



A REVIEW ON EFFECT OF COW COLOSTRUM ON BIOLOGICAL ACTIVITY OF BACOPA MONNIERI

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ABSTRACT

Cow colostrum is the initial mammary secretion after parturition. All mammalian newborns require colostrum to enhance physiological processes such as lifelong immunity, gastrointestinal development and resistance to microbial infections. Cow colostrum been used for hundreds of years as a traditional complementary therapy for a wide variety of ailments and in veterinary practice. colostrum are provide immunity and nutrition, supporting the growth, development, and contains high levels of immunoglobulin, antimicrobial peptides and growth factor. Bacopa monnieri are used by ayurvedic medical profession for a variety of purpose including improving memory, reducing anxiety and treating epilepsy. Bacopa monnieri it belong to the family scrophulariaceae commonly called as Brahmi. Brahmi is found to effective in case of anxiety and neurosis. It posses anti-inflammatory, analgesic and antipyretic activity. It is also used to treat asthma , insanity epilepsy enlargement of spleen, snakebite , rheumatism, leprosy, eczema, ring worm and as a diuretics and cardio tonic. It is the foremost nootropic and neuroprotective ayurvedic herb known from ancient times .It is generally used to upgrade memory bacopa plants contain various phytochemicals which include alkaloids, flavonoids, glycosides and saponins other important constituents present in the plant are bacosides, bacopasides and bacopa saponins, which are responsible for the therapeutic properties.

Key words – Bacopa monnieri, Brahmi, cow colostrum, Ayurveda, Memory ,Nutritional and bioactive compounds.

INTRODUCTION

Medicinal plant firm the backbone of the traditional system of medicine in India. Many plant extract vitamins, flavonoids and polyphenol that are of great interest for use in complementary medicine as supplements. Bacopa monneri is an important Ayurvedic drug and, traditionally, it is reported to be used for skin diseases, fever, inflammation, anemia, urinary disorder and psychiatric disorder. It is also considered to be a cardi tonic, a potent nerve tonic, for the treatment of asthma, hoarseness, insanity and epilepsy.⁽¹⁾Bacopa monneri(L.) Wettst. (Scrophulariaceae), is a well – known medicinal herb in Indian system of medicine as Brahmi (Sanskrit) and Indian water hyssop. The plant is commonly found in wet,

damp and marshy areas. Indian Materia Medica (1500 AD) cites the use of the plant as a brain tonic, which is responsible for the memory enhancing is a triterpenoid saponin called Bacosides'. enhance the efficiency of transmission of nerve impulse there by strengthening memory and cognition.⁽¹⁾ The medicinal plants are the main source of drug and work in the world healthcare system ⁽²⁾ The plants and their extracts are used in differently worldwide .The repetition use of the herbal plants demonstrate these plants contain the therapeutics effects which are the applicable to treat human and animals ⁽³⁾ as per resource 80% of newly medicines are directly or indirectly prepare the plant extract ⁽⁴⁾ Ayurveda are the Indian culture of medicines viz .charak samhita sushruta samhita and Atharva veda. The name bacopa monnieri (Brahmi) is obtain from the "Brahma" The "traditional" creator in the Hindu patheon .the cerebrum is answerable for the creative activity the material that the material that enhance the mind capability is called the monnieri . (Brahmi)⁽⁵⁾ It has so many therapeutic effect like an anti-inflammatory analgesic, antipyretic sedative ,anti epileptic and antioxidant, memory enhancing , antianxiety, anticancer & immuno-modulatory ^(6,7)



Table No.1 & 2 represents the taxonomical classification

Sr.No.	Taxonomical Rank	Taxon
1	Kingdom	Plantae
2	Division	Anthophyta
3	Class	Dicotyledoneae
4	Order	Scrophulariales
5	Family	Scrophulariaceae
6	Genus	Bacopa
7	Species	Monnieri
8	Common Name	Bramhmi

Veracular names:

English: Water Hyssop, Thyme Leaved Gratiola, Indian Pennywort

Hindi: Saraswati, Brahmi.

