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Elimination of Free Radicals and Immunity Enhancement with 644 nm (Red Colour) Radiation: A Randomised Controlled Clinical Trial

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Abstract

Superoxide dismutase (SOD) is an important antioxidant enzyme present in all oxygen-metabolizing cells. The effect of different wavelengths on superoxide dismutase (SOD) has been reported previously which has shown to have a remarkable effect on immune system. Thus, after presenting solid scientific reasoning behind this therapeutic mode of treatment pertaining to the activity of SOD in the presence of 644 nm radiation, a randomised controlled clinical trial has been carried out which builds a unique relationship of 644 nm irradiated SOD with the elimination of free radicals and hence the enhancement of immunity, not only for curative treatment but also as a preventive tool against all those diseases related to the elimination of free radicals to get better immune system of the human body. This study was conducted in the department of Gynecology and obstetrics at Al-Khidmat Teaching Hospital Mansoorah, Lahore, Pak

Keywords

Immunity System ([articles.aspx?searchcode=Immunity+System&searchfield=keyword&page=1&skid=0](#)), Free Radicals ([articles.aspx?searchcode=Free+Radicals&searchfield=keyword&page=1&skid=0](#)), SOD ([articles.aspx?searchcode=SOD&searchfield=keyword&page=1&skid=0](#)), Chromotherapy ([articles.aspx?searchcode=Chromotherapy&searchfield=keyword&page=1&skid=0](#)), Red Colour (644 nm Radiation) ([articles.aspx?searchcode=Red+Colour+\(644+nm+Radiation\)&searchfield=keyword&page=1&skid=0](#))

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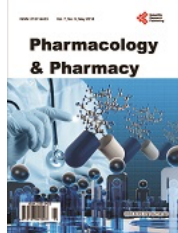
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Free radicals are the class of compounds characterized by high reactivity due to unpaired electrons in their molecule are generated in a variety of chemical and biological systems including the human body [1] [2] . Production of the free radicals in the cells is a constant process as a part of normal cellular function. However, excess free radical production from endogenous or exogenous source might play a role in various diseases [3] .

Oxygen-free radicals, more usually known as reactive oxygen species (ROS) along with reactive nitrogen species (RNS) are well known for playing a twofold role as both lethal and valuable species. Over-production of ROS results in oxidative stress (an imbalance between oxidants and antioxidants), a deleterious process that can be a vital arbitrator of damage to cell structure together with lipids and membrane, proteins and DNA [4] . According to the Free Radical Theory of ageing (the most widely accepted theory of ageing) proposed by Herman in 1956, age-related impairment is caused by oxygen-derived free radicals through oxidative damage to biomolecules, with mitochondria being the main target of free radical attack. It is now well known that the activity of the immune system, in general, declines with age, with the most prominent alterations in cell-mediated immunity, especially in the T lymphocyte functions with decreased proliferation.

In order to maintain health, an equilibrium is required between the production of free radicals and their inactivation by anti-oxidants [6] . The levels of free radicals and other reactive species in living organisms are controlled by intricate balance of antioxidants defence, which lowers oxidative harm to biomolecules [2] . Antioxidants prevent free radicals induce tissue damage by preventing the formation of radicals, scavenging them, or by promoting their disintegration.

Superoxide dismutase (SOD) is an important antioxidant enzyme present in all oxygen-metabolizing cells. The effect of different wavelengths on superoxide dismutase (SOD) has been reported [7] [8] . Thus, after presenting solid scientific reasoning behind this therapeutic mode of treatment pertaining to the activity of SOD in the presence of 644 nm radiation, a randomised controlled clinical trial has been carried out which builds a unique relationship of 644 nm irradiated SOD in the elimination of free radicals and hence the enhancement of immunity. Previously, the effect of visible range radiation was also studied on platelets in thrombocytopenia in dengue fever [9] .

2. Materials and Methods

In this study seventy pregnant female patients were enrolled at department of Obstetrics and Gynecology at Al-Khif Teaching Hospital Mansoorah, Lahore (Pakistan) during 2nd September to 17th October 2015. All the enrolled patients were between the ages of 25 - 35. All the pregnant patients were between 3 to 8 months of gestation. The patients were randomised into two groups in 1:1 (n = 35) to chromotherapy group and controlled group, (n = 35). They complained easy fatigability and inability to do routine household chores without any specific under-lived disease. None of the patients were suffering from other medical disorders such as hepatitis, hypertension, and diabetes.

Chromotherapy was adopted for one group (n = 35), with the consent of patients, as the mode of treatment using red light as a medium i.e. hydrochromotherapy. This group was advised to take two ounces of red (644 nm) chromotized water twice a day after each meal for six weeks. For the preparation of chromotized water, transparent glass bottles with a capacity of 1 litre, were wrapped with 644 nm (Red) filter sheets. Bottles were filled with 750 ml of distilled water. The bottles were then exposed to sunlight (6 hours) by placing on a piece of wood (non-conducting surface [10]).

The remaining (n = 35) patients acted as a control. These patients were advised only to take balanced diet to improve their resistance and hence immunity, with no other supplements or immunity enhancement therapy.

