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Zinc Effectiveness in Tinnitus Treatment

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Introduction

Tinnitus (specifically, subjective tinnitus) is a common complaint among patients both with and without hearing impairment. Our limited understanding of the pathology and etiology of this condition has placed severe limitations on the effective treatments available to tinnitus sufferers. Examples of current treatments include: diet, tinnitus retraining therapy, sound therapy, and in extreme cases surgical intervention. However, none of these treatments are universally effective.

The goal of this systematic review is to investigate the efficacy of a dietary treatment for tinnitus: zinc supplementation.

Question

Does zinc provide an effective treatment for tinnitus patients?

PICO Element	PICO Question
Patient	Subjective tinnitus sufferers
Intervention	Zinc supplementation
Comparison	No treatment (placebo)
Outcome	Audiometry, questionnaires, self-report

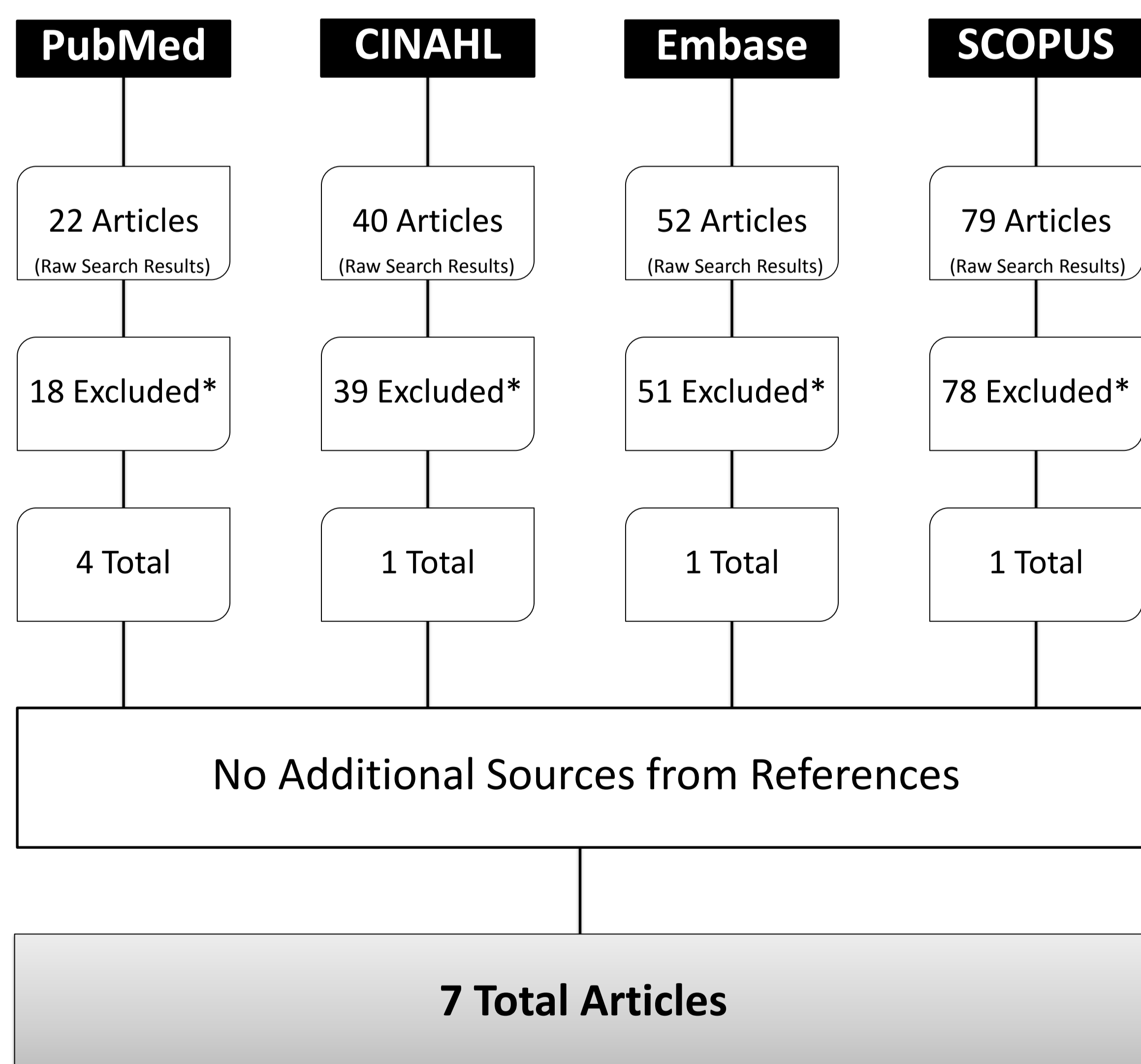
Search Terms & Criteria

Searches included the following terms in various combinations: zinc, supplement, supplementation, diet, deficiency, subjective, tinnitus, ringing, treatment, outcome.

