

HOSTED BY



ELSEVIER

Contents lists available at ScienceDirect

## Asian Pacific Journal of Tropical Medicine

journal homepage: <http://ees.elsevier.com/apjtm>Review <http://dx.doi.org/10.1016/j.apjtm.2017.09.002>

## A review of five traditionally used anti-diabetic plants of Bangladesh and their pharmacological activities

Q2 Md. Rajdoula Rafe<sup>✉</sup>

Department of Pharmacy, Southeast University, Dhaka, Bangladesh

## ARTICLE INFO

## Article history:

Received 12 Jul 2017

Received in revised form 11 Aug 2017

Accepted 13 Sep 2017

Available online xxx

## Keywords:

Anti-diabetic

Traditional

Ethno-medicine

Pharmacology

Bangladesh

## ABSTRACT

Plants are used traditionally throughout the globe to treat various diseases. Traditionally used medicinal plants are an essential part of the health sector in Bangladesh due to its abundance of a vast source of ethno-medicine. Rural people from developing country like Bangladesh are greatly dependent on traditional source of medicine. The prevalence of diabetes mellitus is increasing from recent years; therefore various researches are going on to discover better medicine to treat this disease. This study has focused on five plants which are *Andrographis paniculata*, *Ageratum conyzoides*, *Swertia chirata*, *Terminalia arjuna*, and *Azadirachta indica* to find out their traditional formulation as anti-diabetic medicine and their pharmacological activity has also been explored through literature search. The available information about traditional anti-diabetic uses of these plants and their pharmacological activities were collected from various electronic sources like Pubmed, SciFinder, Elsevier, Springer, Scopus, Scirus, Science Direct, Google Scholar and Web of Science apart from these locally available books and peer reviewed journal were also used to collect information. This study will help to strengthen the relation between traditional medicine, pharmacology and drug development. A clue may be found from the information provided this review to discover new and better anti-diabetic drugs.

## 1. Introduction

Ethnobotanical research has been increased recently at greater diversity not only in national level but also at international level. A number of the literature revealed that there is a significant gap exists between scientific validation of ethno-medicine and their uses. Herbal medicines with nutritional value are now a way also used for their pharmacological properties to improve health status [1,2]. Thus plants are used as both food and medicine simultaneously [2,3]. The opportunity of using the plant as a medicine is huge due to the wide diversity of plants around the world. Cultural and geographical factors also facilitated the treatment of various diseases with plants in different formulations like crude extracts, whole plants, a paste of plants, infusions, etc [4–6]. Because of producing from natural sources and having less toxic effects, herbal medicines are gaining popularity all over the world [7]. In recent years, a lot of researches revealed that medicinal plants are used to

treat diseases in a specific part of the body like the nervous system, cardiovascular systems, respiratory system, digestive and other systems as well as in various organs of the body [8].

Metabolic changes caused by hyperglycemia are called diabetes mellitus and the hyperglycemia may cause due to the defects in insulin action or secretion or in both cases. The available hypoglycemic agents used worldwide such as metformin, sulfonylureas, and glucosidase inhibitors have serious adverse effects such as diabetic ketoacidosis, diarrhea and various diabetes complications [9]. The successful treatment and management of diabetes are yet to be discovered. Within the Indian subcontinent, extensive research has been performed in ethno-medicine system to find out the possible uses of the plant as anti-diabetic agents [10,11].

The fertile Bengal part of the South Asia which got independent in 1971 is called Bangladesh. The country located between latitudes 20° and 27°N, and longitudes 88° and 93°E. This type of location of Bangladesh makes it one of the most fertile countries in the world with alluvial soil. The fertile alluvial soil boasted with a diversified floral source which can be used in different aspects of medicine. Available and smooth nature of traditional herbal medicines made this sector an important part of public health service [12–14]. The geographical

<sup>✉</sup>First and corresponding author: Md. Rajdoula Rafe, Lecturer, Department of Pharmacy, Southeast University, Dhaka, Bangladesh.

Tel: +880 1748358585

E-mails: [rafi.royeb@gmail.com](mailto:rafi.royeb@gmail.com), [rajdoula@seu.ac.bd](mailto:rajdoula@seu.ac.bd)

Peer review under responsibility of Hainan Medical University.

and cultural similarity of Bangladesh with India influenced the involvement of local people with Indian Ayurveda and Unani medicine.

In the current review article, we have tried to collect information of five plants with hypoglycemic uses in traditional medicine of Bangladesh and their respective pharmacological effects studied through various reputed scientific journals to find out the relation between traditional use and pharmacological effects. This review may also help the scientists and researchers to work in the field of complementary and alternative medicine to find out a possible cure for diabetes and explore the modern health sector. This review also covers the traditional formulations of plants which are used to treat diabetes.

