Ethno-pharmacological and in-vitro anti-diabetic study of some medicinal plants commonly used in Ogbomoso, South Western Nigeria.

ABSTRACT

Objective: to document the knowledge of the anti-diabetic plants used by traditional healers in Ogbomoso, Oyo state Nigeria and to validate their antidiabetic property using in vitro approach.

Methodology and Results: An ethnobotanical survey on plants commonly used for treatment of type-2 diabetes mellitus was conducted and 5 of the plants chosen at random were investigated in-vitro for anti-diabetic property. A semi-structured questionnaire was given to 132 traditional healers and medicinal herb dealers who claimed to have treated type 2 diabetes mellitus or have knowledge on how to treat the disease in the five local government areas in Ogbomoso. In-vitro-anti-diabetic activities of Uvaria chamae (finger root or bush banana) (P.BAEUV), Peperomia pellucida (pepper elder) (L.KUNTN), Argimones Mexican (mexican poppy) (Papaveracea), Anchomanes difformis (kabaka-kachulu) (Araceae) and Cassia fistula (golden rain tree) (LINN) were assessed using α-amylase inhibition assay. Data were analyzed qualitatively and quantitatively.: A total of 71 plants species from 44 families were reported from 132 respondents out of whom 53 % were males and 47 % females. From the list of plants, the most cited families are Malvaceae and Euphorbiaceae (9.9%) while Vernonia amygdalina (RFC = 0.159) was the most cited species. The part of plants mostly used is the leaf or in a mix with other parts. The ethanolic leave extracts of Uvaria chamae demonstrated the highest dose dependent alpha amylase inhibitory (59.81 %) activity with an IC50 value of 385 µg/ml when compared with the other plant extracts. However, the plant showed a weaker alpha amylase inhibitory property when compared with the standard drug Acarbose (IC50 value of 46.2 µg/ml).

Conclusion and application of results: The in vitro anti-diabetic property of the chosen plants showed that there is need for proper documentation and preservation of indigenous knowledge on the treatment of diabetes mellitus.
INTRODUCTION

Diabetes mellitus is one of the major causes of morbidity and mortality in the world. According to Durmuşkahya and Öztürk (2013), there are 285 million (6.6% of population aged 20-79 years) diabetic patients across the globe and it account for more than 1.1 million deaths worldwide. By 2030, it is estimated that the number of diabetes patients will reach 450 million with 97% showing type 2 diabetes mellitus (Israel, 2010, 2011). In Africa, approximately 13.6 million people are reported to be suffering from diabetic mellitus and 7 million of this population resides in sub-Saharan Africa. Nigeria has the highest number of people with diabetic (approximately 1.2 millions) and impaired glucose tolerance estimated at 3.85 million. Consumption of energy-rich diet and obesity, increase in sedentary lifestyle has been attributed to the rise in the number of diabetic cases (Mustafa et al., 2014). Based on aetiology and clinical presentation, diabetes mellitus is classified into two namely type 1 and type 2. Type 1, commonly referred to as insulin dependent diabetes mellitus (IDDM) is caused by immunological destruction of pancreatic β cells resulting in insulin deficiency (Notkins,2002) while, Type 2, also known as non-insulin-dependent diabetes mellitus (NIDDM) is characterized by both impaired insulin secretion and insulin resistance which is often associated with obesity and hereditary disposition (Zimmet,1990). Although, there are many conventional therapies such as stimulation of endogenous insulin secretions, enhancement of the action of insulin at the target tissues, use of oral hypoglycaemic agents (biguanids and sulfonylureas) and the inhibition of degradation of dietary starch by glycosidases (α-amylase and α glucosidase) (Sudha et.al., 2011), over 80 % of rural dwellers in developing countries still depend on medicinal herbs (van Wyk et al., 2002). They believe that plants and plant materials are cheap, easily accessible and have fewer or no side effects. Therefore, they rely on it as a better alternative to the synthetic drugs (Rajans and Kumarasamys, 2012). In Ogbomosho, south west Nigeria, 80% of people still rely on traditional medicine and Traditional Health Practitioners (THPs) as the primary source of health care (WHO,2002) due to accessibility and cultural acceptance. Information and documentation on herbs commonly employed in the treatment and management of diabetes mellitus in Ogbomosho is scanty in the literature. Hence, the present survey was undertaken to document the knowledge of the anti-diabetic plants used by traditional healers in the study area and to validate the antidiabetic property of few of them using in vitro approach.

MATERIALS AND METHODS

Briefly, the survey was carried out in five local areas (Kinnira, Arowomole, Surulere, Orire and Ogo-Oluwa) which cover the whole of Ogbomoso North and a substantial part of Ogbomoso South. Ogbomoso lies between latitude 8° 08' 00" and longitude 4° 16' 00". It is densely populated majorly by the “Yoruba’s” and was estimated to cover 27.5 square kilometres, the second largest city after Ibadan in Oyo State Nigeria (Olorunnisola et al., 2013). This study was carried out between January and April 2014 to gathered phytotherapeutic information about indigenous plants used in the treatment of diabetes.

