STUDY I
INCREASED IMMUNE READINESS
(College Students were used in this study)

⇒ The two graphs show the antibody values which are considered very important. This places the body in an acute state of readiness when colds, flus, or other infections come about.
⇒ The lozenges were only taken for the first two weeks of the test—the blue and red bars. Not on both graphs, the one-a-day and the one twice-a-day increase in antibody volume is substantial; however, the one twice-a-day is much greater.
⇒ An important part of this shows that there is a residual benefit for another two weeks after discontinuing the lozenges (represented by the yellow and green bars).
⇒ This percent increase in the acute state of readiness is awesome. Science knows that in certain immune enhancing proteins small amounts stimulate immune readiness and in large amounts of suppressing. It is vital to know the amount to use.

ONE Colostrum Lozenge Per Day

Supplemental Pd. - 1st Week after Baseline of -0-
Supplemental Pd. - 2nd Week after Baseline of -0-
Supplemental Pd. - 3rd Week after Baseline of -0-
Supplemental Pd. - 4th Week after Baseline of -0-
Colostrum Lozenges

A bar chart showing the percentage of IgG, IgA, and IgM over different weeks:

- **Supplemental Pd. - 1st Week after Baseline of -0-**
- **Supplemental Pd. - 2nd Week after Baseline of -0-**
- **Supplemental Pd. - 3rd Week after Baseline of -0-**
- **Supplemental Pd. - 4th Week after Baseline of -0-**

CD4 and CD8 are other values of measuring immune readiness.

**Colostrum Lozenges**

*Usually here are more lymphocytes bearing CD8 than T-cells bearing CD4 in normal individuals. An increase in CD4 to CD8 ratios indicates heightened immune function, while a decrease in ratios is indicative of the presence of disease.*
This set of graphs demonstrates the immune response readiness of CD4 to CD8, with the CD4 being the most important in this set of graphs. It measures the white cell activity and readiness. These are extremely large increases.

Note the continual readiness of CD4 lymphocytes two weeks after the lozenges were discontinued (yellow and green bars).

### CD4 Lymphocyte Markers

![CD4 Lymphocyte Markers](image)

- **Supplemental Pd. - 1st Week after Basement of -0-**
- **Supplemental Pd. - 2nd Week after Basement of -0-**
- **Supplemental Pd. - 3rd Week after Basement of -0-**
- **Supplemental Pd. - 4th Week after Basement of -0-**

### CD8 Lymphocyte Markers

![CD8 Lymphocyte Markers](image)

- **Supplemental Pd. - 1st Week after Basement of -0-**
- **Supplemental Pd. - 2nd Week after Basement of -0-**
- **Supplemental Pd. - 3rd Week after Basement of -0-**
- **Supplemental Pd. - 4th Week after Basement of -0-**
Comments on 4 Graphs:

1. This same response was reported by three other universities researching these products.
2. Not all suppliers have the same quality
3. Immuno-Dynamics provides the only unaltered and first milking colostrum products available.
4. The lozenges were 200 mg each. Dosing studies indicate there is enough in each lozenge to produce the chemical energy responses needed at one time.
5. By taking one lozenge twice a day there is a considerable increase in immune stimulation. The need to increase frequency of consumption depends upon activity as well as the amount of body overload or dysfunction.
   - For a rather sedentary life style, one lozenge each day is sufficient-usually take at night as this is when the body regenerates itself.
   - More active lifestyles-one in the morning or before exertion, such as exercise, and one in the evening before bed.
   - Still more active lifestyle – take one at a time three or four times a day.
   - One at a time is enough to product the body’s response that starts the normalizing and regulating process.
6. The cells lining our mouth are so designed with thousands of electrical chemical receptors to receive stimuli from what is put in our mouth, and transmits these signals to other parts of our body.
7. Lozenges and the liquid whey are the most effective way to take colostrum products.
Bovine Colostrum: its dietary supplementation role in improvement and modulation of human immune indices

