

CORRELATION OF ENVIRONMENT AND HIGH INCIDENCES OF CANCER

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ABSTRACT

Numerous studies and investigations have been conducted in order to better understand the relationship that exists between environmental variables and the alarmingly high rates of cancer. A genetic predisposition, lifestyle choices, and exposure to environmental agents are all factors that might increase one's risk of developing cancer. Cancer is a complicated illness with several causes and sources. The purpose of this abstract is to provide a synopsis of the existing body of evidence concerning the connection between the environment and the rising rates of cancer. Numerous environmental variables have been singled out as having the potential to play a role in the onset and advancement of a variety of cancers. These variables include exposure to hazardous chemicals, ionizing and non-ionizing radiation, air pollution, water contamination, occupational hazards, and lifestyle-associated factors such as smoking, poor nutrition, and physical inactivity. Other factors include exposure to hazardous chemicals, ionizing and non-ionizing radiation, air pollution, and water contamination. The influence of environmental variables on the development of cancer is made more clear in the context of situations involving occupational exposure to carcinogens. Workers in sectors such as mining, manufacturing, and agricultural frequently experience continuous exposure to toxic chemicals, which leads to a greater risk of cancer incidence. These industries include agriculture. In addition, individuals living in locations with high concentrations of industrial activity or in close proximity to waste disposal facilities are at an elevated risk of developing cancer owing to the discharge of toxins into the air, soil, and water. A number of epidemiological studies have shown solid evidence connecting certain environmental variables to forms of cancer. For instance, it has been demonstrated beyond a reasonable doubt that prolonged exposure to asbestos fibers causes mesothelioma, but exposure to ultraviolet (UV) radiation from the sun is a well-established cause of skin cancer. In addition, the ingestion of polluted food and water has been connected to gastrointestinal malignancies, and the exposure to certain industrial chemicals, such as benzene and formaldehyde, has been associated with many forms of cancers, including leukemia and lung cancer. It is essential to keep in mind that the progression of cancer is the result of a complex interaction between a number of factors, and that no one environmental factor can be held solely responsible for the occurrence of cancer even though there is substantial evidence supporting the correlation between environmental factors and

high incidences of cancer. The risk of a person acquiring cancer as a result of their exposure to environmental agents is not just dependent on their genetic predisposition; individual susceptibility also plays a crucial part in this process. The implementation of severe laws, the enhancement of workplace safety standards, and the promotion of public knowledge about the possible risks inherent in the environment are all components of the efforts that are being made to reduce the influence of environmental variables on the incidence of cancer. It is essential for scientists, legislators, and public health organizations to continue their study and work together in order to effectively identify and treat the particular environmental variables that lead to high cancer rates. This will ultimately result in a reduction in the burden that cancer places on society.

KEYWORD: *Correlation, Environment, Cancer.*

INTRODUCTION

Pollution in the air that people breathe outside is a significant factor in the global illness burden.¹ Emissions from major sources like as industry, power generation, transportation, and home burning are the primary contributors to air pollution levels that significantly exceed the health-based limits established by the World Health Organization (WHO). The majority of the world's population presently lives in areas where these levels of air pollution are present. This report provides an overview of outdoor air pollutants, sources, and global levels. It also provides a description of the epidemiological evidence linking outdoor ambient air pollution with lung cancer incidence and mortality. This is followed by studies of other types of cancers that affect adults as well as cancers that affect children, as well as the biological mechanisms of air pollution-derived carcinogenesis. The suggestions for public health and policy are summed up in this report's conclusion. These recommendations include multilayer interventions that are directed at the individual, community, and regional scales.

In addition, the specific role that the medical and health care communities should play in terms of prevention and advocacy, as well as recommendations for more study, are discussed. Breast cancer is the type of cancer that is diagnosed in more women than any other type of cancer globally ¹, and its prevalence is quickly expanding in industrialized nations and metropolitan regions. Breast cancer is the second most frequent kind of cancer in South Korea, behind thyroid cancer; also, the incidence of breast cancer has grown by 6.1% year from 1999 to 2014^{2,3}. It is believed that an increased exposure to ambient female hormones is a factor in the rise in the incidence of breast cancer. In addition, the prevalence of cancers that are dependent on hormones is growing in developed nations. The role of the environment in cancer development is a nuanced one that is sometimes misinterpreted. When discussing

the factors that might lead to the development of cancer, the word "environment" can have a number of distinct interpretations.

