Critically Appraised Topic (CAT)

Project Team:
10B-3
Project Team Participants:
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Clinical Question:
Can my patients regular use of inhaled corticosteroid medications be having an impact on her oral health?
PICO Format:
P:
Adult patients
I:
Inhaled corticosteroid medications
C:
No inhaled corticosteroid medication
O:
Incidence of caries, xerostomia, and thrush
PICO Formatted Question:
Do adult patients that regularly take inhaled corticosteroid medications exhibit higher rates of oral health issues such as caries, xerostomia, and oral thrush than those that don't?
Clinical Bottom Line:
There is evidence that the use of inhaled corticosteroids does increase the perceptibility of a patient to exhibit oral health issues such as caries, xerostomia, and oral thrush. There is some evidence that alternative medications or treatments may decrease the risk of these side effects. For example, the use of FP/SAL pMDI and BUD/FOR DPI may be more protective against oral thrush, and alternative inhaled drugs should be considered for patients who already have hyposalivation to decrease the risk of extreme xerostomia. It is important to keep these side effects in mind when a patient begins taking inhaled corticosteroids, so that we, as dentists, can be proactive in preventing and treating them.
Date(s) of Search:
October 12-14, 2020
Database(s) Used:
PubMed
Search Strategy/Keywords:
Corticosteriods, dental caries, oral candidiasis, thrush, xerostomia
MESH terms used:
Adrenal Cortex Hormones / adverse effects*, Inhalation Administration, Candida albicans / drug effects, Oral Candidiasis / chemically induced, asthma / drug therapy*, dental caries / chemically induced, xerostomia / chemically induced, salivation / drug effects

Article(s) Cited:

1. Dekhuijzen PNR, Batsiou M, Bjermer L, Bosnic-Anticevich S, Chrystyn H, Papi A, Rodríguez-Roisin R, Fletcher M, Wood L, Cifra A, Soriano JB, Price DB. Incidence of oral thrush in patients with COPD prescribed inhaled corticosteroids: Effect of drug, dose, and device. Respir Med. 2016 Nov;120:54-63. doi: 10.1016/j.rmed.2016.09.015. Epub 2016 Sep 22. PMID: 27817816.
2. Santos NC, Jamelli S, Costa L, Baracho Filho C, Medeiros D, Rizzo JA, Sarinho E. Assessing caries, dental plaque and salivary flow in asthmatic adolescents using inhaled corticosteroids. Allergol Immunopathol (Madr). 2012 Jul-Aug;40(4):220-4. doi: 10.1016/j.aller.2011.04.005. Epub 2011 Sep 8. PMID: 21862197.
3. Hira D, Koshiyama S, Komase Y, Hoshino N, Morita SY, Terada T. Dry mouth as a novel indicator of hoarseness caused by inhalation therapy. J Asthma. 2015 Apr;52(3):296-300. doi: 10.3109/02770903.2014.971965. Epub 2014 Oct 22. PMID: 25272184.

Study Design(s):

1. historical, observational, matched cohort study
2. Cross-sectional study
3. Cross-sectional study

Reason for Article Selection:

1. This cohort study compares the incidence of oral thrush in people using corticosteroids compared with those that do not. It concludes a link between corticosteroid use and the incidence of oral thrush. The study also compares oral thrush incidence between two different combinations of ICS (Budesonide/Formoterol Fumerate dehydrate [BUD/FOR] vs. fluticasone propionate/salmeterol xinafoate [FP/SAL]), along with two devices (dry powder inhalers (DPI) and pressurized metered dose inhalers (pMDI)).
2. Although this study does not evaluate adults, it does evaluate the direct association of incidence of dental caries and salivary flow while taking inhaled corticosteroids. It also addresses changes in salivary composition and increases in dental plaque.
3. Although this study's primary focus is hoarseness prediction, the article finds a correlation between hyposalivation and inhaled corticosteroid use. They found that hyposalivation can predict hoarseness, and that inhaled corticosteroid use increases the incidence of hyposalivation. Therefore, the administration of inhaled corticosteroids provided a higher predictive value for hoarseness than a patient not using inhaled corticosteroids.

