Journal of Earth Science & Climatic Change

Brief Report Open Access

Impact of Climate and Seasons Changes on Ophthalmic Diseases

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Abstract

Weather describes the temperature and other outdoor circumstances (such as rain, cloudiness, and so on) at a specific time and location. Climate relates to the typical weather conditions in a specific location or region. Climate change has an adverse effect on human systemic and ocular health. Nowadays, it's simple to understand how climate change affects the environment. As a result of the environmental shift, this change will also have an impact on human's systemic and ocular health.The Intergovernmental Panel on Climate Change (IPCC), The 2014 Report on Human Health identified three basic prospects for how climate change will affect human health: (i) changes in the frequency of extreme events, such as heatwaves, droughts, and heavy rain; (ii) effects on natural systems, such as changes in disease vectors, waterborne diseases, and air pollution; and (iii) strongly conditioned effects by poorly managed human systems, such as labour impacts, malnutrition, and mental stress. Extreme weather has an impact on human systemic health, causing increased respiratory and cardiovascular disease, injuries and premature deaths, shifts in the prevalence and geographical distribution of food and water-borne illnesses and other infectious diseases, and threats to mental health.

Eye sight is the window through which we perceive the world, yet environmental changes are affecting human's ocular state and leading to eye diseases such as corneal, scleral and conjunctival diseases like conjunctivitis(Madras eye), Keratitis, Trachoma (leading cause of blindness due to bacterial infections) and so on due to water illness . Weather patterns can become unpredictable due to climate change, especially when temperatures rise, which can cause dry eyes, glaucoma, ARMD, cataracts and etc. Environmental factors, particularly sunlight and UVR, cause Uveitis, eye tumour, retinal detachment, retinal tears, Age Macular Degeneration (AMD), Posterior Vitreous Detachment, and Central Serous Choroidopathy. Adaptation to climate change is not a solution but we have prevention to prevent our systemic and ocular health from the climate changes. We should be kept in mind about seasonal characteristics about ocular and systemic states before diagnosing, treating as well as the investigating the conditions. In this study 57% peoples are affected with nuclear sclerosis and 42% peoples are affected with cortical cataract. 52.6% peoples are affected with grade 2 pterygium followed by 26.2% of grade 1 and 21% of grade 3. Pterygium prevalence was high in summer seasons (April-August) compared with other seasons. Dry eyes shows it's greatly affected by seasonal weather changes. 62.6% are affected with fungal keratitis; the incidence was high comparing with bacterial keratitis 38.9%.A higher incidence of Allergic Conjuctivitis occurs during the months of summer seasons (April-June). Patients should be advised to wear peaked cap and protective glasses to prevent eyes from both dryness and UV radiations

Keywords: Climate changes; Ophthalmic diseases; UV radiation

Introduction

The Intergovernmental Panel on Climate Change (IPCC), The 2014 Report on Human Health identified three basic prospects for how climate change will affect human health: (i) changes in the frequency of extreme events, such as heatwaves, droughts, and heavy rain; (ii) effects on natural systems, such as changes in disease vectors, waterborne diseases, and air pollution; and (iii) strongly conditioned effects by poorly managed human systems, such as labour impacts, malnutrition, and mental stress. Extreme weather has an impact on human systemic health, causing increased respiratory and cardiovascular disease, injuries and premature deaths, shifts in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases, and threats to mental health.

Global climate change, a substantial addition to the spectrum of environmental health hazards [1] is expected to have widespread negative effects on the planet over the next century. Time span of several decades [2]. As a result, the planet's geological, biological, and ecological processes [3, 4] as well as human biology and health, are predicted to be affected. As the earth's climate changes, severe weather and climatic events are expected to become more often. significant climate changes include temperature and rainfall increases, severe weather changes, and sea level rise. The health effects of climate change on human populations have developed as a major worry throughout the years, in acknowledgment of current climate extremes and the expected consequences that may continue to escalate as a result of rapid changes in climate [5]. Climate change may have an immediate impact on health by increasing the frequency of heat waves, or it may have an indirect impact by facilitating the transfer of infectious diseases and favouring the development of disease vectors. Climate changes direct, indirect and social dynamic effects on health and wellbeing result in the following health consequences: General Health-Cardiovascular disease, respiratory disease, infectious disease, malnutrition, mental illness, allergies, and injuries. Ocular Health- Cataracts, severe allergic eye disease, glaucoma, age-related macular degeneration, trachoma infections, vitamin A insufficiency, etc.

Materials and methods

Experimental and Prospective study included all patients with

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Received: 01-Aug-2023, Manuscript No: jescc-23-109397; **Editor assigned:** 03-Aug-2023, PreQC No: jescc-23-109397 (PQ); **Reviewed:** 18-Aug-2023, QC No: jescc-23-109397; **Revised:** 25-Aug-2023, Manuscript No: jescc-23-109397 (R); **Published:** 30-Aug-2023, DOI: 10.4172/2157-7617.1000714

Citation: Swarnalakshmi MR, Mohana Sundari SB (2023) Impact of Climate and Seasons Changes on Ophthalmic Diseases. J Earth Sci Clim Change, 14: 714.

clinically diagnosed ocular conditions. In this investigation 700 subjects were included and followed by clinical investigation related to disease conditions.