Marathi: Brahmi, Jalnam, Ghola.

Arabic: Farfakh.

Urdu: Brahmi.

French: Petite bacopa.

Punjabi: Brahmibuti.

Sanskrit: Nir-Brahmi, Brahmi, Aindri.

Botanical Description:

Bacopa Monneri is a small, smooth, beefy plant with many branches, bacopa monnieri is a continuous non-aromatic herb, it grows up to a height of 60-90 cm and its branches are 5-35 cm long, it has many seeds, bacopa monnieri roots are little wiry or thin creamish-yellow, yellow in color the stem is slender, Green or purplish green around 1mm thick. Bacopa monnieri taste is normally bitter its flowers are small axillary, five petaled, white purple, pink or pale violet in appearance.

Phytochemical Constituents Of Bacopa Monnieri

Bacopa monnieri constituents are called to have anti-carcinogen properties ⁽⁸⁾ it includes the chemical constituents of bacopa monnieri are alkaloids, brahmine and herepestine. The phytochemicals are saponins, terpenoids ⁽⁹⁾. The saponin contains the bacoside A, bacoside B, botulin acid, stigmastanol, stigmastrol, D mannitol, B-sitosterol. ⁽¹⁰⁾ The other phytochemical present in bacoside A₁, Bacoside A₃, bacoside B bacoside A₁, Bacoside A₂, bacoside A₃, bacoside A₄, bacopa saponin -c^(11,12)



Cow Colostrum

What is colostrum ?

Colostrum is also known as the first milk or mother's milk. In mammals it is very thick and highly concentrated during its first feed in case of new born mammals they need to have the colostrum from its lactating mother within 10 to 12 hr in order to avoid any abnormal health problems or even death. It is produced by cow's and even human mothers. Colostrum is very nutritious and has every nutrient that a newly born requires.

A newly born has no immunity system of its own

- so it is very much possible to develop infection and illness.
- calves have never been exposed to bacteria or any germs.
- -so they are most susceptible to falling sick.
- Mother transfers all the required nutrients (antibodies, immune factor) to its calf to stay healthy and strong.
- -It also provides fat and proteins to the calf for development of healthy and strong bones and muscles.
- It has adaptogenic properties for producing cells with its own immune system.
- It helps in increasing white blood cell count and also helps to fight against disease on its own.
- colostrum is also known to provide with good bacteria to the lactating calf for digestion of milk.

