An-Najah National University

Faculty of Graduate Studies

KNOWLEDGE OF COMMUNITY PHARMACISTS AND PREGNANT WOMEN ABOUT MEDICINES GIVEN DURING PREGNANCY: A CROSS-SECTIONAL STUDY FROM PALESTINE

By

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Supervisor

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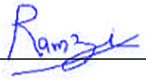
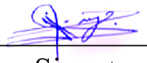
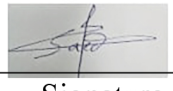
Prof. Ramzi Shawahna Supervisor	 Signature
Dr. Mohannad Jazzar External Examiner	 Signature
Prof. Sa'ed Zyoud Internal Examiner	 Signature

Dedication

أهدي ثمرة جهدي المتواضع إلى من وهبوني الحياة والأمل، و النشأة على شغف الاطلاع والمعرفة، ومن علموني أن أرتقي سلم الحياة بحكمة وصبر، برا وإحسانا، ووفاء لهما: والدي العزيز، ووالدتي العزيزة.

إلى من كان ظلي حين ينهكني التعب، إلى كتفي الثابت، ونصفي الأحب، إلى رفيق دربي : اسحق.

وإلى كل شخص ساهم بأي شكل من الأشكال في هذه الرحلة، هذه الرسالة مخصصة لكم احترامًا وامتنانًا لدعمكم وتشجيعكم الدائم.

بيان البو

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أرغب بتقديم أعمق التعابير الشكر والامتنان لكل من ساهم في إتمام هذه الرسالة بنجاح. أتقدم بخالص الشكر والتقدير لمشرفي العلمي (الاستاذ الدكتور رمزي الشواهنة)، الذي قدم الإرشاد القيم والدعم اللازم لإتمام هذا البحث بأفضل شكل ممكن.

كما أشكر جامعتي العزيزة وقسم الصيدلة السريرية على توفير البيئة الأكاديمية المناسبة التي ساعدت في تطوير مهاراتي وإتاحة الفرص للبحث والتعلم.

لا يمكنني إلا أن أعبر عن امتناني العميق لأسرتي على دعمهم اللامحدود والثقة التي وضعوها في قدراتي. كان دعمكم الدائم هو الحافز وراء كل خطوة أخذتها في هذا المسار الأكاديمي.

شكرًا لكل الأصدقاء والزملاء الذين كانوا بجانبي خلال هذه الرحلة، سواء بالمشورة أو الدعم النفسي. كانت تلك اللحظات ذات أهمية كبيرة بالنسبة لي.

وأخيرًا، شكرًا لكل من شارك في هذا البحث والدراسة، سواء بالمشاركة في المقابلات أو المساهمة في البيانات، لقد أضفتم الكثير من القيمة لهذا العمل البحثي.

في النهاية، هذه الرسالة وهذا الإنجاز مخصص لكم جميعًا. شكرًا لكل شخص ساهم ودعم وشجع وشارك في رحلتي الأكاديمية.

بيان البو

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

KNOWLEDGE OF COMMUNITY PHARMACISTS AND PREGNANT WOMEN ABOUT MEDICINES GIVEN DURING PREGNANCY: A CROSS-SECTIONAL STUDY FROM PALESTINE

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: **Bayan Salah EL-Baou**

Signature: 

Date: **31/7/2024**

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KNOWLEDGE OF COMMUNITY PHARMACISTS AND PREGNANT WOMEN ABOUT MEDICINES GIVEN DURING PREGNANCY: A CROSS-SECTIONAL STUDY FROM PALESTINE

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Abstract

Background: Pregnant women often suffer health conditions that need medication therapy. Therefore, the use of medications in pregnant women cannot be completely avoided. This study was conducted to assess the knowledge and practices of community pharmacists and pregnant women regarding the use of medications during pregnancy.

Methods: This study was conducted in a cross-sectional design. In this study, there were two target groups: community pharmacists and pregnant women. The study tools were two questionnaires that were developed based on previous studies. A purposive random sampling method was used for approximately (n=400) community pharmacists and (n=400) pregnant women distributed in the West Bank. All analyses were performed using SPSS 21. Descriptive statistics such as frequencies (numbers), percentages (%), mean, and standard deviation (SD) were generated. Data were evaluated for normal distribution using skewness and kurtosis and data were normally distributed. Chi-square and T-test were used to control for potential confounding factors. Multivariable logistic regression was also performed in order to adjust for potential confounders. A P value of less than 0.05 was considered statistically significant.

Results: In this study, complete questionnaires were returned by (n=400) community pharmacists and (n=400) pregnant women. The mean knowledge score was 71.0% ± 12.5% and 42.8%of the community pharmacists scored below 70%. Multiple linear regression, higher scores were predicted by years of experience, self-rating knowledge about the use of medicines during pregnancy, and belief that community pharmacists needed continuing education courses, especially in medicines used in pregnancy. In this study, 23.8% pregnant women stated that they had health issues that needed a visit to the

physicians during the past 12 months. During the current pregnancy 96.8% pregnant women reported that they have used medications or supplements. Of the women, 88.5% stated that they needed information about the use of medications during pregnancy. The majority of the women 65.0% stated that pharmacists were their main source of information about the medications or supplements used during pregnancy. Of the pregnant women, 70.3% stated that women can use medications and supplements during pregnancy without a prescription.

Conclusions: The findings reported in this study identified gaps in knowledge about the safety of medication use in pregnancy among the community pharmacists practicing in the West Bank of Palestine. Similarly, pregnant women reported inadequate knowledge about the importance of seeking medical advice before using medications during pregnancy. There is a need to improve the knowledge and practices of community pharmacists about medication use in pregnancy. Again, there is a need to improve information-seeking behavior among pregnant women when using medications during pregnancy.

Keywords: Knowledge, Pharmacist, Pregnancy, Women, Medication use, Safety

Chapter One
Introduction and Theoretical Background

Despite the many benefits, medications can adversely affect the health of pregnant women and their fetuses (1). Therefore, physicians and pharmacists often exert extra caution when prescribing, dispensing, and administering medications to pregnant women (2). This is often linked to the yet-to-be-established safety profile of many medications in pregnancy.

Therefore, physicians and pharmacists often need to weigh the benefits against the risks of using medications in pregnant women. This is often done on a case-by-case basis (1, 2). Moreover, pregnant women were reportedly reluctant to use medications. This reluctance leaves pregnant women unguided and subject to suffering health issues despite the availability of safe and effective medications for their clinical conditions.

Community pharmacists are probably the most accessible healthcare providers to the general public, including pregnant women. As experts in medications, community pharmacists are often approached by pregnant women seeking consultations, information, and counseling regarding the use of medications (3).

1.1 Pharmacotherapy in pregnant women

In many clinical conditions, the use of medications in pregnant women cannot be completely avoided. Like other patients, pregnant women can have chronic diseases or acute conditions that require the use of medications. These conditions include diabetes mellitus, hypertension, asthma, nausea, and vomiting, among others (4). The most common indications in pregnancy according to the Pharmacovigilance Institute for Embryo toxicology are listed in Figure 1.

In the current practice, medication use during pregnancy is not the exception, on the contrary, it is the norm (1). Recent studies have reported that about 90% of all pregnant women use medications during their pregnancies (5). Despite this high use of medications, both healthcare providers and pregnant women consider using medications during pregnancy as challenging and uneasy (1). This could be linked to historical events of severe consequences of using thalidomide and the possibilities of inaccurate weighing of the benefits against the risk of using medications during pregnancy and the

consequences that could be associated with this use on the health of pregnant women and their developing fetuses. It is noteworthy to mention that using medications during pregnancy involves two individuals: the pregnant women and her developing fetus. In addition, fetuses remain particularly vulnerable to the teratogenic actions of the medications during their developmental stages because of the immaturity of their livers and kidneys to clear toxic metabolites of the medications (2). Moreover, adverse effects on the fetus cannot be detected early enough, unlike those occurring to adults or even born children. Therefore, discontinuation of treatment of chronic diseases and lack of adherence to taking medications has been reported during pregnancy (1, 2).

Table 1

The most common indications in pregnancy according to the Pharmacovigilance Institute for Embryo toxicology

Medical Condition	%
Psychiatric conditions	23.9
Infections	17.2
Surgery	8.4
CNS disorders	7.6
GI disorders	6.2
Musculoskeletal disorders	4.6
Dermatological disorders	4.6
Respiratory disorders	3.3
Puerperium and perinatal conditions	3.2
Injuries and poisoning complications	2.7

Note. CNS: Central nervous system, GI: Gastrointestinal, *Adopted from (1)

Although healthcare providers can obtain important information about the safety of medications in pregnancy through textbooks, reference databases, and medication information centers, however, the information provided in the package inserts of the medications used is oftentimes misleading or largely missing (1, 2, 4). Oftentimes, information on the ability of these medications to cross the placenta is provided. However, the effects on the fetus are often not provided due to a lack of sufficient evidence. It is noteworthy to mention that conducting clinical trials on pregnant women has been hampered by many logistic and ethical constrains. Additionally, the majority of information on the effects of medications in pregnancy comes from animal studies (2).

However, there are significant differences between humans and animals, therefore direct extrapolation of animal data to humans can be tricky, flawed, and imprecise. In addition, some adverse effects of medications are very rare. Therefore, these rare events can be detected in very large studies. However, achieving very large samples of pregnant women can be difficult. Therefore, the majority of the available data are based on observations.

Health regulatory agencies in the United States and Europe require that manufacturers of medications should include real-world information about the effects of the medications in pregnancy in the labeling and the package inserts of the medications (6). Historically, a superficial categorization of medications was used in the United States and other countries that classified medications into A, B, C, D, and X categories based on the nature and quality of evidence on the effects or risks of pregnancy. This classification system has long been criticized as superficial, flawed, imprecise, and unhelpful. The shift from using the A, B, C, D, and X categories to providing detailed real-world information should help healthcare providers make more informed decisions when recommending medications for pregnant women (1).

In daily clinical practice, off-label prescription of medications to pregnant women is very common. This off-label use has historically evolved in the absence or scarcity of information about the safety of these medications in pregnancy (6). Today, off-label prescription of medications to pregnant women continues on the premise that no medication is 100% safe and complete information on the risks associated with the use of the medications in pregnancy on the health of the pregnant women and their developing fetuses cannot be obtained in the near future (1, 2, 6). Therefore, the likelihood of risks on the pregnant women themselves and their fetuses of one medication is weighed against the likelihood of risks of alternative medications or leaving the disease or medical condition untreated. It is noteworthy to mention that about 3% of all neonates are born with a major malformation (7). Of those, only a small percentage (about 3%) can be attributed to physical or chemical causes. It is important to realize that medications constitute a small percentage of the chemicals consumed during pregnancy if we consider alcohol, tobacco, and other recreational drugs (8).

1.2 Exposure of pregnant women to harmful medications

Medications used during pregnancy can be harmful to the pregnant women themselves, the continuity of the pregnancy, and the developing fetus. These harmful medications

might cause birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays (9). Previous studies have reported that pregnant women were exposed to harmful and potentially harmful medications during their pregnancies. A study in The Netherlands reported that 73% of the pregnant women included were exposed to any potentially harmful medication (10). The study reported that 24%, 19%, and 16% of pregnant women were exposed to potentially harmful medications during their 1st, 2nd, and 3rd trimesters, respectively. A large study in China reported that pregnant women used medications in their 2nd and 3rd trimesters (11). The study also reported that the majority of the medications used among pregnant women were in the US Food and Drug Administration (FDA) pregnancy category C. Moreover, 7.5% and 5.0% of the medications used were in categories X and D, respectively. A list of medications with teratogenic potential is shown in Table 2.

