

**EARLY DETECTION OF BREAST CANCER IN
WOMEN EXPOSED TO ENVIRONMENTAL
ESTROGEN**

Submitted By

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M.B.B.Ch., Faculty of Medicine, Ain Shams University, ١٩٨٩

Master of (Radiodiagnosis), Faculty of Medicine, Ain Shams University, ١٩٩٣

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Sciences

Department of Environmental Medical Sciences
Institute of Environmental Studies and Research
Ain Shams University

٢٠١٨

APPROVAL SHEET
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أَعُوذُ بِاللَّهِ مِنَ الشَّيْطَانِ الرَّجِيمِ

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

سُورَةُ النِّفَاةِ

مَدَنِيَّةٌ

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First of all, I would like to express my deep gratitude to **ALLAH** for His care and generosity throughout my life.

*I would like to express my sincere appreciation to **Prof. Dr. Mahmoud Serry El Bokhari**, Professor of Chest Diseases, Faculty of Medicine - Ain Shams University, for his keen supervision, guidance, overwhelming support and encouragement. I really have the honor to complete this work under his supervision.*

*I am very thankful to **Dr. Omar Sherif Omar**, Associate Professor of Surgery, Faculty of Medicine – Cairo University, for the efforts and time he has devoted to accomplish this work. His great support has been of great help throughout this work.*

I dedicate this work to all members of my family who have done a lot to me without waiting for anything in return and, I hope I can pay even small part of this debt to them.

ABSTRACT

Objectives:

We aim in this research to evaluate the role of screening of women for exposure to environmental estrogens and to determine its predictive value for early detection of breast cancer.

Material and Methods:

Fifty adult women with breast cancer who were referred to the radiology department were included as the study group. The cases were compared to control group of fifty women who were referred to the radiology department for routine screening for breast cancer and had no breast complaint or abnormalities detected. All women in both groups were subjected to a comprehensive structured questionnaire including the following: age, residency, marital status, parity, occupation, breast feeding, family history, age of menarche, age at menopause, hormone replacement therapy, contraceptive pills/injections, applications of cosmetics (body lotion, cream, make up, foundations, perfumes), wearing bras, implant, use of plastic wrappings, use of bottles/foams, dietary habits (fast/fresh food), chest irradiation, complaint of women (breast mass, pain, nipple discharge, skin discharge), history of exposure to other possible risk factors such as smoking, exposure to chest irradiation, radon, asbestos, pesticides and children toys. The collected data were organized, tabulated and statistically analyzed using statistical package for social science, version 16.

Results:

Significant relationship was found between incidence of breast cancer and exposure to cosmetics, smoking exposure, physical inactivity, frequent fish consumption and low fruit intake. Exposure to xenoestrogens (e.g., insecticides, food preservatives) was a serious factor to breast cancer incidence. Some environmental factors showed rather insignificant relationship with exposure to radon or asbestos, wearing bra, or plastic use to incidence of cancer breast.

Conclusion:

Breast cancer has currently no available cure so perhaps the best strategy to combat breast cancer perhaps relies on early detection and prevention through avoiding the exposure to high risk factors.

Key words:

breast cancer, women, environmental estrogens, predictive value

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List of Abbreviations

Abbr.	Full-term
ACOG	: American College of Obstetricians and Gynecologists
ACRIN	: American College of Radiology Imaging Network
ACS	: American Cancer Society
ADH	: Atypical ductal hyperplasia
AH	: Atypical hyperplasia
AhR	: Aryl hydrocarbon receptor
ALL	: Acute lymphoblastic leukemia
AWBUS	: Automated Whole-Breast Ultrasound System
BL	: Burkitt's lymphoma
BMI	: Body mass index
BPA	: Bisphenol A
BSE	: Breast self-examination
BSGI	: Breast-specific gamma imaging
CBE	: Clinical breast examination
CC	: Cranio-caudal
CMR	: Carcinogenic, mutagenic and/or reprotoxic
CNS	: Central nervous system
CT	: Computed tomography
CTFPHC	: Canadian Task Force on Preventive Health Care
DCIS	: Ductal carcinoma in situ
DDE	: Dichlorodiphenyldichloroethylene
DEHP	: di(ϳ-ethylhexyl)phthalate
DES	: Diethylstilbestrol
DM	: Digital mammography
DMBA	: Dimethylbenz(a)anthracene
DNA	: Deoxyribonucleic acid
DOHaD	: Developmental origins of health and disease
EASR	: European age-standardized rate
EBV	: Epstein-Barr virus
EDCs	: Endocrine disrupting compounds

