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SHORT COMMUNICATION

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Concentrated bovine colostrum protein supplementation reduces the incidence of self-reported symptoms of upper respiratory tract infection in adult males

Summary *Background* Anecdotal reports suggest that bovine colostrum may prevent upper respiratory tract infection (URTI). There is scant evidence to support such claims, although salivary IgA protects against URTI, and it was recently shown that bovine colostrum increases salivary IgA. *Aim of the study* The present investigation examined whether concentrated bovine colostrum protein (CBC) affected the incidence or duration of self-reported symptoms of URTI in adult males. *Methods* We examined logbooks containing self-reported symptoms of illness from previous studies which examined physiological effects of CBC. In these double-blind, placebo controlled studies, subjects had been randomly allocated to consume 60 g · day^{-1} of CBC (n = 93) or whey protein (WP) (n = 81) for eight weeks. Symptoms were coded using established criteria to identify those related to URTI. Since the incubation period for an URTI is up to five days, symptoms reported during the first week of supplementation (PRE-EXP) were analysed separately to preclude those arising from infection prior to study commencement. *Results* During PRE-EXP, there was no difference in the proportion of subjects taking the different supplements who reported symptoms of URTI (CBC, 11 %, WP, 5 %; 95 % Confidence Interval (95 % CI) –14 % to 2 %; P = 0.16). During the subsequent seven weeks (i. e. the experimental period), a significantly lesser proportion of subjects taking CBC reported symptoms of URTI compared with those taking WP (CBC, 32 %, WP, 48 %, P = 0.03; 95 % CI –30 % to –2 %), but symptom duration did not differ (CBC, 6.8 ± 4.2 days, WP, 6.0 ± 4.4 days; P = 0.27). *Conclusion* This study provides preliminary evidence that CBC may enhance resistance to the development of symptoms of URTI.

Key words URTI – prophylactic agent – neutraceutical – common cold

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Introduction

Bovine colostrum is the first milk secreted by cows after parturition and is a rich source of immunoglobulins (Igs) and other antimicrobial factors, including lactoferrin, lysozyme and lactoperoxidase [1–3]. The importance of colostrum for the survival and health of newborn calves has been long recognised since, due to limited *in utero* antibody transfer during foetal life [4, 5], calves are born in a hypogamma-globulinaemic state [2, 5, 6]. Therefore, the ingestion and absorption of colostral Igs is essential for the provision of passive immunity in these animals [2].

The role of colostrum in providing passive immunity in calves led to interest developing in the potential for bovine colostrum to prevent infection and illness in humans. Hyperimmune forms of colostrum obtained from cows vaccinated against particular pathogens [7–10], as well as specific preparations of bovine colostrum Ig concentrate [11–15], have been used to successfully prevent and treat enteric infections in the gastrointestinal tract of humans. However, much of the interest and support for the use of non-hyperimmune bovine colostrum as a

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prophylactic agent to protect against the development of upper respiratory tract infection (URTI), has been established from testimonials, anecdotal reports and the marketing efforts of supplement manufacturers and distributors [16, 17], since there is limited scientific evidence to support such claims.

IgA is the major Ig found in mucosal secretions, which constitute the first barrier to the entry of pathogens into the body. Consequently, the level of secretory IgA contained in mucosal fluids has been shown to correlate highly with resistance to certain infections caused by viruses, such as URTI [18, 19]. A recent study reported that bovine colostrum increases salivary IgA (sIgA) concentrations after 2 weeks of supplementation [20]. Therefore, it is possible that an increase in sIgA resulting from bovine colostrum supplementation may protect against the development of URTI. However, to date, no studies have specifically investigated whether bovine colostrum is effective in preventing URTI.

The aim of this study was to determine whether supplementation with concentrated bovine colostrum protein (CBC) had any effect on the incidence and/or duration of self-reported symptoms of URTI in otherwise healthy young adult men.

Subjects and methods

The data for this study were obtained by retrospectively examining illness logbooks from a number of previous studies, which had investigated various physiological effects of supplementation with CBC [21–23]. Data from a recent study, which has yet to be submitted for publication, were also included in the present analysis. The data for all of these studies were collected between March 1997 and October 2000 using subjects who resided in the metropolitan area of Adelaide, South Australia and who had been recruited by posted advertisement. Prior to the commencement of each study, all aspects of the protocol were explained before subjects completed a medical-screening questionnaire [24]. Subjects who were not 18–35 year old males, not physically active, or who had any known chronic or serious illness (cardiovascular, respiratory or metabolic disease), were lactose intolerant, cows milk protein intolerant, or who had taken any colostrum products during the three months prior to study commencement, were excluded from enrolment. All subjects were free of URTI on entry into the study. The protocols for each study, including the procedures for taking the supplements and recording symptoms of illness, were carefully explained to each subject by research staff of the University of South Australia before written informed consent was obtained, and subjects were enrolled into the study. All of the experimental procedures undertaken were approved by the Human Research Ethics Committee of the University of South Australia. Only the data from subjects who completed the entire course of supplementation were used for the present analysis.

