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Prevalence of ' Happy Hypoxia ' in Covid-19 Positive Patients

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I. Introduction

The spO_2, of a normal person is around 95 percent or more. However, in conditions that affect the lungs like pneumonia, the blood saturation levels drop below 94 percent. This condition is called hypoxemia. Blood oxygen levels below 90 percent are considered to be too low and oxygen therapy is needed for such patients. [1]

Generally, a person with low oxygen levels would have symptoms like shortness of breath and chest pain. However, in happy hypoxia, the person shows no such symptoms. [2-4]

A pulse oximeter is used to detect blood oxygen levels (SpO_2) in a COVID-19 patient. In conditions like pneumonia, the reduction in spO_2 levels are accompanied by fluid collection and raised carbon dioxide levels in the lungs that makes them unable to breathe properly instead of the low blood oxygen levels. And this Hypoxemia, if left unchecked, leads to a condition called hypoxia (low tissue levels of oxygen), which can cause organ damage.

II. Aims & Objectives

1. This study will be undertaken to make a happy hypoxia as an important clinical sign to diagnose Covid-19.
2. To reduce disease transmission through asymptomatic patients.
3. To establish prevalence of happy-hypoxia in relation to age, sex, and other co morbidities.

III. Materials And Methods

SOURCE OF DATA: COVID-19 FLU-OPD & WARDS, P.D.U. MEDICAL COLLEGE & HOSPITAL RAJKOT.
STUDY DESIGN: Prospective clinical study
SAMPLE SIZE: 500 cases
DURATION: 2 months (Aug-Sep ’20)
INCLUSION CRITERIA:
All patients visiting flu OPD in Covid-19, patients who are not having breathlessness, asymptomatic patient with contact history, health care worker.
EXCLUSION CRITERIA:
Seriously ill patient, unconscious patient, intubated patient, patients having breathlessness.
STUDY AGE GROUP: All age groups. (My study constituted of the patients in the age group of 5-75 years)

Method of collection of data:

- The suspected patients of Covid-19 selected for the study were subjected to detailed history and clinical examination and radiological investigation.
- SpO_2 checked by pulse oximeter in all suspect Covid-19 patients, and ask for breathlessness and chest discomfort in patients.
- Routine investigations were carried out including Covid-19 sampling.
- Correlate the $sp0_2$ of Covid-19 positive patients and does not having shortness of breath and chest discomfort.
- All patients are examined by same doctor with same pulse oximeter.

IV. Observation And Results

According to our study, the total number of male patients affected was 59% whereas female patients were 41%. The age group most affected was between 30-69 years which is 77.8%, followed by >69 years .i.e. 23%, and the least affected was <20 years which is 2.2%.

According to the present study, 63.7% patients were having spo2 less then 90% but inspite of that they did not having breathless or shortness of breathing as a symptom of COVID-19 positive patients.

As per my study, some of the most common symptoms are fever (59%), cough (59%) and shortness of breath(15%) which is comparable to other similar studies. There are other symptoms like myalgia, sore throat, and headache(5%).

The disease severity is more in those with comorbidities including cardiovascular, diabetes, chronic respiratory disease, hypertension and cancer. [10]

TABLE NO.1
PRESENTING COMPLAINTS

Age group	Affected
• <20 year	2.2%
• 30-69 years	77.8%
• >69year	23%

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TABLE NO. 2
CLINICAL FINDINGS

Sex	Affected
• Male	59%
• Female	41%

Symptoms	Affected
• Fever	59%
• Cough	59%
• Shortness of breath	15%
• Myalgia	5%
• Sore throat	5%
• Headache	5%

V. Discussion

Happy hypoxia can be an important predictor that the patient is at risk of requiring admission to the intensive care unit (ICU). [5-6]

Possible causes of Happy hypoxia:

1. Difficulty in breathing (Dyspnea) is a symptom, not a sign: only experienced by the patient, and not a sign that can be observed by others around the patient. A healthcare practitioner or a caregiver cannot catch it until the patient shows signs like rapid breathing, fast heartbeats or any other signs associated with the condition.

2. Carbon dioxide (and not oxygen) tells the brain about hypoxia: Our brain senses carbon dioxide levels not oxygen levels in our blood. Even a small increase in the pressure of carbon dioxide in arterial blood ($PaCO_2$) would show large changes in ventilation. But, severe hypoxia only leads to an increase in ventilation when the $PaCO_2$ goes above 39 mmHg. [7]

3. ACE_2 receptors are present on brain cells that respond to hypoxia: Hypoxemia induces breathing difficulty via special chemical receptors called 'carotid bodies' present at bifurcation of common carotid artery. Covid-19 causing virus uses ACE_2 receptors(cell surface receptors) to enter healthy cells. ACE_2 receptors are present on carotid bodies too. So, it is a possibility that these receptors may play a role in dyspnea. [8-9]

4. Pulse oximeters are not as effective in critically-ill patients: The readings from a pulse oximeter have about 4 percent difference from true arterial oxygen saturation, SaO_2. Oximetry is much less reliable at SaO_2 levels below 80 percent.

5. Fever & our body response to hypoxia: Fever, a symptom of COVID-19, may have something to do with happy hypoxia. The carotid bodies in the brain only respond to PaO2 and not SaO2. However, the two could vary at different temperatures. A lot of COVID-19 patients are either diabetic or old, two conditions that reduce the response of the respiratory system to hypoxia. It has been indicated that diabetics and people older than 65

years have a 50 percent reduced response to hypoxia. So the study suggested that such patients with COVID-19 may be more prone to silent hypoxia.

VI. Conclusion

The remarkable dissociation between profound hypoxemic respiratory failure and a clinically 'Happy' patient is frequently seen and should prompt physicians and health care workers not only to rely on the patient's apparent wellbeing but closely monitor respiratory rate, signs of hyperventilation, oxygen saturation and invasive measurements of hypoxemia/ hypocapnia at regular time intervals. As in the first days of the disease, the lung mechanics are well-preserved and there is no increased airway resistance or dead space ventilation. The respiratory center thus does not sense an uncomfortable sensation of breathing. However, sudden and rapid respiratory decompensation may occur, and tachypnea and hyperpnoea might be the most important clinical warning signs of impending respiratory failure in COVID-19 patients.

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