

## Call for Enhancing Pregnant Women's Knowledge Regarding Teratogenic Medications and Most Common Drugs That Cause Congenital Anomalies

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**Background:** Self-medication presents serious health risks for pregnant women and their fetuses, warranting global concern. Historical incidents, like the thalidomide crisis, emphasize the importance of evaluating the risks tied to medication use during pregnancy.

**Aim:** The current study was conducted to evaluate the effect of an educational program on enhancing pregnant women's knowledge regarding teratogenic medications and the most common drugs that cause congenital anomalies.

**Subjects and Methods:** Design: A quasi-experimental design was used.

**Sample and Settings:** A convenient sample of 358 pregnant women was used at outpatient clinics at Beba Hospital, affiliated with the Ministry of Health, Beni-Suef Governorate.

**Tools:** Tool 1: A structured interview questionnaire. Tool 2: Women's knowledge regarding congenital anomalies and the drug that causes women to fill out a questionnaire sheet. Tool 3: A questionnaire sheet assessing women's knowledge about the most common drugs that cause congenital anomalies.

**Results:** reveal that 46.6% of women had previous births through cesarean section and 27.4% had normal vaginal births; 70.9%, 63.1%, and 67.3% of women had correct knowledge of medication, prescription, and current use. Additionally, 46.9% and 47.8% of women had correct knowledge about congenital malformations and medications that do not cause anomalies. Moreover, the study revealed that 86.3% of women had inadequate knowledge about congenital anomalies and their causes, which regressed to 17.0% posttest and 21.8% posttest, respectively.

**Conclusion:** The study also showed improvements in understanding common drugs that cause congenital anomalies, such as Imodium, Anabril, and clonazepam, which improved posttest. Additionally, the study found that pregnant women with correct knowledge of medication and congenital anomalies during pregnancy showed significant improvement posttest. The posttest significantly improved compared to the pretest.

**Recommendation:** Collaborate with public health organizations to implement national awareness programs focusing on educating pregnant women about teratogenic medications and offering resources for safer pregnancy practices.

**Keywords:** Enhancing, Knowledge, Teratogenic Medications, Drugs, Congenital Anomalies.

### Introduction

Teratogenic drugs are medications or chemical substances that can interfere with fetal development during pregnancy, leading to congenital abnormalities or other adverse outcomes. These drugs pose the greatest risk during the embryonic period, particularly between weeks 3 and 8 post-conception, which is especially sensitive to external influences, and exposure to teratogens during this time can lead to disorders in organ differentiation and, consequently, malformations. Understanding the impact of these factors on the organogenesis process is essential, as it provides a basis for addressing and preventing potential complications in fetal development [1].

Several antiepileptic drugs (AEDs) are known to have teratogenic effects. Valproic acid, for example, is associated with neural tube defects like spina bifida, as well as craniofacial abnormalities and heart defects. Similarly, phenytoin has been linked to fetal hydantoin syndrome, characterized by growth deficiencies, facial abnormalities, and developmental delays. Carbamazepine, another common antiepileptic drug (AED), carries a risk of neural tube defects and minor facial deformities. Pregnant women taking antiepileptic drugs require careful management to minimize risks [1].

Retinoid medications, commonly used for severe acne or psoriasis, are among the most teratogenic drugs. Isotretinoin can cause severe craniofacial, cardiac, and central nervous system abnormalities. Even small doses can result in fetal malformations, making it critical for individuals on isotretinoin to use effective contraception. Acitretin, used for psoriasis, has long-lasting teratogenic effects that may persist even after discontinuation, necessitating extended contraceptive measures [2].

Warfarin, a commonly used anticoagulant, can cause fetal warfarin syndrome, characterized by nasal hypoplasia, limb defects, and central nervous system abnormalities. Similarly, drugs like thalidomide, famous for its history of causing limb deformities, and angiotensin-converting enzyme (ACE) inhibitors, which can lead to kidney and growth abnormalities [2].

Preconception counseling can significantly reduce maternal and infant morbidity and mortality by optimizing health before pregnancy [3-5]. This involves a thorough review of current medications to review medications for safety, efficacy, and possible dosing adjustments; taking a careful family history; providing genetic counseling; and offering patients genetic screening [6-8]. Assess immunization status and offer patients appropriate vaccinations. In addition, providing appropriate patient education on diet and nutrition and supplements may reduce risks to the fetus, especially in early pregnancy before the first prenatal visit, thereby establishing a foundation for a healthier pregnancy [9-12].

