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Review

Colostramin capsules: A Natural Support helps to promote healthy intestinal Flora & normal functioning of Gastrointestinal tract.

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Abstract

Colostrum because of its versatile composition it can be used in variety of diseases. It has properties to stimulate immune system and also contains hormones, growth factors and other bioactive components required for the body to combat with various diseases. It has been used for various respiratory tract infections, gastrointestinal disorders and rheumatoid arthritis. The medical importance of Colostrum has been described in ancient ayurveda. In US Colostrum was in use for its antibacterial activity before the discovery of antibiotics 5. Colostrum upon contact with stomach acid inhabits and kill *campylobacter, candida, E.coli, colostridium, helicobacter pylori, rotavirus, salmonella, shigella and streptococcus*. Colostrum is effective in leaky gut, irritable bowel syndrome, colitis, ulcers, chronic fatigue, diabetes, autoimmunity, arthritis, lupus and cancers, improves intestinal assimilation of nutrients, inhibits protein breakdown, shifts energy source from carbohydrate to fat, spur glucose transport in muscles. It is now well established fact that ingestion of Colostrum promotes nutritional, functional and biological activities. This article reviews the current available scientific literature regarding the effect of Colostramin capsules as a effective supplementation for daily energy needs in enhancing immune response.

Keywords: Colostram, Clostridium, irritable bowel syndrome,

INTRODUCTION

Colostrum is the premilk provided by mammal mothers to their newborns. Colostrum is the first milk produced by mammals for their young ones. This transfers the passive immunity gained by the mother to the baby. Colostrum is low in volume but high in nutritional value. The Colostrum is a mixture of carbohydrate, protein, growth factors, blood cells and immunoglobulins. It is yellow, thick and sticky in nature. The bovine Colostrum has therapeutic potential to the human being as it contains near about 90 useful components.

Colostrum is a form of milk produced by the mammary glands in late pregnancy and continues through the early few days of breast feeding. It is thick in consistency, yellowish to orange in colour and sticky in nature.

1. The volume of Colostrum produced per day is very less but its nutritional value is high for the newborn. It is low in fat but high in carbohydrate, protein and antibodies which keep the baby healthy. Colostrum can

be defined as the milk produced in the first 48 hours after delivery which is rich in nutritional value. It contains immunoglobulins, antimicrobial peptides and other bioactive molecules including growth factors. Colostrum plays an important role in the nutrition, growth and development and also contributes to the immunologic defense of neonates.

2. Primarily Colostrum exerts its laxative action for encouraging the evacuation of meconium (Baby's first stool). This clears the excessive bilirubin to prevent jaundice. The immunoglobulin A (Ig A) or antibodies helps to protect the mucus membrane of throat, lungs and intestine of the infant. The white blood cells or leukocytes protect the infant from viral and bacterial infections.
3. Colostrum is natural and 100 percent safe vaccine. Many scientific studies have beenreported on the nutritional and therapeutic importance of Colostrum (bovine or human). The Colostrum should not only be considered as nutrient but also an agent providing protection to newborn against new environment [1-4].

Colostrumis thick yellow mammary secretion and lasts for 2-4 days after the lactation has started. The scientific literature reveals that Bovine Colostrum contains around 90 useful components; few of them are presented in Fig. 1.

