

# Amyron: A plant based pharmacotherapy for faster recovery of dengue fever

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## ABSTRACT

“Dengue virus, the main cause of dengue fever, induces bone marrow suppression. Since bone marrow is the manufacturing centre of blood cells, its suppression causes deficiency of blood cells leading to low platelet count. Anaemia and spontaneous severe bleeding are the other consequences of bone marrow suppression.” Amyron is a plant based pharmacotherapy which can play a vital role in the recovery from dengue fever with its miraculous herbal ingredients like *Carica papaya* leaves juice which helps in the blood platelet formation, *Tinospora cordifolia* which powerfully activate the immune system specially increase the activity of NK-cell (natural killer cell), T-cell, and B-cell, *Withania somnifera* which accelerate the oxygen carrying capacity, *Boerhavia diffusa* which boosts synthesis of haemoglobin and RBC's, *Aloe vera* & *Emblica officinalis* also helps to boost the immunity. Thus, the ingredient herbs of Amyron provides all the essential measures for faster recovery in case of dengue fever. Apart from these benefits Amyron also provides complete nutrition by supplementing minerals, Vitamins, essential fatty acid like omega-3 & omega-6, antioxidants like Vitamin C and Vitamin E which contribute to the faster recovery of patients suffering from dengue.

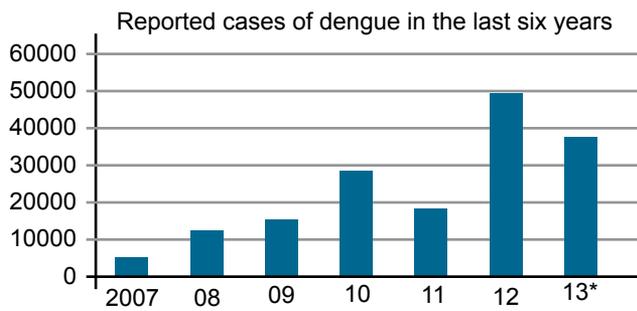
## INTRODUCTION

According to World Health Organisation (WHO) an estimated 2.5 billion people in more than 100 countries are at-risk and an estimated 50 million dengue infections occur annually in the world. It is of particular importance in South East Asia, which bear high burden of dengue. Dengue is an acute viral infection with potential fatal complications and is a febrile illness that affects infants, young children and adults. Symptoms of dengue fever range from a mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash. It is transmitted by the bite of an *Aedes mosquito* infected with any one of the four dengue viruses. It occurs in tropical and sub-tropical areas of the world. Symptoms appear 3—14 days after the infective bite. The other form of dengue fever is Dengue haemorrhagic fever with symptoms

like fever, abdominal pain, vomiting, bleeding is a potentially lethal complication affecting mainly children. Early clinical diagnosis and careful clinical management by experienced physicians and nurses increase survival of patients (WHO). There are no specific antiviral medicines for dengue. It is important to maintain hydration. Use of acetylsalicylic acid (e.g. aspirin) and non-steroidal anti-inflammatory drugs (e.g. Ibuprofen) is not recommended.

## PREVALENCE OF DENGUE IN INDIA

Dengue disease presents highly complex pathophysiological, economic and ecologic problems. In India, the first epidemic of clinical dengue-like illness was recorded in Madras (now Chennai) in 1780 and the first virologically proved epidemic of dengue fever (DF) occurred in Calcutta (now Kolkata) and

**Figure 1** Dengue cases in India

\*To Sept. 30.

Source: India Ministry of health

Eastern Coast of India in 1963-1964. During the last 50 years a large number of physicians have treated and described dengue disease in India, but the scientific studies addressing various problems of dengue disease have been carried out at limited number of centres. The following are the reported cases of dengue in the recent past in India.

#### AMYRON: A PLANT BASED PHARMACOTHERAPY FOR FASTER RECOVERY OF DENGUE FEVER

Amyron plays a vital role in improving the overall blood picture and platelet count which make this product an ideal adjuvant therapy in case of dengue fever. Dengue virus, the main cause of dengue fever, induces bone marrow suppression. Since bone marrow is the manufacturing centre of blood cells, its suppression causes deficiency of blood cells leading to low platelet count. Anaemia and spontaneous severe bleeding are the other consequences of bone marrow suppression. Ingredient herbs of *Amyron* like *Tinospora cordifolia* and *Carica papaya* plays an important role in increasing the platelet count in these conditions. *Carica papaya* leaves contain various phytoconstituents like saponins, tannins, cardiac glycosides and alkaloids. The alkaloids present include carpaine, pseudocarpine and dehydrocarpaine II. These constituents act on the bone marrow, prevent its destruction and enhance its ability to produce platelets. Moreover, it can also prevent platelet destruction in the blood and thereby, increase the life of the platelets in circulation.<sup>4</sup>

#### MECHANISM OF ACTION OF AMYRON AND PATHOGENESIS OF DENGUE VIRUS INFECTION

Dengue Virus induces generation of helper T cells (ThF) in mouse spleen which enhance clonal expansion of Dengue Virus -specific B cells. Dengue Virus -specific ThF secrete a cytokine, the helper factor (HF) which is composed of two

chains, one has antigen and the other has I-A determinants; both chains are essential for helper activity. The helper signal is transmitted only by a close physical contact of the plasma membranes of B cells and ThF or HF-adsorbed macrophage. ThF and HF help in production of DV-specific antibodies.

