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Zinc lozenges efficacy in cold treatment

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Abstract

Introduction: Until now zinc has been used mainly in oral pellets form when it was an insufficiency of this element in the body. Zinc as a lozenge or used locally on the skin found use in dermatology, ophthalmology and removing halithosis. Recently scientific publications suggesting that zinc lozenges can shorten the duration of cold even 30% appeared.
The aim of the study is to analyze available scientific data considering zinc lozenges efficacy in cold treatment.
Material and method: The study uses research results published on the PubMed platform.
Results: Comparative diagrams were made in order to clearly depict effectiveness of certain zinc doses and forms on shortening the duration of cold. The most important is dose and type of zinc compound. Zinc acetate and gluconate show the best therapeutical activity applied in dose >75mg per day.
Conclusions: According to the most of included research taking zinc lozenges reduces the duration of illness. Moreover the industrial process of making pellets is significant. Commonly used additional ingredients can bind zinc ions preventing their local activity In

oral cavity. Properly prepared drug can be very effective way of shortening the duration of cold.

Key words: zinc ions; common cold; lozenges

1. Introduction:

The common cold is an acute, self-limiting, usually recoverable within 1 week, viral infection of the upper respiratory tract, including: nose, sinuses, throat and larynx. It is one of the most common diseases that affect everyone. Recommendations for treatment vary depending on the country and there is no official guidelines that can be used in the daily work of the doctor. The basis of cold management is symptomatic treatment, but there are lesser-known methods that significantly shorten its duration [1,2].

Zinc is one of the trace elements of the human diet. The most sensitive to its deficiencies are the epidermis, digestive tract, central nervous system, immune system, bones and reproductive system [3]. The immunomodulatory mechanism of action of zinc is to inhibit the inflammatory response. [4] The daily requirement (RWS) for that element is 11 milligrams for men and 8 milligrams for women. People over 60 years old, who due to age are predisposed to more frequent infections, often consume too little zinc (even below 50% RWS) [5].

The interest in the therapeutic activities of zinc in the form of lozenges began with the story of a 3-year-old girl with leukemia who instead of swallowing the preparation held it in the mouth for a long time. Cold symptoms resolved after a few hours. This indicates a beneficial local effect of zinc in the throat area. This observation of the child's prompt her father to start the first research on the effectiveness of the zinc in the form of lozenges in reducing the duration of a cold [6]. In recent years, studies have appeared that prove that there is a strong relationship between the dose of zinc in lozenges form and its effect to reduce the duration of colds [6,7].

2. Material and method

The study uses available research results of many authors published on the PubMed platform regarding the impact of zinc in the form of lozenges on the common cold.

3. Results

In research where the zinc dose was lower than 75mg/day, no significant effect comparing to placebo was observed. Comparative results were obtained among groups in which the zinc dose was 80-92mg/day and 192-207mg/day [Diagram 1].

