

# Awareness and Attitude of Women about The Teratogenic Effect of Drugs During Pregnancy: A Pilot Study

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## ABSTRACT

**Study design:** Cross-sectional pilot study

**Background/Objective:** Lack of awareness regarding the teratogenic risks associated with drug use during pregnancy can have detrimental effects on both maternal and fetal health outcomes. This study aimed to assess the knowledge and attitude toward teratogenic drug usage among reproductive-age women in the Arar region, Saudi Arabia.

**Methods:** This cross-sectional study used convenience sampling to collect data via an online self-administered questionnaire. Descriptive and analytical statistical analyses were employed.

**Results:** One hundred eleven eligible individuals, nearly 50% aged 21 to 29, were included. Nearly 29.7% agreed that frequently, the adverse side effects of medications outweigh their benefits. At the same time, 5.4% held the view that all drugs are essentially detrimental. Close to 10% believed that any medical drug carries a potential danger for unborn babies. About 12.6% agreed that using insulin may harm the fetus. Around a third (31.5%) recognized the necessity of vitamin A intake during pregnancy. A notable 75.7% did not see any link between prenatal vitamin A intake and congenital disabilities. In addition, a substantial 85.6% agreed they should discuss family planning intentions with their doctor. The most widely used medications in currently or previously pregnant women were vitamins/supplements, accounting for 65.6%, analgesics/antipyretics (59.2%), and antibiotics (31.6%).

**Conclusions:** study respondents show relatively poor awareness/attitude toward the teratogenic effects of drugs during pregnancy. To alter the women's conservative attitudes and exaggerated ideas about pharmaceutical hazards, physicians, pharmacists, and other healthcare professionals must offer adequate counseling.

**Keywords:** Awareness; attitude; drugs, women; pregnancy; Saudi Arabia

## INTRODUCTION

The catastrophe caused by thalidomide, notorious for the suffering it inflicted on infants born from 1957 to 1961 to mothers who ingested this medication for morning sickness, remains infamous. Nevertheless, the emergence of specific-target modern pharmaceutical drugs is rising globally. Since the 1960s, it has been acknowledged that drugs can cause teratogenic effects in humans<sup>1</sup>. However, a notable gap exists in the systematic assessment of the comprehension related to the teratogenic effects of these medicines in humans<sup>2</sup>. A considerable fraction of females, during their first pregnancy trimester, are administered drugs inferred to generate teratogenic impacts<sup>3</sup>. Various drugs that are either known or deemed to augment the probability of congenital and developmental disabilities (teratogenic potential) are often employed during gestation. Even though most pregnant females ingest at least one

pharmaceutical product during their pregnancy, the safety parameters of these treatments remain frequently ambiguous. Anticipating the inevitable use of such potential teratogenic drugs, which heighten the peril of fetal toxicity, becomes paramount. Necessary steps to guarantee the safest possible use of these potential teratogens by women in their fertile years are urgently required<sup>4</sup>. Women who are either pregnant or contemplating pregnancy should be appropriately informed if they are prescribed teratogenic medications. A comprehensive analysis of the risk posed by human teratogenicity was hampered due to a paucity of existing published data for 49% of the ingredients in these regularly prescribed drugs<sup>5</sup>.

Knowledge transfer has become an essential aspect of effective teratogenic management. It is required to take a more robust strategy for post-marketing surveillance for teratogenic risks<sup>6</sup>. Because most

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pregnancies are unplanned, there are often concerns about medication and exposure throughout the perinatal period<sup>7</sup>. A teratology information service can provide timely scientific advice to anyone concerned about prenatal exposure. A thorough research review was executed on 12 medications and medicinal categories known for their potential to cause fetal abnormalities, and also an additional 29 medications and drug categories where the safety level for human fetuses is still under debate<sup>8</sup>. Several scientific studies have identified plausible explanations for birth abnormalities induced by a variety of medicines, including pharmaceutical drugs used during pregnancy<sup>9</sup>.

