PAEDS RESEARCH AND JSNA

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VACCINES

- 2014-15 Joined National Portfolio Study (UKMenCar4)
- 2018 Be on the TEAM: Teenagers against Meningitis
- part of the Oxford Vaccines Group (series of cross-sectional studies but then sub- studies within these peri-pandemic)
  - Recruit Adolescents (15-19yrs in schools/colleges); target of about 24000
  - Evaluate prevalence of pharyngeal carriage of pathogenic meningococci

Meningococcal carriage in periods of high and low invasive meningococcal disease incidence in the UK: comparison of UKMenCar1–4 cross-sectional survey results

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Summary

Background The incidence of invasive meningococcal disease in the UK decreased by approximately four times from 1999 to 2014, with reductions in serogroup C and serogroup B disease. Lower serogroup C invasive meningococcal disease incidence was attributable to implementation of the meningococcal serogroup C conjugate vaccine in 1999, through direct and indirect protection, but no vaccine was implemented against serogroup B disease. UK Meningococcal Carriage surveys 1–3 (UKMenCar1–3), conducted in 1999, 2000, and 2001, were essential for understanding the impact of vaccination. To investigate the decline in invasive meningococcal disease incidence, we did a large oropharyngeal carriage survey in 2014–15, immediately before the changes to meningococcal vaccines in the UK national immunisation schedule.

Methods UKMenCar4 was a cross-sectional survey in adolescents aged 15–19 years who were enrolled from schools and colleges geographically local to one of 11 UK sampling centres between Sept 1, 2014, and March 30, 2015. Participants provided an oropharyngeal swab sample and completed a questionnaire on risk factors for carriage, including social behaviours. Samples were cultured for putative *Neisseria* spp, which were characterised with serogrouping and whole-genome sequencing. Data from this study were compared with the results from the UKMenCar1–3 surveys (1999–2001).

Findings From the 19 641 participants (11 332 female, 8242 male, 67 not stated) in UKMenCar4 with culturable swabs and completed risk-factor questionnaires, 1420 meningococci were isolated, with a carriage prevalence of 7·23% (95% CI 6·88–7·60). Carriage prevalence was substantially lower in UKMenCar4 than in the previous surveys: carriage prevalence was 16·6% (95% CI 15·89–17·22; 2306/13 901) in UKMenCar1 (1999), 17·6% (17·05–18·22; 2873/16 295) in UKMenCar2 (2000), and 18·7% (18·12–19·27; 3283/17 569) in UKMenCar3 (2001). Carriage prevalence was lower for all serogroups in UKMenCar4 than in UKMenCar1–3, except for serogroup Y, which was unchanged. The prevalence of carriage-promoting social behaviours decreased from 1999 to 2014–15, with individuals reporting regular cigarette smoking decreasing from 2932 (21·5%) of 13 650 to 2202 (11·2%) of 19 641, kissing in the past week from 6127 (44·8%) of 13 679 to 7320 (37·3%) of 19 641, and attendance at pubs and nightclubs in the past week from 8436 (62·1%) of 13 594 to 7662 (39·0%) of 19 641 (all p<0·0001).

Interpretation We show that meningococcal carriage prevalence in adolescents sampled nationally during a low incidence period (2014–15) was less than half of that in an equivalent population during a high incidence period (1999–2001). Disease and carriage caused by serogroup C was well controlled by ongoing vaccination. The prevalence of behaviours associated with carriage declined, suggesting that public health policies aimed at influencing behaviour might have further reduced disease.

Lancet Infect Dis 2021; 21: 677–87

Published Online January 19, 2021 https://doi.org/10.1016/S1473-3099(20)30842-2

This online publication has been corrected. The corrected version first appeared at thelancet.com on April 22, 2021

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Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Original article

Impact of meningococcal ACWY conjugate vaccines on pharyngeal carriage in adolescents: evidence for herd protection from the UK MenACWY programme

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VITAMIN D

- >20yr interest in this area
- Vit D deficiency adversely affects Ca metabolism resulting in rickets, hypocalcaemic convulsions, poor growth and general ill health
- Multiple conditions linked with Vit D deficiency eg respiratory infections and autoimmune conditions

ORIGINAL ARTICLE

Vitamin D deficiency: prevention or treatment?

C S Zipitis, G A Markides, I L Swann

Arch Dis Child 2006;**91**:1011–1014. doi: 10.1136/adc.2006.098467

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Accepted 29 June 2006
Published Online First 31 August 2006

Background: Vitamin D deficiency is a chronic condition which contributes to general ill health and seems to be re-emerging in our catchment area since funding of vitamin D supplementation by Primary Care Trusts ceased. This study aims to verify this situation and to assess the cost effectiveness of reintroducing vitamin D supplementation in the Burnley Health Care NHS Trust.

