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HERBAL DIP / HEART CARE : A COMBINATION OF NATURAL HERBS WITH MODERNISED TECHNIQUE FOR EXTRACTION OF PHYTOCHEMICAL COMPONENTS AND ITS MEDICAL BENEFITS ON HEART SPECIALLY ON TRIGLYCERIDES CONTROL

Dr. Prem Kumar[1*], Mrs. Prabhavathi[2] and Mr. Sushanth[3], Ms.Vedavarshni [4]

[1,2]Crescent Biologicals Pvt Ltd, 45/1A, Vadiyarkottai via, Balanayapalli pt, SIDCO Bargur, Krishnagiri - 635108*
www.crescentbiologicals.com, drpremkumar@crescentbiologicals.com, +919344037811
[3](Jr. Research associate), Crescent Biologicals Pvt Ltd, 45/1A, Vadiyarkottai via, Balanayapalli pt, SIDCO Bargur, Krishnagiri - 635108
[4](Research associate B.Tech PES college) Crescent Biologicals Pvt Ltd, 45/1A, Vadiyarkottai via, Balanayapalli pt, SIDCO Bargur, Krishnagiri - 635108

ABSTRACT
Cardiovascular diseases (CVDs) are the foremost cause of morbidity and mortality globally, accounting for approximately 17.9 million deaths each year. The increasing prevalence of lifestyle-related risk factors such as hypertension, hyperlipidemia, oxidative stress, endothelial dysfunction, and chronic inflammation has intensified the need for preventive and therapeutic interventions. While synthetic drugs are widely used, their long-term usage is often associated with adverse effects and reduced patient compliance. This has led to growing interest in natural plant-based therapies, particularly those rooted in traditional medicine systems such as Ayurveda and Traditional Chinese Medicine, which offer holistic benefits with minimal side effects.
*This study aims to investigate the cardioprotective potential of a selected group of medicinal plants known for their historical and scientific relevance in heart care. The nine botanicals evaluated include Flax Seed (*Linum usitatissimum*), Cinnamon (*Cinnamomum verum*), Garlic (*Allium sativum*), Turmeric (*Curcuma longa*), Ginger (*Zingiber officinale*), Dill Leaf (*Anethum graveolens*), Ginkgo Biloba, Brahmi (*Bacopa monnieri*), and Ashwagandha (*Withania somnifera*). These plants were selected based on their rich composition of bioactive compounds including omega-3 fatty acids, polyphenols, flavonoids, alkaloids, terpenoids, organosulfur compounds, and phytosterols, which are known to play significant roles in cardiovascular modulation.*
Each plant is analyzed under five core headings: Taxonomy, Physio-Chemical Composition, Antimicrobial Activity, Antioxidant Activity, and Mechanism of Action with respect to heart care. Collectively, the selected plants demonstrate a diverse range of mechanisms contributing to cardiovascular health, such as lipid profile regulation, blood pressure reduction, anti-inflammatory activity, endothelial function improvement, inhibition of platelet aggregation, and protection against oxidative stress-induced myocardial damage.
Flax Seed, for instance, is abundant in alpha-linolenic acid and lignans that lower LDL cholesterol and inflammation. Garlic and Ginger contribute significantly through their vasodilatory and antithrombotic actions. Turmeric and Ashwagandha exhibit profound antioxidant and adaptogenic effects that mitigate oxidative cardiac stress. Ginkgo Biloba and Brahmi enhance microcirculation and cognitive function, indirectly benefiting vascular health.
This comprehensive review underscores the potential of integrating these botanicals into heart care formulations, either as dietary supplements or functional beverages. By offering synergistic, multi-targeted effects, such herbal combinations may serve as effective adjuncts to conventional therapies, promoting long-term cardiovascular well-being with minimal adverse effects.

INTRODUCTION

Cardiovascular diseases have emerged as the leading cause of mortality and morbidity globally, representing a significant challenge to public health systems and clinical medicine. Despite the availability of advanced medical therapies and interventional procedures, the global burden of heart disease continues to rise due to a combination of sedentary lifestyles, poor dietary habits, increasing psychological stress, and the prevalence of metabolic disorders such as diabetes and obesity. In this context, preventive strategies and holistic interventions that emphasize long-term wellness, rather than short-term symptomatic relief, have gained considerable interest. Among them, plant-based approaches offer promising potential, both from historical and scientific perspectives.

The human cardiovascular system is highly sensitive to inflammation, oxidative stress, and metabolic imbalances. Chronic low-grade inflammation, endothelial dysfunction, and lipid peroxidation are key contributors to the development of atherosclerosis and subsequent cardiovascular events such as myocardial infarction and stroke. Medicinal plants, especially those rooted in traditional systems of medicine, are rich in bioactive phytochemicals that can modulate these biological pathways and restore cardiovascular balance. With increasing scientific validation, many of these plants are now being integrated into dietary supplements, functional foods, and therapeutic formulations aimed at supporting heart health.

Among the plants explored for their cardioprotective potential, flax seed (*Linum usitatissimum*) stands out due to its high content of alpha-linolenic acid (ALA), an omega-3 fatty acid known to reduce serum cholesterol levels, improve endothelial function, and suppress inflammation. In addition to its fatty acid profile, flax seed is also rich in lignans, which exhibit antioxidant properties that protect blood vessels from oxidative damage and reduce platelet aggregation, thereby minimizing the risk of thrombosis.

Cinnamon (*Cinnamomum verum*) has been traditionally used in culinary and medicinal applications for its metabolic benefits. It contains polyphenolic compounds that help regulate blood sugar and lipid profiles, reduce arterial stiffness, and improve microcirculation. The presence of cinnamaldehyde and other antioxidants enables cinnamon to protect vascular tissues from oxidative stress and inflammatory damage, making it highly relevant for individuals with metabolic syndrome and early-stage atherosclerosis.

Garlic (*Allium sativum*) has long been recognized in both folk medicine and scientific literature for its robust cardiovascular effects. Allicin, the primary bioactive compound released upon crushing garlic, has been shown to lower blood pressure, inhibit cholesterol biosynthesis, and reduce blood clot formation. Garlic also enhances nitric oxide production, which improves vasodilation and overall vascular health.

Turmeric (*Curcuma longa*) is widely known for its potent anti-inflammatory and antioxidant effects, attributed primarily to curcumin. Curcumin inhibits multiple pro-inflammatory pathways and reduces the levels of inflammatory cytokines such as TNF-α and IL-6. This anti-inflammatory potential is particularly beneficial for preventing the progression of vascular injury and maintaining cardiac muscle function under stress conditions.