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Abstract

Oral ingestion of bovine colostrum lozenges student subjects has been shown to be effective in improvement and modulation of humoral and cell-mediated immune indices during the feeding (two weeks) and post-feeding (two weeks) duration’s. Both of circulate serum immunoglobulins IgG, IgM and IgA as a some parameters of humoral immunity and T-lymphocytes CD4 and CD8 as a some parameters of cell-mediated immunity in all of examined human subjects has been significantly influenced by oral supplementation by bovine colostrum lozenges. There was a direct positive correlation between the daily-received colostrum dose and the observed influence on the titters of measured immunity indices. A daily dose of 400 mg bovine colostrum supplementation has more improvement and increase effects on estimated parameters rather than 200 mg daily dose which indicate that the improvement and modulation roles of bovine colostrum supplementation on immunity status was carried out through a dose - dependant fashion. All of the student cases of this study were having a low to moderate levels of all measured immunity indices which improved and modulated significantly as a result of daily consumption of bovine colostrum supplement. Our finding suggest the possible incorporation of bovine colostrum as a dietary supplement in production of bovine colostrum – containing food products (super immune foods) to provide an immunity enhancement and modulation specially for human classes whose suffered from shortage or auto -immune diseases and in infant formulas to offer them both clinical and nutritional benefits of this miracle natural food.

Key words: bovine colostrum; supplementation; human immunity.

Introduction

Bovine colostrum is first milk secreted during the first few days after calving (Campbell & Petersen 1963; Brambell 1969; and Butler 1974). It has been
historically concepted that bovine colostrum could be served as a human healthy food due to a lot of its nutritional and clinical importance (Lascelles 1963; Lamm et al.; 1978, Butler 1986, Larson 1992 and Quigley & Drewry 1998). It has long been recognized that breast colostrum feeding could offer a pronounced enhancement of passive immunity for humans primarily via transfer of lacteal specific and non-specific antibodies directly to the infants (Reddy et al.; 1988, Davidson 1996, and Korhonen 1998). Regular consumption of bovine colostrum has been reported as a protective role for infantile gastrointestinal immunity due to its direct effect on promoting and development of infantile gut-associated lymphoid tissues which responsible mainly for pronouncing the infantile gut immunity (Carbonare et al.; 1997, Kelly & Coutts 2000 and Korhonen et al.; 2000).

Bovine colostrum contains not only a detectable levels of immunoglobulins as far much higher (several hundred – fold) rather than the ordinary bovine milk (Butler 1994 and Korhonen et al.; 1995); but also contain a series of physiologically bioactive constituents like as growth promoting factors that acts as a mediators of infantile growth and development (Reiter 1978; Donovan & Odle 1994 and Merro et al.; 1997) in addition to a series of antimicrobial fractions including lactoferrin; prostglandin; lactoperoxidase and lysozymes (Sánchez et al.; 1992, Levay & Viljion 1995; Lonnerdol & Lyer 1995 and Antonuis et al.; 2000).

The studies of Nord et al. (1990); Mitra et al.; (1995) and Warmy et al.; (1999) indicated the possible therapeutic and providing roles of orally ingested bovine colostrum in infants against many of bacterial and viral gastrointestinal infectious diseases until their own immunity system develop and mature.

This work was aimed to assess the possible supplementation role of bovine colostrum as lozenges of 200 and 400 mgm daily doses in 40 student cases on the improvement and modulation of general systemic immunity status of studied cases.

**Material and Methods**

1- **Subjects:** 40 healthy female students volunteers aged 17.5 to 19.4 years of Home Economics Faculty; Minufiya University were selected for this work. All of the subject cases are non smokers; without any historical serious diseases background and does not received any kind of therapeutic drugs or any other
forms of food supplements during the course of this study (4 weeks) and at least six months before the work. All of the student subjects have received a full information about the research protocol before participation with their approval and agreement of the Ethics Committee of the Faculty authorities.

2- **Protocol:** Study subjects 40 students were divided into two regular groups (20 per each) A and B. group “A” were received 200 mg bovine colostrum lozenge daily. Whereas; group “B” were received two lozenges i. e. 400 mg daily. The feeding duration was two successive weeks through a manner of daily ingestion of lozenges. The work duration was successive four weeks which divided into the following intervals:

A- Pre-feeding (zero time): it is the day of starting colostrum receives.

B- Feeding duration: it is the early 1st and 2nd weeks of colostrum supplementation.

