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An Examination of the Characterization of Oxygen Saturation in Hospitalized COVID-19 Patients: A Systematic Review

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Abstract: ***Background**: Many people with COVID-19 have low levels of oxygen in their blood, even when they feel well. Therefore, it is noted that low oxygen levels can be an early warning sign that medical care is needed urgently. A novel coronavirus-2 (SARS-CoV-2) was first identified in Wuhan, China, and quickly spread globally; a patient with COVID 19 experiences deterioration in oxygen saturation. Many treatments have been tried, of which sadly have proven ineffective. In this regard, it is necessary to review the published evidence of drug clinical trials to guide future recommendations in the management of severe oxygen distress. Therefore, measuring oxygen saturation has been proposed as one way of assessing illness severity in suspected or confirmed COVID-19 infection. In this systematic review, we aimed at determining the accuracy of oxygen saturation for predicting adverse outcomes in admitted COVID-19. **Objective**: This paper attempts to conduct a systematic review on various studies already done to understand the characterization of Oxygen Saturation in hospitalized COVID-19 patients. COVID-19 treatment and other interventions can be implemented in the management of COVID-19 patients to reduce the poor prognosis of the outcome. Also, to engage best possible prescriptions to improve the Oxygen Saturation. **Methods**: A systematic review of published clinical trials that followed retrospective observational studies was included. The search was made using PubMed, Ebscohost, Google Scholar, Springer, Clintrial.org databases. The researchers included articles published between the month of January 2020 and July 2021 and those written in English language; these articles were retrieved and included in the study. Researches that did not use human subjects were excluded. In addition, we undertook a sub-study of an observational cohort study across the COVID-19 pandemic in the UK; patients oxygen saturation recorded were selected for this systematic review. **Results**: We analyzed data from systematic review articles as regards patient's oxygen saturation after excluding some articles whose measurement appeared not clear. The recorded results of oxygen saturation were 0.589 (95% CI 0.465: 0.713) respectively, and the positive and negative probability ratios of 3% or more desaturation were, 1.78 (1.25: 2.53) and 0.67 (0.46: 0.98) respectively. The secondary analysis further removed patients whose measurement results appeared unsuitable in a c-statistic of 0.699 (0.581 to 0.817) and showed a probability ratio of 1.98 (1.26:3.10) and 0.61 (0.35:1.07) respectively, and others indicated an additional prognostic value on multivariable analysis of p=0.019. **Conclusions**: Assessment of oxygen saturation provides uncertain prognostic information in the evaluation of selected patients attending the emergency department with suspected or confirmed COVID-19 infection. However, currently there are no approved treatment options worldwide for patients with COVID-19 despite the preliminary build-up with different remedies, including hydroxychloroquine and other repurposed drugs. Nevertheless, dexamethasone has shown promise in the symptomatic treatment and improving plasma in boosting immunity. In conclusion, it is noted that researchers are busy finding new treatments, and the discoveries will be reported accordingly to provide evidence-based guidance for prescribers and policymakers.***

Keywords: COVID-19, Oxygen Saturation, High Nasal Oxygen Flow, Oxygen Dissociation Curve

1. Introduction

COVID-19 is a contagious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus strains. COVID-19 disease, a pneumonia outbreak which is caused by coronavirus SARS-CoV-2 began in the Chinese city of Wuhan (Dhont et al., 2020). COVID 19 disease has now evolved into a global pandemic and spread worldwide, including in the United States and many other countries. The infected number individuals get increasing significantly day by day and is accompanied by large number of patients dying and others critically ill (Jesenak et al., 2020). Guidelines for assessing confirmed COVID-19 recommend measurement of peripheral oxygen saturation to determine the severity of acute respiratory infection. Clinicians have noted that patients with confirmed COVID-19 and either relatively normal oxygen saturation may desaturate after exertion, or at rest but the clinical importance of this finding is uncertain. An evaluation of oxygen saturation has shown to forecast adverse outcome, testing for post-exertional desaturation and could be used to identify patients in need of hospitalization (Goodacre et al., 2021).

Furthermore, studies have shown that COVID-19 affects more older adults, chronic smokers and people of any age who have underlying medical conditions who might have a higher risk of severe illness and low peripheral oxygen saturation from the disease and the risk is double fold as compared to someone without comorbidities (hypertension, diabetes mellitus, chronic obstructive pulmonary disease and cardiovascular diseases). Individuals with severe COVID-19 infection manifest with an impairment of respiratory function such as deterring oxygen uptake in the lungs and cause severe dyspnoea, hospital admission and death (Niu et al., 2020).

