Vitamin D for the management of asthma

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Background

- Asthma is a *chronic inflammatory condition* of the airways, characterised by recurrent attacks of breathlessness, wheezing, cough, and chest tightness, commonly termed 'exacerbations'.

- Vitamin D is a *fat-soluble micronutrient*: cholecalciferol (vitamin D$_3$) and ergocalciferol (vitamin D$_2$).
Background

- Cholecalciferol (D3) is synthesised in human skin *by sunlight*; or supplied by *diet*.
- Ergocalciferol (D2) is *ingested in the diet*.
- *Inadequate vitamin D* status has been reported to be common *among people with asthma*. 
Vitamin D to prevent asthma attacks

Review question
- Does vitamin D *prevent asthma attacks* or *improve control of asthma symptoms* or both?

Background
- Low blood levels of vitamin D linked to an *increased risk of asthma attacks* in children and adults.
- Results from several studies about the benefit of vitamin D in asthma have *not been evaluated as a group*.
- Cochrane decided to synthetize all the studies and gave the conclusions.
Why it is important to do this review

- Potential of administration of vitamin D to *reduce exacerbation risk and improve asthma symptom control*.

- Several published trials of vitamin D in children with asthma have reported the *reductions in exacerbation rates* among children randomised...
Why it is important to do this review

Meta-analysis of these trials has the potential to increase statistical power to detect effects of administering vitamin D on exacerbation risk.

We conducted a meta-analysis that was restricted to double-blind, placebo-controlled trials of at least 12 weeks' duration to determine the effect of vitamin D on the primary outcome of exacerbation.
Search methods

We searched the Cochrane Airways Group Trial Register and reference lists of articles.

Date of last search: January 2016.

Selection criteria

- Double-blind, randomised, placebo-controlled trials of vitamin D in children and adults with asthma

Data collection and analysis

- Two review authors independently applied study inclusion criteria, extracted the data, and assessed risk of bias
Participants

- 7 RCT involved 435 children
- 2 RCT involved 658 adults
- Participants were ethnically diverse
- The majority of participants had mild/moderate asthma, and a minority had severe asthma.
- Median baseline serum 25(OH)D concentration ranged from 48 nmol/L to 89 nmol/L
Intervention

- All studies administered oral vitamin D₃ (cholecalciferol)
- 4 studies used daily dosing ranging from 500 IU/day to 1200IU/day
- 1 used weekly dosing (Majak 2009)
- 1 used monthly dosing (Yadav 2014)
- 1 used two-monthly dosing (Martineau 2015)
- 2 gave a bolus dose, followed by daily dosing (Castro 2014; Jensen 2016)
Outcomes

Asthma exacerbation treated with systemic corticosteroids

- Reduction in the rate of asthma exacerbations treated with systemic corticosteroids (RR 0.63, 95% confidence interval (CI) 0.45 to 0.88; 680 participants; 3 studies; high-quality evidence).

- Benefit of vitamin D for the outcomes of time to first exacerbation (HR 0.69, 95% CI 0.48 to 1.00; 658 participants; 2 studies; moderate-quality evidence).
Outcomes

- Benefit of vitamin D for proportion of participants experiencing one or more exacerbation (OR 0.74, 95% CI 0.49 to 1.10; 933 participants; 7 studies; moderate-quality evidence)

Asthma exacerbation precipitating emergency department or requiring hospitalisation

- Reduction in the proportion of participants experiencing an asthma exacerbation precipitating an emergency department visit or hospital admission or both (OR 0.39, 95% CI 0.19 to 0.78; NNTB 27, 95% CI 20 to 76; 963 participants; 7 studies; high-quality evidence)
Outcomes

- Adverse reaction to vitamin D
  - Two participants in one trial experienced hypercalciuria (Jensen 2016).
  - No other study reported episodes of hypercalciuria or any other adverse events potentially attributable to administration of vitamin D.
Outcomes

Costs from healthcare providers

- No effect on total costs associated with asthma/upper respiratory infection over 12 months (adjusted mean difference GBP 66.78, 95% CI GBP -263.47 to GBP 397.03).

Use of inhaled beta2-agonists

- One trial investigated the effects of vitamin D on the number of uses of inhaled relief medication per 24 hours (Martineau 2015).
- Allocation to vitamin D did not influence this outcome at 12 months (adjusted ratio of geometric means 1.00, 95% CI 0.77 to 1.28).
Conclusion

- Reduction in the rate of asthma exacerbations requiring treatment with systemic corticosteroids
- Reduction in the risk of asthma exacerbations resulting in emergency department attendance or hospitalisation
- No effect of vitamin D on ACT score
Conclusion

- Vitamin D did not influence the risk of any serious adverse event.
- No fatal asthma exacerbations were reported in any trial included in this meta-analysis.

That caution is warranted in applying this evidence to clinical practice.
THANK YOU FOR YOUR ATTENTION