C- Post-feeding duration: it is the 3rd and 4th weeks after basal time. There is colostrum supplementation.

3- **Bovine colostrum:** it was supplied as free of charge gift from Immuno Dynamic Inc.; P.O. Box 544 Perry. Iowa 50220 – USA. It is supplied in form of chewable lozenges (100 lozenges per vial). According to the indication label; this colostrum was harvested from selected grade A American dairies within the first six hours of calving. It certified as free from all forms of pathogens; drugs; heavy metals and pesticides. It is widely available in the pharmaceutical markets as a natural food supplements not as a drug.

4- **Blood sampling:** 5 blood samples (5 ml each) were taken from each student at each of the following intervals: basal time (immediately before receiving the first dose of bovine colostrum lozenges); at the end of 1st and 2nd weeks of successive oral colostrum supplementation (feeding duration) and at the end of 3rd and 4th weeks from the basal time (post -feeding duration). Blood samples were taken from antecubital vein of right arm in EDTA-containing glass tube and centrifuged (5000 rpm for 10 minutes) immediately to get serum, which stored in plastic Eppendorf tube in deep freezer till the time of inspection.

5- **Serum analysis:** obtained serum samples at each interval for each student case were inspected for immunoglobulins IgG; IgM and IgA by the use the described techniques Endoplate Single Radial Immunodifussion (RID) (Nerenberg & Prasad 1975) test kits. Whereas; T lymphocytes CD4 and CD8 were estimated by direct follow cytometric Immunoflourescence Specific Staining kit methods (Sabin et al.; 1994 and Vigali & Strominger 1994). The kits were supplied by Cymbus Biotechnology Ltd.; for design & Development and Production of Immunological Reagents- UK. All of used kits were purchased from Clini Lab Office; Maadi - Cairo (a local agent of Bechman Coulter Inc.; for Diagnostic kits and Reagent – USA).
6- **Statistical analysis:** all of our obtained results were treated by Student’s paired two-tailed t-test via Multivariate Analysis of Variance (MANOVA) to produce F-statistic to detect the presence of a significant difference within the treatments. The level of significance was set at P< 0.05 (Statograph Program 1987).

**Results and Discussion**

Data presented in tables and figures (1, 2 and 3) show the responses of estimated serum IgG, IgM and IgA titers as affected by daily intake of bovine colostrum lozenges for two student groups. It could be observed that there was a significant increase in estimated titer which dependent on the receiving dose. Student group who received daily dose of 400 mg of bovine colostrum had a significantly higher levels (P < 0.05) of estimated immunoglobulins more than the other studied group who received a daily dose of 200 mg of bovine colostrum. During the 3rd and 4th weeks (post-supplementation period) that after completely stopping of daily receive of bovine colostrum lozenges, there was no significant difference (P> 0.05) in detected increase in all estimated immunoglobulin classes.

In respect of estimated lymphocytes groups (CD4 and CD8) as shown in tables and figures (4 and 5); also the level of bovine colostrum 400 mg was the most significant (P< 0.05) and potent effective dose which lead to increase the level of estimated lymphocyte classes. There was a continuos increase in estimated level of CD4 class till the end of the fourth week of this study (post-feeding). Whereas; CD8 class was undergo a gradual decline at the fourth week in case of student groups who received daily dose of bovine colostrum as 400 mg.