Increases in UVR and ocular effects

Human populations are becoming more exposed to solar radiation as stratospheric ozone depletion and global climate change influence surface radiation levels. Sunlight is the main source of radiation that reaches the eye [6]. The spectrum of solar radiation varies from ultraviolet radiation (100 nm) through far-infrared radiation (1 mm or 100,000 nm).

UVR has a physical spectrum that runs from 100 to 400 nm. Despite representing only 5% of the sun's energy, ultraviolet radiation (UVR) poses the greatest risk to humans, while solar UVR that reaches the Earth's surface contains around 95% UVA and 5% UV-B [6]. UVR from sunlight is classified into three bands: UVA (315 to 400 nanometers), which causes tanning, skin ageing, and skin cancer; UV-B (280 to 315 nanometers), which can cause sunburn and skin cancer; and UVC (280 - 100 nm), which is almost completely absorbed by atmospheric ozone and has little effect on health [7]. A significant amount of UVA that passes through the atmosphere is unfiltered

WHO's stance is the following: Climate change has an impact on social and environmental health determinants

Climate change is estimated to cause approximately 250 000 additional deaths each year between 2030 and 2050 due to malnutrition, malaria, diarrhoea, and heat stress etc.

According to [5] UVR causes an estimated 1% of the worldwide burden of diseases (skin cancers, cataracts, various eye disorders, viral infections) that can result in death and disability. Broadband UVR can be harmful to the eye and eyesight, as well as cause damage to numerous ocular tissues [8]. The effects on the eye might be acute after long periods of exposure or chronic with recurrent exposure to high levels of UVR [9]. Solar UVR typically affects the anterior structures of the eye as well as the around the eye. The anterior structures of the eye (cornea and lens) absorb more than 99% of UV-B radiation, which is high in energy and can thus readily damage the anterior structure.

Cataracts

Cataracts (clouding of the crystalline lens of the eye) are the most serious sunlight-related eye illness and the primary cause of avoidable blindness worldwide [10]. It is difficult to quantify the wide range of health implications and dangers associated with high amounts of UV-B radiation since they are likely to be influenced by other human behavioral, ethical, and geographical risk factors. Epidemiological studies [11, 12, 13] have confirmed that UVR exposure causes specific kinds of cataract. Nuclear sclerosis, cortical, and posterior sub capsular cataracts are the three main forms of age-related cataracts. In this study 57% peoples are affected with Nuclear sclerosis and 42% peoples are affected with cortical cataract Extreme heat and low humidity were independently associated with an increased risk of cataracts in older persons especially peoples are affected during Summer seasons (April-June). Exposure to UV radiation workers are high risk to get cataract early when compared with non UV radiation workers.

Pterygium

Wing-shaped, inflammatory, and invasive development on the conjunctiva and cornea of the human eye is most common in populations exposed to high amounts of UV-B, UVR, and particulate matter. [14] A wide range of environmental conditions, including UVR, heat, cold, and wind, have been associated with the development of pterygium. A study is conducted in Tamil Nadu found a significant connection between pterygia and environmental hazards. Excessive sunlight exposure has been related to a higher prevalence of pterygium in rural locations, older populations, and outdoor occupations. In this study 52.6% peoples are affected with grade 2 pterygium followed by 26.2% of grade 1 and 21% of grade 3. Pterygium is associated with dry eye has a result from dry climate, increased exposure UV, dust and increased winds. Pterygium prevalence was high in summer seasons (April-August) compared with other seasons [15, 16].

Dry eye

Dry eye (DE) is a common condition with symptoms of pain (discomfort, burning, and dryness) and impaired vision that have a detrimental influence on quality of life. [17, 18] It shows Strong correlation between dry eye and environmental hazards. We done two investigations Schirmer-I and tear break up time. The results shows during Wind: (51%), peoples are affected then winter: (39%), and summer (28%). The data support the clinical finding that dry eyes are greatly affected by seasonal weather changes [20]. The environment, which was windy, cold, and dry, probably contributed to the symptoms getting worse. When asking patients about their dry eye symptomatology, clinicians should inform them of these seasonal changes also.

Infectious keratitis

Fungal keratitis (FK) is a serious, sight-threatening infectious condition that is climate-sensitive, and its prognosis is worse than that of bacterial keratitis (BK). [19, 21] in our study 62.6% are affected with fungal keratitis, the incidence was high comparing with bacterial keratitis 38.9%. A higher incidence of fungal keratitis occurs during the months corresponding to the wind and harvest seasons.

Conjunctivitis

Allergic conjunctivitis is a prevalent condition that has a negative impact on patients' quality of life. The risk of conjunctivitis is greatly enhanced when the temperature rises in the summer. It shows 73.4% Peoples are affected with Allergic Conjunctivitis and 73.4% with bacterial and viral. A higher incidence of Allergic Conjunctivitis occurs during the months of summer seasons-(April-June) and a higher incidence of Bacterial and viral Conjunctivitis occurs during the month's monsoon seasons-(June-Dec).