Historically, the term "environmental cause of cancer" was used to apply to all cancers that were not caused by genetic or inherited causes. Today, however, this word is only used to refer to cancers that are caused by environmental factors. This concept encompassed all forms of cancer that can be traced back to a person's lifestyle choices, such as their food and their relationship with cigarettes, as well as cancers that can be traced back to viruses. When discussing the factors that might lead to the development of cancer, the term "environment" has been given a more comprehensive definition by virtue of the addition of the phrases "personal environment" and "external environment." To better guide efforts to enhance the health of a community, it is helpful to quantify the potential number of cancer cases related with exposure to environmental carcinogens. In the course of this research, a technique to estimating the environmental burden of cancer was established and then applied.. In order to assist decision making that is evidence-based, the goal was to determine environmental carcinogens that have the greatest influence on the cancer burden.

OBJECTIVE: to determine which environmental toxins have the most significant influence on cancer risk.

METHOD

A probabilistic analysis of the environmental burden of cancer was carried out. Based on certain categorizations that were supplied by the International Agency for Research on Cancer, 23 carcinogens were chosen that fit the bill of being "environmental" (such as pollution) and were pertinent to the province. These were our choices. We investigated the population's exposure to the carcinogens by the breathing of indoor and outdoor air, the ingestion of food, drink, and dust, and exposure to radiation. We were able to collect or construct concentration-response functions that relate the amount of exposure to carcinogens to the likelihood of acquiring cancer. We calculated the yearly cancer cases associated with each environmental carcinogen by running a Monte Carlo simulation, applying human health risk assessment methods as well as population attributable fraction models, and giving the simulation summary (such as the mean and percentiles).

Sources and Levels of Outdoor Air Pollution

Because it is pervasive, meaning that it affects everyone, and because it is associated with a wide range of substantial detrimental consequences on human health, including cancer, exposure to outdoor air pollution is a pressing concern for public health on a global scale.² Gaseous pollutants (such as sulfur dioxide [SO₂], nitrogen dioxide [NO₂], carbon monoxide [CO], and volatile organic compounds [VOCs]) and particulate matter (PM) (including carbonaceous aerosol particles, such as black soot) are examples of major primary air pollutants. These pollutants are emitted directly into the environment largely as a result of the combustion of fossil and biomass fuels. Even though CO levels are often rather low outside in the industrialized world in modern times (thanks to the deployment of emission controls such as catalytic converters on vehicles), it is possible to encounter high levels in close proximity to sources of biomass burning such as wildfires.³ In addition, secondary air pollutants are produced in the atmosphere from primary air pollutants. Secondary air pollutants include gaseous ozone (O₃), which is a significant component of photochemical smog. Photochemical smog is produced in the atmosphere when nitrogen oxides (NO_x) and hydrocarbons such as volatile organic compounds (VOCs) react in the presence of sunlight. In a similar fashion, particle sulfate aerosols (such as sulfuric acid [H₂SO₄]) and nitrate aerosols (such as ammonium nitrate [NH₄NO₃]) are frequently produced in the atmosphere from SO₂ and NO_x, respectively. Fine particulate matter, also known as PM_{2.5} (particles with a diameter of less than 2.5 micrometers), is often comprised of primary combustion particles as well as secondary particles. Both types of particles have a tiny diameter. Because it may go further into the lung than bigger PM created by natural processes, such as the majority of windblown soil particle mass, PM_{2.5} that is associated to submicron combustion is a particular cause for worry for public health. This is due to the fact that it includes a wide variety of hazardous substances, such as acids and heavy metals.

Personal environment/Lifestyle choices

Tobacco use

Tobacco is well recognized as one of the most powerful carcinogens that may affect people. diseases of the lung, trachea, bronchus, larynx, pharynx, oral cavity, and esophagus are some of the tobacco-related diseases that result in thousands of deaths annually.

Other malignancies, such as those of the pancreas, kidney, bladder, and cervix, have been related to the use of tobacco products. However, due to the rise in the number of women who smoke cigarettes, lung cancer now claims the lives of more women than breast cancer does annually. Cigarette smoking is more prevalent among males. If a person smokes, they may expect to live an average of 12 years less than someone who does not.

Diet and nutrition

The American Cancer Society identifies consuming at least five portions of fruits and vegetables every day as the single most significant dietary strategy for reducing the risk of developing cancer. Phytochemicals are non-nutritive compounds found in plants that have been shown to exhibit health preventive properties. Consuming a diet high in plant sources gives phytochemicals to the body. Cancers of the gastrointestinal system, respiratory tract, and colon are all more likely to be prevented by eating a diet that is abundant in foods derived from plant sources. Consuming more fruits and vegetables is linked to a lower chance of developing lung cancer, which is another benefit of this diet.

