



## Review Article

### EFFECT OF ENVIRONMENTAL TOXICITY ON REPRODUCTIVE SYSTEM: A REVIEW

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#### ABSTRACT

Reproductive toxicity is the toxicity of reproductive system caused due to environmental factors such as chemicals, heavy metals etc. They interfere in some way with normal reproduction, such substances are called reprotoxic. It includes hazardous effects on fertility and sexual function in adult males and females as well as developmental toxicity in the offspring. Developmental toxicity is abnormal structure or functional development following exposure of pregnant or lactating females. In environment there are various factors which are responsible for causing adverse effect on reproductive system. Heavy metals like cadmium, lead, mercury, Industrial chemicals like phthalates, BPA, Agricultural chemicals, radiations, some of the narcotics drugs like morphine, ethanol, psychotropic drugs like diazepam, chlorpromazine, hypotensives like methyldopa, reserpine. All these factors acts as reproductive toxicants and affects male and female reproductive system causing spontaneous abortion, miscarriage, reduced fertility, preterm delivery, LBW, affect sertoli cells in the testis, affect leydig cell function etc. In ancient Ayurvedic texts also it is described that the heavy metal such as mercury, copper affects the reproductive system. Metals and metallic compounds, pesticides, some food additives have a nature of accumulations within the living body when it exposed since prolonged period. These factors accumulate in the body day by day. This is nothing but *Dushivisha* (cumulative toxins). *Dushivishas* vitiates the *Dhatu*s after the laps of a long time on obtaining a favorable condition. It also affects the *Shukradhatu* causing *Shukrashaya* (diminish semen). People should be aware of all these factors to take adequate precaution.

**KEYWORDS:** Reprotoxins, Reproductive toxicity, developmental toxicity, *Dushivisha*.

#### INTRODUCTION

Reproductive toxicity includes the toxic effects of some substances on the reproductive ability of an individual and the development of its offspring. In environment there are various factors that are responsible for reproductive and developmental health effects. In the main, adverse reproductive effects of chemicals have been identified by direct practical experience from either accidental occupational exposure or as side effects of therapeutic drugs. Factors such as pesticides, solvents, some of the heavy metals, air pollutants, cigarette smoke, alcohol consumption radiations affects the male and female reproductive system both causing miscarriage, decreased semen quality, infertility, menstrual disorders, decreased foetal and birth weight, spontaneous abortion, premature delivery etc. In ancient Ayurvedic text some of the heavy metals copper, mercury, *Haratala* affects the reproductive system. It enters into the body through food, drinks etc. accumulates in the body acts as *Dushivisha* (cumulative toxins) causes diminish semen. Again *Virrudhaahar* (incompatible diet) some of the wrong combination of foods causes impotency.

**AIM:** To elaborate the concept of effect of environmental toxicity on reproductive system.

#### OBJECTIVES

1. To provide insight various environmental factors that affect reproductive system.
2. To aware common people about hazardous effect of environmental factors on Reproductive system.

#### Reproductive Toxicity<sup>[1]</sup>

Reproductive toxicity is the toxicity of reproductive system which includes hazardous effects on sexual function and fertility in adult males and females as well as harmful effects on development of the offspring

#### Two Major classes

**Reproductive toxicity-** Harmful effects on sexual function and fertility in males and non-pregnant females

**Developmental toxicity-** Abnormal structure or functional development following exposure of pregnant or lactating females.

**Reproductive Health Effects of Prenatal Exposure to Environmental Contaminants<sup>[2,3]</sup>**

<b>Chemicals</b>	<b>Sources</b>	<b>Reproductive or developmental Health Effects</b>
<b>Pesticides</b>	Food residues, Gardening, Agriculture, greenhouse work	Increased susceptibility to testicular cancer Impaired fetal growth Impaired cognitive development Impaired neurodevelopment Childhood cancer
<b>Lead</b>	Paint. Occupational exposure occurs in battery manufacturing and recycling, car repair and welding, Lead smelting, Battery industry, Car repair, welding	Miscarriage, Premature birth
<b>Mercury</b>	Dental personnel, Lamp industry, Chloralkali industry, fish. Frequently enters the food chain through coal combustion	Cerebral palsy, brain malformation
<b>Phthalates</b>	Medical devices, cleaning and building materials, personal care products, cosmetics, pharmaceuticals, food processing, toys	Shortened gestational age Reduced masculine play in boys Reduced anogenital distance Impaired neurodevelopment in girls
<b>Bisphenol A</b>	Food, consumer products, packaging	Birth defects, Recurrent miscarriage Aggression and hyperactivity in female children
<b>Polybrominated diphenyl ethers</b>	Furniture, textiles, carpeting, electronics, plastics	Impaired neurodevelopment, premature delivery, low birth weight, still birth
<b>Polychlorinated biphenyls</b>	Polychlorinated biphenyls were used as industrial insulators and lubricants	Development of attention deficit and hyperactivity disorder- associated behavior
<b>Perchlorate</b>	Rocket fuel, fireworks, flares, explosives, bleach, fertilizers	Altered thyroid function
<b>Perflurochemicals</b>	Food wrappers, stain- resistant, non-stick surfaces	Reduced birth weight, birth defect
<b>Solvents</b>	Industrial wok places ; used in numerous consumer products including: plastics, dyes, detergents, food containers, carpeting, cleaning products, nail salons, Painting, degreasing, shoemaking, printing, dry cleaning, metal industry	Fetal loss Miscarriage
<b>Toluene</b>	Dry cleaning, degreasing shoe industry, laboratory work, Painting	Decreased fetal and birth weight Congenital malformations
<b>Formaldehyde</b>	Wood adhesives, abrasive materials, industrial products, clinical laboratories, embalming, Personal care products, germicides, fungicides, insecticides	Spontaneous abortion Low birth weight