Preconception care is vital by focusing on the preconception period that nurses provide to women planning a pregnancy. During these sessions, interventions such as optimizing nutrition, managing chronic medical conditions, ensuring vaccinations are current, identifying and addressing genetic risks, and promoting healthy lifestyle choices are used. Addressing these factors and optimizing health before pregnancy can significantly contribute to the well-being of both the mother and the developing fetus. It can reduce the risk of pregnancy complications, birth defects, and other adverse outcomes [13-17].

During pregnancy, nurses work closely with the healthcare team to ensure patients receive tailored care plans. For example, pregnant women with epilepsy may require a balance between seizure control with anti-epilepsy medications and the adverse drug effects on mothers and fetuses. Taking ASMs has an increased risk of some maternal and delivery complications, including preeclampsia, vaginal bleeding, labor induction, and the need for cesarean section. Nurses advise pregnant women to use folic acid supplements before and during pregnancy to reduce antiepileptic drug side effects [18].

Lifestyle modifications are essential for reducing teratogenic risks. Pregnant women should avoid alcohol completely, as even small amounts can lead to fetal alcohol spectrum disorders. Smoking cessation is also crucial, as tobacco increases the risk of low birth weight, preterm birth, and other complications. Recreational drugs like cocaine, marijuana, and opioids should be strictly avoided, as they have been linked to severe developmental and neurological problems in the fetus [19-22].

Drugs like cocaine, methamphetamine, and opioids are associated with severe neonatal complications, including withdrawal syndromes, low birth weight, and developmental delays. Pregnant women should also maintain balanced diet, as deficiencies in nutrients like iodine, iron, and vitamin D can negatively affect fetal development [23].

Nurses advocate for safe environments at home and work. Nurses educate pregnant women about avoiding harmful substances like pesticides, solvents, and cleaning chemicals. Nurses guide patients on workplace safety, including the use of personal protective equipment and discussing job modifications if necessary [24].

### **Aim of the Study**

The current study was conducted to evaluate the effect of an educational program on enhancing pregnant women's knowledge regarding teratogenic medications and the most common drugs that cause congenital anomalies.

### **Research Hypothesis**

Pregnant women's knowledge regarding teratogenic medications and the most common drugs that cause congenital anomalies will be improved after implementation of the educational program.

## Subject and Method

**Research Design:** Quasi-experimental research design (pre/post-test) was utilized.

**Subjects and Settings:** A convenient sample of 358 pregnant women was used at outpatient clinics at Beba Hospital, affiliated with the Ministry of Health, Beni-Suef Governorate.

### Tools of Data Collection

**Tool 1:** A structured interview questionnaire: A self-administered questionnaire was designed for data collection. An Arabic-structured interview was developed after a thorough literature review, incorporating open- and closed-end questions regarding reproductive history to meet the study's objectives and data requirements.

**Tool 2:** Women's knowledge regarding congenital anomalies and the drug that causes women questionnaire sheet: Total global score from 21 questions, each worth 1 point, was calculated based on correct answers (1) or "don't know"/incorrect responses (0). Mean scores for knowledge were derived by summing scores in each section and dividing by the number of items, then converted to percentages. A score of  $\geq 60\%$  ( $\geq 13$  points) indicates adequate knowledge, while  $< 60\%$  ( $< 13$  points) indicates inadequate knowledge.

**Tool 3:** Women's knowledge regarding most common drugs that cause congenital anomalies questionnaire sheet: Total global scores were derived from 6 questions (1 point each) based on correct answers (1 point) or "don't know"/incorrect (0 points). Mean scores were calculated by summing scores, dividing by the number of items, and converting to percentages. A score of  $\geq 60\%$  ( $\geq 4$  points) reflects adequate knowledge;  $< 60\%$  ( $< 4$  points) indicates inadequate knowledge.

**Supportive material:** The researcher created an educational booklet in simple Arabic to raise awareness among women about teratogenic medications during pregnancy. It includes instructions for drug intake, highlights common teratogenic drugs that may lead to congenital anomalies, such as Imodium causing cleft lip and palate, and provides basic knowledge of congenital anomalies and their effects on pregnant women's health.

