

Anti-jugular vein thrombotic effect of *Morinda citrifolia* L. [noni] in male SD rats

¹Funmi Ayanbule, ²Guodong Li, ¹Lin Peng, ¹Jacob Nowicki, ¹Gary Anderson, ¹Mian-Ying Wang

¹University of Illinois College of Medicine at Rockford, Department of Pathology, 1600 Parkview Avenue, Rockford, IL 61107, USA; ²Zhengzhou University, Department of Bioengineering, 100 Science Road, Zhengzhou, Henan 450001, China, PRC

Corresponding author: Mian-Ying Wang, MD, University of Illinois College of Medicine at Rockford, Department of Pathology, 1601 Parkview Avenue, Rockford, IL 61107, USA

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Abstract

Background: Venous thromboembolism (VTE) is a common and serious medical condition, which is estimably responsible for more than 300,000 hospital admissions annually in the USA. Pulmonary embolism (PE) is a major complication of VTE, which contributes to 12% death of hospitalized patients. Heparin is the most common anti-coagulant, but severe allergic reactions, bleeding, and thrombocytopenia limit its use. Thus, seeking a botanical, nontoxic antithrombotic alternative is an interesting area. *Morinda citrifolia* L. [noni] is a medicinal plant used in folk remedies by Polynesians for over 2,000 years. It has been reported to have a broad range of therapeutic and preventive effects. The bioactivities of NJ have been continuously discovered with antioxidative, anti-inflammatory, analgesic, and immune modifying activities. Our novel hypothesis is whether NJ has an anti-venous thrombotic effect in rodents. To examine our hypothesis, this study was designed to examine the anti-thrombotic effect of NJ on the jugular vein thrombosis model induced by ferric chloride in SD rats.

Material and Methods: NJ and placebo used in this study were donated by Morinda Holding Inc. NJ was formulated with grape juice and blue berry juice. Placebo was prepared by using the same procedure of NJ preparation, but without NJ in it. Thirty-six male SD rats were divided into six groups. Anti-venous thrombotic activities of 5% NJ, 10% NJ, heparin, and 10% NJ plus heparin were examined and compared with the positive and blank controls. Thrombosis was induced by application of a filter paper soaked in 50% ferric chloride on the right jugular vein. A

2-cm fragment of the occluded vein (thrombus) was removed and weighed after 1-hour maturation. Blood samples were collected for platelet count, aPTT, and PT tests.

Results: The weight of a 2-cm fragment of normal jugular vein was 9.9 ± 2.1 mg, while the weight of the occluded vein in positive controls was 30.7 ± 12 mg [$p=0.001$], 24.7 ± 6.5 mg in heparin [$p=0.16$], 25.5 ± 6.5 mg in 5% NJ [$P=0.15$], 20.0 ± 5 mg in 10% NJ [$P=0.04$], and 16.1 ± 5.0 mg in heparin plus 10% NJ [$P=0.02$], respectively. The activity of aPTT was significantly increased in heparin, 60.0 ± 10.0 sec [$p=0.002$] compared with 16.83 ± 4.9 sec in blank control. There was a significant increase in 5% NJ [34.24 ± 9.6 sec, $p=0.01$], a slight increase in 10% NJ [24.0 ± 5.4 sec, $p=0.06$]. The activity of PT was significantly increased in heparin group only [36.52 ± 3.0 sec vs 26.85 ± 0.4 sec in blank control, $p=0.01$]. There was no significant change in NJ groups. Clearly, the reduced thrombus weight by heparin may be partially due to the activation of aPTT and PT. The slight inhibition of NJ on aPTT activity may explain the possible additive antithrombotic effect of NJ with heparin. The platelet count was slightly reduced to 775,700 in the heparin group compared with blank control, there was no changes observed in other groups.

Conclusion: NJ has an anti-jugular vein thrombotic effect and a possible additive antithrombotic effect with heparin by activating aPTT without induction of thrombocytopenia. We wonder whether NJ has an anti-platelet function activity. The mechanisms for anti-venous thrombotic effects of NJ needs further study.

Key words: *Morinda citrifolia* L. [noni], noni juice (NJ), jugular vein thrombosis, heparin, antithrombosis, anticoagulant, activated partial thromboplastin time [aPTT], prothrombin time [PT].