Methods: Vitamin D deficient patients presenting between January 1994 and May 2005 were identified and data retrospectively collected from their case notes. The cost of treatment and the theoretical cost of primary prevention for the Trust population were calculated using previous and current DoH guidelines.

Results: Fourteen patients were identified, of whom 86% presented in the last 5 years and 93% were of Asian origin. The incidence of vitamin D deficiency for our population is 1 in 923 children overall and 1 in 117 in children of Asian origin. The average cost of treatment for each such child is £2500, while the theoretical cost of prevention of vitamin D deficiency in the Asian population through primary prevention according to COMA guidance is £2400 per case.

Conclusions: Vitamin D deficiency is re-emerging in our Trust. The overwhelming majority of our patients are of Asian origin. The cost of primary prevention for this high risk population compares favourably both medically and financially with treatment of established disease. We suggest that Primary Care Trusts provide funds for vitamin D supplementation of Asian children for at least the first 2 years of life.

LETTERS

Vitamin D deficiency and guideline awareness

We thank Ahmed and colleagues for adding a substantial number of new cases of vitamin D deficiency to the literature.[1] Despite earlier omissions, the 2008 version of the National Institute for Health and Clinical Excellence antenatal guideline[2] suggests that all women should be informed at the booking appointment about the importance of maintaining adequate vitamin D stores during pregnancy and the breastfeeding period. Further, it specifies certain characteristics that would place women into a high-risk category for vitamin D deficiency. This guideline has been adopted by our institution (St Mary's Hospital, Manchester, UK). In addition, the Department of Health (DH) recommends supplementation of children with vitamin D to the age of 5.[3]

After appropriate approval, we undertook a prospective audit over 1 week in January 2010, aiming to assess maternity team awareness of the aforementioned guidelines still, limited awareness of the guidelines and absence of clear pathways of how to deal with this growing problem. Campaigns to raise awareness among healthcare staff and the general public are necessary. Women identified as high-risk need to have their vitamin D levels measured as supplementation at the recommended amounts will not treat deficiency. Clear and funded referral pathways need to be in place in every area so that those with deficiencies are appropriately investigated and treated. All pregnant and breastfeeding mothers, and babies need to be offered vitamin D supplements.

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Vitamin D supplementation in early childhood and risk of type 1 diabetes: a systematic review and meta-analysis

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Accepted 17 January 2008
Published Online First
13 March 2008

ABSTRACT

Objectives: To assess whether vitamin D supplementation in infancy reduces the risk of type 1 diabetes in later life.

Methods: This was a systematic review and meta-analysis using Medline, Embase, Cinahl, Cochrane Central Register of Controlled Trials and reference lists of retrieved articles. The main outcome measure was development of type 1 diabetes. Controlled trials and observational studies that had assessed the effect of vitamin D supplementation on risk of developing type 1 diabetes were included in the analysis.

Results: Five observational studies (four case-control studies and one cohort study) met the inclusion criteria; no randomised controlled trials were found. Meta-analysis of data from the case-control studies showed that the risk of type 1 diabetes was significantly reduced in infants who were supplemented with vitamin D compared to those who were not supplemented (pooled odds ratio 0.71, 95% CI 0.60 to 0.84). The result of the cohort study was in agreement with that of the meta-analysis. There was also some evidence of a dose-response effect, with those using higher amounts of vitamin D being at lower risk of developing type 1 diabetes. Finally, there was a suggestion that the timing of supplementation might also be important for the subsequent development of type 1 diabetes.

Conclusion: Vitamin D supplementation in early childhood may offer protection against the development of type 1 diabetes. The evidence for this is based on observational studies. Adequately powered, randomised controlled trials with long periods of follow-up are needed to establish causality and the best formulation, dose, duration and period of supplementation.

The fact that people with affected first-degree relatives are a lot more likely to develop type 1 diabetes than the general population points to an important genetic influence.[7] However, low concordance among identical twins and the fact that many children with a genetic predisposition to the disease do not develop it suggest that environmental factors are also important.[8] One of the environmental factors thought to be protective against the development of type I diabetes, is early supplementation with vitamin D.