Each study used a double-blind, placebo controlled, randomised, parallel design, and subjects consumed $60\,g \cdot day^{-1}$ of either CBC powder (intact™, Numico Research Australia Pty Ltd, Adelaide, Australia), or concentrated whey protein powder (WP; Alacen, New Zealand Milk Products Australia, Rowville, Australia), for eight weeks. Subjects were randomly allocated to the consumption of a particular supplement by research staff of the University of South Australia providing them with a numbered box which contained pre-weighed 20 g sachets of the appropriate supplement, with enough sachets for the entire eight weeks of each protocol. The numbering of the boxes was, in all cases, carried out by staff of Numico Research Australia Pty. Ltd., with each box numbered in accordance with a sequence generated using a random number table [25]. This numerical sequence was concealed from the investigators and subjects (i. e. double-blind) until all of the data for each study had been collected, entered into a database and checked for data entry errors by staff of Numico Research Australia Pty. Ltd. Subjects consumed the contents of one 20 g sachet of supplement with their morning meal, and two sachets with their evening meal by mixing the contents of each sachet with 85 ml of warm water and 40 ml of milk, shaking it vigorously, and then chilling before drinking. The taste and colour of the two supplements were indistinguishable.

For the duration of the supplementation periods, logbooks were kept daily in which subjects recorded the presence of any symptoms of illness. At the end of the supplementation period, these symptoms were coded using established criteria developed by the Centres for Disease Control [26–28]. The coded symptoms included: 1) no symptoms today; 2) cold symptoms (runny, stuffy nose, sore throat, coughing, sneezing, coloured discharge); 3) flu symptoms (fever, headache, general aches and pains, fatigue and weakness, chest discomfort, cough); 4) nausea, vomiting, and/or diarrhoea; 5) muscle, joint or bone problems/injury; 6) allergy (itchy eyes, stuffy nose, clear discharge); 7) other health problems. Using this coding system an URTI was defined as having occurred when symptoms coding for a cold or flu were reported on two or more consecutive days. An episode was considered to be a new URTI if it was separated from a previous URTI by at least 3 days without any respiratory symptoms. Episodes that coded for other than cold or flu symptoms were not considered to be an URTI and were not included in the analysis.

Given that there is a typical incubation period of up to 5 days for an URTI [29, 30], and that symptoms had to be present for at least two consecutive days for an episode to be defined as an URTI, symptoms reported during the first seven days of the study (i. e. the pre-ex-

perimental period; PRE-EXP) were analysed separately from those which occurred during Weeks 2 to 8 (i. e., the 7 week experimental period; EXP) to preclude symptoms arising from infection prior to study commencement.

The percentage of subjects taking each supplement that reported symptoms coding for URTI were compared using the test for the Difference Between Two Proportions. All other group means were compared using the Mann-Whitney U test. Statistical significance was set at an α level of $P < 0.05$. The magnitude and precision of effects are reported as 95 % Confidence Intervals (95 % CI) where appropriate. All values cited represent means ± standard deviations.

Results

One hundred and seventy four healthy, physically active, adult males comprised the sample for this study. During the supplementation period, 93 subjects consumed CBC, while 81 consumed WP. There was no significant difference in age, body mass or height between the subjects taking the different supplements (Table 1).

During PRE-EXP, there was no significant difference in the proportion of subjects taking the different supplements who reported symptoms of URTI (CBC 10/93, 11 %, WP 4/81, 5 %; P = 0.16; 95 % CI –14 % to 2 %). During EXP, a significantly lesser proportion of subjects taking CBC reported symptoms of URTI compared with those taking WP (Fig. 1), with 32 % (30/93) of subjects taking CBC reporting at least one episode of URTI, compared with 48 % (39/81) who were taking WP (P = 0.03; 95 % CI –30 to –2 %). Of those subjects who reported symptoms of URTI during EXP, those taking CBC experienced 1.2 ± 0.4 episodes of URTI, which was not significantly different from the 1.1 ± 0.3 episodes experienced by those subjects taking WP (P = 0.60). Once an episode of URTI had occurred, there was no difference in the duration for which symptoms persisted between subjects taking the different supplements, such that the average number of symptom days per episode was 6.8 ± 4.2 days in CBC and 6.0 ± 4.4 days in WP (P = 0.27).