TYPES OF COLOSTRUM

1. Human colostrum
2. Bovine colostrum

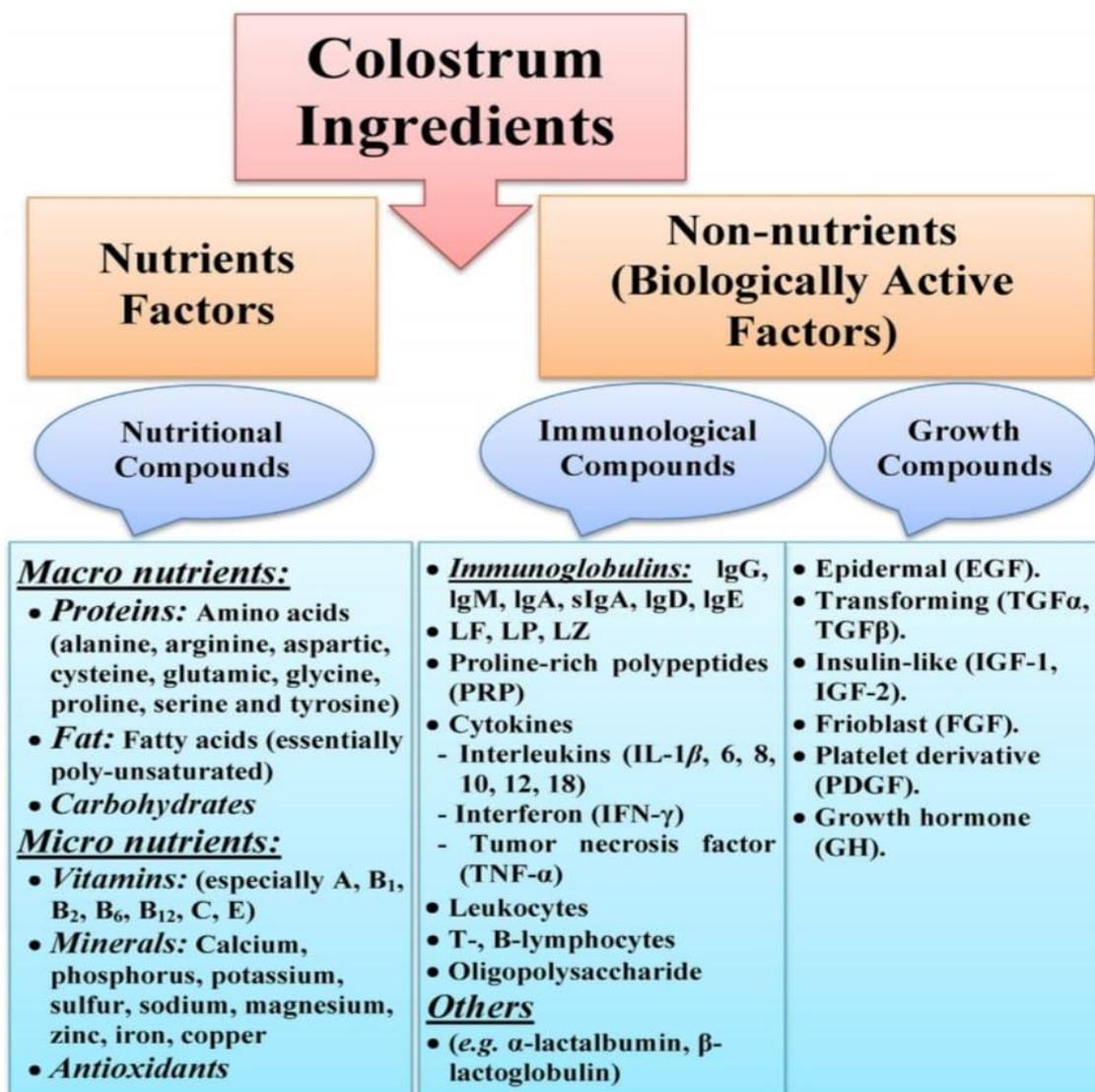
Bovine colostrum

This is produced by cows and also used as a colostrum supplement. It has similar nutrient like human colostrum but contains higher levels of fats and proteins. Colostrum is antimicrobial, improves metabolism, fights cancer. In pregnancy the functional placenta prevents the transfer of antibodies (immunoglobulin) from the mother cow to the baby calf. In that case, the baby calf is unable to develop resistance to any infection. Usually a baby calf takes three to four weeks in developing its own immune system. Antibodies in colostrum is the only barrier which protects a calf against disease. Colostrum has higher contents of fat and protein than normal milk. It is very essential nutrients for the calf at the time of its birth which benefits a lot later in life. In almost one hour the newly born calf starts losing its ability to absorb antibodies further gets reduced by six hours and finishes completely in 24 hours. Nutraceutical products are used to provide with health and medical provide for prevention and therapy of different diseases. Colostrum is a spontaneous product which is wealthy in macro- and micromineral, and because of this, it is measured as a best spontaneous food supplement. Colostrum is the first milk produce at the time of parturition, is also the only source of passive immunization because the colostrums is an superb source of immunoglobulins and highly organic value proteins, Growth Factor, lipids, carbohydrates, antioxidants, vitamins, minerals and workable cells. A viable cell like neutrophils, macrophages secretes cytokines and antimicrobial proteins and peptides, such as lactoferrin, defensins, and cathelicidins. In view of so many healthy factor through Colostrum, the use of Colostrum has been extended to so many health difficulty like treatment of autoimmune disorders, gastrointestinal conditions, including non-steroidal anti-inflammatory drug-induced gut injury, H pylori infection, insufficiency related diarrhea for all age group. This review survey the recent knowledge on the advantageous effect of immune factors containing Colostrum in the above order as well as the results of research aimed at register untouched importance in milk(13).