Data collection: A total of one hundred and thirty two (132) respondent mostly traditional healers and medicinal herb dealers who are rural dwellers and are aware of the disease (DM) were interviewed. A guided questionnaire was given to the respondents. Each respondent was then interviewed alone to maintain confidentiality among them. The interviews deduced information on the socio-demographic data like age, education, occupation, the causes and diagnosis of type 2 diabetes mellitus, medicinal plants, vernacular names, parts used, source of the plant materials, methods of preparation, and routes of administration, duration of treatment and contraindications or likely side effect in traditional treatment of the disease. Professor JA Ogunkunle, a botanist in the Department of Pure and Applied Biology, Ladoke Akintola University of Science and technology, Ogbomoso, identified the medicinal plants mentioned by the interviewees. Voucher specimens of each plant species reported
were collected for confirmation and are deposited at the University’s Herbarium. **Intellectual property agreement:** The respondents who contributed to the wealth of information here reported were financially rewarded and assured that the information supplied will not be used for commercial purposes but to serve as enlightenment information to the community and to conserve the wealth of knowledge of plants used for the treatment of type 2 diabetes mellitus in Ogbomoso, Oyo State. **Data analysis:** The data obtained in this study was analysed using relative frequency of citation, which was used to access whether synthetic index could assist to quantify the distribution and diversity of information supplied by each respondent on a particular plant species. Relative frequency of citation (RFC) is used to determine the probability between number of people who give citation to each species and number of all respondents. The result of RFC obtained described the local importance of each species of the plants collected. The RFC was therefore calculated according to Tardio and Pardo-De-Santayana (2008): 

\[
RFC = \frac{FC}{N}
\]

Where FC is the number of informants who mentioned the use of the plants and N is the total number of respondents. Descriptive statistics such as frequency distribution, pie chart and percentages were used in the analysis of the data. **RESULTS**

**Age, Demographic and Educational data of Respondents:** Information obtained from 132 respondents interviewed revealed that 53 % were males healers compared to 47 % females. The ages of the respondents were between 40-70 years. Thirty-seven of the respondents were between 40 – 50 years, Forty-three of them were between the ages of 51 – 60 years old, while the remaining 52 of the respondents were between the ages of 61 – 70 years of age. All of the respondents claim to have inherited the knowledge from their parents and that it has become the normal practice in the lineage (Table 1). About 31.06 % of the respondents claimed to have between 26 and 30 years of experience in the treatment of type 2 diabetes mellitus (Table 1). We observed that 38.64 % of the total respondents had secondary education, 25.76% had the primary school education, 18. 94 % had vocational education/training while 16.67% of had no formal education. However, with little or no formal education, the respondents were able to diagnose diabetes based on sugar in the urine, frequent urination and loss of body weight. Majority of the respondents therefore believed their patients were cured once there is disappearance of sugar in the urine and reduced frequency in urination.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40 – 50</td>
<td>37</td>
<td>28.03</td>
</tr>
<tr>
<td>51 – 60</td>
<td>43</td>
<td>32.58</td>
</tr>
<tr>
<td>61 – 70</td>
<td>52</td>
<td>39.39</td>
</tr>
<tr>
<td>&gt;70</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
<td>53</td>
</tr>
<tr>
<td>Female</td>
<td>62</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAI</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancestral</td>
<td>132</td>
<td>100</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEDT</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 5</td>
<td>3</td>
<td>2.27</td>
</tr>
<tr>
<td>6 – 10</td>
<td>15</td>
<td>11.36</td>
</tr>
<tr>
<td>11 – 15</td>
<td>36</td>
<td>27.27</td>
</tr>
</tbody>
</table>
Ethno-pharmacological and in-vitro anti-diabetic study of some medicinal plants commonly used in Ogbomoso, South Western Nigeria.

### Table 1: Distribution of respondents according to their years of experience (YEDT) in diabetes treatment

<table>
<thead>
<tr>
<th>Years of Experience (YEDT)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 – 20</td>
<td>11</td>
</tr>
<tr>
<td>21 – 25</td>
<td>26</td>
</tr>
<tr>
<td>26 – 30</td>
<td>41</td>
</tr>
<tr>
<td>&gt;30</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
</tr>
</tbody>
</table>

### Table 2: Distribution of plant family and the percentage of occurrence

<table>
<thead>
<tr>
<th>Family</th>
<th>Distribution</th>
<th>Percentage species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malvaceae</td>
<td>4</td>
<td>9.09</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>4</td>
<td>9.09</td>
</tr>
<tr>
<td>Annonaceae</td>
<td>3</td>
<td>6.82</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td>3</td>
<td>6.82</td>
</tr>
<tr>
<td>Fabaceae (Leguminosae)</td>
<td>3</td>
<td>6.82</td>
</tr>
<tr>
<td>Arecaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Bignoniaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Poaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Rubiaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Rutaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Sapotaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Zingiberaceae</td>
<td>2</td>
<td>4.55</td>
</tr>
<tr>
<td>Phyllanthaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Acanthaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Amaryllidaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Anacardiaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Araceae</td>
<td>1</td>
<td>2.27</td>
</tr>
<tr>
<td>Aristolochiaceae</td>
<td>1</td>
<td>2.27</td>
</tr>
</tbody>
</table>

Anti-diabetic medicinal plant species: In the present study, 71 species belonging to 44 plant families were reported by the traditional healers to possess anti-diabetic properties (Table 2). Malvaceae and Euphorbiaceae have the highest number of species (4 species) and were the most frequently mentioned (9.9%) by the traditional healers in the preparation of their recipes. Other plant families commonly mentioned include Annonaceae, Cucurbitaceae and Fabaceae with 6.82% each. The results of RFC (Table 3) showed that *Vernonia amygdalina*, is the most important plant with (RFC = 0.159) 21 citations from 16% of the respondents, followed by *Morinda lucida* (RFC = 0.136) with 18 citations. About 45% of the total plants were cited once by the respondents therefore has least local importance as indicated by their least RFC. The ethnobotanical index and ranking of the plants as mentioned by the respondents were also presented in Table 3.
Table 3: showing Results of analysis used by RFC

