Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Case Report

Asthma in COVID-19: Mitigating or exacerbating? An interesting case report

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A B S T R A C T

Introduction: Bronchial asthma is an age-old disease whereas COVID-19 is an officially declared pandemic on March 11, 2020 by WHO. Since both are primarily a disease of the respiratory system, researchers across the globe tried to explore the potential relationship between them; to date, there is no convincing data. Here, we tried to present a case to explore potential relationships between these two, if present.

Case presentation: A 30-year-old male patient with well-controlled cough variant asthma was diagnosed with a case of covid-19 infection 12 months back. All other sign symptoms subsided except dry cough. The patient is treated with an inhaled bronchodilator, oral and inhaled steroid, Tab montelukast as well as other conservative management like hot water vapor, lozenge, honey, etc but symptoms were not controlled for the last 12 months. The patient could not do his job because of this problem. All examination and investigation findings were normal. After long-term use of inhaled steroids, he is now 50–60% improved and gradually improving.

Discussion: Covid can exacerbate cough in an asthmatic patient. Neuronal activation and neuroinflammatory mechanisms may aggravate this cough after covid. Diagnosis confirmed clinically with the relevant improvement of symptoms. Other important differentials were excluded by appropriate history, examinations, and investigation. Cough is improved by steroids in this case.

Conclusion: Summary of conclusion: Cough variant asthma may be aggravated with covid 19 infection and meticulous history, treatment, and follow up needed for an asthmatic patient who is infected with covid 19.

1. Background

Bronchial asthma is an age-old disease. Asthmatic patients are found all across the world throughout the year. Current data says 262 million people in the world are suffering from bronchial asthma which estimates at about 3415.5 cases per 100,000 people [1].Coronavirus disease or shortly called Covid-19 is now an officially declared pandemic. As of August 01, 2021, 198 million patients were diagnosed & 4.2 million died [2]. As both are primarily diseases of the respiratory system there is a high likelihood of interaction between these two. Both WHO & CDC reported asthma as a risk factor for severe Covid-19 [3,4]. However, few data depict a somewhat different scenario. In a review article Shuang et al., she said there are no reports regarding asthma exacerbation due to COVID-19 [5]. Correspondingly, there were few reports on asthma exacerbations during the SARS and MERS epidemics too. In another review article, Dr. Nurhan proposed that asthma patients may receive little protection due to their asthmatic medicines. However, these phenomena, though interesting, still need to be well documented [6] (see Figs. 1–3).

As of today, despite the continuous effort of researchers across the globe, being a new pandemic, we have very little convincing data to explore the relation between these two diseases.

To Summarize, to date there is no solid evidence to say Covid-19 causes exacerbation of asthma. Our case was a bit different. Recently

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we managed a patient with bronchial asthma who got infected with Covid-19. We tried to present the case in-depth to explore potential relationships between these two presentations. The aim and objectives of the case are to raise physician awareness that there may be potential relation between Covid-19 & bronchial asthma. We hope & believe this will guide other clinicians to elucidate the matter more in the future.

2. Case report

Our patient, a 30 years old male was diagnosed with a case of intermittent cough variant asthma in 2014 which occasionally required a Salbutamol inhaler. In September 2020, he developed a fever that was high grade, continuous, with the maximum recorded temperature of 103.50F. He also developed a loss of taste sensation from the very beginning of the illness that lasted for 7 days. He also developed a dry cough which was initially mild but gradually the frequency increased. There were no chills or rigor, skin rash, or body ache & the patient denied any chest/abdominal/joint pain or leg swelling.

During the febrile phase, the temperature was 103.5 °F, respiratory rate 18 breaths/min, blood pressure 130/86 mmHg, pulse 100/min, SpO_2 98% in the pulse oximeter. As the patient had no respiratory distress or serious comorbid condition, he visited the nearby hospital personally with these features and underwent a few serological tests as well as reverse transcriptase-polymerase chain reaction (RT-PCR) based testing for COVID-19 and was found positive.

