

# TERATOGENIC EFFECT OF DRUGS-KNOWLEDGE AND PRACTICE AMONG INTERNS-DESCRIPTIVE CROSS-SECTIONAL STUDY IN A GOVERNMENT MEDICAL COLLEGE

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## ABSTRACT

**Context:-**Teratogenicity is a major cause of abortion, still birth and can result in long-term disability with a significant impact on individuals, families, societies and healthcare systems. Drugs being one of the causes of teratogenicity, creating awareness among medical students, the future prescribing physicians, the rate of teratogenicity can be decreased. Attainment of right knowledge at right time about teratogenicity of a particular drug is very crucial which requires more awareness among general doctors in a country like India where most of the pregnant females are managed by these doctors only in peripheral regions.**Aims:-**1.To estimate the knowledge regarding teratogenicity of drugs and their practice of prescribing in pregnant women.2.To assess the gap between knowledge and practice among the interns.3.To heighten their awareness and inquisitiveness about teratogenicity of drugs.**Settings and Design:**This is a descriptive cross-sectional study conducted among interns.

**Methods and Material:**The data was collected by self-administered closed ended questionnaire through Google forms.Statistical analysis used: Statistical analysis was performed using SPSS software 21 version.

**Results:**Though majority of interns knew about teratogenic effect of drugs,only 60.8% believed that they can affect fetus through all gestational ages.Good number (73.3%)were practicing preconception counselling also.

**Conclusions:** Based on the findings of present study it is obvious that more emphasis should be put on improving knowledge about teratogenic drugs during early years of medical training in order to bring about necessary changes in existing practices of treating doctors.

**Keywords:** Teratogenicity,Interns,Knowledge

## INTRODUCTION

Teratogenicity is defined as “any morphological, behavioral or biochemical effect induced during embryonic life or fetal life detected at birth or later”.<sup>1,2</sup>The term teratogen is originated from a Greek word ‘teras’ meaning a monster.<sup>1</sup> A number of factors like infections (TORCH), ionizing radiation, metabolic disturbances (diabetes mellitus and phenylketonuria) and drugs act like a teratogen.<sup>3</sup> Teratogenicity is a major cause of abortion, still birth and can result in longterm disability with a significant impact on individuals, families, societies, and healthcare systems.<sup>4</sup> WHO had estimated 2,70,000 deaths during the first 28 days of life to be due to congenital anomalies globally.

March of Dimes (MOD) global report on birth defects stated 7.9 million births (0.6% of total births) to be associated with serious birth defects annually. Majority (94%) of these defects occur in middle and low income countries. Joint WHO and MOD meeting reported birth defect to account for 7% of all neonatal mortality and 3.3 million under five deaths. Common birth defects include congenital heart disease, congenital deafness and neural tube defect.<sup>5</sup> India being a high birth rate country the annual birth defect prevalence of 6-7% can significantly affect many health indicators.<sup>5,6</sup> Teratogenicity is an important cause of fetal birth defect leading to neonatal morbidity and mortality still awareness about teratogenicity is found to be inadequate among physicians.<sup>7,8</sup> Teratogenic drugs are responsible for <1% of birth defects.<sup>9</sup> Previous studies had reported only 24% of physicians to be confident while prescribing for a pregnant woman.<sup>10</sup> Teratogenic drugs can affect developing fetus at various stages of intrauterine life, most susceptible being the period of organogenesis i.e. from 3rd week to 8th week of intrauterine life, nevertheless these drugs can affect a fetus beyond 8 weeks also as development and maturation of many organs continues throughout the pregnancy.<sup>11</sup>

As per one study from Europe about 86% pregnant women are exposed to >1 drug and at least 1% birth defects are a result of teratogenic drug use in pregnancy.<sup>12,13</sup> On other side pregnant women themselves decided to terminate their otherwise wanted pregnancy because of their wrong perception of even safe drugs like antihistamines most important reason being lack of effective counselling by the treating doctor.<sup>14</sup> Worldwide a significant proportion of pregnancies are unplanned.<sup>15,16</sup> With medical advances more of these women with chronic medical conditions are getting pregnant and need to continue their medication, therefore treating doctor needs to be very well aware about the teratogenicity of drugs.<sup>17,18</sup> Most of the Indian pregnant females can't access a secondary or tertiary care institute during initial period of pregnancy and generally are taken care by a general physician, who may not have a very good knowledge regarding rational drug prescription in pregnancy. In our undergraduate curriculum also topic of teratogenicity doesn't get due space, therefore there is a need to increase awareness regarding teratogenic drugs during undergraduate training itself.

## MATERIALS & METHODS

**STUDY DESIGN**

An observational cross sectional descriptive study was done to analyse the knowledge, attitude and practices about teratogenicity of drugs and prescribing in pregnancy among interns.

**STUDY PERIOD:**

The study was carried out over a period of one week from 7th to 14th of December 2023.

**STUDY SETTING:**

The study was carried out among the interns of Kurnool Medical College, Kurnool; a teaching hospital in Andhra Pradesh.

