Drug Utilization Patterns in Pregnant Women

A case study at the Mount Hope Women's Hospital in Trinidad, West Indies

LM Pinto Pereira[1], BS Nayak[1], H Abdul-Lateef[1], V Matmungal[1], K Mendes[1], S Persad[1], G Ramnath[1], I Bekele[2], S Ramsewak[1]

ABSTRACT

Objective: *To explore drug (prescription, over-the-counter and herbal) utilization in pregnant women attending a public sector tertiary healthcare institution.*

Methods: *This was a cross-sectional case study in women attending antenatal clinics at the Mount Hope Women's Hospital. Women (506) who consecutively presented for routine care at the antenatal clinic were interviewed on the medication they took. Descriptive statistics and logistic regression for predictors of drug use were done using SPSS 16.*

Results: *There were 200 (39.5%) primigravidae, 306 (60.5%) multigravidae and 299 (59%) women were in the third trimester of pregnancy. Most women (69.8%) were between 20−35 years of age. Women took an average of 1.32, 1.22 and 0.94 prescribed drugs in each trimester, respectively. Multivitamins (59.8%) and iron/folic acid (54.2%) were the most frequently prescribed drugs. Regardless of trimester, only 20% of women took supplemental calcium. Very few women (2.4%) took herbal medications. Paracetamol was the most common over-the-counter (OTC) medication in all trimesters. Women with secondary level education were most likely to use OTC iron/folic acid (*$p = 0.02$*), paracetamol and histamine$_2$ receptor antagonists [H_2RAs] (*$p = 0.001$*). More primigravidae took non-steroidal anti-inflammatory drugs (*$p = 0.02$*) and more women in the first trimester used anti-emetics (*$p = 0.001$*). Age group (*$p = 0.048$*), marital status (*$p = 0.001$*) and the trimester of pregnancy (*$p = 0.001$*) were predictors of drug utilization.*

Conclusion: *Overall, women in tertiary healthcare institutions took medication as prescribed particularly multivitamins and iron/folic acid. More women with higher education took OTC paracetamol, iron/folic acid and vitamin supplements. Herbal supplements were rarely used. Research on drug utilization in primary care facilities is recommended.*

Keywords: Drug use, herbal, over-the-counter, pregnancy, prescription

Patrones de Utilización de Medicamentos en las Mujeres Embarazadas

un Caso de Estudio en el Hospital de Mujeres Mount Hope en Trinidad, West Indies

LM Pinto Pereira[1], BS Nayak[1], H Abdul-Lateef[1], V Matmungal[1], K Mendes[1], S Persad[1], G Ramnath[1], I Bekele[2], S Ramsewak[1]

RESUMEN

Objetivo: *Explorar el uso de los medicamentos (con prescripción, sin receta médica, herbarios) en mujeres embarazadas que asisten a una institución terciaria de atención a la salud pública dentro del sector público.*

Métodos: *Se trató de un estudio transversal de mujeres que asisten a las clínicas prenatales en el Hospital de Mujeres Mount Hope. Las mujeres (506) que consecutivamente se presentaron para cuidados de rutina en la clínica prenatal, fueron entrevistadas acerca de la medicación que tomaban. Se hicieron estadísticas descriptivas y se hizo una regresión logística para los predictores del uso del medicamento usando SPSS 16.*

From: [1]Faculty of Medical Sciences and [2]Faculty of Science and Agriculture, The University of the West Indies, St Augustine, Trinidad and Tobago, West Indies.

Correspondence: Dr S Nayak, Faculty of Medical Sciences, The University of the West Indies, St Augustine, Trinidad and Tobago, West Indies. E-mail: shiv25@gmail.com

Resultados: *Había 200 (39.5%) primerizas, 306 (60.5%) multíparas, y 299 (59%) embarazadas en su tercer trimestre. La mayoría de las mujeres (69.8%) tenían entre 20–35 años de edad. Las mujeres tomaban un promedio de 1.32, 1.22 y 0.94 medicamentos prescritos en cada trimestre, respectivamente. Las multivitaminas (59.8%) y el hierro/ácido fólico (54.2%) fueron los medicamentos más frecuentemente prescritos. Con independencia del trimestre, sólo 20% de las mujeres tomaron suplemento de calcio. Muy pocas mujeres (2.4%) tomaban medicaciones herbarias. El paracetamol fue el medicamento sin receta más común en todos los trimestres. Las mujeres con nivel de educación secundaria presentaban una mayor probabilidad de usar hierro/ácido fólico (*p = *0.02), el paracetamol y los antagonistas de los receptores de la histamina-2- [H2RAs] (*p = *0.001). Un mayor número de primerizas tomaron medicamentos anti-inflamatorios no esteroideos (*p = *0.02) y más mujeres en el primer trimestre usaron anti-eméticos (*p = *0.001). El grupo etario (*p = *0.048), el estado matrimonial (*p = *0.001) y el trimestre de embarazo (*p = *0.001) fueron predictores de la utilización de medicamentos.*