In addition, it has also been noted that most patients with COVID-19 experience mild symptoms, but few develop a severe disease that requires hospital admission and oxygenation; however, it was reported that about 14.2% to 30% of admitted patients further needed ICU admission for proper management, primarily for mechanical ventilation. In a study conducted in Peru the number of admitted patients who died due to COVID-19 ranged from 13.2% to 28.3%: with the majority of reports coming from China and United States of America (Mejía et al., 2020). In another study in Brazil regarding SARS-CoV-2 related deaths reported a mortality rate ranging from 8 to 21% in patients hospitalized for SARS-CoV-2 pneumonia, low oxygen saturation and up to 16 to 78% in that requiring ICU admission due to respiratory problems and desaturation (Olivas-Martínez et al., 2021).

Consequently, the notable respiratory problems due to COVID worldwide post a serious threat to the health-care system across the globe as many people are losing their lives. COVID-19 is exerting a significant burden to public health healthcare systems and results in poor prognosis of patients (Supady et al., 2021). Having said that, it is wise to develop strategies for management of COVID 19 admitted patients who are dying due to respiratory problems to improve the detection, awareness, and management of COVID 19 through various interventions. The policy makers need to understand that by not addressing the issue of management of COVID 19 beforehand will cause significant continuity loss of lives across the globe (Akhavan et al., 2020). Acknowledging the threat of comorbidities and potential organ injuries due to COVID-19 it is important to note in the clinical management of patients. This paper aims to add onto the ever-emerging landscape of medical knowledge on COVID-19, encapsulating its impact on oxygen saturation (Zaim et al., 2020).

Objective

This paper attempts to conduct a systematic review on various studies already done in order to understand the characterization of Oxygen Saturation in hospitalized COVID-19 patients. COVID-19 treatment and other interventions can be implemented in the management of COVID-19 patients. Furthermore, it tries to engage on best possible prescriptions to improve the Oxygen Saturation.

2. Literature Review

A retrospective observational study design was used to collect data among COVID-19 patients at Mount Sinai Health System facilities in New York City, April 2020, and carefully a sample of 47,000 patients were tested for COVID-19 and roughly an investigation of admitted 8770 COVID-19 positive patients were confirmed by use of real time-polymerase chain reaction (RT-PCR) and via nasopharynges where oropharyngeal swabs were collected in outpatient (OPD) and emergency care. In this study, admitted patients shown a decreased oxygen saturation or dropped by day 3 that needed immediate intervention to avoid ICU admission or intubation (Rechtman et al., 2020). In another study in China the treatment of critically ill COVID-19 patients was of serious worry due to the high death of the diseased which was a result of a decline in oxygen saturation among the patients. An observation was made that, the first step was to closely monitor the mild patients to prevent diseased from worsening. The clinical manifestations, vital signs, blood oxygen saturation, should be vigorously watched every day (Ai et al., 2020).

The existing literature provides data from numerous studies across the globe on COVID 19 related to oxygen saturation characterization on patients hospitalized in different hospitals. Disparities have been reported on the characterization of Oxygen Saturation among patients admitted due to COVID-19. In a study conducted in Spain at University Hospital of Salamanca, a sample of n=918 confirmed cases were enrolled and n=555 did not develop severe disease whilst n=363 developed severe distress when Oxygen Saturation was checked. It was noted that at the moment of hospital admission, the probability that a COVID-19 patient will die or require invasive mechanical ventilation during hospitalization was high (Marcos et al., 2021). In a related study conducted and reported by De Martino narrated that few publications have addressed potential changes of the Oxygen Dissociation Curve (ODC) in COVID-19. De Martino measured venous blood from a sample of n=179 patients (SO2 range 20%–95%); the measured data points tended to lie to the right of the standard curve, yet without a significant difference (Böning et al., 2021).

