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## **REVIEW ARTICLE**

### **Potential Anticoagulant Herbal Plants: A Review**

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#### **ABSTRACT:**

Herbal medicines have been used for the various diseases and disorders since ancient era. The aim of this review is to focus on the herbal remedies for anticoagulant purpose. Now a days the use of allopathic medicines is exaggerated which leads to side effects and adverse reactions of drugs. To avoid such reactions use of herbal medicine is indicated. This review explored various plants like *Thymus atlanticus*, *Selaginella*, *Terminalia belerica*, *Tulbaghia violaceae*, *Tridax procumbens*, *Porana volubilis*, *Panax notoginseng*, *Petroselinum crispum*, Green and Brown algae, Grape seed, *Gracilaria debilis*, *Ferulago carduchoram*, *Erigeron canadensis*, *Fagonia arabica*, *Codium fragile*, *Cyamopsis tetragonoloba*, *Bauhinia forficata*, *Careya arborea*, *Artemisia dracunculus*, *Angelica shikokiana*, *Syzygium cumini*, *Melastoma malabathricum*, *Rhaponticum acaule*, *Cinnamomum cassia* showing anticoagulant activity. The data for this review is collected mainly from sciencedirect and pubmed.

**KEYWORDS:** Anticoagulant plants, anticoagulant activity, cardiovascular disorder, Antiplatelete drugs, plant extract.

#### **INTRODUCTION:**

Anticoagulants, also known as blood thinners, these are the chemical substances that prevent coagulation of blood. Coagulation is also known as clotting, it is the process of conversion of liquid blood into the gel form. Anticoagulants are used by one who is at the risk of developing blood clots in their body. Blood clots in the body may cause serious problems such as heart attacks, strokes, ischemic heart disease, deep vein thrombosis, pulmonary embolism.

These are the main causes of morbidity and mortality in the world.<sup>1</sup> For the treatment of such diseases plant extracts have been used which shows anticoagulant activity. The plants discussed in this review has a good anticoagulant activity. The plants are as like *Thymus atlanticus*, *Selaginella*, *Terminalia belerica*, *Tulbaghia violaceae*, *Tridax procumbens*, *Porana volubilis*, *Panax notoginseng*, *Petroselinum crispum*, *Leucas indica*, *Macroalga ulva*, *Jatropha curcas*, *Jatropha gossypifolia*, Green and Brown algae, Grape seed, *Gracilaria debilis*, *Ferulago carduchoram*, *Erigeron canadensis*, *Fagonia arabica*, *Codium fragile*, *Cyamopsis tetragonoloba*, *Bauhinia forficata*, *Careya arborea*, *Artemisia dracunculus*, *Angelica shikokiana*, *Syzygium cumini*, *Melastoma malabathricum*, *Rhaponticum acaule*, *Cinnamomum cassia*.

## ANTICOAGULANT HERBAL DRUGS:

### ***Thymus atlanticus:***

*Thymus atlanticus* belonging to family lamiaceae, it is native to morocco and used in the folk medicine for thrombosis and other cardiovascular diseases. It is also used as anti-inflammatory, antifungal, antioxidant, antimicrobial activity. Mainly the aerial part of this plant is collected during flowering period and extract of these aerial parts were used for the estimation of anticoagulant activity. The extract obtained by decoction method is used and it shown efficient anticoagulant and antioxidant activity.<sup>2</sup>

### ***Selaginella (sanjeevini):***

It is also known as sanjeevini. The biological source of the plant is *Selaginella byopteris* belonging to family selaginellaceae. *Selaginella* plant is abundantly available, ecofriendly, biodegradable and non-toxic in nature. Leaf extract is used for the synthesis of green silver nanoparticles. These green nanoparticles subjected to anticoagulant activity and it was found to be positive. These nanoparticles also showed strong antimicrobial, antifungal and antiplatelete activity.<sup>3</sup>

