



A comparative in-vitro study of the hypolipidemic effects of Brahmi (*Bacopa monnieri*) leaf powder and Karela (*Momordica charantia*) fruit powder

*Shweta. P. Akhani

Dr. Sulekha.R. Gotmare

S.H.P.T. College of Science, Department of Analytical Chemistry, SNDTWU Juhu Campus, Santacruz (west), Mumbai, Maharashtra, India, 400049.

*Corresponding author : Shweta. P. Akhani

Abstract

Traditional medical practises frequently benefit from the use of herbal remedies, particularly when it comes to providing a safer alternative and well-tolerated treatments for long-term conditions like hypercholesterolemia. Hypercholesterolemia, is the sixth-highest risk factor for death globally, is one of the most common risk factors for atherosclerotic & cardiovascular disease.

High cholesterol levels, which are prevalent in both industrialised and developing nations, are the root cause of one-third of ischemic heart disease. Modern medicine can reduce hypercholesterolemia, however there are long-term unfavourable side effects. The Ayurvedic medicinal system, which offers safer treatments for many diseases, has been widely used in the Indian subcontinent for centuries to cure illnesses. The study's conclusions regarding the effects of Brahmi and Karela to decrease cholesterol were favourable and demonstrated positive and encouraging results.

Keywords: Brahmi, Karela , Hypercholesterolemia, Herbal remedies.

Introduction:

Blood contains cholesterol, a waxy substance naturally present in the human body but having too much cholesterol can increase your risk of getting heart disease even though your body requires it to build healthy cells.

You can form fatty deposits in your blood vessels if you have high cholesterol. Over time, these deposits thicken and restrict the amount of blood that can pass through your arteries. Sometimes these deposits can suddenly form a clot that causes a heart attack or stroke.

Although high cholesterol can be inherited, it's usually brought on by poor lifestyle choices, making it both curable and preventive. In some circumstances, medicine can help lower high cholesterol along with a healthy diet and physical exercises. The sixth-highest risk factor for death worldwide is excessive cholesterol and related ailments. ¹ More and more people worldwide, including in India, are classified as having excessive cholesterol levels. ² Sedentary behaviours, diets high in saturated fat, heredity, and other factors can all raise cholesterol levels. Heart disease, stroke, and other vascular conditions are all made more likely by high cholesterol. One-third of ischemic heart disease cases worldwide are caused by elevated blood cholesterol. The primary cause of atherosclerosis and the related heart problems is hypercholesterolemia. People with high cholesterol are more prone to develop coronary heart disease at various stages of the illness. The main goal of treatment for these conditions is to lower blood cholesterol. ²

Numerous national and international pharmaceutical companies are developing and actively marketing a variety of cutting-edge synthetic medications as a result of the rise in the number of hypercholesterolemic patients around the world. However, the negative effects of abusing synthetic drugs have increased, and people are now more aware of them. This has inspired many people to resume using herbal medicines, which are natural and significantly safer than synthetic ones. ³

Herbal remedies typically complement modern medical procedures since they are well-tolerated and safe, particularly when treating chronic conditions. Traditional medicine is making a significant comeback in Western nations, particularly Canada, the USA, and Britain, etc., because many chronic ailments no longer have viable conventional treatments. ⁴

Specific nutrients with positive health effects can be included in nutraceuticals, which are products that fall between diets and pharmaceuticals. Plant-based nutraceuticals may optimize the plasma lipid profile. ⁵ It has been investigated whether *Anogeissus latifolia*, gum ghatti, *Sida rhomboidea*, soy protein, garlic, ginger, and citrus peel extracts can lower cholesterol. ⁶

For example, various herbal extracts are being studied to see if they help lower cholesterol levels. The predictive and causal aspects of dyslipidaemia and oxidative stress, as well as the effects of antioxidant treatment to treat abnormal lipid parameters, are supported by a sizable body of research. ⁷

Karela : *Momordica charantia* L. (Fruit)

A member of the Cucurbitaceae family and a fruit utilised in Ayurveda, karela is also known as *Momordica charantia* L. Other names for it include balsam pear, bitter melon, bitter gourd, karela, and kugua.

