Original Article

Endocrine Disruptors; Are Gynecologists Aware of it?

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Abstract

Objective: To assess the level of knowledge among gynecologists as regards to EDCs.

Methodology: A cross sectional survey was designed to explore the knowledge of doctors practicing obstetrics and gynecology in different public hospitals of Lahore. A detailed proforma was designed about different types of EDCs and their effects on females. This was a unique study, as this aspect of preventive medicine has not been evaluated before. Results were then compiled and tabulated.

Results: A total of 140 doctors (OBGY) participated in this survey. When asked about their awareness regarding EDCs, almost 42% did not have any idea however interestingly up to 96% knew that use of plastic is bad for human health. Information about other EDCs was mixed, blaming pesticides, heavy metals, phytoestrogens, and cane food. Almost 96% knew that microwave heating could enhance the leaking of chemicals from plastics. However, 60% of participants linked gynecological and breast cancer with EDCs exposure and, to a lesser extent, birth defects and immunological and cognitive disorders. Most participants denied their routine practice of educating the patients about EDC exposure and how to prevent it.

Conclusion: Health care professionals themselves are not aware of it so the problem remains unrealized. Moreover, there is neither an effective effort to resolve this threat nor an attempt to educate the public by doctors who are only partly aware of the issue. So this trend needs to be changed on a revolutionary basis.

Keywords: Endocrine disruptors, Reproductive disorders, gynecologists, awareness.

Cite this article as: Kouser S, Anwar B, Tabassum Z, Anwar K, Fatima T, Tayyab M., Endocrine Disruptors; Are Gynecologists Aware of it?.J Soc Obstet Gynaecol Pak.2020; Vol 10(3):146-149.

Introduction

Endocrine disruption by exposure to different substances in females is a real phenomenon. Endocrine disruptors are chemicals that on exposure can derail and interfere human endocrine system.

Endocrine Disruptors have emerged as a new causative factor for reproductive endocrine disorders over the last 2-3 decades.[1] These endocrine disruptors (EDs) are exogenous substances or a mixture of chemicals, which can change the endocrine system functions leading to adverse health issues.[2]

The endocrine system plays a central role in all vertebrates and regulates metabolism, development, reproduction, and behavior through more than 50

Authorship Contribution: [1,2,3] Conceived and planned the idea of the study and writing of the manuscript. Supervised the study all along and reviewed the manuscript[1,2,3], Data collection[5,6], analysis & interpretation of data[4]

Funding Source: none
Conflict of Interest: none

Received: April 21, 2020
Accepted: Nov 19, 2020

different hormones and hormone related molecules (cytokines and neurotransmitters) that integrate and control normal body functions throughout life. These hormones act via hormone receptors and are active at low doses. There is a non-linear dose-response relationship, and these have tissue and life stage-specific effects. The developmental effects are permanent and different end points vary insensitivity.[3]

The Endocrine disruptors, on the other hand, act via hormone receptors as well as multiple receptors, thus simulating multiple hormones at the same time and changing their actions by competing with their receptors.[4] Thus, the EDCs can have an augmented response of estrogens, androgens, and thyroid hormones. Extrinsic factors such as diet and lifestyles can impact individual susceptibility to endocrine active agents.[5]

The EDs are found frequently and abundantly in consumer products, industrial, agricultural products, pharmaceutical applications, disinfectants, plastics, and personal care products.[6] With continuous exposure via ingestion, inhalation, and skin uptake, there are *Increased chances of* Endometriosis & Fibroids, Precocious puberty, Precocious puberty (PCO), Premature ovarian failure (POF), Genital malignancies, progressive decline of fertility in the last decades and Pregnancy complications (abortions and Preterm labour).[7] Exposure to EDCs during vulnerable periods of fertilization through fetal development and nursing of young offspring, raises particular concerns.

BPA is one of the most common industrial EDC, which is used in plastic wares and leaches from it and is capable of activating estrogen receptors.[8] In 2012 the FDA amended its food additive regulations to no longer provide for the use of polycarbonate resins in baby bottles and sippy cups.[9] The other common EDCs, their sources and ultimate reproductive effects are revealed by the table below.[10, 11]

Table I: Endocrine disruptors sources and side effects

Compound	Use/ Source	Disease Link
BPA (Bisphenol-A)	Plastics, Thermal receipts	Breast & other cancers, metabolism, puberty, neurobehavioral
Phthalates	Plastics, fragrances	Low sperm count, metabolism, birth defects, asthma, neurobehavioral
PCBs (Polychlorinated biphenyl)	Electrical coolant and other uses	Cancer, Developmental issues
PBDEs (polybrominated diphenyl ether)	Flame retardants, house dust	Thyroid disruption, neurological issues
Lead	Drinking water, paint, gasoline	Neurological issues, Premature birth, Kidney disorders.
Mercury	Drinking water, paint, gasoline	Neurological issues, Premature birth, Kidney disorders.
Dioxin	Formed in industrial processing	Cancers, sperm quality, fertility, neurobehavioral
DDT/DDE/DDD	Pesticides	Cancers, Developmental toxicity, Early puberty & menopause.
Arsenic	Drinking water, Animal feed, herbicides, fertilizers	Cancers, DM, Immune suppression, neurodevelopment, cardiovascular disease
Cadmium	Tobacco, Smoke, fertilizers	Cancers, Reproductive issues
Atrazine	Herbicide	Alterations in pubertal development, DUB
Alkylphenols & p-Nonyl-phenol	Detergents, Additives	Breast cancer