Conclusión: *En general, las mujeres en las instituciones terciarias de atención a la salud tomaron la medicación como fue prescrita, en particular las multivitaminas y el hierro/ácido fólico. Más mujeres con mayor escolaridad tomaron medicamentos sin recetas: paracetamol, hierro/ácido fólico y suplementos de vitamina. Raramente se usaron suplementos herbarios. Se recomienda la investigación del uso de medicamentos en centros de atención primaria.*

Palabras claves: Uso de medicamentos, herbario, sin recentar, embarazo, prescripción

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INTRODUCTION

Self-medication, medical advice from individuals other than doctors or recommendations by pharmacists for treatment of various ailments are common occurrences in developing countries. In the pregnant woman, this is a risky practice because of potential harm to the fetus. Research into drug utilization in pregnant women has generated vast amounts of data from countries such as Australia (1), Brazil (2−4), England (5, 6), Finland (7, 8), India (9), Norway (10) and the United States of America [USA] (11−14).

Pregnant patients seek relief for minor problems like headache, musculoskeletal pain and various gastrointestinal complaints, such as heartburn, nausea, vomiting, dyspepsia and constipation (15). More than 90% of pregnant women take prescription or non-prescription drugs (over-the-counter drugs (OTC)) at some time during their pregnancy (16). Medications may pass from the mother to the fetus putting the fetus at risk particularly during the first trimester and first part of the second trimester. The most critical time appears to be around the fifth week after conception, during organogenesis, a time of considerable development. During these crucial weeks of organ formation, the fetus matures very quickly with increased susceptibility to outside influences which includes medications and their consequent harmful effects which may not be evident immediately after birth (17). Further, the safety and efficacy of a given medicine often changes during the course of a normal pregnancy. Though 60% of patients in the USA are estimated to consult a healthcare professional when selecting an OTC product (18), this projection may not be applicable to other countries. An estimated 10% or more of birth defects resulting from maternal drug exposure has prompted the USA Food and Drug Administration to assign risk categories to drugs in pregnancy (19).

Herbal medications commonly considered "natural" alternatives to medicines may be just as potent as prescription medications (20) or contain chemicals that cross the feto-placental barrier with toxic and unpredictable effects (17). Generally, any medication (including herbal teas) unless absolutely necessary, should not be taken during pregnancy, particularly during the first trimester (20).

Recent studies indicate an increase in drug consumption during pregnancy (21). Women may be uninformed or unaware of the risk that the drugs and chemicals pose to the fetus.

Studies on the utilization of allopathic or herbal agents in pregnant women in the Caribbean are not available to inform healthcare providers, pregnant women and future mothers. This study examined drug utilization patterns in pregnancy in women attending antenatal clinics in a tertiary healthcare institution in Trinidad.

SUBJECTS AND METHODS

The study was approved by the Ethics Committee of the Faculty of Medical Sciences, The University of the West Indies, St Augustine, and the Chief of Staff of the Mount Hope Women's Hospital (MHWH). The MHWH, with 110 beds, opened in Trinidad in 1978 to provide general access to obstetric and gynaecology care for the general public. It is a tertiary care University of the West Indies-affiliated institution and also receives referrals of high and low risk pregnancies from other clinics, hospitals and doctors. As a public sector hospital, drugs are prescribed from the hospital formulary and only by medical personnel attached to the

hospital. This case study was conducted on women as they presented at the antenatal clinics at the hospital between the months of June to September 2007. Subjects were asked to sign the consent form after their acceptance to participate in the study. All subjects were interviewed on a pilot tested questionnaire with all open-ended questions; the interviewer completed the questionnaire based on the patients' responses. Patients were requested to provide the names of drugs they had used up to the time of interview even if they were not specific to pregnancy. Patients named prescribed and OTC drugs that they had taken up to the time of interview, and also reported on any herbal medication they used. Data were analysed for educational status, age, duration of pregnancy, monthly household income, number of prescribed OTC drugs used and the number of herbal/home remedies used.