Its fruit has been used as a vegetable for countless years. It is widely dispersed throughout the world's tropical and subtropical climates. The name "bitter melon" or "bitter gourd" refers to how bitter the entire plant, including the fruit, tastes. A few of the countries where karela is frequently grown include India, China, Japan, Malaya, Thailand, Vietnam, Singapore, Colombia, Brazil, the Amazon, Cuba, East Africa, Haiti, Ghana, Mexico, Nicaragua, New Zealand, Panama, the Middle East, Central America, and South America etc. ⁸

Karela (plant insulin) contains a number of substances, such as glycoside, charantin, vicine, karavilosides, and polypeptide-p, which promote glucose absorption and may reduce blood sugar levels. ^{9,10}

Brahmi : *Bacopa monnieri* L.(leaves)

Brahmi, also known as *Bacopa monnieri* L. , as a leaf or entire plant extract used in Ayurveda as a possible brain tonic. The brain chemicals involved in memory, learning, and thought are improved as well, which improves people's cognitive ability. ^{11,12}

Brahmi has been regarded as having a wide range of uses and advantages in Ayurveda .It is a native plant that can be found all throughout the nation in the wet, marshy conditions typical of tropical locations. ^{13,14}

Other nations that border India include Nepal, Sri Lanka, China, Taiwan, and Vietnam. Brahmi is also grown there. It can grow in moist environments; hence it is also found in various southern US states including Florida, Hawaii etc.

The Ayurvedic medical texts Charaka Samhita and Sushruta Samhita also extensively discuss Brahmi. Here, a few illustrations from these traditional textbooks have been provided. ¹⁵⁻¹⁷

Despite these positive outcomes, there is very little evidence to support the hypolipidemic benefits of the herbal remedies mentioned above.

The current investigation was conducted on pooled discarded and healthy serum samples in order to evaluate and assess the total cholesterol-lowering effects of the filtrate of branded *Momordica charantia* L. fruit powder (Karela) and *Bacopa monnieri* L. leaf powder (Brahmi)

Materials and Methods:

Standard preparation:

Cholesterol standard was obtained from Erba chem Transasia kit with standard cut off value 200 mg/dL.

Sample preparation:

A kinetic study was conducted using the herbal filtrate of Brahmi leaf powder in distilled water (d/w) and cow's urine (c/u) (branded, distilled, and purified). It was added to the discarded non-infectious pooled serum samples that were obtained aseptically.

A kinetic study was conducted using the herbal filtrate of Karela fruit powder in distilled water (d/w) and cow's urine (c/u) (branded, distilled, and purified). It was added to the discarded non-infectious pooled serum samples that were obtained aseptically.

Following samples were obtained:

CHOL PS: Pooled sample

B1: Brahmi soaked sample (300 mg powder in d/w for 12 hrs)

B2:- Brahmi soaked sample (300 powder mg in c/u for 12 hrs)

C1:- Karela soaked sample (300 mg powder in d/w for 12 hrs)

C2:- Karela soaked sample (300 mg powder in c/u for 12 hrs)

Method:

CHOD -PAP : Enzymatic Colorimetric Determination of Serum Cholesterol, is intended for the in- vitro quantitative determination of total cholesterol in serum samples at 505 nm on the fully automatic EM 200 Autoanalyzer & Vitros 5600 system.

Aliquots were drawn at an interval of 0, 2 ,4 ,6 hours from each tube maintained in hot water bath at 37⁰ C.

Results:

Baseline (0 hrs.) reading in all the samples was 189 mg/dL (Table 1).

Table 1: Changes in total cholesterol levels in pooled sample (CHOL PS),

Brahmi powder-soaked sample (300 mg in distilled water for 12 hours)-B1, Brahmi powder -soaked sample (300 mg in distilled cow urine for 12 hours)-B2.

Karela powder -soaked sample (300 mg in distilled water for 12 hours)-C1, Karela powder -soaked sample (300 mg in distilled cow urine for 12 hours)-C2.

Table 1:

Sample	Baseline	2 hrs	4 hrs	6 hrs
CHOL PS	189 mg/dL	187 mg/dL	186 mg/dL	183 mg/dL
B1	189 mg/dL	155 mg/dL	146 mg/dL	112 mg/dL
B2	189mg/dL	154 mg/dL	144 mg/dL	110 mg/dL
C1	189 mg/dL	172 mg/dL	150 mg/dL	113 mg/dL
C2	189 mg/dL	169 mg/dL	148 mg/dL	111 mg/dL

Graphs given below show the decrease in the total cholesterol levels after 2 hrs. , 4 hrs. and 6 hrs. respectively for samples CHOL PS, B1,B2, C1 and C2 in distilled water (d/w) & cow’s urine (c/u) respectively.

