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The Effects of Climate Change on Oral Health

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ABSTRACT

Environmental health and human health are intertwined. Human activities and natural disasters can discharge pollutants or disease-causing germs into the environment, which can have an impact on a community's water, food, and air quality, as well as the lives of the local populace. Dental hygienists (DHs) and other oral health care (OHC) professionals utilize enormous quantities of resources in their everyday clinical operations, which adds to the burden of global pollution and climate change. Climate change's effects on dental health are quite important. Numerous negative consequences, including the onset of epidemics, deforestation, coastal floods, and other tragedies, have been brought about by climate change. The effects of climate change on the general health of people living in a certain geographic area are directly related to each other. Upgrading healthcare facilities and funding for research can help in the coordinated effort to understand these modifying elements in order to effectively address the health burden resulting from climate change. These initiatives will guarantee optimal oral health and allow for sustainable development.

Keywords: Climate Change, Oral Health, Dental Caries, Oral Cancer

INTRODUCTION

The National Communications Report of India to the United Nations Framework Convention on Climate Change (UNFCCC) indicates that climate change is likely to have an effect on all natural ecosystems. (Parkin, 2010; Priebe, 2008). The topic of climate change and global warming is combined with serious worries about health, water, social life, and culture. There are several facets to the connection between human health and climate change. Human health is impacted by climate change in both direct and indirect ways. Individuals are directly exposed to increased frequency of extreme occurrences and shifting weather patterns, including rising sea levels and temperature. It influences alterations in the ecosystem, agriculture, industry, human settlements, and economy indirectly, as well as changes in the quality of the water, air, and food (Petersen, 2003; Sturgis, 2004; Silverman, 2001; Lingen, 2001). When talking about health issues among the elderly, a population with many comorbidities, particularly cardiovascular or neoplastic illnesses that have a significant negative influence on this population's quality of life, oral health is sometimes neglected (Janto, 2022). Because it affects people's overall health and quality of life, oral health is becoming more and more important globally (WHO, 2021). For these reasons, the world's aging population necessitates the creation of healthcare services that deal with the pathology specific to the aged (Oliveira, 2013). In a strict sense, caries incidence is the quantity or percentage of people who have newly developed or worsening caries (Machiulskiene, 2020). Recent research on the etiology and pathophysiology of dental caries has demonstrated that the degree of enamel resistance is one of the critical factors influencing the development of dental caries. The caries situation worsens more quickly and easily when dental tissues have less resistance. Numerous research attest to the fact that the environment's condition affects how quickly the carious process develops. The body experiences metabolic abnormalities due to a variety of environmental conditions, which can produce pathological alterations in the mouth's organs and tissues. Owing to its physiological makeup and range of functions, the mouth is among the first to respond negatively to environmental stimuli. The degree and frequency of dental caries are clearly influenced by the environment, according to research on how environmental factors affect adult population dental health. Large-city air pollution from industrial facilities and vehicle emissions is one potentially dangerous element in the development of dental problems in urban people (Hamroeva, 2021)

CLIMATE CHANGE

Alternatively, long-term variations in the condition of the climate are discernible from persistent variations in the climate (Change, 2007). The Earth's climate has altered significantly since the start of the transition period, with the last ten years of the twenty-first century being the warmest (Amanambu, 2020). The

global average temperature has risen by 1 degree Celsius, while the atmospheric concentration of carbon dioxide has climbed from 416 parts per million. Given this, environmental scientists' primary research focus is on climate change. It influences how social and economic policies are developed and decided upon at the national and international levels. The future extent of global warming and its impact on various aspects of life remain mostly unknown (Berhail, 2019). Due to individual and group differences in exposure, sensitivity, and capacity for adaptation, these differences will contribute to susceptibility and mean that the health effects of climate change will not be the same for everyone. People who live in top-floor apartments or flood plains, for instance, may be disproportionately exposed to the negative health effects of climate change (Paavola, 2017)