Table 2

A list of potentially teratogenic medications

Medication/class of medications*	Signs/symptoms/affected organs by teratogenicity
Potent teratogens (up to 10-fold (30%) increased risk of gross structural malformations)	

Thalidomide	Multiple malformations
Systemic retinoids (isotretinoin, tretinoin, acitretin, and etretinate)	Skeleton, CNS, ear, and heart
Valproic acid	Neural tube defect (lumbar spina bifida), palate, heart, dysmorphic facial features, and urogenital system
Mycophenolate	Palate and ear
Proven teratogens (up to 3-fold (10%) increased risk of gross structural malformations)	
Carbamazepine	Neural tube defect (lumbar spina bifida), palate, heart, dysmorphic facial features, and urogenital system
Phenobarbital	Palate, heart, dysmorphic facial features, and urogenital system
Phenytoin	Palate, heart, dysmorphic facial features, and urogenital system
Androgens	Masculinization
Warfarin	Nose
Methotrexate	Multiple malformations
Cyclophosphamide	Multiple malformations
Misoprostol	Moebius sequence
Penicillamine	Cutis laxa
Topiramate	Palate
Vitamin A (>25 000 IU retinol/day)	Skeleton, CNS, ear, and heart
Cytostatics	Multiple malformations
Weak teratogens (risk 1:100 to 1:1000 exposed fetuses)	
Trimethoprim/Cotrimoxazole	Neural tube defect
Systemic glucocorticoids	Palate
Lithium	Heart (a very rare ebstein anomaly)
Methimazole/thiamazole/carbimazole	Choanal atresia, tracheo-esophageal fistulas, aplasia cutis

Note. CNS: Central nervous system, *Adopted from (1)

In addition to teratogenicity, medications can be fetotoxic in case the pregnant women were exposed to these medications during their 2nd and 3rd trimesters of pregnancy. A list of potentially fetotoxic medications is shown in Table 3.

Table 3
A list of potentially fetotoxic medications

Medication/class of medications*	Signs/symptoms/affected organs by fetotoxicity
	Centrally acting drugs
Lithium	Hypothyroidism and floppy infant syndrome
Benzodiazepines	Respiratory depression, floppy infant syndrome, and adaptation syndrome
Antipsychotics	Serotoninergic symptoms and adaptation syndrome
Valproic acid	CNS functional disorders and lower IQ
Opioids	Respiratory depression and withdrawal symptoms
	Others
Amiodarone	Bone marrow depression
Androgens	Hypothyroidism
Systemic aminoglycosides	Masculinization Inner ear and kidneys
Warfarin	Intracerebral hemorrhage
ACE inhibitors	Kidneys, oligohydramnios, anuria, joint contractures, and hypoplasia of the skull
Antithyroid drugs	Hypothyroidism
Radio iodine	Thyroid hypoplasia/aplasia
Ergotamine	Fetal hypoxia
Tetracyclines	Yellow discoloration of teeth
Cytostatics	Growth retardation and bone marrow depression
AT1-receptor blockers	Kidneys, oligohydramnios, anuria, joint contractures, hypoplasia of the skull

Note: ACE: Angiotensin-converting enzyme inhibitors, CNS: Central nervous system, IQ: Intelligence quotient, AT1: Angiotensin receptor blockers, *Adopted from (1)

Over the years, evidence has been accumulating and some medications have emerged as effective and safe when used during pregnancy. However, it is important to note that no medication is 100% safe. A list of medications that are safe to be used in pregnancy is shown in Table 14 in Appendix C.

1.3 Knowledge of pharmacists about medications used in pregnancy

Pharmacists are highly trained experts in medications. In today's practice, pregnant women visit community pharmacies with a prescription that was issued by a physician or

come to seek the help of community pharmacists to obtain over-the-counter medications. In ideal practice, community pharmacists are supposed to inquire about the pregnancy status of female patients before dispensing any prescription or over-the-counter medications. Additionally, community pharmacists are supposed to counsel, educate, and provide adequate information and advice regarding the best use of medications for pregnant women. This should also include the safety and adverse effects caused by these medications on the health of pregnant women and their developing fetuses. In order to do so, community pharmacists are supposed to be knowledgeable of the safety of these medications before dispensing them to pregnant women.

A cross-sectional study was conducted in Qatar to assess the knowledge and practices of pharmacists about medications used in pregnancy (12). The majority of the pharmacists did not receive a course that was dedicated to the safety of medications in pregnancy. The pharmacists reported a lack of access to resources and ignorance of the pregnancy status of the patients when dispensing medications. The majority of the pharmacists had less than optimal knowledge about medications used in pregnancy. Higher knowledge was associated with length of practical experience and receiving continuing education. The study recommended designing a continuing educational program to increase the knowledge and improve practices of pharmacists in Qatar about medications used in pregnancy.

In Ethiopia, the knowledge and practices of pharmacists about the risks associated with prescription and over-the-counter medications used in pregnancy were assessed (13). The majority of the pharmacists had very low knowledge about the use of medications in pregnancy. The majority of the pharmacists did not know that isotretinoin was not safe in pregnancy. Higher knowledge was associated with the length of practical experience. The study recommended continuing education to increase knowledge and improve practices of the pharmacists.

In another study in Saudi Arabia, the knowledge of community pharmacists about the safety of prescription and over-the-counter medications used during pregnancy was assessed (14). The study reported that community pharmacists had low knowledge about the safety of medications and nutritional supplements used during pregnancy. The study recommended that educational interventions were needed to improve the knowledge of the community pharmacists about the medications used during pregnancy.

1.4 Knowledge of pregnant about medications used in pregnancy

In the current practice, patients are increasingly involved in the decisions related to their healthcare. Due to their vulnerable status, pregnant women are supposed to be cautious about their health and the health of their developing fetuses. Therefore, they are supposed to seek information from reliable sources and make informed decisions before using prescription and over-the-counter medications. This also applies to herbal products, nutritional supplements, and other products with health claims.

A study was conducted in Saudi Arabia to assess the knowledge and attitudes of pregnant women toward using medications (15). The study reported that the pregnant women were generally positive toward using medications in general. However, pregnant women have to exert extra caution when using medications during pregnancy. Correct beliefs about medications were associated with the education and employment status of the pregnant women. The pregnant women who worked in the healthcare sector were more knowledgeable about the medications used in pregnancy. The pregnant women relied on obtaining information from the medication pamphlet, instead of asking physicians and pharmacists.

Another study was conducted to assess the medication safety information-seeking behavior of pregnant women through the Internet (16). The study also assessed the knowledge and willingness to take prescription and over-the-counter medications. The study reported that the majority of pregnant women searched the internet for information relevant to the safety of medications during pregnancy. The study showed that the majority of the searched medications were analgesics. The vast majority of the women expressed hesitancy to take medications while being pregnant.

In Italy, a study was conducted to assess the knowledge, attitude, and use of medications during pregnancy among pregnant women (17). The study reported that the women who knew that pregnant women should discuss medication use with their healthcare providers were employed, 31-40 years old, ha no history of abortion, knew how to use medications during pregnancy, reported good health, and needed more information about the medications to be used. The study suggested educational interventions among pregnant women to increase their knowledge and improve their attitudes toward medication use in pregnancy.

Another study was conducted to assess the knowledge, practices, and beliefs of pregnant women about medication use in pregnancy (18). The study reported that the majority of pregnant women had low knowledge about potentially harmful medications. The pregnant women also held wrong beliefs about stopping all medications during pregnancy. Moreover, the pregnant women reported less practice of asking the pharmacists how to use medications during pregnancy. Knowledge and practices were influenced by educational status, age, occupation, and place of residence. The study recommended educational interventions to increase the knowledge and improve the practices of pregnant women who were unemployed, less educated, and those living in rural areas.

1.5 Problem statement

Pregnant women often suffer health conditions that need medication therapy (4). These health conditions include nausea and vomiting in the first trimester and early in the second trimester of pregnancy. In addition, pregnant women might also suffer other chronic or acute health conditions like epilepsy, asthma, diabetes mellitus, hypertension, and infections, among other conditions that need treatment. Moreover, pregnant women might also need to use over-the-counter medications for minor ailments, herbal health products, and nutritional supplements. Therefore, the use of medications in pregnant women cannot be completely avoided (2).

Community pharmacists are highly trained healthcare providers who are viewed as experts in medications and pharmacotherapy. Community pharmacists are highly accessible to patients including pregnant women. Therefore, community pharmacists are in a key position to educate and counsel pregnant women about the appropriate and safe use of medications. In order to provide these services, community pharmacists should be knowledgeable of the appropriate and safe use of medications during pregnancy. Little studies were conducted in Palestine to assess the knowledge of community pharmacists about medication use during pregnancy. Moreover, little studies were conducted in Palestine to describe the practices of community pharmacists regarding dispensing and counseling pregnant women about medications. Similarly, women are supposed to know that they become more vulnerable to the adverse effects of medications during pregnancy. These adverse effects might affect their health, the continuity of their pregnancy, and the health of the developing fetus. Therefore, pregnant women should

know that they need to exert extra caution and seek information before using medications during pregnancy. Little studies were conducted in Palestine to assess the knowledge and practices of pregnant women regarding the use of medications.

1.6 Study questions

In this study, the research questions were:

- What is the extend of knowledge of community pharmacists about the safety of medications during pregnancy?
- What factors predict adequate or inadequate knowledge of community pharmacists about the safety of medications during pregnancy?
- What are the practices of community pharmacists regarding dispensing and counseling pregnant women about medications?
- What is the extend of knowledge of pregnant women with regard to the safety of medications during pregnancy?
- What are the practices of pregnant women regarding the use of medications?

1.7 General aim

The general aim of this study was to assess the knowledge and practices of community pharmacists and pregnant women regarding the use of medications during pregnancy. The community pharmacists were included as education, counseling, and dispensing services providers, and the pregnant women were included as users of medications and education and counseling services receivers.

1.8 Specific objectives

The specific objectives of this study were:

- To assess the knowledge of community pharmacists about the safety of medications during pregnancy
- To determine the factors that predict adequate or inadequate knowledge of community pharmacists about the safety of medications during pregnancy
- To assess the practices of community pharmacists regarding dispensing and counseling pregnant women about medications
- To assess the knowledge of pregnant women with regard to the safety of medications during pregnancy
- To assess the practices of pregnant women regarding the use of medications

1.9 Significance of the study

Little is known about the knowledge of community pharmacists in Palestine about the safety of medications used during pregnancy. Similarly, little is known about the medication education, counseling, and dispensing practices of community pharmacists for pregnant women. In addition, little is known on the knowledge of pregnant women about the safety of using medications during medications during pregnancy. Moreover, little is known about the practices of pregnant women regarding the use of medications during pregnancy. Identifying gaps in knowledge and practices can inform measures to improve knowledge and correct inadequate practices. Improving knowledge and correcting inadequate practices might promote appropriate and safe use of medications during pregnancy. In addition, improving knowledge and correcting inadequate practices might reduce the risks associated with inappropriate or unsafe medications during pregnancy, including abortion, teratogenicity, and poor birth outcomes.

1.10 Novelty

This is the first study to assess the knowledge of community pharmacists about the safety of medications during pregnancy, determine the factors that predict adequate or inadequate knowledge of community pharmacists about the safety of medications during pregnancy, assess the practices of community pharmacists regarding dispensing and counseling of pregnant women about medications, assess knowledge of pregnant women with regard to the safety of medications during pregnancy, and assess the practices of pregnant women regarding the use medications in the Palestinian healthcare system.

Chapter Two
Methods

2.1 Study settings

This study was conducted in community pharmacies and mother and child health centers in the Palestinian healthcare system in the West Bank of Palestine. The community pharmacists were recruited from the community pharmacies and the pregnant women

were recruited from the public health and mother and child health centers that were distributed all over the West Bank of Palestine.

2.1.1 Community pharmacies

Community pharmacies are distributed in urban and rural areas all over the West Bank of Palestine (19). These community pharmacies are often within or close to residential areas and healthcare facilities. The community pharmacies are accessible to all patients, including pregnant women. Patients often come to the community pharmacies with prescriptions that were issued by their physicians. In many cases, patients come to community pharmacies to have over-the-counter medications, herbal products, and medical devices, or seek health information from community pharmacists about these health products (20).

In general, patients in Palestine view community pharmacists as easily accessible highly trained healthcare professionals. Community pharmacists are often the first point of contact for many patients who come to the community pharmacies seeking health advice, medication information, management of minor ailments, and other general health queries (19, 20).