<table>
<thead>
<tr>
<th>S/N</th>
<th>Species</th>
<th>FC</th>
<th>Ethnobotanical index</th>
<th>Ranking of RFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vernonia amygdalina (Del)</td>
<td>21</td>
<td>0.159</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Morinda lucida (Benth)</td>
<td>18</td>
<td>0.136</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Picralina nitida (Staphf)</td>
<td>16</td>
<td>0.121</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Citrusllus colocynthis (Schrad)</td>
<td>12</td>
<td>0.091</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Cocos nucifera L.</td>
<td>12</td>
<td>0.091</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>Carica papaya (L)</td>
<td>11</td>
<td>0.083</td>
<td>5</td>
</tr>
<tr>
<td>7.</td>
<td>Ocinum gratissium (Linn)</td>
<td>10</td>
<td>0.076</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>Momordica charantia (L)</td>
<td>8</td>
<td>0.061</td>
<td>7</td>
</tr>
<tr>
<td>9.</td>
<td>Allium cepa (L)</td>
<td>7</td>
<td>0.053</td>
<td>8</td>
</tr>
<tr>
<td>10.</td>
<td>Allium sativum (Linn)</td>
<td>7</td>
<td>0.053</td>
<td>8</td>
</tr>
<tr>
<td>11.</td>
<td>Anthocleista djalonensis (A. Chev.)</td>
<td>7</td>
<td>0.053</td>
<td>8</td>
</tr>
<tr>
<td>12.</td>
<td>Aristolochia ringens (Vahl.)</td>
<td>6</td>
<td>0.045</td>
<td>9</td>
</tr>
<tr>
<td>13.</td>
<td>Curculigo pilosa (schum &amp; Thonn.)</td>
<td>6</td>
<td>0.045</td>
<td>9</td>
</tr>
<tr>
<td>14.</td>
<td>Azadirachta indica (Juss.)</td>
<td>5</td>
<td>0.038</td>
<td>10</td>
</tr>
<tr>
<td>15.</td>
<td>Citrus aurantium (L.)</td>
<td>5</td>
<td>0.038</td>
<td>10</td>
</tr>
<tr>
<td>16.</td>
<td>Psidium guajava(L.)</td>
<td>5</td>
<td>0.038</td>
<td>10</td>
</tr>
<tr>
<td>17.</td>
<td>Viscum album (Linn.)</td>
<td>5</td>
<td>0.038</td>
<td>10</td>
</tr>
<tr>
<td>18.</td>
<td>Aframomum melegueta (K. Schum)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>19.</td>
<td>Ageratum conyzoides (L)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>20.</td>
<td>Phyllanthus niruri (L)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>21.</td>
<td>Citrus aurantifolia (Christm)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>22.</td>
<td>Ficus asperifolia (Miq)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>23.</td>
<td>Tithonia diversifolia (Hemsl.)</td>
<td>4</td>
<td>0.030</td>
<td>11</td>
</tr>
<tr>
<td>24.</td>
<td>Hibiscus acetosella (Welw.)</td>
<td>3</td>
<td>0.023</td>
<td>12</td>
</tr>
<tr>
<td>25.</td>
<td>Jatropha gossypifolia Linn.</td>
<td>3</td>
<td>0.023</td>
<td>12</td>
</tr>
<tr>
<td>26.</td>
<td>Kigelia africana (Lam.) Benth.</td>
<td>3</td>
<td>0.023</td>
<td>12</td>
</tr>
<tr>
<td>27.</td>
<td>Mangifera indica(L)</td>
<td>3</td>
<td>0.023</td>
<td>12</td>
</tr>
<tr>
<td>28.</td>
<td>Saccharum officinarum(L)</td>
<td>3</td>
<td>0.023</td>
<td>12</td>
</tr>
<tr>
<td>29.</td>
<td>Anchomanes difformis (Blume) Engl</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
<tr>
<td>30.</td>
<td>Butyropermum paradoxum (Don)</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
<tr>
<td>31.</td>
<td>Chlorophora excelsa (Withs Bath.)</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
<tr>
<td>32.</td>
<td>Chrysophyllum delevoyi (De Wild)</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
<tr>
<td>33.</td>
<td>Cymbopogon citrates (DC)</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
<tr>
<td>34.</td>
<td>Distemonanthus benthamianus (Bail.)</td>
<td>2</td>
<td>0.015</td>
<td>13</td>
</tr>
</tbody>
</table>
Other relevant information about the plants used:
According to the respondents different parts of the plants were mention for the therapeutic usage of these plants such as leaves, stem, bark, roots, fruits, seeds and whole plants (Fig. 1). Different parts of the same plant were also mentioned by the respondents or sometimes combination of parts. The leaves were the most frequently used parts with 57.75% followed by
the combination of leaf, bark, root with 12.68 %, this is followed by the fruits with 11.27 %. The least frequently used are seed, bulb and stem with 1.41 %. These plant parts are majorly prepared in water or schinapps. These result of this study revealed that different parts of the plants were used for treatments (Table 4) and also most of the respondents rarely use a single plant species for the treatment but rather prepare two or more plants as concoctions with different methods of preparations (table 5). The patients are required to take specific dosage at intervals based on the experience of the respondent.

Figure 1: showing the variations in the plant parts used in the treatment of diabetes
### Table 4: Species used for the treatment of diabetes

