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Mini Review

An Oxygen Support System in Management of Covid-19 Patients: A Novel Strategy

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Abstract

Covid-19 infection has assumed alarming proportions in several countries. In present times, oxygen consumption and/or requirement by the patients has risen to colossal levels creating acute scarcity and crisis of oxygen availability resulting in high incidence of morbidity and mortality. This brief paper analyzes the physiological basis of increased oxygen requirement and/or consumption and postulates an oxygen support system to not only resolve the oxygen crisis and supplement routine pharmaco-therapy but also to decrease the oxygen scarcity-induced morbidity and mortality.

***Keywords**: Antioxidants; Oxygen Requirement; Stress Relievers; Supplementary Therapy; Surfactant*

Introduction

The current Covid-19 infection is primarily affecting the lungs in a manner that is leading to marked increase in oxygen consumption and/or requirement by the patients. In several countries, this has generated acute scarcity and crisis of oxygen supply resulting in significant and alarming morbidity and mortality due to failure of meeting the huge and continuously rising oxygen demand.

This brief paper presents a novel strategy in the form of an oxygen support system recommended to be used as a supplement to routine pharmaco-therapy to optimize oxygen consumption and/or requirement in Covid-19 patients in an attempt to reduce the high morbidity and mortality observed in current times due to the generated significant scarcity of oxygen availability.

The novel strategy

The postulated concised model of oxygen support system consists of several elements that can potentially not only reduce oxygen consumption and/or requirement but also assist in neutralizing possible deleterious effects that may result from high oxygen consumption:

1. Surfactant: Covid-19 infection has been found to cause pneumonic lesions in the lungs, thickening of respiratory membranes (site of gaseous exchange), difficulty in breathing and low oxygen saturation levels, a situation mimicking a state of acute respiratory distress; in such cases drugs like surfactant known to increase the diffusing capacity in lungs [1,2] can relieve the oxygen distress, raise its saturation levels and thus reduce oxygen consumption and/or demand. The rationale behind the use of surfactant is based on Graham's law of diffusion of gases and inter-dependence of alveoli.

2. Antioxidants: High consumption of oxygen can generate proportionately excessive levels of reactive oxygen species (free radicals) that are known to exert wide spread deleterious effects in the body [3] and contribute to high morbidity and mortality; hence, administration of antioxidants may play a pivotal role and form an essential constituent of the proposed support system for the patients with Covid-19 infection.

3. Stress relievers: Stress (physical, mental, emotional stress and/or anxiety in any form) can unambiguously raise oxygen consumption and/or requirement mainly due to release of stress hormones like adrenaline and also by over-stimulation of sympathetic stimulation resulting mainly in increase in heart rate and blood pressure, both of which increase oxygen consumption and/or requirement. Covid-19 patients are undoubtedly under severe stress warranting stress-relieving therapeutic measures.

4. Intermittent proning position for varying periods has been demonstrated to increase oxygen saturation levels by three to five percent that can in addition reduce stress levels.

5. Dietary: It is advised to reduce intake of fats as they require lot more oxygen for combustion and energy (calorie) production; this recommendation is also in line with the low respiratory quotient (approximately 0.7) of fats [4].

6. Cooling of ambient temperature (not to the extent of shivering): Lowering of ambient temperature within physiological limits reduces oxygen requirement proportionately. Similarly, reduction in body metabolism by any other means also can reduce oxygen consumption and/or requirement.

7. Relaxation: Ensuring physical, mental and emotional relaxation by known means.

8. In many hospitals, it has been observed that there is a significant artificially created increase in oxygen demand due to panic among the patients; many patients are obsessed with receiving oxygen-administration even if they do not medically require it. Mere oxygen-masking can reduce their stress-levels and corresponding oxygen consumption and/or requirement; hence, such patients may be administered placebos and oxygen spared and judiciously used only for those who genuinely require it.

9. Guided imagery [5,6] and adjustments in ambience:

    a. Visual: Pasting of soothing scenes/landscapes on the walls of the patients' wards.

    b. Auditory: Any form of musicotherapy [7,8].

    c. Smell: Soothing scents like lavender or other form of aromatherapy [9-11].

10. It is also equally important to consider the possibility of alteration of expected bio-availability, pharmaco-dynamics and efficacy of standard/supportive medication for Covid-19 infection in hypoxemic states warranting adjustments of the drug-dosages accordingly [12].

Very recently, a pegylated interferon alpha-2b drug has received approval for restricted emergency use from the Drug Controller General of India (DCGI) in moderate Covid-19 patients; the approved drug has exhibited efficacy in reducing oxygen supplementation in the patients.

Conclusion

The proposed oxygen support system is targeted at optimization of oxygen consumption and/or requirement in an attempt to reduce oxygen demand and morbidity and mortality at least due to scarcity of oxygen availability.

Thus, in absence of a universally accepted and effectively adaptable standard treatment protocol, the postulated novel strategy of 10-point oxygen support system may form the mainstay treatment rather than a mere supplemental therapy.

Declarations of Interest

None.

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