Different medications are often recommended to expectant women to treat a range of health issues, particularly those linked to pregnancy. Beyond the potential hazards of introducing the developing fetus to drugs that could cause possible congenital disabilities, there is also the danger of overlooking the drug's potential to cause such defects. To address this issue, the National Health Authority highlights the importance of scientific and clinical studies to boost understanding of drug science during pregnancy<sup>10</sup>. A few scientific studies in Saudi Arabia that evaluated pregnant women's beliefs, knowledge, and use of medicines showed that the majority were aware of the importance of using medications cautiously during pregnancy. However, it is clear from the literature that women's knowledge of teratogenic drugs is still lacking<sup>11-13</sup>. In this sense, this study aimed to assess the knowledge/attitude of teratogenic drug usage among reproductive-age women in our region, Arar, Saudi Arabia.

## METHODS

This cross-sectional study was conducted among reproductive-age women in Arar, the capital of the Northern Borders province of Saudi Arabia, with a population of 148,540. It has been described in detail previously<sup>14</sup>. The inclusion criteria were adult females of reproductive age (18-49 years), including currently or previously pregnant women, who lived in Arar and agreed to participate in the study.

This study applied a convenience sampling method to include the study participants. The minimum sample size for this study was calculated using "Rosoft's sample size online calculator" (Raosoft Inc., Seattle, Washington, United States). On calculating the female population in our region, considering that the female ratio in the Saudi population is approximately 42%, the result was 62,386. By applying an 80% confidence interval with a 6% margin of error and 50% response distribution, the calculation yields 114 adult females. On survey response analysis, there were three responses with incomplete data, so the final total sample was 111. This sample was run for the time framework of the present study and achieved the minimum recommended size of our survey.

Data were collected in November through December 2023 using an online self-administered questionnaire developed on Google Forms (Google LLC, Menlo Park, California, United States) that comprised a brief introduction explaining the nature of the research, demographics data, including the age, marital status, educational level, and history of self-medication, chronic disease and/or pregnancy status. The second section assesses the women's knowledge (19 questions) regarding the teratogenic drug impacts during pregnancy, followed by the third section, which inquiries about the type of medication that is taken by currently or previously pregnant women, selecting from a list, including vitamins, non-steroidal anti-inflammatory medicines, antibiotics, hormones, antihistamines, anti-hypertension, oral hypoglycemics, antipsychotics, laxatives, bronchodilators, antitussives, and others. This questionnaire was slightly modified and translated into the mother language of the current population from previously validated

ones<sup>11,15</sup>. Three consultants have reviewed the questionnaire to ensure its validity, delete any confusing wording, and improve its clarity. The researchers distributed the questionnaire using different social media platforms (e.g., WhatsApp, Telegram, Twitter, etc.) to be filled out personally. Data confidentiality and personal data anonymity were confirmed for all responders.

A pilot study was conducted on 10% of the calculated sample to test the reliability and applicability of the study to ascertain the feasibility, applicability, and clarity of the tool, and no modification was done. Participants in the pilot study were excluded from the overall study sample size calculation and analysis.

The research followed the guidelines and the rules stated in the Declaration of Helsinki. Participants were briefed about the aim of the study, the potential hazards and advantages of participation, and their freedom to discontinue their involvement at any moment. Approval to carry out the study was obtained from the local Bioethics committee. The confidentiality of collected data was maintained throughout the study.

The information gathered from the online survey was collected into an Excel file (Microsoft Corporation, Redmond, Washington, USA), allocated codes, and then subsequently statistically analyzed using IBM SPSS Statistics for Windows, Version 23 (Released in 2015; IBM Corp., Armonk, New York). Analytical and descriptive statistical analyses, including frequencies and percentages, to summarize the data were applied. The results were displayed using tables and figures when appropriate. Multiple logistic regression examining factors affecting the knowledge of women toward the teratogenic effects of drugs was employed. For every question (from a total of 19), if the woman answered correctly, she would get one point. If she was uncertain or answered wrongly, she got zero. If the total responses of women are equal to or more than ten questions, she will be considered knowledgeable. If less than ten, she will be considered as non-knowledgeable. Then, this variable (knowledgeable vs. non) will be treated as the dependent variable in the applied logistic regression analysis. The significance level was considered at a *p*-value < 0.05.

## RESULTS

The study encompassed 111 individuals. In that group, 50% were aged between 20 and 29, while nearly 19% fell within the age range of 30 to 39. Over half the group, 54.1%, were married, whereas 42.3% identified as single. A significant portion, 82%, had completed university education. Among the total, 41.5% identified as students, and nearly 20% reported being homemakers (Table 1).