In addition, community pharmacists are viewed as medication experts who have extensive knowledge about the medications, how and when these medications can be used, their adverse effects, interactions, and the best ways to administer them. Similarly, community pharmacists are viewed to be in a key position to guide patients on the use of over-the-counter medications. Moreover, services of the community pharmacists are often sought when patients need education or information about the medications, when and how to take them, their adverse effects, and how adherence to taking these medications can improve health outcomes. In addition, community pharmacists often counsel patients on how to take preventive measures or make lifestyle modifications to diet, exercise, and even vaccination to mitigate risk factors of some diseases and health conditions. Community pharmacists are also solicited by patients seeking referrals to specialty healthcare services. In their community pharmacies, pharmacists often engage in various health promotion activities, including screening for certain diseases or risk factors and providing health information to the general public, including pregnant women.

2.1.2 Public health, mother, and child health centers

In Palestine, primary healthcare centers (public health, mother, and child health centers) are distributed all over the West Bank and Gaza Strip. The total number of primary healthcare centers in Palestine was 732 in 2018 (21). Of those, 468 centers were in the West Bank of Palestine. The majority of the centers are run by the Palestinian Ministry of Health. However, the other centers are run by non-governmental organizations, United Nations Relief and Works Agency for Palestine Refugees in the Near East, and military medical services.

Mother and child healthcare services are offered through the primary healthcare centers. In 2018, there were 155,603 visits by pregnant women to these centers (21). Pregnant women are registered once they come for a first visit during their pregnancy. In 2018, 34,605 pregnant women were registered and the average number of visits by pregnant women during their pregnancy to these centers was 4.5 visits in 2018.

In addition to routine care provided to pregnant women, the primary healthcare centers also offer high-risk pregnancy referrals and postnatal healthcare services. In addition, pregnant women and children are screened for anemia. Folic acid and iron supplements are dispensed through these centers. The centers also offer family planning services including distribution of contraceptive pills and other methods. Moreover, these centers offer Pap smear examinations to screen for cervical cancer, and mammography and ultrasound mammography to screen for breast cancer.

The postnatal care services include screening for abnormal growth, anemia, disabilities, and congenital diseases. Through these centers, child supplements including iron and vitamins are dispensed. The centers also offer tests to screen for phenylketonuria and thyroid stimulating hormone to all newborns. The centers also distribute maternal and child health handbooks.

2.2 Study design

This study was conducted in a cross-sectional design. The decision to use this study design was made after considering the objectives of the study, the phenomena to be studied, the resources available for the study, time constrains, access to the study participants, and the study tools to be used.

2.3 Study population

In this study, there were two target populations: the community pharmacists and the pregnant women.

2.3.1 Community pharmacists

The community pharmacists were the pharmacists who practiced community pharmacy in one of the community pharmacies that were distributed all over the West Bank of Palestine.

2.3.2 Pregnant women

The pregnant women were the pregnant women who visited one of the public health, mother, and child health centers that were distributed all over the West Bank of Palestine.

2.4 Sample size

2.4.1 Community pharmacists

In 2020, there were 16.9 pharmacists for every 10,000 residents in the West Bank of Palestine (22). This corresponds to about 5,152 registered pharmacists in the West Bank of Palestine. The sample size of community pharmacists needed for this study was calculated using an online samples size calculator (http://www.raosoft.com/samplesize.html).

Assuming a response distribution of 50%, accepting a margin of error of 5%, and using a confidence interval of 95%, the sample size needed for this study was 358 community pharmacists.

2.4.2 Pregnant women

In 2018, 34,605 pregnant women were registered in the public health, mother, and child health centers (21). Pregnant women are registered once they come for a first visit during their pregnancy. The sample size of pregnant women needed for this study was calculated using an online samples size calculator (http://www.raosoft.com/samplesize.html).

Assuming a response distribution of 50%, accepting a margin of error of 5%, and using a confidence interval of 95%, the sample size needed for this study was 380 pregnant women.

2.5 Inclusion criteria

2.5.1 Community pharmacists

Community pharmacists were included in this study when they met the following inclusion criteria:

- Having a basic degree in pharmacy
- Practicing community pharmacy in one of the community pharmacies distributed all over the West Bank of Palestine
- Willing to answer items in a questionnaire
- Providing informed consent

2.5.2 Pregnant women

Pregnant women were included in this study when they met the following inclusion criteria:

- Being 18 years and older
- Being pregnant at the time of the study
- Willing to answer items in a questionnaire
- Providing informed consent

2.6 Exclusion criteria

2.6.1 Community pharmacists

Community pharmacists were excluded from this study when they met the following exclusion criteria:

- Refused to answer items in a questionnaire
- Refused to provide informed consent

2.6.2 Pregnant women

Similarly, pregnant women were excluded from this study when they met the following exclusion criteria:

- Refused to answer items in a questionnaire
- Refused to provide informed consent

2.7 Sampling approach

2.7.1 Community pharmacists

A two-stage sampling technique was used to identify, approach, invite, and recruit the community pharmacists in this study. In the first stage, the West Bank was divided into geographical clusters: north (Nablus region), center (Ramallah, Al-Eizariya, Abu Dis, Al-Sawahrah Al-Sharqiya), and south (Bethlehem, Hebron). In the second stage, the community pharmacists were conveniently identified, approached, invited, and recruited from the community pharmacies in these clusters.

2.7.2 Pregnant women

Similarly, a two-stage sampling technique was used to identify, approach, invite, and recruit the pregnant women in this study. In the first stage, the West Bank was divided into geographical clusters: north (Nablus region), center (Ramallah, Al-Eizariya, Abu Dis, Al-Sawahrah Al-Sharqiya), and south (Bethlehem, Hebron). In the second stage, the pregnant women were conveniently identified, approached, invited, and recruited from the public health, mother, and child health centers in these clusters.

2.8 Data collection

2.8.1 Community pharmacists

The community pharmacists were visited in their places of work and were asked to participate in this study. After explaining the design and objectives of the study, informed consent was obtained from the community pharmacists who expressed willingness to participate in the study. The data were collected from the community pharmacists through face-to-face interviews. During these face-to-face interviews, the community pharmacists answered the items in the questionnaire.

2.8.2 Pregnant women

The pregnant women were recruited from the public health, mother, and child health centers. After explaining the design and objectives of the study, informed consent was obtained from the pregnant women who expressed willingness to participate in the study. The data were collected from the pregnant women through face-to-face interviews. During these face-to-face interviews, the pregnant women answered the items in the questionnaire.

2.9 Study tools

In this study, a questionnaire was used to collect the data from the community pharmacists, and another questionnaire was used to collect the data from the pregnant women.

2.9.1 The questionnaire used for the community pharmacists

The questionnaire used for the community pharmacists was developed from previous studies (14, 23). The questionnaire that was used to collect data from the community pharmacists contained three parts. The first part collected the demographic variables of the community pharmacists. These variables included gender, age, country from where the pharmacy degree was obtained, place of work, academic degree, and number of years of experience.

The second part collected the practice and education variables of the community pharmacists. In this part, the community pharmacists were asked to indicate how often they asked female patients about their pregnancy status, how often they gave medical advice to pregnant women, and how often they explained the adverse effects of the medications on pregnancy when they dispensed or administered medications to a female patient.

The community pharmacists were asked to answer these questions by either: never, only if she looks pregnant, often, or always. The community pharmacists were asked if they had taken a course about medication use during pregnancy. Moreover, the community pharmacists were asked to self-rate their level of knowledge about the use of medications during pregnancy. Additionally, the community pharmacists were asked about their opinion on whether community pharmacists needed continuing education courses,

especially in medicines used in pregnancy. In the third part, the community pharmacists were asked about the safety of 22 medications in pregnancy.

The medications were: alprazolam, amoxicillin, inhaled budesonide, ciprofloxacin, isotretinoin, lamotrigine, contraceptives, paroxetine, phenobarbital, statins, tetracyclines, valproic acid, acetaminophen, aspirin, bismuth subsalicylate, caffeine, dextromethorphan hydrobromide, guaifenesin, St. John's Wort, ibuprofen, pseudoephedrine hydrochloride, and vitamin A.

The community pharmacists could answer by either: I don't know, not safe in the first trimester, must weigh risks and benefits for the individual patients, or safe in the first trimester. The medications included prescription-only medications, over-the-counter medications, and food supplements. The medications included those with known risks to the fetus like tetracycline, isotretinoin, valproic acid, and phenobarbital.

The medications also included those that are frequently used for gynecological issues like contraceptives, amoxicillin, and ciprofloxacin. Some medications might be used to treat health conditions that might be present in pregnant women like budesonide for asthma, lamotrigine for epilepsy or bipolar disorder, and paroxetine for depression. Over-the-counter medications included those that could be used by pregnant women like aspirin, acetaminophen/paracetamol, ibuprofen, pseudoephedrine, guaifenesin, and dextromethorphan.

2.9.2 The questionnaire used for pregnant women

The questionnaire used to collect data from pregnant women was developed based on previous studies (16, 17). The questionnaire was composed of five parts. The first part collected the demographic and health status of the pregnant women. These variables included age, educational level, employment status, place of residence, number of deliveries, current pregnancy trimester, history of abortion, and history of use of medications during pregnancy. The second part collected the health practices of pregnant women during their pregnancy.

The data collected included the number of pregnancy follow-up visits to physicians, the number of visits to physicians for other healthcare purposes, and number of prescriptions

used during pregnancy. In the third section, the pregnant women were asked to indicate whether they had health issues that needed a visit to the physician in the past 12 months, the reasons for the visit to the physician, whether they have used medications or supplements during the current pregnancy, and the medications or supplements they used. In the fourth part, the pregnant women were asked to indicate whether they needed information about the use of medications during pregnancy, the sources of information about using medications or supplements during pregnancy, whether they read the medication information leaflets, and whether they have been counseled by their physicians about the risk of using medications during pregnancy.

In the fifth part, the pregnant women were whether women can use medications or supplements without a prescription during pregnancy, the reasons for not using medications or supplements without a prescription during pregnancy, when pregnant women can use medications or supplements without a prescription during pregnancy, the adverse effects that medications can cause to pregnant women, and the adverse effects that medications can cause to the developing fetus.

2.10 Efforts to reduce bias

2.10.1 Community pharmacists

The following steps were taken to reduce bias:

- The community pharmacists were recruited from different community pharmacists in different regions of the West Bank of Palestine
- The community pharmacies were visited in the morning and evening to ensure the recruitment of a representative sample of community pharmacists
- The interviewer posed the questions in a neutral tone
- The interviewer was non-aligned and had no interest in influencing the answers of the community pharmacists

2.10.2 Pregnant women

The following steps were taken to reduce bias:

- The pregnant women were recruited from different public health, mother, and child health centers in different regions of the West Bank of Palestine
- The public health, mother, and child health centers were visited at different timings during the working hours of the centers to ensure the recruitment of a representative sample of pregnant women
- The interviewer posed the questions in a neutral tone
- The interviewer was non-aligned and had no interest in influencing the answers of the pregnant women

2.11 Statistical analysis

The data collected in this study were handled in MS Excel Spreadsheets. The data were entered into IBM SPSS for Windows v.21.0. The community pharmacists received 1 point for each correct answer. The scores obtained in the safety of medications knowledge test were converted into percentages by dividing the number of correct answers by the highest possible score X 100%.

Descriptive statistics like frequencies (numbers), percentages (%), mean, and standard deviation (SD) were generated. The data were assessed for normality of distribution using skewness and kurtosis. Because the skewness was within the range of -2.0 to +2.0 and kurtosis was within the range of -7.0 to +7.0, the data were normally distributed. Scores of the community pharmacists in different categories were compared using t-tests or analysis of variance (ANOVA), as appropriate.

Scores of 70% or more were considered high and scores of < 70% were considered low. Pearson's chi-square was used to compare differences in scoring high or low among the community pharmacists in different categories.

To control potentially confounding factors, the variables that were significantly associated with the t-tests or ANOVA were included in a multiple linear model. The goodness-of-fit was ensured by a significant R^2. Multicollinearity issues were diagnosed using the variance inflation factor and tolerance values. A p-value < 0.05 indicated a statistically significant difference.

2.12 Ethical considerations

The protocol of this study was approved by the Institutional Review Board (IRB) of An-Najah National University. Additional approvals were obtained from the Office of Medical Education in the Ministry of Health. The community pharmacists and pregnant women provided informed consent before they answered the questionnaires in this study.

