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Cochrane Nursing Care Field (CNCF) – Cochrane Review Summary

Vitamin E supplementation in people with cystic fibrosis: A Cochrane review summary

J. Dru Riddle

Director Center for Translational Research, Texas Christian University, Harris College of Nursing and Health Sciences, School of Nurse Anesthesia, United States

1. Background

Patients with cystic fibrosis (CF) suffer with thickened, sticky secretions that impact multiple organ systems. Specifically, CF patients have respiratory and gastrointestinal involvement leading to impaired mucous clearing, pulmonary infections, decreased pancreatic secretions and impaired fat absorption. In addition, CF patients have malabsorption of fat soluble vitamins and require pancreatic enzyme supplementation (Okebukola et al., 2017).

As early as 1977, studies have identified CF patients as vitamin E deficient (Farrell et al., 1977). Low vitamin E levels in CF patients put them at risk of the detrimental effects of vitamin E deficiency including cerebellar ataxia, peripheral neuropathy, myopathy, and vision loss. Sensory and motor neuropathies, cognitive impairment, and haemolytic anaemias may occur late in the progression of vitamin E deficiency (Okebukola et al., 2017).

Vitamin E is actually a generic term for a group of eight different fat-soluble compounds of which alpha-tocopherol is the most biologically active. Vitamin E functions as an antioxidant to prevent oxidative damage. Low vitamin E levels are known to worsen oxidative stress which is a result of constant systemic inflammation. In patients with CF, digestive and respiratory inflammation is chronic and low vitamin E levels may compound inflammatory symptoms. Vitamin E also plays a role in the structural integrity of haemoglobin, vision, and nerve conduction (Okebukola et al., 2017).

Vitamin E is easily supplemented with either oral or parenteral administration. In patients with CF, the supplementation is usually via the oral route in the form of either chewable or non-chewable tablets, liquids, or powders. Typically, vitamin E supplementation is started when the serum levels of vitamin E are low. Once started, vitamin E supplementation in CF patients is typically lifelong and carries very few adverse effects (Okebukola et al., 2017).

2. Objective/s

The objective of this systematic review was to determine the effectiveness of vitamin E supplementation on vitamin E deficiency (or frequency of vitamin E deficiency disorders) in patients with CF who had not received a lung transplant[1].

3. Intervention/methods

The systematic review considered randomized controlled trials and quasi-randomized controlled trials that were composed of CF patients who had not received a lung transplant. These CF patients must have been diagnosed based on a genetic test or sweat test along with one additional clinical feature of CF. The intervention of interest was vitamin E supplementation of any preparation which was compared to either placebo or no supplement. The outcomes of interest included vitamin E total lipid ratio, vitamin E serum level, incidence of vitamin E-specific deficiency disorders. Other outcomes included growth and nutritional status, lung function, and quality of life (Okebukola et al., 2017).

The reviewers searched the Cystic Fibrosis Trials Register, Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE and hand searching of two relevant journals. In addition, searches for unpublished works were undertaken along with contacting the manufactures of various vitamin E supplements for any relevant studies (Okebukola et al., 2017).

Two authors reviewed the titles and abstracts to identify relevant studies. Once identified, a risk of bias assessment was conducted by independent reviewers to determine methodological quality of the studies. Data were extracted from the included studies and were analysed using meta-analysis methods appropriate to the type of data (Okebukola et al., 2017).

4. Results

The reviewers included four studies (three RCTs and one controlled clinical trial) in their analysis containing both paediatric and adult patients aged 22–44 years. The risk of bias was reported as low or unclear in all studies. The serum vitamin E levels increase significantly at both one and three months when water- or fat-soluble soluble vitamin E supplementation is used. No studies reported vitamin E total lipid ratios or incidence of vitamin E deficiency disorders. No studies reported on lung function, quality of life, or growth or nutritional status (Okebukola et al., 2017).

E-mail address: d.riddle@tcu.edu.

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5. Conclusions

The review concluded that people with CF have increased serum vitamin E levels when supplemented with vitamin E. The status of pancreatic activity was not clear in any included study and the effects of increased serum vitamin E levels was not studied. It is difficult to determine if the vitamin E supplementation is actually beneficial to the CF patient aside from an increased serum level of vitamin E. Knowing that CF patients with pancreatic insufficiency have decreased absorption of fats would support the supplementation of vitamin E, however, the efficacy of vitamin E supplementation on symptoms of CF or disease progression is not known based on this review. Additional work is needed to determine if vitamin E supplementation improves CF symptoms, nutritional status, and quality of life for CF patients. Based on the idea that vitamin E deficiency would lead to poor health outcomes in CF patients, the results of this review support the current practice of vitamin E supplementation for CF patients.

6. Implications for practice

The results of this review support the current practice of vitamin E supplementation in patients with CF. Vitamin E supplementation will increase the serum levels of vitamin E, however, there are no data to suggest any change in CF symptoms, nutritional status, or quality of life. Based on the low-risk profile of vitamin E supplementation, patients with CF should be instructed to remain compliant with their vitamin E supplementation due to the health risks of vitamin E deficiency.

References

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Farrell, P.M., et al., 1977. The occurrence and effects of human vitamin E deficiency: a study in patients with cystic fibrosis. J. Clin. Invest. 60 (1), 233.

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