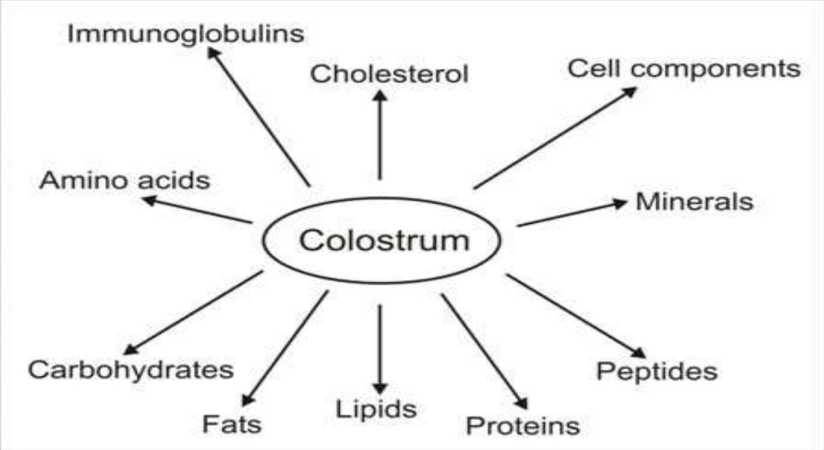


Fig 1: Bovine Colostrum contains around some of useful components

The main two components are immune factors and growth factors. It also contains vitamins, minerals, amino acids, proteins, fats and carbohydrates [5]**.** Colostrum is the specific first diet of mammalianneonates. Bovine Colostrumultrafiltrate contains-1.16g/L protein, 0.24g/L immunoglobulin G(IgG) and less than 0.24 EU/ml endotoxin [6].

a) Proteins and peptides

Many amino acids, proteins, enzymes and peptides are present in human Colostrum and milk which plays variety of roles to keep the neonate healthy. The enzymes are αamylase, lactoperoxidase, protease and vitamin binding protein etc.

Casein

Casein in human milk appears to be present almost exclusively in micellar form. Casein is not a single entity but is a group of protein subunits, associated and linked together, with organic and inorganic ions into micelles.

Lactoferrin

Lactoferrin, a redcolored Ironbinding protein in human milk, was first isolated by Johansson [7]. Lactoferrin (LF), also known as lactotransferrin (LTF), is a globularmultifunctional protein with antimicrobial activity (bacteriocide, fungicide) and is part of the innate defense. It is a glycoprotein present at a concentration of ~7g/L in human Colostrum [8].

Lactoferrin facilitate iron absorption, act as an antimicrobial agent and stimulate growth ofvarious cells [9]. Lactoferrin binds the iron and makes it unavailable to *E.coli*in the intestine and inhibits bacterial growth [10].

Growth factors

Colostrum contains many hormones like prolactin, somatostatin, oxytocin, leutinizing hormone releasing hormone, thyroid stimulating hormone, thyroxine, calcitonin, estrogen and progesterone. These hormones influence thyroid gland, hypothalamus, sexual gland, adrenal and pancreatic gland [11].

Growth hormone (GH) and growth hormone releasing factor (GHRF)

GH and GHRF arepresent in human Colostrum and bovine Colostrum.Human Colostrum contains ~ 41ng/L of GHRF [12]. Suckling neonates have high circulating concentration of GH [13]. GH many have direct mitogenic effect [14]. Peptides growth factors are

Present in Colostrum which can regulate or modulate intestinal growth and development. Nonpeptide trophic factors viz glutamine, polyamines and nucleotides present in colostrum plays an important role in developing and maintaining GI mucosal mass and modulating immune system [2].

Epidermal growth factor (EGF)

It is a 53- amino acid peptide present in human Colostrum.

Its concentration in human Colostrum is 200µg/L [15].

Transforming growth factor (TGF) α

It is a 50 amino acid molecule present in human Colostrum at much lower concentration 2.2- 7.2µg/L [16]. TGF- α stimulates gastrointestinal growth and repair, inhibit acid secretion, stimulates mucosal repairing after injury and increases gastric mucin concentration [17].

Transforming growth factor (TGF) β

Human milk contained latent, but not free, TGF-beta 1, and especially TGF-beta 2, both of which may be activated by gastric acid pH [18]. It is structurally distinct from TGF-α and has many diverse functions. In bovine Colostrum TGF-β is present in very high concentration (20-40mg/L)1. It is a key component in mediating its ability to maintain GI integrity in sucklingneonates [19].

Insulin like growth factors (IGF)

IGF is also known as somatomedins. Two types of IGF are found in Colostrum viz. IGF-I and IGF-II. Both have similar structure to proinsulin and it is possible that they exert insulin like action at higher concentration. Bovine Colostrum contains much higher concentration (500µg/L) of IGF-I than human Colostrum (18µg/L) [20]. IGF-I is known to promote protein build-up [21]. IGF-II is present in bovine Colostrum at much lower concentration and has anabolic activity [22]. IGF in bovine andhuman Colostrum are present in both free and bound form.

Platelet derived growth factor (PDGF)

PDGF present in Colostrum is a disulphide linked polypeptide consisting of two chains. PGDF is a potent mitogen for fibroblast and arterial smooth muscle cells. Exogenously oral administration of PDGF has been shown to facilitate ulcer healing [2].

