



# Use of household ingredients as complementary medicines for perceived hypoglycemic benefit among Sri Lankan diabetic patients; a cross-sectional survey

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## ABSTRACT

**Background:** Biologic based therapies are frequently used as complementary medicines in diabetes. The aim of this study was to identify the commonly used herbal remedies and their preparations in Sri Lankan patients with Type 2 diabetes. **Methods:** This is a descriptive, cross-sectional study on 220 diabetic patients using herbal remedies for perceived glycemic benefit. **Results:** All the patients used their regular conventional medications together with herbal remedies. The most commonly used medication was metformin (91.4%). Ivy gourd (*Coccinia grandis*) was the most commonly used herbal remedy (32%), followed by crepe ginger (*Costus speciosus*) (25%) and bitter melon (*Momordica charantia*) (20%). Herbal remedies used less frequently were finger millet (*Eleusine corocana*) (5%), amaranth leaves (*Wattakaka volubilis*) (5%), goat weed (*Scoparia dulcis*) (4%), *Salacia reticulata* (4%), fenugreek (*Trigonella foenum-graecum*) (3%) and tree turmeric (*Coscinium fenestratum*) (0.5%). None of the patients used commercially available over-the-counter herbal products. The common preparations were salads (72.8%), curries (12.8%), herbal tea (6%), and herbal porridges (6%). **Conclusion:** The practice of using household ingredients as complementary medicines is common in Sri Lanka. Few herbal remedies and their methods of preparation have limited evidence for efficacy. In view of the frequent use by diabetic patients each needs to be documented for reference and scientifically explored about their hypoglycemic potential.

**KEY WORDS:** Bitter melon, crepe ginger, complementary medicine, ivy gourd, Type 2 diabetes

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## INTRODUCTION

The concept of combining dietary constituents to manage illnesses is ingrained in the history. At present, there is a booming market for the complementary and alternative medicines (CAM) globally. Five categories of CAM have been identified; biological based therapies such as herbal and dietary supplement; alternative medical systems like acupuncture and Ayurveda; energy therapies like Reiki; manipulative and body-based systems like chiropractic or massage; and mind-body interventions like Yoga [1]. Of these, the herbal remedies are the most abundantly used form of therapy. Global prevalence for the use of CAM in diabetes varies from 30% to 57% [1,2]. Diabetic patients are 1.6 times more likely than non-diabetics to use a CAM for a host of reasons [3].

In a previous study, we observed the prevalence of CAM use in diabetic patients in Sri Lanka to be 76% [4]. Recent estimates show that over 80% of people living in developing countries still depend on CAM for treatment of health conditions [5].

Similarly even in the absence of good supporting evidence, developed countries like the United States also has recorded an increase of 380% in the use of herbal remedies. [6] In the western world most of the herbal remedies used like Asian Ginseng, St John's wart and garlic are available in the form of proprietary products at supermarkets and pharmacies. In contrast in the developing Asian countries non-proprietary raw herbal products sourced locally are used with minimal processing. Most often they are common household vegetables perceived to process hypoglycemic properties [4]. While commercial preparations may have safety related information together with the product [7], the Physician needs to be knowledgeable about the locally sourced products.

Over 400 plants and compounds have so far been evaluated for use in Type 2 diabetic patients and over 1200 have been claimed to be remedies for the same illness [8]. Although the perceived adverse events of herbal remedies are low, they are not entirely devoid of adverse events [7]. Some are known to cause interactions with conventional medicines. For example,

Tanners cassia (*Cassia auriculata*) used in the Asian region as an herbal remedy for diabetes is known to cause elevated levels of Carbamazepine [9].

Since patients believe herbal products to be devoid of adverse events most do not inform their regular physician of their use [7].

While it will be exhaustive for physicians to be informed about all the existing herbal products used in diabetes, each country or region should have on record a list of common preparations used by their patients for reference.

The aim of this study was to identify the commonly used herbal remedies and their preparations in patients with Type 2 diabetes, attending a tertiary care diabetes clinic in Sri Lanka.

## METHODS

A cross-sectional survey was performed between April and August 2014 at the diabetes clinic of Teaching Hospital Peradeniya Sri Lanka. This diabetes clinic caters to 2200 registered patients with diabetes from multi-ethnic backgrounds. From a previous study [4] we knew the prevalence of herbal remedy use to be around 76% among our diabetic patients.

