infant's wellbeing. To assess medication-related awareness and beliefs in general and during pregnancy among King Faisal University female students. It also determines the perception of the students regarding drug utilization and chemical composition. Prospective descriptive study design was used. A self-administered questionnaire was distributed to (400) students in both medical and non-medical colleges. Out of 400 students who took the questionnaire only (371) returned the completely filled out questionnaire, resulting in the response rate of 92.8%. The mean age of the respondents was 21.34. Out of the total respondents, (66%) were from non-medical colleges. More than one-tenth of the respondents (15.9%) were pregnant. More than one-third of the respondents (36.4%) took medication during pregnancy. For the type of medication used during pregnancy, 37.8 of them used the most frequently prescribed drugs during pregnancy, including vitamins, iron, folic acid, and calcium supplements. The result also shows that (85.5%) of respondents believed that pregnant women should read the medicine composition. Some respondents (37.2%) believed that doctors prescribe too many medicines, while almost half of them (46.4%) disagreed with this. Also, (22.7%) of the participants disagreed about reading the chemical composition of medicine before using it. There is a lack of essential knowledge on the safety of drug utilization towards both mother and growing fetus during prenatal period among King Faisal University female students.

1. Introduction

Pregnancy is a unique biological condition where medicine intake causes worry because of changing pharmacokinetics and medication crossing the placenta, which may cause impairment to the growing fetus (Banhidy et al., 2005). However, treatment and medication during the prenatal period cannot be completely avoided since many pregnant ladies may have chronic medical conditions that need uninterrupted medication (e.g., asthma, epilepsy, and hypertension).

The idea that there is no effective prescription without unfavorable effects enabled the suppliers to weigh the advantages as opposed to dangers when they chose to recommend medications (Schoen et al., 2007). This point is useful for all patients, especially in the case of pregnant women.

Several concerns from mothers and other healthcare professionals about medication used in the prenatal period are about the alteration of pharmacokinetics properties of several drugs in relation to the structural and biological changes that happen throughout pregnancy. Generally, these adjustments in functional indices go on gradually

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through pregnancy. Normal pregnancy-related adjustments in systems function may cause changes in the pharmacokinetics of the medicine (Pariente et al., 2016). The most favorable dosage of any medication used during the prenatal period ought to expand curative efficacy whilst diminishing the threat on mother and growing fetus (Amundsen et al., 2019).

All medications should be limited, if possible, throughout the first three months and should be prescribed only when the mothers' benefits are more than the fetus' risk (Sachdeva et al., 2009; Porter, 2004). Prescribed medications throughout pregnancy may create side effects, and it also affects the fetus, especially in the early stage of pregnancy, when organogenesis starts. It happens because the placenta is a partial barrier; therefore, the majority of the drugs cross over it. The influence of medications on the growing fetus may fluctuate from minimal problem to significant congenital abnormality. It may be dangerous and have an effect on growing fetus health and inconvenience to the family (Hajiseidjavadi, 2005). The researchers noticed that there are functional alterations that come with structural imperfections. Several cases of teratogenicity, like spina bifida, cleft lip, and cleft palate, are noted (Banhidy et al., 2005). Therefore, the usage of medications in pregnancy should be avoided with the exemption of hematinic, i.e., iron, folic acid, and certain vitamins (Bestwick et al., 2014). Folic acid inhibits neural tube defects.

It has been recorded that congenital malformations caused by individual teratogenic medicines are less than 1% of overall congenital malformations (Sachdeva et al., 2009). Therefore, in 1979, the Food and Drug Administration formed a technique to verify the teratogenic danger of medicines by studying the data from mammal and human-based studies (Sachdeva et al., 2009). FDA categorized different medicines used in the prenatal period to five classifications, A, B, C, D, and X. Class A is believed as the not dangerous classification, and class X is completely contraindicated in the prenatal period (FDA, 2005).

But even if avoiding medications during pregnancy may be more appropriate, it is not possible in all cases and may be unsafe for the reason that several pregnant ladies had chronic diseases, and some had serious medical complications related to pregnancy. Moreover, throughout the prenatal period, different medical conditions can develop, and chronic medical conditions may deteriorate, demanding treatment (Deborah et al., 2005). Neglect in controlling these conditions can possibly affect the mother and the infant's wellbeing (Andrade et al., 2004).