Vascular endothelial growth factor (VEGF)

Human Colostrum contains VEGF at a concentration of ~ 75µg/L. It is a homodimeric heparin binding glycoprotein with potent angiogenic, mitogenic and vascular permeability enhancing activities [23].

Cytokines

Colostrum contains many cytokines including interleukin (IL) 1β, IL-6. IL-10, tumor necrosis factor α (TNF-α) and granulocyte-macrophage colony stimulating factors. Cytokines trigger acute cellular responses such as chemotaxis, protein synthesis and cellular differentiation in picomolar or nonomolar concentration.

Colostrinin

Bovine Colostrumcontain a proline rich polypeptide (PRP) complex called colostrinin. The complex shows immunomodulatory actions. It is a cytokine like factor that acts as an inducer
of interferon gamma [24]. Recently it is found that colostrinin have a beneficial effect in Alzheimer's disease [25].

Immunoglobulins

Human Colostrum and mature milk contains high concentration of secretory immunoglobulin-A (S-IgA). S-IgA is quite resistant to trypsin digestion [26]. The presence ofimmunologically active cells in Colostrum which produces antibodies to antigens has profound implications for infant's survival and future health interventions26. The human Colostrum contains neutralizing antibodies against many infectious agents including entero-viruses. Major portion of the proteins present in Colostrum consists of immunoglobulins. In human Colostrum IgA

predominates (120g/L) [27]**.** IgA acts in the intestine and limit themultiplication of bacterial and viral antigens Within the digestive tract. Human Colostrum contains large number of antibodies called secretory immunoglobulin (IgA). colostrum actually works as a safe and effective oral vaccine. IgA protect the baby from harmful viruses and bacteria. In human Colostrum IgA is present in free as well as in association with cellular and non-cellular elements [28].

Alpha amylase

The presence of α-amylase in human milk has long been recognized. The concentration of α-amylase is high in Colostrum and declines rapidly thereafter [29].

Lactoperoxidase

Recently Langbakk and Flatmark were able to show that lactoperoxidase is present in human colostrum [30]. The specific assays performed on Colostrum and human milk reveals the presence of γ-glutamyl transferase31, acid phosphatase, alkalinephosphotase, lactic and malic dehydrogenase, N-acetyl-α-hexosamidase, ribonuclease and xanthineoxidase. It is found that activity of some enzymes is higher in Colostrum than in mature milk.

Protease and protease inhibitor

Human Colostrum has an inhibitory effect on trypsin activity *invitro*. The molecular weight of inhibitor found in the Colostrum is 6000-10000 and is heat and acid stable.

Vitamin binding protein

Cobalamin (VitaminB_{12}) for its absorption requires binding protein called cobalamin binding protein (CblBP). The concentration of CblBP is considerably higher in Colostrum than in mature milk.

Corticosteroid binding protein

The presence of corticosteroid binding protein in human Colostrum has been proved by Payne et al. This protein is found in whey and has a molecular weight of 93000 and itsconcentration is higher in Colostrum than in mature milk. It is similar to serum corticosteroid binding globulin.

Glycoprotein

Glycoprotein from human Colostrum has been isolated by the researchers. The non-orosomucoid glycoprotein from Colostrum and mature milk has stimulating effect on growth of *lactobacillusbifidus*. This glycoprotein is reported as a proteolyte fragment of human casein.

Biotin and Biotinidase

Human milk contains relatively high concentration of biotin. However the concentration of biotin is much higher in mature milk (0.81µg/100ml) than in Colostrum.Biotinidase is present in human Colostrum and mature milk. The biotinidase activity in Colostrum is about 5 times higher than that of milk. This enzyme regulates the metabolism of biotin.

Vitamins

Rich alimentary supply of the vitamin is essential in early childhood. Maternal milk;particularly COLOSTRUM is usually an excellent source of vitamin A and β-carotene in 440 and 428 µg/L concentration respectively43. Human Colostrum contains β-carotene44. The concentration of carotenoids in Colostrum is eight times more than the mature milk10.

Vitamin A

Vitamin A content of Colostrum and transitional milk is very high and it is found thatits concentration is independent of Vitamin A status of mother.