Human and animal immunoglobulin fractions IgG, M, A, E D, and establish in many secretion (colostrum, milk, mucus, blood, and tears(14)). They contain main classes in milk existence IgG, IgM, IgA. About 1% of the complete milk protein or about 6% of complete protein (15). Colostrum has big levels of them and produce of 70 – 80% of the protein (16-17). Colostrum is clear than mature or normal milk because of its lots of Igs that are specific protein molecules produce by the resistant system. IgG transfer immunity against particular pathogens from one to another so bovine colostrum is greatly and has lots of benefits of human childhood and the large amount of fat exceeds mother cow produces the calf milk. The amount of large –quality of whole colostrum it has large susceptible of pathogens will not develop to a healthy body (15,18,19). The immunity define as the ability to protect from pathogens and has to basic parts, general and specific that are effort and conduct various function (20). Passive vaccine is either by move prebirth Igs through the placenta by

colostrum post partunis the first hour of the mother to her youngs then the unglulates are exceeds antibodies until absorbed from colostrum(21).



Clinical Applications Of Bovine Colostrum

The firstly study investigating of role of colostrum in exercise presentation was fully in 1997 and display marked advance on explosive power and increased concentration of immunoglobulin in serum (22). This discovery is pertinent given intence physical activity can suppress immunity several hours after instructions (23). Further, colostrum improvement dimished exercise induced intestinal absorptive which was copy invitro culture models of intestinal epithelial cells (24).

Colostrum ,a nutrient rich fluid fabricate by female mammals immedietly after the birth it is loaded with immune ,growth and repairing factor. It is composite biological fluid,which development of immunity of the newborn calf . It contains quantities of supplement componenant that act as a normal anti-microbial agent to stimulate the immune system of that newborn calf. Bovine' colostrum a raw material for the milk of the preparation used for the treatment of infection of the GIT .It is possible that colostrum focused at specific purchaser may important role in the transforming, growth factor were remarkable muscle and cartilage repair characteristics . They encourage wound healing with patients . colostrual growth effect have expand to all structural body cells(25). Nootropic are called as cognitive enhancers . The drug addition that improve the nootropic function like memory creativity or motivation. They are also used for enhancing concentration and memory capabilities .

➤ The cognitive mechanism such as.

- Increase circulation to the brain .
- Provide chemical messengers to neurotransmitter.
- Providing useable energy to the brain .
- Preventing free radical and oxidative damage to the brain cells and other cells(26).

Colostrum constituents:

The composition of bovine colostrum and milk different for numerous breeds from one species to another (27). All milk variety differ in their nourishing value and have exclusively specific and advantageous features, helping to choose the best food for humans nutriement . The human and mare milk contain the lower levels that cause arteriosclerosis and thrombosis. The good nutritional for humans and development of cardiovascular disease(28). Additionally ,bovine colostrum has lots of protein contant than in milk fat contains had the identical trend in some types lilke sheep(29-30). And horse(31-32). But less in colostrum than in milkin some other types like camel (33)and humans (34). Finally in bovine colostrum the fat was highly changeable(35).

Concerning the configuration of camel milk changes after birth ,lactose reduces but total solids ,protein ,fat ,and mineral increases(34-35) Additionally bovine colostrum differs than mature milk due higher level of proteins (Igs,LE,Ip and Lz) along with being rich in vitamins and mineral (36).

Materials and Methods

An integrated cheminformatics and system pharmacology approach has been applied for the first time, to unveil the curative effects of Bacopa-derived, pharmacologically active compounds—consisting of: (1) target fishing and functional analysis to identify the compounds—direct target network; (2)networkconstruction and analysis to illustrate the molecular mechanisms of Bacopa-derived compounds in treating NDs, particularly Alzheimer’s and SCA; (3) gene ontology enrichment for targets will pave the way for pathway integration analysis to reveal the regulatory mode of target players in multiple functional nodes from a signaling pathway level.