**Table 1.** Sociodemographic characteristics of study participants (n=111).

Parameter	Frequency (%)	
Age	< 20	13 (11.7)
	20-29	55 (49.5)
	30-39	21 (18.9)
	> 40	22 (19.8)
Marital status	Single	47 (42.3)
	Married	60 (54.1)
	Divorced	2 (1.8)
	Widow	2 (1.8)
Education level	High school education	11 (9.9)
	University education	91 (82.0)
	Postgraduate	9 (8.1)

Job	Health sector	14 (12.7)
	Housewife	22 (19.8)
	Student	46 (41.5)
	I do not work	1 (9.0)
	Teacher	23 (20.7)
	Government employee	3 (2.7)

Data are presented as frequencies (numbers; n) and percentages (%).

Table 2 reveals that 46.8% of respondents are currently on medication. It also presents that 8.1% have a chronic illness, and out of these, 55.6% are taking medication specifically for their disease. Further, 42.3% of the participants have either been pregnant in the past or are currently pregnant.

**Table 2.** Having chronic diseases and/or using any medications in the pregnancy (n=111).

Items	Yes, no (%)	No, no (%)
Take any medications	52 (46.8)	59 (53.2)
Have any chronic diseases	9 (8.1)	102 (91.9)
If yes, do you take any medications for this disease	5/9 (55.6)	4/9 (44.4)
Are you pregnant now, or have you been pregnant before	47 (42.3)	64 (57.7)

Data are presented as frequencies (numbers; n) and percentages (%).

The data shown in Table (3) indicates that 29.7% of participants concurred with the view that drugs can often cause more harm than benefit. There were 5.4% of the respondents who asserted that all medicines are harmful. Meanwhile, 9.9% were in agreement that all pharmaceuticals pose risks to an unborn child, and 12.6% believed that insulin usage could potentially endanger a fetus. According to 19.8% of participants, the cessation of thyroid medicine during gestation is crucial for fetal safety. Interestingly, 35.1% concurred that antiepileptic medication use during gestation can be hazardous to the unborn child. Additionally, 31.5% asserted the importance of vitamin A consumption during pregnancy. Contrarily, a vast majority of 75.7% disputed any link between vitamin A intake during pregnancy and potential birth defects.

**Table 3.** Knowledge/attitude of participants concerning the common teratogenic risks (n=111).

Variable	Agree n (%)	Disagree n (%)	Do not know n (%)
Medicines do more harm than good	33 (29.7)	44 (39.6)	34 (30.6)
All drugs are toxic	6 (5.4)	92 (82.9)	13 (11.7)
All medicines harm the fetus	11 (9.9)	83 (74.8)	17 (15.3)
Doctors prescribe many medicines for pregnant women	12 (10.8)	79 (71.2)	20 (18.0)
Using insulin may harm the fetus	14 (12.6)	43 (38.7)	54 (48.6)
Stopping thyroid medication during pregnancy is important for the safety of the fetus	22 (19.8)	37 (33.3)	52 (46.8)
Using antiepileptics during pregnancy can harm the fetus	39 (35.1)	14 (12.6)	58 (52.3)
A pregnant woman should not use antiepileptic drugs, even if she needs them	7 (6.3)	46 (41.4)	58 (52.3)
Vitamin A is an essential vitamin to take during pregnancy	35 (31.5)	34 (30.6)	42 (37.8)

There is no relationship between vitamin A intake during pregnancy and birth defects	18 (16.2)	50 (45.0)	43 (38.7)
In planning a pregnancy, Roaccutane tablets should be discontinued	84 (75.7)	2 (1.8)	25 (22.5)
Medications for mental illnesses can cause birth defects	57 (51.4)	7 (6.3)	47 (42.3)
It is preferable to use herbal medicines during pregnancy	15 (13.5)	66 (59.5)	30 (27.0)
Pregnant women should not use herbal medicine without consulting a doctor	91 (82.0)	9 (8.1)	11 (9.9)
I tend to use medication when I am pregnant more than before	14 (12.6)	74 (66.7)	23 (20.7)
Medication treatment during pregnancy has saved the lives of many unborn children	66 (59.5)	11 (9.9)	34 (30.6)
It is better to use medication and recover than to suffer from an untreated disease during pregnancy	57 (51.4)	16 (14.4)	38 (34.2)
Medications for the same disease can be different for pregnant and non-pregnant women	89 (80.2)	3 (2.7)	19 (17.1)
I must inform my doctor of my plan to conceive	95 (85.6)	7 (6.3)	9 (8.1)

Data are presented as numbers (n) and percentages (%).