The most important finding of this work was that incidence of significant increase and improvement of all examined immunity parameters as affected by daily oral ingestion of supplementary bovine colostrum in the form of lozenges. Our estimated immunity parameters and indices have previously been shown to be associated with various effective functions of human immune system and general systemic body defense reactions (Petty & Todd 1993; Taylor et al.; 1994 and Sutterwala et al.; 1996). The observed increase in all investigated parameters was carried out in a dose –dependant linear manner with a significant correlation with the received daily dose of bovine colostrum. This finding is highly agree with that reported by Castrucci et al.; (1988), Tsunemitsu et al.; (1989) and Schller et al.; (1992), whose stated that oral ingestion of bovine colostrum could provide a significant protection for humans against viral gastrointestinal infections in animal models through a dose dependant – manner due to its high contents of immunoglobulins which present naturally in abundance level in addition to other natural antiviral constituents. In addition; Isaacson et al.; (1980), Snodgrass et al.; (1982) and Moon & Bunn (1993) reported also about the same attitude but in case of acute gastrointestinal infections caused by enterotoxigenic Escherichia coli that could be removed completely with elimination of all the infection signs by regular consumption of bovine colostrum through a dose – dependant manner with a significant support of general human immunity.
The observed significant increase in serum immunoglobulins as direct benefits of bovine colostrum consumption could be refereed primarily to the high content of immunoglobulins present naturally in bovine colostrum, which ingested and represents an immunoglobulins exogenous feeding. Stephan et al.; (1990) and Zaremba et al.; (1993) concluded that most of bovine colostrum immunoglobulins and other biologically active constituents has the ability to withstand most of human gastric proteolytic enzymatic actions and therefore could be absorbed very effectively from intestine into blood stream to work as an exogenous non-specific ones and parallel with the human native immunoglobulins which of course lead to a detectable increase in the serum level of immunoglobulins. This finding suggest that part of the detected increases of serum immunoglobulins as affected by oral consumption of bovine colostrum are derived from consumed bovine colostrum.

Due to the high ability of IgG to resist all of acidic nature and gastric degradation of stomach enzymes more than other classes of immunoglobulins (Zinkernagal et al.; 1972, Goldmann 1993, Ross et al.; 1995, Kelly et al.; 1997 and Korhonen et al.; 2000), it could be explain why this class of estimated immunoglobulins was the most predominant and significantly increased due to colostrum supplementation.

On the other; the significant increase in serum immunoglobulins titer as affected by ingestion of bovine colostrum is that some of ingested bovine colostrum constituents could be digested into a biologically active fractions which acts as immunogens that promote the self human immunity system to produce and release its own native immunoglobulins. This finding is highly supported with that mentioned by Butler 1994 and Korhonen et al.; (1995) and (1998), whose stated and explained that most of digested bovine colostrum acts as a reactors to the immunity system and promote the releasing of self defense host immunoglobulins. Also; Lefranc – Millot et al.; (1996) added that most of colostrum proteins has a lot of biological benefits for humans not only to give nourishment to the offspring but also to provide an immune protection through the stimulation of releasing the reactive immunoglobulins which present an primary barrier in humoral immune defense.

Transferring Growth Factor-B (TGF-B) which abundant naturally in bovine colostrum could serves actively in activation and stimulation of B lymphocytes to produce immunoglobulins specially IgG and IgA in addition to enhancement of transporting of polymeric IgA into intestinal lumen and therefore activate the immune responses of both intestine and other mucous membranes against pathogens and other environmental pollutants (Brown 1978 and McGee et al.; 1991). This finding support our suggestion about the possible role of active constituents present naturally and abundance in bovine colostrum could stimulate not only B-lymphocytes to produce and release immunoglobulins but also initiate and activate also T- lymphocytes to produce and releases CD4 and CD8 as a members of T lymphocytes which involved mainly in cell-mediated immune mechanism in human (Leszek et al.; 1999).
This work was summarize the clinical and nutritional role of bovine colostrum supplementation in human that serve effectively as health – promoting functional food due to its high effect in enhancement; modulation and improvement of general immunity of human through increase of the titer of immunity keys as immunoglobulins and lymphocytes in addition to its high contents of antimicrobial factors beside immunoglobulins and other complementary proteins (IDF. 1991 and Mee & Mhra 1995), therefore it is offering a potential protection against infectious pathogens in addition to providing a lot of nutritional; growth – promoting services (Brock et al.; 1978 and Akita & Chan 1998).

This work suggest and recommend also that it is of the nutritional benefits to focus on the production of wide ranges of bovine colostrum – containing or based foods to serve potentially in providing a support and enhancement for the immunity system specially for the infants and human categories and classes whose suffered from immunity diseases and shortage. It is highly suggested also to incorporate some of bovine colostrum biologically active constituents into the human foods to offer a lot of physiological benefits because many of colostrum proteins has a pronounced health and clinical benefits for human health and growth (Nord et al.; 1990, Rump et al.; 1992, Plettenberg et al.; 1993, swart 1998 and Ng et al.; 2001).

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