<table>
<thead>
<tr>
<th>S/N</th>
<th>Species</th>
<th>Local name</th>
<th>Family</th>
<th>Number of occurrences</th>
<th>Parts used</th>
<th>Pictures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acanthus montanus</td>
<td>Ahon-ekun</td>
<td>Acanthaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Aframomum melegueta</td>
<td>Ataare</td>
<td>Zingiberaceae</td>
<td>4</td>
<td>Leaf, fruit</td>
<td><img src="image1.jpg" alt="Image" /></td>
</tr>
<tr>
<td>3</td>
<td>Ageratum conyzoides</td>
<td>Imi-esu</td>
<td>Asteraceae</td>
<td>4</td>
<td>Leaf</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>4</td>
<td>Allanblackia floribunda</td>
<td>Orogbo</td>
<td>Clusiaceae</td>
<td>1</td>
<td>Fruit</td>
<td><img src="image3.jpg" alt="Image" /></td>
</tr>
<tr>
<td>5</td>
<td>Allium cepa</td>
<td>Onion</td>
<td>Amaryllidaceae</td>
<td>7</td>
<td>Bulb</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>Allium sativum Linn</td>
<td>Ayu</td>
<td>Lilaceae</td>
<td>7</td>
<td>Fruit</td>
<td><img src="image4.jpg" alt="Image" /></td>
</tr>
<tr>
<td>7</td>
<td>Aloe barbadensis</td>
<td>Allovera/eti erin</td>
<td>Xanthorrhoeaceae</td>
<td>1</td>
<td>Leaf</td>
<td><img src="image5.jpg" alt="Image" /></td>
</tr>
<tr>
<td>8</td>
<td>Aloe barbadensis</td>
<td>Eti-erin</td>
<td>Xanthorrhoeaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>Ananas sativus</td>
<td>Ope oynbo</td>
<td>Bromeliaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>Anchomanes difformis</td>
<td>Ogirisako</td>
<td>Araceae</td>
<td>2</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>Anogeissus leiocarpus (DC) Guill &amp; Perr</td>
<td>Ogo ayin</td>
<td>Combretaceae</td>
<td>1</td>
<td>Bark</td>
<td>N/A</td>
</tr>
<tr>
<td>No.</td>
<td>Species Name</td>
<td>Common Name</td>
<td>Family/Clothing</td>
<td>Ethanobotanical Use</td>
<td>Plant Part</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------</td>
<td>-------------</td>
<td>-----------------------------</td>
<td>---------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Anthocleista djalonensis</td>
<td>shapo</td>
<td>Loganiaceae (APG: Gentianaceae)</td>
<td>7</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Aristolochia ringens Vahl.</td>
<td>Akogun</td>
<td>Aristolochiaceae</td>
<td>6</td>
<td>Leaf, Root</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Azadirachta indica Juss.</td>
<td>Dongoyaro</td>
<td>Meliaceae</td>
<td>5</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Butyrospermum paradoxum</td>
<td>Emi</td>
<td>Sapotaceae</td>
<td>2</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Carica papaya</td>
<td>Ibepe dudu</td>
<td>Caricaceae</td>
<td>11</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Phyllanthus niruri</td>
<td>Eyin olobe</td>
<td>Euphorbiaceae</td>
<td>4</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Chlorophora excelsa (Weths) Bth.</td>
<td>Iroko</td>
<td>Moraceae</td>
<td>1</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Chrysophyllum delevoyi</td>
<td>Baka</td>
<td>Sapotaceae</td>
<td>2</td>
<td>Fruit</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Citrus aurantifolia</td>
<td>Lime</td>
<td>Rutaceae</td>
<td>4</td>
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<tr>
<td>No.</td>
<td>Plant Name</td>
<td>Common Name</td>
<td>Family</td>
<td>Extract/Part</td>
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<tr>
<td>21</td>
<td>Citrus aurantium L.</td>
<td>Oronbo</td>
<td>Rutaceae</td>
<td>Juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Citrusllus colocynthis</td>
<td>Bara egunsi</td>
<td>Cucurbitaceae</td>
<td>Leaf, pod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>cocos nucifera L.</td>
<td>Omi agbon</td>
<td>Areaceae</td>
<td>Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Cola acuminata</td>
<td>Obi olojumeta</td>
<td>Malvaceae</td>
<td>Nut/fruit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>croton zambesicus</td>
<td>Ajeobale</td>
<td>Euphorbiaceae</td>
<td>Leaf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Curculigo pilosa (schum &amp; Thonn.)</td>
<td>Epa ikun</td>
<td>Hypoxidaceae</td>
<td>Fruit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Curcuma longa</td>
<td>Laali pupa</td>
<td>Zingiberaceae</td>
<td>Leaf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Cymbopoqon citratus</td>
<td>Tea</td>
<td>Poaceae</td>
<td>Leaf</td>
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<tr>
<td>29</td>
<td>Distemonanthus benthianus Bail.</td>
<td>Igi Ayan</td>
<td>Leguminosae</td>
<td>Bark</td>
<td></td>
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<tr>
<td>30</td>
<td>Eugenia aromatica Linn.</td>
<td>Kanna furu</td>
<td>Myrtaceae</td>
<td>Leaf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Ficus asperifolia</td>
<td>Ipin</td>
<td>Moraceae</td>
<td>Leaf</td>
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<td></td>
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<tr>
<td>No.</td>
<td>Plant Name</td>
<td>Common Name</td>
<td>Family</td>
<td>Code</td>
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<td>------</td>
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<tr>
<td>32</td>
<td>Gliricidia sepium (Jacq)</td>
<td>Agunmaniye</td>
<td>Fabaceae (Leguminosae)</td>
<td>4</td>
<td>Whole</td>
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<tr>
<td>33</td>
<td>Gossypium barbadense</td>
<td>Ewe Owu</td>
<td>Malvaceae</td>
<td>1</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Harungana madagascariensis</td>
<td>Ewe amuje</td>
<td>Hypericaceae</td>
<td>1</td>
<td>Leaf</td>
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<tr>
<td>35</td>
<td>Heliotropium indicum L.</td>
<td>Ogbe akuko</td>
<td>Boraginaceae</td>
<td>2</td>
<td>Leaf</td>
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</tr>
<tr>
<td>36</td>
<td>Hibiscus acetosella</td>
<td>Owuakese</td>
<td>Malvaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
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<tr>
<td>37</td>
<td>Hura Crepitans</td>
<td>kerebuje</td>
<td>Euphorbiaceae</td>
<td>1</td>
<td>Leaf</td>
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<tr>
<td>38</td>
<td>Hymenocardia acida</td>
<td>Orupa omunu</td>
<td>Phyllanthaceae</td>
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<td>Leaf</td>
<td>N/A</td>
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<tr>
<td>39</td>
<td>Jatropha gossypifolia Linn.</td>
<td>Lapalapa pupa</td>
<td>Euphorbiaceae</td>