Evidence about medicines and over the counter drugs used in pregnancy are also widespread (Yaffe, 2002). Ever since the thalidomide period, there has been a high level of consciousness regarding the dangerous effects of drugs on the growing fetus (Kacew, 1994; Melton, 1999). So, it turns out to be an important concern for pregnant ladies not to take any medication, whether prescribed, herbal, or over-the-counter.

In various countries, health practitioners work hard to guarantee a sufficient understanding of health issues among antenatal women (Marsack et al., 1995). Nonetheless, many studies have indicated that pregnant women still have inadequate understanding and awareness about the variety of health hazards during the prenatal period (Roth and Taylor, 2001; Arnold et al., 2001).

The study intends to assess medication-related awareness and beliefs in general and during pregnancy among King Faisal University female students. It also aims to determine the perception of the students regarding medicine's drug utilization and chemical composition.

2. Methods

Prospective descriptive study design was used. Data were obtained from the female section of King Faisal University, Saudi Arabia. This study was conducted in October-November 2018. Data were collected about their socio-demographic background, medication use, chemical composition awareness, and beliefs about medications. Oral informed consent was obtained before participation in the study. The study conformed to the ethical principles of the Research Deanship of King Faisal University.

The total number of female students enrolled at King Faisal University was 22,000. Based on population size, a maximum allowable error of 5%, a confidence level of 95%, and hypothesized frequency of the outcome being 50%, the minimum required sample size is 400, which was drawn by cluster sampling technique and a simple random sample of clusters. A self-administered questionnaire was distributed to (400) students in both medical and non-medical colleges.

The tools used in the study were developed by the researchers after reviewing the current local and international related literature using books, articles, and scientific journals. The questionnaire was also based on a previously validated survey. Validation of the questionnaire was done by conducting a pilot study on 20 participants and incorporating suggestions of experts after reviewing the study results.

Questionnaires were administered to 400 students. The first part of the questionnaire included nine questions about socio-demographic queries (age, education, and economic status), pregnancy, and use of medications or herbal during pregnancy. The second part of the questionnaire contained 21 questions (beliefs and attitudes regarding medication use in general, their beliefs about medication use during pregnancy and medical composition). To determine the participants' degree of agreement or beliefs, the study used the four points Likert scale from strongly agree, agree, disagree, to strongly disagree. A Chi-square test was

used to test for differences in proportions between answers given to each of the 21 statements.

3. Results

Out of 400 students who took the questionnaire (381) returned the questionnaire, but only (371) returned a complete questionnaire, resulting in a response rate of 92.8%.

Table 1 shows that out of 371 students who returned the questionnaire, more than three quadrants of the respondents (77.4%) age were more than 20 years old (The mean age of the respondents was 21.34). Out of the total respondents, (66%) were from non-medical colleges. More than one-tenth of the respondents (15.9%) were pregnant.

Table 1: Demographic profile "Characteristics of participants"

Demographic Profile	No	Percent
Age (Mean age = 21.34)		
20 and less	84	22.6%
More than 20	287	77.4%
College		
Non-medical college	245	66%
Medical college	126	34%
Pregnancy		
Pregnant	59	15.9%
Not pregnant	169	45.6%
Single	143	38.5%
Taken medication during pregnancy		
Yes	135	36.4%
No	91	24.5%
NA	145	39.1%
Type of medication used during pregnancy*(135)		
Vitamins, iron, calcium, or folic acid	51	37.8%
Paracetamol	32	23.8%
Antacid	33	24.4%
Drugs for nausea and vomiting	8	5.9%
Antihistamine	9	6.7%
Antibiotics	2	1.5%
Regularly use of supplementation medicine in pregnancy		
Yes	42	31.1%
No	93	68.9%
Safe to use herbals during pregnancy		
Yes	58	15.6%
No	100	27%
I don't know	213	57.4%
All herbals are safe		
Yes	74	19.9%
No	88	23.8%
I don't know	209	56.3%
Chronic diseases history		
Yes	31	8.4%
No	340	91.6%

More than one-third of the respondents (36.4%) took medication during pregnancy. In relation to the type of medication used during pregnancy, (37.8%) used most frequently prescribed drugs during pregnancy such as vitamins, iron, folic acid, and calcium supplements, while (23.8%) used Paracetamol, (24.4%) used antacid, (5.9%) used nausea and vomiting drugs, (6.7%) used antihistamine and (1.5%) used antibiotics. Regarding the regular use of the supplements during pregnancy, (68.9%) didn't use it regularly.