The data were captured in Excel and exported to SPSS version 16 and Minitab version 14 statistical packages for processing. The Minitab package was used to obtain descriptive statistics and SPSS to fit the logistic regression analysis to determine predictors of medication use.

RESULTS

Of the 543 patients approached, 506 agreed to be interviewed (93% compliance rate). Of these, 200 were primigravidae and 306 were multigravidae. Most women (59%, 299) were in the third trimester; others were in the first (6.0%, 32) and second (34% 169) trimesters and unknown (1%; 6) [Fig 1].

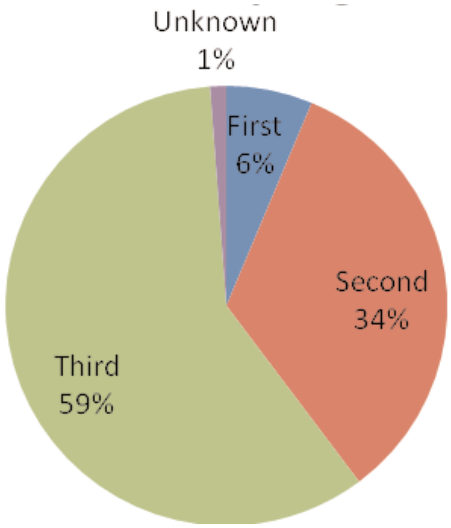

Fig. 1: Percentage of women at different trimesters of pregnancy.

At least two thirds, 69.8% (353) of the sample were between 20 to 35 years old, 16.0% (81) were less than 20 years and 13.2% (67) were above 35 years of age (Table 1).

As many as 506 474 and 299 prescribed drugs, averaging 1.0, 1.1 and 1.7 drugs per woman, were used during the first, second and third trimesters of pregnancy, respectively (Table 2). Approximately 73% of women used at least one type of medication during their pregnancy. Multivitamins, iron/folic acid and calcium were the most frequently prescribed drugs during the respective first, second and third trimesters (55.5%, 43.4%, 11%), (46.2%, 46.8%, 18.8%) (56.5%, 56.9%, 25.8%) of pregnancy respectively. Other commonly used drugs in all trimesters were: multivitamins, iron, folic acid, calcium and dimenhydrinate in the first trimester, multivitamins, iron, folic acid, calcium and anti-infectives (metronidazole) during the second trimester, and

Table 1: Demographics of pregnant women (n = 506)

Parameter	Number of subjects (%)
Age (yrs)	
Less than 20 yrs	81 (16.00%)
20–35 yrs	353 (69.76)
Greater than 35 yrs	67 (13.2%)
Unknown	5 (0.99%)
Educational status	
Primary	53 (10.47%)
Secondary	257 (50.79%)
Tertiary	162 (32.02%)
Vocational/technical	27 (5.34%)
None/unknown	7 (1.38%)
Marital Status	
Single	178 (35.18%)
Married	321 (63.44%)
Divorced	3 (0.59%)
Widowed	1 (0.20%)
Unknown	3 (0.59%)
Monthly household income ($TT)	
< 5000	210 (41.50%)
5000–10 000	232 (45.85%)
> 10 000	37 (7.31%)
Unknown	27 (3.34%)

Table 2: Drugs prescribed per trimester in pregnant women (%) n = 506

Drugs	First trimester (n = 506)	Second trimester (n = 474)	Third trimester (n = 299)
Multivitamin supplement	281 (55.55)	219 (46.20)	169 (56.52)
Iron/Folic acid	220 (43.40)	222 (46.84)	170 (56.86)
Calcium	56 (11.06)	89 (18.78)	77 (25.75)
Dimenhydrinate	25 (4.90)	9 (1.9)	3 (1.00)
Insulin and metformin	12 (2.37)	12 (2.53)	11 (3.68)
Paracetamol	14 (2.76)	10 (2.11)	6 (2.01)
Anti-infectives[a]	13 (2.56)	19 (4.01)	14 (6.70)
Anti-hypertensives	7 (1.38)	8 (1.69)	7 (2.34)
Antacids/H_2RAs[b]	12 (2.37)	7 (1.48)	1 (0.33)
Metamizole	7 (1.38)	5 (1.05)	3 (1.00)
NSAIDs and analgesics[c]	3 (0.59)	5 (1.05)	6 (2.01)
Aspirin 81 mg	1 (0.19)	1 (0.21)	2 (0.67)
Antivirals[d]	1 (0.19)	2 (0.42)	0 (0.00)
Others[e]	8 (1.58)	4 (0.84)	5 (1.67)

