



FINAL REPORT

Investigation of antioxidant activity of some medicinal plants used in traditional medicine for the treatment of cardiovascular diseases in Sri Lanka. NSF (RG/2005/HS/10)

Section 1

Information regarding Project/Project Personnel:

- i) Contract Number : NSF (RG/2005/HS/10)
- ii) Title of the Project : Investigation of antioxidant activity of some medicinal plants used in traditional medicine for the treatment of cardiovascular diseases in Sri Lanka.
- iii) Principal Investigator : Dr. M I F P Jayawardene, Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayawardenepura (Ex)
- iv) Co-Investigators : Dr. N MV M Ruvin Kumara, Department of Biochemistry, Faculty of Medicine, Karapitiya, Galle (Ex).
- v) Institute(s) where research was being carried out : University of Sri Jayawardenepura. India Institute of Technology Madras, Chennai.
- vi) Date of award : 13/06/2005
- vii) Date of completion of Project : Halted in 15/10/2009
- viii) Total allocation of funds : (Rs) 447,000.00
- ix) Total spent (Rs) : (Rs) 374,474.00
- x) Number of Research Students employed : 01
- xi) Post graduate degree completed with dates : Not completed.
- xii) Number of Technical Assistants and/or labourers employed and period of service : None
- xiii) Publications/Communications arising from the project during the reporting period
 1. Ranatunga D N, Jayawardene M I F P and Ruvin Kumara N K V M In- vitro antioxidant activity of some Sri Lankan Medicinal plants used in Ayurveda as cardio- protective agents, International Conference Biomaterials in Regenerative Medicine, Polish Academy of Sciences, Scientific Centre, Vienna, 2006 Abstract p 96-97.
 2. Ranatunga D N, Jayawardene M I F P and Ruvin Kumara N K V M and U G Chandrika Determination of in- vitro antioxidant activity by different methods of some Sri Lankan Medicinal plants used in Ayurveda as cardio-protective agents - 4th Joint Meeting Of Free Radical Research Australasia and Japan at Kyoto University Japan. Abstract p 66.

Section 2

Executive Summary of the Project:

The aim of the project was to determine the antioxidant activity of some medicinal plants used in traditional medicine for the treatment of cardiovascular diseases in Sri Lanka. Flavanoids and phenols of plants are used in preparations of alternative medicines used in treatment for cardiovascular diseases and peripheral vascular diseases. It is believed that these the active ingredients of these plant extracts confer cardio-protective by anti

oxidant properties Plant /plant parts of *Terminalia chebula* (Aralu), *Terminalia belerica* (Bulu), *Terminalia cattapa* (Kottamba), *Rauwolfia serpentina* (Ekaveriya), *Cyprus rotundus* (Kaladuru), *Osimum tenuiflorum* (Maduruthala), *Gmelina arborea*(Athdemata), *Alphinia calcarata* (Heen aratha), *Stereospermum suavelone* (Palol) *Azadiarachia indica* (Kohomba), *Ricinus communis* (Beheth endaru), *Orozylum indicum* (Thotila), *Munronia pinnata* (Binkohomba), *Rubia cordifolia* (Walmadata) were screened for antioxidant activity by DPPH free radical assay, hydrogen peroxide scavenging activity test, hydroxyl scavenging activity test, superoxide anion scavenging activity test and by determination of reducing power. Total phenolic compound analysis and determination of total flavonoid content was done. *Gmelina arborea*, *Ricinis communis* and *Terminalia chebula* showed the maximum antioxidant activity in the above tests. The Comet Assay for the detection of DNA fragmentation, cell cytotoxicity of the cells by MTT assay and DPPH quenching assay by Electron spin Resonance (ESR). Based on results of all the tests, *Terminalia chebula* (Aralu) fruit showed the best anti oxidant activity. Further it did not show a high cytotoxicity. *Terminalia chebula* should be studied further and active ingredients should be isolated and their structures elucidated. Such identification and quantification of antioxidants in will let researchers understand the nature of antioxidants in the medicinal plant/parts and could popularize the usage and /or lead to formation of drugs.

Section 3 : Report in detail:

i) Introduction/background

Research on traditional medicine is being revalued all over the world. For this reason at present extensive research is based on different plant species and their therapeutic principles.

Free radicals are molecules / atoms with unpaired electrons which are highly reactive. Free radicals are produced in the cells as by-products of normal oxidation. Most of the radicals are reactive oxygen species (ROS) formed during normal cell aerobic respiration in redox reactions involving xanthine oxidase, aldehyde oxidase, membrane associated NADPH oxidases and cytochrome P450system. (Gutteridge and Halliwell, 2000). Free radicals and ROS react with several biomolecules such as proteins, lipids and DNA and begin to form a chain reaction which could lead to aetiology of many diseases including cardio-vascular diseases. In the case of lipids, ROS cause lipid peroxidation. Lipids form an important part of the cell and many foods. The unsaturated sites of polyunsaturated fatty acids are easily attacked by free radicals. Low density lipoproteins (LDL) are oxidized to form atherosclerotic plaques, which are responsible for the development of cardiovascular disease (Halliwell, 1993; Frei, 1999). These reactions continue until free radicals are removed from the system. The generated free radical reacts with another free radical or when it reacts with a chain breaking or primary antioxidant.

Cardiovascular diseases remain as an important cause of death in developed and developing countries including Sri Lanka. Plants produce a lot of antioxidants to counter act oxidative stresses due to sunlight and oxygen. Research conducted in many parts of the world has shown that diets rich in fruits and vegetables protect against formation of peripheral diseases. Further there is evidence that different antioxidant agents in plants act as synergistic cooperative manner therefore using a mixture could be more beneficial than just using one.