In connection with the belief on the safety of using herbal during pregnancy, (15.6%) considered it safe, while (57.4 %) did not know if it's safe or not. Among the respondents (19.9%) considered all herbs safe during pregnancy, while (56.3%) did not know. (91.6%) of the respondents had no medical history of any disease.

Table 2 illustrates the overview or beliefs about medications in general. It shows that (37.2%) of respondents believed that doctors prescribe too many medicines, while near to half of respondents (46.4%) disagreed with it. (12.6%) respondents believed that most medicines are addictive, while (64.2%) of them disagreed. Furthermore, (61.9%) of the respondents disagree or strongly disagree that natural remedies are safer than medicines. (11.9%) of respondents believed that medicines do more harm than good, while (88.1%) of them disagreed. Also, the majority (91.9%) of respondents disagreed or strongly disagreed with the idea that all medicines are poisons. In relation to doctors placing too much trust on medicines, (76.9%) of the respondents agreed or strongly agreed with it. In the context, if doctors had more time with patients, they would prescribe fewer medicines, (37.5%) of the respondents agreed or strongly agreed with it.

Table 2: Participant views on medication use in general

What do you believe about medications in general?	Strongly Disagree	Disagree	Agree	Strongly Agree
Doctors prescribe too many medicines	43 11.6%	172 46.4%	138 37.2%	18 4.8%
Most medicines are addictive	86 23.2%	238 64.2%	38 10.2%	9 2.4%
Natural remedies are safer than medicines	54 14.5%	176 47.4%	120 32.4%	21 5.7%
Medicines do more harm than good	81 21.8%	246 66.3%	44 11.9%	0 0%
All medicines are poisons	144 38.8%	197 53.1%	30 8.1%	0 0%
Doctors place too much trust in medicines	5 1.3%	81 21.8%	244 65.8%	41 11.1%
If a doctor had more time with patients; he would prescribe fewer medicines	22 5.9%	210 56.6%	116 31.3%	23 6.2%

Table 3 illustrates the overview or beliefs about medications during pregnancy. It shows that (19.1%) of respondents believed that medicines could be harmful to the fetus, while (80.9%) disagreed with it. In relation to the participants' beliefs about refraining from using the medicine during pregnancy because of the baby, (62.4%) of participants agreed, while (37.6%) of them disagreed. As regards to medicines during pregnancy, saving many unborn children each year, (74.6%) agreed or strongly agreed, while (25.4%) disagree and strongly disagree. With reference to the idea that it's better for the fetus than the mother use medicines and get well than to have untreated illness during pregnancy, (68.7%) agreed about it.

Referring to doctors prescribing too many medicines to pregnant women, (19.1%) agreed about it. In relation to natural remedies being generally used by pregnant women (39.1%), agreed. About pregnant women, preference in using natural remedies during pregnancy, (44.8%) agreed. (82.2%) agreed that pregnant women should not use natural remedies without the advice of the doctor.

Table 3: Participants' beliefs about medication use during pregnancy

What do you believe about medication use during pregnancy?	Strongly Disagree	Disagree	Agree	Strongly Agree
All medicines can be harmful to the fetus	69 18.6%	231 62.3%	54 14.6%	17 4.6%
Even if I'm ill and if not pregnant, I believe it's better for the fetus that I refrain from using medicines during pregnancy	30 8.1%	110 29.6%	200 53.9%	31 8.4%
Thanks to treatment with medicines during pregnancy lives of many unborn children are saved each year	12 3.2%	82 22.2%	206 55.5%	71 19.1%
It is better for the fetus that I use medicines and gets well than to have untreated illness during pregnancy	33 8.9%	83 22.4%	215 58%	40 10.7%
Doctors prescribe too many medicines to pregnant women	70 18.9%	230 62%	65 17.5%	6 1.6%
Natural remedies can generally be used by pregnant women	42 11.3%	184 49.6%	132 35.6%	13 3.5%
Pregnant women should prefer to use natural remedies during pregnancy	39 10.5%	166 44.7%	142 38.3%	24 6.5%
Pregnant women should not use natural remedies without the advice of a doctor	20 5.4%	46 12.4%	141 38%	164 44.2%

Table 4 illustrates the beliefs about medicine compositions. It shows that (85.5%) of respondents believed that pregnant women should read the medicine composition. In relation to participants reading the chemical composition of medicine before using it, (22.7%) disagreed. (21%) of the participant disagreed that they had an idea about the effects of chemicals present in medicine on the body while (11.5%) disagreed that they know the benefit of reading the chemical composition**.** (20%) of the participants disagreed that reading the chemical composition can avoid side effects**.** (36.6%) of the participants disagreed that they had an idea about which chemical composition they are allergic to.

