Air pollution: Health effects

Contaminación del aire: efectos sobre la salud

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Recibido: 24-10-2019 Aceptado: 23-01-2020

Abstract

Background: Air contamination happens when unsafe or inordinate amounts of substances including gases, particles, and organic atoms are brought into Earth's climate. **Objective:** This review article defines air pollution, describes the types of pollutants, enumerates the various causative factors, enumerates the ways it impacts human health and suggests preventive measures to reduce the impact of air pollution on human health. **Methods:** Literature was studied extensively and effects of air pollution on human health have been described. **Results and Conclusion:** Air pollution has tremendous effects on human health in the form of respiratory diseases and aggravations in the form of asthma and lung cancer, cardiovascular dysfunctions, and malignant growth. An affiliation has been found to exist between male infertility and air pollution and a relationship has been established between air contamination and higher danger of immune dysfunction, neuroinflammation, neurobehavioral hyperactivity, crime, age-unseemly behaviours, Alzheimer's and Parkinson's disease. Traffic-related air pollutants have been found to affect skin aging and cause pigmented spots on the face. An association exists between air pollution and irritation of the eyes, dry eye syndrome, risk for retinopathy and adverse ocular outcomes. Chronic exposure to air pollutants during pregnancy has been associated with adverse effects on the developing foetus in the form of low birth weight and still birth. Air contamination has been seen as a significant supporter of the expanded predominance of allergic diseases in children.

Key words

Air pollution, particulate matter, fog, smog, mist, deforestation, volcanoes

Introduction

Air pollution means the presence of chemicals or compounds in the air which are usually not present and which lower the quality of the air or cause detrimental changes to the quality of life such as the damaging of the ozone layer or causing global warming. Air contamination happens when unsafe or inordinate amounts of substances including gases, particles, and organic atoms are brought into Earth's climate. Both human activity and natural processes can generate air pollution.

Aim

This review article defines air pollution, describes the types of pollutants, enumerates the various causative factors, enumerates the ways it impacts human health and suggests preventive measures to reduce the impact of air pollution on human health.

Methods

Literature was studied extensively and effects of air pollution on human health have been described. In order to locate research studies and interventions that examined the health effects of air pollution, databases were searched through Google Scholar. The key words entered into the database were air pollution, health effects and articles from 1979 to 2014 were searched.

Results

Definition

Air pollution is caused by solid and liquid particles and certain gases that are suspended in the air. These particles and gases regularly originate from vehicle and truck fumes, manufacturing plants, dust, volcanoes and wild fires. The solid and liquid particles suspended in air are called aerosols [1].

Types:

- Primary pollutants: There are many types of primary pollutants, including carbon oxides, nitrogen oxides, sulphur oxides, particulates, lead, and volatile organic compounds.
- Secondary pollutants: Secondary pollutants form from chemical reactions that occur when pollution is exposed to sunlight.

The major air pollutants include particulate matter, nitrogen dioxide, carbon mono-oxide and sulphur dioxide [1].

Causes

The wellsprings of contamination shift from little unit of cigarettes and common sources, for example, volcanic exercises to enormous volume of emanation from engine motors of cars and mechanical activities[2].Emission from vehicles, burning of petroleum products, contamination from Air Conditioners, dust and soil, family contamination, contamination from characteristic occasions, for example, volcanoes, deforestation and contamination from industrial facilities discharging hurtful gases like carbon monoxide, nitrogen oxide as final results are the principle reasons of air contamination [3].

Fog

Fog is a kind of cloud that touches the ground. Fog forms when the air near the ground cools enough to turn its water vapour into liquid water or ice. Urban areas are facing increasing fog frequencies that may result due to increased air pollution emanating from variety of sources. The increased pollution levels may lead to the atmospheric reactions resulting into the formation of secondary pollutants that may also lead to increased pollutants in the atmosphere.

Mist

Mist and fog are caused by water droplets in the air, and the only difference is how far you can see. Haze is the reflection of sunlight off air pollution, while smog is what happens when pollution causes low-lying ozone. Mist and fog both occur when there are water droplets in the air.

Smog

Smog is a kind of air pollution, originally named for the mixture of smoke and fog in the air. Classic smog results from large amounts of coal burning in an area and is caused by a mixture of smoke and sulfur dioxide. Smog is a problem in a number of cities and continues to harm human health [4].