Inclusion criteria included Type 2 diabetes for at least 6 months and use of at least one type of herbal remedy in addition to conventional medications. Potential subjects were briefed regarding the study during a regular clinic day and were asked to report back during their next clinic visit if they were willing to participate. Out of 234 patients briefed 220 patients agreed to participate. Informed verbal consent was obtained and formally recorded from those who consented.

An interviewer-administered questionnaire was used to collect data. The questionnaire contained questions on the 3 domains of demographic information, diabetes related information and herbal remedy use. Demographic data included age, gender, level of education, occupation, income, the diabetes related information included duration of diabetes, presence of complications and current anti-diabetic medication. CAM related information included the type of CAM, source of the product and the method of preparation. The participants were asked to describe their method of preparing the herbal product and the details recorded. Excluding minor variations the methods were then re-categorized during post coding of the data to a limited number of preparations. To ensure validity of these methods they were read out to local housewives and cross checked with local recipes.

A two-stage sampling technique was used and consisted of an initial pilot-test being administered to 25 patients to establish face validity and identify any questions that needed re-phrasing. The questionnaire was then administered to the selected 220 participants.

Ethical approval for the study was obtained from the Ethics Review Committee (ERC) of the Faculty of Medicine, University of Peradeniya.

## RESULTS

### Demographic Characteristics

The study included 220 patients with 47 (21.4%) males and 173 (78.6%) females. The mean age was 60.6 years. The majority (93.6%) was Buddhist with the Hindus and Muslims making up the remaining 6.7%. Only 12.7% had completed secondary education, and 4.5% had completed tertiary education. Only 38 (17.2%) patients were actively employed, and 149 (67.7%) were unemployed. The mean duration of diabetes in the participants was 9.79 years. The socio-demographic profile of the participants is given in Table 1.

### Background Hypoglycemic Therapy

All the participants were on one or more oral hypoglycemic agents (OHG). The majority (68.3%) was on 2 OHGs. Metformin was used by 91.4% of the herbal remedy users and sulfonylureas by 64%. Insulin was used by 15.5%. None of the patients had reduced or stopped taking conventional medicines while using herbal therapies.

### Types and Preparations of Herbal Remedies

Ivy gourd (*Coccinia grandis*) was the most commonly used herbal remedy (32%), followed by crepe ginger (*Costus speciosus*) (25%) and bitter gourd (*Momordica charantia*) (20%). Herbal remedies used less frequently were finger millet (*Eleusine corocana*) (5%), anguna leaves (*Wattakaka volubilis*) (5%), goat weed (*Scoparia dulcis*) (4%), *Selacia reticulata* (4%),

**Table 1: Demographic and clinical characteristics of the diabetic respondents**

	CAM users n=220 (%)
Gender	
Male	47 (21.4)
Female	173 (78.6)
Religion	
Buddhist	206 (93.6)
Christian	03 (1.3)
Muslim	09 (4.0)
Hindu	02 (1.0)
Education	
Primary education	124 (56.4)
Secondary education	58 (26.3)
Completed secondary	28 (12.7)
Grad/Post graduate	10 (4.5)
Occupation	
Student	1 (0.5)
Unemployed	149 (67.72)
Retired	32 (14.54)
Employed	38 (17.27)
Individual income (Rs)	
No income	158 (71.8)
<10000	07 (3.2)
10000-20000	30 (13.6)
20000-30000	03 (1.3)
30000-40000	06 (2.7)
>40000	2 (1)

CAM: Complementary and alternative medicines

fenugreek (*Trigonella foenum-graecum*), (3%) and tree turmeric (*Coscinium fenestratum*) (0.5%). Cinnamon (*Cinnamomum zeylanicum*) and garlic was used by less than 1% of instances. None of the patients used over-the-counter (OTC) proprietary herbal medications.

All of the participants sourced the remedies locally, with most being grown in their gardens or bought from local groceries. The preparation of the herbal products was done as part of the general household cooking and consumed as a constituent of a daily meal. In most instances (48-78%) individual remedies were consumed on a weekly basis. The common preparations were salads (72.8%), curries (12.8%), herbal tea (6%) and herbal porridges (6%). This largely depended on the part of the plant that was consumed.