**Fieldwork:** The study involved four phases: assessment, planning, implementation, and evaluation. Data was collected through interviews with pregnant women, questionnaires, and interviews. An educational booklet was created based on the assessment data. Pregnant women participated in pretest questionnaires and sessions in Arabic. The evaluation phase measured knowledge, attitude & behavioral changes resulting from the educational program. Ethical approval was obtained from Beni-Suef University's research ethics committee and Beba Hospital. Data was analyzed using descriptive statistics and chi-square test.

## Results

Figure (1) reveals that 46.6% of women had previous births through cesarean section and 27.4% had normal vaginal birth.

Table (1) illustrates that there was a statistically significant improvement during the posttest among the studied pregnant women regarding congenital anomalies and the drug. Women were compared with the pretest, and it was noticed that 41.6%, 46.6%, and 43.3% of the studied pregnant women had correct knowledge regarding any medication that can be used at any stage of pregnancy, the name of the medicine that has been prescribed by the doctor, and the use of all the medicines that they were currently taking during the pretest, which was improved in the posttest to become 70.9%, 63.1%, and 67.3% of women, respectively. The same table reveals that 46.9% & 47.8% of the studied pregnant women had correct knowledge regarding congenital malformations, which are structural or functional challenges that can be identified inside the uterus before birth, and medications without consulting a doctor do not lead to congenital anomalies during the pretest, which improved in the posttest to become 66.2% & 74.6% of women, respectively.

Figure (2) shows that it was noticed that 86.3% of women had an inadequate knowledge level regarding congenital anomalies and the drug that causes them during the pretest; that regressed to only 17.0% posttest.

Table (2) presents that, there was a statistically significant improvement during posttest among the studied pregnant women regarding most common drugs that cause congenital anomalies comparing with pretest and noticed that, (38%, 45.3% & 45%) of the studied pregnant women had correct knowledge regarding taking Imodium tablets during pregnancy without consulting a doctor may lead to a cleft palate, taking anal Brill tablets to treat pressure during pregnancy without consulting a doctor may lead to fetal failure and taking clonazepam tablets in the first trimester during pregnancy without consulting a doctor may lead to phenomenon of neonatal withdrawal during pretest which improved posttest to become (89.9%, 86.9% & 71.8%) of women, respectively.

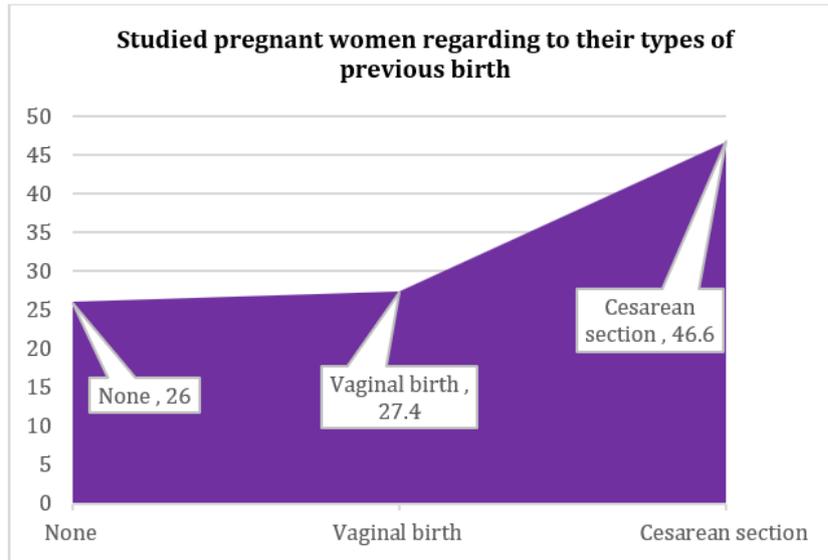
Figure (3) shows that it was noticed that 85.2% of women had an inadequate knowledge level regarding the most common drugs that cause congenital anomalies; that regressed to 21.8% posttest.

**Table 1:** Percentage distribution of the studied pregnant women's knowledge regarding to congenital anomalies and the drug that causes (n=358).