ELF	: Extremely low frequency
EMF	: Electromagnetic fields
ER	: Estrogen receptor
ETS	: Environmental tobacco smoke
EZH^γ	: Enhancer of zeste homolog ^γ
FDA	: Food and Drug Administration
FDG	: Fluorodeoxyglucose
FISH	: Fluorescent in situ hybridization
H&E	: Hematoxylin and eosin
HBV	: Hepatitis-B virus
HCB	: Hexachlorobenzene
HCC	: Hepatocellular carcinoma
HCCP	: Harvard Center for Cancer Prevention
HCV	: Hepatitis C virus
HD	: Hodgkin's disease
HER^γ	: Human epidermal growth factor receptor ^γ
HIV	: Human immunodeficiency viruses
HMS	: Homosalate
HPV	: Human papilloma virus
HRT	: Hormone replacement therapy
HTLV	: Human T-cell lymphotropic virus type ^γ
IARC	: International Agency for Research on Cancer
IDC	: Invasive ductal carcinoma
ILC	: Invasive lobular carcinoma
KS	: Kaposi Sarcoma
LBD	: Ligand binding domain
LCIS	: Lobular carcinoma in situ
LFS	: Li-Fraumeni syndrome
MGD	: Mean glandular dose
MLO	: Mediolateral oblique
MRI	: Magnetic resonance imaging
MRI	: Magnetic resonance imaging
NACT	: Neoadjuvant chemotherapy
NCCN	: National Comprehensive Cancer Network

NOC	: N-nitroso compounds
NPV	: Negative predictive value
OCP	: Oral contraceptive pill
OMC	: Octyl-methoxy-cinnamate
PACS	: Picture archiving and communication system
PAH	: Polycyclic Aromatic Hydrocarbons
PCB	: Polychlorinatedbiphenyls
PCBs	: Poly-chlorinated biphenyls
PCE	: Perchloroethylene
PCR	: Poly-merase chain reaction
PEM	: Positron emission mammography
PET	: Positron emission tomography
PHF^γ	: PHD finger protein ^γ
PPV	: Positive predictive value
PTEN	: Phosphatase and tensin
PVC	: Polyvinyl chloride
RNA	: Ribonucleic acid
RR	: Relative risk
SD	: Standard deviation
SEER	: Surveillance, epidemiology, and end results program
SFM	: Screen-film
SPSs	: Statistical package for social science
TCE	: Trichloroethylene
USEPA	: U.S. Environmental Protection Agency
USPSTF	: US Preventative Services Task Force
UV	: Ultraviolet
VLF	: Very low frequency
VOC	: Volatile organic compounds
ε-MBC	: ε-methylbenzylidene camphor

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Introduction

Risk factor is anything that affects the chance of getting a disease, such as cancer. Different cancers have different risk factors. Many risk factors were related to cancer breast such as female gender, older age, genetic risk factor and environmental factors (**Byrne, ۱۹۹۶**).

Environmental risk factors that are related to cancer breast include oral contraceptive use, hormone therapy after menopause, and alcohol. Other environmental factors of controversial effect on breast cancer risk include dietary as amount of fat, intake of fruits, and intake of meat, antiperspirants and wearing bras (**John and Kelsey, ۱۹۹۳**).

A great deal of research has been reported on possible environmental influences on breast cancer risk. Of special interest are compounds in the environment that have estrogen-like properties such as plastics, cosmetics, personal care products, pesticides such as dichlorodiphenyldichloroethylene (DDE) & poly-chlorinated biphenyls (PCBs) seem to have such properties. Most studies have found on link between cigarette smoking and breast cancer (**Rockhill et al., ۱۹۹۸; Kelsey, ۱۹۹۱**).

This issue understandably invokes a great deal of public concern. Till date, researches did not show a clear link between breast cancer risk and exposure to these substances (**John and Kelsey, ۱۹۹۳**).

Early detection of cancer breast has utmost effect on management and prognosis of the condition. The American Cancer Society recommends clinical breast examination every ۳ years for