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[Intervention Review]

Vitamin D for the management of asthma

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ABSTRACT

Background

Several clinical trials of vitamin D to prevent asthma exacerbation and improve asthma control have been conducted in children and adults, but a meta-analysis restricted to double-blind, randomised, placebo-controlled trials of this intervention is lacking.

Objectives

To evaluate the efficacy of administration of vitamin D and its hydroxylated metabolites in reducing the risk of severe asthma exacerbations (defined as those requiring treatment with systemic corticosteroids) and improving asthma symptom control.

Search methods

We searched the Cochrane Airways Group Trial Register and reference lists of articles. We contacted the authors of studies in order to identify additional trials. Date of last search: January 2016.

Selection criteria

Double-blind, randomised, placebo-controlled trials of vitamin D in children and adults with asthma evaluating exacerbation risk or asthma symptom control or both.

Data collection and analysis

Two review authors independently applied study inclusion criteria, extracted the data, and assessed risk of bias. We obtained missing data from the authors where possible. We reported results with 95% confidence intervals (CIs).

Main results

We included seven trials involving a total of 435 children and two trials involving a total of 658 adults in the primary analysis. Of these, one trial involving 22 children and two trials involving 658 adults contributed to the analysis of the rate of exacerbations requiring systemic corticosteroids. Duration of trials ranged from four to 12 months, and the majority of participants had mild to moderate asthma. Administration of vitamin D reduced the rate of exacerbations requiring systemic corticosteroids (rate ratio 0.63, 95% CI 0.45 to 0.88; 680 participants; 3 studies; high-quality evidence), and decreased the risk of having at least one exacerbation requiring an emergency department visit or hospitalisation or both (odds ratio (OR) 0.39, 95% CI 0.19 to 0.78; number needed to treat for an additional beneficial outcome, 27; 963 participants; 7 studies; high-quality evidence). There was no effect of vitamin D on % predicted forced expiratory volume in one second (mean difference (MD) 0.48, 95% CI -0.93 to 1.89; 387 participants; 4 studies; high-quality evidence) or Asthma Control Test scores (MD -0.08, 95% CI -0.70 to 0.54; 713 participants; 3 studies; high-quality evidence). Administration of vitamin D did not influence the risk of serious adverse events (OR 1.01, 95% CI 0.54 to 1.89; 879 participants; 5 studies; moderate-quality evidence). One trial comparing low-dose versus high-dose vitamin D reported two episodes of hypercalciuria, one in each study arm. No other study reported any adverse event potentially attributable to administration of vitamin D. No participant in any included trial suffered a fatal asthma exacerbation. We did not perform a subgroup analysis to determine whether the effect of vitamin D on risk of severe exacerbation was modified by baseline vitamin D status, due to unavailability of suitably disaggregated data. We assessed two trials as being at high risk of bias in at least one domain; neither trial contributed data to the analysis of the outcomes reported above.

Authors' conclusions

Meta-analysis of a modest number of trials in people with predominantly mild to moderate asthma suggests that vitamin D is likely to reduce both the risk of severe asthma exacerbation and healthcare use. It is as yet unclear whether these effects are confined to people with lower baseline vitamin D status; further research, including individual patient data meta-analysis of existing datasets, is needed to clarify this issue. Children and people with frequent severe asthma exacerbations were under-represented; additional primary trials are needed to establish whether vitamin D can reduce the risk of severe asthma exacerbation in these groups.

PLAIN LANGUAGE SUMMARY

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 (the 'sunshine vitamin') have been linked to an increased risk of asthma attacks in children and adults with asthma. Several clinical trials have been conducted to test whether vitamin D might prevent asthma attacks and improve control of asthma symptoms in children and adults, but results from studies with the most scientifically sound designs have not previously been evaluated as a group.

Included studies

We included seven trials involving 435 children and two trials involving 658 adults in the review from searches run up to January 2016. Of these, one trial involving 22 children and two trials involving 658 adults contributed to the analysis of the rate of severe asthma attacks. Study duration ranged from four to 12 months, and the majority of those taking part had mild or moderate asthma. All of the studies compared vitamin D with placebo.

Key results

People given vitamin D experienced fewer asthma attacks needing treatment with oral steroids. The average number of attacks per person per year went down from 0.44 to 0.28 with vitamin D (high-quality evidence). Vitamin D reduced the risk of attending hospital with an acute asthma attack from 6 per 100 to around 3 per 100 (high-quality evidence).

Vitamin D had little or no effect on lung function or day-to-day asthma symptoms (high-quality evidence). We found that vitamin D did not increase the risk of serious adverse events at the doses that were tested (moderate-quality evidence).

We based all of these findings on studies judged to be of high quality.

Conclusion

Vitamin D is likely to offer protection against severe asthma attacks. Further trials focusing on children and people who experience frequent severe asthma attacks are needed before definitive clinical recommendations can be made.