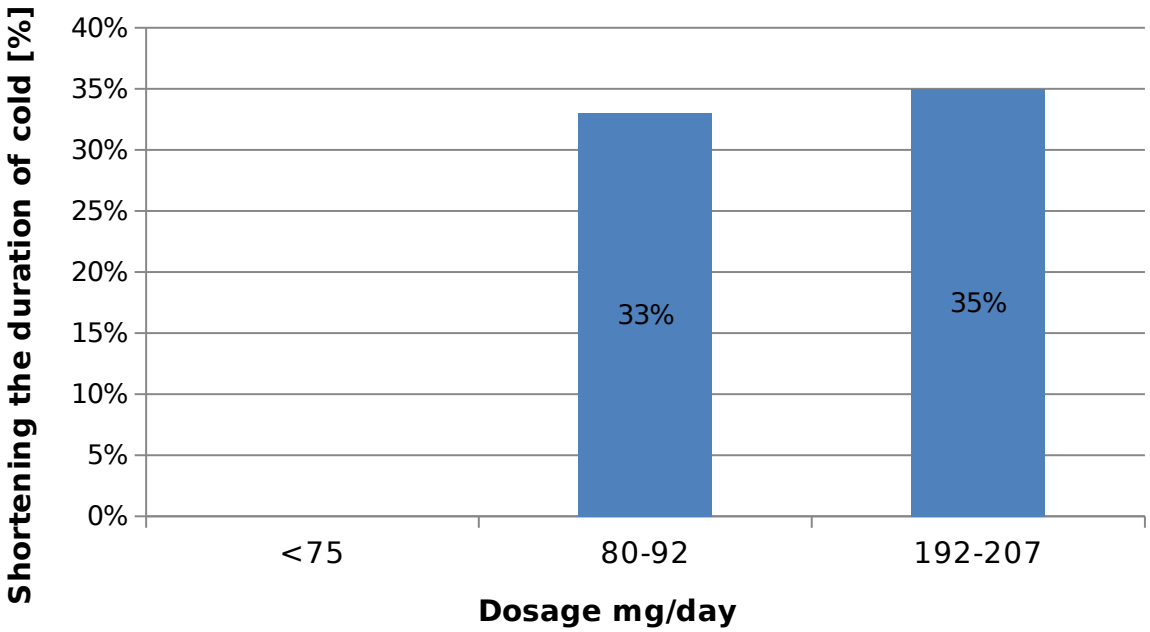

Diagram 1. The correlation between dose of zinc preparation and shortening the duration of cold.

Among eight research in which zinc lozenges dose was higher than 75mg/day seven of them demonstrated zinc efficacy while in one there were no significant changes relative to the placebo group. The effectiveness of zinc therapy (reduction of the duration of colds compared to placebo) ranged from 21% to 64%. Studies in which doses <75mg / day were used did not show the effectiveness of the therapy [Table 1].

Research	Daily zinc dose [mg]	Average cold duration in group taking zinc lozenges [days]	Average cold duration in placebo group [days]	Zinc efficacy [% of shortening the duration of cold comparing to placebo]
Eby *et al.*1984 [6]	207	3.9	10.8	-64%
Smith *et al.*1989 [8]	207	5.7	6.6	-22%
Godfrey *et al.* 1992 [9]	192	4.9	6.1	-21%
Prasad *et al.* 2008 [4]	92	4.0	7.1	-44%
Petrus *et al.* 1998 [10]	89	3.8	5.1	-26%
Turner at al. A 2000 [11]	80	6.0	5.5	*
Mossad *et al.*1996 [12]	80	4.4	7.6	-42%
Prasad *et al.* 2000 [13]	80	4.5	8.1	-44%
Turner *et al.* B 2000 [11]	69	5.5	5.5	*
Douglas *et*	64	12.1	7.7	*

al. 1987 [14]				
Macknin et al. 1998 [15]	45	9.0	9.0	*
Weismann et al. 1990 [16]	45	7	6	*
Turner et al. C 2000 [11]	30	6.0	5.5	*

* p<0,05 – no statistical significance

Table 1. Zinc lozenges therapeutical efficacy during spontaneously acquired cold.

The chart includes studies in which a dose of zinc> 75mg / day was used. The highest efficacy using zinc acetate was obtained in the Prasad 2000 and 2008 studies, whereas for zinc gluconate in the Eby 1984 and Mossad 1996 studies. An extremely low result for zinc gluconate was obtained in the Turner 2000 study [Diagram 2].

