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**CASE REPORT****Physiotherapy for orofacial pain and temporomandibular joint dysfunction after prolonged CPAP therapy due to COVID-19: a case report***Sandeep Shinde<sup>1\*</sup>, Prachiti Bhore<sup>1</sup>**<sup>1</sup>Department of Musculoskeletal Sciences, Krishna College of Physiotherapy, Krishna Institute of Medical Sciences “Deemed to be University”, Karad-415339 (Maharashtra) India*

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**Abstract**

During this COVID-19 pandemic, intensive care units are being overwhelmed by several hypoxemic patients. Continuous Positive Airway Pressure (CPAP) full face masks are being used for these patients presenting with acute respiratory distress disease. Due to these masks, the movements of the face are restricted. The patient can experience orofacial pain and can further have temporomandibular disorders on a long-term basis. Early physiotherapy management can be done to reduce the pain and tenderness, release trigger points, elongate the shortened muscles, and reduce the jaw's restricted movements.

**Keywords:** Temporomandibular Joint Dysfunction, Acute Respiratory Distress Syndrome, Breathing Exercises, Facial Muscles.

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**Introduction**

Corona Virus (SARS-CoV2) initially affects the respiratory system, but many other organ systems are severely affected. A high percentage of these patients are admitted to an Intensive Care Unit (ICU) and they develop severe Acute Hypoxemic Respiratory Failure (AHRF) and fulfill criteria for COVID-19 Acute Respiratory Distress Syndrome (CARDS), requiring mechanical ventilation [1-4]. For patients with COVID-19 pneumonia, use of noninvasive mechanical ventilation with Face Masks (FM) or High Flow Nasal Therapy (HFNT) has been either reduced or restricted to airborne infection isolation rooms, due to the viral aerosolization potential with these techniques [5-6]. Continuous Positive Airway Pressure (CPAP) full mask users tend to develop orofacial pain, restricted jaw movements and also it compresses of clinical causes such as facial pain secondary to dento-alveolar pathology, sinusitis, tempo-

mandibular joint disorders, and neuropathic pain [7-9].

CPAP was first developed in the 1980s and its underlying principle is that of continuous mild air pressure which to stent open the airway, and thereby overcome anatomical areas of collapse or obstruction. The key elements of the system include a CPAP machine (which creates the pressure gradient) and tubing, which attaches to and transmits pressure to, the CPAP mask. The CPAP mask usually covers the nose only (nasal CPAP, nCPAP) but can be used via a nose and mouth mask (full-face mask) [10-11].

A large body of literature, including higher-level evidence in the form of meta-analyses and randomized controlled trials, describes the benefits of CPAP in terms of both symptomatic improvement and long-term outcomes [11]. Interestingly a meta-analysis of these studies

suggested that a confounding factor may be non-adherence to CPAP, particularly if it was used for less than 4 hours per night, highlighting the importance of compliance [12]. Common side effects include dermatitis, rhinitis, epistaxis, nasal discomfort, congestion, mask leak, aerophagia, orofacial pain or discomfort and claustrophobia [13].

According to a recent study published by the journal of clinical medicine, found that Temporomandibular Joint Dysfunction (TMJD) and Bruxism can be a possible outbreak factors in patients suffering from COVID-19 symptoms. A significant increase in facial pain, including jaw pain is linked to jaw clenching and grinding of the teeth [14].

Physiotherapy can be beneficial in restoring the normal functions of the TMJ, muscles of mastication and cervical muscles. It also reduces pain and inflammation, promotes relaxation, minimizes stiffness, and improves strength and coordination [14-16]. Primary goals of treatment are stretching the contracted and fatigued muscles, increasing the Range of Motion (ROM), and reducing muscular trigger point activity [16]. Presently no study has been reported to check for the effect of early physiotherapy intervention on any individual suffering from orofacial pain and temporomandibular joint dysfunction secondary to the use of a CPAP mask.

### Case Report

A 42-year-old, male was diagnosed with SARS-CoV2 positive status at Krishna Hospital and was admitted for ICU management for 17 days and later was shifted to a general ward. He complained of having difficulty in breathing and generalized

weakness on admission. While history-taking he mentioned that due to a sudden fall in the rate of oxygen saturation he was previously prescribed for full-face CPAP mask when he was under ICU management which was then continued for 15 days (4 hours per every 2 hourly rest). Later he was shifted to regular oxygen therapy with a ventury mask. Due to the prolonged use of this mask his facial movements including the temporomandibular and jaw movements were restricted which lead to orofacial pain and discomfort while chewing and opening the mouth. The patient had no history of diabetes and hypertension. There was no sign of swelling or inflammation at the site of the face or the mouth. Visual Analogue Scale (VAS) was used to check for the intensity of the pain and the American Academy of Orofacial Pain (AAOP) questionnaire was used to check for any temporomandibular disorder. It was noted that he still had minimal difficulty in breathing and weakness of the lower extremities. He had orofacial pain (VAS on activity= 6.2), mild tenderness over masseter muscles the (Grade-1), both lateral pterygoid and medial pterygoid (Grade-2), muscle spasm over both temporalis at his both TMJ and a slight difficulty in opening of the mouth (3 fingers length). Superficial sensations were normal when they were tested on the face.