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<td>Leaf</td>
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<tr>
<td>40</td>
<td>Juglans regia L</td>
<td>Walnut (Awusa)</td>
<td>Juglandaceae</td>
<td>2</td>
<td>Fruit</td>
<td>N/A</td>
</tr>
<tr>
<td>41</td>
<td>Kigelia Africana</td>
<td>Pandoro</td>
<td>Bignoniaceae</td>
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<td>Leaf</td>
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</tr>
<tr>
<td>No.</td>
<td>Plant Name</td>
<td>Local Name</td>
<td>Family</td>
<td>IC50 Value</td>
<td>Part Used</td>
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<td>-----------------</td>
<td>------------</td>
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</tr>
<tr>
<td>42</td>
<td>Luffa cylindrica l H(c)</td>
<td>Erun</td>
<td>Cucurbitaceae</td>
<td>2</td>
<td>Leaf, root</td>
<td></td>
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<tr>
<td>43</td>
<td>Magnifera indica</td>
<td>Mangoro</td>
<td>Anacardiaceae</td>
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<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>44</td>
<td>Momordica charantia</td>
<td>Ejinrin</td>
<td>Cucurbitaceae</td>
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<td>Leaf</td>
<td></td>
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<td>45</td>
<td>Monodora myristica(Geafn)</td>
<td>Sasangbaku</td>
<td>Annonaceae</td>
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<td>Whole</td>
<td>N/A</td>
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<tr>
<td>46</td>
<td>Morinda lucida</td>
<td>Oruwo</td>
<td>Rubiaceae</td>
<td>8</td>
<td>leaf, Bark and root</td>
<td>N/A</td>
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<td>47</td>
<td>Moringa oleifera</td>
<td>Igbale</td>
<td>Moringaceae</td>
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<td>Leaf</td>
<td>N/A</td>
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<tr>
<td>48</td>
<td>Musa paradisiaca Linn.</td>
<td>Ogede agbagba</td>
<td>Musaceae</td>
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<td>Fruit</td>
<td>N/A</td>
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<tr>
<td>49</td>
<td>Nauclea latifolia</td>
<td>Egbeesi</td>
<td>Rubiaceae</td>
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<td></td>
</tr>
<tr>
<td>50</td>
<td>Newbouldia laevis</td>
<td>Akoko</td>
<td>Bignoniaceae</td>
<td>2</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Nyctaginaceae boehravia diffusa Linn</td>
<td>etipon ola</td>
<td>Fabaceae</td>
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<td>Root</td>
<td>N/A</td>
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<tr>
<td>52</td>
<td>Ocimum gratissium</td>
<td>Efrin</td>
<td>Lamiaceae</td>
<td>1</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Parkia biglobosa Jacq</td>
<td>Igba</td>
<td>Fabaceae</td>
<td>1</td>
<td>Bark</td>
<td>N/A</td>
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<td></td>
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<td>Common Name</td>
<td>Family</td>
<td>Code</td>
<td>Part</td>
<td>Location</td>
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<tr>
<td>54</td>
<td><em>Peperomia pellucida</em></td>
<td>Rinrin</td>
<td>Piperaceae</td>
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<td>Leaf</td>
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<tr>
<td>55</td>
<td><em>Pergularia daemia</em> (Forsk)</td>
<td>Chiov</td>
<td>Apocynaceae</td>
<td></td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>56</td>
<td><em>Picralina nitida</em></td>
<td>Abeere</td>
<td>Apocynaceae</td>
<td>1</td>
<td>Seed</td>
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<tr>
<td>57</td>
<td><em>Piliostigma reticulatum</em></td>
<td>Abefe</td>
<td>Caesalpiniaceae</td>
<td>1</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td><em>Psidium guajava</em></td>
<td>Guava</td>
<td>Myrtaceae</td>
<td>2</td>
<td>Leaf</td>
<td>N/A</td>
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<td>59</td>
<td><em>Saccharum officinarum</em></td>
<td>sugar cane</td>
<td>Poaceae</td>
<td>1</td>
<td>Juice</td>
<td>N/A</td>
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<tr>
<td>60</td>
<td><em>Securidaca longipedunculata</em></td>
<td>Egbo ipeta</td>
<td>polygalaceae</td>
<td>1</td>
<td>Root</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td><em>Senna fistula</em> Linn</td>
<td>Aidan tooro</td>
<td>Fabaceae/Leguminosae</td>
<td>5</td>
<td>Whole</td>
<td></td>
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<tr>
<td>62</td>
<td><em>Solanum aethiopicum</em> L.</td>
<td>Efo gbagba</td>
<td>Solanaceae</td>
<td>3</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>63</td>
<td><em>Solanum Hispidum</em></td>
<td>Mafowokan omo</td>
<td>Solanaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>64</td>
<td><em>Sphenocentrum jollyanum</em> Pierre</td>
<td>Akerejupon</td>
<td>Menispermaceae</td>
<td>1</td>
<td>Stem</td>
<td></td>
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<tr>
<td>No.</td>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Family</td>
<td>Use</td>
<td>Part/s</td>
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<td>-----------------</td>
<td>--------------</td>
<td>---------------</td>
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<tr>
<td>65</td>
<td>Theobroma cacao L.</td>
<td>Ewe cocoa</td>
<td>Malvaceae</td>
<td>1</td>
<td>Leaf, pod</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Thumanmato-coccus dannelli (Benn.) Benth</td>
<td>Ewe Iran, miracle berry</td>
<td>Marantaceae</td>
<td>1</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>67</td>
<td>Tithonia diversifolia</td>
<td>Jogbo</td>
<td>Asteraceae</td>
<td>2</td>
<td>Leaf</td>
<td>N/A</td>
</tr>
<tr>
<td>68</td>
<td>Uvaria chamae</td>
<td>eruju</td>
<td>Annonaceae</td>
<td>1</td>
<td>Leaf, root</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Vernonia amygdalina</td>
<td>Ewuro</td>
<td>Asteraceae</td>
<td>2</td>
<td>Leaf</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Viscum album Linn.</td>
<td>Afomo</td>
<td>Viscaceae; Loranthaceae</td>
<td>1</td>
<td>Whole</td>
<td>N/A</td>
</tr>
<tr>
<td>71</td>
<td>Xanthosoma sagittifolium L. Schot</td>
<td>isu koko coco yam</td>
<td>Araceae</td>
<td>1</td>
<td>Bark</td>
<td>N/A</td>
</tr>
<tr>
<td>72</td>
<td>Xylopia aethiopica</td>
<td>Eeru</td>
<td>Annonaceae</td>
<td>4</td>
<td>Leaf</td>
<td>N/A</td>
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Table 5: List of some recipes for the treatment of diabetes