Vitamin D is either produced endogenously, through skin exposure to sunlight, or exogenously from ingestion of foods and supplements. Breast milk contains little vitamin D, although this is influenced by the vitamin D status of the mother,[9] and this is the reason behind the recommendation for an administered supplement for breastfed infants.[10] Furthermore, in northern areas, including the northern United States, Canada and most of Europe, little or no vitamin D is produced in the skin during winter months.[11] Even in the summer and at lower latitudes, many infants are so thoroughly protected from sun exposure that they produce little endogenous vitamin D. In addition, there is evidence that over the last few decades the uptake[12] as well as the dosage[13] of vitamin D supplementation have been declining leading to a resurgence of rickets and hypocalcaemia,[14] as well as speculation about the possible role of vitamin D in the increasing incidence of type 1 diabetes and other autoimmune conditions such as rheumatoid arthritis[15] and multiple sclerosis.[16]

Clinical Research Reports

Is Vitamin D Protective Against Development of Type 1 Diabetes Mellitus?

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Abstract: *The literature on vitamin D is expanding rapidly, and new associations with diseases are being described all the time. Many of these associations are derived from observational studies. Many question the importance of observations from such studies and call for a demonstration of effectiveness in what would be very long and expensive randomized controlled trials. This article focuses on the association between vitamin D and development of type 1 diabetes mellitus. Although randomized controlled trials are necessary for clarifying some aspects of intervention, this*

between vitamin D and type 1 diabetes mellitus (T1DM).

It is clearly the case that interventions only shown to be useful in observational studies are not considered to have met the stringent criteria for causality, and this is why many clinicians question the available evidence and call for randomized controlled trials (RCTs). In the pyramid of levels of evidence, RCTs and systematic reviews of RCTs are considered the strongest level of evidence.[9] However, one should not dismiss lower levels of evidence; indeed, one of the most widely

Biological Plausibility

Biological plausibility checks whether the proposed pathways are consistent with known biological processes. The incidence of T1DM tends to have a peak in early childhood and another in early puberty, such that most of those with the disorder would have been diagnosed by age 30.[11] A Th-1 cellular response is responsible for the autoimmune destruction of the beta-cells of the pancreas,[12] but we are less clear as to what sets this off in the first place. A Th-1 cellular

Clinical Review

The Royal Society of Medicine

Journal of the Royal Society of Medicine Open;
7(11) 1–5
DOI: 10.1177/2054270416653522

Assessing the population impact of low rates of vitamin D supplementation on type 1 diabetes using a new statistical method

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Summary

Vitamin D supplementation for all children <5 is recommended by the UK Department of Health for its skeletal effects. Vitamin D is also linked with a number of extra-skeletal effects; one of them being protection against type 1 diabetes. With a rapid increase in the incidence of type 1 diabetes and the associated costs, measures of curtailing the rapid increase of type 1 diabetes are needed. In this review, we look at type 1 diabetes using a statistical method (PIN-ER-t) and published data in an attempt to quantify the impact on the population of babies born in 2012 of increasing vitamin D supplementation rates. Calculations show that for the population of 729,674 babies born in England and Wales in 2012, 374 cases of type 1 diabetes (out of 1357 total predicted) could be prevented over 18 years if all were supplemented with vitamin D. This could lead to savings in excess of £62 million for the cohort. This piece of work adds to the argument for studying the potential link between vitamin D supplementation and type 1 diabetes further.

Keywords

paediatrics, public health, vitamins and supplements, other statistics and research methods

influences are important.[5] However, it is clear that environmental factors are also important as evidenced by low-concordance levels in identical twins and observation that many children with genetic predisposition never develop the disease.[6]

One of the environmental factors thought to be protective against development of type 1 diabetes is early supplementation with vitamin D.[7–10] Vitamin D supplementation in infants is recommended in the UK for its skeletal effects for all infants and children under five years of age (if receiving less than 500 ml of formula milk a day).[11] Despite the advice, supplementation rates remain low.[12] There are indications that vitamin D supplementation of high-risk children is cost-effective compared with treating those displaying symptoms of hypovitaminosis D.[13]

We set out to quantify potential improvements in the burden of type 1 diabetes on the population of babies born in 2012 by increasing vitamin D supplementation rates. Such quantification might prove useful to those considering cost-effectiveness of uni-

OTHER IDEAS

- Dental – 28% of 5yr olds had visibly obvious dental decay 2023/24
  - Government supervised toothbrushing 3-5yr olds
  - Fluoridation of H2O?
  - Very strong dental Dept in hospital – can we increase educational resources in schools/general community by organizing educational meetings/visits to schools or educational videos that can be shared more widely?
- Breastfeeding –
  - We have been struggling to increase breastfeeding rates in premature babies in the neonatal unit for many years but now making some good progress
  - Obesity
  - Wellbeing families and babies
  - Health benefits mums/babies

THANK YOU!

Any Questions?