Cobalamin (Cbl)

Sampson and McClelland reported the presence of Cbl in human milk. The Cbl levels found in human COLOSTRUM was almost eight fold greater than those of milk collected after a month of lactation.

Choline

Choline is an organic compound, classified as a water-soluble essential nutrientand usually grouped within the Vitamin B complex. This natural amine is found in the lipids that make up cell membranes and in the neurotransmitter acetylcholine.Adequate intakes (AI) for this micronutrient between 425 to 550 milligrams daily, for adults, have been established. Human Colostrum contains choline in aqueous as well as in lipid fractions. In

aqueous fraction free choline, phosphocholine and glycerophosphocholine are present while lipid fraction contains phosphatidylcholine and sphingomyelin. Choline is an essential constituent of membrane phospholipids.

Miscellaneous Minerals

Different types of minerals are alsopresent in human Colostrum. The concentration offew of them viz. copper, iron, selenium and zinc is 400-600, 400-800, 15 and 4000-5000 µg/L respectively. The ratio of zinc to copper was found to be 13 in human Colostrum49**.** The same amount of chromium is found in human Colostrum and mature milk. The average concentration of chromium in breast milk is 0.18 µg/L. Human Colostrum contains high concentration of sodium than mature milk10.

Cholesterol

Human Colostrum and mature milk contain >0.26mmol/L of cholesterol.

Sialic acid

Sialic acid is a generic term for the *N*-or *O*substituted derivatives of neuraminic acid, a monosaccharide with a nine-carbon backbone. It is *also* the name for the mostcommon member of this group, N-acetylneuraminic acid (Neu5Ac or NANA).Three types of sialic acids are present in human Colostrum viz. oligosaccharide bond, protein bound and free sialic acid. The concentration of sialic acid is highest in COLOSTRUM and decreases by nearly 80% over the next three months.

Fatty acid

Long chain polyunsaturated fatty acid viz. docosahexanoic acid and arachidonic acid are present in human milk and plays an important role in neural maturation of breast feed neonates. The concentration of total protein, fat and lactose is more in Colostrum during first 24 hours.

Cellular components

Colostrum contains two types of macrophages viz macrophages engorged with fat droplets and phagocytic macrophages with abundant lysozymes and synthesizing immunoglobulins. Human Colostrum has inherent Positive anti-infective properties due to the presence of cellular components. Colostrum is rich in cells ~3-8x10 cells/ml. The macrophages, neutrophils, T and B-lymphocytes and epithelial cells have been reported in human milk. Tcells comprise more than 50% of the lymphocyte of Colostrum.

Others

Human Colostrum also contains lysozymeand corticosteroids.

Composition of colostramin capsules

Colostramin capsules contain colostrum 250 mg with plant based protein digestive enzymes for proper absorption of protein molecules

Supplement Facts		
Serving Size : 1 Veg Capsule	Servings per container : 90	
Each capsule contains		
Piyusha Ghan (Colostrum)		250mg
Eranbakrkati Phala (Papaya Fruit Latex)	Fruit Pulp	2.5mg
Anannasa Ghan (Pine Apple Fruit Extract)	Fruit	2.5mg

General health and therapeutic benefits of colostrum in colostramin capsules

Colostrum because of its versatile composition it can be used in variety of diseases. It has properties to stimulate immune system and also contains hormones, growth factors and other bioactive components required for the body to combat with various diseases. It has been used for various respiratory tract infections, gastrointestinal disorders and rheumatoid arthritis. The medical importance of Colostrum has been described in ancient ayurveda. In US Colostrum was in use for its antibacterial activity before the discovery of antibiotics5. Colostrum upon contact with stomach acid inhabits and kill*campylobacter,candida, E.coli, colostridium, helicobacter pylori, rotavirus, salmonella, shigella andstreptococcus*. Colostrum is effective in leaky gut, irritable bowel syndrome, colitis, ulcers, chronic fatigue, diabetes, autoimmunity, arthritis, lupus and cancers, improves intestinal assimilation ofnutrients, inhibits protein breakdown, shifts energy source from carbohydrate to fat, spurglucose transport in muscles. It is now well established fact that ingestion of Colostrum promotes nutritional, functional and biological activities.