<table>
<thead>
<tr>
<th>S/N</th>
<th>RECIPE</th>
<th>Mode of preparation</th>
<th>Mode of administration</th>
<th>Possible side effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Ficus asperifolia</em></td>
<td>The plant is crushed and soaked in water. Shake before use</td>
<td>A full glass cup is taken orally once per day</td>
<td>Not reported</td>
</tr>
<tr>
<td>2</td>
<td><em>Carica papaya, kan bilala</em></td>
<td>Squeeze the leaf of carica papaya and add small amount of kan bilala</td>
<td>A full glass cup taken orally in the morning and night</td>
<td>Too much can cause stomach ache</td>
</tr>
<tr>
<td>3</td>
<td><em>Pricanina nitida</em> and coconut water</td>
<td>The leaf is squeezed thoroughly, then mixed with coconut water</td>
<td>A small cup is taken per day</td>
<td>Not reported</td>
</tr>
<tr>
<td>4</td>
<td><em>Gossypium barbadense, Jatropha gossypiifolia, Kolanut (oloju meta)</em></td>
<td>The root of Jatropha gossypiifolia and kolanut were grounded together, mixed with the fluid from Gossypium barbadense and kept in shinnapp bottle</td>
<td>Small cup taken orally 3 times per day</td>
<td>Not reported</td>
</tr>
<tr>
<td>5</td>
<td><em>Vernonia amygdalina, Morinda lucida, coconut water</em></td>
<td>The leaves are washed thoroughly then squeezed. Coconut water is then added. This is kept in a 5 litre bottle</td>
<td>A cup is taken twice daily</td>
<td>Not reported</td>
</tr>
<tr>
<td>6</td>
<td><em>Picalina nitida, Aristolochia ringens, Citrus aurantiifolia</em></td>
<td><em>Picalina nitida</em> and Aristolochia ringens were grounded together, sieved and mixed with liquid from Citrus aurantiifolia. This is kept in a clean bottle</td>
<td>A cup 3 times daily</td>
<td>Not reported</td>
</tr>
<tr>
<td>7</td>
<td><em>Morinda lucida, ocinum gratissium, Citrus aurantiifolia</em></td>
<td>Squeeze the leaves of Morinda lucida and Ocimum gratissium then sieve to get the liquid in a different container. Then squeeze the liquid from Citrus aurantiifolia</td>
<td>Orally 4 times a day</td>
<td>Not reported</td>
</tr>
<tr>
<td>8</td>
<td><em>Citrusllus colocynthis, palm wine, kaun bilala</em></td>
<td>Palm wine is added to sliced Citrusllus colocynthis in a bottle and kaun bilala added. This is stored for 3 days before usage.</td>
<td>A cup taken daily</td>
<td>Not reported</td>
</tr>
<tr>
<td>9</td>
<td><em>kigelia africana</em></td>
<td>Soak peeled and sliced plant with water or fermented water from sohgum</td>
<td>Taken orally, a cup once per day</td>
<td>Can terminate pregnancy at early stage</td>
</tr>
<tr>
<td>10</td>
<td><em>Picalina nitida</em></td>
<td>Lime water is added to grounded plant and mix for 10 minutes</td>
<td>2 tea spoons morning and night</td>
<td>Not reported</td>
</tr>
<tr>
<td>11</td>
<td><em>Anchomanes difformis</em></td>
<td>The slice root of Anchomanes difformis is soaked in lime water</td>
<td>A cup taken orally every morning</td>
<td>Body itching</td>
</tr>
</tbody>
</table>
Ethno-pharmacological and in-vitro anti-diabetic study of some medicinal plants commonly used in Ogbomoso, South Western Nigeria.