Amyron powerfully activates immune system with its different immunomodulatory herbs some of them are *Tinospora cordifolia*, *Aloe vera* and *Emblca officinalis*. In a study, a novel extract of *Tinospora cordifolia* (Giloe) was found to powerfully activate different types of lymphocytes, which are important immune factors, it increased NK-cell (natural killer cell) activity by a remarkable 331%, T-cell activity by 102%, and B-cell activity by 39%, all of which demonstrates increased immune activity.<sup>7</sup>

#### AMYRON IMPROVES BLOOD PICTURE AND PLATELET COUNTS

In an experimental study on *Carica papaya* leaves, platelet formation in test and control groups were studied before and after the treatment. During the study it was found that there was no significant difference in the platelet counts during the first 3 days in either group. However, platelet counts within the test group started to rise steadily after Day 3 and reached a peak level at Day 13 ( $10.94 \times 10^5/\mu\text{L}$ ). Subsequently, the platelet count remained relatively constant at a range of  $10 \times 10^5$  TO  $11 \times 10^5/\mu\text{L}$ . The platelet count of the test group was  $(11.33 \pm 0.35) \times 10^5/\mu\text{L}$  at the end of the experiment compared to that of the control group  $(5.53 \pm 0.12) \times 10^5/\mu\text{L}$ . Study results clearly indicated that there was a significant increase ( $P < 0.05$ ) in average platelet counts in the test group, as against a slight increase in the control group (Table 1). RBC count was also significantly ( $P < 0.05$ ) increased in the test group compared to controls. The findings of the study strongly suggest that there are active compounds in *C. papaya* leaves that enhance Haemopoiesis and thrombopoiesis.<sup>5</sup>

#### A. Iron supplementation, assimilation and absorption:

Amyron supplements natural iron fortified with Ascorbic acid and folic acid rich herbs. The natural sources of iron include *Colocasia esculanta*, *Boerhavia diffusa* and *Punarnavadi Mandoor* (a Classical Ayurvedic preparation containing iron oxide) to meet increased iron requirement during pregnancy. It also contains *Emblca officinalis* a rich source of Ascorbic acid (Vit.C) which enhances absorption of iron and prevents the formation of insoluble and unabsorbable iron compounds. It reduces ferric to ferrous iron, which is a requirement for the uptake of iron into the mucosal cells. Thus Amyron not only supplement Iron but also provide ingredient herbs for its assimilation and absorption in the body to saturate body's iron store.

**Table 1** Effect of *C. papaya* leaves on the formation of Blood Platelet, WBC's and RBC's

Parameters	Day 1		Day 7		Day 14		Day 21	
	Control group	Test group	Control group	Test group	Control group	Test group	Control group	Test group
Platelet count (X 105/ $\mu$ L)	3.67 $\pm$ 0.16	3.36 $\pm$ 0.16	4.52 $\pm$ 0.15	9.00 $\pm$ 0.35	5.21 $\pm$ 0.13	10.86 $\pm$ 0.38	5.53 $\pm$ 0.12	11.33 $\pm$ 0.35
RBC (X 106/ $\mu$ L)	6.23 $\pm$ 0.17	5.87 $\pm$ 0.19	5.95 $\pm$ 0.18	6.63 $\pm$ 0.32	6.61 $\pm$ 0.28	7.95 $\pm$ 0.59	6.00 $\pm$ 0.31	7.97 $\pm$ 0.61
WBC (X 103 )	7.45 $\pm$ 0.23	7.61 $\pm$ 0.13	7.16 $\pm$ 0.21	7.62 $\pm$ 0.32	7.34 $\pm$ 0.15	7.71 $\pm$ 0.61	7.52 $\pm$ 0.11	8.01 $\pm$ 0.42

**B. Improves Haemopoiesis, Hb level and oxygen carrying capacity of RBC's:** Various ingredients of Amyron are responsible for improvement in Haemopoiesis, haemoglobin level and oxygen carrying capacity of the blood cells. Different ingredients in Amyron have their own mechanism for these improvements. Some of them are as:

- 1. *Withania somnifera* accelerate the oxygen carrying capacity:** In a study conducted in haloperidol induced iron deficiency anaemia subjects with Extract of *Withania somnifera*, it was found that supplementation of *Withania* extract accelerated the oxygen carrying capacity of red blood cells and showed increased number of RBCs with normal counts and normocytic shape. From the study results It was concluded that *Withania* exhibited potent haematopoietic activity against haloperidol induced iron deficiency anaemia.<sup>1</sup>

In an another study with *Withania somnifera* it was found that *Withania somnifera* administered experimental subjects showed increase in RBC count, Hb content and PCV.

