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The effect of time exposure to sunlight on patients with COVID-19

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Abstract

This cohort study investigates the association between the timing of exposure to sunshine and the severity of COVID-19 disease in Wasit, Iraq. The Questionnaire has to be filled out by Wasit patients diagnosed post-COVID-19. The study evaluated mild, moderate, and severe COVID-19 conditions. The period of exposure to sunlight was described as its daily exposure. According to the findings, daily exposure to sunshine for up to one hour reduces the severity of symptoms in 55.3% of participants, while a reduction in daily exposure reduces the severity of symptoms in 37.8% of respondents. Nevertheless, the absence of sun exposure was connected with serious sickness symptoms in 6.9% of the patients. This study indicated that regular sunshine exposure had a direct impact on the severity of COVID-19 symptoms.

Keywords: Sunlight, coronavirus, Iraq

Introduction

Beginning in December 2019, the coronavirus disease (COVID-19) has been discovered as the source of an outbreak of respiratory sickness in Wuhan, Hubei Province, China. Since then, the disease has spread globally, resulting in an ongoing epidemic. SARS-Coronavirus 2 (SARS-CoV-2) is a novel severe acute respiratory syndrome coronavirus. All structural properties of the unique SARS-CoV-2 virus particle are shared with other coronaviruses. Compared to other respiratory infections, this one has a rather high transmission rate. Due to this and other causes, such as huge gatherings and the propagation of the disease by returning travelers or pilgrims, fresh outbreaks erupted in various countries, with thousands of known cases and an estimated number of millions of unreported cases ^[1].

According to the Italian study, COVID-19 patients had a significant vitamin D deficiency, and pneumonia caused by the novel coronavirus (COVID-19) is a fatal infection. In patients with coronavirus pneumonia, a temperature above 38°C is common, as are symptoms such as a dry cough, fatigue, difficulty breathing, and diarrhea ^[2, 3]. The electromagnetic energy that the sun emits includes light beams, particularly infrared and ultraviolet light. The sun's rays are scattered by the ground and subsequently filtered by the atmosphere. The average daily amount of light falling on Earth is 164 watts per square meter, according to several sources. Long-term exposure to the sun has been related to skin cancer, ageing, immunosuppression, and eye problems such as cataracts and macular degeneration.

Sunburn, snow blindness, and solar retinopathy are the effects of short-term sun exposure ^[14]. Epidemiological data ^[15] indicate that individuals who are exposed to more sunshine had lower blood pressure and cardiovascular disease-related mortality.

Sunlight's ultraviolet (UV) radiation and its adverse health consequences are the most dangerous. UV radiation is a form of electromagnetic energy that the sun emits predominantly. UV rays are of three types: UVA, UVB, and UVC radiation. UVC or ultraviolet C, wavelengths vary from 100 and 280 nanometers. This spectrum of radiation has bactericidal effects, as demonstrated by germicidal lamps, but relatively little reaches the Earth's surface due to air absorption. As proved by germicidal lamps, this spectrum of radiation possesses bactericidal properties; yet, due to air absorption, very little of it reaches the Earth's surface ^[4]. UVB (ultraviolet B) is the second type of ultraviolet light, with wavelengths ranging from 280 to 315 nm. UVB (ultraviolet B) is the second kind of ultraviolet radiation, with wavelengths between 280 and 315 nanometers. It triggers a photochemical reaction with UVC rays in the Earth's atmosphere, resulting in the development of the ozone layer. It causes sunburn and damages DNA directly.

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Not only does it possess a short-term effect on skin ageing, it also contributes significantly to the development of skin cancer [5]. In addition, it is required for the synthesis of vitamin D in mammalian skin [6]. UVA (ultraviolet A) is utilised in cosmetics, tanning salons, and PUVA therapy for psoriasis [7] because its wavelength range of 315 to 400 nm is less damaging to DNA.

UV radiation from the sun has both positive and negative health effects, as it is required for vitamin D3 synthesis and is a mutagen [8]. While a vitamin D pill can help prevent this harm [9], it cannot circumvent the body's natural defenses against vitamin D overload from sunlight. Vitamin D has been demonstrated to have multiple health benefits, including bone-strengthening [10] and perhaps preventing the onset of certain cancers [11, 12]. Visible sunshine is beneficial to health because of its link with the time of melatonin synthesis and the maintenance of normal, robust circadian rhythms [13].

Vitamin D is often referred to as the "sunshine vitamin." 7-dehydrocholesterol absorbs UV radiation and converts pre-vitamin D3 to vitamin D3, which is subsequently converted to vitamin D3. Pre-vitamin D3 and vitamin D3 absorb UVB light and subsequently change into photoprotective chemicals, some of which have unique biological features. Sun-induced vitamin D synthesis is significantly influenced by the season, time of day, latitude, altitude, air pollution, skin pigmentation, usage of sunscreen, transmission through glass and plastic, and age.

Vitamin D is converted by the liver and kidneys into 25-hydroxyvitamin D, the major circulating form, and 1,25-dihydroxy vitamin D, the physiologically active form, in this order. Because it affects calcium and phosphate metabolism, 1,25-dihydroxy vitamin D is crucial for sustaining metabolic function and bone health. Nearly every cell and organ in the body possess vitamin D receptors, and many of these cells and organs may produce 1,25-dihydroxy vitamin D. This may explain why vitamin D insufficiency and residing at high latitudes are linked to an increased risk of autoimmune illnesses, some malignancies, cardiovascular diseases, infectious diseases, schizophrenia, and type 2 diabetes.