Table 4: Participants' beliefs about medicines compositions

What do you believe about medicines compositions	Strongly Disagree	Disagree	Agree	Strongly Agree
Pregnant women should read the medicine composition	28 7.5%	26 7%	188 50.7%	129 34.8%
I read the chemical composition of medicine before using it	31 8.4%	53 14.3%	196 52.8%	91 24.5%
I have an idea about the effects of chemical present in medicine on the body	14 3.8%	64 17.2%	220 69.3%	73 19.7%
I know the benefit of reading the chemical composition	18 4.8%	25 6.7%	228 61.5%	100 27%
If I read the chemical composition, I can save myself from side effects	21 5.7%	53 14.3%	201 54.2%	96 25.8%
I have an idea about which chemical composition I'm allergic to it	18 4.9%	118 31.7%	165 44.5%	70 18.9%

Fig. 1 shows that the sources of information for women about drug use during pregnancy are physicians (37%), internet (27%), and nurses (6%).

4. Discussion

The decision of drug utilization by pregnant women depends on the access and availability of drug-related information and on beliefs about the medication during the prenatal period. The advantages of drug use during gestation is related to maternal health, along with the growing fetus' wellbeing.

In the present study, 22.6% of the participants were between ages twenty or below, which is similar to the study conducted by Abasiubong et al. (2012). 36.4% of participants used medicine during the prenatal period. Our results are similar to Aljofan and Alkhamaiseh (2020), who found that 33% of participants used herbal medicine during pregnancy. This is contrary to Banzal et al. (2017), who found that 74% of participants took medications during pregnancy. The prevalence of drug use during pregnancy was 85.1% (Bedewi et al., 2018) and 62.2% (Gebreegziabher et al., 2012).

From the participants in this study, the supplementary drug is used by 37.8% of them. The supplementary drugs they were taking are iron and folic acid supplements. This is related to the study done by Bedewi et al. (2018), who found that iron/folate consumption is between 97.81% and by Heikkilä et al. (1994), who found that iron and vitamin supplementation was the highest commonly utilized drugs. Although these were similar to a study conducted in the eight rural regions of Ethiopia, it was found that 35.4% of pregnant women used iron supplements (Gebremedhin et al., 2014).

Antacid were the commonly used medications from non-supplementary drugs in this study. This

result was not similar to prior studies conducted in HFSUH, which found that antibiotics were the commonly utilized medications from non-supplementary drugs (Negasa and Tigabu, 2014).

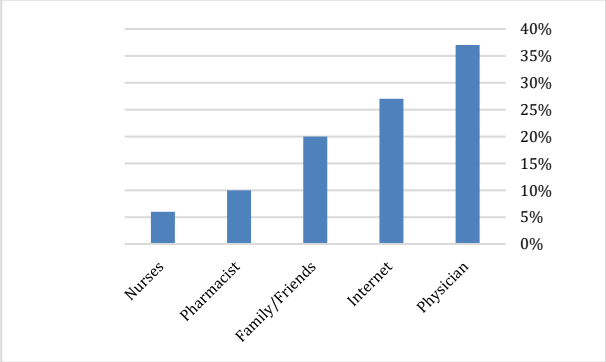

Fig. 1: Sources of information for young adults about drug use during pregnancy

In the current study, 68.5% didn't care about taking supplementation on a routine basis during the prenatal period. This finding is the same with Kureshee and DhaNDe (2013), who observed that among 501 patients, iron and calcium supplements were stopped to be used by (38.3%) patients.

The advantages of medicine used during the prenatal period are not limited to the improvement of maternal health, but they also have consequences on the growing fetus as well (Banhidy et al., 2005). 11.9% of respondents thought that medicines could do harm than good. This result is similar to Eldalo et al. (2015), who found that 38.6% of pregnant women believed that medicines do more harm than good. On the other hand, Aljofan and Alkhamaiseh (2020), reported that 74% of the participants considered that the mild use of herbal medicines would not harm the mother nor the growing fetus.

In the present study, 19.1% believed that medicines could be dangerous to the growing fetus. This finding is similar to Eldalo et al. (2015), who found that 12.2% of studied women believed that all medications could be harmful to a growing fetus. This result is dissimilar to a study done by Amundsen et al. (2019), who reported that a significant proportion of the participants were afraid to use medications during pregnancy and breastfeeding period because of fear of harming the growing fetus or the baby.