[a]Beta-lactam antibiotics, antifungal creams, metronidazole, cefuroxime, [b]H_2RAs = H_2 Receptor Antagonists, [c]*Buscopan plus* (Hyoscine butylbromide and paracetamol), *Panadeine F* (Paracetamol 500 mg and codeine 30 mg), Tramadol; [d]3TC (Lamivudine), zidovudine, stavudine, lamivudine & zidovudine; [e]Enoxaprin, acetylcysteine, oral rehy-dration salts, Rhogam, salbutamol tablets, prochlorperazine, fluoxetine ,paroxetine, buproprion

multivitamins, iron, folic acid, calcium and anti-diabetic drugs (insulin, metformin) during the third trimester (Table 2 and Fig. 2).

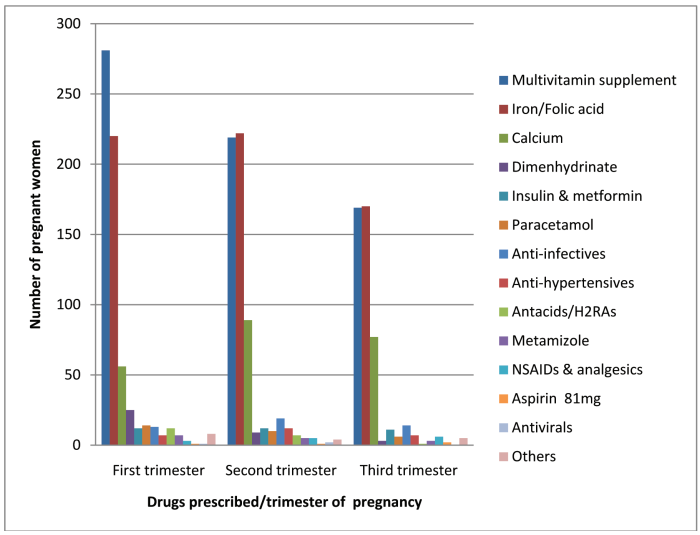

Fig 2: Drug prescription pattern in each trimster of pregnancy

Regardless of trimester, not more than 25 % of women used calcium, though the frequency of prescribed calcium markedly increased from the first to the last trimester from 11% to 18.9.% and 25.7% respectively. The frequency of prescribed iron/folic acid also increased with the trimesters (first, second and third respectively from 43.4%, 46.9%, and 56.5% respectively). Materna®, *a multivitamin formulation* used in pregnancy was the most frequently prescribed drug, and was used by 59.8% of women. The use of NSAIDs appears as shown in Table 2. Overall, a small percentage (less than 2%) of women used dimenhydrinate in any trimester.

Multivitamin supplements were most frequently used in all trimesters 94.7%, 46.2% and 56.5% respectively), followed by paracetamol in trimester one (1.4%) and calcium in the second and third trimesters (18.8% and 25.8%) [Table 3 and Fig. 3]. The use of OTC paracetamol was associated

Table 3: Over-the-counter medicines used in each trimester of pregnancy

Drugs	First trimester (n = 506, (%))	Second trimester (n = 474, (%))	Third trimester (n = 299, (%))
Paracetamol	7 (1.38)	50 (10.55)	34 (11.37)
Antacids/H_2RAs[a]	1 (0.2)	7 (1.48)	1 (0.33)
Iron/Folic acid	3 (0.59)	18 (3.8)	18 (6.02)
Multivitamin supplement	24 (4.74)	219 (46.20)	169 (56.52)
Dimenhydrinate	2 (0.4)	9 (1.90)	3 (1.00)
Metamizole	0 (0.00)	5 (1.05)	3 (1.00)
Calcium	1 (0.2)	89 (18.78)	77 (25.75)
NSAIDs*	1 (0.2)	3 (0.63)	5 (1.67)