### ***Terminalia belerica:***

It is commonly known as behada. It is also used in Trifala churna, shows the properties like hair care, in headache, leucorrhea, as laxative, etc. It is powerful rejuvenative herb which provides nourishment to lungs, voice, eyes and throat. It also produces effects like antihelmintic, astringent, expectorant, antiseptic. *Terminalia belerica* belonging to family combratiaceae. The extract of fruits of this plant shows the anti thrombotic and thrombolytic activity.<sup>4</sup>

### ***Tulbaghia violaceae:***

It is small bulbous herbs belonging to family Alliaceae. It is native from south Africa. Mainly used in south Africa for treatment of hypertension, asthma, cold, fever, paralysis. Aqueous & methanolic extract of leaf & bulb shows anticoagulant property. Same extract also, show antithrombotic activity.<sup>5</sup>

### ***Tridax procumbens:***

It is commonly known as 'Ghamra' in hindi and 'Coat buttons' in English. *Tridax procumbens* belongs to the asteraceae family. It is used for jaundice and liver disorders. It is extensively used in Indian folk medicines As antifungal, antibacterial, insect repellent, in diarrhea and dysentery. It also possesses wound healing and hair growth properties. The sulphated polysaccharides derived from *tridax procumbens* shows the excellent anticoagulant activity. This drug can be used in anticoagulant therapy.<sup>6</sup>

### ***Porana volubilis:***

It is also called horse tail creeper. *Porana volubilis* belongs to family convolvulaceae. It is a climber creeper with hairless, warted branches. The nonsulphated polysaccharide obtained from *porana volubilis* which acts as catalyst of hrobin inhibition by the heparin cofactor II. Hence it shows antocoagulant activity.<sup>7</sup>

### ***Panax notoginseng:***

*Panax notoginseng* belongs to the family araliaceae. It is the most important medicinal herb in Chinese system of medicine. The *panax notoginseng* found in mainly two different forms i.e. raw and steamed form. The raw *panax notoginseng* shows medicinal activities like reduction of blood pressure, lowering blood cholesterol, in the treatment or prevention of cardiovascular diseases and also shows antioxidant and hepatoprotective effects. The steamed or processed *notoginseng* is claimed to show nourishing effect to the blood cells. The common species of *panax* affects platelete aggregation and coagulation differently, but the root extract of steamed *panax notoginseng* shows the greatest antiplatelete and anticoagulant activity as compared to other species.<sup>8</sup>

### ***Petroselinum crispum:***

It is commonly known as parsley in morocco. The *petroselinum crispum* belongs to the family apiaceae. In morocco it is used medicinally to treat cardiovascular diseases, diabetes, renal diseases. The aqueous leaf extract of the parsley shown the inhibition of platelete aggregation *in vivo* which demonstrate the anticoagulant activity of the plant. To normalize the platelete hyperactivation, the dietary intake of parsley may be beneficial.<sup>9</sup>

### ***Leucus indica:***

*Leucus indica* belongs to family Lamiaceae. Commonly known as Guma, tumba. It is traditionally used in the region of Uttarakhand as a wound healer. Leaves are also used as stomachic, vermifuge, sedative & in sores this plant widely used in psoriasis, chronic skin eruptions & painful swelling, also used in jaundice, inflammation, asthma, dyspepsia, fever & cold, snake bites & scorpion stings. Leaf extract of *L. indica* shows thrombolytic activity & also show anticoagulant property.<sup>10</sup>

### ***Macroalga ulva rigida:***

Marine macroalgae have several industrial applications. *Ulva rigida* belongs to family Ulvaceae. The sulfated polysaccharides from macroalgae shows various biological activities like anticoagulant, antioxidant, antiviral, antitumor. Sulfation of polysaccharides is necessary for anticoagulant activity.<sup>11</sup>

