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REVIEW ARTICLE

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Ultraviolet and COVID-19 pandemic

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Abstract

Background: COVID-19 virus causes coronavirus disease.

Aims: It is a highly contagious viral infection.

Patients/Methods/Results/Conclusion: In this article, we will discuss the potential phototherapy problems and also alternative options for dermatologists, ultraviolet treatment against COVID-19 virus, and vitamin D–associated problems in these coronavirus days.

KEYWORDS

COVID-19, cutaneous, skin diseases, ultraviolet, vitamin D

1 | INTRODUCTION

COVID-19 pandemic has spread quickly through our planet since its recognition in December 2019.[1] This pandemic has resulted in closure of cabin-type or local ultraviolet treatments all around the World.[2] In this review article, COVID-19-related ultraviolet treatments are mentioned as 4 sections: ultraviolet treatment risks and potential treatment options in coronavirus days, potential ultraviolet uses against COVID-19 virus, and vitamin D status in this pandemic.

2 | ULTRAVIOLET TREATMENTS AND ALTERNATIVE OPTIONS IN DERMATOLOGY DEPARTMENTS DURING CORONAVIRUS DAYS

Ultraviolet rays can be separated as 4 parts—ultraviolet-A1 (340-400 nm), ultraviolet-A2 (320-340 nm), ultraviolet-B (280-320 nm), and also ultraviolet-C (200-280 nm)—with the most of ultraviolet rays arriving the epidermis and dermis falling into the previous 3 UV rays because of the blocking impacts of ozone layer.[3] Phototherapy is useful for the therapy of different skin diseases such as vitiligo, psoriasis, endogenous or exogenous eczemas, mycosis fungoides, lichen amyloidosis, lichen planus, chronic urticaria, alopecia areata, and prurigo nodularis.[4] After March 2020, all ultraviolet treatments have been stopped because of coronavirus disease pandemic. COVID-19 virus may keep alive in the air until 3 hours.[2,3] After opening the PUVA-cabins' door, we cannot take out the droplets and also we cannot decrease the viral load in the cabin easily. This coronavirus may also live for long term on surfaces with steel and plastic until 9 days. The coronavirus-19 can live only one day on the surfaces with paper and cardboard.[1,5,6] Mostly PUVA or UVB cabins have got steel or plastic surfaces. These conditions bring viral dissemination between the patients. Phototherapy is generally not the unique treatment option for these dermatoses. We can propose home phototherapy, PUVASOL, turban PUVASOL, Dead Sea climatotherapy, and the other systemic or topical treatments.[7-11] PUVASOL is the use of oral or topical psoralen follow-up by sun exposure as a source of ultraviolet-A. PUVASOL therapies have been successfully utilized for especially psoriasis treatment.[9] The modification of topical PUVA which we call, "Turban PUVASOL," is a method of localized skin-directed immunomodulatory therapy using topical methoxsalen with turban fashion followed by sun exposure. It can be effective and safe in alopecia areata treatment.[10] Dead Sea climatotherapy can be useful in the short period for therapy of moderate and severe psoriatics, and it can also help the psychological problems of these patients.[11] FDA-approved home-based phototherapy devices are proven to be safe and effective for use at home by patients who have vitiligo or psoriasis.[7] These alternative phototherapy methods may be safer in coronavirus days.

3 | ULTRAVIOLET AGAINST COVID-19

Mostly epidemic respiratory viral infections are more virulent in cold weather, and COVID-19 infection may repeat or keep going

for a longer time.[2] Atmospheric conditions including temperature changes with wind, cloud, rain, and snow, etc were found as very important elements affecting the pulmonary and upper respiratory tract viral diseases. But the impact of these conditions on coronavirus disease stays unknown. Coronavirus infection can be slowly stopped with temperature and humidity rises according to some studies. Heat is an major element influencing the coronavirus survive and viral load decreases more quickly at 23-25°C than at 4°C. Some studies indicate that there is no any association of coronavirus-19 spread with heat or ultraviolet rays in pandemic cities.[12]

Ultraviolet rays from the sun rise in summer times, and it can be a crucial element in stopping coronavirus disease. The UV index is an international standard measurement that provides a forecast of the expected risk of overexposure to UV radiation at a particular place and time. UV light can damage or destroy various types of viruses such as SARS and MERS, and the destructive power of UV light depends on factors such as wavelength and the type of the organism. UV energy negatively impacts the influenza virus and some similar viruses, and it may have a similar effect on the coronavirus. China's central bank and also a public transport firm have used UV light to combat the COVID-19 pandemic.[13]