Ginger (*Zingiber officinale*) possesses gingerols and shogaols—compounds with powerful anti-inflammatory, antihypertensive, and antiplatelet properties. Ginger supports peripheral circulation, reduces arterial pressure, and prevents lipid accumulation within arterial walls. Its antioxidant content further protects the heart from oxidative stress, especially in conditions associated with obesity or poor glycemic control.

Dill leaf (*Anethum graveolens*), though less commonly highlighted in cardiovascular research, contains essential oils and flavonoids that exhibit lipid-lowering and vasorelaxant effects. Traditionally used to treat digestive disorders, dill also supports blood pressure regulation and contributes mild diuretic action, which can be helpful in managing fluid balance in hypertensive individuals.

Ginkgo biloba, a staple in traditional Chinese medicine, is renowned for its ability to enhance blood circulation. Its unique constituents—ginkgolides and bilobalides—improve endothelial function, reduce blood viscosity, and increase oxygen delivery to tissues. These effects are not only important for brain health but also play a critical role in preserving vascular elasticity and reducing ischemic damage to cardiac tissue.

Brahmi (*Bacopa monnieri*) is primarily known for its cognitive-enhancing effects, but emerging studies reveal its benefits in cardiovascular modulation. As an adaptogen, Brahmi helps in mitigating stress-induced changes in blood pressure and heart rate. It also supports nitric oxide synthesis and reduces oxidative damage to vascular cells, contributing indirectly to heart health through neurovascular coupling and stress reduction.

Ashwagandha (*Withania somnifera*) is another potent adaptogen that plays a pivotal role in stress management. Chronic stress is a well-established risk factor for cardiovascular diseases, often leading to hypertension, arrhythmias, and endothelial dysfunction. Ashwagandha reduces cortisol levels, enhances cardiac resilience, and supports mitochondrial energy metabolism within myocardial cells. Its broad-spectrum activity includes antioxidant, anti-inflammatory, and lipid-regulating effects, making it a cornerstone herb in holistic heart care.

The combination of these nine plants provides a rich pharmacological foundation for the development of herbal interventions targeted at cardiovascular health. Their synergistic effects span multiple physiological domains—from lipid regulation and blood pressure control to inflammation suppression and oxidative stress reduction. By addressing the root causes of cardiovascular dysfunction rather than just the symptoms, these botanicals offer a natural and comprehensive strategy for the prevention and management of heart disease. With increasing consumer preference for plant-based wellness and the expanding evidence base in phytotherapy, the integration of such herbs into daily health routines holds great promise for improving global heart health outcomes.

Health Benefits of the Heart Care Herbal Drink

The Heart Care Herbal Drink, composed of nine medicinal plants—Flax Seed, Cinnamon, Garlic, Turmeric, Ginger, Dill Leaf, Ginkgo Biloba, Brahmi, and Ashwagandha—offers a multifaceted approach to cardiovascular wellness. This combination targets lipid regulation, inflammation, oxidative stress, blood pressure, circulation, and stress—all critical to heart health.

1. Cholesterol and Lipid Profile Regulation

Flax Seed and Garlic play a key role in managing lipid levels. Flax Seed contains alpha-linolenic acid (ALA) and lignans, which help lower LDL cholesterol and triglycerides. Garlic inhibits cholesterol synthesis enzymes, thus supporting a healthy lipid profile.

2. Blood Pressure Control

Garlic, Cinnamon, Ginger, and Ashwagandha are known for their antihypertensive effects. Garlic enhances nitric oxide production, improving vasodilation. Cinnamon and Ginger reduce vascular resistance, while Ashwagandha lowers stress-induced blood pressure by regulating cortisol levels.

3. Antioxidant Protection

Turmeric, Ginger, Ginkgo Biloba, and Flax Seed are rich in antioxidants such as curcumin, gingerols, and flavonoids. These compounds neutralize free radicals, reduce lipid peroxidation, and protect vascular tissues from oxidative damage.

4. Anti-inflammatory Action

Turmeric, Cinnamon, and Ginger suppress pro-inflammatory mediators like TNF-α and IL-6. By reducing vascular inflammation, they help prevent endothelial dysfunction and atherosclerosis.

5. Improved Circulation and Vascular Health

Ginkgo Biloba enhances blood flow, reduces platelet aggregation, and improves endothelial function. Dill Leaf also contributes by promoting mild vasodilation and circulation.

6. Stress Reduction and Cardiac Resilience

Ashwagandha and Brahmi act as adaptogens. They stabilize the HPA (hypothalamic-pituitary-adrenal) axis, reduce anxiety, lower cortisol, and support emotional well-being—important for preventing stress-related cardiac conditions.

7. Overall Cardiovascular Protection

Through these combined effects—lowering cholesterol, managing blood pressure, reducing inflammation, improving circulation, and regulating stress—the drink offers a holistic, plant-based preventive solution for heart health. Its regular intake may support long-term cardiovascular resilience and reduced disease risk.

MATERIALS AND METHODOLOGY

Flax Seed (*Linum usitatissimum*)

1. Taxonomy

- **Kingdom**: Plantae
- **Clade**: Angiosperms
- **Order**: Malpighiales
- **Family**: Linaceae
- **Genus**: *Linum*
- **Species**: *L. usitatissimum*

Commonly known as flaxseed or linseed, *Linum usitatissimum* is a functional food that has been extensively studied for its cardioprotective effects, largely due to its rich content in omega-3 fatty acids, lignans, and dietary fiber.

2. Physio-Chemical Composition

Flaxseed is rich in bioactive compounds that contribute significantly to cardiovascular health:

- **Alpha-linolenic acid (ALA)** – An omega-3 fatty acid (~50–60% of total fat content)
- **Lignans (secoisolariciresinol diglucoside - SDG)** – Phytoestrogens with antioxidant properties
- **Dietary Fiber** – ~28% (both soluble and insoluble)
- **Proteins** – ~18–25%, including arginine which supports nitric oxide production
- **Minerals** – Magnesium, potassium, calcium, phosphorus
- **Vitamins** – B-complex, vitamin E
- **Polyphenols** – Flavonoids and phenolic acids

These constituents help reduce lipid profiles, control blood pressure, and reduce systemic inflammation, which are all central to heart disease prevention.

3. Antimicrobial Activity

Though not directly a cardiovascular benefit, flaxseed exhibits antimicrobial effects due to the presence of phenolic compounds. These compounds inhibit:

- Gram-positive and Gram-negative bacteria (e.g., *Staphylococcus aureus*, *E. coli*)
- Fungal strains (e.g., *Candida albicans*)

By reducing microbial-induced inflammation and endotoxemia, flaxseed indirectly contributes to reducing cardiovascular stress, especially in chronic inflammatory states.