It has been found that diets high in fat are linked to an increased risk of developing malignancies of the colon, rectal, prostate, and endometrium. The link between diets rich in fat and the onset of breast cancer is considerably more tenuous than was previously thought. The specific advice are to replace high-fat meals with fruits and vegetables, to consume smaller amounts of high-fat foods, and to restrict consumption of meats, particularly those that are regarded to be high in fat. Foods derived from animals continue to make up a significant portion of the typical American diet. Meat consumption, particularly of red meats like beef, hog, and lamb, has been linked to an increased risk of developing colon and prostate cancers.

Diets that are heavy in meat and fat are frequently the root cause of obesity. The risk of developing cancer at several locations, such as the colon and rectum, the prostate, the kidney, and the endometrium, as well as breast cancer in postmenopausal women, has been associated to obesity.

Alcohol use

Drinking alcohol is associated with an increased risk of developing malignancies of the mouth, esophagus, pharynx, and larynx in both men and women. Additionally, drinking alcohol is associated with an increased risk of breast cancer in females. The more alcohol that is drunk, the greater the likelihood of developing cancer. When compared to either smoking or drinking alcohol on its own, the combined risk of acquiring cancer in a person who engages in both behaviors significantly increases the chance of developing cancer.

Physical activity

The current recommendations on physical exercise call for individuals to take part in activities of at least moderate intensity for a period of at least thirty minutes on most days of the week. A lower chance of developing specific forms of cancer, such as colon, breast, and prostate cancer, has been found to be associated with higher levels of physical activity, according to the findings of several studies.

Radiation exposure

It has been demonstrated beyond a reasonable doubt that only high-frequency radiation, namely ionizing radiation (IR) and ultraviolet (UV) radiation, may cause cancer in humans. Sunlight is one of the sources of ultraviolet radiation. The majority of cases of basal cell and squamous cell skin cancer are brought on by years-long exposure to UV radiation. Melanoma is also strongly linked to exposure to ultraviolet (UV) radiation.

Studies conducted on those who had survived an atomic bombing as well as other groups provided conclusive evidence that IR is carcinogenic. IR may have an effect on virtually any region of the body; however, the bone marrow and the thyroid gland are the sections of the body that are impacted the most. Diagnostic equipment, such as X-ray machines used in medicine and dentistry, is known to give out trace amounts of infrared radiation. Machines used to administer radiation treatment to patients emit significantly greater quantities of infrared radiation (IR). Extreme caution is exercised so that neither the patients nor the personnel are subjected to the side effects of IR unless it is absolutely necessary.

Radon, a kind of ionizing radiation (IR), has been linked to an increased risk of developing lung cancer. Radon is a naturally occurring radioactive gas that is produced when uranium in rocks and soil decays. Radon may be found in soil and rocks. The gas lacks all detectable odor, color, or taste, and it is also invisible to the human eye. Radon is discharged into the atmosphere after making its way up through the earth. Radon gas is present in the atmosphere, but only at safe amounts. Radon has the potential to collect to levels that represent a threat to the development of lung cancer when it is present in environments with insufficient ventilation, such as underground mines. Radon is carcinogenic because, when it decays, it releases radioactive particles that can cause cancer. When breathed, radon causes damage to the lining of the lung, which is caused by these particles. Uranium miners and those who live in homes that are highly insulated, have tight seals, and were constructed on uranium-rich soil are the two groups of people who have the highest likelihood of developing cancer as a result of radon exposure. The only method to tell whether or not a dwelling contains unsafe levels of radon is to get it tested for the gas.

Reproductive and gynecologic factors

Diet, alcohol consumption, oral contraceptives, estrogen replacement treatment, postmenopausal obesity, and nulliparity (the medical term for a woman who has never given birth to a child) are all lifestyle choices that have been related to an increased risk of breast cancer. Ongoing research focuses on determining the nature of the link between dietary lipids and breast cancer. Women who take more than two drinks of alcohol each day put themselves in a greater risk category. The usage of oral contraceptives has been related to an increased risk of developing breast cancer. Women who have never given birth and started taking oral contraceptives before the age of 18 and have maintained doing so without interruption for more than eight years have a slightly higher chance of developing ovarian cancer. Women who took hormone replacement treatment before the year 1958, who used replacement therapy for eight years or more, and who also used oral contraceptives are the ones who appear to be at the greatest risk associated with the use of estrogen replacement therapy. Gaining weight throughout the first few decades of adulthood is associated with an increased chance of developing breast cancer, particularly if the weight gain happened around the third decade of life. In postmenopausal women, the chance of developing breast cancer due to obesity is significantly higher than in younger women.