Furthermore, in a study conducted in China, at You'an Hospital in Beijing, from January 21 to February 12, 2020 all confirmed COVID 19 infected patients who were hospitalized were enrolled in that study and the clinical data was obtained from electronic medical records, including demographic data, exposure history, signs and symptoms, and laboratory data at admission. All patients were laboratory-confirmed to have COVID 19 infection the COVID 19 specific real-time RT-PCR result was positive. In consideration of quality results patients with COVID-19 enrolled in this study were diagnosed according to the guidelines for the diagnosis and the exclusion of influenza A virus and influenza B virus coinfection. The majority of diagnosis of severe patients was respiratory distress indicated by a number of breaths >30 times/min; in a resting state, oxygen saturation < 93%; and respiratory failure and a needed for mechanical ventilation (Cao et al., 2020). In addition, a study which was conducted in Pakistan at Karachi received 11,855 suspected COVID-19 patients out of which 3,851 tested positive for COVID-19 PCR (positivity rate 32.5%) from 19th March to 7th June 2020 and Mean Oxygen saturation in peripheral blood measured through a pulse oximeter was 86% (IQR = 71.7%90.2%) and all these did not survive COVID-19 disease. Most patients among non-survivors had critical disease 95.5% versus 70.9% among survivors (Sarfaraz et al., 2021).

Furthermore, in another study conducted retrospectively, clinical data analysis of 123 patients hospitalized in the ICU at Huoshenshan Hospital, a specialized COVID-19 hospital in Wuhan, China, identified the risk factors of those who died, a sample of 64 patients was included, which comprised of 44 men and 20 women in the deceased group and another sample of 59 patients had 34 men and 25 women who survived, and this was seen between February 10 to April 10, 2020 (Gu et al., 2021). An average time from onset of illness to admission in ICU was 22.38 days. However, no statistical difference was seen in the following categories, age, sex, and underlying diseases between those sick and surviving groups. The most common symptoms of the patients were fever, followed by cough, dyspnoea, fatigue, chest tightness, muscle soreness, and poor appetite. However, fatigue showed a result of p-value of 0.011 and these manifestations were similar between the two groups. The patients who died had a higher heart rate with p value of 0.003 and respiratory rate had p value of 0.009, while no statistically significant difference was seen in the body temperature, systolic blood pressure (SBP), and diastolic blood pressure (DBP) had p value of greater than 0.05 in all instances at ICU admission (Li et al., 2020).

Furthermore, the existing literature from different studies did not exactly explain on which day the Oxygen Saturation Starts to drop in all the admitted patients due to COVID-19 and what actions were implemented to save lives. It is paramount to admire the steps which were followed by the health care providers to improve the health of patients, and numerous steps were taken towards finding the effective measure to improve the awareness, treatment and control of dropping of oxygen saturation curve.
In another study which was done in Mexico, the common risk factor of people that had low oxygen saturation included frequent tobacco smokers, old aged above 50 years and those that had comorbidities such as Hypertension, Asthma, COPD and a condition of Diabetes mellitus and about 72% of these patients were mechanically ventilated due to low oxygen saturations (Olivas-Martínez et al., 2021).

Although the risk factors for COVID -19 are known, many health workers remain ignorant when a COVID-19 patient condition will decline. Therefore, it is very essential to measure vital signs regularly to notice drop in oxygen saturation as early as possible. This helps to provide immediate medical attention and care. Furthermore, the goal of managing patients with COVID-19 infection is to reduce the viral load and to improve lung function (Abubakar et al., 2020).

Furthermore, it was also noted that a compensatory ventilatory response to dyspnoea, high ventilation, led to extreme hypocapnia. In addition, diffusion of carbon dioxide (CO_2) into the tissues was 20 times more rapidly than oxygen (O_2), and these properties resulted into a disproportional pulmonary exchange of Carbon dioxide and Oxygen and that led to a decline of oxygen saturation among patients admitted in the hospital (Ottestad & Søvik, 2020).

It was further noted that the condition of admitted patients with COVID-19 infection deteriorates rapidly, subsequently, worsening respiratory problems, such as low oxygen saturation but with minor abnormalities in other vital signs. Consequently, this posed potential ability to identify early warning scores to determine patient’s condition (Pimentel et al., 2020).

