FINAL REPORT

Section 1

Information regarding Project/Project Personnel:

i) Contract Number - RG/2007/Hs/10

ii) Title of the Project - Screening of twenty five medicinal plant extracts for their polyphenol content and *in- vitro* antioxidant activity

iii) Principal Investigator - Dr. K.A.P.W. Jayatilaka

iv) Co-Investigators - not applicable

v) Institute(s) where research was being carried out – Department of Biochemistry, Faculty of Medicine, Galle

vi) Date of award - 03-12-2007

vii) Date of completion of Project - 31-01-2011

viii) Total allocation of funds (Rs) - 184,835/=

ix) Total spent (Rs) - 179,267.20

x) Number of Research Students employed - None

xi) Post graduate degree completed with dates – Not applicable

xii) Number of Technical Assistants and/or labourers employed and period of service – Not applicable

xiii) Publications/Communications arising from the project during the reporting period – none so far

Section 2

Executive Summary of the Project:

Recent years have witnessed renewed interest in plants as pharmaceuticals across the world. This interest has channeled into the study of bioactivities of medicinal plant extracts. Oxidative stress is implicated in many chronic diseases. Plant antioxidants comprise an important role in defence against such oxidants.

A considerable body of literature supports the role for oxidative stress in pathogenesis of disease and contribution of dietary polyphenols to their prevention. The objective of this study was to determine the total polyphenol content of twenty five aqueous plant extracts and to determine the *in vitro* antioxidant activity of those extracts by DPPH assay, ferric reducing antioxidant power assay and by nitric oxide radical inhibition assay. These assays based on different chemical mechanisms were selected to take into account the wide variety and range of action of antioxidant compounds.

Twenty one hot water extracts out of the twenty five were analyzed. The most potent extracts out of the twenty one extract activities analyzed for the total polyphenol content were *Osbeckia aspera*, *Terminalia arjuna*, *Nauclea orientalis*, *Langus calcarata* and *Azadirachta indica*. Highest activities of the FRAP assays were followed by *Osbeckia aspera*, *Langus calcarata*, *Terminalia arjuna* and *Nauclea orientalis*. The low IC_{50} values for nitric oxide scavenging activity depicting high activity was found in *Osbeckia aspera, Terminalia arjuna*, *Nauclea orientalis* and *Adhatoda vasica*. The strongest activity

against DPPH radical was shown in *Osbeckia aspera, Nyctanthus arbor-tristis, Coscinium fenestratum, Nauclea orientalis* and *Terminalia arjuna*.

Regardless of the method of analysis the best antioxidant activity along with polyphenol contents were found in the extracts of *Osbeckia aspera, Terminalia arjuna* and *Nauclea orientalis*. Therefore they can be considered as rich sources of water soluble antioxidants and or phenolic compounds.

Section 3
Report in detail:

Introduction/background
Finding healing powers in plants is an ancient idea. People of all continents have long imbibed infusions of plants dating back to pre history. There is romance and mystique surrounding these traditional remedies, which is lacking from the white tablets and sophisticated techniques of modern medicine. New pharmaceuticals are often thought to arise from a 'black box' of synthetic chemistry or from recent drug design concepts such as biological receptors or the use of combinatorial chemistry techniques. But various active compounds from barks, leaves and roots are found in a new guise in existing treatments or may be used as a basis for design of novel medicinal molecules (1).

In spite of the scientific and commercial concerns, there is still considerable interest in ethno botany as a source of novel drugs and medicine for the world community. It should not be forgotten that a large proportion of the world's flora –probably 90% remains to be investigated scientifically. Most of these plants are used medicinally in some part of the world (1).

In addition to that the WHO has also stressed on the importance on medicinal plant research. In a monograph on medicinal plants by the WHO, it has emphasized the need of medicinal plant research as the information available on safety and efficacy data are very few (2).

Despite the wide distribution of plants, the health effects of polyphenols have come to the attention rather recently. Until mid 1990s the most widely studied antioxidants were antioxidant vitamins, carotinoids and minerals (3). A considerable body of literature supports the role for oxidative stress in pathogenesis of disease and contribution of dietary polyphenols to their prevention. Antioxidants are compounds that can delay or inhibit oxidation of lipids or other molecules by inhibition or propagation of oxidizing chain reactions. For many years polyphenols and other antioxidants were thought to protect cell constituents against oxidative damage through scavenging free radicals. However, this concept now appears to be an oversimplified view of their mode of action (4). It has been reported that cells respond to polyphenols mainly through direct interactions with receptors or enzymes involved in signal transduction, which may result in modifications of redox status of the cell and may trigger a series of redox dependant reactions (5).