Oral Health

Oral health is an essential component of general health as poor oral health effects growth, development and learning for children, communication, nutrition, self-esteem and various systemic conditions. Because of its effects on daily living, oral health is considered a determinant of quality of life (Khanna, 2010) Oral Cancer has emerged as a public health concern with over two hundred thousand new cases reported annually worldwide. Oral leukoplakia and oral submucous fibrosis largely constitutes oral precancer. Areca nut and betel quid chewing are known risk factors for the causation of oral precancer & cancer (Khanna, 2010) Societies cannot achieve social and economic stability in the absence of a healthy environment.(Edmonton University of Alberta 2019) The environments in which communities are built have an impact on human health. (Reber, 2021; Duane, 2019) The livability, water and food supplies, and air quality of communities are all impacted by pollutants, carcinogens, and disease-causing bacteria that are discharged into the environment as a result of human activity or natural disasters. (Reber, 2021; Duane, 2019) Environmentally sustainable (ES) initiatives on a national and international scale are desperately needed to ameliorate the climate disaster as environmental concerns and the effects of climate change grow (Reber, 2021; Duane, 2019) Health issues make people more vulnerable to climate change and less able to adapt to it. As a result, it is crucial to consider the social, economic, political, and cultural determinants of health. There is mounting evidence that the state of the climate can have a major effect on dental health. Changes in temperature, humidity, and precipitation patterns brought on by climate change can result in the emergence and spread of infectious diseases as well as other health issues (Schantz, 2002; Khanna, 2007; Salas, 2020; Fini, 2020). We will look at a few of the ways that the climate issue impacts dental health in this examination (Patil, 2023).

CLIMATE CHANGE EFFECTS ON ORAL HEALTH

Dental Caries

Dental caries is a result of interactions between carbohydrates, saliva, genetics, and the microbial biofilm that forms on the surface of the tooth (Pitts, 2016) The dynamic caries process is made up of quickly alternating phases of tooth demineralization and remineralization. If net demineralization continues for a long enough amount of time, specific caries lesions will begin to develop at particular anatomical predaliction spots on the teeth. Maintaining a balance between the pathogenic and protective factors that impact the development and advancement of dental caries is crucial. While pathogenic factors tip the scales in favor of dental caries and disease progression, protective factors encourage remineralization and lesion arrest (Pitts, & Zero, 2016). Many experts believe that the primary cause of the global drop in dental caries in recent decades has been the widespread use of fluoride toothpaste, whose mode of action involves tipping the balance of the oral biofilm in favor of health (Pitts, 2017). Temperature and humidity variations brought on by climate change may have an impact on dental health. Elevated body temperatures and high relative humidity can encourage the growth of oral bacteria, hence raising the risk of dental caries, or tooth decay. Furthermore, variations in precipitation patterns may impact water availability, which may have an impact on oral bacterial development (Pitts, 2017).

Oral Cancer

Sun exposure that emits ultraviolet (UV) radiation is one of the main causes of mouth cancer. The ozone layer, which shields the planet from dangerous UV radiation, may shift as a result of climate change. Oral cancer incidence may rise in response to a depletion of the ozone layer. More than 200,000 new cases of oral cancer are recorded globally each year, raising concerns about the disease's impact on public health (Chin, 2000); Chadna, 2015; Kotcher, 2021; Khanna, 2010); Hackley, 2021) The use of tobacco and betel quid, which were once taboo in Southeast Asia, is now a global public health issue. In India, the majority of oral

precancerous lesions are caused by oral leukoplakia and oral submucous fibrosis. Chewing betel quid and areca nuts is known to increase the risk of mouth cancer and precancerous lesions. (Schantz, 2002). Oral cancer incidence rises with fast urbanization that promotes hazardous lifestyle choices, such as easier availability to tobacco products (Khanna, 2007) Betel quid without tobacco has been categorized as a human carcinogen by the International Agency for Research on Cancer (Salas & Shultz, 2020). Oral cancer ranks third among women and the most prevalent malignancy in men in the majority of India's regions (Fini, 2020). Eighty percent of head and neck malignancies in South Central Asia are located in the oropharynx and oral cavity. Leukoplakia, erythroplasia, and erythroleukoplakia are inflammatory lesions that are the precursors to the majority of oral cancers (Chin, 2000; Chadna, 2015) Because visual and physical examinations are limited, diagnosing aerodigestive tract tumors is still difficult (Ferlay, 2010).

CONCLUSION

Oral health may be significantly impacted by the climate catastrophe. Oral health can be impacted by variations in temperature, humidity, precipitation patterns, and food availability. These variations can raise the risk of dental caries, oral cancer, periodontal disease, dental erosion, and nutritional alterations. In order to solve the climate catastrophe and save our dental health, we must act. The OHC sector places high demands on energy, water, supplies, and other resources, in order to successfully execute ES programs and reduce pollution and greenhouse gas emissions, the OHC clinical setting must adopt a multifaceted, high-tech, cooperative approach. Currently, institutional, educational, individual, and infrastructure impediments stand in the way of environmental sustainability in OHC clinical practice. In light of the constantly shifting global landscape, more study and cooperation may be needed to inform the creation of education, protocol, policy, and infrastructure modifications that will help OHC professionals adopt ES efforts. Peoples with poor oral hygiene are mostly expose to dental caries and oral cancer, so that is why it is recommended that peoples should follow the roles of oral hygiene strictly advised that cannot be lived belayed where they are expose to radiation.

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