4. Antioxidant Activity

Flaxseed contains potent antioxidants, mainly lignans and phenolic acids:

- **SDG** neutralizes free radicals and inhibits lipid peroxidation
- **ALA** modulates the redox balance via incorporation into membrane phospholipids

• **Flavonoids** such as herbacetin and kaempferol further enhance antioxidant capacity

These effects reduce oxidative damage to lipids (LDL), blood vessels, and myocardial tissue, thereby protecting against atherosclerosis.

5. Mechanism of Action

Flaxseed supports heart health via multiple mechanisms:

• **Lipid-Lowering Effect**: Reduces total cholesterol, LDL-C, and triglycerides through fiber and lignan action.

• **Anti-Hypertensive Action**: ALA improves endothelial function and vasodilation, aided by nitric oxide production.

• **Anti-Inflammatory Effect**: Downregulation of inflammatory markers like CRP and IL-6.

• **Anti-Thrombotic Activity**: ALA reduces platelet aggregation and improves blood rheology.

• **Improved Vascular Health**: Enhances arterial elasticity and reduces vascular stiffness.

These combined effects make flaxseed a valuable dietary intervention in preventing and managing cardiovascular diseases like atherosclerosis, hypertension, and myocardial infarction.

RESULT

Product name		Flax Seed		
Source		*Linum usitatissimum*		
Parts used		Seeds		
Appearanc**e**		Brown, flat, oval-shaped dried seeds		
Moisture Content		≤ 8%		
Ash Content		≤ 7%		
Ph		6.0-7.2		
Odour		Mild nutty aroma		
Solubility		Slightly soluble in water, soluble in alcohol		
Physio – chemical properties	**Specification**	**Batch No: CBLU001**	**Batch No: CBLU002**	**Batch No: CBLU003**
Specific Gravity @20°c(g/ml)	0.900-0.950	0.923	0.927	0.930
Optical Rotation @ 20°c(Degrees)	+10 to +30	+15	+18	+17
Refractive index @ 20°c	1.460-1.470	1.465	1.467	1.469
Microbial test	**Specification**	**Batch No: CBLU001**	**Batch No: CBLU002**	**Batch No: CBLU003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Cinnamon (*Cinnamomum verum*)

1. Taxonomy

• **Kingdom:** Plantae

• **Phylum:** Magnoliophyta

• **Class:** Magnoliopsida

• **Order:** Laurales

• **Family:** Lauraceae

• **Genus:** *Cinnamomum*

• **Species:** *C. verum*

Cinnamon, derived from the inner bark of the tree *Cinnamomum verum* (also called "true cinnamon"), is a well-known spice with extensive use in traditional and modern medicine. It has been widely recognized for its cardiovascular and metabolic health-promoting properties, particularly due to its polyphenolic content.

2. Physio-Chemical Composition

Cinnamon contains a wide range of bioactive compounds, including cinnamaldehyde, cinnamic acid, eugenol, coumarin, linalool, and various polyphenols. Cinnamaldehyde, the major component of the essential oil, is responsible for its characteristic aroma and most of its pharmacological actions. It also contains flavonoids, tannins, and trace minerals like manganese, calcium, and iron. The phenolic compounds contribute to its strong antioxidant and anti-inflammatory activities, crucial for heart protection.

3. Antimicrobial Activity

Cinnamon exhibits strong antimicrobial effects against a broad spectrum of pathogens, including *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*. The essential oil, particularly cinnamaldehyde, disrupts microbial

membranes, inhibits bacterial enzyme activity, and impairs fungal growth. This antimicrobial property helps reduce systemic inflammation that may contribute to endothelial dysfunction and plaque formation in blood vessels.

4. Antioxidant Activity

Cinnamon is a potent natural antioxidant. Its phenolic content neutralizes reactive oxygen species (ROS), enhances the activity of antioxidant enzymes such as catalase and superoxide dismutase, and reduces lipid peroxidation. These actions protect vascular endothelial cells from oxidative damage, a major cause of atherosclerosis and vascular aging.

5. Mechanism of Action

Cinnamon supports heart health through several interlinked pathways. Firstly, it helps lower blood pressure by promoting vasodilation and reducing vascular resistance. Secondly, it improves lipid metabolism—lowering LDL cholesterol and triglycerides while increasing HDL levels. Thirdly, it exhibits anti-inflammatory effects by inhibiting key mediators like TNF-α, COX-2, and NF-κB, which are implicated in vascular inflammation. Additionally, cinnamon enhances insulin sensitivity and glucose metabolism, indirectly benefiting cardiovascular function by reducing the risk of diabetes-related heart complications. Its ability to reduce platelet aggregation also adds to its cardioprotective profile.

RESULT

Product name		Cinnamon Bark		
Source		*Cinnamomum verum*		
Parts used		Dried inner bark		
Appearance		Light brown, curled bark quills		
Moisture Content		≤ 10%		
Ash Content		≤ 6%		
Ph		5.5-6.5		
Odour		Warm, sweet-spicy aroma		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBCV001**	**Batch No: CBCV002**	**Batch No: CBCV003**
Specific Gravity @20°c(g/ml)	0.920-0.950	0.936	0.941	0.947
Optical Rotation @ 20°c(Degrees)	+30 to +55	40	+45	+50
Refractive index @ 20°c	1.465-1.475	1.470	1.472	1.469
Microbial test	**Specification**	**Batch No: CBCV001**	**Batch No: CBCV002**	**Batch No: CBCV003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Garlic (*Allium sativum*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Liliopsida
- **Order**: Asparagales
- **Family**: Amaryllidaceae
- **Genus**: *Allium*
- **Species**: *Allium sativum*

Garlic is one of the most ancient medicinal plants, traditionally used across cultures for its broad therapeutic spectrum, particularly in cardiovascular protection. Its sulfur-rich profile contributes to its distinct aroma and potent biological activity.

2. Physio-Chemical Composition

Garlic bulbs contain a wide array of organosulfur compounds, the most significant being allicin, formed enzymatically from alliin when garlic is crushed. Other key constituents include diallyl disulfide (DADS), diallyl trisulfide (DATS), S-allyl cysteine (SAC), and ajoene. Garlic is also a source of flavonoids, saponins, selenium, and vitamins B6 and C. These compounds contribute to its hypotensive, hypolipidemic, antithrombotic, and antioxidant actions.

3. Antimicrobial Activity

Garlic exhibits strong antimicrobial effects against bacteria (*Staphylococcus aureus*, *E. coli*, *Helicobacter pylori*), fungi (*Candida albicans*), viruses, and even some parasites. Allicin and other sulfur compounds target microbial cell membranes and metabolic enzymes, leading to cell death. This antimicrobial action may reduce inflammation and prevent infections that can contribute to systemic inflammation and vascular injury.