Health effects

Long haul impacts of air contamination on the beginning of maladies, for example, respiratory diseases and aggravations, cardiovascular dysfunctions, and malignant growth is generally accepted [5]. An affiliation has been found to exist between male infertility and air pollution in a study by Zhou et al [6]. Wheezing, cough, dry mouth, and limitation in activities due to breathing problems are the most predominant clinical indications of respiratory sickness because of air pollution [7,8]. Air contamination is likewise considered as the major natural hazard factor for some respiratory illnesses, for example, asthma and lung cancer [9,10]. Epidemiologic examinations have demonstrated the immediate relationship of air toxin presentation and heart related illnesses [11].

Neuropsychiatry manifestations

Studies have announced the connection between air contamination and neurobehavioral hyperactivity, crime, and age-unseemly behaviours [12,13]. Studies have likewise uncovered the relationship between air contamination and higher danger of neuroinflammation [14], Alzheimer's and Parkinson's disease [15]. A few investigations demonstrated that hostility and tension in megacities are in close association with the significant level of air pollutants [16].

Skin changes

Studies have uncovered that traffic-related air pollutants affect skin aging and cause pigmented spots on the face [17].

Immune system

Poor air quality can cause serious complications in the immune system such as an abnormal increase in the serum levels of the immunoglobulin (Ig); IgA, IgM, and the complement component C_3 in humans as well as chronic inflammatory diseases of the respiratory system [18]. Exposure to these immunotoxicants may also cause immune dysfunction at different stages which can serve as the basis for increased risks of numerous diseases such as neuroinflammation [15].

Effects on eyes

Chronic exposure to air pollutants increases the risk for retinopathy and adverse ocular outcomes. In addition, there are now evidence suggesting the association between air pollution and irritation of the eyes, dry eye syndrome, and some of the major blinding [19].

Pregnancy

Recent studies have shown that air pollution can affect the developing foetus via maternal exposure, resulting in preterm birth, low birth weight, growth restriction, and potentially adverse cardiovascular and respiratory outcomes [20]. A number of epidemiological and clinical studies conducted in low-income countries found an association between exposure to indoor air pollution during pregnancy and low birth weight and still birth [21].

Allergy

Air contamination has been seen as a significant supporter of the expanded predominance of allergic diseases in children [22].

Preventive measures

Legitimate cooking stoves might be utilized rather than wood-consuming cooking stoves to decrease air contamination. In rural Mexico, a randomized trial of properly vented wood-burning cooking stoves versus open fires showed reductions in the longitudinal decline in forced expiratory volume in one second and improvements in respiratory symptoms, when proper cooking stoves were used [23]. The use of improved cooking stoves has also been found to halve the exposure to carbon monoxide and resulted in a lower rate of diagnosis of pneumonia [24].

Government has a huge task to carry out in controlling air contamination and measures planned for decreasing environmental change, including exacting laws to diminish carbon dioxide emanations ought to be authorized.

Urban forests and green roofs should be proposed as strategies for reducing pollution in urban areas [25]. Vegetation removes pollutants in several ways; by absorbing gaseous pollutants, through interception of particulate matter by leaves, and by breaking down organic compounds such as polycyclic aromatic hydrocarbons [26].

Upgrades in the ventilation of homes in which biomass fuels are used will reduce the health effects of air pollution.

Empowering walking and cycling as opposed to utilizing vehicles and bikes while voyaging short distances will help check air contamination.

Conclusions

Air pollution is caused by solid and liquid particles and certain gases that are suspended in the air which may originate from vehicle and truck fumes, manufacturing plants, dust, volcanoes and wildfires.

Air pollution has tremendous effects on human health in the form of respiratory diseases and aggravations in the form of asthma and lung cancer, cardiovascular dysfunctions, and malignant growth.

An affiliation has been found to exist between male infertility and air pollution.

A relationship has been established between air contamination and higher danger of immune dysfunction, neuroinflammation, neurobehavioral hyperactivity, crime, age-unseemly behaviours, Alzheimer's and Parkinson's disease.

Traffic-related air pollutants have been found to affect skin aging and cause pigmented spots on the face.

Evidence suggests an association between air pollution and irritation of the eyes, dry eye syndrome, risk for retinopathy and adverse ocular outcomes.

Chronic exposure to air pollutants during pregnancy has been associated with adverse effects on the developing foetus in the form of low birth weight and still birth.

Air contamination has been seen as a significant supporter of the expanded predominance of allergic diseases in children.

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