Based on the investigation found, he was diagnosed with a case of moderate Covid-19. He started home management of Covid-19. With the conservative & symptomatic management, his fever gradually decreased and the temperature came to baseline within 1 week. Approximately 2 weeks after his diagnosis, he had only a dry cough and weakness

Fig. 2. Chest X-ray shows no abnormality.

hampering his daily activity. The cough had no diurnal variation, no definite aggravating or relieving factors, and occurred almost daily throughout the day. Sometimes, patients developed headaches and abdominal pain after vigorous coughing. There was no history of fatigue, rhinitis, shortness of breath, chest pain, or night awakening. The patient

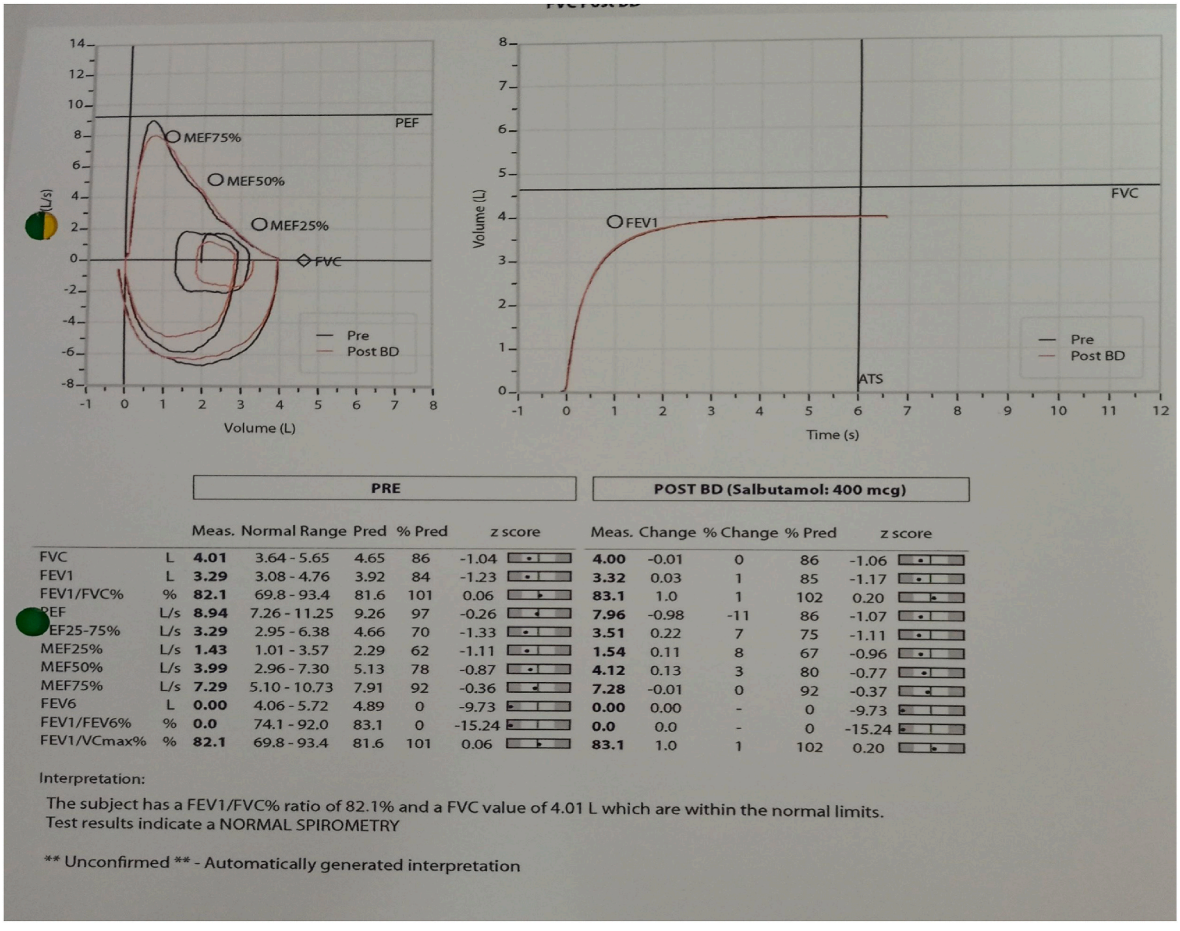

Fig. 1. Spirometry- normal.