4. Antioxidant Activity

Garlic demonstrates significant antioxidant potential through direct scavenging of reactive oxygen species (ROS) and enhancement of antioxidant enzymes such as glutathione peroxidase, catalase, and superoxide dismutase. S-allyl cysteine has been shown to protect endothelial cells and cardiomyocytes from oxidative stress, a central contributor to atherosclerosis and ischemic injury.

5. Mechanism of Action

Garlic contributes to heart health through multiple validated mechanisms. It lowers blood pressure by enhancing nitric oxide bioavailability, leading to vasodilation. Its hypolipidemic effect is achieved by suppressing cholesterol biosynthesis enzymes like HMG-CoA reductase, reducing total and LDL cholesterol levels. Garlic also reduces platelet aggregation, thereby minimizing the risk of thrombus formation. Furthermore, it exerts anti-inflammatory actions by modulating cytokines and inhibiting NF-κB pathways. Garlic improves endothelial function, delays the progression of atherosclerosis, and has even been associated with regression of arterial plaque in long-term supplementation studies.

RESULT

Product name		Garlic Powder		
Source		*Allium sativum*		
Parts used		Bulb		
Appearance		Off-white to pale yellow fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 5%		
Ph		5.8-6.5		
Odour		Strong pungent, sulfurous aroma		
Solubility		Soluble in water and alcohol		
Physio – chemical properties	**Specification**	**Batch No: CBAS001**	**Batch No: CBAS002**	**Batch No: CBAS003**
Specific Gravity @20°c(g/ml)	0.920-0.960	0.928	0.948	0.952
Optical Rotation @ 20°c(Degrees)	+10 to +25	+21	+17	+20
Refractive index @ 20°c	1.460-1.470	1.467	1.468	1.463
Microbial test	**Specification**	**Batch No: CBAS001**	**Batch No: CBAS002**	**Batch No: CBAS003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Turmeric (*Curcuma longa*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Liliopsida
- **Order**: Zingiberales
- **Family**: Zingiberaceae
- **Genus**: *Curcuma*
- **Species**: *Curcuma longa*

Turmeric, a rhizomatous herbaceous perennial, is widely used in traditional Indian and Chinese medicine systems. It is renowned for its anti-inflammatory, antioxidant, and cardioprotective properties, with curcumin as its primary bioactive compound.

2. Physio-Chemical Composition

Turmeric contains curcuminoids, mainly curcumin, demethoxycurcumin, and bisdemethoxycurcumin, which are responsible for its yellow color and therapeutic effects. It also contains essential oils such as turmerone, atlantone, and zingiberene, as well as polysaccharides, flavonoids, and minerals. Curcumin exhibits poor water solubility and

bioavailability, but its therapeutic impact can be significantly enhanced when formulated with piperine or delivered via nanoemulsions.

3. Antimicrobial Activity

Turmeric exhibits broad-spectrum antimicrobial activity, inhibiting the growth of bacteria such as *Staphylococcus aureus*, *E. coli*, *Bacillus subtilis*, and fungi like *Candida albicans*. Curcumin disrupts bacterial membranes, interferes with quorum sensing, and inhibits viral replication, contributing to overall immune regulation and systemic inflammation control that benefits heart health.

4. Antioxidant Activity

Curcumin is a potent free radical scavenger. It enhances endogenous antioxidant enzymes, such as superoxide dismutase (SOD), catalase, and glutathione peroxidase. It inhibits lipid peroxidation in plasma and membranes, protecting endothelial cells from oxidative stress—a major factor in the pathogenesis of hypertension, atherosclerosis, and myocardial infarction.

5. Mechanism of Action

Turmeric supports cardiovascular health through its anti-inflammatory, antioxidant, and anti-atherogenic effects. Curcumin inhibits the NF-κB signaling pathway and downregulates inflammatory mediators like TNF-α, IL-1β, and COX-2. It also helps maintain endothelial integrity and prevents vascular remodeling. Curcumin reduces the expression of adhesion molecules and smooth muscle cell proliferation—key events in plaque formation. Additionally, turmeric modulates lipid metabolism by reducing total cholesterol and triglyceride levels. In animal models and clinical trials, curcumin supplementation has been shown to improve left ventricular function and reduce myocardial fibrosis, highlighting its potential in managing heart failure and ischemic heart disease.

RESULT

Product name		Turmeric Powder		
Source		*Curcuma longa*		
Parts used		Rhizome		
Appearance		Bright yellow-orange fine powder		
Moisture Content		≤ 9%		
Ash Content		≤ 7%		
Ph		6.0-7.2		
Odour		Characteristic earthy-aromatic smell		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBCL001**	**Batch No: CBCL002**	**Batch No: CBCL003**
Specific Gravity @20°c(g/ml)	0.930-0.960	0948	0.954	0.956
Optical Rotation @ 20°c(Degrees)	+20 to +35	+28	+30	+26
Refractive index @ 20°c	1.465-1.470	1.468	1.469	1.469
Microbial test	**Specification**	**Batch No: CBCL001**	**Batch No: CBCL002**	**Batch No: CBCL003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Ginger (*Zingiber officinale*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Liliopsida
- **Order**: Zingiberales
- **Family**: Zingiberaceae
- **Genus**: *Zingiber*
- **Species**: *Zingiber officinale*

Ginger is a rhizomatous plant extensively used in traditional systems like Ayurveda and Traditional Chinese Medicine. It is widely acknowledged for its anti-inflammatory, antioxidant, and cardiotonic properties. Its active constituents exhibit beneficial effects on cardiovascular, gastrointestinal, and immune systems.

2. Physio-Chemical Composition

Ginger's bioactive components include gingerols (especially 6-gingerol), shogaols, paradols, zingerone, and volatile oils such as zingiberene and β-bisabolene. These compounds contribute to its pungent flavor and wide-ranging pharmacological actions. The rhizome also contains flavonoids, phenolic acids, and small amounts of vitamins and minerals.

3. Antimicrobial Activity

Ginger exhibits antimicrobial activity against a broad spectrum of bacteria such as *Streptococcus mutans*, *Escherichia coli*, and *Helicobacter pylori*, as well as fungi like *Candida albicans*. Gingerols and shogaols disrupt microbial cell membranes and inhibit biofilm formation. These actions can prevent subclinical infections that contribute to systemic inflammation and endothelial damage, thereby supporting vascular health.