The results revealed that 85.5% of participants believed that pregnant women should read the drug composition before using the medication, and 77.2% actually read the chemical composition of the medicine before using it. These results are in accordance with Eldalo et al. (2015), who found that about two-thirds of pregnant women have a tendency to verify the drug booklet before using the drugs.

For women in the antenatal period, drug information can be taken from the medical doctor, pharmacists, and nurses. In the current study, information is taken from physician (37%), internet (27%), pharmacist (10%), and nurses (6%) These findings are in contradictory with Eldalo et al. (2015) who found that most pregnant women got their information from physicians or from pharmacists and Al-Ghamdi et al. (2017), who found that 52.9% of the pregnant women used herbal medicine as instructed by family and friends.

5. Conclusion

Careful utilization of medications, sufficient information, positive attitude, and awareness towards medication utilization are compulsory requirements for maternal and growing fetus wellbeing. However, there is a lack of essential knowledge about the safety of drug utilization to both mother and growing fetus during the prenatal period. With this, there is a need to strengthen the information dissemination on the related topics among pregnant women.

Data availability

The data utilized to support the results of the research are accessible with the corresponding author upon request.

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

References

Abasiubong F, Bassey EA, Udobang JA, Akinbami OS, Udoh SB, and Idung AU (2012). Self-medication: Potential risks and hazards among pregnant women in Uyo, Nigeria. Pan African Medical Journal, 13: 1.

Al-Ghamdi S, Aldossari K, Al-Zahrani J, Al-Shaalan F, Al-Sharif S, Al-Khurayji H, and Al-Swayeh A (2017). Prevalence, knowledge and attitudes toward herbal medication use by Saudi women in the central region during pregnancy, during labor and after delivery. BMC Complementary and Alternative Medicine, 17: 196. https://doi.org/10.1186/s12906-017-1714-3 **PMid:28376788 PMCid:PMC5379727**

Aljofan M and Alkhamaiseh S (2020). Prevalence and factors influencing use of herbal medicines during pregnancy in Hail, Saudi Arabia: A cross-sectional study. Sultan Qaboos University Medical Journal, 20(1), e71-e76. https://doi.org/10.18295/squmj.2020.20.01.010 **PMid:32190372 PMCid:PMC7065689**

Amundsen S, Øvrebø TG, Amble NMS, Poole AC, and Nordeng H (2019). Risk perception, beliefs about medicines and medical adherence among pregnant and breastfeeding women with migraine: Findings from a cross-sectional study in Norway. BMJ Open, 9(2): e026690.

https://doi.org/10.1136/bmjopen-2018-026690
PMid:30819714 PMCid:PMC6398664

Andrade SE, Gurwitz JH, Davis RL, Chan KA, Finkelstein JA, Fortman K, and Yood MU (2004). Prescription drug use in pregnancy. American Journal of Obstetrics and Gynecology, 191(2): 398-407.
https://doi.org/10.1016/j.ajog.2004.04.025 **PMid:15343213**

Arnold CL, Davis TC, Berkel HJ, Jackson RH, Nandy I, and London S (2001). Smoking status, reading level, and knowledge of tobacco effects among low-income pregnant women. Preventive Medicine, 32(4): 313-320.
https://doi.org/10.1006/pmed.2000.0815 **PMid:11304092**

Banhidy F, Lowry RB, and Czeizel AE (2005). Risk and benefit of drug use during pregnancy. International Journal of Medical Sciences, 2(3): 100-106.
https://doi.org/10.7150/ijms.2.100
PMid:16007261 PMCid:PMC1168874

Banzal N, Saxena K, Dala M, and Srivastava SK (2017). A study to assess awareness amongst pregnant women about the effects of drugs on the fetus and self-medication. International Journal of Basic and Clinical Pharmacology, 6(4): 924-927.
https://doi.org/10.18203/2319-2003.ijbcp20171105

Bedewi N, Sisay M, and Edessa D (2018). Drug utilization pattern among pregnant women attending maternal and child health clinic of tertiary hospital in eastern Ethiopia: Consideration of toxicological perspectives. BMC Research Notes, 11(1): 1-7.
https://doi.org/10.1186/s13104-018-3966-5
PMCid:PMC6280540

Bestwick JP, Huttly WJ, Morris JK, and Wald NJ (2014). Prevention of neural tube defects: A cross-sectional study of the uptake of folic acid supplementation in nearly half a million women. PloS One, 9(2): e89354.
https://doi.org/10.1371/journal.pone.0089354
PMid:24586711 PMCid:PMC3929694

Deborah E, McCarter, Spaulding MS (2005). Medications in pregnancy and lactation. The American Journal of Maternal Child Nursing, 30: 10-17.
https://doi.org/10.1097/00005721-200511000-00015

Eldalo AS, Siraj N, and MA Y (2015). Pregnant women's awareness and perception about medicines. Latin American Journal of Pharmacy, 34(5): 869-74.