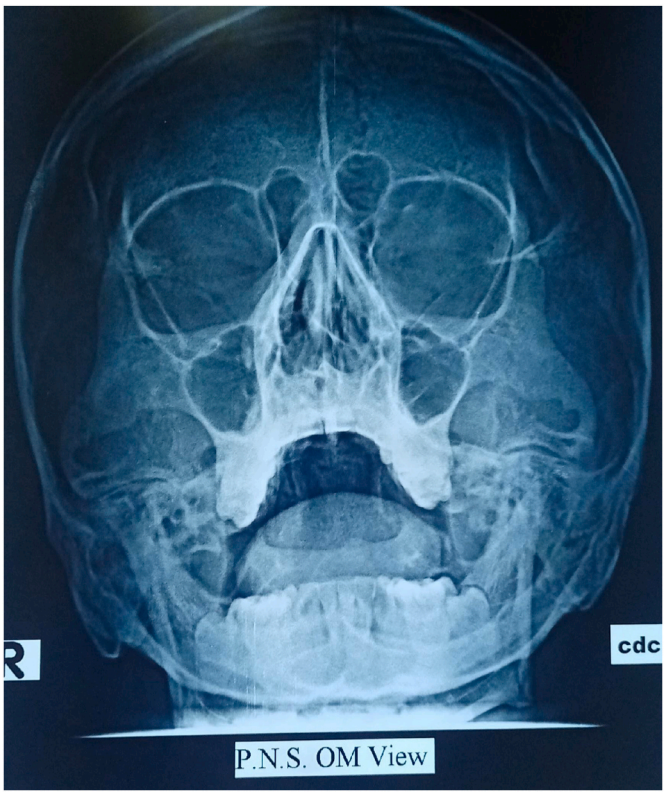

Fig. 3. X-ray Paranasal sinuses occipitomental view is normal.

had no prior smoking history.

For a dry cough, he was treated with montelukast, inhaled salbutamol, inhaled salmeterol, and fluticasone combination (25/250 μg, 2 puffs in morning and night) for 6 months but the dry cough did not improve significantly. At that time, several investigations were done to exclude all possible differentials. Baseline reports are shown in Table 1. The physician also added oral steroids (Tab. Prednisolone 40mg daily) for 7 days with his previous treatment and his cough was partially improved. After stopping oral steroids, the cough increased again as previously. Then he added Indacaterol and Glycopyrronium combination breezhaler daily for 1 month and the condition improved partially. For the persistence of the symptom, he was again treated with oral methylprednisolone for 10 days with an inhaled steroid and then improved gradually. He was also treated with anthelmintic medications (Tab. Albendazole 400 mg stat) without benefit. The study has been done followed by the SCARE 2020 guidelines [7].

After the second phase of treatment with oral methylprednisolone for 7 days with inhaled fluticasone with salmeterol (25/250 μg, 2 puffs in morning and night) for 3 months, the patient's symptoms improved significantly and he started his ordinary activity.

Table: 1

Date: March 21, 2021	Result
Hb	16.2 gm/dl
TC and DC of WBC	6490/mm3(N = 61%, L = 34%)
Platelet	331,000/mm3
ESR	3 mm in 1st hr
Serum creatinine	1.0 mg/dl
Serum Calcium	10.4 mg/dl
Serum ACE	14.1 U/L
MT test	04 mm
Spirometry with reversibility	Normal
CXR(P/A view)	Normal
X-Ray PNS	Clear sinuses, Hypertrophied inferior turbinate
HRCT	Normal

Hb: Hemoglobin, TC: Total count, DC: Differential count, ESR: Erythrocyte sedimentation rate, ACE: Angiotensin-converting enzyme.

