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MEDICINAL PLANTS FOR TREATMENT OF IDIOPATHIC THROMBOCYTOPENIC PURPURA: A REVIEW

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ABSTRACT
When platelets are destroyed by cellular and antibody-mediated processes, this is known as idiopathic thrombocytopenic purpura (ITP), which is an autoimmune disorder. Multiple research studies have documented the potential therapeutic applications of various Indonesian plants for ITP. These plants include *Tribulus terrestris*, *Tinospora cordifolia*, *Lycenium barbarum*, *Oryza sativa*, *Carica papaya*, and *Psidium guajava*. It has been demonstrated that these plants elevate platelet counts and reduce oxidative stress in ITP patients. This article attempts to provide a synopsis of several Indonesian plants that have been utilized in vivo and in vitro to treat ITP.

KEYWORDS: Idiophathic thrombocytopenic purpura, *Tribulus terrestris*, *Tinospora cordifolia*, *Lycenium barbarum*, *Oryza sativa*, *Carica papaya*, *Psidium guajava*.

INTRODUCTION

Idiopathic thrombocytopenic purpura (ITP) is an autoimmune disease in which platelets are destroyed by cells and antibodies.[1] Acute patients often present with clinical symptoms of bleeding and platelet counts below 30,000, indicating damage to circulating platelets and suppression of platelet production in the bone marrow.[1] With the absence of clinically evident secondary immune thrombocytopenia, the presence of isolated thrombocytopenia below 100 x 10^9/L, and the exclusion of other etiological factors, the diagnosis of this condition is generally straightforward.[2, 3] Nearly 30 new cases of the disease are identified annually, although this figure fluctuates by region. Age increases the incidence rate of this disease, which is more prevalent in women.[4] Conversely, the success rate of curing this ailment in children exceeds 70%.[5] On the contrary, ITP is a more intricate condition that typically manifests gradually in adults without any discernible symptoms. This persistent disease frequently develops subsequent to a viral infection or another medical condition.[5] The objective of this review is to analyze the research outcomes concerning potential therapeutic applications of Indonesian plants for idiopathic thrombocytopenic purpura (ITP).

Tribulus terrestris

Tribulus terrestris is an annual plant indigenous to the Mediterranean region and a member of the *Zygophyllacea* family. Long stems, small yellow flowers, and large spines adorn the fruit of *T. terrestris*.[6] Active compounds, including alkaloids, flavonoids, and saponins, are present in this plant. An advantageous characteristic of *T. terrestris* is its capacity to alter blood parameters or increase platelet activity.[7] According to clinical research, platelet counts in patients with ITP can be increased by 10 mg/kg/day of *T. terrestris*.[8] Patients diagnosed with ITP typically exhibit a platelet count that is below 100×10^3/µL.[9]

Tinospora cordifolia

Tinospora cordifolia is a plant belonging to the *Menispermaceae* family that has the nickname "nectar of life" because of its benefits for the immune system and the balance of various body organs.[10] *T. cordifolia* has a stem with a mouse structure, and in the cross section there is yellow wood composed of wedge-shaped wood bundles with large veins oriented radially and separated by narrow medullary rays. It has heart-shaped leaves made of a thin, waterproof membrane. The flowers are small, unisexual, and yellow.[11] *T. cordifolia* has many benefits that can be used to treat various medical conditions, such as fever, urinary tract problems, diarrhea, skin diseases, leprosy, diabetes, and many

more. *T. cordifolia* is reported to have antibacterial, antipyretic, immune-modulatory, analgesic, smooth muscle relaxant, antioxidant, cardio-protective, and hypoglycemic properties. On the other hand, *T. cordifolia* has alkaloids, steroids, glycosides, sesquiterpenoid, phenolics, aliphatic chemicals, and a few polysaccharides.[12] *T. cordifolia* plant has been reported to increase platelet counts in ITP patients at a dose of 100 mg/kg.[11]

Lycium barbarum

Lycium barbarum is a member of the *Solanaceae* family. For millennia, the red fruit of *L. barbarum* has been employed in traditional Chinese herbal medicine.[13] One of the biological activities and pharmacological functions of this plant has been documented to be the ability to increase platelet count and decrease oxidative stress.[14] According to in vivo investigations, platelet counts in mice with immune thrombocytopenic purpura are significantly increased by *L. barbarum* polysaccharides at doses of 50, 100, 200, and 400 mg/kg/day for seven days.[15] The findings indicate that the platelet count tripled from the stable condition to the point where it reached 100 mg/kg/day. The significance of *L. barbarum* polysaccharides in the immune treatment of thrombocytopenic purpura is demonstrated.[16]

Oryza sativa

Red yeast rice, or what is commonly known as *Oryza sativa*, is the result of rice fermentation by the mold *Monascus purpureus*. As a traditional medicine, *O. sativa* has many benefits, including restoring platelet counts and maintaining erythrocyte, hemoglobin, and hematocrit levels within normal limits. Lovestatin and vitamin B12 are bioactive compounds that are found in *O. sativa*. They are secondary metabolites that can raise the number of platelets.[17] In vivo research results report that administration of *O. sativa* at a dose of 400 mg/kg/day can increase the number of erythrocytes, hematocrit, and platelets in thrombocytopenia patients.[18]

Carica papaya

Carica papaya is a plant belonging to the *Caricacae* family. This plant is a two-seed plant, diploid, and polygamous.[19] Basically, this plant has properties as an anti-inflammatory, anti-tumor, antioxidant, and immuno-modulatory agent.[20] *C. papaya* leaf extract has long been used as a treatment for thrombocytopenia[21], where this plant extract contains proteolytic enzymes such as papain and chymopapain, which can increase the number of platelets.[21] Platelet counts goes up in people with ITP taking *C. papaya* leaf extract tablets three times a day for seven days, according to results from a clinical study.[22]

Psidium guajava

Psidium guajava is a plant that is widely used in traditional medicine in various countries.[23] *P. guajava* leaf extract has been shown to increase platelet counts in both humans and animals.[24] The results of in vivo research show that administration of *P. guajava* at doses of 150 and 300 mg/kg/day for 15 days can increase the number of rat platelets.[25] This is because the quercetin content contained in *P. guajava* leaves can increase the expression level of SCF mRNA in bone marrow stromal cells, which can stimulate platelets by inducing the liver to secrete thrombopoietin.[26-28]

CONCLUSION

It has been scientifically demonstrated that each of these plants can increase platelet count in idiopathic thrombocytopenic purpura; however, the specific mechanism by which each plant increases platelet count or restores platelet count to normal varies between plants. To determine whether this plant is effective as a novel alternative treatment for idiopathic thrombocytopenic purpura, additional research is required.

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