In a study conducted in Cape Town, South Africa it found out that the median arterial oxygen partial pressure to fraction inspired oxygen ratio was 68 in 293 enrolled patients. Consequently, out of these, 137 of 293 representing 47% of patients had arterial oxygen partial pressure to fraction inspired oxygen ratio of 76 and were successfully stopped from High Flow Nasal Oxygen (HFNO). The median duration of High Flow Nasal Oxygen was 6 in those successfully treated versus 2 days in those who failed to recover with a *p-value of greater than* 0.001. There was a higher ratio of oxygen saturation to respiratory rate within 6 hours after High Flow Nasal Oxygen was commenced which was also associated with usage of steroids. Therefore, it was noted that 139 patents survived and discharged from the hospital. However, among those who died were on High Flow Nasal Oxygen but failed with an outcome of 129 out of 140 patients representing 92%. (Calligaro et al., 2020).

In a study conducted in India, it was noted that achieving 100% inspired oxygen concentration is not possible, but there is need of application of continuous positive airway pressure through well-fitting mask to deliver 100% inspired oxygen concentration which can assist respiration in order to improve the life of patients (Senniappan et al., 2020). Furthermore, the capillary blood oxygen saturation was also collected from documents of all patients. Low oxygen in tissues was determined by capillary blood saturation using pulse oximetry and low oxygen saturation in tissues was defined as oxygen levels of less than 95% (Aalinezhad et al., 2021). In conclusion, as outlined above, not many published studies were found in COVID-19 infection as regards to characteristics of oxygen saturation. Evidently, the authors proposed that a drop-in oxygen saturation by 3% while exercising was a major concern. Researchers, took a thorough look at hospital records and identified results of 30 days and upwards after the first presentation. Researchers described patients who died or required respiratory ventilation, cardiovascular or renal support as having a poor outcome. Furthermore, they delineated that respiratory ventilation or mechanical ventilation as a result of desaturation is an intervention which supported the patient’s airway.

3. Methods

Search Strategy

Data was sourced from five electronic databases, which were Clintrial.org, PubMed, Google Scholar, Springer and Ebscohost. The search terms used included clinical trials, COVID 19, drug treatment, oxygen saturation, retrospective study and treatment options.

The study followed the Prisma methodology for preferred reporting items for the systematic reviews and meta-analyses, protocols 2015 (Prisma-p 2015).

Initially, the first 25 articles were retrieved from the databases on the oxygen saturation curves and treatment options for COVID 19 independently. However, after collecting the retrieved articles together, 3 duplicates were left out. In addition, and finally, 22 published articles that met the inclusion criteria were assessed in depth. Therefore, this systematic review has included pre-printed publications where pertinent research on the COVID 19 pandemic as a novel and evolving research area is related. The article retrieval, screening, and inclusion flow chart are shown in Table 1.

Inclusion Criteria

Studies published between January 2020 and July 2021, Quantitative studies and written in the English language.

Exclusion Criteria

Studies undertaken using medicinal plants, in-vitro studies, in-vivo animal studies, and articles without available full text available.

Screening Guidelines

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (2009) was used as a guide to record the review process (Moher et al., 2009). Selected abstracts were reviewed to ensure their eligibility for inclusion. Full text articles of eligible abstracts were retrieved and assessed on whether they answered the research questions and fulfilled the inclusion criteria. Research Information System (RIS) formatted references were exported from the databases, where studies were automatically screened based on the inclusion criteria and then imported into CADIMA-evidence synthesis database, which is a free web tool for facilitating the conduct and assuring for the documentation of systematic maps and further literature review. The 46 studies that were imported in CADIMA were accessed based on title and abstracts. The researchers Kamanga and Dharmendra Dubey accessed the studies two times before discussing if the studies should be chosen for full text review. Conflicts were managed by dialogue discussion between the researchers of this study. After the initial discussion, the researchers agreed that 46 studies should be selected for further screening using the inclusion criteria. Therefore, during the second phase of screening, all articles with full text were included and again to exclude review articles, the two researchers again screened the 46 articles two times independently. After discussion, 30 more articles were excluded because they did not meet the inclusion criteria, and 16 articles were selected to be included in the systematic review. The PRISMA flow chart (Figure 1) exhibits the search and inclusion process for the systematic review.

