Effect of *Nardostachys jatamansi* extract on vascular endothelial dysfunction in hypertensive, hyperglycemic patients: An open-label, prospective study

I. Rajyalakshmi¹²*, A. V. Rao³, Ravindra Babu Potti⁴, K. V. G. S. Murty²

**ABSTRACT**

**Background and Aim:** The vascular endothelium is directly involved in peripheral vascular disease, stroke, heart disease, diabetes, insulin resistance, chronic kidney failure, tumor growth, metastasis, venous thrombosis, and severe viral infectious diseases. Dysfunction of the vascular endothelium is thus a hallmark of human diseases. The present treatment packages available are unable to control/manage the progress of diseases mentioned above. **Method:** Jatamansi liquid 10 ml contains 500 mg of extract equivalent to 2.5 g raw herb given twice a day on open-label study to 10 subjects suffering with diabetes and hypertension for 15 days, and observation of augmentation pressure (AP) and augmentation index (AIx) done before and after treatment with SPHYGMOCOR machine, which show the vascular resistance and nitric oxide (NO)-dependent vascular relaxation at Nizams Institute of Medical Sciences, Hyderabad. The method was performed by using SPHYGMOCOR instrument. **Results:** The results are encouraging in the reduction of blood pressure, improvement of NO availability, reduction of AP, and AIx shows a considerable reduction in vascular resistance indicating an improvement of endothelial function. **Conclusion:** To sum up the study, Jatamansi extract showed improvement of NO availability apart from the reduction of blood pressure and reduction of vascular resistance by improving endothelial function, and being a small study, future investigation of Jatamansi extract may aid in better understanding the molecular mechanism associated with the observed protection.

**KEY WORDS:** Augmentation index, Augmentation pressure, Cardiovascular, Coronary artery disease, Diabetes, Endothelial dysfunction, SPHYGMOCOR

**INTRODUCTION**

Endothelial dysfunction¹ is a systemic disorder and a key variable in the pathogenesis of atherosclerosis, diabetes, autoimmune diseases, and their complications. The vascular endothelium is an active paracrine, endocrine, and autocrine organ that is indispensable for the regulation of vascular tone and maintenance of vascular homeostasis. The presence of endothelial dysfunction can be regarded as a clinical syndrome that per se is associated with and predicts an increased rate of adverse cardiovascular events.

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kidney failure. “In every region of the world, obesity doubled between 1980 and 2008,” “Today, half a billion people (12% of the world’s population) are considered obese.” Irrespective of advances in the treatments, each year over 2 million people in the United States alone have heart attacks or strokes, and many of them die indicates to look out for an alternative way of treatments to address this situation, in particular, vascular endothelial dysfunction, the basic root cause of above diseases and disorders. A small open-label study based on Jatamansi as a single drug to address vascular endothelial dysfunction conducted at Nizams Institute of Medical Sciences, Hyderabad.

**MATERIALS AND METHODS**

**Instrumentation**

SPHYGMOCOR\(^3\) - pulse wave analysis (PWA) is a simple and non-invasive technique that has been widely used in epidemiological and interventional studies. PWA provides useful information regarding the mechanical properties of the arterial tree and the ventricular-vascular interaction and can also be used to assess endothelial function. PWA is a simple, valid, reliable, and inexpensive technique, offering great clinical and epidemiological potential (Figure 1).

**Chemicals Used**

Jatamansi extract purchased from Amruta Herbals, Indore, and GMP Unit.

**Method**

Jatamansi liquid 10 ml contains 500 mg of extract equivalent to 2.5 g raw herb given twice a day on open-label study to 10 subjects suffering with diabetes and hypertension for 15 days, and observation of augmentation pressure (AP) and augmentation index (Alx) done before and after treatment with SPHYGMOCOR machine, which show the vascular resistance and nitric oxide (NO)-dependent vascular relaxation at Nizams Institute of Medical Sciences, Hyderabad.