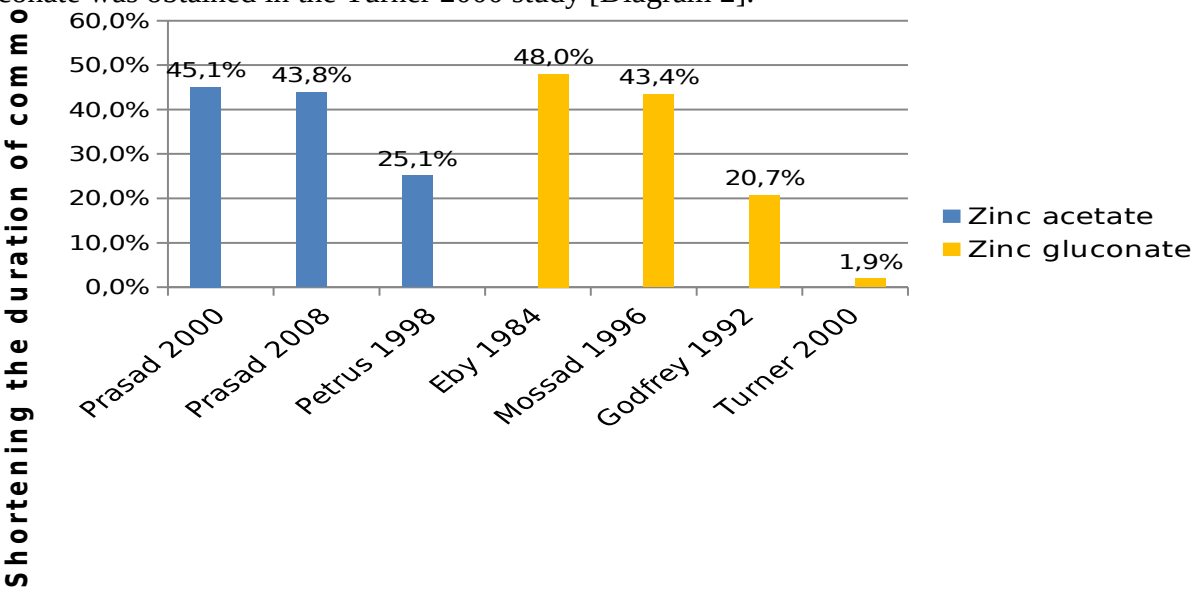

Diagram 2. The correlation between the form of zinc used and the shortening of the duration of the common cold.

The differences between the two forms of zinc are respectively 40% for zinc acetate and 28% for zinc gluconate. Excluding the extremely low result of one Turner 2000 study [Diagram 2], the effectiveness of zinc gluconate increases to 37.4% and is comparable to zinc acetate [Diagram 3].