Chapter Three

Results

3.1 Demographic and practice variables of the pharmacists

In this study, complete questionnaires were returned by (n= 400) community pharmacists. The mean age of the community pharmacists was 32.1 ± 7.7 years and the median age was 29.0 [26.0, 36.0] years. The mean years of experience was 7.5 ± 7.0 and the median was 5.0 [2.0, 10.0] years. Of the community pharmacists, (n=220) 55.0% were female, (n=206) 51.5%were younger than 30 years old, (n=360) 90.0% obtained their pharmacy degree from Palestine, (n=223) 55.8% worked in community pharmacies located in cities, (n=289) 72.3% had a basic degree in pharmacy, and (n=302) 75.5% had experience of less than 10 years. The detailed demographic and practice variables of the pharmacists are shown in Table 5.

Table 4

Demographic and practice variables of the community pharmacists

Variable	n	%
Gender		
Male	180	45.0
Female	220	55.0
Age (years)		
< 30	206	51.5
≥ 30	194	48.5
Country from where the pharmacy degree was obtained		
Palestine	360	90.0
Other	40	10.0
Place of work		
City	223	55.8
Village/Refugees camp	177	44.3
Academic degree		
BSc	289	72.3
PharmD	67	16.8
MSc/PhD	44	11.0
Number of years of experience		
< 10	302	75.5
≥ 10	98	24.5
How often do you ask female patients about their pregnancy status?		
Never	12	3.0
Only if she looks pregnant	107	26.8
Often	134	33.5
Always	147	36.8
How often do you give medical advice to pregnant women?		
Never	9	2.3
Only if she looks pregnant	113	28.3
Often	150	37.5
Always	128	32.0
When you dispense/administer the medication to a female, do you explain its side effects on the pregnant woman?		
Never	21	5.3
Only if she looks pregnant	124	31.0
Often	131	32.8
Always	124	31.0
Have you had a course about medication use during pregnancy?		
No	207	51.8
Yes	193	48.3
How would you rate your level of knowledge about the use of medicines during pregnancy?		
Inadequate	84	21.0
Adequate	316	79.0
In your opinion, do community pharmacists need continuing education courses, especially in medicines used in pregnancy?		
No	114	28.5
Yes	286	71.5

Of the community pharmacists, (n=12) 3.0% stated that they never asked female patients about their pregnancy status, (n=9) 2.3% stated that they never gave medical advice to pregnant women, and (n=21) 5.3% stated that they never explained the side effects on pregnant women when they administer/dispense medications to female patients (Table 5).

Of the community pharmacists, (n=207) 51.8% have reported that they have not had a course about medication use during pregnancy, (n=84) 21.0% rated their knowledge about the medicines used during pregnancy as inadequate, and (n=286) 71.5% believed that community pharmacists need continuing education courses, especially in medicines used in pregnancy (Table 5).

3.2 Knowledge of the community pharmacists about the use of medications in pregnancy

In this study, the medications used to test the knowledge of the community pharmacists are listed with their pregnancy categories in Table 3.

Table 5

The medications used to test the knowledge of community pharmacists

Medication	Pregnancy category
Alprazolam	D
Amoxicillin	B
Budesonide, inhaled	B
Ciprofloxacin	C
Isotretinoin	X
Lamotrigine	C
Contraceptives	D, X
Paroxetine	D
Phenobarbital	D
Statins	X
Tetracyclines	D
Valproic Acid	D, X
Acetaminophen	B
Aspirin	C
Bismuth subsalicylate	C
Caffeine	C
Dextromethorphan hydrobromide	C
Guaifenesin	C
St. John's Wort	C
Ibuprofen	B/B/D
Pseudoephedrine hydrochloride	C
Vitamin A, supplement	X

Note: A: Safest, controlled studies of pregnant women show no risk of fetal abnormalities.
B: animal studies show no risk, or animals show risk unconfirmed in humans
C: Animal studies show risk, caution is advised, benefits may outweigh risks.
D: Evidence of risk to human fetus, benefits may outweigh risks in serious conditions.
X: Risk outweighs benefit, contraindicated in pregnancy.

Responses of the community pharmacists on the use of medications in pregnancy are shown in Table 4. Of the community pharmacists, (n=233) 58.3% stated that amoxicillin was safe in the first trimester. The rest of the community pharmacists either stated that amoxicillin was not safe, there was a need to weigh risks and benefits for the individual patients or did not know about the use of amoxicillin in pregnancy. Similarly, (n=151) 37.8% of the community pharmacists stated that inhaled budesonide was safe in the first trimester.

The rest of the community pharmacists either stated that inhaled budesonide was not safe, there was a need to weigh risks and benefits for the individual patients or did not know about the use of inhaled budesonide in pregnancy. On the other hand, (n=295) 73.8% of the community pharmacists stated that acetaminophen was safe in the first trimester. The

rest of the community pharmacists either stated that acetaminophen was not safe, there was a need to weigh risks and benefits for the individual patients or did not know about the use of acetaminophen in pregnancy.

In this study, (n=41) 10.3% of the community pharmacists stated that ibuprofen was safe in the first trimester and (n=126) 31.5% stated that the risks and benefits for the individual patients must be weighed. The rest of the community pharmacists either stated that ibuprofen was not safe or did not know about the use of ibuprofen in pregnancy.

Of the community pharmacists, (n=160) 40.0%, (n=159) 39.8%, (n=156) 39.0%, (n=139) 34.8%, (n=136) 34.0%, (n=129) 32.3%, (n=119) 29.8%, (n= 82) 20.5%, and (n=67) 16.8% stated that the risks and benefits for individual patients must be weighed for dextromethorphan, caffeine, bismuth subsalicylate, pseudoephedrine, aspirin, ciprofloxacin, lamotrigine, guaifenesin, and St. John's wort. The rest of the community pharmacists either stated that these medicines were safe or did not know about the use of these medicines in pregnancy.

Of the community pharmacists, (n=288) 72.0%, (n=176) 44.0%, (n=165) 41.3%, and (n=164) 41.0% stated that tetracyclines, phenobarbital, alprazolam, and paroxetine were not safe in the first trimester. The rest of the community pharmacists either stated that these medicines were safe, needed risk/benefit weighing for the individual patients, or did not know about the use of these medicines in pregnancy.

Of the community pharmacists, (n=304) 76.0%, (n=241) 60.3%, (n=192) 48.0%, (n=166) 41.5%, and (n=153) 38.3% stated that isotretinoin, statins, vitamin A, contraceptives, and valproic acid were not safe in the first trimester. The rest of the community pharmacists either stated that these medicines were safe, needed risk/benefit weighing for the individual patients, or did not know about the use of these medicines in pregnancy.

Table 6
Responses of the community pharmacists on the use of medications in pregnancy

		I don't know		Not safe in the first trimester		Must weigh risks and benefits for individual patients		Safe in the first trimester	
#	Medication	n	%	n	%	n	%	n	%
1	Alprazolam	62	15.5	165	41.3	134	33.5	39	9.8
2	Amoxicillin	3	0.8	30	7.5	134	33.5	233	58.3
3	Budesonide, inhaled	34	8.5	55	13.8	160	40.0	151	37.8
4	Ciprofloxacin	21	5.3	204	51.0	129	32.3	46	11.5
5	Isotretinoin	17	4.3	304	76.0	54	13.5	25	6.3
6	Lamotrigine	90	22.5	134	33.5	119	29.8	57	14.3
7	Contraceptives	37	9.3	166	41.5	149	37.3	48	12.0
8	Paroxetine	63	15.8	164	41.0	128	32.0	45	11.3
9	Phenobarbital	50	12.5	176	44.0	143	35.8	31	7.8
10	Statins	35	8.8	241	60.3	79	19.8	45	11.3
11	Tetracyclines	14	3.5	288	72.0	70	17.5	28	7.0
12	Valproic Acid	30	7.5	153	38.3	156	39.0	61	15.3
13	Acetaminophen	8	2.0	30	7.5	67	16.8	295	73.8
14	Aspirin	16	4.0	56	14.0	136	34.0	192	48.0
15	Bismuth subsalicylate	32	8.0	103	25.8	156	39.0	109	27.3
16	Caffeine	40	10.0	78	19.5	159	39.8	123	30.8
17	Dextromethorphan hydrobromide	47	11.8	105	26.3	160	40.0	88	22.0
18	Guaifenesin	49	12.3	153	38.3	82	20.5	116	29.0
19	St. John’s Wort	119	29.8	178	44.5	67	16.8	36	9.0
20	Ibuprofen	18	4.5	215	53.8	126	31.5	41	10.3
21	Pseudoephedrine hydrochloride	37	9.3	192	48.0	139	34.8	32	8.0
22	Vitamin A, supplement	41	10.3	192	48.0	117	29.3	50	12.5

3.3 Association between the demographic and practice variables of the pharmacists with their knowledge about the use of medications in pregnancy

In this study, the community pharmacists who worked in pharmacies located in cities, those who had an experience of 10 or more years, who self-rated their knowledge about the use of medicines during pregnancy as adequate, and those who stated that community pharmacists needed continuing education courses, especially in medicines used in pregnancy scored significantly higher than those who worked in pharmacies located in villages/refugees camps, who had an experience of less than 10 years, who self-rated their knowledge about the use of medicines during pregnancy as inadequate, and those who stated that community pharmacists did not need continuing education courses, especially in medicines used in pregnancy. On the other hand, the community pharmacists who stated that they never asked female patients about their pregnancy status and those who never gave medical advice to pregnant women scored significantly lower compared to those who reported asking female patients about their pregnancy status and those who gave medical advice to pregnant women. The details of these associations are shown in Table 8.

Table 7

Association between demographic and practice variables of the community pharmacists and their knowledge about the use of medications in pregnancy

Variable	n	%	Mean	SD	p-value
Gender					
Male	180	45.0	71.2	13.1	0.828
Female	220	55.0	70.9	12.0	
Age (years)					
< 30	206	51.5	70.3	12.6	0.241
≥ 30	194	48.5	71.8	12.3	
Country from where the pharmacy degree was obtained					
Palestine	360	90.0	70.6	12.7	0.077
Other	40	10.0	74.3	9.5	
Place of work					
City	223	55.8	72.5	12.9	0.006
Village/Refugees camp	177	44.3	69.1	11.6	
Academic degree					
BSc	289	72.3	71.0	0.7	
PharmD	67	16.8	69.7	1.5	0.350
MSc/PhD	44	11.0	73.2	2.5	
Number of years of experience					
< 10	302	75.5	69.9	13.0	0.001
≥ 10	98	24.5	74.5	10.1	
How often do you ask female patients about their pregnancy status?					
Never	12	3.0	60.6	4.0	
Only if she looks pregnant	107	26.8	70.7	1.4	0.029
Often	134	33.5	71.4	1.0	
Always	147	36.8	71.7	0.9	
How often do you give medical advice to pregnant women?					
Never	9	2.3	59.1	3.8	
Only if she looks pregnant	113	28.3	70.7	1.2	0.032
Often	150	37.5	71.6	0.9	
Always	128	32.0	71.4	1.2	
When you dispense/administer the medication to a female, do you explain its side effects on the pregnant woman?					
Never	21	5.3	65.6	4.9	
Only if she looks pregnant	124	31.0	71.8	1.1	
Often	131	32.8	72.0	0.8	0.108
Always	124	31.0	70.1	1.1	
Have you had a course about medication use during pregnancy?					
No	207	51.8	71.7	12.4	0.273
Yes	193	48.3	70.3	12.6	
How would you rate your level of knowledge about the use of medicines during pregnancy?					
Inadequate	84	21.0	68.0	11.8	0.013
Adequate	316	79.0	71.8	12.6	
In your opinion, do community pharmacists need continuing education courses, especially in medicines used in pregnancy?					
No	114	28.5	67.5	13.5	< 0.001
Yes	286	71.5	72.4	11.8	

In this study, the mean knowledge score was 71.0% ± 12.5% and the median score was 72.7% [36.6%, 77.3%]. Of the community pharmacists, (n=171) 42.8% scored below 70%.