[a]H_2RAs = H_2 Receptor antagonists, *NSAID = Non-steroidal anti-inflammatory drug

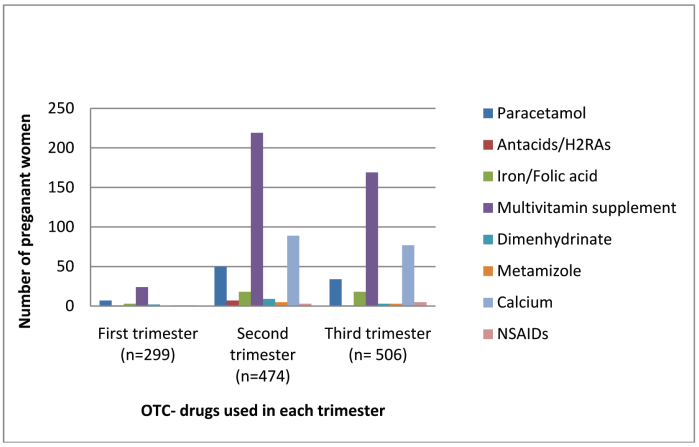

Fig. 3: Over-the-counter medicines used in each trimester of pregnancy

with all three trimesters of pregnancy (p = 0.001), but was limited to just 10% of the subjects. Laxative use was also associated with the trimesters (p = 0.049) and, although only 0.2% of the women used them, these drugs were taken only in the first trimester.

Doctors are most frequently consulted on OTC drugs as compared with pharmacists or self-medication, regardless of the patients' income bracket (p = 0.001). No patient ever stated that a pharmacist advised on the use of OTC drugs. Women in this study appeared to be aware of a potential danger to the fetus from using medication without seeking medical advice from a health professional. Only 2.4% of women used herbal remedies, and these included aloes (0.26%), senna (0.26%) and occasionally Momordica charantia L. (carailli) and a 'colon cleanser' which is retailed at herbal outlets. Of the small percentage of women using herbal remedies, 0.80% self medicate, 0.70% took advice from the herbalists while 0.40% from a relative, 0.20% from a friend and 0.10% from a pharmacist.

Women with tertiary education (57.1%) used more (p = 0.006) OTC multivitamins than those who did not have tertiary education. More (p = 0.001) women with secondary school education used OTC paracetamol (48.13%), antacids/H_2RAs (34.54%), and iron/folic acid [44%] (p = 0.02). This educational level was also associated with the highest use of herbal medication (p = 0.01) with 52.6% using these agents compared with tertiary and primary level educated women, 15.79% and 26.32% respectively. However, these observations may be due to the larger proportion of women with education up to the secondary level as opposed to those educated to the primary and tertiary levels.

A greater (p = 0.039) percentage of women (98.0%) who had previous births used chronic disease medication than those who were about to be first time mothers (0.7%) However, overall, more women with previous experience of pregnancy (60.0%) attended the clinic which may explain these findings. More (p = 0.026) women who had multiple pregnancies (91.7%) took prescribed non-steroidal anti-in-

flammatory drugs (NSAIDs) than primiparous women (8.3%). Using logistic regression, the predictors of medication intake were age group ($p = 0.048$), marital status ($p = 0.001$) and the trimester of pregnancy ($p = 0.001$)

DISCUSSION

The United States Food and Drug Administration has classified drugs which may present potential harm in pregnancy but are warranted for use as their potential benefits are perceived to outweigh the risks as categories C and D (22). The benefits of rational drug use during pregnancy relate to maternal health as well as to fetal development. Multivitamins, iron/folic acid, calcium and dimenhydrinate were the most frequently prescribed drugs for pregnant women in this study, whereas paracetamol, antacids/H_2RAs, iron/folic acid and multivitamins were the most common OTC drugs that women used. In a report from North India, pregnant women also regularly used iron/folic acid, calcium and vitamins (1). Other prescribed drugs for chronic disease such as anti-diabetics and anti-hypertensives were used by more multigravidae than first time pregnant women.