It would appear that carrying a pregnancy to term has a protective impact on the development of breast cancer. Women who become pregnant beyond the age of 30 or who do not become pregnant at any point in their lives are at an increased risk. Throughout the course of medical history, both breast-feeding and lactation have been considered to be protective against the development of breast cancer. Several research projects carried out in the United States have found that there is a connection between having an abortion and an increased risk of developing breast cancer. Women who had abortions did not have an increased risk of developing breast cancer, according to the findings of a big research that investigated this association and was carried out in Denmark.

Cervical precancerous and cancerous lesions are linked to a wide variety of personal risk factors. These lesions occur more frequently in women who began sexual activity before the age of 17, who have a large number of sexual partners, and who are multi-parous (have given birth to at least one kid who is still alive). There is also thought to be a connection between the kind of work one does and the risk of dying from cervical cancer. Women who had formerly working in agricultural labor, manufacturing, personal service jobs, or nursing assistant jobs have been found to have greater death rates than other women. Women who are infected with the human immunodeficiency virus (HIV) have an increased likelihood of developing squamous intraepithelial lesions of the cervix. These lesions can lead to the development of cervical cancer. Women who have never given birth, who have never been sexually active with more than one partner, or who have never been celibate for their whole lives are far less likely to be diagnosed with cervical cancer.

Psychological stress

It is well known that stress may stimulate the endocrine system of the body, also known as the hormonal system, which then produces alterations in the immune system. There is no concrete evidence to suggest that shifts in the immune system brought on by stress directly lead to the development of cancer. On the other hand, research has only lately been done to investigate the link between stress and the onset of breast cancer. According to the findings of certain research, the risk of developing breast cancer is greatly increased in females who have been through emotionally trying experiences and suffered losses in the years leading up to their breast cancer diagnosis. According to the findings of other research, there is no correlation between stress and the development of breast cancer.

Cellular phone use

Research carried out in the United States and Denmark in 2000 and 2001 found that the use of cellular telephones does not increase the risk of developing brain tumors, salivary gland tumors, leukemia, or any other type of cancer. There was no correlation between the usage of mobile phones and the development of cancer in either the younger or older generations of phone users.

External environment

Chemicals and other substances

An increased likelihood of developing cancer is associated with prolonged contact with certain chemicals, insecticides, and metals. Nickel, cadmium, vinyl chloride, and benzene are some examples of carcinogens that fall under this group. It is possible for these carcinogens to raise the risk of cancer either on their own or in conjunction with another carcinogen, such as cigarette smoke.

Environmental tobacco smoke (secondhand smoke)

The term "environmental tobacco smoke" (often abbreviated as "ETS") refers to a mixture of two different types of smoke that are produced by tobacco products: sidestream smoke and mainstream smoke. Sidestream smoke is the smoke that is emitted between each puff of a cigarette, cigar, or pipe that is being burned. The smoke that the smoker really inhales is not considered mainstream smoke. The components that are found in sidestream smoke are nearly identical to those that are found in the mainstream smoke that the smoker inhales. At least sixty distinct types of carcinogens have been identified in cigarette smoke. Those who are not smokers but are nonetheless exposed to secondhand smoke take in nicotine as well as other toxic substances. There is a 20% greater risk of lung cancer in non-smokers who are exposed to ETS. ETS can cause lung cancer in healthy persons who do not smoke, and this increases the risk of lung cancer by 20%. Other malignancies, such as those of the nasal cavity, cervix, breast, and bladder, have been associated to ETS as well. The Environmental Protection Agency of the United States designated ETS as a Group A carcinogen in the year 1992. The Environmental Protection Agency (EPA) reserves Group A for only those carcinogens that pose the greatest threat to human health.

Asbestos exposure

Asbestos refers to a collection of minerals that can be found in their natural state as resilient and pliable fibers, which can be unraveled into individual threads and then woven together. The fibers of asbestos do not allow electricity to flow through them and are unaffected by heat or chemicals. Asbestos has been utilized in a wide variety of commercial applications because to the qualities described above. Insulation, fireproofing, and sound absorption are some of the uses that may be made with this material. Exposure to the dust that results from the fragmentation of asbestos fibers into smaller and smaller particles poses a significant threat to human health and should be avoided at all costs. After then, the asbestos particles might be taken in through the lungs or eaten. Asbestos exposure can result in a variety of malignancies, including those of the lung, larynx, and digestive tract, as well as the very uncommon form of cancer known as mesothelioma. People who smoke cigarettes in addition to having a history of asbestos exposure are the ones who are at the greatest danger. When smoking is combined with asbestos exposure, the chance of developing lung cancer is increased by a factor of 10, compared to that of someone who does not smoke. The usage of asbestos in the United States has dramatically decreased in recent years as a result of both government legislation and public concerns over the health risks associated with asbestos exposure. The use of asbestos in the workplace is heavily controlled by both business and the government in order to reduce the risk of asbestos exposure for workers.