### ***Jatropha curcas:***

*Jatropha curcas* is a shrub belonging to family Euphorbiaceae. It is widely distributed in tropical

regions of Africa. Ethanomedicinally the leaves and roots of the plant is used as an abortifacient, for cancer therapy, as diuretic, haemostatic and purgative. It is traditionally used in the treatment of burns, convulsions, fever and inflammation. The *Jatropha curcas* latex shows the anticoagulant activity.<sup>12</sup>

***Jatropha gossypifolia:***

*Jatropha gossypifolia* is a medicinal plant belonging to family Euphorbiaceae. It is generally found in Brazil and it is worldwide known as “bellyache bush”. It is widely distributed in the tropical regions of the Africa and America. Leaves, stem, roots and latex of the plant is medicinally active. This plant shows the antihypertensive, anti-inflammatory, analgesic, antipyretic, haemostatic, antianemic applications. The aqueous crude extract obtained by decoction method shown the anticoagulant activity which was confirmed by pTTT test.<sup>13</sup>

**Green and Brown algae:**

The various species of the brown and green algae were isolated and extracted using the hot water. The extracts were subjected to APTT assay and their anticoagulant efficacy was determined. Some algal extracts show the anticoagulant activity through sulphated polysaccharides some shows through proteins and glycoprotein like compounds. *M. nitidum*, *C. fragile*, *L. ochotensis*, *H. fusiformis*, *S. horneri*, *S. siliquastrum* and *M. myagroides* shown highest potential for the anticoagulant activity.<sup>14</sup>

**Grape seed:**

It is the berries of plant *Vitis vinifera* belonging to family Vitaceae. From the ancient time it is consumed as a fruit. It is a promising nutraceutical for CVS. Grape seed also shows cardioprotective, antitumor, immunomodulator and antioxidant activities. The commercial extract of *Vitis vinifera* shown promising anticoagulant activity.<sup>15</sup>

***Gracilaria debilis:***

*Gracilaria debilis* is a marine macroalgae belonging to family Gracilariaceae. The sulfated polysaccharides of *Gracilaria* shows antitumor, antioxidant, anti-inflammatory, immunomodulatory, antiviral, antibacterial and antilipidemic. The sulphated polysaccharide extract shows potent anticoagulant activity, sulphated polysaccharide extract was obtained from depigmented algae (*Gracilaria debilis*).<sup>16</sup>

***Ferulago carduchoram:***

*Ferulago carduchoram* belongs to family Apiaceae. It is commonly known as Chavil in Persian language. It is mainly grown in west of Iran. Locally *Ferulago carduchoram* added to oil, ghee & dairy products as preservative. This plant reported traditionally as sedative

digestive, tonic & aphrodisiac property & also used for the treatment of ulcer, snake bite, intestinal worms, headache & hemorrhoids. Methanolic extract of aerial parts of *Ferulago carduchoram* prepared & from which coumarins were isolated. The isolated coumarins is mainly responsible for anticoagulant activity.<sup>17</sup>

***Erigeron canadensis:***

*Erigeron Canadensis* also known as *Conyza Canadensis*. The blossoming parts are used in folk medicine. Mainly lowering part of *Erigeron Canadensis* have medicinal activity like astringent, anthelmintic, diuretic & antidiarrhoeic. The aqueous extract have rich antioxidant & antiplatelet comp. The extract of flowering parts of this plant shown anticoagulant activity but it was lower than the well known anticoagulant heparin.<sup>18</sup>

***Fagonia arabica:***

*Fagonia arabica* belongs to family Zygophyllaceae. It is a small spiny undershrub with more or less prostrate, branches. Mainly found in Deccan & northwest India. Traditionally it is used as a deobstruent & blood purifier. It also possesses thrombolytic, antioxidant, molluscidal activities & also used in liver empowerment, cancer treatment. This is a better & cheaper natural source of anticoagulant, because of its abundant availability & extraction process is simple.<sup>19</sup>