## 2. Traditional uses as anti-diabetic medicine

After an extensive literature search, it was observed that various parts of the plants are used for the treatment of diabetes and the parts included are leaves, barks, seeds, fruits, stems, flower and in some cases whole plants. Maximum of the plants are used with water and consumed in the early moment of the day. Over the past few decades, a lot of researches have been done about uses and formulation related with diabetes from which we can find out the most common formulations of our featured plants, i.e., *Andrographis paniculata* (*A. paniculata*), *Ageratum conyzoides* (*A. conyzoides*), *Swertia chirata* (*S. chirata*), *Terminalia arjuna* (*T. arjuna*), and *Azadirachta indica* (*A. indica*) [15–18]. Those formulations are given in Table 1.

## 3. Pharmacological activities

### 3.1. Pharmacological studies of *A. paniculata*

#### 3.1.1. Hepato-protective effects

*A. paniculata* is used in Indian systems of medicine for a long time to treat patients with liver diseases [19]. Not only as a single agent it also used as a component of poly-herbal preparation to treat liver damages [20]. Ram has observed and reported hepatoprotective activity of crude leaves extracts after investigating against CCl<sub>4</sub>-induced liver damage [21]. Andrographolide, a compound isolated from *A. paniculata*, has given inhibiting activity against liver injury induced by concanavalin A [22]. Shukla *et al.* has also reported choleric effects of compound isolated from *A. paniculata* against rats and guinea pigs [23].

#### 3.1.2. Anti-microbial effects

This plant has been investigated for the activity against bacteria, viruses and parasites to find out anti-microbial activity.

In a study, daily single dose administration of 0.12–24 g/kg body weight in rats for 6-month durations did not show any anti-bacterial activity [24]. But in another study, alcoholic rhizome extracts showed potential anti-microbial activity against *Ascaris lumbricoides* [25]. Methanolic extracts from *A. paniculata* have also showed significant inhibitory activity against *Plasmodium falciparum* and the IC<sub>50</sub> value was recorded at 7.2 µg/mL [26].

#### 3.1.3. Hypoglycemic effects

Aqueous *A. paniculata* extract was given potential inhibiting activity to glucose-induced hyperglycemia in normal rabbits and did not show any activity on hyperglycemia induced by epinephrine. Six weeks continuous administrations have no observable effects on blood glucose in fasting condition [27]. But in another study, Subramanian *et al.* stated that *A. paniculata* and andrographolide can produce hypoglycemic effects by inhibiting alpha-amylase and alpha-glucosidase enzymes [28]. A significant anti-diabetic activity was observed in alloxan induced diabetic rats by restoring incapacitated estrous cycle [29].

#### 3.1.4. Anti-oxidant activity

A study done by Trivedi *et al.* suggested that *A. paniculata* plant extracts have potential anti-oxidant activity against  $\gamma$ -Glutamyl transpeptidase, glutathione-S-transferase, and lipid peroxidase enzymes with in comparison to Benzenhexa chloride and this study was conducted on mice model [19].

#### 3.1.5. Anti-inflammatory effects

Andrographolide (a compound isolated from *A. paniculata*) and methanolic extract of *A. paniculata* can inhibit LPS-stimulated NO production of macrophage depending on the concentration of the incubated plant sample [30,31]. Another study done by Chiou *et al.* reported that andrographolide can inhibit NO production induced by lipopolysaccharide and can also inhibit inducible nitric oxide synthase production of murine cell line [32].

#### 3.1.6. Effects on cardiovascular disease

Aqueous plant extracts and biologically active compounds isolated from *A. paniculata* have been investigated in animal model to find out significant effects on myocardial infarction. A study has shown that the plant extract from *A. paniculata* can produce hypotensive effects by relaxing the blood vessel so that blood can flow easily to the brain, heart and other parts of the body [33]. Another study suggested that andrographolide an active constituent of *A. paniculata* gave a time dependent protection against hypoxia in rat models and this effect was said to be

**Table 1**

The most common formulations of the featured plants.

Plants name	Family	Bengali name	Formulation used in local areas of Bangladesh
<i>A. paniculata</i>	Acanthaceae	Kalomegh	Usually, the whole plant is used as a drug for treating diabetes. 5 mg Crude paste extract of the whole plant is taken in the morning before breakfast.
<i>A. conyzoides</i>	Asteraceae	Oochunt	Macerated form of the whole plant is taken 1 spoon full twice a day.
<i>S. chirata</i>	Gentianaceae	Chirata	Chirata root is used for the treatment of diabetes with a mixture of honey. It is taken 1–2 g a dose per day in the morning.
<i>T. arjuna</i>	Combretaceae	Arjun	3–6 g per dose of Berks in powder or macerated form with milk is taken 2 h after food.
<i>A. indica</i>	Meliaceae	Neem	The paste of leaf extracts prepared with water is taken at a dose of 2–3 teaspoons daily in empty stomach.

Download English Version:

<https://daneshyari.com/en/article/8754070>

Download Persian Version:

<https://daneshyari.com/article/8754070>

[Daneshyari.com](https://daneshyari.com)