Electric and magnetic field (EMF) exposure

EMFs are caused by the movement of electrical charges and are released into the environment by any equipment that generates, transmits, or uses electric power. Power lines, transmitters, and common home items like microwave ovens, electric blankets, TVs, and computers are all examples of the types of electronic equipment that fall under this category. Electromagnetic fields (EMFs) are examples of non-ionizing radiation. The National Cancer Institute (NCI) reports that there has been an upsurge in public concern over the health consequences of electromagnetic fields (EMFs), particularly in connection to the risk of getting cancer in children and adults who are exposed to EMFs. Over the course of the last 15 years, a great number of research have been carried out to investigate the link between electromagnetic fields (EMFs) and the development of cancer. According to the NCI, the results have been all over the place since the year 2001. The National Cancer Institute and the Children's Cancer Group conducted a comprehensive research to investigate whether or not exposure to magnetic fields played a role in the progression of acute lymphoblastic leukemia (ALL) in children who were younger than 15 years old. The findings of this study showed that there is very little evidence to support a connection between exposure to magnetic fields and an increased risk of ALL in children.

Other studies that are looking to determine whether or not there is a relationship between magnetic fields and malignancies of the central nervous system (CNS), such as brain cancer, are still in the research phase. To this day, professional panels that have gone through the available data and come to the opinion that there is not enough evidence to support the theory that cancer may be caused by magnetic fields have reached this verdict.

Nuclear facility exposure

According to the findings of a research conducted by the National Cancer Institute and published in 1991, residents in more than one hundred counties in the United States that have nuclear reactors or are located in close proximity to such facilities do not face an elevated risk of dying from cancer. According to the findings of a survey conducted in the United Kingdom to determine the rates of cancer mortality in the areas surrounding nuclear plants in that country, there was an increase in the number of fatalities caused by juvenile leukemia in close proximity to certain of the sites. Other, smaller-scale studies on the incidence of cancer mortality in the vicinity of nuclear reactors in both nations produced different results.

RESULTS

The results showed an increasing trend in instances of cancer, that were caused by exposure to 23 environmental carcinogens. Solar ultraviolet (UV) radiation, radon in houses, and fine particulate matter (PM_{2.5}) in outdoor air were shown to be the three environmental carcinogens that were responsible for more than 90 percent of the environmental cancer burden. Acrylamide, arsenic, asbestos, chromium, diesel engine exhaust particulate matter, dioxins, formaldehyde, and second-hand smoking were the other eight carcinogens that had an estimated mean burden of at least ten yearly cancer cases each. The other 12 carcinogens were expected to cause fewer than ten new instances of cancer per year.

CONCLUSION

The association between environmental variables and high occurrences of cancer is supported by the substantial study and data that has been gathered. Toxic chemicals, ionizing and non-ionizing radiation, air pollution, water contamination, occupational risks, and variables linked with a person's way of life have all been found as important contributors to the development and progression of different forms of cancer. Although it is impossible for a single environmental component to be fully responsible for the development of cancer, it is certain that environmental variables play a significant part in the elevation of cancer risks. The ingestion of polluted food and water, exposure to carcinogens in the workplace, and living in locations with high concentrations of industrial activity have all been shown to increase the risk of developing certain forms of cancer. Understanding the role that the surrounding environment plays in the development of cancer is necessary in order to develop and execute effective preventative techniques. It may be possible to reduce the dangers posed by environmental elements by the implementation of stricter legislation, higher workplace safety standards, and increased public awareness campaigns. It is absolutely necessary for scientists, legislators, and public health organizations to work together in order to successfully identify and treat particular environmental variables that contribute to high cancer rates. We can work toward minimizing the cost that cancer has on society if we understand and address the complicated interplay that exists between heredity, the lifestyle decisions we make, and the environmental hazards we are exposed to. In order to make living circumstances better and, eventually, reduce the number of cases of cancer that occur all over the world, it is vital to carry on research, educate people, and take preventative measures.

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