4. Antioxidant Activity

Ginger exerts potent antioxidant effects by neutralizing free radicals and enhancing endogenous antioxidant defense systems. Its phenolic compounds inhibit lipid peroxidation and reduce oxidative stress in endothelial cells. Ginger also enhances levels of superoxide dismutase (SOD), catalase, and glutathione peroxidase—enzymes critical for maintaining cardiac cell integrity under stress.

5. Mechanism of Action

Ginger benefits cardiovascular health through multiple pathways. It lowers blood pressure by acting as a calcium channel blocker and promoting vasodilation. It improves lipid metabolism by reducing total cholesterol, LDL, and triglycerides while increasing HDL levels. Ginger's anti-inflammatory effects are mediated through the inhibition of COX-2, TNF-α, and interleukins, thereby protecting blood vessels from chronic inflammation and plaque formation. Moreover, ginger reduces platelet aggregation, preventing thrombus formation and enhancing blood flow. In diabetic models, ginger also improves insulin sensitivity, which indirectly lowers cardiovascular risk.

RESULT

Product name		Ginger Powder		
Source		*Zingiber officinale*		
Parts used		Rhizome		
Appearance		Pale yellow to light brown fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 6%		
Ph		5.5-6.8		
Odour		Pungent, spicy characteristic aroma		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBZO001**	**Batch No: CBZO002**	**Batch No: CBZO003**
Specific Gravity @20°c(g/ml)	0.920-0.950	0.932	0.938	0.945
Optical Rotation @ 20°c(Degrees)	+15 to +30	+21	+24	+23
Refractive index @ 20°c	1.462-1.468	1.465	1.467	1.465
Microbial test	**Specification**	**Batch No: CBZO001**	**Batch No: CBZO002**	**Batch No: CBZO003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Dill Leaf (*Anethum graveolens*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Magnoliopsida
- **Order**: Apiales
- **Family**: Apiaceae
- **Genus**: *Anethum*
- **Species**: *Anethum graveolens*

Dill (*Anethum graveolens*), a delicate aromatic herb, is traditionally used in culinary and medicinal applications. While the seeds are more often studied, the leaf (also called dill weed) is equally rich in phytochemicals and contributes to various health benefits, including cardiovascular protection.

2. Physio-Chemical Composition

Dill leaves contain essential oils (including carvone, limonene, and dill ether), flavonoids (such as quercetin and kaempferol), tannins, phenolic acids, coumarins, and terpenoids. The plant is also a source of dietary fiber, vitamin C, calcium, and magnesium. These compounds are primarily responsible for its antioxidant, anti-inflammatory, and vasorelaxant properties.

3. Antimicrobial Activity

Dill exhibits antimicrobial activity against several Gram-positive and Gram-negative bacteria, including *Staphylococcus aureus*, *E. coli*, and *Pseudomonas aeruginosa*. Its essential oils disrupt microbial cell walls, inhibit bacterial enzymes, and prevent biofilm formation. This action indirectly supports cardiovascular health by reducing inflammation triggered by systemic infections.

4. Antioxidant Activity

Dill leaves possess significant antioxidant capacity due to the presence of polyphenols and flavonoids. These compounds effectively scavenge free radicals and reduce lipid peroxidation. Dill also enhances antioxidant enzyme levels, contributing to the protection of myocardial and endothelial tissues from oxidative damage.

5. Mechanism of Action

Dill promotes heart health primarily through its hypolipidemic, antihypertensive, and anti-inflammatory effects. Experimental studies have shown that dill extract lowers total cholesterol, LDL, and triglyceride levels, likely by modulating hepatic lipid metabolism and reducing intestinal fat absorption. Dill also exhibits vasodilatory effects by relaxing smooth muscle, contributing to lower blood pressure. Inflammation modulation is achieved by inhibiting the expression of pro-inflammatory cytokines and enzymes such as IL-6 and COX-2. Additionally, dill supports cardiac rhythm and may offer mild diuretic benefits, thereby reducing circulatory overload and supporting optimal blood pressure regulation.

RESULT

Product name		Dill Leaf Powder		
Source		*Anethum graveolens*		
Parts used		Fresh Leaves (aerial parts)		
Appearance		Greenish fine powder		
Moisture Content		≤ 10%		
Ash Content		≤ 8%		
Ph		5.8-6.5		
Odour		Aromatic, mildly pungent		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBAG001**	**Batch No: CBAG002**	**Batch No: CBAG003**
Specific Gravity @20°c(g/ml)	0.900-0.940	0.924	0.929	0.938
Optical Rotation @ 20°c(Degrees)	+5 to +15	+9	+11	+12
Refractive index @ 20°c	1.460-1.466	1.463	1.464	1.462
Microbial test	**Specification**	**Batch No: CBAG001**	**Batch No: CBAG002**	**Batch No: CBAG003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Ginkgo Biloba (*Ginkgo biloba* L.)

1. Taxonomy

- **Kingdom:** Plantae
- **Division:** Ginkgophyta
- **Class:** Ginkgoopsida
- **Order:** Ginkgoales
- **Family:** Ginkgoaceae
- **Genus:** *Ginkgo*
- **Species:** *Ginkgo biloba*

Ginkgo biloba is one of the oldest living tree species, often referred to as a "living fossil." Its leaves have long been used in traditional Chinese medicine, especially for enhancing circulation and brain and heart health. Its cardioprotective effects are increasingly supported by scientific research.

2. Physio-Chemical Composition

Ginkgo leaves are rich in terpenoids (mainly ginkgolides A, B, C, J, and bilobalide) and flavonoid glycosides (such as quercetin, kaempferol, and isorhamnetin). These constituents contribute to Ginkgo's vasodilatory, antioxidant, and anti-inflammatory properties. It also contains proanthocyanidins, organic acids, and trace minerals.

3. Antimicrobial Activity

Ginkgo extracts demonstrate antimicrobial effects against a range of bacteria including *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. These effects are largely attributed to the flavonoid content, which disrupts microbial membranes and inhibits biofilm formation. This activity supports cardiovascular health by reducing inflammation initiated by microbial or endotoxin exposure.

4. Antioxidant Activity

Ginkgo is a potent antioxidant plant. Its flavonoids and terpenoids scavenge free radicals and upregulate endogenous antioxidant enzymes like superoxide dismutase (SOD) and glutathione peroxidase. These actions prevent oxidative injury to blood vessels and cardiac tissues, thereby reducing the risk of ischemia and atherosclerosis.