Similarly, more community pharmacists who worked in pharmacies located in cities, those who had experience of 10 or more years, and those who stated that community pharmacists needed continuing education courses, especially in medicines used in pregnancy scored more than 70% or higher compared to the community pharmacists who worked in pharmacies located in villages/refugees camps, who had an experience of less than 10 years, and those who stated that community pharmacists did not need continuing education courses, especially in medicines used in pregnancy. On the other hand, fewer community pharmacists who stated that they never asked female patients about their pregnancy status and those who never gave medical advice to pregnant women scored 70% or higher compared to those who reported asking female patients about their pregnancy status and those who gave medical advice to pregnant women. The details of these associations are shown in Table 9.

Table 8

Association between demographic and practice variables of the community pharmacists

Variable	< 70% n	< 70% %	≥ 70% n	≥ 70% %	Chi-square	p-value
Gender						
Male	78	19.5	102	25.5	0.01	0.911
Female	93	23.3	127	31.8		
Age (years)						
< 30	92	23.0	114	28.5	0.63	0.426
≥ 30	79	19.8	115	28.8		
Country from where the pharmacy degree was obtained						
Palestine	159	39.8	201	50.3	2.95	0.086
Other	12	3.0	28	7.0		
Place of work						
City	85	21.3	138	34.5	4.42	0.036
Village/Refugees camp	86	21.5	91	22.8		
Academic degree						
BSc	126	31.5	163	40.8	2.57	0.276
PharmD	31	7.8	36	9.0		
MSc/PhD	14	3.5	30	7.5		
Number of years of experience						
< 10	142	35.5	160	40.0	9.18	0.002
≥ 10	29	7.3	69	17.3		
How often do you ask female patients about their pregnancy status?						
Never	10	2.5	2	0.5	9.49	0.023
Only if she looks pregnant	48	12.0	59	14.8		
Often	51	12.8	83	20.8		
Always	62	15.5	85	21.3		
How often do you give medical advice to pregnant women?						
Never	8	2.0	1	0.3	10.58	0.014
Only if she looks pregnant	47	11.8	66	16.5		
Often	56	14.0	94	23.5		
Always	60	15.0	68	17.0		
When you dispense/administer the medication to a female, do you explain its side effects on the pregnant woman?						
Never	11	2.8	10	2.5	7.50	0.058
Only if she looks pregnant	47	11.8	77	19.3		
Often	49	12.3	82	20.5		
Always	64	16.0	60	15.0		
Have you had a course about medication use during pregnancy?						
No	80	20.0	127	31.8	2.95	0.086
Yes	91	22.8	102	25.5		
How would you rate your level of knowledge about the use of medicines during pregnancy?						
Inadequate	39	9.8	45	11.3	0.59	0.443
Adequate	132	33.0	184	46.0		
In your opinion, do community pharmacists need continuing education courses, especially in medicines used in pregnancy?						
No	72	18.0	42	10.5	27.13	< 0.001
Yes	99	24.8	187	46.8		

When the variables with a p-value of < 0.1 were included in a multiple linear regression model, higher scores were predicted by years of experience, self-rating knowledge about the use of medicines during pregnancy, and belief that community pharmacists needed continuing education courses, especially in medicines used in pregnancy. Details of the multiple linear regression model are shown in Table 10.

Table 9
Details of the multiple linear regression model

Variable	Unstandardized Coefficients	SE	Standardized Coefficients	T	p-value
Age	-0.56	1.50	-0.02	-0.37	0.711
Country from where the pharmacy degree was obtained	0.96	2.14	0.02	0.45	0.655
Place of work	-2.03	1.33	-0.08	-1.53	0.128
Number of years of experience	4.75	1.83	0.16	2.59	0.010
How often do you ask female patients about their pregnancy status	0.20	0.74	0.01	0.27	0.790
How often do you give medical advice to pregnant women	0.08	0.82	0.01	0.09	0.927
When you administer the drug to a female, do you explain its side effects on the pregnant woman	-0.11	0.73	-0.01	-0.15	0.878
How would you rate your level of knowledge about the use of medicines during pregnancy	3.86	1.70	0.13	2.28	0.023
In your opinion, do community pharmacists need continuing education courses, especially in medicines used in pregnancy	5.64	1.38	0.20	4.08	< 0.001

3.4 Demographic variables and health status of pregnant women

In this study, responses were obtained from (n=400) pregnant women. The mean age of the pregnant women was n= (28.2 ± 5.9) years. The mean number of visits pregnancy follow-up visits to physicians was n= (3.3 ± 2.0), the mean number of visits to physicians for other healthcare purposes was n= (1.7 ± 1.2), and the mean number of prescriptions was n= (2.0 ± 0.9).

Of the women, (n=301) 75.3% had university or higher education. On the other hand, only (n=140) 35.0% were employed. Of the women, (n=215) 53.8% lived in villages and (n=59) 14.8% lived in refugee camps. Less than a third of the women (n=116) 29.0% were in their first pregnancy and (n=90) 22.5% had a history of abortion. Of the women, (n=153) 38.3% were in their third trimester. These details are listed in Table 11 in Appendix C.

Table 10

Demographic and pregnancy variables of the women

Variable	n	%
Educational level		
School	99	24.8
University	260	65.0
Higher education	41	10.3
Employment		
Unemployed	260	65.0
Employed	140	35.0
Place of residence		
City	126	31.5
Village	215	53.8
Refugee camp	59	14.8
Number of deliveries		
First pregnancy	116	29.0
1	79	19.8
2	74	18.5
≥ 3	131	32.8
Current pregnancy trimester		
First trimester	121	30.3
Second trimester	126	31.5
Third trimester	153	38.3
History of abortion		
No	310	77.5
Yes	90	22.5
Have you used medications in the past pregnancy?		
No	149	37.3
Yes	251	62.8

In this study, (n=95) 23.8% pregnant women stated that they had health issues that needed a visit to the physicians during the past 12 months. During the current pregnancy, (n=387) 96.8% pregnant women reported that they have used medications or supplements. Reasons for physician visits and the medications or supplements used by pregnant women are shown in Table 12 in Appendix C.

Of the women, (n=354) 88.5% stated that they needed information about the use of medications during pregnancy. The majority of the women (n=260) 65.0% stated that pharmacists were their main source of information about the medications or supplements used during pregnancy. Of the pregnant women, (n=101) 25.3% reported that they always read the medicine information leaflets and (n=190) 47.5% stated that they have been counseled by physicians about the risks of using medications during pregnancy. The answers of the pregnant women are shown in Table 13 in Appendix C.

Of the pregnant women, (n=281) 70.3% stated that women can use medications and supplements during pregnancy without a prescription. The women cited harm to the fetus and pregnant women as reasons for not using medications or supplements without a prescription. Of the pregnant women, (n=45) 11.3% stated that pregnant women can use medications or supplements without a prescription upon advice from pharmacists. Of the women, (n=327) 81.8% stated that the use of medications during pregnancy can be associated with abortion. Similarly, (n=296) 74.0% pregnant women stated that the use of medications during pregnancy can be associated with abnormalities in the chromosomes of the developing fetus. The detailed answers of the pregnant women are shown in Table 14 in Appendix C.

Chapter Four
Discussions and Conclusions

4.1 Summary of the main findings

In many cases, pregnant women need to use medications, herbal products, and nutritional supplements for different health conditions (2, 4). Therefore, medication use during pregnancy is unavoidable (1, 10, 11, 24). However, unsafe use of medications during pregnancy can be associated with birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays (9). For the first time, the knowledge and practices of community pharmacists and pregnant women regarding the safety of medications were assessed in the Palestinian healthcare system. In this study, large gaps in the adequate practices of the community pharmacists were identified as indicated by about one-third of the community pharmacists always asked female patients about their pregnancy status when dispensing medications, giving medical advice to pregnant women, and explaining the adverse effects of the medications they dispensed or administered to pregnant women. More than half of the community pharmacists did not receive a course about medication use during pregnancy and the majority of the community pharmacists stated that they needed continuing education courses about medication use during pregnancy.

The average score of medication safety during pregnancy test was relatively low and 42.8% of the community pharmacists scored low in this test. High knowledge scores were predicted by the number of years of experience, self-rating knowledge about the use of medications during pregnancy as adequate, and expressing a need for continuing education courses about medication use during pregnancy. About one-fourth of the pregnant women stated that they had a health condition that needed a visit to the physician during the last 12 months and the vast majority of the pregnant women used medications, herbal products, or nutritional supplements during their current pregnancy. The pregnant women visited physicians for a variety of health conditions. Despite their knowledge about the potential adverse effects on the continuity of the pregnancy and the developing fetus, the majority of pregnant women stated that they can use medications and supplements during pregnancy without a prescription.

The findings of this study are significant and might be informative to decision-makers, policymakers, healthcare professionals, patient advocacy groups, and the general society who might be interested in designing and implementing measures to improve knowledge and correct inadequate practices regarding the use of medications during pregnancy.

4.2 Discussion and interpretation of the main results

4.2.1 Practices of Community Pharmacists

In this study, only about one-third of the community pharmacists always asked female patients about their pregnancy status when they dispensed medications. In ideal practice, community pharmacists should always inquire about the pregnancy status of female patients (25-28). Certain medications are not safe for use in pregnant women as they might cause birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays (2, 4, 7, 9-11).

Therefore, it is important for community pharmacists to always inquire about the pregnancy status of female patients as a proactive approach to safeguard maternal and fetal health during pregnancy. A previous qualitative study has reported that a lack of knowledge about the pregnancy status of female patients was a major to providing better care services for pregnant women by community pharmacists (25). Another qualitative study has reported that pharmacists were highly motivated to ensure the safe use of medications during pregnancy and protect the developing fetus from the risks that could be associated with the unsafe use of medications during pregnancy (29). The study recommended adopting more patient-centric approaches in communicating with and caring for the patients. The study recommended that pharmacists should screen for pregnancy and counsel pregnant women about the safe use of medications. Taken together, these findings suggest that community pharmacists should always inquire about the pregnancy status of female patients to be able to tailor their recommendations, education, counseling, and information about medications, herbal products, and nutritional supplements.

About one-third of the community pharmacists surveyed in this study have reported that they always provide health advice to pregnant women. Community pharmacists are experts in medications. Therefore, community pharmacists are in a key position to provide education, counseling, information, and advice to pregnant women about

medications, herbal products, nutritional supplements, and other health issues (25, 28). As highly trained, skilled, and trusted healthcare professionals, community pharmacists can expand their roles beyond simply dispensing medications by providing more education, counseling, information, and health advice services. Community pharmacists can provide education, counseling, information, and health advice services about the importance of adequate nutrition for pregnant women. In addition, community pharmacists can advise pregnant women on the importance of taking vitamins and nutritional supplements including iron and folic acid. A recent study in Saudi Arabia has reported that counseling provided by pharmacists significantly increased adherence to folic acid intake among pregnant women in the Tabuk area (30).

The pregnant women included in the study have reported that pharmacists were a main source of information about the benefits of folic acid intake during pregnancy. Moreover, community pharmacists can advise pregnant women on the importance of making lifestyle changes in terms of physical activity, stress management, and avoiding substance use like alcohol, tobacco, and drug abuse. A pragmatic randomized clinical trial has demonstrated that smoking cessation programs led by pharmacists were effective (31). The study showed that counseling provided by pharmacists that was coupled with nicotine replacement therapy resulted in improved tobacco cessation outcomes. Community pharmacists can also provide advice about hygiene and self-care during pregnancy. Pregnant women often suffer nausea, vomiting, heartburn, sleep problems, and back pain. Management of these health problems can improve the quality of life of pregnant women. Probably, community pharmacists can play a role in providing counseling on lifestyle changes, changes to the diet, nonpharmacological therapies, and pharmacotherapies to manage these health problems (24).

A study has reported that pregnant women who suffered nausea and vomiting rated their consultations with pharmacists as useful to a large or a very large extent (32). These pharmacist consultations resulted in improvement in the quality of life of pregnant women who had moderate or severe nausea and vomiting. Community pharmacists can also provide postpartum consultative services to pregnant women.