Scientists and environmentalists know these facts. However, awareness among the public is quite low especially in developing and underdeveloped countries. It is expected that doctors must know the types of different EDCs and their impact on human life. So the prime objective of this study was to assess the level of knowledge among gynecologists as regards to EDCs. This was a unique study, as this aspect of preventive medicine has not been evaluated before.

Methodology

A cross sectional survey was designed to explore the knowledge of doctors practicing obstetrics and gynecology in different public hospitals of Lahore. A detailed proforma was designed about different types of EDCs and their effects on females. Results were then compiled and tabulated.

Results

Total of 140 doctors working in obstetrics and gynecology, participated in the survey. They responded to different questions asked in proforma. The results are mentioned in the tabulated form below:

Table II: Awareness about endocrine Disruptors(N=140)

Question	Yes	No
Have you ever heard about endocrine disruptors?	80 (58%)	60 (42%)
Do you know plastic utensils, release chemicals into the food, they contain?	134 (95.7%)	6 (4.3%)

Table III: Do you know which substances may cause endocrine disorders (N= 140)		
Substance	**Number**	**Percentage**
Plastics	76	54%
Pesticides	62	44.3%
Heavy Metals	52	37%
Cosmetics	50	35.8%
Sprays	34	24.3%
Bottled Water	20	14.3%
Tap water	14	10%
Cane food	56	40%
Personal care products	26	18.6%
Phytoestrogens	58	41.5%

Table IV: Do you know which factors increase the rate of release of chemicals from plastic? (N= 140)		
Factors	Number	Percentage
Heat	68	48.6 %
Microwave	134	95.7 %
Sunlight	38	27 %
Chemical composition of food	42	30 %
Lamp light	8	5.7 %
Don't Know	14	10 %

Table V: Which disease you know to be linked with use of endocrine disruptors? (N= 140)		
Disease	Number	Percentage
Gynecological & Breast cancers	106	75.7 %
Infertility	84	60 %
Birth defects	46	32.9 %
Prematurity	16	11.5 %
Disturbance in the immune and nervous system	48	34.3 %
Cognitive disorders	40	28.6 %

All participants denied educating patients about EDC exposure however they do counsel some lifestyle modification.

Discussion

Endocrine Disruptors are worldwide factors, posing a significant threat to human health and life. Humans and wild animals are continuously being exposed to man-made and natural chemicals, which have now become a part of everyday life. So far, we have only looked at the tip of the iceberg as only a small fraction of the hundreds of thousands of synthetic chemicals have been assessed for their effects. Many more are yet to be evaluated. According to an estimate, almost 24% of human diseases and disorders are due to some sort of environmental factors.[12] There is a significant increase in reproductive disorders, in some parts of the world. This fact points towards a strong role of different environmental factors as a causative agent for endocrine disorders.

Because of the seriousness of the situation, prompt actions were taken by different international societies to prevent harm.[13] The European society for pediatric endocrinology and the Pediatric endocrine society of the USA put forward a joint statement calling for action to prevent endocrine disruptors and their effects.[14] In 2012 UNFP and WHO in collaboration with international experts, took a step forward and drafted a document on EDCs explaining in detail the types of EDCs and their impact on humans as well as wildlife.[3]

While so much work is being done internationally and so many task forces have come into action, there is almost a phase of silence in developing and underdeveloped countries partly because of limited resources but mainly due to lack of awareness of the magnitude of the problem. Due to the low level of literacy and increasing poverty, the population in Pakistan is very much unaware of EDCs and related health dangers.

During the conduction of this survey, it was observed, with surprise, that even the highest educated class of society i.e. doctors, did not bother much about the EDCs and their effects. Though many were aware of the bad effects of different EDCs, mainly plastics, pesticides and sprays, yet no one bothered to educate the patients about their dangers, too. However, many doctors were not fully aware of the types of reproductive diseases caused by EDCs. So, there is a need to educate everyone on a mass scale as limiting the use of EDCs is an integral part of preventive medicine.

Conclusion

It is a fact that EDCs can interfere with tissue and organ development and functions; therefore, they may alter susceptibility to different types of diseases throughout life. Health care professionals themselves are not aware of it so the problem remains unrealized. Moreover, there are neither any efforts to resolve this threat nor an attempt to educate the public by doctors who are only partly aware of the issue. So, this trend needs to be changed on a revolutionary basis by strengthening knowledge of EDCs, improving testing for EDCs, reducing Exposures and thereby vulnerability to disease.

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