5. Mechanism of Action

Ginkgo Biloba enhances coronary and peripheral circulation by promoting nitric oxide synthesis and reducing platelet aggregation. This improves blood flow and oxygen delivery to cardiac tissues. The ginkgolides act as platelet-activating factor (PAF) antagonists**,** thereby reducing thrombosis risk and preventing myocardial infarction. Ginkgo also stabilizes the endothelium and reduces arterial stiffness, both important in preventing hypertension and vascular aging. Furthermore, its neurocardiological benefits—improving autonomic nervous system balance—support heart rate variability and cardiac function under stress.

RESULT

Product name		Ginkgo Biloba Leaf Powder		
Source		*Ginkgo biloba*		
Parts used		Dried Leaves		
Appearanc**e**		Light green to yellowish-green powder		
Moisture Content		≤ 9%		
Ash Content		≤ 6%		
Ph		5.5-6.8		
Odour		Mildly bitter, herbaceous aroma		
Solubility		Soluble in ethanol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBGB001**	**Batch No: CBGB002**	**Batch No: CBGB003**
Specific Gravity @20°c(g/ml)	0.930-0.960	0.948	0.953	0.957
Optical Rotation @ 20°c(Degrees)	+12 to +25	+20	+17	+24
Refractive index @ 20°c	1.462-1.470	1.467	1.468	1.464
Microbial test	**Specification**	**Batch No: CBGB001**	**Batch No: CBGB002**	**Batch No: CBGB003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Brahmi (*Bacopa monnieri*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Magnoliopsida
- **Order**: Lamiales
- **Family**: Plantaginaceae (formerly Scrophulariaceae)
- **Genus**: *Bacopa*
- **Species**: *Bacopa monnieri*

Bacopa monnieri, commonly known as Brahmi, is a traditional Ayurvedic herb known for its nootropic and adaptogenic properties. While widely researched for cognitive enhancement, Brahmi also exhibits protective effects on the cardiovascular system due to its antioxidant, vasodilatory, and anti-inflammatory activities.

2. Physio-Chemical Composition

The primary active constituents of Brahmi are bacosides A and B, along with flavonoids (luteolin, apigenin), alkaloids, saponins, and sterols. Bacosides, in particular, are known for modulating neurotransmission, antioxidant defense, and vascular tone. The plant also contains betulic acid and hersaponin, which contribute to its anti-inflammatory effects.

3. Antimicrobial Activity

Brahmi demonstrates antimicrobial activity against various pathogens including *Bacillus subtilis*, *E. coli*, *Pseudomonas aeruginosa*, and *Candida albicans*. Its antimicrobial effects help reduce chronic infections that may promote systemic inflammation and vascular endothelial dysfunction—both risk factors for heart disease.

4. Antioxidant Activity

Brahmi is a rich source of antioxidants. Bacosides enhance the activity of key enzymes such as superoxide dismutase (SOD), catalase, and glutathione peroxidase. This reduces oxidative stress on cardiac tissues and blood vessels, limiting lipid peroxidation and atherosclerotic progression. Brahmi also protects mitochondrial function in cardiomyocytes.

5. Mechanism of Action

Brahmi supports heart health through endothelial protection, anti-inflammatory, and anti-stress mechanisms. It promotes vasodilation by enhancing nitric oxide synthesis and reducing intracellular calcium in vascular smooth muscle cells. Brahmi also lowers blood pressure by relaxing peripheral vessels. Its adaptogenic effects modulate the hypothalamic-pituitary-adrenal (HPA) axis, reducing stress-induced sympathetic overactivity that can raise heart rate and blood pressure. Additionally, bacosides reduce inflammatory cytokines and improve lipid metabolism, potentially lowering cholesterol and triglyceride levels.

RESULT

Product name		Brahmi Extract Powder		
Source		*Bacopa monnieri*		
Parts used		Whole plant (aerial parts)		
Appearance		Brownish-green fine powder		
Moisture Content		≤ 7%		
Ash Content		≤ 6%		
Ph		5.8-6.6		
Odour		Earthy, slightly bitter aroma		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBBM001**	**Batch No: CBBM002**	**Batch No: CBBM003**
Specific Gravity @20°c(g/ml)	0.925-0.960	0.944	0.949	0.957
Optical Rotation @ 20°c(Degrees)	+10 to +20	+14	+17	+16
Refractive index @ 20°c	1.462-1.470	1.466	1.467	1.469
Microbial test	**Specification**	**Batch No: CBBM001**	**Batch No: CBBM002**	**Batch No: CBBM003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

Ashwagandha (*Withania somnifera*)

1. Taxonomy

- **Kingdom**: Plantae
- **Phylum**: Magnoliophyta
- **Class**: Magnoliopsida
- **Order**: Solanales
- **Family**: Solanaceae
- **Genus**: *Withania*
- **Species**: *Withania somnifera*

Ashwagandha, also known as Indian ginseng or winter cherry, is a prominent adaptogen in Ayurvedic medicine. Traditionally used to promote longevity and vitality, its emerging cardiovascular benefits are now supported by scientific evidence.

2. Physio-Chemical Composition

Ashwagandha roots contain biologically active compounds called withanolides (e.g., withaferin A, withanolide D), alkaloids (anaferine, isopelletierine), saponins, sitoindosides, and flavonoids. These contribute to its adaptogenic, antioxidant, and anti-inflammatory activities. The leaves also contain phenolic acids and chlorogenic acid, offering additional therapeutic benefits.

3. Antimicrobial Activity

Ashwagandha has demonstrated moderate antimicrobial activity against a variety of bacteria including *Staphylococcus aureus*, *Salmonella typhi*, *E. coli*, and some fungal species. While not a primary antimicrobial herb, its immune-modulatory effects can enhance host defense and reduce systemic inflammatory burden—an indirect cardiovascular benefit.

4. Antioxidant Activity

Ashwagandha enhances the body's natural antioxidant defenses by increasing the activity of superoxide dismutase (SOD), catalase, and glutathione peroxidase. It inhibits lipid peroxidation and protects cardiomyocytes from oxidative damage. Withanolides and sitoindosides reduce mitochondrial oxidative stress, which is vital for maintaining heart muscle function under stress or ischemic conditions.

5. Mechanism of Action

Ashwagandha supports cardiovascular health through stress modulation, anti-inflammatory, and cardioprotective effects. It normalizes cortisol levels and calms the sympathetic nervous system, thereby reducing blood pressure and heart rate. In animal models, Ashwagandha has been shown to improve cardiac contractility and prevent myocardial cell degeneration. It helps regulate lipid profiles by lowering LDL cholesterol and triglycerides while modestly increasing HDL. Additionally, Ashwagandha's anti-inflammatory effects reduce vascular inflammation and arterial stiffness, key risk factors in atherosclerosis and hypertension.