These services can include supporting and promoting breastfeeding and safeguarding the mental health of the women. In Kuwait, community pharmacists provide counseling services including recommending vitamins, contraception, and nutritional supplements

(33). The community pharmacists also recommended pharmacotherapy for minor ailments including nausea, vomiting, constipation, headache, sore throat, heartburn, runny nose, and cough. Taken together, these findings indicate that community pharmacists can provide healthcare and advisory services that go beyond simply dispensing medications. These services can promote the health of pregnant women and improve their quality of life.

Again, less than one-third of the community pharmacists always explained the adverse effects of the medications they dispensed or administered to pregnant women. Community pharmacists are experts in medications and are supposed to educate patients on when and how to use these medications (25, 27, 32). The use of medications can be associated with adverse effects. In the case of pregnancy, these adverse effects can be significant, notably, those that would affect the continuity of the pregnancy and the health or integrity of the developing fetus (2, 4, 7, 9-11). Medications can cause birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays (9).

A recent study in The Netherlands has reported that more than one-third of pregnant women were exposed to potentially harmful medications (10). The study has shown that there was a high use of potentially harmful medications among pregnant women over the last two decades. Taken together, these findings indicate that community pharmacists should educate, counsel, and provide sufficient information to pregnant women about the safety and adverse effects of the medications dispensed to pregnant women. This is particularly important as recently patients are becoming more involved in making decisions relevant to their healthcare. By having adequate information on the safety and adverse effects of the medications, pregnant women can make better-informed decisions regarding their healthcare.

4.2.2 Knowledge of the community pharmacists about medications used in pregnancy

When the community pharmacists asked about the safe use of the medications during pregnancy, the average knowledge score was relatively low. In this study, 42.8% of the community pharmacists scored below 70%. These findings are particularly important because when the community pharmacists were asked to self-rate their knowledge about the use of medications during pregnancy, the majority of the community pharmacists self-

rated their knowledge as adequate. Overconfidence in one's knowledge might increase the risk of making errors (26, 34, 35). Probably, those community pharmacists would not consult resources to obtain further information on the safety of these medications before dispensing them to pregnant women (1, 36-38). Of the medications included in the knowledge test, amoxicillin, inhaled budesonide, acetaminophen/paracetamol, and ibuprofen were safe in the first trimester. More than half of the community pharmacists gave incorrect responses about the safety of contraceptives, valproic acid, and vitamin A in pregnancy.

In addition, a considerable percentage of the community pharmacists gave incorrect responses about the safety of statins and isotretinoin. Similarly, many community pharmacists gave incorrect responses about the safety of unsafe medications included in the test. These findings were consistent with previous studies that were conducted elsewhere in which pharmacists lacked knowledge about the safe use of medications during pregnancy (12-14). In many cases, notably outpatients, community pharmacists are the last checkpoint to prevent medication errors from reaching the patients (25, 26, 29).

Lack of knowledge of the risks associated with these medications might lead to dispensing or administering the medications to pregnant women (9, 13, 25, 31, 37). This would mean that prescribing errors made by the physicians would not be intercepted by the community pharmacists and would ultimately reach the patients and might cause harm. For example, isotretinoin is used in the treatment of severe acne. It is known for its teratogenic effects on the fetus (39).

The use of isotretinoin in pregnant women can lead to defects in the brain, heart, face, and other organs of the developing fetus (39, 40). Moreover, failure to provide adequate counseling or failure to implement cautionary measures might be associated with legal implications for community pharmacists. This might also damage the reputation of the community pharmacists, lead to disciplinary actions, or lead to loss of the license to practice community pharmacy (25, 26). In addition, failure to educate or counsel the patients about the safety of the medications can also damage the relationship and trust between the community pharmacist and the patient. Moreover, treating the birth defects caused by unsafe medications can be associated with significant financial burden on the patients, their families, and the healthcare system.

On the other hand, a considerable percentage of the community pharmacists gave incorrect responses about the safety of safe medications included in the test. These findings were consistent with those that were previously reported (12-14). Lack of knowledge about the safety of safe medications in pregnancy can lead to misguided counseling or incorrect advice that would lead to depriving pregnant women of using effective and safe medications that can be used to treat their conditions. This might result in unnecessary discontinuation of necessary treatment with safe and effective medications leading to compromising the health of the pregnant women and the developing fetus (1, 2, 4, 14, 26, 28, 33).

In addition, this would result in missed opportunities to effectively manage their health condition, leaving pregnant women suffering discomfort, pain, and other health complications that would further worsen their health condition. Moreover, providing misguided counseling or incorrect advice to patients would lead to damage to the relationship and trust between the patient and the community pharmacist. In addition, failure to provide adequate counseling and education to the patients might also damage the reputation of the community pharmacists, lead to disciplinary actions, or lead to loss of the license to practice community pharmacy. Taken together, these findings indicate a need to increase knowledge of the community pharmacists about medication use in pregnancy.

Although knowledge can be increased through education and training, more than half of the community pharmacists in this study indicated that they had not taken a course that was dedicated to medication use in pregnancy during their pharmacy education. The findings reported in this study were consistent with those that were previously reported among pharmacists in Qatar and Ethiopia (12, 13). Probably, decision-makers in pharmacy education and pharmacy schools should consider ways to increase knowledge about medication use in pregnancy during pharmacy education. Similarly, professional bodies like the pharmacist syndicate should also consider ways to increase knowledge of the practicing pharmacists about the safe use of medications in pregnancy. Interestingly in this study, the majority of the community pharmacists stated that they needed continuing education courses in medication use in pregnancy.

In this study, knowledge was associated with working in community pharmacies located in cities. Probably, these findings could be explained by a higher flow of patients to these

pharmacies and interaction with more patients, including pregnant women. This explanation could also be supported by the association between higher knowledge and longer working experience. Community pharmacists who had longer working experience could likely have interacted with and provided counseling and education to more pregnant women. This should have increased their knowledge about the use of medications in pregnancy. Similarly, the community pharmacists who never asked female patients about their pregnancy status and those who never gave medical advice to pregnant women scored lower in the knowledge test. Moreover, the community pharmacists who self-rated their knowledge about the use of medications during pregnancy as adequate, and those who stated that community pharmacists needed continuing education courses in medication use in pregnancy also scored higher in the knowledge test.

These findings might indicate that community pharmacists who had adequate knowledge also expressed eagerness to increase their knowledge through continuing education courses. The findings reported in this study were consistent with those reported in Qatar, Saudi Arabia, and Ethiopia in which knowledge was associated with longer experience and working in urban areas (12-14). Taken together, these findings indicate that community pharmacists might benefit from interventions to increase their knowledge about medications used in pregnancy through continuing education, more interactions with pregnant women, and providing more counseling and education to pregnant women about the safety of medications used in pregnancy.

4.2.3 Health status of pregnant women

In this study, about one-fourth of the pregnant women had health issues that needed a visit to the physician. These findings were consistent with those previously reported on the chronic and acute conditions that might affect the health of pregnant women (1, 2, 4, 10, 15). The health conditions that necessitated visits to the physicians in this study were consistent with those reported among pregnant women elsewhere. Therefore, healthcare providers including community pharmacists should be knowledgeable of the health conditions that might affect the health of pregnant women and how to care for pregnant women.

In this study, the vast majority of the pregnant women stated that they have used medications and supplements. In Palestine, women receive folic acid and iron supplements during their visits to public health and mother and child health centers (21).

The pregnant women in this study reported using medications to manage their nausea and vomiting, analgesics to alleviate their pain, antiplatelets or anticoagulants, and antibiotics. It is noteworthy to mention that the use of prescription medications, over-the-counter medications, herbal products, and nutritional supplements was previously reported to be high among pregnant women (1, 5, 10, 15). These findings stress the need for community pharmacists should be knowledgeable about the appropriate and safe use of medications in pregnancy.

4.2.4 Knowledge of pregnant women about medications

In this study, the majority of the pregnant women wanted to receive information about the use of medications in pregnancy. Moreover, the majority of the pregnant women reported that community pharmacists were a major source of information about the medications or supplements used during pregnancy. These findings indicate that community pharmacists need to be knowledgeable of the safety of the medications used in pregnancy in order to provide adequate counseling, education, information, and advice to pregnant women (26).

This is notably important because only about one-fourth of the pregnant women read the information leaflets about the medications and more than half of the pregnant women reported that they have been counseled by their physicians about the risk of using medications during pregnancy. Therefore, community pharmacists should ensure that pregnant women are adequately counseled, educated, informed, and advised about the use of medications during pregnancy.

The findings of this study showed that despite knowledge about the possibility of causing abortion and teratogenicity to the developing fetus, the majority of pregnant women stated that women can use medications and supplements during pregnancy without a prescription. These findings indicate a lack of health literacy among pregnant women. These findings were not surprising as only one-fourth of the pregnant women read the information leaflets and more than half of the pregnant women were not counseled about the use of medications by their physicians (15-18). Again, these findings indicate that community pharmacists should ensure that pregnant women are adequately counseled, educated, informed, and advised about the use of medications during pregnancy.

4.3 Strengths of the study

This study has a number of strengths. First, this is the first study to be conducted to assess the knowledge of community pharmacists and pregnant women about the safety of medications during pregnancy. The impact of this study was twofold because not only the knowledge of the community pharmacists was assessed, but pregnant women also.

This should have allowed drawing a clear picture of the current situation from the service provider side and from the service receiver side. Second, the sample sizes of community pharmacists and pregnant women were adequately large. The findings reported from studies with large samples are more reliable and robust compared to those reported from studies with small sample sizes.

Third, the community pharmacists and the pregnant women were diversified in terms of demographic characteristics. The community pharmacists were of both genders, had different academic degrees, and worked in community pharmacies in cities, villages, and refugee camps. Additionally, the community pharmacists had a variable length of practical experience in the field. Moreover, the community pharmacists were recruited from the northern, central, and southern regions of the West Bank of Palestine. Even more, the community pharmacists were recruited from morning and evening shifts.

Similarly, the pregnant women were recruited from the public health and mother and child health centers from the northern, central, and southern regions of the West Bank of Palestine. Again, the pregnant women were diversified in terms of age groups and number of deliveries. This diversity should have improved the representativeness of the sample used in this study. This should also have improved the external validity of the findings reported in this study.

Fourth, the knowledge test used among the community pharmacists included some medications that were commonly used to treat health conditions that affect the health of pregnant women. This indicated that the medications used in the test were relevant to what community pharmacists might dispense to pregnant women in practice.

4.4 Limitations of the study

This study has a number of limitations. First, the study was conducted in a cross-sectional design. Using this design allows studying data collected from a single point in time and does not allow for establishing cause-and-effect relationships due to a lack of temporal sequence. Second, although a two-stage sampling technique was used in this study, finally the community pharmacists and pregnant women were selected using a convenience sampling approach from each cluster.

The convenience sampling approach like other non-probability sampling techniques is prone to selection bias. Third, the data collected in this study from both the community pharmacists and the pregnant women were self-reported. It is noteworthy to mention that self-reported data are subject to reporting and desirability bias. Moreover, the questions used in the knowledge test could be answered using options. It is likely that some of the community pharmacists could have used guessing while answering the questions. Therefore, the correct answers could have been overestimated.

4.5 Conclusion

The findings reported in this study identified gaps in knowledge about the safety of medication use in pregnancy among the community pharmacists practicing in the West Bank of Palestine. A considerable proportion of the community pharmacists reported adequate inquiry about the pregnancy status when providing care for female patients. Moreover, a considerable proportion of the community pharmacists reported adequate counseling, education, information, and advice about the adverse effects of the medications dispensed to pregnant women. Similarly, pregnant women reported inadequate knowledge about the importance of seeking medical advice before using medications during pregnancy. There is a need to improve the knowledge and practices of community pharmacists about medication use in pregnancy. Again, there is a need to improve information-seeking behavior among pregnant women when using medications during pregnancy.

4.6 Recommendations and implications of the findings

4.6.1 For future practice

The findings of this study might be implicated in improving counseling, education, providing information, and advising services provided by community pharmacists to pregnant women about the safe use of medications during pregnancy (26, 33). Improving counseling, education, providing information, and advising services provided by community pharmacists to pregnant women about the safe use of medications during pregnancy might promote the safe use of medications in pregnancy. Safe use of medications in pregnancy might reduce the risks of birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays (9). These might also reduce dispensing and administration errors, and disciplinary and legal actions against the community pharmacists. Additionally, this might also improve the health of the pregnant women and their developing fetuses, birth outcomes, and relationship and trust between the community pharmacist and the patient.