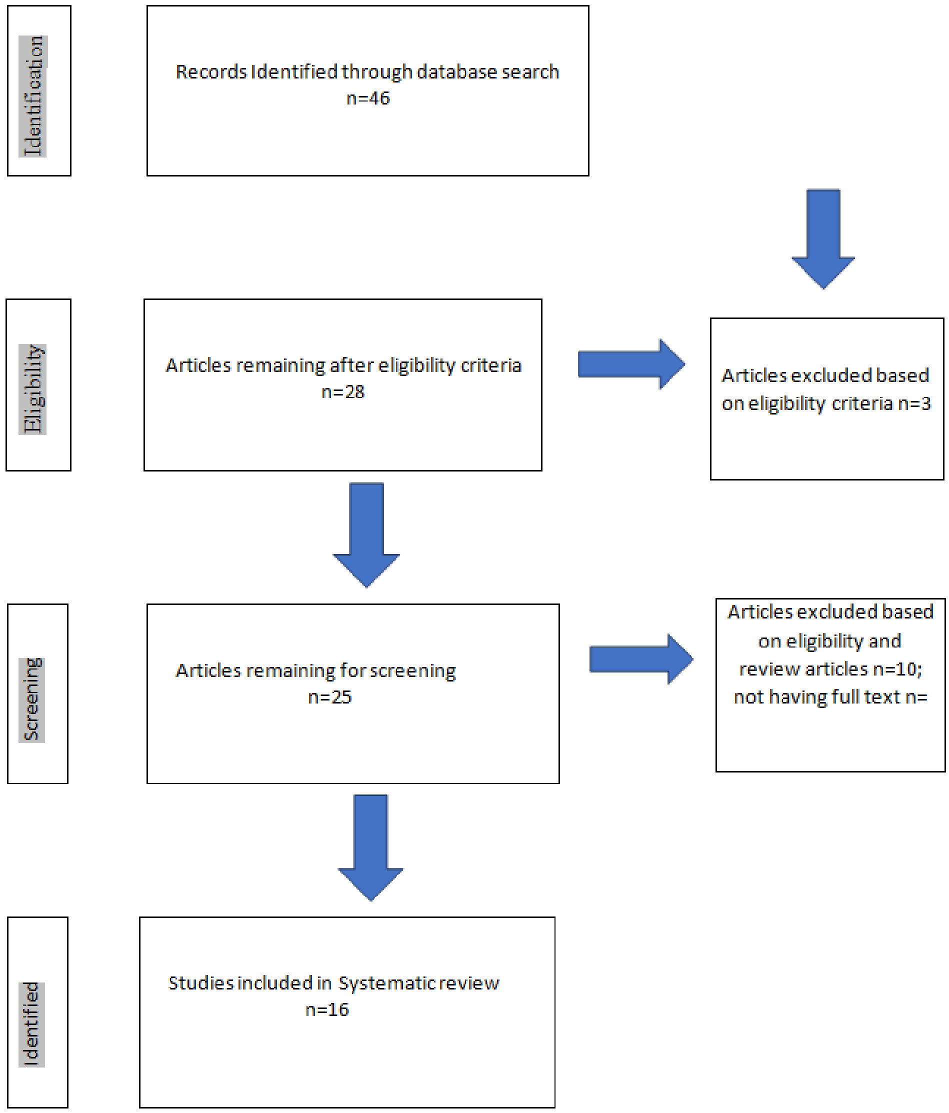

Figure 1: PRISMA flow chart to illustrate the article search and the inclusion process

Quality Appraisal

Studies were evaluated for excellence using CADIMA. Through CADIMA, standards for the critical appraisal and the rating scale of the studies were defined. We followed the critical appraisal tools for systematic reviews developed by the University of Adelaide, South Australia. A rating scale from 0 to 4 was based on the following criteria: (1) Study design-cross-sectional, case–control, or cohort study = 1, otherwise = 0; (2) Sample size-large = 1, small = 0; (3) Use of standardized instrument(s) for data collection=1, not specific=0, (4) Selection of participants-random selection or lack of bias = 1, non-random sample or convenience sample or presence of bias = 0 point.

Based on the above-mentioned criteria, the two researchers rated each of the 16 studies independently from a range of 0 to 4. Due to having no major inter-observer variations in the evaluation of the quality of the studies, an average of the three scores was presented in Table 1.