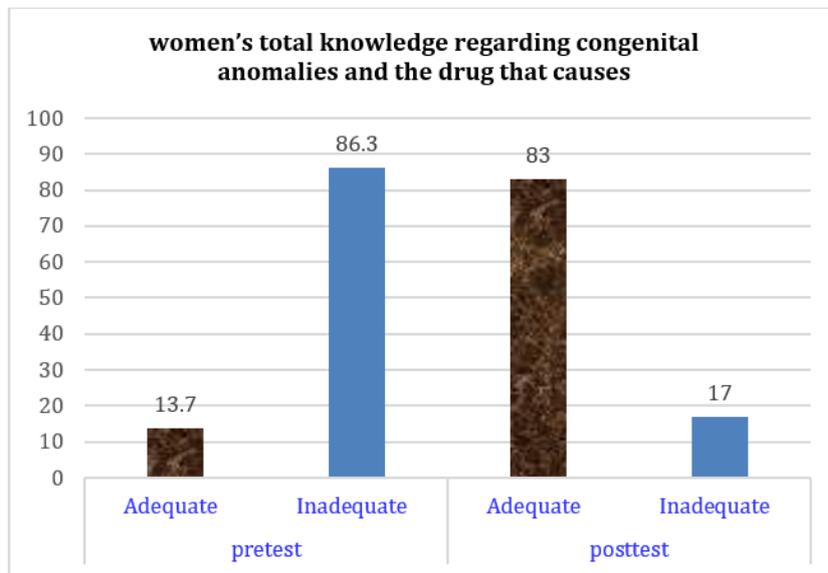
Congenital anomalies and the drug that causes women	Pretest				Posttest				X <sup>2</sup>	p value
	Correct		Incorrect		Correct		Incorrect			
	No.	%	No.	%	No.	%	No.	%		
Any medication can be used at any stage of pregnancy.	149	41.6	209	58.4	254	70.9	104	29.1	25.269	0.000**
Some medications may be more suitable to be used during pregnancy.	117	32.7	241	67.3	267	74.6	91	25.4	31.653	0.000**
A non-prescribed medication can be used during pregnancy.	112	31.3	246	68.7	289	80.7	69	19.3	17.769	0.000**
Wrong drug choice can affect the formation of the fetus and the health of mother.	133	37.2	225	62.8	242	67.6	116	32.4	37.192	0.000**
The pharmacist should provide all necessary information and advice regarding the medication before using it.	137	38.3	221	61.7	247	69.0	111	31.0	54.767	0.000**
It is safe to take common medications and over-the-counter drugs without the physician's or pharmacist's advice.	129	36.0	229	64.0	286	79.9	72	20.1	6.077	0.014*
Some medications should never be used in pregnancy regardless of condition.	110	30.7	248	69.3	261	72.9	97	27.1	28.754	0.000**
Taking a folic acid tablet before pregnancy and during the first three months contributes to preventing congenital malformations.	130	36.3	228	63.7	221	61.7	137	38.3	76.766	0.000**
Know the name of the medicine that has been prescribed by the doctor.	167	46.6	191	53.4	226	63.1	132	36.9	39.373	0.000**
know the use of all the medicines that are currently being taken	155	43.3	203	56.7	241	67.3	117	32.7	45.484	0.000**
Know that medicines can also show adverse effects.	130	36.3	228	63.7	246	68.7	112	31.3	46.183	0.000**
Know that all medicine that is taken might not be safe in pregnancy.	146	40.8	212	59.2	259	72.3	99	27.7	46.545	0.000**
Know that unnecessary medicine taken by the pregnant mother can show adverse effects on the health of the mother and fetus.	158	44.1	200	55.9	283	79.1	75	20.9	17.734	0.000**
Know that exposure to unnecessary medicine during pregnancy can affect fetal organogenesis and development.	151	42.2	207	57.8	260	72.6	98	27.4	39.955	0.000**
Congenital malformations are structural or functional challenges that can be identified inside the uterus before birth.	168	46.9	190	53.1	237	66.2	121	33.8	100.522	0.000**
The side effect of the congenital anomalies is fetal growth retardation.	166	46.4	192	53.6	260	72.6	98	27.4	87.891	0.000**
The kinship between the son may lead to congenital anomalies.	145	40.5	213	59.5	257	71.8	101	28.2	44.576	0.000**
The fast food may lead to congenital anomalies.	157	43.9	201	56.1	272	76.0	86	24.0	32.071	0.000**
Medications without consulting a doctor do not lead to congenital anomalies.	171	47.8	187	52.2	267	74.6	91	25.4	54.815	0.000**
Obesity may lead to congenital malformation.	162	45.3	196	54.7	265	74.0	93	26.0	36.892	0.000**
Radiation does not lead to congenital malformation.	153	42.7	205	57.3	271	75.7	87	24.3	22.829	0.000**
<b>Total (mean±SD)</b>	<b>8.508±3.447</b>				<b>15.106±4.097</b>				<b>6.743</b>	<b>0.009**</b>