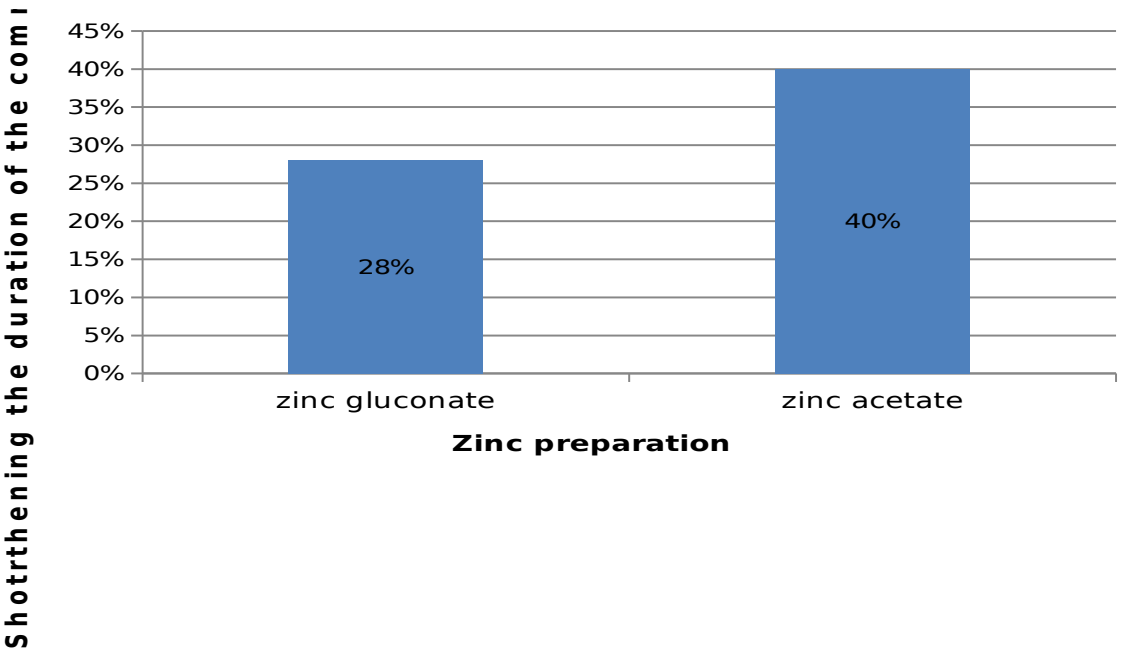

Diagram 3. The correlation between type of zinc preparation and shortening the duration of the common cold.

4. Discussion

Many factors have impact on shortening the duration of cold using zinc lozenges. That is why reasearch do not give unambiguous results.

In the foregoing analyses therapeutic effectiveness of zinc was not certified using doses <75mg per day but we cannot explicitly verify that the minimal therapeutic dose equals >75mg per day because of the possible mistakes made during the research process. In 3 studies there were used improperly prepared zinc pellets which were not able to release zinc ions. In one study used dose was 45 mg per day. In another study the reasearch group was children who might not take the medicine properly.[17]

According to George A. Eby Turner 2000 research could not prove zinc lozenges therapeutical effectiveness because tablets used in the study were not able to release zinc ions. It was due to the mistakes during industrial process - using hydrogenated palm-kernel oil and cotton-seed oil. At the high preparation temperatures these fats form waxes: oleates, stearates and palmitates, which are not able to release ion zinc in oral cavity. Paying attention to those exclusions is critical to credibility of the Turner 2000 [11] study. In other research like: Prasad 2008 [4] or Petrus 1998 [10] using proper pellets significant therapeutic effects were observed.[18]

According to Prasad 2008 [4] during infection as a result of oxidative stress NF-κB is activated which increases generation and gene expression of inflammatory cytokines (such as TNF-α, IL-1β, and IL-8) and adhesive molecules (such as VCAM-1 and ICAM-1) in cell [19,20]. Zinc reduces oxidative stress and induces zinc-dependent transcription factor A20 in monocytes and macrophages. This factor inhibits NF-κB through TNF-dependent pathway [19]. Zinc decreases oxidative stress by many more mechanisms [19,20]. One of them is inhibiting NADPH oxidase, an enzyme which initiates formation of free radicals.

Despite applying high doses of zinc lozenges through 1-2 weeks we should not be afraid of adverse effects [17]. The most common side effects were unpleasant aftertaste, bad taste and dry mouth. Rarely there were present other adverse effects like: nausea, constipation or diarrhoea. Placebo groups reported similar quantity and intensity of side effects comparing to those who actually used zinc lozenges [21].

Widely available pellets with zinc lozenges usually have too low dose of active ingredient. Moreover among the additional ingredients there are components which bind zinc ions preventing their release in oral cavity and local activity [17].

5. Conclusions

Analyzed data suggest significant zinc lozenges efficacy in case of using doses 75mg or higher per day. Doses higher than 100mg per day do not bring measurably better profits than doses 80-92 mg per day. Relevant differences in efficacy between zinc acetate and zinc gluconate were not observed, although zinc acetate proved slightly better effectiveness. The key role for therapeutic efficacy has availability of free zinc ions in oral cavity which needs to be taken into consideration during industrial process of the commercial preparations. Developing certain recommendations based on the obtained research results is difficult that is why better standarized, massive studies need to be conducted.

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