4.6.2 For future education

The findings of this study might be implicated in improving the education and training of future and practicing community pharmacists. Pharmacy schools and syndicates might consider developing and implementing educational courses, continuing education programs, and training sessions related to the safety of medications in pregnancy (12-14). Community pharmacists might benefit from targeted and regular education and training programs that focus on the safety of medications during pregnancy. These programs might be developed based on the latest and most updated evidence-based guidelines (37).

Community pharmacists might also benefit from access to the most updated resources about the safety of medications in pregnancy. Granting easy access to community pharmacists to reliable and updated resources might help increase their knowledge and information-seeking behaviors. This would also enable the community pharmacists to develop tailored counseling, education, providing information, and advising services provided to individual pregnant women.

Community pharmacists might also benefit from an interdisciplinary collaborative approach to learn and care for pregnant women. This would involve open dialogues and effective communication channels between the community pharmacists and other

healthcare providers including gynecologists, obstetricians, midwives, neonatologists, pediatricians, pediatric and neonatal nurses, and maternal-fetal medicine specialists (29). These communication channels would enable the sharing of knowledge and information about the safety of medication use in pregnancy.

4.7 For future research

Future studies might be conducted to develop interventions to increase knowledge of the community pharmacists about medication use during pregnancy. Moreover, future research might help identify the most effective ways to increase the knowledge of community pharmacists about medication use in pregnancy. In addition, future studies might be conducted to assess the quality of counseling, education, information, and advising services provided by community pharmacists to pregnant women about the safe use of medications during pregnancy. Moreover, future studies might be conducted to evaluate the effectiveness of the counseling, education, providing information, and advising services provided by community pharmacists to pregnant women about the safe use of medications during pregnancy in terms of reducing medication errors, birth defects, miscarriage, preterm birth, restrictions of fetal growth, teratogenicity, and developmental delays.

List of Abbreviations

Abbreviation	Meaning
ACE	Angiotensin-converting enzyme
ADHD	Attention deficit hyperactivity disorder
ANOVA	Analysis of variance
AT1	Angiotensin receptor
CNS	Central nervous system
FDA	Food and Drug Administration
GI	Gastrointestinal
ICS	Inhaled corticosteroids
IQ	Intelligence quotient
IRB	Institutional Review Board
NSAIDs	Non-steroidal anti-inflammatory drugs
SD	Standard deviation
WG	Weeks' gestation

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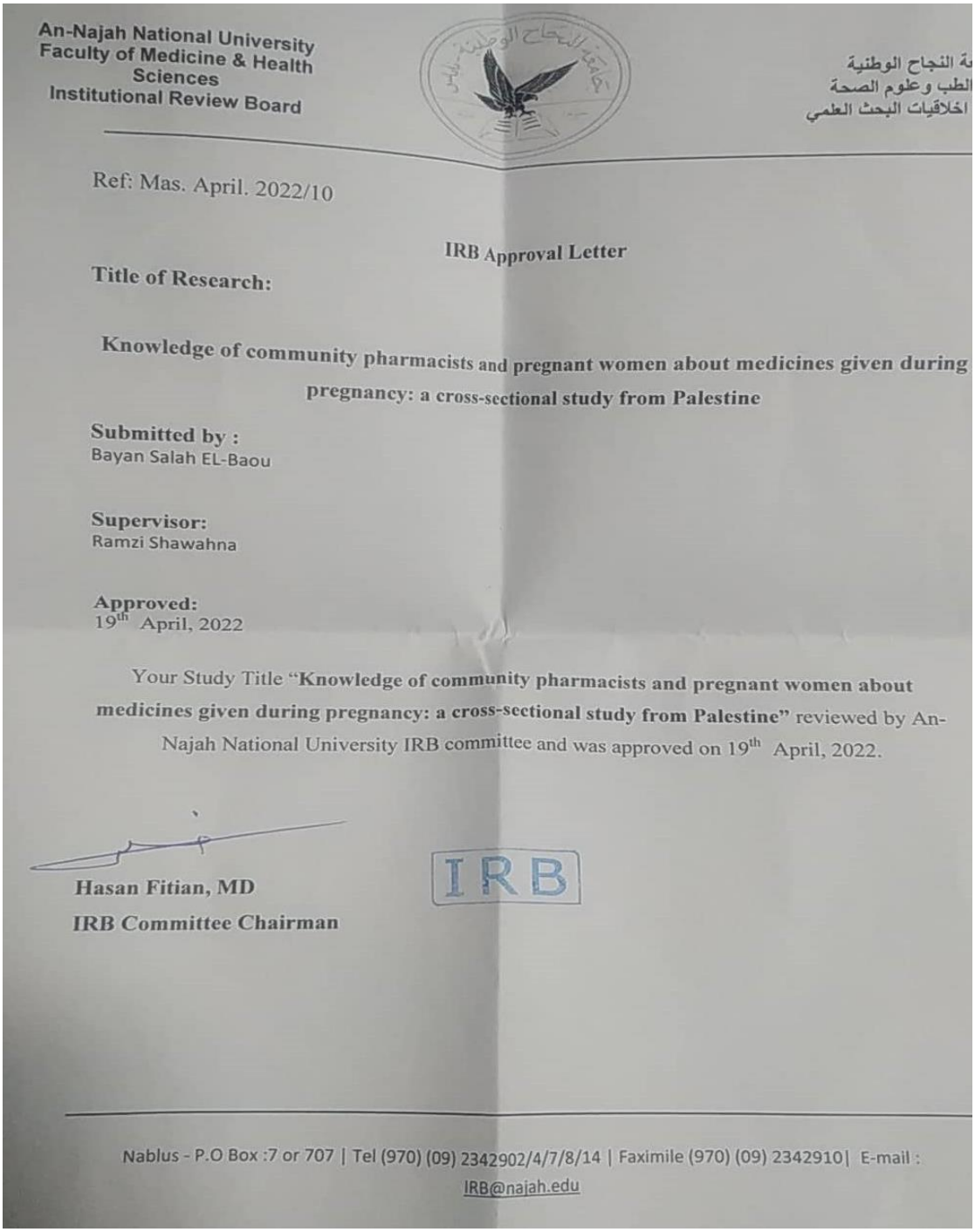
Appendices

Appendix A

Supplementary Tables

Supplementary Table 1 *IRB approval*



An-Najah National University
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اخلاقيات البحث العلمي

Ref: Mas. April. 2022/10

IRB Approval Letter

Title of Research:

Knowledge of community pharmacists and pregnant women about medicines given during pregnancy: a cross-sectional study from Palestine

Submitted by :
Bayan Salah EL-Baou

Supervisor:
Ramzi Shawahna

Approved:
19th April, 2022

Your Study Title "**Knowledge of community pharmacists and pregnant women about medicines given during pregnancy: a cross-sectional study from Palestine"** reviewed by An-Najah National University IRB committee and was approved on 19th April, 2022.

Hasan Fitian, MD
IRB Committee Chairman

IRB

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Appendix B

Approval

An-Najah
National University
Faculty of Graduate Studies

النجـــاح الوطنية
كلية الدراسات العليا

التاريخ: 2022/5/23

حضرة الدكتور عبد الله القواسمي المحترم
مدير عام التعليم الصحي / وزارة الصحة الفلسطينية

الموضوع: تسهيل مهمة الطالبة/ بيان صلاح محمود البو رقم تسجيل (12053319)
تخصص ماجستير الصيدلة السريرية

تحية طيبة وبعد ،،،

الطالبة/ بيان صلاح محمود البو ، رقم تسجيل 12053319 ، تخصص ماجستير الصيدلة السريرية في كلية الدراسات العليا/ جامعة النجاح الوطنية، وهي بصدد اعداد الاطروحة الخاصة بها والتي عنوانها:

قياس مدى معرفة صيادلة المجتمع والحوامل بالأدوية التي تُعطى أثناء الحمل: دراسة مقطعية من فلسطين

KNOWLEDGE OF COMMUNITY PHARMACISTS AND PREGNANT WOMEN ABOUT MEDICINES GIVEN DURING PREGNANCY: A CROSS-SECTIONAL STUDY FROM PALESTINE

يرجى من حضرتكم تسهيل مهمتها في جمع البيانات والمعلومات عن قياس مدى معرفة النساء الحوامل في الادوية التي تعطى اثناء الحمل وتحتاج الى مقابلة النساء الحوامل من اجل تعبأة الاستبانات الكتابية في مراكز الامومة والصحة الفلسطينية في المحافظات التالية: (نابلس، رام الله، بيت لحم، الخليل، وضواحي القدس "العيزرية، ابو ديس، والسواحرة الشرقية").

علماً بأن البيانات والمعلومات سوف تستخدم لأغراض البحث العلمي فقط وسيتم الحفاظ على السرية التامة.

شاكرين لكم حسن تعاونكم.

مع وافر الاحترام ،،،

جامعة النجاح الوطنية
كلية الدراسات العليا

أ.د. وليد صويلح
عميد كلية الدراسات العليا

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Appendix C

Tables

Table 11

Physician visits, medications, and supplements used by pregnant women

Variable	n	%
Have you had health issues that needed a visit to the physician in the past 12 months?		
No	305	76.3
Yes	95	23.8
Reason for the visit to the physician*		
Tooth pain	20	21.1
Vaginitis	16	16.8
Pharyngitis/tonsillitis	6	6.3
Tachycardia	7	7.4
Influenza	10	10.5
Abortion	15	15.8
Knee pain	5	5.3
Leg fracture	5	5.3
Back/muscle pain	6	6.3
Diabetes mellitus	5	5.3
Have you used medications/supplements during the current pregnancy?		
No	13	3.3
Yes	387	96.8
Medications/supplements**		
Folic acid	157	40.6
Iron (including iron with fish oil and folic acid)	87	22.5
Vitamins and minerals (including multivitamins, calcium, and vitamin D)	68	17.6
Antiemetics		
Metoclopramide	14	3.6
Meclizine and pyridoxine	5	1.3
Analgesic		
Paracetamol	15	3.9
Antiplatelet/anticoagulant		
Acetylsalicylic acid	7	1.8
Enoxaparin	19	4.9
Antibiotic		
Amoxicillin	7	1.8
Hormone		
Dydrogesterone	8	2.1

*The percentages were calculated based on the number of women who had health issues (95)

**The percentages were calculated based on the number of women who used medications or supplements (387)

Table 12

Need for information, sources of information, and receiving counseling about medications and supplements during pregnancy

Variable	N	%
Do you need information about the use of medications during pregnancy?		
No	46	11.5
Yes	354	88.5
Source of information about using medications/supplements during pregnancy*		
Physician	194	48.5
Pharmacist	260	65.0
Internet	198	49.5
TV/Newspapers	30	7.5
Nurse	8	2.0
Do you read the medicine information leaflets?		
No	60	15.0
Sometimes	239	59.8
Always	101	25.3
Have you been counseled by your physician about the risk of using medications during pregnancy?		
No	210	52.5
Yes	190	47.5

Table 13

Views of the women about the use of medications and supplements during pregnancy

Variable	N	%
Can women use medications/supplements without a prescription during pregnancy?		
No	281	70.3
Yes	119	29.8
Reasons for not using medications/supplements without a prescription*		
Risk of harm to the fetus	189	47.3
Risk of harm to the pregnant woman	120	30.0
When pregnant women can use medications/supplements without a prescription during pregnancy*		
When the health issue is not serious	42	10.5
When the woman was prescribed the medication/supplement before	25	6.3
When there is an emergency	7	1.8
When advised by the pharmacist	45	11.3

Variable	N	%
What adverse effects can medications have on pregnant women? *		
Abortion	327	81.8
Uterine contraction	204	51.0
Subchorionic hemorrhage	279	69.8
Postpartum depression	133	33.3
Memory loss	71	17.8
What adverse effects can medications have on the developing fetus? *		
Birth defects	190	47.5
Chromosomal abnormalities	296	74.0
Intrauterine fetal demise	244	61.0
Fetal developmental abnormalities	239	59.8