Physiotherapy management was started on 9<sup>th</sup> June 2021 and was continued for one week till the time of the patient's discharge. Later the patient was asked to continue with all the exercise programme which was taught to him and after a week follow-up was taken to check the status of the patient.

**Physiotherapy Exercise Programme [7, 17]**

Day 1:

- Patient education
- Diaphragmatic breathing exercise
- Pursed lip breathing exercise
- Spirometry
- Stretching for elevator jaw muscles (opening of the mouth with few seconds hold)
- Relaxation for elevator jaw muscles (Touching the plate by the apex of the tongue and pronouncing 'N')

Day 2-4:

- Continued all exercises as per day 1.
- Thoracic expansion exercises.
- General upper and lower limb mobility exercises
- Co-ordination exercise program: Elevation and depression movements of the jaw performed bilaterally and symmetrically.
- Soft tissue mobilization: For masseter, medial and lateral pterygoid muscles were done using one or two finger tips for myofascial trigger point release. (Bilaterally)

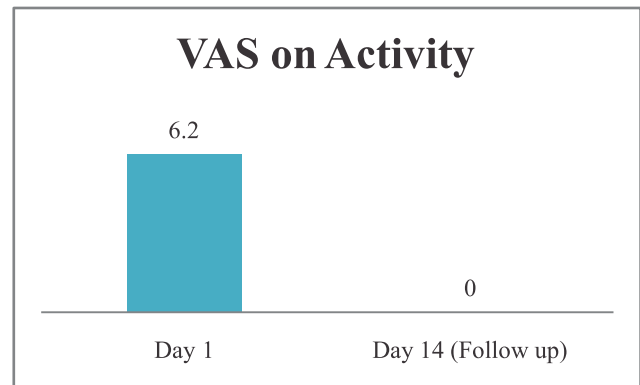
Day 5-7:

- Continued all exercises from day 1-4.
- Ambulation: It was increased gradually as per patient's tolerance.
- Strengthening and endurance exercises: Forcefully placing the chin over the hand during jaw depression (mouth opening), opposing the inferior incisors with two fingers while jaw elevation (mouth closing). For lateral jaw movements exerting a counter opposition on the lateral part of the mandible with two fingers.
- Home exercise program: The patient was asked to perform all exercises for 1 week and was called for follow up.

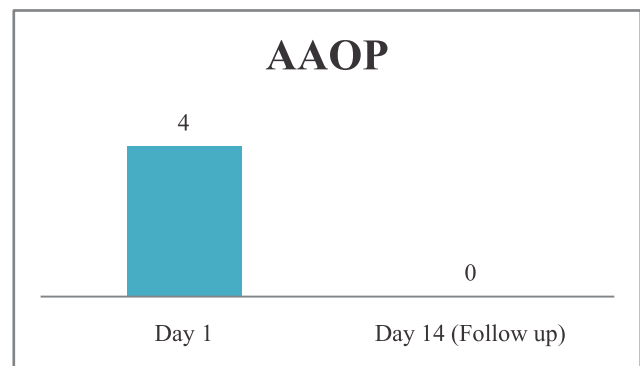
Follow up: After 1 week of discharge from the hospital.

**Results**

After 7 days of physiotherapy treatment, during the follow up the patient had no orofacial pain (VAS on activity=0) (Figure 1), or any discomfort while chewing and no other difficulty in opening of the mouth (AAOP questionnaire) (Figure 2). No tenderness was present bilaterally over the masseter, both lateral pterygoid and medial pterygoid muscles.