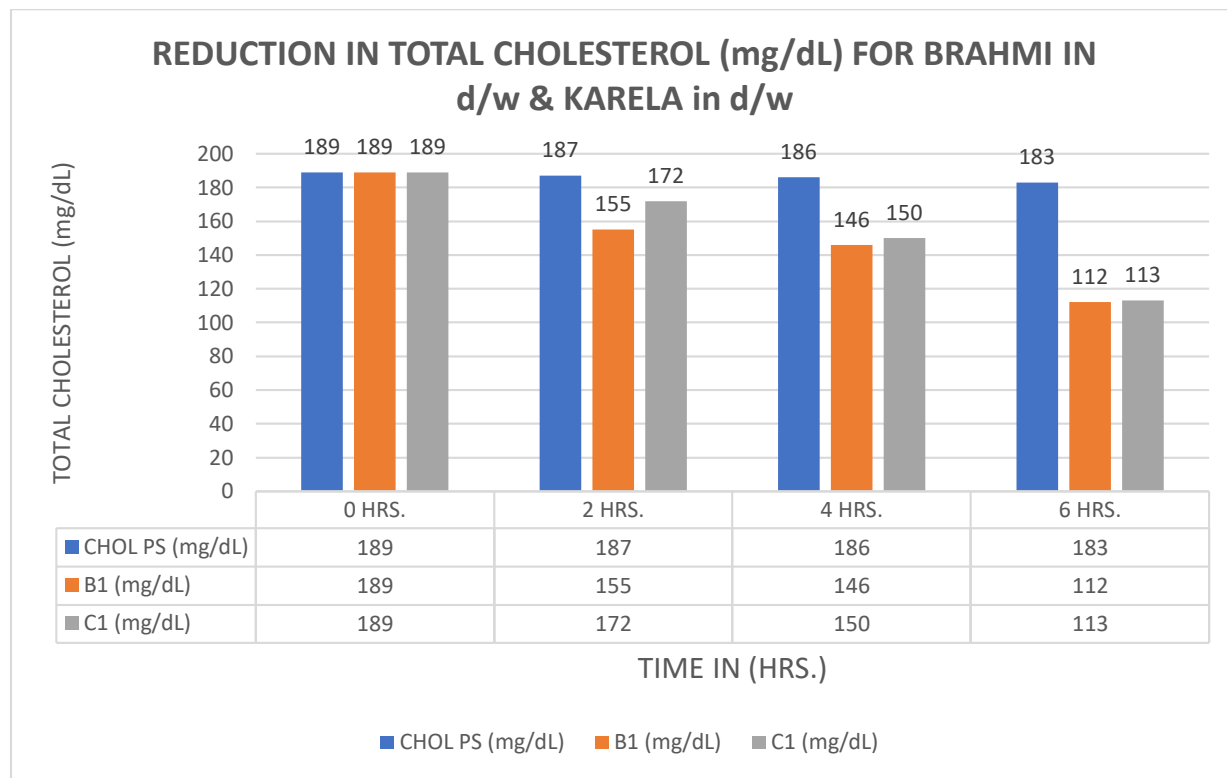


FIGURE 1.

