Ethno-Botanical Survey of Anti-Diabetic Medicinal Plants Used by the Santal Tribe of Joypurhat District, Bangladesh

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ABSTRACT

Traditionally used medicinal plants have been a source of relief in controlling different types of diseases throughout the globe. People living in rural areas of developing countries including Bangladesh rely mainly on indigenous medicinal practice to get rid of various diseases. A total of 33 medicinal plants belonging to 28 families and 33 genera were recorded. In the present study was conducted an ethno-botanical survey to collect information about the use of traditional medicinal plants for diabetes treatment by the Santal tribe of Joypurhat District, Bangladesh. This study further strengthened the relationship between indigenous knowledge, ethno-medicinal practices and pharmacology. Therefore, it is suggestive that the survey report on anti-diabetic medicinal plants could be helpful and useful in finding newer anti-diabetic drugs.

Keywords: Anti-diabetic Medicinal Plants, Indigenous Uses, Santals, Joypurhat, Bangladesh

INTRODUCTION

Interests in ethno-botanical explorations have been increased in recently at the national and international level. A perusal of the literature reveals that there is still a huge gap in knowledge of ethno-medicine and its scientific validation in this part of the world. Traditional use of plants and plant-parts has been a deep rooted practical knowledge in the culture and livelihood of the people living in the remote parts of the world and has been using different medicinal plants in their daily healthcare practices. According to the World Health Organization (WHO) about 65-80% of the world’s population in developing countries depends essentially on plants and plant derived compounds for their primary health care [57].

Diabetes mellitus is one of the most common metabolic disorders that arises from malfunctioning of body’s mechanism to produce a hormone “insulin,” a reduction of the response of peripheral organs to the same hormone, or both [14], [67] and has a significant impact on the health, quality of life, and life expectancy of patients as well as on the health care system [10]. According to WHO report, globally, approximately 347 million people or 5-8% of the global population is estimated to be affected by this disease [12]. Diabetes now is becoming the third “killer” of mankind along with cancer, cardiovascular and cerebrovascular disease [15]. It has also been predicted that by the year 2025, more than 75% of people with diabetes will reside in developing countries, as compared with 62% in 1995 [20]. A good number of synthetic commercial anti-diabetic drugs/agents like sulfonylureas, biguanides, glucosidase inhibitors and thiazolidiones are well known today which are not only expensive but also produces serious side effects [66]. Therefore, there has been a growing interest in the ethno-botanical approach to examine the anti-diabetic properties of plants traditionally used by the ethnic groups in different parts of the world. A large number of plants and plant-parts have been investigated for their beneficial role and anti-diabetic properties [21], [68]. In view of its medical importance, the present study was focused to know the traditional medicinal plants wealth that is being used by the tribal people of the study area against diabetes.

Over the past two decades several medicinal and ethno-botanical studies in Bangladesh have been carried out [1], [5], [6], [8], [11], [13], [16], [22-56], [59-65], [70-71]. The article focused on the traditional medicinal practices used for the treatment of diabetes in Joypurhat district of Bangladesh.

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METHODOLOGY

Study Area

Akkelpur is an Upazilla of Joypurhat District in the Division of Rajshahi, Bangladesh. Akkelpur is located at 24°58′30″N 89°01′15″E 24.9750°N 89.0208°E with a total area of 139.47 km². It is the smallest Upazilla in Joypurhat Zila. As of the 1991 Bangladesh census, Akkelpur has a population of 126,046, with it has 24,475 units of household as of the 1991 Census. Males constitute 52.9% of the population, and females 47.1%. This Upazila's eighteen up population is 68033. Akkelpur has an average literacy rate of 34% (7+ years), and the national average of 32.4% literate. The annual rainfall is 1350mm. Temperature of the area is low in January varies from 9.0°C to 14.1°C. From February an increasing trend of temperature is found up to April and thereafter temperature start to decline. In April temperature varies from 22.6°C to 36.9°C. The mean relative humidity is found to be low in March (65%) and high in July-September (88-89%) [9].