Traditional use:

Bacopa monnieri traditionally been used as a brain tonic and is commonly advocate to enhance memory and heighten learning capacity. It is one of the important drugs of Ayurveda. Classical therapeutic assert suggest that the entire plant is advice for large number of diseases like asthma, epilepsy, insanity and memory enhancement. It is also used as a nerve tonic to treat anxiety, nervous exhaustion or weakness and is prescribed to enhance rehabilitation after any wound causing nervous deficit, such as stroke. Other traditional uses include promoting durability, and treating diarrhoea. It is used as an anti-inflammatory, analgesic and anxiolytic agent. It is also established to have laxative effect and the whole plant is used in treatment of constipation and stomach disorders (37).

Brahmi and its active components

Brahmi is a climber plant of height 2–3 feet with branched leaves and purple flowers; discourage the moist and marshy areas. It was earlier addressed in Ayurveda as a ‘medhya rasayana’, or “the memory booster herb” [38-39]. The phytochemical analysis of Brahmi extract disclose the presence of several bioactive component in the extract (40). The Brahmi extract reported to contain compounds belonging to triterpenoids saponins, alkaloids, glycoside and alcohols.

Brahmi as an antioxidant

Reactive oxygen type are the oxygen-derived free radicals, which have short half-life and unpaired electron in their valence shells. Lots of ROS accumulation in cells leads to damage of cellular machinery resulting in diseases such as inflammation, cancer, and neurodegeneration [41-42]. Oxidative stress or ROS generates numerous neurological dysfunctions, including oxidization of enzymes, protein aggregation and membrane disruption, resulting in gradual loss of neurons [43]. To overcome

Brahmi in neuroinflammation

A number of factors such as brain injuries, exposure to toxins, deposition of protein aggregates trigger the inflammatory responses in central nervous system (CNS). The microglia residing in CNS are the principle immune cells, which leads to neuroinflammation via several signalling proteins predominantly the interleukins IL-6, IL-10 and TNF- α , and cytokines [44,45]. The exposure of LPS, Amyloid- β fibres etc., are the immunogenic factor, which triggers the activation of microglia from resting to Bioactive Components

BC contains multiple components that influence the growth, development, and immune function of the suckling neonate, and cover a wide range of molecular weights

Antimicrobial Factors

Immunoglobulins

In mammals, immunoglobulins are important in passing passive immunity from mother to offspring. In BC, the major immunoglobulin is IgG, with a concentration of 30–87 g L⁻¹, contributing approx. 80–90% of the total IgGs, with smaller amounts of IgA, IgD, IgE, and IgM being present (Table 1) [15]. In contrast to humans, where immunoglobulins can traverse the placental barrier, this does not occur in cows, and the calf's sole natural source of immunoglobulins is from the consumption of BC. Immunoglobulins comprise a variable region that determine antigen binding specificity and a constant Fc region. Once an antigen is bound, immune complexes are formed, and the Fc region interacts with multiple immune effector cells, such as phagocytes, NK cells, dendritic cells and CD4⁺ T lymphocytes through binding to their Fc receptors. Bovine immunoglobulins can help prevent pathogen binding to host cells, present pathogens to macrophages for microflora, and induce local immunoglobulin A production [46]. IgG can, therefore, provide both passive immunity and modulate the adaptive and innate immune systems. Readers interested in the details of immune effects of BC and signalling pathways involved in microbe destruction and cytokine/antibody production, including IgFc interaction with effector cells, are referred to the upcoming article in this series on the “Immunological Effects of In addition to normal IgG constituents, specific vaccination of cows against human or bovine pathogens (hyper-immunisation) results in the production of neutralizing antibodies that show benefits for preventing and treating infections, resulting in increased weight gain in clinical and veterinary situations. Examples include preventing and treating enteropathic infections by *Escherichia coli* [47] or rotavirus [48]. Similarly, using a tooth surface model, a concentrate of hyper-immune milk was shown to prevent adherence of *Candida albicans* [49], and a hyperimmune BC preparation reduced dental plaque [50]. Although the use of purified specific antibodies

from serum or milk appears to have value for infectious diseases [1], there may be additional benefits in using whole hyperimmune

Bovine Colostrum because it also enhances the repair process mediated through its growth factor constituents in addition to enhancing eradication of infections via its nonspecific antibacterial components.