<table>
<thead>
<tr>
<th>Plant Combination</th>
<th>Preparation Method</th>
<th>Medication</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td><em>Vernonia amygdalina</em>, natural honey, lime, <em>Jatropha gossypifolia</em> Linn.</td>
<td>Soaked in a clay pot and cooked thoroughly</td>
<td>A cup taken orally once a day</td>
</tr>
<tr>
<td>13</td>
<td><em>Agaratum conyzoids</em> L., gin, sugar</td>
<td>Squeezed and water extracted is added to crushed <em>Jatropha gossypifolia</em> before adding lime and honey. Half a cup taken morning and evening</td>
<td>Not reported</td>
</tr>
<tr>
<td>14</td>
<td><em>Kigelia Africana</em>, <em>Aframomum melegueta</em></td>
<td>Slight burning of both plants. The powder is taken with <em>ogi</em> (cooked sorghum)</td>
<td>Not reported</td>
</tr>
<tr>
<td>15</td>
<td><em>Anchomanes difformis</em>, palm oil</td>
<td>A cup is taken orally every morning</td>
<td>The plant causes itching</td>
</tr>
<tr>
<td>16</td>
<td><em>Nyctaginaceae boerhavia diffusa</em> Linn.</td>
<td>Half a cup taken three times daily</td>
<td>Not reported</td>
</tr>
<tr>
<td>17</td>
<td><em>Vernonia amygdalina</em></td>
<td>Squeezed the leaf thoroughly in a big bowl, the leaf is cooked as soup while the liquid is kept in a bottle</td>
<td>Liquid taken orally three times daily, while the soup is eaten as many times as possible</td>
</tr>
<tr>
<td>18</td>
<td><em>Momordica charantia</em>, bitter gourd</td>
<td><em>Momordica charantia</em> is squeezed into a bottle and bitter gourd is added</td>
<td>A cup taken twice a day</td>
</tr>
<tr>
<td>19</td>
<td><em>Vernonia amygdalina</em>, <em>Ocinum gratissium</em>, <em>allium satium</em></td>
<td>The leaves squeezed in to a bottle and then allium satium and potash added and also lime juice</td>
<td>A glass cup three times daily</td>
</tr>
<tr>
<td>20</td>
<td><em>Gossypium barbadense</em></td>
<td>The leaves are dried and grounded. Then soaked in water</td>
<td>One cup of the liquid taken orally twice daily</td>
</tr>
<tr>
<td>21</td>
<td><em>Momordica charantia</em></td>
<td>The leaves are squeezed into a bowl</td>
<td>1 cup taken twice a day</td>
</tr>
<tr>
<td>22</td>
<td><em>Psidium guajava</em></td>
<td>The leaves are cooked in a clean pot with water. Or the leaves are oven dried then ground. The powder is kept in a bottle and taken with pap</td>
<td>A spoon</td>
</tr>
<tr>
<td>23</td>
<td><em>Aristolochia ringens</em></td>
<td>The seeds are cooked in a bottle. The cooked seeds are then soaked with water in a bottle for 2 hrs.</td>
<td>1 cup of liquid taken orally twice a day.</td>
</tr>
<tr>
<td>24</td>
<td><em>Chanca piedra</em>, lime</td>
<td>Squeeze the leaves and add lime and water</td>
<td>1 cup taken twice per day</td>
</tr>
<tr>
<td>Number</td>
<td>Plant Species</td>
<td>Preparation and Method</td>
<td>Dosage</td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
<td>------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>25</td>
<td>Anthocleista djalonensis, Allium cepa, Tithonia diversifolia</td>
<td>The leaves of Anthocleista djalonensis, Allium cepa and Tithonia diversifolia are crushed together before coconut water is added</td>
<td>1 tea spoon in the morning and night</td>
</tr>
<tr>
<td>26</td>
<td>Citrulus colocynthis, Curculigo pilosa, Allium sativum, Picralina nitida, Piper guineensis</td>
<td>The bark of Citrulus colocynthis is ground with Curculigo pilosa,</td>
<td>1 cup in the morning and night</td>
</tr>
<tr>
<td>27</td>
<td>Carica papaya</td>
<td>The leaves are squeezed in warm water</td>
<td>A glass cup taken daily</td>
</tr>
<tr>
<td>28</td>
<td>Picralina nitida, coconut water</td>
<td>Grinded seeds are mixed with coconut water</td>
<td>½ tea spoon for females and 1 tea spoon for males</td>
</tr>
<tr>
<td>29</td>
<td>Chanca piedra, Picralina nitida, lime</td>
<td>Chanca piedra is boiled with seeds of Picralina nitida. Lime is added as preservatives</td>
<td>1 cup twice daily</td>
</tr>
<tr>
<td>30</td>
<td>Moringa lucida, Palm wine</td>
<td>Grind the whole plant of Moringa lucida in a calabash. Palm wine is then added to the liquid in a bottle.</td>
<td>1 cup daily</td>
</tr>
<tr>
<td>31</td>
<td>Momordica charantia, Ocimum gratissium</td>
<td>The leaves of both plants are squeezed in water.</td>
<td>A glass cup, 3 times a day</td>
</tr>
<tr>
<td>32</td>
<td>Viscum album</td>
<td>An handful of fresh or dried Viscum album is soaked in water overnight. The following day, a cup of hot water is added.</td>
<td>1 cup morning and night</td>
</tr>
<tr>
<td>33</td>
<td>Azadirachta indica</td>
<td>The leaves are squeezed into water</td>
<td>1 spoon daily</td>
</tr>
<tr>
<td>34</td>
<td>Allium sativum</td>
<td>3 bulbs of Allium sativum are mashed and soaked in a bottle of hot water overnight</td>
<td>A glass full three times daily</td>
</tr>
<tr>
<td>35</td>
<td>Musa acuminata</td>
<td>The roots are cut into pieces and pounded in a mortal. The juice is extracted and chaff discarded. Then add half bottle of honey</td>
<td>2 spoons three times daily</td>
</tr>
<tr>
<td>36</td>
<td>Magnifera indica</td>
<td>The leaves are soaked in warm water then filtered in the morning</td>
<td>Regularly</td>
</tr>
<tr>
<td>37</td>
<td>Carica papaya, Xylopia aethiopica</td>
<td>Boil the dried leaves of Carica papaya with Xylopia aethiopica with one tea spoon of salt and allowed</td>
<td>½ cup every morning</td>
</tr>
</tbody>
</table>
**α-Amylase inhibitory activities of the selected plants:** Figure 2 below show that *Uvaria chamea* (P.BAEUV), *Peperomia pellucida* (L.KUNTN), *Argimones Mexican* (Papaveracea), *Anchomanes difformis* (Araceae) and *Cassia fistula* (LINN) demonstrated significant (p<0.05) α-amylase inhibitory activities. The result showed that *Uvaria chamea* (UV) has the highest percentage α-amylase inhibition activity and its activity is concentration dependent. *Uvaria chamea* (UV) > *Anchomanes difformis* (AD) > *Cassia fistula* (CF) > *Peperomia pellucida* (PP) > *Argimones Mexican* (AM). The α amylase activity of the most potent plant i.e *Uvaria chamea* is significantly lower than that of the standard (AC). Table 5 revealed that *Uvaria chamea* demonstrated the lowest IC50 when compared with other plant extracts. However, its IC50 is significantly (p>0.05) higher than the standard Acarbose.

