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Blood Glucose Level Lowering Activity of Sri Lankan Black Tea brew (*Camellia sinensis*) in rats

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ABSTRACT

This study examined the blood glucose level lowering ability of black tea brew (BTB) of Sri Lankan *Camellia sinensis* (L.) O.Kuntze (Family: *Theaceae*). This was tested in normoglycaemic and streptozotocin induced diabetic rats using high grown Dust grade No: 1 tea (doses used: 84 mg /ml, equivalent to 1.5 cups; 168 mg/ml, equivalent to 3 cups; and 501 mg/ml, equivalent to 9 cups, orally). The results show that BTB possess promising and significant ($P < 0.05$) hypoglycaemic (both in normoglycaemic fasted rats and non fasted rats), antihyperglycaemic (in terms of improved glucose tolerance test), and antidiabetic (when tested in streptozotocin induced diabetic rats) activities. BTB (only highest dose tested) also exhibited α -glucosidase inhibitory activity (in terms of sucrose tolerance test) inhibited glucose absorption from the lumen of small intestine and possessed marked antioxidant activity *in vitro* (in terms of DPPH assay). On the other hand, the highest dose failed to increase insulin output and glycogen content in liver and skeletal muscle. It is concluded that BTB made from Sri Lankan black tea has blood glucose lowering activity in both normoglycaemic and diabetic status.

KEY WORDS- *Camellia sinensis*, antidiabetic, hypoglycaemia, antihyperglycaemia, diabetes, black tea

INTRODUCTION

Today diabetes mellitus is a common disease. Currently there are over 150 million diabetics worldwide and this is likely to increase to 300 million or more by the year 2025 (1). In the allopathic system of medicine, there are five classes of oral drugs, namely, sulphonylurea, repaglinide, biguanides, thiazolidinediones and α -glucosidase inhibitors used in the treatment of diabetes mellitus (2). Although, these drugs are highly effective they are expensive and possess adverse side effects (2). On the other hand, in Ayurvedic and other traditional systems of medicine there are several relatively inexpensive herbs that are claimed to have safe antidiabetic potentials (3, 4). However, efficacy of many of these have not been scientifically proven. In addition, there are few other herbs which are claimed by folklore as having antidiabetic properties but not mentioned in Ayurvedic medicine. Black tea brew (BTB) and green tea brew of *Camellia sinensis* (Family: *Theaceae*) is one of these. There are several studies showing antidiabetic potential of green tea brews of *C. sinensis* (5, 6) but scientific studies on this aspect of black tea brew are limited (7, 8). No studies have been reported so far on blood sugar lowering properties of BTB made from Sri Lankan teas. It is important to investigate this in BTB made from Sri Lankan tea since final chemical composition of tea brew and hence its pharmacological

properties of tea brew is known to vary with several factors such as country of origin, geographical background of soil, the cultivating method, the collection season, the age of the leaves, grades of tea, brewing conditions of time and temperature (5, 9). Further, some scientists have emphasized that more research on blood sugar lowering properties of tea are needed before its antidiabetic potentials are confirmed (6).

The aim of this study was therefore to investigate the blood glucose lowering activity of black tea brew made from Sri Lankan teas. This was examined in rats using Sri Lankan high grown Dust grade No:1 tea which is drunk widely by the Sri Lankans. If potent activity is found it would be a cheap readily available orally active herbal source that could be beneficial in diabetes mellitus.

MATERIALS AND METHODS

Experimental Animals

Healthy, adult male Wistar rats weighing 200-225 g purchased from the Medical Research Institute, Colombo, Sri Lanka were used in this study. The animals were housed in plastic cages in the animal house, Department of Zoology, University of Colombo, under standardized conditions (temperature: 28-31 °C, photoperiod: approximately 12 h natural light per day, relative humidity: 50-55%). The animals were fed with