Introduction

Vitamin A is an essential nutrient in maintaining healthy eyes, vision, growth and development. It functions in the visual cycle at the level of the eye by acting in the production of photosensitive pigments in the cells of the retina.

Vitamin A deficiency (VAD), which affects over 250 million preschool-aged children worldwide, is characterized primarily by the prevalence of xerophthalmia. VAD is the leading cause of preventable blindness in children, affecting 500 000 children annually. Xerophthalmia encompasses a series of symptoms, most commonly Bitot’s spots and night blindness. Bitot’s spots, caused by the build-up of keratin debris superficial to the conjunctiva, are irregular in shape and are associated with conjunctival xerosis. Night blindness, also known as nyctalopia, is limited visibility in low light settings.

Supported financially by the Canadian International Development Agency (CIDA), the Micronutrient Initiative (MI) supplies over 75% of the world’s vitamin A needs and has to date supplied over 5 billion vitamin A capsules. The Ottawa-based NGO seeks to develop and implement innovative solutions to address the world’s vulnerable populations with the vitamins and minerals they need to survive and thrive.

The purpose of this literature review is to determine the effectiveness of vitamin A supplementation programs in reducing xerophthalmia and its associated symptoms in vulnerable populations — namely in infants and pre-school aged children using Bitot’s spots and night blindness as indicators.

Methods

SEARCH STRATEGY: The PubMed and SCOPUS databases were searched for randomized trials and supplementation programme reviews containing pre- and post-intervention evaluation data.

Keywords used in the search included: vitamin A, vitamin A deficiency, vitamin A supplementation, xerophthalmia, night blindness, and Bitot’s spots.

SELECTION CRITERIA: Randomized controlled trials and vitamin A supplementation programme analyses were selected that evaluated the effects of vitamin A supplementation on prevalence of xerophthalmia. 8 studies were selected based on availability of comparisons between pre- and post-intervention data or experimental group and control group data. Data collected was restricted to prevalence of Bitot’s spots and/or nyctalopia.

DATA COLLECTION AND ANALYSIS: At least two reviewers assessed trials for inclusion and extracted data. Exclusion criteria were set so that only peer-reviewed trials were used from publications dated 1988 and onwards. The following information was collected in each study: relative risk (RR), odds ratio (OR) or P-value with associated confidence interval as well as loss to follow-up, setting and year.

Results

According to the compiled results, a reduction was observed in the prevalence of xerophthalmia due to vitamin A supplementation. Although some of the results proved to be insignificant and others were not well founded, a majority of findings indicated that vitamin A supplementation correlated positively with a decrease in prevalence of Bitot’s spots and night blindness.

Interpretation of results is complicated by non-differential bias in methodology. The search strategy was not exhaustive as it was limited by database access. However, internal validity was not compromised due to the structured and rigorous nature of selection criteria.

Confounders in our methodology included gender and age. The prevalence of both Bitot’s spots and night blindness are known to be higher in boys, however data collected was not gender-specific and therefore inferences can only be applied to children in general. Vitamin A supplementation greatly reduces xerophthalmia prevalence in infants under 65 months, while effects are reduced in children older than 65 months. Therefore, results from this study are primarily applicable to vulnerable populations which fall within the 0-5 year-age range. Vulnerable populations for this study are defined as being vitamin A deficient as determined by serum retinol levels.

Based on the results of the study, it is advisable that CIDA continues support of vitamin A supplementation programs in vulnerable populations. Current CIDA collaborations include partnerships with the Micronutrient Initiative, valued at $150 million, and with the United Nations Children’s Fund (UNICEF), worth $9 million. CIDA has also previously partnered with Helen Keller International for vitamin A supplementation.

Discussion

References