![Graph showing inhibitory effect of plant extracts on α-amylase activity](image)

**Fig 2:** Inhibitory effect of selected plant extracts and standard drug on α-amylase

**Table 5:** IC50 values of alpha amylase inhibition of the selected plants.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Uvaria chamea</th>
<th>Anchomanes difformis</th>
<th>Cassia fistula</th>
<th>Peperomia pellucida</th>
<th>Argimones Mexican</th>
<th>Acarbose</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC50 µg/ml</td>
<td>385.0</td>
<td>873.8</td>
<td>1343.4</td>
<td>6950.0</td>
<td>55446.1</td>
<td>46.5</td>
</tr>
</tbody>
</table>
DISCUSSION

Medicinal plants have been used by man for the treatment of various diseases since prehistoric time (Solecki and Shanidar, 1975) and these plant materials have been found to be potent, safe, reliable and cheaper compare to the synthetic drugs (Vliathan, 1998). From these results, it was important to note the higher percentage of the male respondents to the female, which may be associated with boldness and ability to command respect. This may also be because of the believed that the male child will retain the indigenous knowledge with the family unlike the females that will leave by marriage. The age of the respondents also correlates with the years of experience indicating the dependence of people of Ogbomoso on herbal treatment. The two families of plants Malvaceae and Euphorbiaceae frequently mentioned here reported indicate a trend of compounds with antidiabetic activity. Plant species with the most frequency of citation need to be analyzed further to discover potential new antidiabetic drugs. Pharmacological studies of these plants may be required to actually justify the use of these plants scientifically and to identify the therapeutic agents responsible for the hypoglycaemic activity. Studies may also be needed to determine the mechanisms of actions of these therapeutic agents. All the respondents mentioned leaf part of the plants for treatment or with a mix with other parts; this indicates the importance of leaves to plants. This is similar to the reports of other studies (Kadir et al., 2012; Gonzalez et al., 2010). The leaves are important for photosynthesis and storage of secondary metabolites of medicinal value and another reason may be the ease of collection of the leaves to other plant parts (Kadir et al., 2012). Some of the plants cited by the respondents in this study (Table 4) have been reportedly demonstrated in the in vivo and in vitro diabetic models. Azadirachta indica has been reported for its antidiabetic property by Dixit et al. (1986) and Khosla et al. (2000). Ocimum gratissimum has been reported for its anti-diabetic activities by Aguiyi et al. (2000) and Egsie et al. (2006). Citrus aurantifolia and Citrus sinensis has been reported by Jaiyesimi et al. (2000), Colocynthis citrullus has been reported for antidiabetic activities by Abdel-Hassan et al. (2000), Cola acuminata has been reported by Ogunleye et al. (2003), Carica papaya has been reported by Oke (1998), Momordica charantia has been reported by Bailey et al. (1985) while Ficus exasperata has been reported by Ogunleye et al. (2003).

Based on these findings, it is anticipated that these medicinal plants documented are required to ameliorate hyperglycaemia by either inhibiting carbohydrate hydrolysing enzymes, increase beta cells proliferation thereby increase insulin secretion or inhibit glucose output by the liver (Malviya et al., 2010). Although further investigation is still required to determine the mechanism of action of active biomolecules in these plants, they may also work by blocking the active sites of enzymes involved in glucose metabolism. Most of these plants have been reported to contain alkaloids, flavonoids, saponins, glycosides etc, which have been implicated with anti-diabetic properties (Malviya et al., 2010; Negri, 2005; Oke 1998).

CONCLUSION

This study was undertaken to investigate the herbs used by the people in Ogbomoso, western Nigeria, as regard the treatment and management of diabetes. The medicinal plants documented here therefore reflect a rich ethno-medicinal knowledge and belief that herbal remedies are cheap and readily accessible. 71 plants belonging to 44 families were mentioned by the respondents for the treatment of diabetes. The most commonly mentioned plants being Vernonia amygdalina, Morinda lucida, Picralina nitida, Citrus colycynthis, Cocos nuclifera L., Carica papaya, Ocimum gratissium and Momordica charantia. This information documented indicates the importance of natural flora, how to maximize their usage, preserve the indigenous knowledge and help to develop novel antidiabetic drugs for global usage. The report of the alpha amylase inhibitory effect of the selected plants (Uvaria chamae (P.BAVEUV), Peperomia pellucida (L.KUNTN), Argimones Mexican (Papaveracea), Anchomanes difformis (Araceaee) and Cassia fistula (LINN ) justifies the anti-diabetic potentialities of these plants. These findings suggest that the anti-hyperglycaemic effects of these five plants could be exerted at least partly by their inhibitory effects on digestive enzymes.
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REFERENCES


World health Organisation, WHO Traditional Medicine strategy 2002-2005