**INCLUSION CRITERIA:**

All interns who were willing to participate in the study were included in the study.

**EXCLUSION CRITERIA:**

All interns who were not willing to participate in the study were excluded from the study.

**SAMPLE SIZE:** The Google questionnaire was distributed to a batch of 150 interns out of which 120 subjects responded.

**TOOLS OF DATA COLLECTION:**

Data were collected using a self-administered pretested closed ended questionnaire. It was circulated among them as a Google form. No name was attached to the questionnaire. Filling up of the questionnaire was taken as consent for participation in the study.

**Statistical analysis:** Data was entered into MS Excel. Statistical analysis was done using the software Statistical Package for Social Sciences (SPSS) 26.0 version. All qualitative and categorical variables were expressed as frequency and percentage and bar and pie diagram were used to present the categorical data.

**Results:**

A total of 120 medical students were included in the study and their awareness regarding teratogenicity and drugs causing teratogenicity were studied.

**Table 1: Responses towards awareness of teratogenicity**

Questions	Responses	Frequency	Percentage
Teratogenic effect of drugs occurs in first trimester only	Yes	51	42.5
	May be	63	52.5
	No	6	5.0
Teratogens may interfere with fetal development and maturation throughout pregnancy	Yes	73	60.8
	May be	75	22.5
	No	20	16.7
What is the Teratogenic window-the period during which they can cause birth defects	4 to 7 weeks	46	38.3
	7 to 12 weeks	29	24.2
	Before 5 months of gestation	40	33.3
		5	4.2

	Before missed period		
What is the right time to counsel a woman about teratogenic effect of drugs	Before conception	84	70
	In early pregnancy	12	10
	Soon after pregnancy test is positive	24	20
Which category of women are at risk of exposure to teratogenic agents	Acute illness in early pregnancy	6	5
	Chronic medical disorder	7	5.8
	Occupational exposure to radiation	14	11.7
	All of the above	91	75.8
	None	2	1.7
Before which day of menstrual cycle, it is ideal to finish off investigations involving radiation exposure. (Ex: X-ray CT scan)	5 <sup>th</sup> day	36	30
	7 <sup>th</sup> day	24	20
	10 <sup>th</sup> day	45	37.5
	14 <sup>th</sup> day	15	12.5
Do you ask date of last menstrual period before prescribing medication/ordering X-ray to a woman of reproductive age	Always	74	61.7
	Often	16	13.3
	Sometimes	22	18.3
	never	8	6.7
Do you counsel a woman with chronic medical illness, to approach for preconception care and need for modification of drugs to avoid teratogenicity?	Always	88	73.3
	Often	12	10
	Sometimes	16	13.3
	never	4	3.4

About 42.5% of students believe that Teratogenic effect of drugs occurs in first trimester only and 60.8% believe that Teratogens may interfere with fetal development and maturation throughout pregnancy. 38.3%, 24.2% and 33.3% had aware that Teratogenic window-the period during which they can cause birth defects was 4 to 7 weeks, 7 to 12 weeks and before 5 months of gestation respectively. Majority (75.8%) of them believe that women who are in Acute illness in early pregnancy, Chronic medical disorder, Occupational exposure to radiation were greater risk of exposure to teratogenic agents. About 30%, were aware that before 5<sup>th</sup> day of menstrual cycle, it is ideal to finish off investigations involving radiation exposure. (Ex: X-ray CT scan). 61.7% were asking always the date of last menstrual period before prescribing medication/ordering X-ray to a woman of reproductive age and 73.3% were always counselling a woman with chronic medical illness, to approach

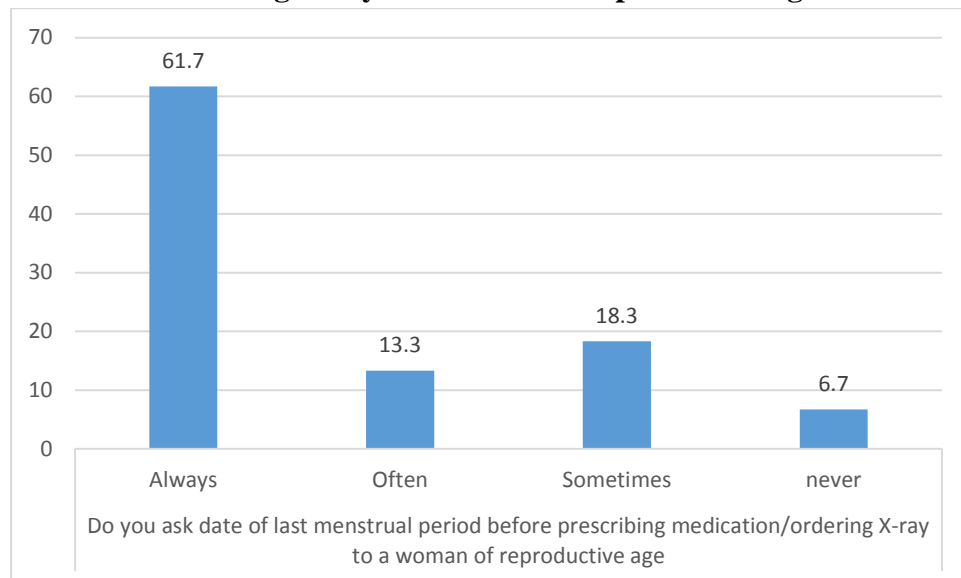
for preconception care and need for modification of drugs to avoid teratogenicity. (Table 1, Figure 1 and Figure 2)