***Codium fragile:***

It is commonly known as green sea fingers, dead man's fingers. It is the species of seaweed belonging to the family Codiaceae. It is originated from Pacific Ocean near Japan. Generally sulfated polysaccharides like heparin and heparan sulphate from algal extracts shown the anticoagulant activity. The *Codium fragile* species of seaweed shown the anticoagulant activity.<sup>20</sup>

***Cyamopsis tetragonoloba:***

*Cyamopsis tetragonoloba* is commonly known as gaur, gavar, gavar beans. It is belonging to family Fabaceae. Commercial preparation of gaur acts as source of galactomannan from *Cyamopsis tetragonoloba*. The individual polysaccharide were isolated using conventional methods. This plant shown the anticoagulant activity by exhibiting anti-thrombin activity.<sup>21</sup>

***Bauhinia forficata:***

It is commonly known as Brazilian orchid tree. *Bauhinia forficata* belongs to the family Fabaceae and it is native to Asia. Aqueous extract of *Bauhinia forficata* and from which thrombin like serine protease enzyme was isolated. The enzyme shown anticoagulant and fibrinolytic activity against *Bothrops jararacussu* venom.<sup>22</sup>

### **Careya arborea:**

Careya arborea also known as khumbhi, belongs to the family Lecythidaceae. Careya arborea indicated for dyspepsia, cough, epilepsy, ulcer, wound, snake bite, fistula, etc. The methanolic extract of careya arborea bark evaluated for its anticoagulant activity by using activated partial thromboplastin time, prothrombin time, and thrombin time. And it found to be almost equivalent to response of warfarin.<sup>23</sup>

### **Artemisia dracunculus:**

Artemisia dracunculus is also known as estragon, belonging to family Asteraceae. It has been shown effect on cardiovascular system. The leaf extract of Artemisia dracunculus was prepared, which contains coumarin compounds that are pharmacologically important. Its anticoagulant activity was confirmed in vitro.<sup>24</sup>

### **Angelica shikokiana:**

Angelica shikokiana belongs to the family Apiaceae. It is commonly used in Japanese folk medicine for the complications of cardiovascular system such as hyperlipidemia, atherosclerosis, hypertension. The methanolic extract of aerial parts of angelica shikokiana shown the potent anticoagulant and antiplatelet activity.<sup>25</sup>

### **Syzygium cumini:**

Syzygium cumini also known as Java plum, black plum or Malabar plum. It is evergreen plant belonging to family Myrtaceae. Traditionally it is used as antioxidant, hypoglycemic and anti-inflammatory. The study concluded that the methanolic extract of leaves of Syzygium cumini have anti-thrombin and anti-platelet activity.<sup>26</sup>

### **Melastoma malabathricum:**

It is a shrub found throughout the Asian countries belongs to the family Melastomataceae. This plant accepted as a medicinal plant in folk medicine. Traditionally it is being used to treat diarrhoea, dysentery and wound healing. Hot water leaf extract of this plant significantly shown anticoagulant activity by the prolongation of blood clotting.<sup>27</sup>

### **Rhaponticum acaule:**

Rhaponticum acaule is perennial herb belonging to family Asteraceae. The dried power of flowering part of the plant is taken and macerated with methanol. The methanolic extract shown the promising activity so the plant can be used as alternative to existing anticoagulants.<sup>28</sup>

### **Cinnamomum cassia:**

Cinnamon cassia is also known as Chinese cassia, it belongs to the family Lauraceae. Generally the bark is used of this plant as a spice, and for medicinal activities.

The extract of the plant shown the strong anti-platelet and anticoagulant activity.<sup>29</sup>

## **CONCLUSION:**

This review shown there are various potential herbal anticoagulants which show the potent activity as like synthetic drugs with no side effects. Such drugs can be used for the treatment of cardiovascular diseases such as thrombosis, but physician should consider possible drug interactions while prescribing these herbal medicines.

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