The following Figure 2 shows typical features of the aortic pulse pressure waveform, from which can be derived AP, Alx, and arrival time of reflected waves at the central aorta (Tr). Tr represents the time from the onset of the ejected pulse waveform to the onset of the reflected wave and reflects aortic pulse wave velocity. AP is the additional aortic systolic pressure generated by the return of the reflected waves at the central aorta, expressed in absolute terms. Alx is the AP as a percentage of central pulse pressure and is a composite measure of aortic wave reflection and systemic arterial stiffness. Although the timing of the arrival of the reflected wave at the proximal aorta is largely determined by large artery PWV, Alx is not interchangeable with PWV.

Analysis of the aortic pressure waveform provides a measure of central blood pressure and indices of systemic arterial stiffness, such as AP and Alx, as shown in the following Figure 3. These indices are related to the reflected pressure waves from the peripheral arterial system, either as in a direct increase in pressure at the heart from the reflected wave (AP) or as a percentage of pulse pressure (Alx). Alx represents a complex measure of wave reflection and includes a component of arterial stiffness.

**Central Pressure Waveform**

The central (aortic) pressure waveform was derived from the radial artery waveform (through a validated transfer function (as provided by the SphygmoCor™)). Identification of early and late systolic peaks...

**Estimation of Total NO (Nitrite/Nitrate)**

The simplest and most frequently applied method employs colorimetric detection with Griess reagents. The Griess reaction, which was first described in 1879, entails formation of a chromophore from the diazotization of sulfanilamide by acidic nitrite followed by coupling with bicyclic amines such as N-1-(naphthyl) ethylenediamine. In this assay, Vanadium (III) chloride is used as a reducing agent. Vanadium (III) is routinely used to reduce nitrate to NO at temperatures exceeding 80°C for chemiluminescent detection. However, at reduced temperatures, nitrate reduction by Vanadium (III) is suspended following nitrite formation, and this is measured using Griess reagent. To 1.0 ml of serum (or standards) in a RIA tube and add 40 µl of 1N NaOH and 400 µl of 120 mM ZnSO4. Vortex for 30 s and centrifuge at 3000 rpm for 10 min. Take 0.5 ml of supernatant into a clean, dry glass tube, add 0.5 ml of VCL3, 2% SULF, and 0.25 ml 0.1% NEDD. Vortex for 15 s and incubate at 37°C for 30 min in the dark. Read at 540 nm against blank.

**RESULTS AND DISCUSSION**

Out of 10 subjects, four are female and rest are male persons, in that 6 are diabetic and hypertensive, and 4 are only hypertensive. The Jatamansi liquid extract was given for 15 days only.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>Systolic/diastolic</th>
<th>Total no (nitrite/nitrate)</th>
<th>AP</th>
<th>AIx</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>1 F</td>
<td>52</td>
<td>78</td>
<td>153</td>
<td>150/95</td>
<td>140/86</td>
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<td>158</td>
<td>150/90</td>
<td>126/84</td>
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<td>30.65</td>
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<tr>
<td>4 M</td>
<td>55</td>
<td>67</td>
<td>173</td>
<td>145/95</td>
<td>140/86</td>
<td>30.4</td>
<td>17.76</td>
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<td>66</td>
<td>169</td>
<td>140/94</td>
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<td>30.7</td>
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<tr>
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<td>54</td>
<td>170</td>
<td>150/90</td>
<td>140/85</td>
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<td>1.47</td>
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<td>145/85</td>
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<tr>
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<tr>
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<td>168</td>
<td>160/95</td>
<td>145/80</td>
<td>27.8</td>
<td>17.27</td>
</tr>
</tbody>
</table>

1=Values before treatment with Jatamansi; 2=Values after treatment with Jatamansi; % Inc: % Increase, % Dec: % Decrease, AP: Augmentation pressure, AIx: Augmentation index, NO: Nitric oxide
vascular resistance indicating an improvement of endothelial function (Table 1 and Figure 4).

**CONCLUSION**

To sum up the study, Jatamansi extract showed improvement of NO availability apart from the reduction of blood pressure and reduction of vascular resistance by improving endothelial function, and being a small study, future investigation of Jatamansi extract may aid in better understanding the molecular mechanism associated with the observed protection.

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**REFERENCES**