In cases of ivy gourd, crepe ginger and *W. volubilis* the leaves were consumed, in case of bitter gourd the fruit, in cases of fenugreek and finger millet the seeds and finally in cases of *S. reticulata* and tree turmeric parts of the trunk were consumed. The leaves were generally consumed as a leafy raw or tempered salad or herbal porridge, the seeds as porridge or boiled extracts, parts of trunk as boiled extracts and the fruit in many number of ways ranging from curries to blended juices. The frequency of use and the preparations of the commonly used herbal products are tabulated in Table 2.

**Table 2: Frequency of use of CAM and the preparations of each herb/vegetable**

Biological based (Herbal therapy)	Frequency	Percentage	Part of plant used	Common types of preparation (%)
Ivy gourd ( <i>C. grandis</i> )	160	32	Leaves	1. Fresh salad (70.62) 2. Tempered salad (24.4) 3. Herbal porridge (16.8)
Bitter gourd ( <i>M. charantia</i> )	103	20	Fruit	1. Curry (67.9) 2. Herbal tea (15.5) 3. Fresh salad (13.6)
Crepe ginger ( <i>C. speciosus</i> )	127	25	Leaves	1. Fresh salad (77.1) 2. Tempered salad (30.7) 3. Curry (7.1)
Finger millet ( <i>E. coracana</i> )	13	5	Seeds	1. Porridge (60) 2. Other (40)
<i>W. volubilis</i>	11	5	Leaves	Herbal tea (100)
Goat weed ( <i>S. dulcis</i> )	9	4	Leaves	Porridge (100)
<i>S. reticulata</i>	9	4	Trunk	Herbal tea (100)
Fenugreek ( <i>T. foenum-graecum</i> )	6	3	Seeds	Herbal tea (100)

*C. grandis*: *Coccinia grandis*, *M. charantia*: *Momordica charantia*, *C. speciosus*: *Costus speciosus*, *E. coracana*: *Eleusine coracana*, *W. volubilis*: *Wattakaka volubilis*, *S. dulcis*: *Scoparia dulcis*, *S. reticulata*: *Selacia reticulata*, *T. foenum-graecum*: *Trigonella foenum-graecum*, CAM: Complementary and alternative medicines

The salads were made by shredding the leaves, mixing it with grated raw coconut and adding spices. The herbal porridge was made by first shredding the leaves, grinding to make it into a pulp then adding coconut extract and water and cooking it over a slow fire. Finger millet was also used as porridge by grinding the seeds into a paste and later adding coconut extract. In most instances fenugreek seeds, *S. reticulata* and tree turmeric had been left to soak overnight in a jar of water and the water drunk in the morning as herbal tea.

## DISCUSSION

We studied the patterns of herbal remedy use on 220 diabetic individuals attending a tertiary care diabetes clinic at Teaching Hospital Peradeniya in Sri Lanka. In a previous study we observed that the use of herbal remedies among this population was high [4]. During the current study, we observed that almost all patients used common household herbs and spices as complementary medications in contrast to the Western practice of using commercially available herbal products. During the current study, participants were specifically probed to ensure that the herbal use was meant as a complementary medication as opposed to everyday use as a vegetable or spice. Although many studies exist that explored socio-demographic correlates of CAM use [2,10], none have documented in detail the patterns of herbal use.

The use of common household vegetables and spices as herbal remedies in diabetes has not been reported in Sri Lanka before. However, their use as CAMs has been reported elsewhere. In India, Modak *et al.* [11] reported the use of several herbs, which included bitter gourd and garlic. Al-Saeedi *et al.* reported the use of fenugreek among the diabetic patients in Mecca [12]. Similarly, herbs or biologic based therapies were used in 80% of CAM users in Malaysia with the majority using bitter gourd [1]. The high prevalence of herbal use in the Asian region is probably due to their low cost, easy accessibility and perceived safety. A common traditional know-how seems to exist with regard to selection and preparation of these substances in the Asian region. This is probably the result of common ancient healing systems that linked these countries through cultural and religious links [1].

In contrast, the western countries use commercially available herbal products as CAMs in diabetes. Cinnamon and Asian Ginseng are widely used for diabetes in USA and Canada [13]. In western Sidney Australia, multivitamins, cinnamon, co-enzyme Q and garlic were used as CAMs [2].

In the current study, only 12.7 and 4.5% of the participants had completed secondary and tertiary education respectively. A large proportion (67%) was unemployed. This may have influenced the pattern of CAM use observed by us as opposed to the use of OTC products.