RESULT

Product name		Ashwagandha Root		
Source		*Withania somnifera*		
Parts used		Root		
Appearance		Beige to light brown fine powder		
Moisture Content		≤ 8%		
Ash Content		≤ 5%		
Ph		6.0-7.0		
Odour		Characteristic earthy smell		
Solubility		Soluble in alcohol, partially in water		
Physio – chemical properties	**Specification**	**Batch No: CBWS001**	**Batch No: CBWS002**	**Batch No: CBWS003**
Specific Gravity @20°c(g/ml)	0.930-0.960	0.946	0.951	0.949
Optical Rotation @ 20°c(Degrees)	+12 to +25	+18	+20	+23
Refractive index @ 20°c	1.465-1.470	1.467	1.468	1.469
Microbial test	**Specification**	**Batch No: CBWS001**	**Batch No: CBWS002**	**Batch No: CBWS003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

METHODOLOGY

1. Preactivated Vedic Methodology for Extraction

The herbal heart-care formulation was developed using a traditional Preactivated Vedic Extraction Methodology, harmonizing Ayurvedic principles with modern phytochemical science. This method emphasizes a multi-phase, low-degradation extraction process designed to retain bioactive constituents, enhance bioavailability, and preserve synergistic efficacy. Techniques used included heat-based decoction (Kashayam), cold maceration (Hima), and extraction in Siddha Jal (structured water infused with tulsi and copper ions), which together helped conserve both volatile and stable cardioprotective phytochemicals. This method was specifically tailored to preserve antioxidant, anti-inflammatory, and vasodilatory properties essential for cardiovascular health.

2. Selection and Sourcing of Raw Material

Nine medicinal plants were selected based on their documented efficacy and traditional relevance to heart health. Raw materials were sourced from certified Ayurvedic suppliers and organic farms. Authentication of each plant was carried out using macroscopic and microscopic examination, and thin-layer chromatography (TLC). Selection focused on plant parts rich in bioactive constituents such as lignans, polyphenols, organosulfur compounds, alkaloids, flavonoids, and terpenoids, all recognized for cardiovascular protective roles.

3. Preliminary Treatment and Cleaning

Each plant material underwent a stringent cleaning and preprocessing regimen. Raw materials were thoroughly washed using sterile distilled water and air-dried under shade to avoid degradation of heat-sensitive compounds. The dried material was then milled into a coarse powder (60–80 mesh).

Traditional Ayurvedic pre-treatment techniques were also applied:

- Garlic bulbs were soaked in warm cow's milk to reduce pungency and moderate sulfur intensity, promoting easier assimilation.
- Flax seeds were lightly roasted to enhance digestibility and increase lignan bioavailability.
- Turmeric and ginger rhizomes were roasted briefly to activate curcuminoids and gingerols.
- Ashwagandha and brahmi roots were sun-dried and cut to optimal particle size for better extraction.
- Ginkgo leaves were shade-dried to preserve ginkgolide stability

4. Preactivated Extraction Process, Filtration and Concentration

A two-phase extraction was used:

PhaseI–Decoction Each powdered herb was boiled separately in Siddha Jal (1:16 w/v ratio) for 90–120 minutes at ~90°C. This phase helped extract thermostable components such as curcuminoids, cinnamaldehyde, withanolides, and lignans. Volume was reduced by ~75% to concentrate active compounds.

PhaseII–After decoction, herbal residues were soaked in fresh structured water at ambient temperature for 16 hours. This allowed for extraction of volatile and heat-sensitive compounds such as ginkgolides, allicin, and essential oils.

The two extracts were pooled, filtered through fine muslin and cotton layers, and concentrated using rotary evaporation under reduced pressure. This resulted in a potent, full-spectrum extract enriched in both fat-soluble and water-soluble phytochemicals beneficial for heart function

5. Formulation and Blending

The concentrated extracts were blended in specific proportions based on Ayurvedic Yukti (rational combination) and pharmacodynamic principles. Each plant was selected for its unique contribution to cardiovascular wellness:

- Flax Seed – Omega-3 source for lipid regulation
- Garlic – Antihypertensive and anti-atherogenic effects
- Turmeric – Endothelial protection and anti-inflammatory action
- Cinnamon – Blood sugar regulation and anti-coagulant effect
- Ginger – Blood thinning and cholesterol-lowering
- Dill Leaf – Mild vasodilator and lipid-modulating effect
- Ginkgo Biloba – Microcirculatory enhancement
- Brahmi – Stress modulation and cardiac tone support
- Ashwagandha – Adaptogenic and myocardial stress protection

Blends were prepared in both liquid concentrate and dry granule forms. Natural excipients like lemon extract and honey were added to improve palatability, cardiovascular compatibility, and bioavailability.

6. Standardization and Quality Control

All batches were subjected to phytochemical and microbiological testing:

- pH: Maintained between 5.6–6.5 for cardiovascular tissue compatibility
- Moisture and Total Solids: Controlled to ensure extract concentration stability
- Marker Compounds: Quantified using HPLC and GC-MS
- Microbial Testing: Performed using WHO guidelines to assess total bacterial and fungal load
- Heavy Metals and Pesticide Residue: Tested using ICP-MS to ensure safety
- Organoleptic Analysis: Evaluated for taste, aroma, and texture to ensure consumer compliance

7. Packaging and Storage

The final heart-care product was stored in accordance with its physical form and photostability requirements:

- Liquid concentrate: Packaged in amber glass bottles to avoid photodegradation
- Powdered extract: Packed in aluminum foil pouches with desiccant to prevent moisture contamination

Both were stored at ambient temperature (25°C) with controlled humidity (<50%). Monthly monitoring included:

- Stability testing for active markers
- Color and aroma retention
- Microbial safety checks
- Shelf-life validation over 12 months

TEST AND RESULT

The physical analysis of the Diabetic care drink has shown the following properties:

Product name		Heart Care Herbal Drink		
Source		Flax Seed, Cinnamon, Garlic, Turmeric, Ginger, Dill Leaf, Ginkgo Biloba, Brahmi, Ashwagandha		
Parts used		Preactive Vedic Treatment		
Appearance		Fine yellow-brown to greenish herbal powder		
Moisture Content		≤ 9%		
Ash Content		≤ 7%		
Ph		5.8-6.8		
Odour		Herbal, mildly pungent and earthy		
Solubility		Soluble in alcohol, partially soluble in water		
Physio – chemical properties	**Specification**	**Batch No: CBHCD001**	**Batch No: CBHCD002**	**Batch No: CBHCD003**
Specific Gravity @20°c(g/ml)	0.900-0.960	0.938	0.944	0.953
Optical Rotation @ 20°c(Degrees)	+10 to +45	+20	+24	+17
Refractive index @ 20°c	1.460-1.470	1.465	1.468	1.467
Microbial test	**Specification**	**Batch No: CBHCD001**	**Batch No: CBHCD002**	**Batch No: CBHCD003**
Aerobic total plate count	<100000CFU/ml	<100CFU/ml	<100CFU/ml	<100CFU/ml
Yeast and mold	<1000CFU/ml	<10CFU/ml	<10CFU/ml	<10CFU/ml
E. coli	Negative	Negative	Negative	Negative
Salmonella	Negative	Negative	Negative	Negative
Staphylococcus sp	Negative	Negative	Negative	Negative
Shelf life		24 Month		

This Data represents the properties of the combined formulation of the diabetic care drink using the Preactivated Vedic Methodology.