Table 1: Impact of COVID-19 on characterization of Oxygen Saturation

Author	Major Findings	Characterization of Oxygen Saturation	Quality Appraisal (Out of 4)	Country of Study
Aalinezhad et al., 2021	n=27; hypoxia among among COVID 19 patients	Negative	4	India
Abubakar et al., 2020	n=817; oxygen desaturation, Oxygen saturation assessment provide modest diagnostic measurement	Positive	4	UK
Ai et al., 2020	n=420; immunity and managing severe cases	Negative	3	China
Akhavan et al., 2020	n=648; severe cases admitted due to desaturation	Negative	4	USA
(Böning et al., 2021)	N=8770; Timely and effective clinical decision making for COVID 19 requires identification of risk factors, Prediction of prognosis by use of capillary oxygen saturation	Negative	4	USA
(Marcos et al., 2021)	n=918; severe cases with oxygen saturation required mechanical ventilation and other died	Negative	4	Spain
(Mejía et al., 2020)	n=369; Oxygen Saturation below 90% is a predictor for admission	Positive	4	Peru
(Supady et al., 2021)	n=127; Outcome prediction of COVID 19 patients using Oxygen Saturation	Positive	4	Germany
(Ottestad & Søvik, 2020)	n=125; respiratory failure requiring oxygen and admission	Negative	3	UK
(Pimentel et al., 2020)	n=497; Increasing hypoxemic, COVID 19 patients condition deteriorate rapidly with respiratory failure	Negative	4	UK
(Li et al., 2020)	n=138; factors that early predict outcome	Positive	3	China
(Gu et al., 2021)	n=123; independent factors of COVID 19 disease progression	Positive	3	China
Sands et al., 2021	n=6180; Comorbidities have an impact on COVID 19 outcome	Negative	4	USA
Torjesen, 2020	n=200; Need of Pulse oximetry in homes to assess Oxygen saturation	Positive	4	UK
Jesenak et al., 2020	n=300; Predict prognosis and recognize improvement in clinical status	Positive	4	USA
Goodacre et al., 2021	N=817; Oxygen saturation assessment provides an easy identification of COVID 19 patient prognosis	Positive	4	UK

4. Results

A summary of the methodology, characteristics of findings, characterization of Oxygen Saturation due to COVID-19, on quality appraisal, and the countries of the studies are presented in Table 1. This systematic review analysed 46 studies. It was seen that a large number of patients who had low oxygen saturation were recorded and few measurements appeared unfeasible. Out of the 46 studies, the results showed that adverse outcomes occurred in the majority of the studies. Furthermore, participants in the analysis who were younger were more likely to have unrestricted performance status, less likely to have any comorbidities, tended to have more normal baseline physiology, and had a much lower rate of adverse outcome than the elderly with comorbidities and smokers.

Comorbidities and chronic treatment

The different comorbidities that patients presented as well as the chronic treatment they received before contracting COVID-19 was seen. In many studies, it is seen that male sex and obesity were the risk markers most strongly associated with severe disease that needed oxygenation through the mask or mechanical ventilation.

Disease presentation

The presenting symptoms most frequently noticed in the emergency room were, fever, cough, dyspnea, diarrhea, asthenia, erythromelalgia, headache, dysgeusia, anosmia, and confusion. Dyspnea was an important predictor of severe disease and confusion was an important predictor of death. Fewer patients died whose reports reported diarrhea, erythromelalgia, headache, and alterations of smell and taste. Notably, the cough was strongly associated with a good prognosis, as patients with cough died much less frequently than those in whom this symptom was not included in the emergency room reports. To eliminate that this result was as a result of the differences in age (elderly patients who are at risk of death, typically cough less), age and cough were mutually entered into a multivariate predictive model of death. Both factors turned out to be independent predictors (OR for cough in this model was 0.30; IC95% 0.17– 0.55).

Strong baseline predictors for both severe disease and death were low baseline oxygen saturation in the emergency department, and the number of quadrants affected on chest radiography.

Laboratory analytical parameters

Patients hospitalized due to COVID-19 disease presented with leukocytosis, neutrophilia, eosinophilopenia, and lymphopenia. In addition, they also presented with high levels of LDH (Lactate Dehydrogenase) and acute phase reactants such as C-reactive Protein [(CRP) and ferritin], changes in coagulation parameters (INR, fibrinogen, D-dimer), renal failure, and alterations in transaminases.

The chance of death was independently related to increased sodium levels, glucose levels, urea levels, and decreased hemoglobin. When age and oxygen saturation were added as co-variables, along with laboratory tests, only increased sodium levels remained independently associated with death.