All the participants of the current study used the herbal preparations alongside with their conventional medications. This raises the likelihood of interactions between conventional

medications and herbal therapies [7]. Little is known on such interactions, and there is no formal reporting of such events. There is reported reluctance on the patient's part in informing about herbal remedies to their respective physicians. One study in the UK found that a vast majority did not inform their physicians regarding herbal use [14].

There are no reported cases of interactions with any of the medications used in our study.

However, in view of the high prevalence of use, attending physicians should have a basic knowledge of the types of remedies used and their possible glycaemic and adverse responses. This task is made considerably difficult by the non-uniformity of the products and preparations from different regions of the world.

There are many studies that explored the efficacy of the herbal remedies used by the participants of our study [15]. Ivy gourd, the most commonly used herb in the current study, has been used in clinical trials in the Asian region and has shown promise in reducing hyperglycemia [16-18]. Munasinghe *et al.* [18] used ivy gourd as a traditional salad in exactly the same context as used by the participants of the present study and demonstrated a significant reduction of post prandial blood glucose in a set of Sri Lankan patients. In 2 other trials different preparations alien to its natural use was mentioned. Use of crepe ginger leaves for hypoglycemic effect was reported by us in a previous study [4]. In this study we demonstrated a significant association between the use of crepe ginger and the incidence of hypoglycemia in diabetic patients. The preparation was done in the same way as in the present study. It is interesting to note that the use of crepe ginger leaves in diabetes is unique to Sri Lanka. Use of various parts of the bitter gourd plant in treating diabetes is common in Asia [1]. Bitter gourd too has been studied in many short-term clinical trials of varying designs and has shown mixed results in reducing hyperglycemia [19-23]. However the use of bitter gourd as curry, salad or tea has not been reported. Bitter gourd seems to have been widely studied albeit having mixed outcomes. The effects of ivy gourd and crepe ginger has a much smaller pool of evidence and needs to be studied in more organized well designed studies to explore their hypoglycemic activity.

In our study, finger millet, anguna leaves (*W. volubilis*), *S. reticulata*, fenugreek, and goat weed were used by few people only. Fenugreek has been studied for its hypoglycemic effect, and there have been favorable results of its hypoglycemic efficacy [24-26]. *S. reticulata* has evidence for inhibition of intestinal alpha glucosidase and may have clinical significance in reducing post prandial glucose values [27]. Goat weed (*S. dulcis*) has been studied widely regarding its intestinal alpha glucosidase inhibitory activity in rat models but clinical trials are lacking [28]. Finger millet use and glycemic response in diabetes had previously been studied, but its use as an herbal remedy was not reported [29].

Unfortunately, there is very little published information on individual methods of preparation of these products. These traditional remedies are often subjected to scientific testing in

preparations that are wholly outside their natural use. Often, different parts of the plant, complex methods of extractions and extensive processing occur, which may alter their naturally occurring hypoglycemic effects.

With regard to fenugreek and bitter gourd the method of preparation seems to play a key role in its demonstrated hypoglycemic potential. Kassaian *et al.* [26] demonstrated patients who were given fenugreek powder in water had a significant reduction in FPG compared to those who received the same dose in yoghurt. Similarly, patients receiving blended raw bitter gourd juice showed significant reductions in blood glucose value compared to other methods of preparation [22,23]. At present, the use of ivy gourd and crepe ginger leaves as salads and the use of blended bitter gourd is supported by limited evidence [4,18,23].

It is important as an initial measure to document the traditional methods of use of herbal remedies so that these methods could be tested scientifically in future studies. We reiterate that whenever these substances are subjected to scientific vigor, that they at least initially get tested within their limits of natural use.

### Strengths and Limitations

The major strength of this study is the detailed reporting of the type of herbal remedies used by a group of Type 2 diabetic patients in Sri Lanka. As limitations, we identify the inclusion of patients only from the state sector and a relatively small sample size of 220.

### CONCLUSION

A variety of household ingredients is commonly used as CAMs by diabetic patients. Because of their non-proprietary nature and individual variations in dosing, the perceived effects and adverse effects are difficult to establish. The safety and efficacy of these products are not backed by sound evidence. Considering the high prevalence of use, efficacy and safety information on the common types of herbal products need to be freely available to attending physicians to better understand and manage their patients.

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