Few women used ibuprofen, aspirin and mefenamic acid in category C/D and nifedipine, prednisolone, salbutamol and beclomethasone in class C of the FDA classification. Ibuprofen increases the risk of premature closure of the ductus arteriosus, leading to persistent neonatal pulmonary hypertension and aspirin may increase the risk of prolonged gestation and fetal intracranial bleeding during labour. While these drugs may well have been used for chronic conditions and may have been difficult to avoid, NSAIDs were generally bought over the counter without apparent knowledge of their potential adverse effects. In the Netherlands, a study on drug prescriptions during pregnancy for chronic, occasional and pregnancy-related complaints showed that during the first trimester of pregnancy, 1.7% of drugs prescribed for chronic conditions and 2.3% of the drugs used occasionally were harmful (13). Notwithstanding, the low proportion of anti-hypertensive medication used and no anti-diabetic drug use, the relation between women older than 35 years of age and therapy for these chronic diseases may be expected considering the high prevalence of these two chronic illnesses in the Caribbean populations (23, 24). Women were informed that the information requested on drug use was not restricted to the symptoms and problems associated with pregnancy.

The majority of the drugs used during pregnancy belonged to FDA category A such as vitamins and supplements, followed by category B, which included paracetamol and dimenhydrinate. These results are encouraging compared with findings elsewhere. In a Finnish study, 20.4% of women purchased at least one drug classified as potentially harmful during pregnancy and 3.4% purchased at least one drug classified as clearly harmful (2). In the current study, many of the commonly used drugs in each trimester were generally safe for use during that trimester with an average of 0.94 – 1.32 drugs per pregnant woman. In North India, a similar pattern of drug use was observed as subjects in the present study with the most commonly used drugs being iron, calcium and vitamins averaging 1.73 – 2.89 drugs per pregnant woman (1).

Many medications used in the first and second trimesters were not used as much as in the third, such as iron/folic acid and Materna® (composed of folic acid, multiple vitamins with iron and minerals), a branded vitamin supplement. Women may be more careful with treatment compliance in the last trimester and may have become tolerant to unwanted effects in earlier trimesters such as the tablet being too big to swallow or constipation with iron. Analgesics were more frequently used in the first trimester, possibly explained by the initial discomforts associated with a new pregnancy diminishing over later trimesters. The higher proportion of women with multiple pregnancies who used prescribed NSAIDs compared with those using these agents in the first pregnancy might be a positive experience of past pregnancies.

Although most OTC drugs have a good safety profile, this may change with fetal gestational age. A higher educational level was associated with increased use of OTC drugs particularly iron, folic acid, H_2RAs and paracetamol. Very few women used OTC laxatives, opting for senna perhaps because as an herb it is considered safe. Most women thought laxatives were unsafe to use and some were not familiar with the term laxative. Women appear to be alert to fetal harm from using drugs without medical advice. Community education on OTC drug use in pregnancy is an unmet need as advice from pharmacists was not forthcoming.

Very few of the women interviewed used herbal remedies. These preparations are not regulated and have the potential to interact with other medications. Herbal drug use in Norwegian women was associated with prior use, high knowledge of herbal drugs, age between 26 to 35 years, and was generally confined to Echinacea, iron rich herbs, ginger, chamomile and cranberry (4). Different plant species and cultures in countries would perhaps reflect the types of herbal agents used. In North India, herbal/homeopathic drugs were used by more graduates than undergraduates and more in the high socio-economic class (2).

Overall, women attending the MHWH in Trinidad take prescribed medication, predominantly multivitamins and iron/folic acid supplements and adhere to the prescribed drugs as recommended and avoid taking unnecessary OTC agents. Herbal remedies are used infrequently and were limited to laxative agents.

Patient responses may have been limited by memory recall. Whether these encouraging results are limited to this tertiary health centre or are reflective of utilization patterns at primary care facilities in Trinidad remains to be investigated.