5. Discussion

Amid the baseline factors associated with poor prognosis, overweightness stood out as one of the cardiovascular parameters which is strongly associated with poor prognosis, and a better marker of poor prognosis than hypertension, Chronic Obstructive Pulmonary Disease, diabetes mellitus or smokers. This finding is important given its prevalence in Europe, the USA, and other parts of the world both in the general population and in patients hospitalized with COVID-19. In addition to the adverse mechanical effect on lung function for example a decrease in forced expiratory volume and forced vital capacity, it has been proposed that the metabolic changes produced by COVID-19 disease could decline cardiorespiratory reserves in the presence of a stressor, and increase dysregulation of the immune system, and favor a prothrombotic and proinflammatory state, all of which are physiopathological phenomena relevant in SARS CoV-2 infection (Neto et al., 2021).

Recently, a clinical trial showed that treatment with low doses of dexamethasone lowers mortality in COVID-19 patients. We further analyzed the prognostic role of corticosteroids, when used before the onset of COVID-19 disease, not as a treatment for it; therefore, we suggest that corticosteroids do not have a preventive role. Possibly corticosteroids are useful at certain stages of the disease when inflammation is present.

Furthermore, our findings refute other studies which found that cough was an adverse predictor of case fatality or severe disease all of these studies involved exclusively Asian cohorts. Additionally, fewer patients died who presented other no respiratory symptoms (diarrhea, erythromelalgia, headache, and alterations in smell and taste. However, regarding this result, we must recognize the possible existence of an information bias because the absence of dyspnea (poor prognostic factor) could have led clinicians to investigate other symptoms; therefore, these symptoms would have been collected with more frequency in patients without dyspnea, who have a better prognosis. Mental confusion, as a presenting symptom, was a predictor of case fatality in our sample, which we believe is due to its relationship with age.

The strong predictive capacity of the parameters related to respiratory involvement (oxygen saturation and a number of observed radiological quadrants) and the inflammatory state (CRP in the emergency room) coincides with that reported in other studies that highlight the prognostic importance of these factors. In addition, our review showed a shorter time of evolution of symptoms to emergency care in the group of patients who died (almost two days), with respect to the survivors. This suggests that a longer presentation may reflect a less aggressive disease, which is an interesting observation.

Regarding laboratory parameters upon admission, it is not surprising that CRP was the most powerful predictor of severe disease given the role of inflammation in the disease. However, it is interesting to note that inflammatory parameters were not independent predictors of case fatality in our sample. This finding, which contrasts with previous studies, it is possibly due to the different profile of the Spanish population with respect to the Asian one; the Spanish population has a greater burden of comorbidity, which may play an important role in mortality associated to COVID-19. The protective role of eosinophilia, independent of other laboratory parameters, has not been evaluated or reported in previous studies. As eosinophilia was measured as a percentage of eosinophils with respect to the total, it could also reflect a decrease in another cell series (for example, neutrophils). If the protective role of eosinophilia is confirmed in other studies, this finding may have practical utility, if considered in prognostic scales, in addition to contributing to future knowledge on immune system reactions against SARS-CoV-2. Our review was carried out on a hospitalized study, so its results may not be applicable to patients with milder disease, who did not require hospitalization. Notably, our results involve a cohort from secondary hospitals and a specific geographical area, which limits the generalization of the results to other cohorts, especially those of patient's hospitalized in tertiary hospital centers. Although we have an intensive care unit that doubled its capacity at the peak of the epidemic, it is likely that some of the most severe patients were transferred to tertiary hospitals and therefore remained underrepresented.

In summary, advanced age, male sex and obesity were the main markers of poor prognosis in patients with COVID-19. The most frequent presenting symptom was fever; dyspnea was associated with severe disease, and the presence of cough was associated with greater survival. Low oxygen saturation in the emergency room, elevated CRP in the emergency room and initial radiological involvement were all related to worse prognosis.

6. Conclusion

There is sufficient evidence regarding the effect COVID-19 disease and lung capacity. There is inadequacy to maintain good oxygen saturation as evidenced from the studies indicating that in clinical practice a lot of patients die during the first few days of hospitalization due to COVID 19 which justify clinical evidence/research on the topic. The current circumstances justify prioritization of intensive care of patients in the first few days of hospital admission and many reviews of studies proposals this, close monitoring, pressing management, etc. Although the use of dexamethasone, chloroquine and other measures to contain the situation may be supported by expert opinion, and clinical use of this drug in patients with COVID-19 should adhere to ethical approval as a trial as stated by the WHO. Data from high-quality, coordinated, clinical trials coming from different locations worldwide are urgently needed.

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