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Colostrum and acute effect on serum IGF-1 levels – A pilot study

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Abstract

Norwegian athletes were recently advised not to use cold remedies containing bovine colostrum until more information was available regarding a possible doping effect of the products' IGF-1-content. To test our hypothesis that small amounts of orally taken IGF-1 would have low bioavailability due to low absorption in the gastrointestinal (GI) tract in addition to first phase metabolism in the liver, the serum concentration of IGF-1 was measured in 14 male volunteers before and after a single intake of one of two different over-the-counter colostrum-containing tablets (CuraMed® and Colostrum®), at a dose corresponding to twice or four times the daily recommended dose of the respective remedies. There was no significant increase in serum IGF-1 in any of the participants after intake of colostrum tablets, regardless of dose. Our results give no indication that short-term use of these cold remedies at the recommended dose will cause an acute increase of serum IGF-1, and should therefore be safe to use as cold treatment by athletes.

Introduction

In many countries, a common over-the-counter remedy to prevent colds is made from first milk from cows; bovine colostrum. In addition to components supposedly beneficial for the immune system, colostrum contains different growth factors including insulin-like growth factor 1 (IGF-1). Due to uncertainty regarding a potential risk for a doping effect taking a product containing IGF-1, Norwegian athletes were recently advised not to use cold remedies containing bovine colostrum until more information was available. Though the most likely fate of an oral intake of IGF-1 would be digestion in the gastrointestinal tract, published studies show contradicting results [1-5]. This prompted us to do a small, unblinded pilot study to check whether consumption of different colostrum products available over-the-counter in

Norway, consumed in amounts meant to prevent sore throats and colds, could have an acute effect on the serum concentration of IGF-1.

Materials and Methods

14 healthy and physically active men were recruited from the Norwegian School of Sports Science. The mean age was 25 yrs (SD 5.1), mean weight 78.4 kg (SD 5.4) and mean BMI 24.2 kg/m^2 (SD 1.7). Each volunteer had a single intake of either 12 CuraMed® tablets or 12 Colostrum® tablets, corresponding to about twice and four times the recommended daily dose of the respective remedies. The study was approved by the regional ethical committee.

The study participants met fasting at 8 am for the t=0 blood sample. No nutritional supplements were taken the last 24 hrs prior to blood collection. The participants were instructed they should either chew or suck the 12 tablets, to ease absorption, in less than 15 minutes. After intake of the tablets, standard Norwegian breakfast was served. Blood samples were collected 2 and 6 hours after intake of tablets, and stored over-night at 4 ^{o}C, prior to centrifugation and immediate analysis. After centrifugation, the concentration of IGF-1 in the serum samples was measured with the Quantikine® Human IGF-1 Immunoassay from R&D Systems. The remaining serum was stored in the freezer (-20 ^{o}C), until serum concentrations of IGF-1 and insulin-like growth factor binding protein 3 (IGFBP3) were measured with respective Immulite® 2500 immunoassays from Siemens Healthcare Diagnostics. Graphing and statistic calculations were done with Prism5 (GraphPad).

Results and Discussion

The individual levels of total serum IGF-1 prior to and after intake of colostrum first milk tablets are shown in Figure 1.

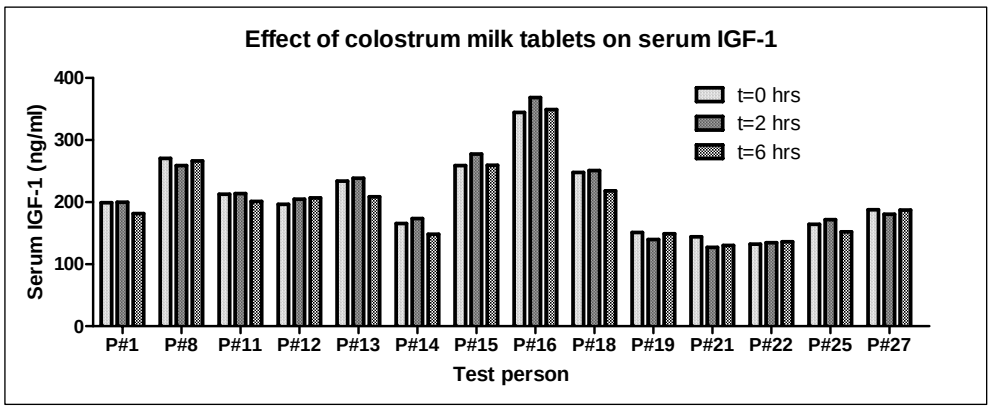

Figure 1. Individual levels of serum IGF-1. The columns display the IGF-1 levels prior to (t=0) and after intake (t=2 and 6 hrs) of milk tablets. Four persons (#8, #11, #25 and #27) were given Colostrum®; the other 10 persons were given CuraMed®. IGF-1 concentrations were determined with Quantikine® Human IGF-1 Immunoassay.

There was no significant increase in serum IGF-1 in any of the participants' samples from 2 or 6 hours after intake. This result was expected both due to the amount of colostrum consumed (Table 1) and since breakdown in the GI-tractus is a likely fate [6]. The trend for the two groups is shown in Figure 2A. The slight increase in IGF-1 at t=2 hrs for the CuraMed-group was non-significant ($p > 0.05$). At t=6 hrs the IGF-1 level had decreased for both groups. An increase in the molar ratio IGF-1/IGFBP3 has been postulated to reflect an increase in free, bioactive IGF-1 [7].