Growth Factors

BC contains multiple components that stimulate growth, differentiation, and

development. Although growth factors are normally considered to be peptides or small proteins, several other factors present in BC induce similar effects, although not usually acting via a classical receptor ligand interaction. These include glutamine, nucleotides, and polyamines. Nevertheless, these molecules play an important role in maintaining gut growth and immune activity, acting either directly or through altering the intestinal flora. Over twenty different peptide growth factors have been described in BC, and the main ones are described in the following section. Although described individually, it is important to note that their functions are interrelated; cells are exposed to multiple factors at any one time and may result in additive or even synergistic responses. This was demonstrated by the finding that when bovine lactoferrin and EGF were added together to rat intestinal IEC-18 cells, it resulted in a synergistic growth response [46].

Growth factor constituents of colostrum vary markedly across species, for example,

EGF content of human colostrum is much higher than BC. Even within species, major changes occur during the first few days post-birthing—some studies have shown marked post-calving (47). Insulin-Like Growth Factors (Somatomedins) and Their Binding Process IGF-I and IGF-II promote cell proliferation and differentiation (48) and there is 100% sequence homology between the bovine and human IGFs. They have structural similarity to pro-insulin and, when administered at high concentrations, IGFs can exert insulinlike effects. Endogenous IGF is mainly produced by the liver [49]. The concentration of IGF-I within BC is much higher than that found in human colostrum (500 mg L⁻¹ versus 18 mg L⁻¹) (50-51), with IGF-I levels falling to approx. 10 mg L⁻¹ in mature bovine milk [52]. IGF-I and-II have been shown to survive exposure to both acid and heat, and it is therefore likely that they remain biologically intact during commercial milk processing as well as during passage through the stomach [53]. IGF-I is an anabolic factor promoting protein accumulation [54], and is probably involved in mediating the growth-promoting actions of growth hormone.

Bovine Colostrum Use in Human and Veterinary Health

Separate articles to be published within this Special Issue will cover the relevance of BC for use in gastrointestinal damage (see Chandwe K. and Kelly M.P.), immunology (see Ghosh S. et al.), paediatrics (see Caitlin V., Burrin D. and Sangild P.) and sports medicine (see Davidson G. et al.). These will, therefore, only be covered briefly in this article.

Conclusion

Mammals' colostrum composition is markedly different from normal milk, containing unique components rich in nutritional, macro-and micronutrients, and many biologically active, and growth factors. All newborn mammals need colostrum to develop the digestive system, resist microbial infections, and boost immune systems to promote lifelong health and immunity; it is a divine immune gift from the Creator. So it is one of the best natural food supplements consumed within various life stages. Recent evidence indicates that the colostrum is used to treat cancer, AIDS, polio, heart disease and rheumatoid arthritis. Likewise, colostrum and its components contribute as a non-drug alternative to the clinical management of CoVID-19. *Bacopa monnieri* is considered as the major traditional plant which is used to prepare various Ayurveda and Folk medicines. It shows huge potential in the enhancement of different neuropharmacological disorders, aggravation and other problems. The methanolic and ethanolic extracts of *B. Monnieri* are used to be a significant part of traditional medicinal system for treating various diseases. Also, Bacosid A is considered the most important phytochemical extracted from this plant which issued to prepare various therapeutic medicines. Brahmi is known to have anticancer, antidiabetic, mitigating, antimicrobial and antioxidant and memory-enhancing properties. It is thus concluded from the literature that *Bacopa monnieri* is a valuable medicinal herb that is being used in Ayurvedic traditional system for the treatment of vast human disorders.

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