Furthermore, 51.4% of participants affirmed that psychiatric medications could lead to congenital anomalies. A substantial 82% of individuals insisted that expectant females should refrain from using herbal treatments without a practitioner's guidance. Finally, 59.5% acknowledged the positive impact of medication during gestation, asserting that it had saved countless unborn lives. A large percentage of participants (80.2%) agreed that therapeutic regimens could differ between pregnant and non-pregnant women for the same ailment. Moreover, an overwhelming 85.6% concluded that it is essential for them to disclose their intention to conceive to their healthcare provider. By employing logistic regression analysis to examine the demographic factors affecting the knowledge/attitude of women regarding the teratogenic effect of drugs, we cannot identify any significant association with the measured variables, including the age group category, the educational level, the employment status, or the marital status (all p-values are > 0.05) (Table 4).

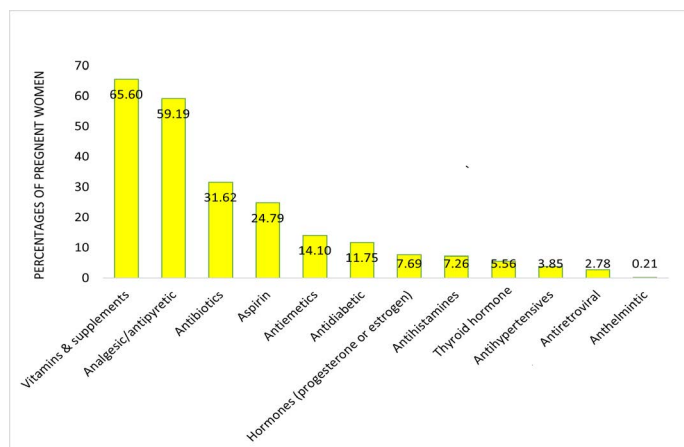
**Table 4.** Multiple logistic regression examining factors affecting the knowledge/attitude of women toward the teratogenic effects of drugs.

Variable	OR (95% CI)	p-value
Age groups		
18-19	Reference	
20-29	0.92 (0.461- 1.836)	0.813
30-39	0.971 (0.591- 1.597)	0.909
More than 40	0.899 (0.603- 1.341)	0.602
Educational level		
High school	Reference	
University	1.489 (0.599- 3.699)	0.391
Postgraduate	1.288 (0.43- 3.86)	0.651
Employment status		
Homemaker	Reference	
Student	0.582 (0.278- 1.218)	0.151
Teacher	0.616 (0.306- 1.242)	0.176

Health sectors	0.791 (0.385- 1.626)	0.524
Others	0.593 (0.287- 1.226)	0.159
Marital status		
Single	Reference	
Married	2.165 (0.415- 11.305)	0.36
Widow	1.372 (0.489- 3.849)	0.548
Divorced	2.051 (0.781- 5.386)	0.145
Do you take any self-medication	0.878 (0.674- 1.143)	0.332
Do you have any chronic disease	0.971 (0.686- 1.374)	0.869
Are you currently or previously pregnant	0.714 (0.479- 1.064)	0.098

OR (95% CI): odds ratio (95% confidence interval). Significance was set at  $p < 0.05$ .

In the study population subgroup, which consisted of women who are currently or have been previously pregnant ( $n = 47, 42.3\%$ ), the most widely used medications were vitamins and supplements, accounting for 65.6%. Analgesics and antipyretics came in second at 59.2%. Following these, antibiotics were taken by 31.6%, and aspirin was used by 24.8% (Figure 1).



**Figure 1.** Type of medications taken by currently or previously pregnant women. The data are presented as percentages.

## DISCUSSION

Although pregnant women's knowledge and educated attitudes about the adverse effects of medications are crucial, inaccurate or insufficient perception may result in unfavorable outcomes of a pregnancy. The pregnant women's views have an impact on how well they take their medications, which could ultimately lead to poor treatment outcomes for the mother's health and negatively impact the well-being of the fetus<sup>16</sup>. This study was designed and performed to assess the knowledge of teratogenic drug usage among reproductive-age women in Saudi Arabia's Arar region.