Few important benefits and actions of Colostrum are discussed below-

Nutritional benefits

As Colostrum contains high concentration of carbohydrate, protein and low fat, it delivers itsnutrients in very concentrated low volume form. Near about 20 times more protein is present in Colostrum as compared to the milk produced later. It is rich in lipids, mineral salts, vitamins and immunoglobulins1.

Role in hyperbilirubinemia

Colostrum has mild laxative effect which facilitates the passing of meconium (baby's first stool). This process clears excess of bilirubin which is produced in large quantities at birth due to reduction in blood volume and helps to prevents jaundice.

Shielding action

Immunoglobulin (IgA) present in Colostrum helps to protect the mucous membrane in the throat, lungs and intestine of newborn. The large number of leukocytes in Colostrum can destroy disease causing bacteria and viruses.

Antidiarrheal action

A study on bovine Colostrum suggests that cryptosporidium (a parasite of human GI tractcausing life threatening diarrhea) associated diarrhea in AIDS can be controlled after thetreatment with hyper immune bovine Colostrum.

Action on immune system

Breast feeding improves the health of children. The greatest significance of Colostrum is hostdefense, prevention of autoimmunity, and development of the digestive system; however,the underlying mechanisms for these effects are not well understood. Based on recent evidence it is found that the cytokines are involved in these processes18. Researchers now believe that Colostrum may be the jump start; one needs to fight infection or immune related chronic diseases such as cancer, AIDS etc.The immune boosting property of Colostrum is attributed to molecules called transfer factors. Colostrum also proved to be an effective anti-cancer agent by boosting immune system and by preventing iron from reaching and nourishing cancer cell with the help of phytic acid. Phytic acid is a powerful antioxidant and found in very high concentration in Colostrum. Without optimal immune protection we are susceptible to conditions ranging from common cold, flu, various stages of immune deficiency, cancer and even AIDS.

Actions on GI tract

Recent studies suggest that colostral fractions or individual peptides present in Colostrum will mitigate the symptoms of acid reflex. It might be useful for the treatment of wide variety of gastrointestinal tract disorders7. Colostrum contains multitude of healthful components that work for adults as well as the newborn. The ingestion of Colostrum by newborns helps the profound growth and maturity of esophagus, stomach, small intestine. This is due to the hormones and growth promoting peptides present in Colostrum**.** Healing of tissues damaged by ulcer, trauma burns and surgery can be facilitated using the growth factors present in Colostrum.

Antiallergic action

Praline rich polypeptide (PRP) present in colostrums can work as a regulatory substance of the thymus gland. It has been demonstrated that PRP inhibits the overproduction of lymphocytes and T-cells and reduces major symptoms of allergies and autoimmune diseases such as rheumatoid arthritis, lupus, and myasthenia gravis.

Importance in athletics and body building

Bovine Colostrum builds muscle and improves athletic performance without side effects. The muscles will become stronger and younger. Colostrum by nature helps to promote both strength and good health.

Use in chronic fatigue syndrome

Chronic fatigue syndrome (CFS) is believed to be caused by the Epstein-Barr Virus (EBV). The virus causes an over-reaction of the immune system. The immune system becomesoverburdened and immunity is burnout. The result is feeling of complete exhaustion. Colostrum is best remedy for CFS as it can boost the immune system.

Miscellaneous uses of Colostrum

The strengthening of immune system is important in the lyme disease. Lyme disease, or borreliosis, is an emerging infectious disease caused by at least three species of bacteria belonging to the genus *Borrelia*. Bovine Colostrum is safe way to enhance immunity. Early diagnosis and treatment with Colostrum can prevent the complications. Components of Colostrum promote the rapid healing, stop bleeding and leave the nostrils clear when applied to bleeding nostrils. Colostrum is really all-in-one medicine because it has tremendous potential for fight against any diseased condition. It is rich source of carbohydrate, protein, growth factors, blood cells, lysozyme and immunoglobulins.

Role of Plant based protein digestive enzymes Papaya fruit latex & bromelain Extract in Colostromin capsules.

Bromelain is a crude protein extract obtained from pine apple fruit and stem, which comprises a variety of proteolytic enzymes. Papaya fruit latex is extracted from dried latex of papaya fruit (Carica papaya L). They assist body,s own digestive mechanism in reducing very large complex proteins into smaller peptide units or indivisual Aminoacids.