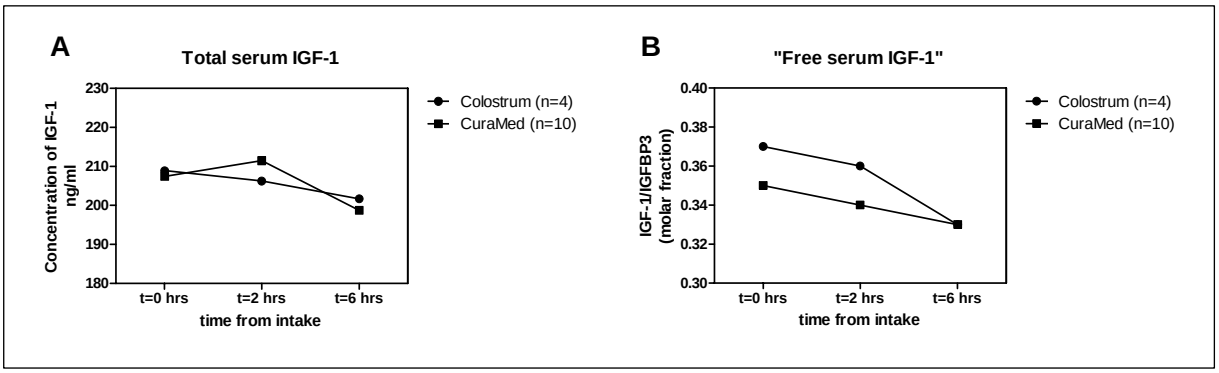

Figure 2. The difference in trend for total serum IGF-1 and "free serum IGF-1" for the two treatment groups. A) The CuraMed-group displays a transient, non-significant increase in serum IGF-1 level 2hrs after intake of tablets. Both groups display a decrease in serum IGF-1 level after 6 hours. The displayed results were determined with Immulite® 2500 Immunoassay. **B)** The molar ratio IGF-1/IGFBP3 is used as an estimate for free, bioactive IGF-1 in serum [7]. Both groups display a decrease in molar ratio at 2 and 6 hours after intake. Roughly 75 % of drugs given perorally will be absorbed from the GI-tractus the first 1-3 hrs after consumption [6], and free serum IGF-1 has a half life of less than 10 minutes [8].

There was a slight decrease rather than an increase in molar ratio for both groups from t=0 to t=6 hrs (Figure 2B). The decrease in both total IGF-1 and IGF-1/IGFBP3 ratio could be due to an increase in insulin levels after breakfast and a subsequent decrease in plasma IGF-1 [9], as all participants were fasting at t=0. The total trend for the IGF-1 levels from the two different immunoassays in addition to the results for IGFBP3, are shown in Figure 3.

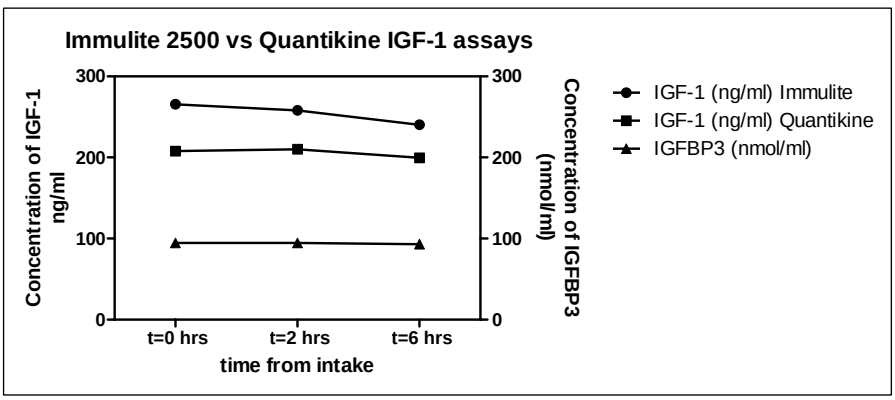

Figure 3. Trend (for all subjects) for the concentration (ng/ml) of IGF-1 in serum measured either manually (Quantikine) or with an automated immunoassay (Immulite). Trend for the concentration of IGFBP3 (nmol/ml) is also shown.

Previous studies [2-6] have been set up entirely different from ours (4-8 weeks of daily intake of 60 g colostrum), with varying results in regard to effect on serum IGF-1 levels. We wanted to check for an acute effect on serum IGF-1 of lower doses of colostrum (Table 1), after a single intake corresponding to 2-4 times the recommended daily dose of first milk tablets in cold-treatment, and not the long-term effect of large quantities of special colostrum supplements available e.g. on the internet.

Table 1: Amount of colostrum and IGF-1 in two different cold-remedy products

	CuraMed®		Colostrum®	
	1 tablet	12 tablets	1 tablet	12 tablets
Bovine colostrum (mg)*	58	696	200	2400
IGF-1 (ng)**	31	372	149	1788
*according to manufacturer; **as measured with Quantikine® Human IGF-1 Immunoassay				

Conclusion

The results from this pilot study give no indication that normal, short-term use of first milk tablets as cold prevention or -treatment will increase serum IGF-1 levels.

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