Article(s) Synopsis:

1. Methods: Healthcare records from Optimum Patient Care Research Database were used to examine data during a one-year baseline period to determine characterization and one-year outcome period after initiation of a new or additional COPD therapy. Patients were grouped by whether or not they were prescribed FDC ICS/LABA (fixed dose combination inhaled corticosteroid/long-acting beta-2 agonist) combination therapy at index date. Sub-groups were analyzed by specific drug combination used (BUD/FOR vs FP/SAL) and device used (drug powder inhalers (DPI) or pressurized metered dose inhaler (pMDI). The incidence of oral thrush was higher in those prescribed FDC ICS/LABA vs. those prescribed long-acting bronchodilators alone. Significantly fewer patients prescribed BUD/FOR DPI developed oral thrush compared to FP/SAL DPI when allowing differing doses. Since FP/SAL DPI is typically prescribed at a higher dose than BUD/FOR, they analyzed the data for controlled doses, and found no significant difference between the two medication combinations. A significantly smaller proportion of patients developed oral thrush in FP/SAL pMDI vs FP/SAL DPI.
2. 80 adolescents (10-18 years old) were recruited for this study. They were divided into 40 asthmatic and 40 non-asthmatic. The asthmatic group was chosen for having been using inhaled corticosteroids for at least 3 months, along with relief beta-2 agonists less than once a week. Excluded patients included those that were taking any other

inhaled medication, presence of oral candidiasis, or systemic diseases. The presence of dental caries was assessed by number of decayed, missing, filled teeth (DMFT) and decayed, missing, filled, surfaces (DMFS). Asthmatic patients were found to have 2x the DMFT on average, and DMFS was also higher in comparison to non-asthmatics. They also assessed visible plaque, and asthmatics were found to have a statistically signifantly higher amount. Non-stimulated salivary flow was assessed by seating the patient upright with their chin down leaning over a cup while allowing the saliva to flow passively for 15 minutes. No statistically significant difference was found for salivary flow between the two groups.

3. Non-stimulated saliva amount was measured in 232 COPD and asthmatic patients. This study also asked that they fill out a questionnaire on subjective hoarseness ratings. They then formed a relationship between the two using the Peason correlation and multiple linear regression. They found that inhaled corticosteroid administration, fluticasone, and hyposalivation proved significant prediction accuracy for hoarseness. They found that hyposalivation was higher in those administering inhaled corticosteroids, which led to a higher incidence of hoarseness.

Levels of Evidence: (For Therapy/Prevention, Etiology/Harm)
See http://www.cebm.net/index.aspx?o=1025
☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
☐ **1b** – Individual RCT
☐ **2a** – Systematic Review of Cohort Studies
☒ **2b** – Individual Cohort Study
☒ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research

☐ **4a** – Systematic Review of Case Control Studies
☐ **4b** – Individual Case Control Study
☐ **5** – Case Series, Case Reports
☐ **6** – Expert Opinion without explicit critical appraisal, Narrative Review
☐ **7** – Animal Research
☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews
See article **J Evid Base Dent Pract 2007;147-150**

☐ **A** – Consistent, good quality patient oriented evidence
☒ **B** – Inconsistent or limited quality patient oriented evidence
☐ **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Conclusion(s):

1. ICS treatment increases incidence of oral thrush in COPD patients. In terms of treatment, the use of FP/SAL pMDI and BUD/FOR DPI may be more protective against oral thrush.
2. There is an association between the use of inhaled corticosteroids and increased risk of dental caries and bacterial plaque. Special attention and preventative treatment should be pursued in these patients.
3. Hyposalivation is a significant prediction factor of hoarseness induced by corticosteroids. Patients with hyposalivation should be considered for alternative inhalation drugs.