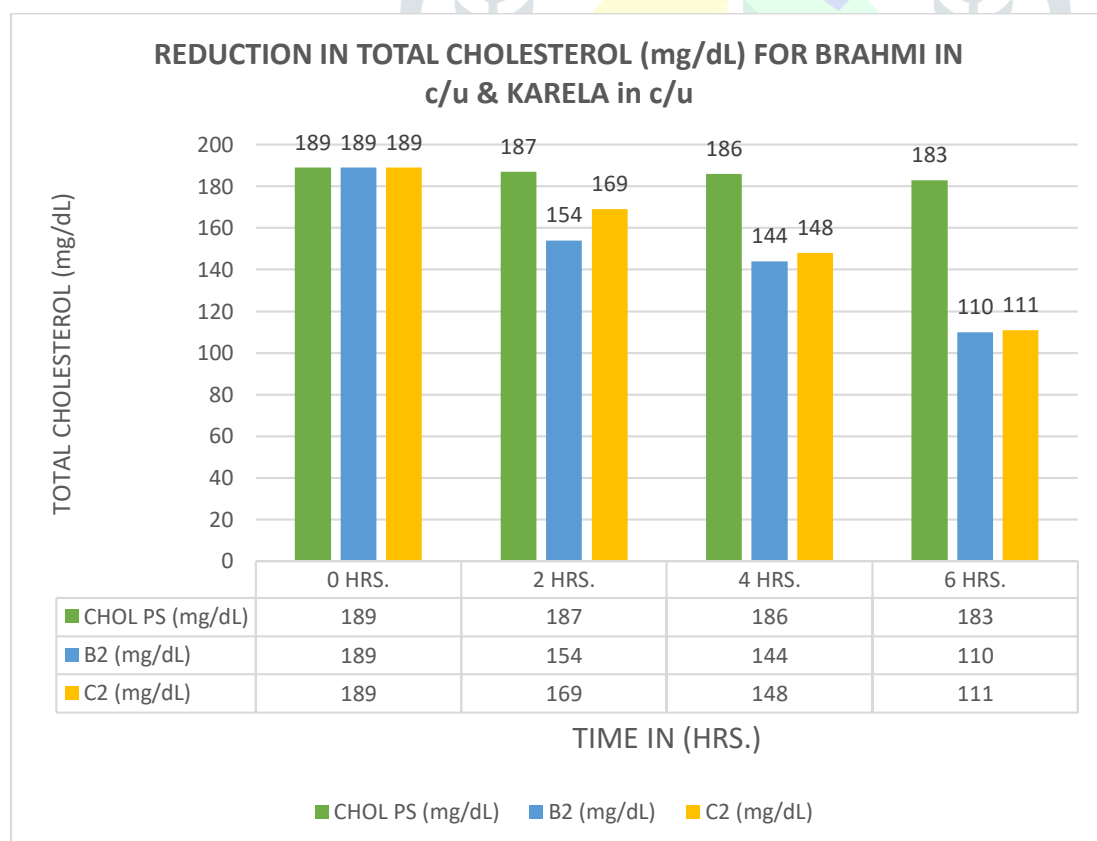


FIGURE 2.

Result

Therefore, the total cholesterol-reducing effect of Brahmi leaf powder and Karela fruit powders, both branded, soaked in distilled water (d/w) and cow's urine (purified, distilled, and branded) at 2 hours, 4 hours, and 6 hours, revealed good findings & showed encouraging results. Also, effect of the powders increased when soaked in cow's urine.

Discussion

As a result, cholesterol is neither harmful nor dangerous; rather, it is a substance required for both cell structure and the healthy operation of the nervous system and the brain. ¹⁸

Although high blood cholesterol is not a disease, it should be properly monitored and managed because it could lead to future cardiac problems. As a result of bad eating practises, stress exposure, a drop in physical activity, and lifestyle changes, the body's cholesterol levels have lately increased. ¹⁹

In the current study, we investigated the total cholesterol-lowering ability of Brahmi (*Bacopa monnieri L.*) leaf powder and Karela (*Momordica charantia L.*) fruit powder.

Herbal therapies are safer to use than the present modern medical system and successful at decreasing cholesterol. Many plants are thought to be useful for treating hypercholesterolemia, including garlic, cinnamon, tulsi, ginger, fenugreek, and Indian gooseberry etc. ^{20,22,23}

A CHOD-PAP (cholesterol dynamic extended stability testing) in vitro investigation was performed on the pooled healthy serum samples that were discarded. It is a colorimetric method, and the resultant colour intensity is directly proportional to the level of cholesterol present in the serum sample being analysed. In our study, we used cow urine, which serves as a bioenhancer²¹, increases or potentiates the effects of Brahmi powder and Karela powder.

Hypercholesterolemia is spurred on by oxidative stress and made worse by the activity of reactive oxygen species scavengers. ^{24,25}

The Ayurvedic medical system makes extensive use of saponin-containing plants. By causing the liver to produce bile from plasma cholesterol, saponins lower blood plasma cholesterol levels.

This is typically caused by decreased gastrointestinal absorption of cholesterol, which the liver needs to produce bile. ²⁶ The good cholesterol, high-density lipoprotein, can be increased by

flavonoids, while the bad cholesterol, low-density lipoprotein oxidation, can be decreased. Plaque and atherosclerotic disease are aided by low-density lipoprotein that has been oxidised.

The roots, stems, leaves, and fruits of *M. charantia* contain saponins, particularly triterpenoids. The total saponin content of *M. charantia* seeds is estimated to be 0.432%. From *M. charantia*, many saponins have been isolated, including stigmasterol and sitosterol saponins, which are effective at lowering blood TG levels, promoting oxidation in the liver and adipose tissue, reducing visceral fat weight, and lowering blood sugar levels. Hyperglycemic group rats fed bitter melon fruit demonstrated improvement in their lipid profiles in week four as evidenced by a 49% decrease in blood total cholesterol, a 35% decrease in triglycerides, an increase in faecal cholesterol production, and a much reduced rate of cholesterol absorption.²⁷

Saponins, flavonoids, and phytosterols are the active phytoconstituents found in brahmi. These phytoconstituents, which are found in brahmi powder soaked in d/w or C/U, may be the cause of the study's cholesterol-lowering effects. Our results are consistent with earlier research documenting Brahmi's ability to prevent hypercholesterolemic rats produced by high-fat diets.²⁸

Oxidative stress has a substantial impact on the onset of coronary heart disease, hypertension, cancer, inflammation, and atherosclerosis, among other diseases and hence there is a need for safer herbal medicines more than before.

Conclusion

Ayurveda is a practise that dates back thousands of years and is safer and more holistic than contemporary medicine. In the current study, we have shown that Karela powder and Brahmi powder have total cholesterol-lowering properties. Therefore, we suggest that Karela and Brahmi, which are frequently used to treat high plasma glucose levels and are used as brain tonics respectively, need additional research to determine their impact on cholesterol levels. Preclinical and clinical research should be done in the future to verify the anti-hypercholesterolemic effects of Karela and Brahmi herbs.

Conflict of interests: None

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