<b>Antineoplastic drugs</b>	This class of chemotherapy drugs presents an occupational exposure for nurses and health care professionals	Spontaneous abortion Low birth weight
<b>Anesthetic gases</b>	Anesthetic gases are administered by inhalation in health care settings and veterinary care.	Congenital anomalies Spontaneous abortion
<b>Ethylene oxide</b>	Ethylene oxide is used to sterilize heat- sensitive medical items, surgical instruments and other objects that come into contact with biological tissues.	Spontaneous abortion and pregnancy loss Preterm and postterm birth
<b>Cigarette smoke</b>	Cigarette smoke exposure includes active smoking, passive smoking or both	Miscarriage Decreased semen quality Intrauterine growth restriction, low birth weight, preterm delivery
<b>Air pollutants</b>	Motor vehicles, industrial production, coal production, wood burning, dry cleaners	Low birth weight Birth defects
<b>Radiation</b>		Miscarriage, brain defects, skeletal defects
<b>Alcohol</b>	Heavy alcohol consumption by pregnant women	Adverse effects upon offspring. Known as foetal alcohol syndrome, this is characterized by facial, limb, and cardiovascular abnormalities, growth retardation and CNS dysfunction.

#### Toxic effects on human male reproductive system<sup>[4]</sup>

Chemicals that target male reproductive system may affect male reproductive organ structure, androgen hormone secretion, spermatogenesis, and accessory organ function.

#### Some examples of chemicals that affect human male reproductive system

Ethylene oxide, chlordecone- Infertility

Carbon disulphide, Chlordecone- Reduced sperm counts.

Lead, Epichlorohydrin- Sperm abnormalities.

Cadmium, m- dinitrobenzene, 1-2 dibromoethane, ethylene glycol monomethylether-

Reduced fertility

Carbon tetrachloride- hormonal changes

#### Toxic effects on human Female reproductive system<sup>[4]</sup>

Chemicals that target female reproductive system causes adverse effects on sexual behavior, onset of puberty, fertility, gestation time, pregnancy, lactation, premature menopause.

#### Some Examples of chemicals that affect human male reproductive system

Lead – menstrual disorders, infertility

Mercury, Polychlorinated biphenyls (PCBs)- Cause irregularities in menstrual cycle

Nitrous oxide – Reduced fertility

Phthalates, Arsenic, toluene, Organic solvents- Foetal abnormalities

#### Drugs that induce male impotence<sup>[5]</sup>

Sr.No	Class	Agent
1	Narcotics	Morphin Ethanol
2	Psychotropic	Chlorpromazine Tricyclic antidepressants Diazepam
3	Hypotensives	Reserpine Guanethidine Methyldopa Clonidine
4	Hormones/ agonists	Estrogens Cyproteronone

## Ayurvedic Aspect

- In Ayurveda some of the heavy metals like mercury, copper are responsible for reproductive toxicity.
- In *Sushruta kalpasthan adhyay 2* diminish semen is one of the sign and symptoms of *Dushivisha*.
- In *Charak samhita sutrasthan adhyay 26 Shandhya (Napunsakta)* is one the disease caused by *Virrudhaahara*.

## Mercury toxic symptoms<sup>[6]</sup>

Mercury toxicity causes painful hard swelling on scrotum

## Copper toxic symptoms<sup>[7]</sup>

Due to the consumption of impure copper causes diminish semen.

## Impure sulphur toxic symptoms<sup>[8]</sup>

Internal use of impure sulphur causes *Viryanash* (Azoospermia)

## *Hartalbhasma Guna*<sup>[9]</sup>

In females the only use of *Hartal* causes *Nashtaartava* (amenorrhoea).

