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

- 7RCT 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 89nmol/L

Intervention

- All studies administered oral vitamin D_3 (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