Results were limited to English language, peer-reviewed studies involving human adults. There were no adult age-range or publication date restrictions, due to the limited literature available in this area. Access through Western University libraries was also required.

Literature Search

A systematic literature review was conducted using the following databases: PubMed, CINAHL, Embase, and SCOPUS. Articles yielded from this primary search were then reviewed for additional articles using their references. A summary chart is shown below:



*Exclusions were based on (in order of their review): title, abstract, article content, and duplications from previous search results

Results

Results of the systematic literature review are shown in the table below. Evidence levels are based on the Research Design Tree by Dr. Archibald (1-4; highest to lowest level of evidence).

#	Research Objective	Sample Size	Description of Research or Intervention	Results	Conclusion	Evidence Level
1	Investigation of zinc administration for tinnitus treatment	41	Two groups: daily 50mg zinc (1) and starch pill (2); both for two months. Pre-post measurements made (surveys, audiometry, blood zinc levels)	Sig. increase in blood zinc levels and decrease in subjective tinnitus scoring for intervention group, but NS changes in tinnitus frequency or loudness.	Administration of zinc improved blood zinc level and subjective scoring	2b
2	Assessment of patient zinc levels, and the effects of zinc deficiency on hearing loss	100	Three groups according to age, assessed zinc levels, TSIQ, subjective loudness, hearing levels	Zinc deficiency worse in older participants, zinc-deficient patients showed sig. higher tinnitus severity/loudness, and AC thresholds	Decreased zinc levels with age, low zinc linked to tinnitus severity/loudness	4
3	Testing the effectiveness of zinc to reduce tinnitus	116	Randomized, prospective double-blind placebo controlled. Two groups: 50mg zinc per day (1) and placebo (2); both for four months. THQ/zinc levels assessed.	Sig. increases in blood zinc levels, NS differences between zinc and placebo measures (5% zinc, 2% placebo showed THQ improvement of 20+)	Zinc is not an effective treatment for tinnitus	1
4	Review of potential treatments for tinnitus	N/A	PubMed and MEDLINE databases were searched for the term tinnitus in articles published from 1940 to 2012.	Several studies link low blood zinc levels to tinnitus. Some unsuccessful zinc interventions (not placebo-controlled).	Poor evidence available linking zinc for tinnitus treatment	4
5	To link hypozincemia to tinnitus	115	Blood and globular zinc levels tested in tinnitus patients and 15 controls (no tinnitus).	Significant serum zinc level differences, but tinnitus patient globular zinc levels were normal. No relation to tinnitus characteristics.	No firm conclusions made	4
6	To link serum zinc levels to tinnitus patients	73	Comparison of blood zinc levels, hearing sensitivity, tinnitus characteristics between tinnitus and control groups.	Tinnitus patient without HL sig. low zinc levels. NS zinc level difference between patients with HL/tinnitus and controls. Sig.	Zinc is involved in tinnitus generation in normal hearing patients	4
7	Investigate hypozincemia in tinnitus of different origin, and the effect of treatment	40	Zinc blood-levels, tinnitus scoring, and tinnitus handicap questionnaire assessed for tinnitus patients. Result of zinc treatment for hypozincemic patients.	Hypozincemia reportedly lower in this experimental group (15%); treatment showed increased serum zinc levels and NS effects, but was sig. for elderly.	Zinc treatment is generally ineffective for tinnitus, but may be beneficial for the elderly	3

Legend: Sig. = significant; NS = non-significant; TSIQ = Tinnitus Severity Index Questionnaire; AC = air conduction; THQ = Tinnitus Handicap Questionnaire; HL = hearing loss

Conclusions

Several studies have investigated and drawn wide conclusions between zinc deficiency (hypozincemia) and subjective tinnitus. These studies were generally thorough in their ruling out of objective causes for the tinnitus, and in maintaining stringent measurements for assessing tinnitus loudness, frequency, severity, and blood serum levels of zinc.

However, studies which actively implemented an intervention using zinc supplementation found no statistically significant benefit of treatment. However these studies are very few, and use substantially different criteria (and outcome measures) for what they consider to be improvement in the tinnitus experienced. In the very limited studies which have found significant improvement in subjective scoring for tinnitus after zinc treatment, no follow-up was done to determine if the intervention provided lasting effects.

In summary, based on the literature available relating to the efficacy of treatment for individuals with tinnitus using zinc supplementation, it can be concluded that: **zinc does not provide an effective treatment for tinnitus patients.** However, more research is needed in this area; not just for zinc supplementation, but for general dietary treatment of tinnitus. A challenge in studying zinc, specifically, and its treatment efficacy is the validity of using serum zinc concentrations as an indicator of what zinc is available to cells. It may be necessary going forward to refer to globular zinc levels, which may provide a more accurate indication of an individual's zinc deficiency.

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