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Editorial

Can Laser Medicine and Laser Acupuncture be used for COVID-19? Selected Areas of the Current Scientific Literature

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Abstract

The present moment lacks any reliable vaccine or treatment for the SARS-CoV-2 virus and the resultant disease COVID-19 (Corona Virus Disease-2019). Laser medicine like photobiomodulation (PBM) or photodynamic therapy (PDT), and laser acupuncture may possess some potential to interact and relieve the symptoms of this disease. PubMed lists only two results for the search term 'PBM or PDT and COVID-19', indicating the paucity of validated scientific clinical studies on the subject. On the contrary, it does not mean that the laser does not have any effect on COVID-19. The development of therapeutic procedures will continue to play a major role in COVID-19 in the future.

Keywords

COVID-19 (Coronavirus disease - 2019); SARS-CoV-2 virus; photobiomodulation (PBM); photodynamic therapy (PDT); laser acupuncture

1. Introduction

Integrative and Complementary Medicine (ICM), including Traditional Chinese Medicine (TCM) with acupuncture, has proven to be effective in the rehabilitation of COVID-19 (Coronavirus Disease 2019) patients [1–5].

Appropriate expert teams have been authorized to manage rehabilitation treatments using TCM and the combination of TCM and Western medicine across China [4]. In February 2020, Chinese health authorities issued a guide for the use of TCM in recovered patients, which includes TCM recipes, nutritional advice, moxibustion, cupping, acupuncture, and music therapies, as well as traditional exercises like Tai Chi or Qi Gong [6].

2. Application of Photobiomodulation (PBM) and Laser Acupuncture (LA)

As on 30th April 2020, the most widely used medical database PubMed indexes only two results for the search 'PBM or photodynamic therapy (PDT) and COVID-19', which included a letter to the editor and a guest editorial [7, 8]. This indicated the fact that no validated scientific studies have been carried out on the subject. However, it nowhere denies the role of lasers on COVID-19. Scientific societies that deal with the topic, therefore, find it very difficult to recommend guidelines for adequate treatment or alleviation. A careful interpretation of the two articles [7, 8] presents great potential for relatively new methods in the area of integrative medicine. Nevertheless, hurried conclusions need to be avoided.

Dominguez et al. [7], in a letter to the editor entitled *'Can transdermal photobiomodulation help us at the time of COVID-19?',* describe various possibilities of the non-invasive laser blood irradiation, which has already been used in numerous areas in Russia and Germany [9,10]. Unfortunately, the authors are unable to pinpoint any confirmed results in connection with COVID-19. On 24th April 2020, they documented, among other things, "We recommend the identification and treatment of hyper inflammation using a non-invasive therapy that exists with proven safety profiles to address the immediate need to reduce the rising mortality by performing projects that include transdermal PBM with application to 30 min per day for 3–5 days with diode laser whether visible or invisible" [7].

Fekrazad cites a good overview of PBM and COVID-19 in a guest editorial in the same journal 'Photobiomodulation, Photomedicine, and Laser Surgery' on 23rd April 2020 [8]. He describes the possibilities of PBM and antiviral PDT as a potential novel approach in COVID-19 management. He asserts, "Of course, in the future, the use of a different modality of PBM and PDT can be evolved and, by using monoclonal antibodies, we could target lung tissue specifically. It can even be improved by using nanotechnology, making new photosensitizers in Nano scales, and pasting them to the target tissues to obtain better results." [8].

The scientific literature on laser medicine presents promising approaches worldwide with regard to attempts at controlling bacterial and viral infections in humans, although no such evidence on containment of COVID-19 is available. Exemplarily, in 2018, Kingsley et al. [11] in the USA investigated the potential of visible monochromatic violet/blue light (405 nm) as a nonthermal intervention for viruses on foods like berries that are prone to norovirus contamination. The authors showed that the use of food-grade singlet oxygen enhancer

compounds in combination with light in the visible spectrum might offer a means to inactivate foodborne viruses.

Another study from Iran investigated the effects of riboflavin (RB) in combination with different doses of ultraviolet light (UV) on platelet concentrate (PC), which was infected by three models of the virus [12]. The study indicated that RB/UV treatment proved to be a promising pathogen reduction technique in PC and had limited effects on platelet quality [12].

One study from Australia [13] demonstrated that treatment with RB and UV light decreases dengue virus (DENV 1-4) titers moderately.

Authors from Sweden in 2019 [14] stated that a high dose of blue light could perhaps treat bacterial infections without any loss of human skin cells. They indicated that PDT using riboflavin and blue light should be explored further as it may be utilized in the treatment of skin diseases associated with keratinocyte hyperproliferation. In 2014, researchers from Beijing [15] developed a flow-based treatment device using RB and UV light to inactivate viruses in fresh-frozen plasma (FFP) and demonstrated an enhanced efficiency of the virus inactivation, although the total activity of plasma factors was reduced.

Risk reduction strategies for transfusion-related acute lung injury (TRALI) involve the preferential use of male donors in providing FFP [16]. Authors from Spain thanked its readiness, simplicity, and feasibility, which facilitated the implementation of riboflavin- and UV light-treated FFP, and thus the TRALI prevention strategy with ease [16].

In 2018, two authors from the UK [17] reported in a perspective article that blue light undoubtedly had the potential to become a highly effective antimicrobial. However, the key questions are yet to be answered, including the mechanisms of toxicity and the contribution of porphyrin-independent mechanisms in particular [17].

In 2016, authors from Colorado [18] investigated the efficacy of RB and UV light against Middle East respiratory syndrome coronavirus (MERS-CoV) tested in human plasma and reported that RB and UV light effectively reduced the titers of MERS-CoV in human plasma products to below the detection limits; this suggested that the treatment process may reduce the risk of transfusion-transmission of MERS-CoV.

The available scientific literature includes only two papers to date on LA, in connection with COVID-19 that speak of the potential for it. Fekrazad in 2020 [8] mentioned that more attention must be paid to laser acupuncture. Liang and Litscher 2020 [3] addressed in an editorial, the prospects of robot-controlled (laser) acupuncture in correlation with highly infectious diseases [19]. The recommended acupoints for moxibustion and needle acupoint application include Zusanli (ST 36), Guanyuan (CV 4), Dazhui (GV 14), Fengmen (BL 12), Feishu (BL 13), Zhongwan (CV 12), and Shenque (CV8). The same points can be used in laser acupuncture. Acupuncture reduced poor appetite, coughing, insomnia, and headaches in patients with COVID-19 [3–5].

3. Future Aspects

The development of therapeutic procedures will continue to play a major role in COVID-19 in the future, especially since consistent containment of SARS-CoV-2 currently appears to be the only sensible strategy from an epidemiological viewpoint. Other strategies, such as rapid infection control or eradication of the virus, are currently impractical and unsuccessful.

Attempting to establish rapid herd immunity does not make sense because it is not yet known how long people will be immune after surviving an infection with the coronavirus. This is also because the approach of the epidemic ultimately builds on the idea that infected people will live for years and afterward become immune. In addition, an infection is not recommended because the long-term effects of COVID-19 on organs like the lungs and heart have not yet been ascertained.

4. Conclusions

PBM and PDT are very interesting and promising approaches to the treatment of various diseases. However, the literature lacks research on PBM and related methods like LA and COVID-19. Out of the available scientific literature on these topics, most are speculating, while robust clinical trials are completely missing.

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Competing Interests

The author has declared that no competing interests exist.

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