**Table 2 : Responses towards awareness of teratogenic drugs**

Questions	Responses	Frequency	Percentage
Which antibiotic should be avoided in pregnancy	Ampicillin	9	7.5
	Azithromycin	9	7.5
	Cephalosporin	4	3.3
	Tetracyclines	98	81.7
Which medication should be stopped soon after conception	Folic acid	6	5
	Hydroxychloroquine	28	23.3
	Levothyroxine sodium	7	5.8
	Warfarin	79	65.8
Which medication can be continued periconceptionally	Azathioprine	16	13.3
	Metformin	88	73.3
	Methotrexate	5	4.2
	Phenytoin	11	9.2
Which Anti-tubercular drug has teratogenic effect?	Ethambutol	15	12.5
	Pyrazinamide	22	18.3
	Rifampicin	12	10
	Streptomycin	71	59.2
Which Antimalarial drug has teratogenic action	Artesunate	14	11.7
	Lumefantrine	9	7.5
	Primaquine	58	48.3
	Quinine	39	32.5

Table 2 shows responses towards awareness of teratogenic drugs. About 81.7% had awareness that Tetracyclines should be avoided in pregnancy. 65.8% had awareness that Warfarin should be stopped soon after conception. 73.3% had awareness that Metformin can be continued periconceptionally. Among anti-Tubercular drugs, 59.2% had awareness that Streptomycin tubercular drug and among anti- malarial drugs, 48.3% had awareness that Primaquine has teratogenic effect.

**Figure 1: Practice of asking date of last menstrual period before prescribing medication/ordering X-ray to a woman of reproductive age**



## DISCUSSION

Awareness regarding teratogenicity among medical students right from their training period is very important in order to reinforce the habit of asking relevant drug history from all reproductive age group and pregnant women because these defects are preventable in most of the cases and also the impact of malformations affects not only the patients but also their families.<sup>19</sup> Hence, it is the need of the hour to make students aware of this important issue. About 42.5% of students believe that Teratogenic effect of drugs occurs in first trimester only and 60.8% believe that Teratogens may interfere with fetal development and maturation throughout pregnancy. In a study conducted among second professional medical students of central India, most of the students (57%) were aware that teratogenicity due to drugs can occur during all the three trimesters.<sup>20</sup> A similar study conducted among second year medical students in Karnataka found that most of the students believed that all drugs are not safe during pregnancy.<sup>21</sup> But lesser number of them was aware that a drug can be teratogenic throughout the pregnancy. Although this number was lesser which is due to the fact that generally it is considered that a drug is teratogenic only during the 1st trimester as organogenesis occurs during this period only. More awareness is needed regarding creating awareness about developmental and biochemical abnormalities that can occur, even when teratogenic drug exposure occurs during the 2nd and 3rd trimesters. These results are consistent with the previous published studies.<sup>20,22,23</sup> 38.3% were aware of Teratogenic window-4 to 7 weeks; the period during which they can cause birth defects. Majority of the interns identified teratogenic drugs correctly. Most of the second year undergraduate students in Central India knew that the most susceptible time for teratogen to affect the fetus, majority (90%) thought that it is initial 8 weeks of intrauterine life, which is correct. Most of the students (77%) knew the value of

eliciting drug intake history in pregnant women. This shows the awareness of students regarding value of this important information to be acquired from a pregnant lady. The knowledge regarding teratogenic drugs was inadequate among the undergraduate students. The results were similar to previous studies done among the physicians.<sup>7,10</sup> Majority of interns (73.3%) were always counselling a woman with chronic medical illness, to approach for preconception care and need for modification of drugs to avoid teratogenicity. Many of them (61.7%) were asking always the date of last menstrual period before prescribing medication/ordering X-ray to a woman of reproductive age. Most of the 2nd year students (64%) thought that this history of drug intake is to be asked during first trimester only while only 21% thought that it is important to ask this history even before pregnancy, this finding emphasizes upon creating more awareness regarding preconception counselling among students right from their training time.<sup>20</sup>

**Limitations:** small sample size.

## CONCLUSION

In the present study, it was found that more effective training is required during undergraduate course itself to create proper awareness among medical students about the teratogenicity of drugs. The medical students should be taught this topic by including more case discussions related with teratogenicity during their clinical practice to inculcate the habit of thinking about possible intake of teratogenic drug by a pregnant lady whenever they come across an antenatal case and preconceptionally also in women of reproductive age.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee.

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