Conclusion

Climate and the environment in which the person lives influences the type of infection and that develops and leads to blindness if left untreated and also affects daily living activities . So, Health promotion and prevention techniques are crucial for raising awareness about human eye health and the effects of climate change. Patients should be advised to wear peaked cap and protective glasses to prevent eyes from both dryness and UV radiations

Acknowledgement

The authors would like to thank Avinashilingam Institute for Home Science and Higher Education for Women for financially supporting the publication of this article.

References

1. McMichael AJ (2003) Climate change and human health: risks and responses. WHO.
2. Samet J (2010) Public health: Adapting to climate change. Issues brief 10.

3. McMichael AJ, Campbell-Lendrum D, Kovats S, Edwards S, Wilkinson P, et al. (2004) Global climate change. Comparative quantification of health risks-Global and regional burden of disease attribution to selected major risk factors. WHO.
4. Oliva MS, Taylor H (2005) Ultraviolet radiation and the eye. Int Ophthalmol Clin 45: 1-7.
5. Lucas R, McMichael T, Smith W, Armstrong BK, Prüss-Üstün A, et al. (2006) Solar ultraviolet radiation: global burden of disease from solar ultraviolet radiation. WHO.
6. Oriowo OM, Cullen AP, Schirmer K, Chou BR, Bols NC, et al. (2002) Evaluation of a porcine lens and fluorescence assay approach for in vitro ocular toxicological investigations. ATLA Altern Lab Anim 30: 505-13.
7. De Gruijl FR, Longstreth J, Norval M, Cullen AP, Slaper H, et al. (2003) Health effects from stratospheric ozone depletion and interactions with climate change. Photochem Photobiol Sci 2: 16-28.
8. Liu B, Xu L, Wang YX, Jonas JB (2009) Prevalence of cataract surgery and postoperative visual outcome in Greater Beijing: the Beijing Eye Study. Ophthalmology 116: 1322-31.
9. Katoh N, Jonasson F, Sasaki H, Kojima M, Ono M, et al. (2001) Reykjavik Eye Study Group. Cortical lens opacification in Iceland: Risk Factor Analysis–Reykjavik Eye Study. Acta Ophthalmol Scand 79: 154-9.
10. West SK, Duncan DD, Muñoz B, Rubin GS, Fried LP, et al. (1998) Sunlight exposure and risk of lens opacities in a population-based study: the Salisbury Eye Evaluation project. Jama 280: 714-8.
11. Schein OD, Steinberg EP, Javitt JC, Cassard SD, Tielsch JM, et al. (1994) Variation in cataract surgery practice and clinical outcomes. Ophthalmology 101: 1142-52.
12. Jaggernath J, Haslam D, Naidoo KS (2021) Climate change: Impact of increased ultraviolet radiation and water changes on eye health. Int J Environ Res Public Health 18: 7197.
13. Eidet JR, Chen X, Ræder S, Badian RA Utheim TP (2022) Seasonal variations in presenting symptoms and signs of dry eye disease in Norway. Scientific Reports, 12: 21046.
14. Echevarría-LL, Senciales-González JM, Medialdea-Hurtado ME, Rodrigo-Comino J (2021) Impact of climate change on eye diseases and associated economical costs. Int J Environ Res Public Health 18: 7197.
15. Berg EJ, Ying GS, Maguire MG, Sheffield PE, Szczotka-Flynn, et al. (2020) DREAM Study Research Group, Climatic and environmental correlates of dry eye disease severity: a report from the dry eye assessment and management (DREAM) Study. Transl Vis Sci Technol 9: 25-25.
16. Zhong JY, Lee YC, Hsieh CJ, Tseng CC, Yiin LM, et al. (2018) Association between dry eye disease, air pollution and weather changes in Taiwan. Int J Environ Res Public Health 15: 2269.
17. Gorski M, Genis A, Yushvayev S, Awwad A, Lazzaro DR, et al. (2016) Seasonal variation in the presentation of infectious keratitis. Sci Clin Pract 42: 295-297.
18. Lin CC, Prajna L, Srinivasan M, Prajna NV, McLeod SD, et al. (2012) Seasonal trends of microbial keratitis in South India. Cornea 31: 1123.
19. Chen CA, Hsu SL, Hsiao CH, Ma DH, Sun CC, et al. (2020) Comparison of fungal and bacterial keratitis between tropical and subtropical Taiwan: a prospective cohort study. Ann Clin Microbiol Antimicrob 19:1-8.
20. Hong J, Zhong T, Li H, Xu J, Ye X, et al. (2016) ambient air pollution, weather changes and outpatient visits for allergic conjunctivitis: A retrospective registry study. Scientific reports 6: 23858.
21. Khalaila S, Coreanu T, Vodonos A, Kloog I, Shtein A, et al. (2021) Association between ambient temperature, particulate air pollution and emergency room visits for conjunctivitis. BMC ophthalmology 21: 1-8.