Herbal Dip Composition With Medical Benefits

S.no	Therpeutic Usage	Material Description	Botanical Name	Medical Benefits
1	**Heart Care**	Flax Seed	*Linum usitatissimum*	Anxiety, reducing risk of certain cancers, cardiovascular support. Supporting a healthy kidney.
		Cinnamon	*Cinnamomum verum*	Low Blood Pressure, Treat Cancer, Boost Metabolism, Lower Blood Sugar, Inflammation, And Regulate Menstrual Cycles.
		Garlic	*Allium sativum*	Lung cancer risk, Brain cancer. Hip osteoarthritis, powerful antibiotic, risk of heart attacks. Anticancer properties.
		Turmeric	*Curcuma longa*	Lessens inflammation. Fights free radicals. Antioxidant properties, Improves memory.
		Ginger	*Zingiber officinale*	Pain relief. Improves blood sugar regulation. Reduces nausea, lower cholesterol. Potent aphrodisiac, fight cancer.
		Dill leaf	*Anethum graveolens*	Improve insulin resistance, cholesterol levels, antioxidants levels , and some gastrointestinal symptoms
		Ginkgo Biloba	*Ginkgo biloba*	May help treat dementia (including Alzheimer disease) and Intermittent claudication, or Poor circulation in the legs.
		Brahmi	*Bacopa monnieri*	For Insomnia, Burning sensation, Memory power, for anxiety, For Blood Pressure, For Joint Pain
		Ashwagandha	*Withania somnifera*	Improves Sexual Function in Women, Sharpens Focus and Memory, and Lowers Blood Sugar and Fat, Muscle& Strength.

HEART CARE DRINK

CONCLUSION

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide, with risk factors such as oxidative stress, chronic inflammation, dyslipidemia, hypertension, and endothelial dysfunction playing central roles in their pathophysiology. The increasing global health burden posed by heart disease has necessitated the exploration of preventive and therapeutic interventions that are not only effective but also safe and sustainable for long-term use. In this context, the integration of phytotherapeutics—particularly polyherbal formulations composed of evidence-based medicinal plants—has garnered substantial attention.

The present formulation draws upon nine well-researched plants: Flax Seed, Cinnamon, Garlic, Turmeric, Ginger, Dill Leaf, Ginkgo Biloba, Brahmi, and Ashwagandha, each selected for their established roles in maintaining and enhancing cardiovascular health. These botanicals were not arbitrarily chosen but were systematically evaluated based on their mechanistic effects relevant to heart care—specifically, antioxidant activity, anti-inflammatory response, lipid regulation, vascular modulation, and adaptogenic properties.

Each plant offers a unique yet complementary bioactive profile that contributes synergistically to the overall cardioprotective potential of the formulation. For instance, Flax Seed, rich in alpha-linolenic acid (ALA), directly supports lipid metabolism and reduces serum triglyceride levels. Garlic, known for its allicin content, inhibits platelet aggregation and modulates blood pressure through endothelium-mediated nitric oxide release. Turmeric and Ginger, both from the Zingiberaceae family, exhibit powerful anti-inflammatory and antioxidant activities, neutralizing free radicals and preventing lipid peroxidation in cardiac tissue.

Notably, Cinnamon and Dill Leaf contribute to glycemic and lipid control while also offering vasorelaxant properties, reducing peripheral resistance and supporting blood pressure stability. Ginkgo Biloba, often used for its neurovascular benefits, also enhances coronary circulation and reduces the risk of thrombosis through platelet-activating factor (PAF) inhibition. On the other hand, Brahmi and Ashwagandha serve as adaptogens, supporting neuroendocrine balance and helping the body resist stress—a major modifiable risk factor for cardiac events. Brahmi's vasodilatory action and Ashwagandha's cortisol-lowering effects combine to support both heart rate variability and vascular tone.

Collectively, this combination of botanicals forms a multifunctional phytotherapeutic matrix that targets the key axes of cardiovascular pathology:

1. Oxidative Stress Reduction: Through scavenging free radicals and enhancing endogenous antioxidant enzymes such as SOD, catalase, and glutathione peroxidase.
2. Inflammatory Pathway Inhibition: By downregulating NF-κB signaling, reducing levels of TNF-α, IL-6, and COX-2.
3. Lipid Metabolism Regulation: Lowering LDL and triglycerides, improving HDL, and preventing lipid oxidation.

4. Blood Pressure Modulation: Via vasodilatory effects, calcium channel blockade, and sympathetic nervous system inhibition.
5. Anti-thrombotic and Anti-atherosclerotic Actions: Through inhibition of platelet aggregation, improved endothelial function, and reduction of arterial stiffness.

Furthermore, this herbal formulation aligns with the principles of holistic medicine and preventive cardiology. Unlike single-drug pharmacotherapy, which often targets one pathway and may lead to adverse side effects, the polyherbal blend provides broad-spectrum support with minimal toxicity. This approach also addresses the psychosomatic dimensions of heart disease—particularly through adaptogenic herbs that reduce emotional stress, regulate hormonal imbalances, and improve overall vitality.

Preliminary in vitro and in vivo studies on the individual plants have already demonstrated significant cardioprotective potential. Future work should focus on clinical trials evaluating the combined effects of this formulation, as well as investigations into optimal dosage, pharmacokinetics, safety profiles, and potential herb-drug interactions. Additionally, advances in delivery systems (e.g., nanoencapsulation or liposomal carriers) could enhance bioavailability, particularly for poorly soluble compounds such as curcumin and bacosides.

In summary, this polyherbal heart care drink represents a promising, natural intervention for the prevention and complementary management of cardiovascular disorders. Rooted in both traditional wisdom and modern pharmacological insight, the formulation could serve as a functional dietary supplement to promote cardiac wellness, reduce disease burden, and enhance quality of life—especially when integrated with healthy lifestyle practices.

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