FDA (2005). Reviewer guidance: Evaluating the risks of drug exposure in human pregnancies. Food and Drug Administration, White Oak, Maryland, USA.

Gebreegziabher TL, Berhe DF, Gutema GB, and Kabtyimer BN (2012). Drug utilization pattern and potential teratogenesity risk among pregnant women; the case of Ayder referral hospital, Tigray-Ethiopia. International Journal of Pharmaceutical Sciences and Research, 3(5): 1371-1378.

Gebremedhin S, Samuel A, Mamo G, Moges T, and Assefa T (2014). Coverage, compliance and factors associated with utilization of iron supplementation during pregnancy in eight rural districts of Ethiopia: A cross-sectional study. BMC Public Health, 14: 607.
https://doi.org/10.1186/1471-2458-14-607
PMid:24930036 PMCid:PMC4073172

Hajiseidjavadi E (2005). Knowledge of pregnant women on drug use during pregnancy. The Journal of Qazvin University of Medical Sciences, 9: 81-83.

Heikkilä AM, Erkkola RU, and Nummi SE (1994). Use of medication during pregnancy--a prospective cohort study on use and policy of prescribing. Annales Chirurgiae et Gynaecologiae. Supplementum, 208: 80-83.

Kacew S (1994). Fetal consequences and risks attributed to the use of prescribed and over-the-counter (OTC) preparations during pregnancy. International Journal of Clinical Pharmacology and Therapeutics, 32(7): 335-343.

Kureshee NI and DhaNDe PP (2013). Awareness of mothers and doctors about drug utilization pattern for illnesses encountered during pregnancy. Journal of Clinical and Diagnostic Research, 7(11): 2470-2474.
https://doi.org/10.7860/JCDR/2013/6329.3582
PMid:24392375 PMCid:PMC3879844

Marsack CR, Alsop CL, Kurinczuk JJ, and Bower C (1995). Pre-pregnancy counselling for the primary prevention of birth defects: Rubella vaccination and folate intake. Medical Journal of Australia, 162(8): 403-406.
https://doi.org/10.5694/j.1326-5377.1995.tb139966.x
PMid:7746171

Melton MW (1999). Take two aspirin or not? Risk of medication use during pregnancy. Mother Baby Journal, 4: 25-32.

Negasa M and Tigabu BM (2014). Drug prescribing pattern among pregnant mothers attending obstetrics and gynecology department in Hiwot Fana specialized teaching hospital, Ethiopia. Archives of Pharmacy Practice, 5(2): 78-84.
https://doi.org/10.4103/2045-080X.132658

Pariente G, Leibson T, Carls A, Adams-Webber T, Ito S, and Koren G (2016). Pregnancy-associated changes in pharmacokinetics: A systematic review. PLoS Medicine, 13(11): e1002160.
https://doi.org/10.1371/journal.pmed.1002160
PMid:27802281 PMCid:PMC5089741

Porter RS (2004). The merck manual's online medical library. Whitehouse Station: Merck Research Laboratory, Hunterdon County, New Jersey, USA.

Roth LK and Taylor HS (2001). Risks of smoking to reproductive health: Assessment of women's knowledge. American Journal of Obstetrics and Gynecology, 184(5): 934-939.
https://doi.org/10.1067/mob.2001.112103 **PMid:11303201**

Sachdeva P, Patel BG, and Patel BK (2009). Drug use in pregnancy; A point to ponder! Indian Journal of Pharmaceutical Sciences, 71(1): 1-7.
https://doi.org/10.4103/0250-474X.51941
PMid:20177448 PMCid:PMC2810038

Schoen C, Osborn R, Doty MM, Bishop M, Peugh J, and Murukutla N (2007). Toward higher-performance health systems: Adults' health care experiences in seven countries. Health Affairs, 26(Suppl2): w717-w734.
https://doi.org/10.1377/hlthaff.26.6.w717 **PMid:17978360**

Yaffe SJ (2002). Drugs in pregnancy and lactation. 6th Edition, William and Wilkins, Philadelphia, USA.