The ultraviolet-C rays, mostly the spectrum of 250-270 nm, are powerfully absorbed by the DNAs of microbial agents and so, this spectrum is the most lethal wavelength for the microorganisms.[14] Though ultraviolet-C ray can be germicidal, the application of ultraviolet-C rays for prophylaxis and therapy of localized infections is still unknown. Previous reports have still experimental level, and human tests are rarer. Since the reaching of ultraviolet-C rays to human body is a limited process, ultraviolet-C rays for viral infections are probably to be used only to regional infections,[14] not systemic conditions. However, we know that it cannot prevent or treat any patient with the coronavirus infection. Ultraviolet-C ray has been recommended for sterilization of N-95 masks during the COVID-19 pandemic.[2] But, ultraviolet ray like 254-nm ultraviolet-C is especially virucidal, and it can decrease the survival time of some viruses such as SARS-CoV and MERS-CoV.[12-14] Unfortunately, ultraviolet germicidal irradiations (UVGI) have potential safety risks. Although previous studies indicate that it does not cause any harmful effect on human skin and eyes, new studies should be done to clarify the safety profile of UVGI before routine pratice.[12] It has been concluded that ultraviolet-C is lesser carcinogenic than ultraviolet-B for its more superficial penetration depth. It has been found that resistance of viruses to ultraviolet-C can develop after more cycles of ultraviolet-C like 80 cycles. So, much more or long period use of ultraviolet-C must be avoided.[14] In conclusion, germicidal UVC may efficiently inactivate bacteria and viruses. Although the general use of ultraviolet-C in public areas including malls, health providers, medical doctors' offices, schools, bus and train stations, airports, airplanes, trains, and bus has been very rare since ultraviolet-C ray devices still have some risks such as carcinogenic and cataractogenic effects on humans, this approach may help to prevent the seasonal COVID-19 virus or the other pandemics.

4 | VITAMIN D AND COVID-19

We know that exposure to ultraviolet-B ray aids our body to produce vitamin D3 for supporting the bone and muscle health. In previous studies, authors concluded that vitamin D insufficiencies have been related with a risk of several virus infections such as parainfluenza, influenza, HIV, and HCV. We do not know any information on whether lower vitamin D level is more specifically characterizing patients with coronavirus infection and is relevant to disease outcome.[15] But, lower vitamin D status in animal has been indicated to higher risk for coronavirus infection. Vitamin D shows endocrine functions in cellular proliferation, differentiation, and apoptosis, as well as in the innate immune system against viral infection like COVID-19.[15] We can recommend the screening of vitamin D levels in coronavirus days. If there is a vitamin D deficiency, we can propose daily, weekly, monthly, or every 4 months vitamin D supplements to obtain an adequate serum vitamin D_3 level. We can also recommend the exposure of the arms and legs to sunlight 15-30 minutes to produce adequate vitamin D.[15]

5 | DISCUSSION

We should not use cabin-type or local phototherapy devices till the COVID-19 pandemic is all finished. Everybody knows that continuous ultraviolet therapies may cause immunosuppression.[16,17] Essentially, phototherapies may suppress the immune system, leaving human body susceptible to various viral infections like coronavirus infections. Phototherapy also frequently leads to skin injury, and this adverse event can bring viral transmission risks. In phototherapy machines, we cannot minimize the infection transmission risks in the cabin's air easily.

We can propose alternative phototherapy options such as home phototherapy, PUVASOL, turban PUVASOL, and Dead Sea climatotherapy with lower infection transmission risks during these COVID-19 pandemic. During COVID-19 pandemic, we can check vitamin D status of our patients and also we may recommend the exposure of the arms and legs to sunlight for 15-30 minutes. This can also relieve the stress, anxiety, fear, sadness, and loneliness of our patient during this lockdown. We know that ultraviolet serves the central neural and neuroendocrine systems to reset human body homeostasis. It can help psychological diseases including anxiety, mood disorders, and depression in coronavirus days. In conclusion, as a dermatologist, we can use safer dermatology treatments with minimum contagious risks.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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