3. Results

Both the groups were re-examined after 6 weeks of treatment. It was observed that out of 35 patients of the group were taking chromotized water, 29 received therapy as instructed. **After 6 weeks, it was observed that the patients took full dose, were not complaining of tiredness and easy fatigability anymore, which they had been complaining at the start of their gestation period. Hence as according to the doctrine of chromotherapy, this easy fatigability or tiredness**

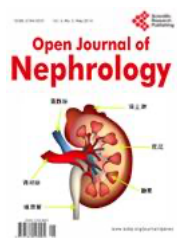
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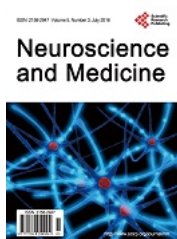
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is due to the low immunity, and as the relationship of immunity with free radicals has already been established, so matter of fact, free radicals were eliminated from their body with increased SOD activity leading to better immunity shown in Figure 1. The remaining 6 patients were not cured fully since they did not take the chromotized water at a took it irregularly. Figure 2 shows that the cure rate of patients treated with chromotherapy was almost 82.9%. After completing the course of treatment, follow-up examinations of patients were carried out and no recurrent infections found. General health condition was also found to be persistently good.

While the control group after 6 weeks, who were advised only to take balanced diet and with no other supplements immunity enhancement medicines, still complained of tiredness, easy fatigability and hence had poor immunity, as illustrated in Figure 3. The cure rate in this case was 34.3% (Figure 4).

4. Discussion

This is an interesting study to investigate the therapeutic effect of 644 nm (red colour) radiation (chromotherapy) in a group of patients with easy fatigability and inability to do routine household chores without any specific under-lived disease. The study is creative and innovative and so relevant to Chinese medicine. In this study a unique relationship 644 nm irradiated SOD with the elimination of free radicals is built and which undoubtedly enhances the immunity. kind of therapy is used not only for curative treatment but also can turn into a preventive tool against all those disease related to the elimination of free radicals and get better immune system of the human body.

We know that Free radicals are the species which are short-lived and generally highly reactive with one or more electrons with unpaired spins. O_2 radicals are stable and long-lived. Oxygen, which is di-radical, has two unpaired electrons on about an axis, called as spin if outermost pair of electrons of oxygen molecule has parallel spins, ($\uparrow\uparrow$), then they are in the "triplet" state and if the oxygen molecules, whose outermost pair of electrons has antiparallel spins $\uparrow\downarrow$, then they are in the "singlet" state. With parallel spins, oxygen has two electrons in the triplet state, which, according to the rules of physical chemistry, does not allow them to react

Figure 1. From the chromotherapy group (n = 35), 29 were completely cured. Whereas the remaining 6 patients took irregular doses and did not recover fully.

Figure 2. The figure shows the cure rate as a percentage.

Figure 3. From the control group (n = 35), 12 were completely cured. Whereas the remaining 23 patients were not cured in 6-week study.

Figure 4. The figure shows the cure rate as a percentage.

with most molecules, that is a lone pair. So, triplet oxygen is not reactive. However, it may be activated by the addition of energy and get into reactive oxygen species. If it absorbs sufficient energy, to reverse the spin of one of its unpaired electrons then it forms the singlet state. Singlet oxygen, has a pair of electrons with opposite spins, as being, not a radical it is highly reactive, that is, no more a lone pair. Either as a result of biological reactions or by photosensitized absorption of electromagnetic energy, Singlet oxygen is produced [11].

Reduction of molecular oxygen, to super oxide, and peroxide to hydroxyl radical, is "spin forbidden" and therefore it is slow unless catalysed by a heavy ion. For the reduction of O_2 , alternative spin-permitted pathways include interaction of molecular oxygen with the excited triplet state of another molecule for producing singlet oxygen, or an excited state molecule and gets to a higher energy orbital, on the same atom [12].

It may be possible at this point, to consider two aspects for the effect of colour vibrations on SOD: 1) colour vibrations of the enzyme may cause the unpaired electrons on metal ions, to have the same direction with applied vibrations or wavelengths and in this way, gain additional energy. This energy may be transferred onto the other molecules that contain more radicals, that may affect to form more super oxide radicals in chain reactions and this increase in energy has



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credited to increased hydrogen bond strength [13] , which undoubtedly reinforces the view that electromagnetic effect that is important for disrupting the hydrogen bonding. 2) Electromagnetic fields may also increase proton spin relaxation which may hasten up some reactions dependent on proton transfer [14] .

SOD is one of the enzymes, which is involved in the reaction with superoxide radicals. Red (644 nm) showed the maximum increase in absorbance level compared with all other wavelengths (colours) used. SOD responded to red wavelength (644 nm), inferring that free radical elimination may become very easy and fast with use of red colour (644 nm) in the body, after lowering the activation energy of SOD.

Chromotherapy also creates photo-bio modulation effect, which activates enzymatic process in cells to promote metabolism. Most of the enzymes need light (energy) for proper functioning. Previously, studies have shown that different wavelengths effect different enzymatic reactions. Different wavelengths actually regulate living process, by acting as catalysts in enzymatic activity, this particular frequency when given to the enzymes (in vitro), leads to the changes might as well be occurring in vivo and this process facilitates chromotherapy to cure diseases. Previously, In the area of hydrochromotherapy, a new conjecture of charged quantization has also been developed, which conjectured that quantum mechanical dipole moment of water molecules, may lead to the phenomena of charged quantization, as a result of absorbance of different wavelengths in water samples [15] . Using chromotherapy, insomnia has also been treated with 495 nm (turquoise colour) radiation successfully during pregnancy [16] . This is absolutely non-teratogenic without risk of side-effects or adverse reactions hence due to its simplicity and quick absorption, it was so chosen for pregnant patients.

5. Conclusion

After the detailed discussion pertaining to this study, it may be concluded that 644 nm (red Colour) might be used to treat those diseases which need elimination of free radicals, which undoubtedly enhances immunity. After this clinical trial suggested that 644 nm radiation (red Colour Hydrochromotherapy) may be used in immunity enhancement.

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Conflicts of Interest

The authors declare no conflict of interest.
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