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REFERENCES

1. Henry A, Crowther C. Patterns of medication use during and prior to pregnancy: the MAP study. Aust N Z J Obstet Gynaecol 2000; **40:** 165−72.
2. Osorio-de-Castro CG, Pepe VL, Luiza VL, Cosendey MA, Freitas AM, Miranda FF et al. Prescribed and reported drug use during pregnancy. Cad Saude Publica 2004; 20 Suppl **1:** S73–82.
3. Gomes KR, Moron AF, Silva R, Siquiera AA. Prevalence of use of medicines during pregnancy and its relationship to maternal factors. Rev Saude Publica 1999; **33:** 246−54.
4. Fonseca MR, Fonseca E, Bergsten-Mendes G. Prevalence of drug use during pregnancy: pharmacoepidemiological approach. Rev Saude Publica 2002; **36:** 205−12.
5. Bakker MK, Jentink J, Vroom F, Van Den Berg PB, De Walle HE, De Jong-Van Den Berg. Drug prescription patterns before, during and after pregnancy for chronic, occasional and pregnancy-related in the Netherlands. BJOG 2006; **113:** 559−68.
6. Hollyer T, Boon H, Georgousis A, Smith M, Einarson A. The use of CAM by women suffering from nausea and vomiting during pregnancy. BMC Complement Altern Med 2002; **2:** 5.
7. Malm H, Martikainen J, Klaukka T, Neuvonen PJ. Prescription of hazardous drugs during pregnancy. Drug Safety 2004; **27:** 899−08.
8. Bond C, Hannaford P. Issues related to monitoring the safety of over-the – counter (OTC) medicines. Drug Safety 2003; **26:** 1065−74.
9. Sharma R, Kapoor B, Verma U. Drug Utilization pattern during Pregnancy in North India. Indian Journal of Medical Science 2006; **60:** 277−87.
10. Nordeng H, Havnen C. Use of herbal drugs in pregnancy: a survey among 400 Norwegian women. Pharmacoepidemiol Drug Safety 2004; **13:** 371−80.
11. American pregnancy Association. Using natural herbs and vitamins during pregnancy. [Online] 2007 [cited 2008 March 21st] Available from: http://www.americanpregnancy.org/pregnancyhealth/naturalherbsvitamins.html
12. Black RA, Hill DA. Over-the counter medications in pregnancy. American Family Physician [serial on the internet] 2003 June 15 [cited 2008 March 21st]; 67(12). Available from: http://www.aafp.org/afp/20030615/2517.html.
13. Refuerzo JS, Blackwell SC, Sokol RJ, LaJeunesse L, Firchau K, Kruger M et al. Use of over-the-counter medications and herbal remedies in pregnancy. Am J Perinatol 2005; **22:** 321−4.
14. Glover DD, Amonkar M, Rybeck BF, Tracy TS. Prescription, over-the-counter and herbal medicines use in a rural, obstetric population. Am J Obstet Gynecol 2003; **188:** 1039−45.
15. Rubin, P.C, editor. Prescribing in pregnancy. London: BMJ 1987; 1−5.
16. Merck.com, Drug use during pregnancy [document from the internet] Merck and Co. INC, c1995-2007 [updated 2003 February, cite 2007 April 4th] Available from: http://www.merck.com/mmhe/sec22/ch259/ch259a.html.
17. Henry AK, Feldhausen J, Curtis G. An Obstetrician's view on pregnancy and drugs: Schuler, J, Bush J, editors. Drugs, vitamins, minerals in pregnancy. Tucson: Fisher Books 1989; 1−5.
18. Black RA, Hill DA. Over-the counter medications in pregnancy. American Family Physician [serial on the internet] 2003 June 15 [cited 2008 March 21st]; 67(12). Available from: http://www.aafp.org/afp/20030615/2517.html.
19. Koren G, Pastuszak A, Ito S. Drugs in pregnancy. N Engl J Med 1998; **338:** 1128−37.
20. Stuebe A. Herbal medicines during pregnancy [document from the Internet] Pennsylvannia: University of Pennsylvania Health System; c2005-2007 [updated 2005 Jan 10; cited 2007 April 4th]. Available from: http://www.pennhealth.com/health_info/pregnancy/000222.htm
21. Briggs GG, Freeman RK, Yaffe SJ, Introduction: Mitchel C.W, editor. Drugs in pregnancy and lactation. 4th ed. Maryland: Williams and Wilkins; 1994, p. xi–xvii.
22. Frankos VH. FDA Perspectives on the use of teratology data for human risk. Assessment Fundam Appl Toxicol 1985; **5:** 615−25
23. Foster C, Rotimi C, Fraser H, Sundarm C, Liao Y, Gibson E et al. Hypertension, diabetes, and obesity in Barbados: findings from a recent population-based survey. Ethn Dis 1993; **3:** 404−12.
24. Swaby P, Wilson E, Swaby S, Sue-Ho R, Pierre R. Chronic diseases management in the Jamaican setting: HOPE worldwide Jamaica's experience. PNG Med J 2001; **44:** 171−5.