**Figure 1: Visual analogue scale readings for on activity**



**Figure 2: American academy of orofacial pain questionnaire readings**

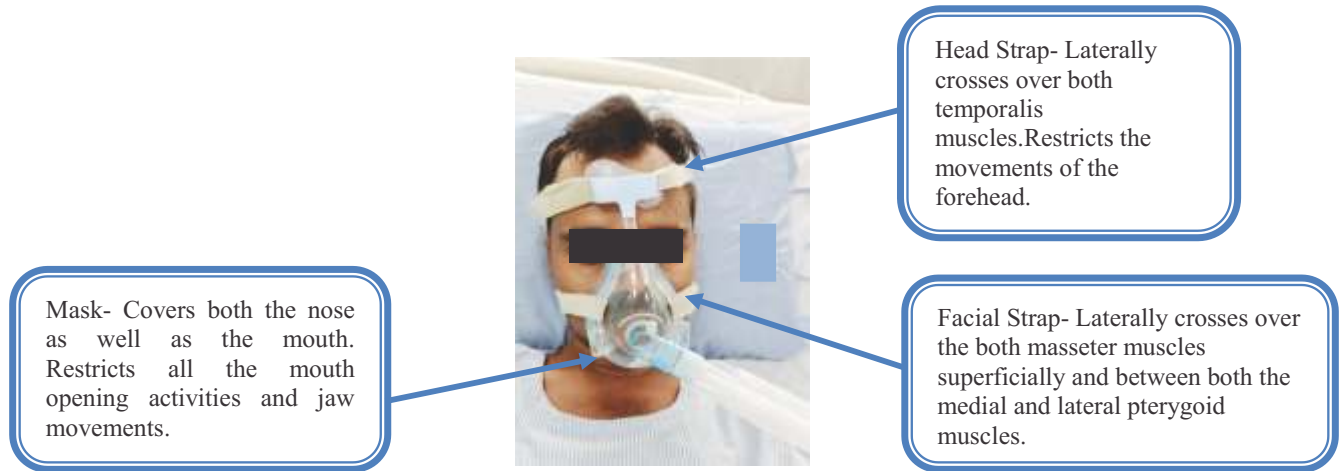


Figure 3: Patient with applied CPAP full face mask



Figure 4: Lateral view of the face application of CPAP full-face mask



a) Minimal mouth b) Restricted clenching c) Restricted mouth opening speaking

Figure 5: Restriction in facial movements on application of full face CPAP mask



Pre test assessment- Restricted Movements of the TMJ (Day-1)



Post test assessment- Restricted Movements of the TMJ (Day-7)

Figure 6: Pre test vs. post test- TMJ Movements

**Discussion**

During this COVID- 19 pandemic, ICU are being overwhelmed by a number of hypoxemic patients. CPAP full face masks are being used for these patients presenting with acute respiratory distress [12]. A study was done in a medical setup, where patients received CPAP treatment was resumed for 2 hours every 4 hours. Later patients could be temporarily taken off CPAP without an immediate fall of SpO<sub>2</sub> below 90% [13].

Elmondi *et al.* has mentioned in their study that, the new situation of the COVID-19 pandemic has

given rise to severe economic uncertainties, social isolation and health threats that are causing a potentially negative effect on people's physical and mental health. These effects can also influence oral and maxillofacial conditions, such as TMJD and bruxism, which could further aggravate the orofacial pain [16]. As TMJD are a group of conditions that cause pain and dysfunction of the masticator muscles, the TMJs, and associated structures. It is seen to be present in individuals with stress and anxiety [7]. The most

common features of TMJD are orofacial pain, limited jaw movements, and acoustic sounds from TMJs during motions [14] which will occur on the use of a full-face CPAP mask which restricts the facial and jaw movements. Due to the sudden hospitalization of the patient who tested positive for Covid pneumonia as the patient is put under ICU management with CPAP therapy the possibilities are that this might put the patient under psychological stress, anxiety, depression, and also in a state of fear which might contribute to the intrinsic factors causing TMJD. First aid for orofacial pain patients includes a variety of treatments such as self-massage of tense and painful areas, stretching, thermotherapy, drug therapy, relaxation techniques, meditation, and mindfulness.

This case study was an attempt to see the effect of physiotherapy management on orofacial pain and any other discomfort caused in the temporomandibular region due to the use of full-face CPAP mask.

In a single-center retrospective observational study, the overall mortality of this cohort was 37% [13]. Sixteen (33%) patients improved with face-mask CPAP and eventually did not require invasive ventilation though they were very hypoxemic [17-18] (73% of them required 15L/min oxygen).

In this study, a patient who had undergone ICU management for 17 days with prolonged use of a

CPAP mask was shifted to a general ward with continuous oxygen support with SPO<sub>2</sub> maintained at 92% was selected for this study [19-20]. He was assessed and treated as per his complaints. All the exercises were increased as per the tolerance of the patient and with respect to the maintenance of the SPO<sub>2</sub> within the normal levels. Later he was discharged from the hospital premises as his respiratory rate normalized, the normal rate of oxygen saturation was maintained and he tested negative for the Covid-19 virus. He was asked to continue with the entire exercise programme for the next week. Follow-up was done 1-week post-treatment and the patient had no orofacial pain or any discomfort in the temporomandibular region, no difficulty in breathing, and no generalized weakness. We suggest that more patients should be undertaken for further research as no literature is present in this area. Another study can include the previous history of the psychological factors and previous association of TMJD.