3. Discussion

Cough is the major presenting feature of cough variant asthma. More common in females possibly due to a lower cough threshold than in males. Cough variant asthma was diagnosed by spirometry and bronchial hyperresponsiveness according to appropriate guidelines. There may or may not be eosinophilic airway inflammation and eosinophilic asthma causes more wheezes [8].

On March 11, 2020, WHO declared covid-19 as a global pandemic. Centers for Disease Control (CDC) and WHO reported asthma as a risk factor for COVID infection. Covid can aggravate many health conditions and is associated with increased hospitalization risk [9].

Like other virus particles, coronavirus may act as a trigger, precipitate asthma: augment inflammation, hypersecretion, irritation of mucosa thus dry cough and other lower respiratory symptoms may happen. Dry cough which is exacerbated after covid infection usually responds to oral steroids [10].

Similar to acute Covid-19 cases, cough is also a very common symptom among long haulers. Approximately 7–10% of patients who recovered from COVID-19 pneumonia suffer from troublesome coughs even after 2 months after being sent off home. There are two major mechanisms of cough among long haulers: neuroinflammation and neuronal activation. But almost always long haulers are associated with other symptoms like fatigue, dyspnoea, pain, etc. [11].

As treatment for dry cough, we have tried montelukast, beta-agonist inhalers both short and long-acting, and also steroid inhalers combinedly for 6 months, but his condition has not improved. Routinely the patient undergoes regular assessment with routine tests and lung function tests to see how it is controlled and whether any step up or step down treatment is needed or not. Oral steroids (Tab. Prednisolone 40mg daily) were added for 7 days with previous medications and the cough was partially improved.

In our case, dry cough aggravated after a mild covid infection with a previous history of cough variant asthma. Primarily we have excluded drug-induced dry cough by full medication history; pulmonary eosinophilia and tropical pulmonary eosinophilia were excluded by doing routine CBC with normal eosinophil count. Sarcoidosis & post covid lung fibrosis is excluded by normal lung function test, imaging in the form of Chest X-ray and High-resolution CT scan, and normal serum calcium with a normal angiotensin-converting enzyme. Loffler's syndrome was excluded by CBC and non-responsive to anthelmintic; vasculitis i.e. Churg Strauss syndrome and Granulomatosis with polyangiitis also excluded by history, examination, and imaging; Allergic rhinitis was excluded by complete upper airway evaluation and history, Atopic history excluded by appropriate history taking.

4. Limitation

For a complete evaluation of this patient, we needed to do an invasive test like bronchoalveolar lavage for histopathological confirmation but it couldn't be done due to patient refusal. Also, a more prolonged follow-up would be more effective.

5. Conclusion

We have presented a case report with a diagnosed case of cough variant asthma with covid 19 infections mediated long-duration dry cough that is not much common to the clinicians after the covid 19 outbreak. It is due to the aggravation of cough variant asthma by covid 19. So, clinicians should be aware of the exacerbation and prolongation of dry cough in patients with previous stable asthma after covid 19 infections and take a proper history of cough, asthma, and family history. If a patient has a cough variant or any type of asthma before covid

infection, the patient should be treated very cautiously according to proper asthma guidelines and patients should be counseled appropriately about this condition.

Consent

Written informed consent was taken from the patient for publication of this case report and accompanying image.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Conflicts of interest

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Ethical approval

It is not necessary.

Research registration Unique Identifying number (UIN)

1. Name of the registry: Not applicable.
2. Unique Identifying number or registration ID: Not applicable.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): Not applicable.

Author contribution

All authors equally contributed to the analysis and writing of the manuscript.

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Declaration of competing interest

The author reported no conflict of interest related to this article.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijso.2022.100491.

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