In one of the previous studies from which the current data were obtained [22], four subjects (two taking CBC, and two taking WP), were withdrawn because severe URTI prevented them from completing the protocol requirements, including the consumption of the appropriate supplements. The two subjects taking WP were withdrawn after 34 and 40 days of supplementation, while those taking CBC were both withdrawn after 28 days. The data for these subjects were not included in the present analysis. However, even if these subjects had been included in the present analysis, it would not alter our findings. There would still have been no difference in the proportion of subjects taking the different sup-

Table 1 Subject characteristics

Characteristic	Concentrated bovine colostrum protein (n = 93)	Concentrated whey protein (n = 81)
Age (years)	23.7 ± 4.5	24.9 ± 4.9
Height (cm)	178.0 ± 12.8	176.7 ± 16.8
Mass (kg)	78.5 ± 13.7	81.4 ± 19.8

Values are means ± SD

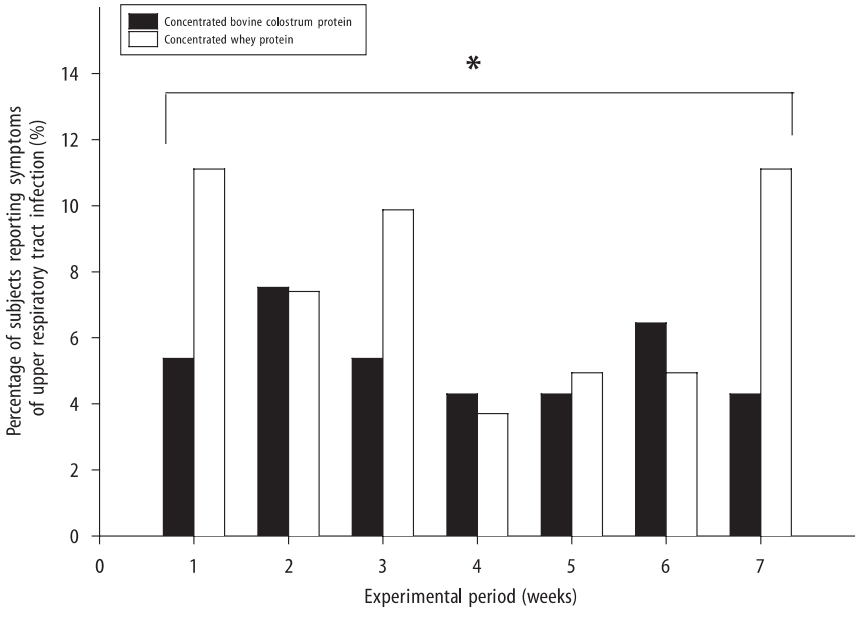

Fig. 1 Incidence of URTI during a 7 week experimental period of supplementation with concentrated bovine colostrum protein powder (n = 93) or a concentrated whey protein powder placebo (n = 81). * P = 0.03 concentrated bovine colostrum protein significantly lower than concentrated whey protein overall

plements who reported symptoms of URTI during PRE-EXP (CBC 10/95, 11 %, WP 5/83, 6 %; P = 0.28; 95 % CI –3 % to 13 %), and a significantly lower proportion of subjects who took CBC would still have reported symptoms of URTI during EXP compared with those who took WP (CBC, 32/95, 34 %; WP 41/83, 49 %; P = 0.04; 95 % CI –29 % to –0.06 %).

Discussion

The major finding of this study was that a significantly lesser proportion of subjects taking CBC reported symptoms of URTI, compared with those taking WP. This provides preliminary evidence that CBC may enhance resistance to the development of symptoms of URTI in young adult males. Although it may provide a prophylactic effect against the development of URTI, CBC appeared to have no effect on the duration of symptoms once they had developed, indicating that it is unlikely to be useful as a therapeutic treatment for URTI once infection has occurred.

The mechanism by which CBC increased resistance to the development of symptoms of URTI is not clear from the present data. However, previous studies have shown that there is a direct relationship between sIgA levels and resistance to URTI [18, 19], such that higher sIgA levels reduce the incidence of URTI and *vice versa*. Mero et al. [20] recently reported that sIgA concentrations are increased after 2 weeks of bovine colostrum supplementation. Therefore, it is possible that the reduced incidence of self-reported symptoms of URTI in subjects taking CBC in the present study may have been due to a colostrum-induced increase in sIgA. Further research should attempt to substantiate this hypothesis.

Although the present findings are based upon self-reported symptoms, and should therefore be considered only preliminary in nature, it appears that CBC may protect against the development of URTI. Future studies should attempt to confirm this finding in both males and females, and should also measure markers of immune function in order to identify the mechanism by which this supplement elicits this effect.

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The investigators declare there are no conflicts of interest regarding this work.

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