\* Statistically significant at p≤0.05

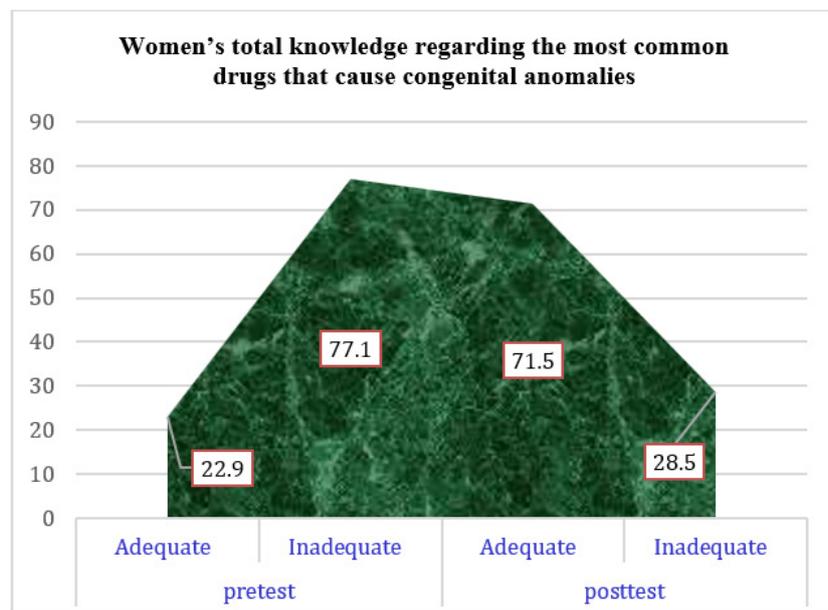
\*\* High statistically significant at p≤0.01



**Figure 1:** Percentage distribution of the studied pregnant women regarding to their types of previous birth.



**Figure 2:** Women’s total knowledge regarding congenital anomalies and the drug that causes.



**Figure 3:** Women’s total knowledge regarding the most common drugs that cause congenital anomalies.

**Table 2:** Percentage distribution of the studied pregnant women's knowledge regarding to most common drugs that cause congenital anomalies (n=358).

Most common drugs that cause congenital anomalies	Pretest				Posttest				X <sup>2</sup>	p value
	Correct		Incorrect		Correct		Incorrect			
	No.	%	No.	%	No.	%	No.	%		
Taking thalidomide during pregnancy without consulting a doctor may lead to hearing defects and lack of limb development.	153	42.7	205	57.3	308	86.0	50	14.0	7.025	0.008**
Taking Imodium tablets during pregnancy without consulting a doctor may lead to a cleft palate?	136	<b>38.0</b>	222	62.0	322	<b>89.9</b>	36	10.1	3.926	0.048*
Taking Analbrill tablets to treat pressure during pregnancy without consulting a doctor may lead to fetal failure?	162	<b>45.3</b>	196	54.7	311	<b>86.9</b>	47	13.1	5.064	0.024*
Taking diazepam in the first trimester of pregnancy may lead to shortness of breath and muscle relaxation in the fetus.	159	44.4	199	55.6	269	75.1	89	24.9	12.041	0.001**
Taking methergine tablets will lead to fetal growth retardation, premature birth, and low fetal weight.	151	42.2	207	57.8	271	75.7	87	24.3	9.071	0.003**
Taking sulfasalazine in the first trimester of pregnancy without consulting a doctor may lead to enlarged head size, ventricular septal defect, and cleft palate.	143	39.9	215	60.1	278	77.7	80	22.3	6.734	0.009**
Taking rifaximin tablets during pregnancy without consulting a doctor may lead to partially open eyes, cleft palate, and short jaw in the fetus.	148	41.3	210	58.7	254	70.9	104	29.1	12.790	0.000**
Taking corticosteroids in the first trimester during pregnancy without consulting a doctor may lead to low birth weight, the toxicosis stage, and cleft lip.	128	35.8	230	64.2	262	73.2	96	26.8	5.952	0.015*
Taking temazepam in the first trimester during pregnancy without consulting a doctor may lead to neonatal withdrawal syndrome.	151	42.2	207	57.8	270	75.4	88	24.6	11.907	0.001**
Taking clonazepam tablets in the first trimester during pregnancy without consulting a doctor may lead to the phenomenon of neonatal withdrawal.	161	<b>45.0</b>	197	55.0	257	<b>71.8</b>	101	28.2	3.953	0.047*
<b>Total (mean±SD)</b>	<b>4.167±1.862</b>				<b>7.826±1.770</b>				<b>5.432</b>	<b>0.020*</b>