### Conclusion

It is very important to assess and treat patients with orofacial pain and temporomandibular dysfunction after prolonged CPAP therapy due to Covid-19 viral pneumonia. Hence, early physiotherapy management can be prescribed in these patients for the prevention long term orofacial pain syndromes and TMJD.

### References

1. Ziehr DR, Alladina J, Petri CR, Maley JH, Moskowitz A, Medoff BD, *et al.* Respiratory pathophysiology of mechanically ventilated patients with COVID-19: A cohort study. *Am J Respir Crit Care Med* 2020;201(12):1560-1564
2. Grasselli G, Zangrillo A, Zanella A, Antonelli M, Cabrini L, Castelli A, *et al.* Baseline characteristics and outcomes of 1591 patients infected with sars-cov-2 admitted to icus of the Lombardy Region, Italy. *JAMA* 2020;323(16):1574-1581.

3. Bhatraju PK, Ghassemieh BJ, Nichols M, Kim R, Jerome KR, Nalla AK, *et al.* Covid-19 in critically ill patients in the Seattle region - case series. *N Engl J Med* 2020;382(21):2012-22
4. Shang Y, Pan C, Yang X, Zhong M, Shang X, Wu Z, *et al.* Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China. *Ann Intensive Care* 2020;10(1):1-73.
5. Hui DS, Chow BK, Lo T, Ng SS, Ko FW, Gin T, *et al.* Exhaled air dispersion during noninvasive ventilation via helmets and a total facemask. *Chest* 2015; 147(5):1336-1343.
6. Cabrini L, Landoni G, Zangrillo A. Minimise nosocomial spread of 2019-nCoV when treating acute respiratory failure. *Lancet* 2020;395(10225):685.
7. Gawade KD, Shinde SB. Effect of early physiotherapy for endotracheal intubation-induced temporomandibular joint dysfunction: an experimental study. *Int J Otorhinolaryngol Clin* 2019;11(2):41-44.
8. Shirazi D. TMD/Orofacial Pain and OSA, Correlation or Causation. *J Lung Pulm Respir Res* 2016; 3(2):00077.
9. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. *JAMA* 2020;324(8):782-793.
10. Amirfarzan H, Cereda MF, Gaulton TG, Leissner KB, Cortegiani A, Schumann R, *et al.* Helmet CPAP use in COVID-19—A practical review. *Pulmonology* 2021; 27(5): 413-422.
11. Donovan LM, Boeder S, Malhotra A, Patel SR. New developments in the use of positive airway pressure for obstructive sleep apnea. *J Thorac Dis* 2015; 7(8):1323-1342.
12. Bratton DJ, Stradling JR, Barbé F, Kohler M. Effect of CPAP on blood pressure in patients with minimally symptomatic obstructive sleep apnoea: a meta-analysis using individual patient data from four randomised controlled trials. *Thorax* 2014;69(12):1128-1135.
13. Alviset S, Riller Q, Aboab J, Dilworth K, Billy PA, Lombardi Y, *et al.* Continuous Positive Airway Pressure (CPAP) face-mask ventilation is an easy and cheap option to manage a massive influx of patients presenting acute respiratory failure during the SARS-CoV-2 outbreak: A retrospective cohort study. *PLoS One* 2020;15(10):e0240645.
14. Emodi-Perlman A, Eli I, Smardz J, Uziel N, Wieckiewicz G, Gilon E, *et al.* Temporomandibular disorders and bruxism outbreak as a possible factor of orofacial pain worsening during the COVID-19 pandemic-concomitant research in two countries. *J Clin Med* 2020;9(10):3250.
15. Desai M, Jain U. Awareness of the role of physiotherapy in temporomandibular disorders amongst dentists. *Indian J Physiother Occupat Thera* 2021;15(1).
16. Romero-Reyes M, Uyanik JM. Orofacial pain management: current perspectives. *J Pain Res* 2014;7:99-115.
17. Moraes AdR, Sanches ML, Ribeiro EC, Guimarães AS. Therapeutic exercises for the control of temporomandibular disorders. *Dental Press J Orthod* 2013; 18(5):134-139.
18. Ramachandra SC, Prashant A, Vishwanath P. COVID-19 induced cytokine storm and the impact of obesity and vitamin D deficiency. *J Krishna Inst Med Sci Univ* 2021;10(1):1-4.
19. Ferreyro BL, Angriman F, Munshi L, Del Sorbo L, Ferguson ND, Rochweg B, *et al.* Association of noninvasive oxygenation strategies with all-cause mortality in adults with acute hypoxemic respiratory failure. *JAMA* 2020; 324(1):57-67.
20. Patil VC, Kasireddy SR, Gada HN, Patil HV. Laboratory parameters in patients with moderate and severe COVID-19 in 2020 and 2021: A comparative study. *J Krishna Inst Med Sci Univ* 2021;10(4): 64-73.

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