Our research findings indicate that 29.7% of individuals agreed that medicines can often be more detrimental than beneficial. A minority of 5.4% concurred with the idea that all drugs are harmful. Additionally, 12.6% believed that the use of insulin could jeopardize the fetus. This reflects earlier survey results, in which most expectant women did not concur with the claim that medications inflict more harm than benefits. Women must maintain a generally favorable perspective on suitable medications<sup>17</sup>. None of the mothers with childbearing abnormalities attributed the cause to drug use; instead, they ascribed it to heredity, a

curse, or supernatural forces, a prevalent belief among many African women who associate birth defects with mystical influences<sup>18</sup>. Parallel research conducted in Saudi Arabia showed that women do not typically hold medications responsible for birth defects<sup>11</sup>. Despite the overarching belief that medicines generally bring more benefit than harm, a considerable majority of women expressed the belief that pharmaceutical intake during pregnancy is harmful to the fetus in terms of risk perception and specific beliefs. As stated in the pregnancy-specific attitudes survey, while the majority of women acknowledged the net benefits of medications, they believed such drugs are harmful to the fetus.

Nevertheless, most expecting mothers preferred medical intervention over letting a disease go untreated for the fetus's sake. The combination of these beliefs led to heightened caution about the use of medicines without a medical professional's guidance. In line with this, a study of Saudi women discovered that 59% of respondents considered medication use during pregnancy risky<sup>11</sup>. Concerns over pharmaceutical use during pregnancy were more frequently voiced by women who were already worried about medication intake<sup>19,20</sup>.

In our study, 82% agree that pregnant women should not use herbal medicine without consulting a doctor. This resembles the Zaki et al. study from Saudi Arabia, in which 79% of women disapproved of using herbal remedies<sup>11</sup>. As safety is not fully understood, adverse effects and contentious natural remedy beliefs are likely reasons to avoid taking herbal medications<sup>21</sup>. This was further substantiated by a study that found that only 2.1% of pregnant women thought natural therapies were safer than prescription medications. Given that avoidance is advised during pregnancy and that the safety of the majority of natural therapies, including herbal medicines, is not well understood, it is perhaps appropriate. Additionally, pregnant women may be knowledgeable about natural therapies and seek qualified counsel from their healthcare provider before making a choice<sup>22,23</sup>.

Our research indicates that 31.5% of participants agreed on the significance of incorporating vitamin A during pregnancy, and this belief could explain, in part, that the most widely used medications during the current or previously pregnant women were the vitamins and supplements, accounting for 65.6%. Meanwhile, 75.7% of participants believed there was no correlation between consuming vitamin A during pregnancy and the incidence of birth defects. A previous investigation suggested that participants were reasonably aware of the importance of sufficient vitamin A intake during pregnancy, yet their understanding of the implications was somewhat limited<sup>24</sup>. Considering isotretinoin's common use for acne treatment among women in their childbearing years, it could explain this heightened consciousness among women about the need to discontinue the medication while pregnant<sup>25</sup>.

The main limitation of this study is the relatively small sample size. Thus, the authors recommend future studies with a larger sample size. The authors highly advise launching community awareness programs and urging patients to ask their doctors for information on the adverse effects of teratogens. The fact that women should never start or stop taking medicine on their own, especially if they are pregnant, should also be emphasized. Additionally, doctors are advised to inform patients about the most prevalent teratogens and tailor their counsel to each patient's needs.

## CONCLUSION

**The awareness/attitude level among study participants about the teratogenic effects of medication during pregnancy appears to be relatively lower compared to past data. To rectify this issue,**

**doctors, pharmacists, and other healthcare practitioners must provide sufficient guidance. Suitable health literacy and public awareness campaigns designed to challenge customary and cultural perspectives will be beneficial, especially during the conception phase. Advancement in these perceptions and beliefs about medication use either pre- or post-pregnancy requires further investigation.**

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**Institutional Review Board Statement:** "The study was conducted following the Declaration of Helsinki and approved by the Local Bioethics Committee (HAP-09-A-043) of Northern Border University (Approval no. 110/23/H), November 2023."

**Potential Conflicts of Interest: None**

**Competing Interest: None**

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