

Table 1
Presence or absence of caries in permanent and primary teeth, according to different variables.

| | No | Yes | Crude OR | Adjusted OR |
|----------------------------------|-------------|------------|-------------------|-------------------|
| Caries of permanent teeth | | | | |
| Age | | | 1.54 (1.34; 1.77) | 1.58 (1.35; 1.86) |
| Consumption of sweets | | | | |
| No | 92 (87.6%) | 13 (12.4%) | 1 | 1 |
| Yes | 135 (77.6%) | 39 (22.4%) | 2.04 (1.03; 4.04) | 1.89 (0.79; 4.50) |
| Brush teeth at least once a week | | | | |
| Yes | 205 (83.3%) | 41 (16.7%) | 1 | 1 |
| No | 23 (65.7%) | 12 (34.3%) | 2.61 (1.20; 5.70) | 3.18 (1.10; 9.14) |
| Parents' tobacco use | | | | |
| Neither parent smokes | 85 (87.6%) | 12 (12.4%) | 1 | 1 |
| One parent smokes | 88 (80.7%) | 21 (19.3%) | 1.69 (0.78; 3.65) | 1.47 (0.62; 3.47) |
| Both parents smoke | 33 (71.7%) | 13 (28.3%) | 2.80 (1.16; 6.74) | 2.09 (0.74; 5.86) |
| Caries of primary teeth | | | | |
| Age | | | 0.90 (0.82; 0.99) | 0.89 (0.79; 0.99) |
| Consumption of sweets | | | | |
| No | 86 (81.9%) | 19 (18.1%) | 1 | 1 |
| Yes | 128 (73.6%) | 46 (26.4%) | 1.63 (0.89; 2.96) | 1.85 (0.92; 3.74) |
| Brush teeth at least once a week | | | | |
| Yes | 194 (78.9%) | 52 (21.1%) | 1 | 1 |
| No | 21 (60.0%) | 14 (40.0%) | 2.49 (1.18; 5.22) | 2.20 (0.93; 5.23) |
| Parents' tobacco use | | | | |
| Neither parent smokes | 76 (78.4%) | 21 (21.6%) | 1 | 1 |
| One parent smokes | 86 (78.9%) | 23 (21.1%) | 0.97 (0.49; 1.89) | 1.12 (0.55; 2.28) |
| Both parents smoke | 30 (65.2%) | 16 (34.8%) | 1.93 (0.89; 4.19) | 1.89 (0.82; 4.37) |

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Effectiveness of High-Flow Oxygen Therapy With Warm Humidification in a COPD Patient With Chronic Cough[☆]

Eficacia de la oxigenoterapia de alto flujo con humidificación térmica en un paciente EPOC con tos crónica

Dear Editor:

The administration of home oxygen therapy (HOT) through a nasal cannula is an essential therapeutic measure in the treatment of patients with COPD and chronic respiratory failure.¹ When it is well indicated, its benefits are clear and evident. However, the continued administration of oxygen can present important

side effects, among which are those related with the exposure to cold, dry air. Epistaxis, mucosa dryness, thick secretions that are difficult to eliminate and cough are some of the problems that our patients complain of with HOT.² Recently, “high-flow” oxygen therapy equipment has appeared on the market, which is able to provide all the gas inspired by the patient and which also incorporates the possibility to warm the air to 37 °C with a humidity of 100%. We present the case of a grade IV COPD patient with HOT and chronic cough in whom the application of oxygen through a system of active humidification was able to eliminate the cough.

Clinical Notes

The patient is a 72-year old diagnosed with grade IV COPD treated with HOT at 21/min with nasal cannulae for the past 3 years. The patient used the O₂ some 20 h/day. Spirometry done after the administration of salbutamol showed: FVC 2500 (83%),