## *Viruddhaharsevanjanyavyadhi*<sup>[10]</sup>

The food which is wrong in combination, which is consumed in incorrect time of day and in wrong season, which has undergone wrong processing, can lead to *Viruddha Ahara*.

According to *Charaksamhita sutrasthan shandhya (Napunsakta)* is one of the diseases caused due to *Virrudhaahara*.

## Signs and symptoms of *Dushivisha*<sup>[11]</sup>

According to *Sushrut Samhitakalpasthan Sukrashay* (diminish semen) is one of the sign and symptoms of *Dushivisha*. *Dushivisha* is chronic type of toxicity due to the accumulation of either inanimate or animate or artificial poisons. It is less potent and remain in the living body for prolonged periods and produces complications. Metals and metallic compounds, some food additives, pesticides have a nature of accumulation within the living body when it exposed since prolonged period.

## *Dushivishaupdrava*<sup>[12]</sup>

According to *Sushrut samhita kalpasthan shukrashay* (diminish semen) is one of the complications of *Dushivisha*.

## DISCUSSION

Chemicals present in food and drugs, agricultural chemicals, industrial chemicals, all these environmental factors affects male and female reproductive system causing spontaneous abortion, congenital anomalies, LBW whereas in male it causes reproductive tract disorders, Infertility, Testicular

and prostate cancer. So, it is important to know about all these factors for prevention from such type of adverse effects. Also some of the narcotics drugs like morphin, ethanol, psychotropic drugs like diazepam, hypotensive drugs like clonidine, hormones like estrogens, cyproteronone cause male impotence. In Ayurvedic text also it is mentioned that due to the consumption of heavy metals causes *Shukra shay* (diminish semen), *Nashtartava* (amenorrhoea) etc. Heavy metals, pesticides, some food additives enters the body through food, drinks or through other ways. It gets accumulates in the body, acts as *Dushivisha* (cumulative toxins) causes diminish semen. Again *Virrudhaahara* (incompatible diet) the wrong combination of some foods, foods consumed in incorrect time and incorrect season causes impotency. So, people should be aware of all these factors that are responsible for reproductive toxicity so as to take adequate precaution.

## CONCLUSION

Toxicity is the degree in which a substance can harm human beings and animals. Now a days there is increase in industrialization, use of synthetic chemicals, environmental pollution, exposures to radiation or harmful compounds at work place which affects the reproductive health. These environmental toxins affects both male and female reproductive systems causing infertility, spontaneous abortions, menstrual irregularities, endometriosis, birth defects in female whereas in male undescended testis, lower sperm counts and sperm volume, testicular cancer. It is necessary to aware people about all the effects of these environmental toxins on reproductive system.

## REFERENCES

1. Reproductive and Developmental Toxicity, cited 2018 Oct 17 [https://www.chemsafety pro... eproductive\\_Toxicity.html](https://www.chemsafety pro... eproductive_Toxicity.html).
2. The American College of Obstetricians and Gynecologists Committee Opinion on Exposure to Toxic Environmental Agents, Number 575, October 2013.
3. Prenatal Exposure to Toxic Chemicals-Physicians for social Responsibility, 2018/05 [www.psr.org](http://www.psr.org).
4. reproductive risks of chemicals at work, version 4:30 November 2011 [www.rsc.org](http://www.rsc.org)
5. Drug induced male sexual dysfunction, AJ Wein 1988 <https://www.ncbi.nlm.nih.gov/pubmed>
6. Bhaishajyaratnavali of Kaviraj Govind Das Sen edited with Siddhipradahindi commentary, Chaukhambha surbharti prakashan, Varanasi, ch 97, sh 11-13.



7. Shri Siddhinandan Mishra, Rasratnasamuchya of Acharya Vagbhat, 1<sup>st</sup> ed. 2011 Varanasi, Chaukhamba orientalia, ch 5, sh 47.
8. Vaidya Vachaspati ShriGulraj Sharma Mishra, Ayurved Prakash of Acharya Shri Madhava, Chaukhambha Bharati Academy, ch 77.
9. Dr.A.D.Satpute, English translation, Rasratnasamuchya, Chaukhamba Sanskrit Pratishthan, Delhi, Ch-3, verse- 66, pg.no-66.
10. PV.Sharma, Charakasamhita, Edition chaukhamba Orientalia, Varanasi- 2008, 4, Sutrasthanam chapter 26 verse 102-103.
11. PV.Sharma, English commentary, Sushrutsamhita, Edition chaukhamba Visvabharti Oriental publisher, Varanasi- 2010, 3, Kalpasthan chapter 2 verse 30-32.
12. PV.Sharma, English commentary, Sushrutsamhita, Edition chaukhamba Visvabharti Oriental publisher, Varanasi- 2010, 3, kalpastan chapter 2 verse 53-54.

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