*More than one answer was allowed

Table 14

Treatment options that can be used for different conditions during pregnancy

Indication*	Treatment of first-choice	Tolerable	Contraindicated (evidence-based)	Comment
Acne	Antiseptics, antibiotics		Retinoids, esp. systemic	No consequences after local retinoid use
ADHD		Methylphenidate		Cautious indication
Allergy	Loratadine, cetirizine	Other H1 antagonists		
Anxiety disorder	Sertraline, citalopram	Venlafaxine, other antidepressants		Neonatal adaptation syndrome possible
Antibiotic treatment	Penicillins, cephalosporins, erythromycin, azithromycin, clarithromycin, roxithromycin, spiramycin, fosfomycin	Cotrimoxazole, doxycycline up to 15 WG, ciprofloxacin, metronidazole, clindamycin, other antibiotics	Tetracyclines contraindicated from 16 WG	
Asthma	Inhaled short-acting beta2-agonists, e.g. salbutamol; ICS, e.g. budesonide; inhaled long-acting adrenergic agonists, e.g. formoterol (in combination with ICS)	Montelukast, theophylline, tiotropium, omalizumab		Treatment according to treatment algorithm for non-pregnant patients
Bipolar disorder	Quetiapine, lamotrigine	Lithium, other established antipsychotics	No valproic acid prophylaxis	Continue lithium if well-controlled; neonatal adaptation syndrome is possible, especially with lithium
Cholestasis	Ursodeoxycholic acid			
Compulsive symptoms	Sertraline, citalopram	Other established antidepressants		Neonatal adaptation syndrome possible
Condylomata acuminata	Cryotherapy, trichloroacetic acid, laser therapy, electrocautery			
Constipation	Bulking agents, lactulose, macrogol, bisacodyl		Anthrachinone, castor oil	
Cough treatment	Dextromethorphan, codeine (short-term)			
Depressive symptoms, agitated	Amitriptyline, mirtazapine	Other established antidepressants		Neonatal adaptation syndrome possible
Depressive symptoms, reduced motivation	Sertraline, citalopram	Other established antidepressants		Neonatal adaptation syndrome possible
Diabetes mellitus	Human insulin, metformin	Other established insulin analogs		Other oral antidiabetic agents are not recommended
Diuresis	Hydrochlorothiazide	Furosemide		
Enterobiasis	Pyrvinium embonate, mebendazole			
Epilepsy	Lamotrigine, levetiracetam	Oxcarbazepine, carbamazepine, clobazam	Valproic acid, topiramate	Valproic acid, topiramate only if better-tolerated anticonvulsants were ineffective

Familial Mediterranean fever	Colchicine			Treatment required to stabilize pregnancy
Gastritis	Magaldrate, other antacids, famotidine, omeprazole			
Glaucoma	Timolol, dorzolamide, brinzolamide	Latanoprost		
Herpes	Aciclovir			
Hypertension (arterial)	Methyldopa, metoprolol	Bisoprolol, labetalol (not approved in Germany), nifedipine, amlodipine, urapidil, dihydralazine	AT1 receptor antagonist, ACE inhibitors after first trimester	If treatment is mandatory up to and including first trimester: prefer ACE inhibitors to AT1 receptor antagonist
Hyperthyroidism	Propylthiouracil; from second trimester: carbimazole, thiamazole			Preferably surgical treatment before pregnancy; residual risk of teratogenicity of antithyroid drugs cannot be excluded
Hypothyroidism	Thyroxine (T4)			No combination with T3
Inflammatory bowel disease	Mesalazine, olsalazine, sulfasalazine, azathioprine, 6-mercaptopurine, cyclosporine, prednisolone, local budesonide, and potentially other corticosteroids	Infliximab, adalimumab, certolizumab		
Lice	Dimethicone			
Local anesthesia	All established agents, also combined with adrenaline			No bupivacaine in obstetrics (e.g. pudendal anesthesia)
Migraine	Sumatriptan, ibuprofen up to 28 WG, paracetamol	Zolmitriptan, rizatriptan, naproxen up to 28 WG	Ergotamine tartrate	Metoclopramide for associated nausea
Migraine prophylaxis	Metoprolol, amitriptyline		Valproic acid	
Multiple sclerosis	Interferon, glatiramer, prednisolone, azathioprine, immunoglobulins		Dimethyl fumarate, fingolimod	Individual treatment depending on the disease course
Mycosis	Nystatin, clotrimazole, miconazole, amphotericin B	Fluconazole, itraconazole	Terbinafine	Avoid: Amorolfine, ciclopirox, naftifine, natamycin, tolciclate, tolnaftate; accidental use without consequences

Nausea	Doxylamine (with pyridoxine), dimenhydrinate, meclizine, metoclopramide	Ondansetron		Meclizine is currently not approved in Germany; import, if necessary
Pain	Ibuprofen up to 28 WG, paracetamol	Other NSAIDs/metamizole up to 28 WG, codeine, other opioids		Ibuprofen and other NSAIDs only up to 28 WG; Warning: Neonatal withdrawal symptoms after exposure to opioids; paracetamol controversial
Poisoning	In general, primary or secondary decontamination and administration of antidote as in non-pregnant patients			
Psychotic symptoms	Quetiapine, olanzapine, haloperidol, risperidone	Aripiprazole, other established antipsychotics		Neonatal adaptation syndrome possible
Reflux esophagitis	Omeprazole	Pantoprazole		
Restless legs	Cabergoline, levodopa			Cautious indication; available evidence sparse
Rheumatic diseases	Hydroxychloroquine, azathioprine, cyclosporine, prednisolone, established NSAIDs up to 28 WG	Adalimumab, infliximab, etanercept, certolizumab	Leflunomide, cyclophosphamide, methotrexate, mycophenolate	To date, no human teratogenicity proven for leflunomide; observe the washout procedure
Scabies	Permethrin	Benzyl benzoate, crotamiton		
Secretolytic therapy	Acetylcysteine			
Sleep disorders, tension, restlessness	Diphenhydramine, amitriptyline, mirtazapine, promethazine, quetiapine	Zolpidem, zopiclone, lorazepam (all only short-term)		Warning: Neonatal withdrawal symptoms after exposure to benzodiazepines and Z-drugs
Thrombosis prophylaxis	Low-dose aspirin; fractionated, low-molecular-weight or unfractionated heparin	Clopidogrel	Vitamin K antagonists, such as phenprocoumon, warfarin	In the case of vitamin K antagonists in early pregnancy, switch, and fetal high-resolution ultrasound
Tuberculosis	Isoniazid, ethambutol, pyrazinamide, rifampicin			
Urinary tract infection	Penicillins, cephalosporins, fosfomycin	see Antibiotic treatment	see Antibiotic treatment	
Vaccinations	Diphtheria, tetanus, pertussis, influenza	Other inactivated vaccines if critically indicated	Live vaccines	No consequences after accidental administration of live vaccine in pregnancy

Note. ADHD: Attention deficit hyperactivity disorder, ICS: Inhaled corticosteroids, NSAIDs: Non-steroidal anti-inflammatory drugs, WG: Weeks' gestation, *Adopted from (1)

Table 15

FDA categories for use of medications in pregnancy

Abbreviation	Meaning
A	Safest, controlled studies of pregnant women show no risk of fetal abnormalities.
B	animal studies show no risk, or animals show risk unconfirmed in humans.
C	Animal studies show risk, caution is advised, benefits may outweigh risks.
D	Evidence of risk to human fetus, benefits may outweigh risks in serious conditions.
X	Risk outweighs benefit, contraindicated in pregnancy.

جـامعـــة النجاح الوطنية

كليـــة الدراســـات العليـــا

قياس مدى معرفة صيادلة المجتمع والحوامل بالأدوية التي تعطى أثناء الحمل: دراسة مقطعية من فلسطين

إعداد

بيان صلاح البو

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أ.د. رمزي شواهنه

قدمت هذه الرسالة استكمالا لمتطلبات الحصول على درجة الماجستير في الصيدلة السريرية، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس– فلسطين.

2024

قياس مدى معرفة صيادلة المجتمع والحوامل بالأدوية التي تعطى أثناء الحمل: دراسة مقطعية من فلسطين

إعداد
بيان صلاح البو
إشراف
أ.د. رمزي شواهنه

الملخص

خلفية الدراسة: غالبا ما تعاني النساء الحوامل من حالات صحية تحتاج إلى علاج دوائي. لذلك، لا يمكن تجنب استخدام الأدوية في فترة الحمل تماما. أجريت هذه الدراسة لقياس مدى معرفة وممارسات الصيادلة المجتمعيين والنساء الحوامل فيما يتعلق باستخدام الأدوية أثناء الحمل.

منهجية الدراسة: أجريت هذه الدراسة في تصميم مقطعي. في هذه الدراسة، كانت هناك مجموعتان مستهدفتان: صيادلة المجتمع والنساء الحوامل. أدوات الدراسة عبارة عن استبانين تم تطويرهما بناءً على دراسات سابقة. تم استخدام طريقة أخذ العينات العشوائية الهادفة لحوالي (ن = 400) من صيادلة المجتمع و(ن = 400) من النساء الحوامل في الضفة الغربية. تم إجراء جميع التحليلات باستخدام SPSS21.

تم إنشاء إحصائيات وصفية مثل التكرارات (الأرقام)، والنسب المئوية (٪)، والمتوسط، والانحراف المعياري (SD). تم تقييم البيانات للتوزيع الطبيعي باستخدام الانحراف والتفرطح وتم توزيع البيانات بشكل طبيعي. تم استخدام مربع كاي واختبار T للتحكم في العوامل المربكة المحتملة. تم أيضًا إجراء الانحدار اللوجستي متعدد المتغيرات من أجل ضبط الإرباك المحتمل. واعتبرت قيمة P أقل من (0.05) ذات دلالة إحصائية.

نتائج الدراسة: في هذه الدراسة، تم إرجاع استبانات كاملة من قبل 400 صيدلي مجتمعي و 400 امرأة حامل. كان متوسط درجة المعرفة (71.0٪ ± 12.5٪) وسجل (42.8٪) من صيادلة المجتمع أقل من

(70٪). تم التنبؤ بالانحدار الخطي الذمتعدد، والدرجات الأعلى من خلال سنوات من الخبرة، ومعرفة التقييم الذاتي حول استخدام الأدوية أثناء الحمل، والاعتقاد بأن صيادلة المجتمع بحاجة إلى دورات تعليمية مستمرة، خاصة في الأدوية المستخدمة في الحمل. في هذه الدراسة ، ذكرت (23.8٪) من النساء الحوامل أنهن يعانين من مشاكل صحية تحتاج إلى زيارة الأطباء خلال الأشهر ال 12 الماضية. خلال فترة الحمل الحالية، ذكرت (96.8٪) من النساء الحوامل أنهن استخدمن الأدوية أو المكملات الغذائية. من بين النساء، ذكرت (88.5٪) أنهن بحاجة إلى معلومات حول استخدام الأدوية أثناء الحمل. ذكرت غالبية النساء (65.0٪) أن الصيادلة كانوا المصدر الرئيسي للمعلومات حول الأدوية أو المكملات الغذائية المستخدمة أثناء الحمل. من بين النساء الحوامل، ذكرت (70.3٪) أنه يمكن للنساء استخدام الأدوية والمكملات الغذائية أثناء الحمل دون وصفة طبية.

إستنتاجات الدراسة: حددت النتائج الواردة في هذه الدراسة فجوات في المعرفة حول سلامة استخدام الأدوية أثناء الحمل بين الصيادلة المجتمعيين الممارسين في الضفة الغربية وفلسطين. وبالمثل، أفادت النساء الحوامل بعدم كفاية المعرفة بأهمية التماس المشورة الطبية قبل استخدام الأدوية أثناء الحمل. هناك حاجة إلى تحسين معرفة وممارسات الصيادلة المجتمعيين حول استخدام الأدوية أثناء الحمل. مرة أخرى، هناك حاجة لتحسين سلوك البحث عن المعلومات بين النساء الحوامل عند استخدام الأدوية أثناء الحمل.

الكلمات المفتاحية: المعرفة، الصيدلي، الحمل، النساء، استخدام الدواء، السلامة.