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FEV₁ 800 (32%) and FEV₁/FVC 32. Chest radiography presented signs of chronic bronchopathy without any other findings of interest, and the stomach was visualized in its anatomically correct location. The patient reported continuous cough over the course of the last year, with little expectoration. The cough had increased, even interfering with sleep and making it impossible to speak normally. The existence of gastro-esophageal reflux had been ruled out by esophageal pH. The patient had come to the hospital's Emergency Department reporting suffocating cough and dyspnea and was therefore hospitalized with the diagnosis of COPD exacerbation. Arterial gasometry showed: pH 7.40, PO₂ 64 mmHg with O₂ at 2l/min through nasal cannulae, PCO₂ 44 mmHg. The complementary studies done (chest radiograph, ECG, blood analysis) did not show relevant alterations or changes compared with previous studies. Given the intensity of the cough and its accentuation with oxygen therapy, we decided to administer O₂ to the patient with AIRVO® equipment (Fisher & Paykel, Auckland, New Zealand). The air flow from the device is regulated at 35 l/min and the O₂ flow of the flow meter at 3 l/min, in order to achieve an estimated FiO₂ of 28%. The clinical response was spectacular, with the complete disappearance of the cough 5 min after initiating the therapy. The patient continued with the treatment for one week and was later discharged with conventional HOT. One month afterwards, the patient was seen in the outpatient consultation. The cough had reappeared, but was much milder and tolerable.

Discussion

We present a COPD patient with HOT and chronic cough related with the administration of O₂ after having ruled out other causes of chronic cough at both the pulmonary and digestive levels. The administration of O₂ at body temperature and 100% relative humidity made the cough disappear almost instantaneously, a situation which was maintained for a prolonged period. It is well known that the medical O₂ that patients receive is a cold, dry gas. Its temperature is 15 °C, and the absolute humidity is 0.3 mg/l. The effect of adding a cold bubbler improves the absolute humidity of the gas, reaching values of 15 mg/l, although this is far from the 44 mg/l necessary to reach a relative humidity of 100%.³ The thermal humidity

provided by AIRVO® imitates the natural balance of temperature and humidity produced in healthy lungs (37 °C, 44 mg/l), achieving a greater well-being of the patient and a greater tolerance to treatment while restoring the defense mechanisms of the respiratory apparatus, especially the mucociliary function.^{4,5} The patient returned to a conventional HOT system after being discharged from the hospital.⁶ The reappearance of the cough, although milder and tolerable, one month after discharge leads us to believe that the patient would still be under the beneficial effects of the thermal humidification on the mucosa, although sooner or later the cough would probably become more intense. Is this patient a candidate for receiving HOT through a system of thermal humidification, either continuous or discontinuous? We believe so. This opens new areas of research in the field of HOT, while identifying the need to individualize the prescription of oxygen therapy.

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Should We Reconsider the Criteria for Home Oxygen Therapy Depending on Altitude?*

¿Deberíamos reconsiderar los criterios de oxigenoterapia crónica domiciliaria en función de la altitud?

Dear Editor:

The criteria for home oxygen therapy (HOT), proposed more than 20 years ago, establish that patients with COPD who are non-smokers, correctly follow treatment and present respiratory failure in a context of clinical stability should receive HOT. Specifically, those patients with PaO₂ <55 mmHg or those with PaO₂ between 55 and 60 mmHg in whom there are signs of repercussions in the organs from hypoxemia, such as pulmonary hypertension, chronic cor pulmonale, congestive heart failure, heart rate disorders or polycythemia (hematocrit >55%), or those with lower

intellect, would be ideal candidates. In this group of patients, HOT has demonstrated its benefits in terms of survival and improvement of the clinical parameters.¹

These universally-accepted criteria are valid at sea level. However, many of our patients do not live at sea level, and one must contemplate whether these criteria are equally applicable at other altitudes. Studies have been done to estimate the degree of hypoxemia that a patient can reach when moved to a certain altitude, basically aimed at evaluating the need for the administration of oxygen (O₂) during airplane travel.^{2,3} However, the prediction equations of a certain level of PaO₂ that are based on a baseline PaO₂ value obtained at sea level cannot be applied inversely. We cannot estimate the PaO₂ that a patient would have at sea level by using his/her PaO₂ determined at a certain altitude.

Our group has worked with patients residing in Madrid at an altitude of 723 m with criteria for respiratory failure whose arterial saturation has ostensibly improved at sea level. That is to say that patients with criteria for HOT in Madrid may no longer meet said criteria when the altitude effect is cancelled out (Table 1). Many of these patients would not receive HOT if they lived at sea level, which leads us to suppose that there is an excess of indications for

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