\* Statistically significant at  $p \leq 0.05$

\*\* High statistically significant at  $p \leq 0.01$

## Discussion

Self-medication is a serious health hazard that can lead to a variety of difficulties and considerable challenges for individuals and communities, particularly in pregnant women. Self-medication is a global issue that demands attention due to the possible risk not only to pregnant women but also to their unborn fetuses [25-29]. Medication use during pregnancy has been a concern both for the mother and fetus since the discovery of birth defects resulting from the thalidomide crisis in early pregnancy; this necessitates critical evaluation of the risk level of medication used during pregnancy [30]. That is why the current study was conducted to evaluate the effect of an educational program on enhancing pregnant women's knowledge regarding teratogenic medications and the most common drugs that cause congenital anomalies.

Regarding types of previous births and place of birth, the current study demonstrated that less than half of pregnant women had cesarean sections. And more than one-third of them delivered at a public hospital. These findings were consistent with Almatrafi et al. (2024), who investigated "Awareness and Attitude of Women about the Teratogenic Effect of Drugs during Pregnancy" and found that the minority of the participants delivered at a public hospital via cesarean section [30]. This may be related to low socio-economic level and decreased awareness.

Overall, after the program, the pregnant women's knowledge regarding teratogenic medications and the most common drugs that cause congenital anomalies was improved. Consequently, the implementation of the program improved the overall good knowledge grades of women. This improvement could be attributed to the implemented educational program and the lecture and positive reinforcement, as well as a wide variety of educational methods used [32-36]. Furthermore, the Arabic booklets that were distributed were essential for acquiring and remembering knowledge.

Brief booklets that are written in plain language, have lots of eye-catching illustrations, and complement other teaching strategies are the best for their purposes. The NTL's Pyramid of Learning, developed by Edgar Dale, demonstrated that people can retain 20.0% of what they see and hear (audiovisual) and 10.0% of what they read, according to Masters. According to the same author, a discussion can help one remember 50.0% of what they have learned [37-39].

Concerning knowledge of the studied pregnant women regarding to congenital anomalies and the drug that causes teratogenicity; the current study revealed that there was a statistical significant improvement during posttest among the studied pregnant women regarding congenital anomalies and the drug that causes them comparing with pretest and noticed that, less than half of the studied pregnant women had correct knowledge regarding any medication can be used at any stage of pregnancy, the name of the medicine that has been prescribed by the doctor and know the use of all the medicines that you are currently taking during pretest which was improved posttest to become more than two third of women.

These findings were consistent with Almatrafi et al. (2024), who investigated "Awareness and Attitude of Women about the Teratogenic Effect of Drugs during Pregnancy" and found that there was a statistically significant improvement in pregnant women's knowledge regarding drug safety and teratogenic risks [30].

The study also reported that less than half of the studied pregnant women had correct knowledge regarding congenital malformations, which are structural or functional challenges that can be identified inside the uterus before birth, and medications without consulting a doctor do not lead to congenital anomalies during the pretest, which improved the posttest to become less than three-quarters of women.

This finding aligns with the cross sectional study by Alemu et al. (2023), who studied "Pregnant women's knowledge of birth defects and associated factors in referral hospitals of the Amhara region" and reported that only about less than half of pregnant women had adequate knowledge about birth defects [40]. The observed improvement clearly demonstrates the effectiveness of structured educational interventions in correcting common misconceptions and increasing pregnant women's awareness of the potential risks associated with unsupervised medication use during pregnancy.

## Conclusion

The study also showed improvements in understanding common drugs that cause congenital anomalies, such as Imodium, Anabril, and clonazepam, which improved posttest. Additionally, the study found that pregnant women with correct knowledge of medication and congenital anomalies during pregnancy showed significant improvement posttest. Compared to the pretest.

Collaborate with public health organizations to implement national awareness programs focusing on educating pregnant women about teratogenic medications and offering resources for safer pregnancy practices.

## Recommendations

Collaborate with public health organizations to implement national awareness programs focusing on educating pregnant women about teratogenic medications and offering resources for safer pregnancy practices.

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