- 2. *Boerhavia diffusa* boosts synthesis of haemoglobin and RBC's:** A study in experimental subjects fed orally with aqueous leaf extracts of *Boerhavia diffusa* showed increasing trend in their RBC count and Hb%. Study also showed increase in haematological parameters of test animals indicating the boosting effects of *Boerhavia diffusa* on the synthesis of haemoglobin

and formation of red blood corpuscles due to the richness of iron and vitamin C, hence *Boerhavia diffusa* has promising role in the treatment or prevention of anaemia.<sup>2</sup>

- 3. Fenugreek seeds have restorative and nutritive properties:** Fenugreek seeds have good beneficial effects to raise blood haemoglobin by easy means. This might further help to prevent and cure anaemia and maintain good healthy life for longer duration in females of child bearing age. In a clinical trial it was reported at the end of third month, a significant rise of 2.24 gm% haemoglobin was seen in group of subjects which was supplemented with the medicinal dosage of powdered fenugreek seeds, while that in group of subjects which were not supplemented with fenugreek seeds, there was an insignificant rise of 0.40 gm % haemoglobin.<sup>3</sup>

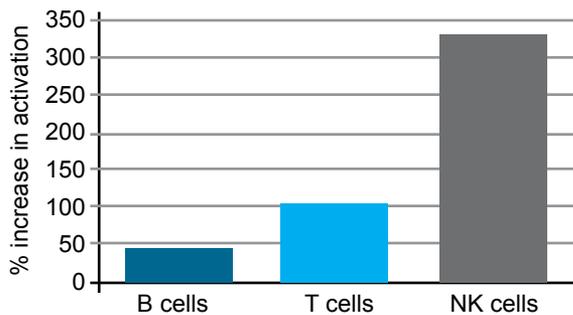
**C Provides a synergistic anti-oxidant protection to the body through multiple mechanisms against different oxidative stress:** Amyron is a complete blend of different herbs which are rich sources of antioxidants. Some of these herbs include *Aloe vera*, *Emblica officinalis* a rich source of vitamin C, Wheat germ oil and Almond (rich source of vitamin E) etc. Different antioxidant constituents from these herbs provides a synergistic anti-oxidant protection to the body by multiple mechanisms against different oxidative stress.

An experimental study with wheat-germ oil as a source of easily assimilable vitamin E. Wheat germ oil intake

**Table 2** Effect of Fenugreek seed on % Hb increase in different groups

Groups	Hb in gm% $\pm$ Mean S.D 1st August 2009	Hb in gm% $\pm$ Mean S.D 1st September 2009	Hb in gm% $\pm$ Mean S.D 1st October 2009	Hb in gm% $\pm$ Mean S.D 1st November 2009	Mean difference Hb in gm%
Group A	11.35 $\pm$ 0.94	11.46 $\pm$ 0.39	11.72 $\pm$ 0.5	11.75 $\pm$ 0.51	0.40
Group B	11.21 $\pm$ 0.87	12.34 $\pm$ 1.06	12.69 $\pm$ 1.04	13.45 $\pm$ 1.02	2.24

**Figure 2** Increase in immune cell activation with *T. cordifolia*



resulted in a rapid increase in the content of vitamin E in the brain, liver, heart, lungs, kidneys, and spleen. A significant reduction in the intensity of lipid per oxidation processes has been observed. It shows that an oral administration of wheat germ oil efficiently saturates the body with vitamin E.

In an another study with long term ingestion of *Aloe vera*, in specific pathogen free experimental subjects, it was found to be beneficial in prevention of age related pathology considered to have arisen from its antioxidant action. *Aloe vera* exhibited significant anti-oxidant activity in DPPH radical scavenging method and in linoleic acid per oxidation system and results were shown to be superior to those obtained with BHT and Alpha-tocopherol.<sup>6</sup>

**D Immunity booster action:** Amyron powerfully activates immune system with its different immunomodulatory herbs some of them are *Tinospora cordifolia*, *Aloe vera* and *Emblica officinalis*.

In a study, a novel extract of *Tinospora cordifolia* (Giloe) was found to powerfully activate different types of lymphocytes, which are important immune factors. The scientists found that it increased NK-cell (natural

killer cell) activity by a remarkable 331%, T-cell activity by 102%, and B-cell activity by 39%, all of which demonstrates increased immune activity.<sup>7</sup>

## CONCLUSION

Thus, Amyron with its herbomineral ingredients having Haemopoiesis, erythropoiesis and immunity boosting action provides a complete adjuvant therapy for faster recovery from dengue fever. Various studies of different ingredient herbs reviewed in this article clearly demonstrate that Amyron addresses all the requirements of complete adjuvant pharmacotherapy for patient suffering from dengue fever. Therefore it can be concluded that Amyron not only accelerates the process of erythropoiesis but also provides immunity booster action which plays a significant role in faster recovery of dengue fever.

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