Supplement Facts
Presentation: CAPSULES
Usage:

- Our colostrum is collected within first four milkings post-partum.
- Naturally high levels of active components
- Purely Indian origin colostrum
- Processed in a required facility under strict hygienic conditions.
- Added with plant based protein digestive enzymes (papain & bromelain extract) for proper absorption of protein molecules.
- Plant based protein digestive enzymes helps to reduce digestive upset and irritation.

Contra-indications: Product is contra-indicated in persons with Known hypersensitivity to any component of the product hypersensitivity to any component of the product.

Recommended usage: *Adults:* 1-2 capsules twice a day with water or liquid of choice twice daily
"Do not exceed the recommended daily dose"

Administration: Taken by oral route at anytime with food.
Precautions: Food Supplements must not be used as a substitute for a varied and balanced diet and a healthy lifestyle. Do notexceed the recommended daily dose.

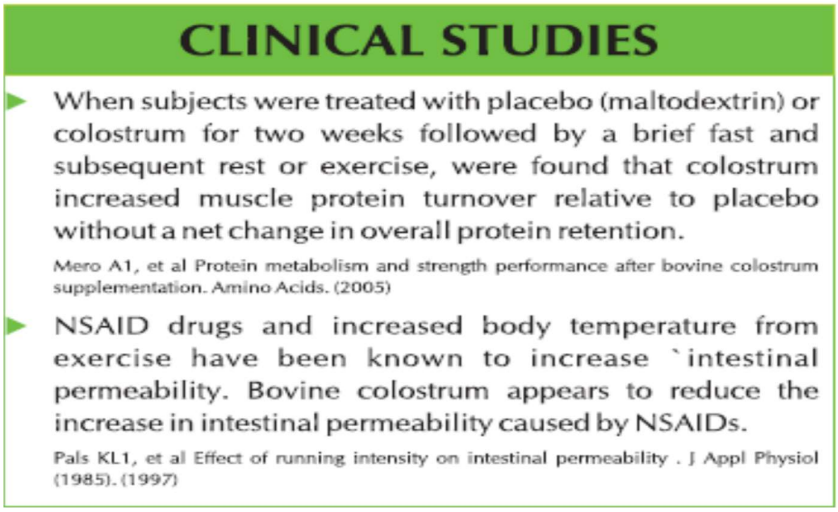
Warnings: If you are taking any prescribed medication or has any medical conditions always consults doctor or healthcarepractitioner before taking this supplement.

Side Effects: Very mild side effects like nausea, headache and vomiting in some individuals may be observed.

Storage: Store in a cool, dry and dark place.

Nutritional Benefits of Colostramin

- Helps to balance immune response.
- Helps to support the prevention of recurrent upper respiratory tract infections (a running nose, nasal congestion, sneezing, cough and sputum production are the hallmark symtoms).
- Helps to Promote healthy intestinal flora and the normal functioning of the entire GI tract.
- Colostrum not only supports normal immune function, it also helps to enhance fat utilization for fuel.
- Naturally occurring growth factors in colostrum may encourage cellular re-growth for healthy skin, bones, muscles, nerves and cartilage.
- It may enhance stamina and normal lean muscle re-growth after strenuous physical exercise.
- The Poly proline-Rich-Peptides found in Colostrum helps to balance and overactive immune system present in auto-immune diseases, makes it effective in assisting with illnesses such as Chronic Fatigue Syndrome, Fibromyalgia, Multiple Sclerosis, Rheumatoid Arthritis, Lupus and Scleroderma.
- It helps in anti-aging due to the cell renewal properties.
- Helps to assist the body in recovering from surgery and illness.
- Ideal for active individuals and athletes. Positively, affects the body's ability to maintain all kinds of physical activity throughout the day.
- It helps to mitigate the adverse side effects of Colon, Bladder, Esophagus, Lungs, Breast, Prostate and Renal cancers produced by chemo-radiotherapies due to its effect as immune booster.



CONCLUSION

This article reviews the current available scientific literature regarding the effect of Colostramin capsules as a effective supplementation for daily energy needs in enhancing immune response.

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