During the winter months, vitamin D insufficiency is rather frequent due to a lack of exposure to sunlight. Even in the spring and summer, a considerable portion of the global population suffers from vitamin D insufficiency when they remain indoors. Those at risk for vitamin D deficiency, particularly those over forty, should take vitamin D supplements in addition to adequate sun exposure (such as obesity, ageing, dark skin, and little exposure to sunlight in eastern societies, especially women). With a few exceptions

(such as a CYP24A1 gene mutation or sarcoidosis), hypersensitivity to vitamin D is uncommon [16]. Considered safe is a modest daily intake of vitamin D3. Recent large-scale studies with vitamin D3 dosages of 2,000 IU/day [17] and 4,000 IU/day [18] did not reveal any increase in kidney stones.

Results

Based on previous research on this virus and its link to sunlight, a statistical analysis of formerly infected individuals in Wasit, Iraq indicated that they had been cured. In 120 cases of varying ages, a questionnaire was administered, and the replies indicated two major findings:

1. The severity of the disease (mild, moderate, or severe).
2. Duration of exposure to sunlight.

As stated previously, when the body is exposed to sunshine, vitamin D, which plays a key role in enhancing the immune system, plays a crucial role in accelerating the rate of recovery and reducing the severity of the sickness. According to Table 1, the following outcomes occurred:

1. 55.3% of people were exposed to sunlight for a period ranging from 15 min to 1 hour, and the severity of the disease was mild.
2. 37.8% of people were exposed to sunlight for a period of 15 minutes to 1 hour, and the severity of the disease was moderate to severe.
3. 6.9% of people who were not exposed to sunlight had severe disease.

Table 1: The percentage of the participant who had mild, moderate, or severe symptoms according to time exposure to sunlight.

| Severity | Exposure time | | | | Total |
|----------|---------------|--------|--------|-------|-------|
| | 0 | 15 min | 30 min | 1 hr | |
| Mild | 0 | 18.6% | 25.2% | 11.5% | 55.3% |
| Moderate | 0 | 16.8% | 4.6% | 16.4% | 37.8% |
| Sever | 6.9% | 0 | 0 | 0 | 6.9% |

The findings revealed that a substantial proportion of individuals (more than fifty percent) experienced moderate sun sickness, suggesting the importance of sunshine in the creation of vitamin D when the body is exposed to ultraviolet radiation, which aids in virus resistance. The remaining third of patients (37.8 percent) were moderate to severely ill, and 6.9 percent of those affected acknowledged the significance of sunlight, since their severe illness may be ascribed to a lack of exposure to sunlight, which worsens the disease according to the study as shown in Figure.1.

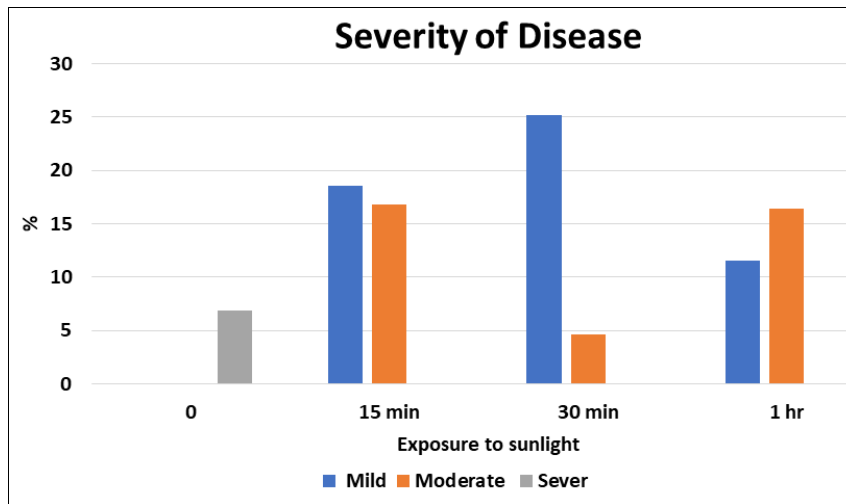


Fig 1: The severity of disease according to time exposure to sunlight.

Discussion

Long-term exposure to sunshine reduced the severity of COVID-19 in the subjects of the research. Consistent with previous research, this conclusion implies that sunlight is incapable of eradicating the COVID-19 virus, rendering it worthless as an antiviral agent. In contrast, exposure to sunlight can aid COVID-19 patients in maintaining their health, leading to a milder disease. The sun's rays fortify the immune system, thereby preventing the transmission of influenza and SARS viruses within the human body [19, 20]. COVID-19 patients who received hospital or home care and were exposed to sunlight were more likely to have a lesser condition. Vitamin D enhances the immune system and is produced by exposure to sunlight [21]. Influenza is triggered by a lack of exposure to sunlight [22]. Exposure to sunlight benefits the recovery of most respiratory illnesses, including tuberculosis and lung disease, according to previous research [23, 24]. Iraq, located in a region where the sun shines for the bulk of the year, can make use of the quantity of sunlight throughout the year. Exposure to sunlight is helpful to human health [25]. Access to adequate sunlight can improve mood and enhance the release of endorphins, which strengthen resistance to diseases like COVID-19 [26]. This study has limitations despite its significant findings regarding the relationship between sunlight and the severity of COVID-19. Multiple additional variables, including early treatment/therapy, PHBS and Germas, and physical capacities, can modify the severity of COVID-19. In addition, it is essential to examine the different types and levels of solar exposure. Moreover, each COVID-19 patient's exposure to sunlight was not represented in the authorities' accessible data.

Conclusion

This study discovered a correlation between sun exposure and the severity of COVID-19 in Wasit, Iraq, patients. Sunlight can lessen the intensity of COVID-19 symptoms not only in Wasit but also in other nations, especially those with high epidemic mortality rates. This exploratory research needs more development.

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