Ethno-Botanical Survey

In the present survey, a total of 33 plant species belonging to 33 genera and 28 families were recorded during the year July 2013 to June 2014. A total of ten field trips were made for documentation. During the field interview, the information was noted in the documentation data sheet. All the information regarding plant species, biological forms, habitat, local names and uses was documented. Medicinal information was obtained through informal interviews following semi-structured from knowledgeable person’s particularly local Kabiraj/Herbalists, Ojha and elderly people. Plant specimens were collected with flowers and fruits and processed using standard herbarium techniques [7]. The specimens were identified consulting with the experts, by comparing herbarium specimens and available literatures [3], [17] and [22]. The voucher specimens were deposited in the Herbarium of Rajshahi University (RUH) for future reference.

RESULTS AND DISCUSSION

A total of 33 medicinal plants species belonging to 33 genera and 28 families were found to be used by the local people of the area surveyed under study for treatment of diabetes. It was observed that the plant parts used for the treatment included leaves, stems, roots, barks, fruits and seeds as well as whole plants. Almost all the plant/plant extracts were found to be prepared in aqueous solution and were consumed during the early hours of the day in empty stomach.

In the present survey, a total of 33 plant species belonging to 33 genera and 28 families were recorded (Table 1). Out of these plants species, 15 (45.45%) belonged to herbs, 9 (27.27%) trees, 3 (9.09%) shrubs, and 6 (18.18%) climbers (Fig. 1). For each species scientific name, local name, family, habit, mode of uses and part(s) used are provided. The most frequently used species for the treatment of diabetes are Ageratum conyzoides L., Andrographis paniculata (Burm.f.) Wall., Ammona squamosa L., Argemone Mexicana L., Azadirachta indica A. Juss., Centella asiatica (L.) Urban., Coccinia cordifolia (L.) Cogn., Ficus racemosa L., Momordica charantia L., Moringa oleifera L., Syzygium cumani (L.) Skeels., Tinospora cordifolia (Willd.) Milers. and Xanthium indicum This finding of common medicinal plants in the study is in agreement with [2], [4], [17] and [69].

Distribution of medicinal plant species in the families shows variation (Table 1). Each of Fabaceae and Cucurbitaceae is represented by 3 species. A single species in each was recorded by 29 families while two species in each was recorded by 2 families. The survey indicated that the common medicinal plant families in the study area are Acanthaceae, Amaranthaceae, Apocynaceae, Annonaceae, Apiceae, Asteraceae, Bombacaceae, Cucurbitaceae, Fabaceae, Lamiaceae, Liliaceae, Meliaceae, Moraceae, Moringaceae, Musaceae, Myrtaceae, Rutaceae and Zingibereaceae. This finding of common medicinal plant families in the study is in agreement with [2], [4], [17] and [69].

Table 1. List of medicinal plants and their use in diabetes of Santals in Joypurhat, Bangladesh

<table>
<thead>
<tr>
<th>S/N</th>
<th>Scientific Name</th>
<th>Local Name</th>
<th>Family</th>
<th>Traditional Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ageratum conyzoides L.</td>
<td>Ochunti</td>
<td>Asteraceae</td>
<td>A cup of maceration whole plant is taken twice daily to treat diabetes.</td>
</tr>
<tr>
<td>2</td>
<td>Andrographis paniculata (Burm.f.) Wall.</td>
<td>Kalomegh</td>
<td>Acanthaceae</td>
<td>Whole plant extract is used for diabetic cure. The crude extract is taken at a dose of 1 tea spoonful in empty stomach in the morning hours before meal.</td>
</tr>
<tr>
<td>No.</td>
<td>Scientific Name</td>
<td>Local Name</td>
<td>Family</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td><em>Annona squamosa</em> L.</td>
<td>Ata</td>
<td>Annonaceae</td>
<td>Raw bark/or and leaf were grinded and the extracts were obtained by squishing. The extract is then filtered and used 2 to 3 tea spoon full of extract every morning.</td>
</tr>
<tr>
<td>4</td>
<td><em>Azadirachta indica</em> A. Juss.</td>
<td>Neem</td>
<td>Meliaceae</td>
<td>Raw leaf extracts mixed with little water is taken at a dose of 2-3 tea spoons daily in empty stomach.</td>
</tr>
<tr>
<td>5</td>
<td><em>Argemone mexicana</em> L.</td>
<td>Sialkata</td>
<td>Papaveraceae</td>
<td>Curry made from of stem is used in diabetes.</td>
</tr>
<tr>
<td>6</td>
<td><em>Asparagus racemosus</em> L.</td>
<td>Stamuli</td>
<td>Liliaceae</td>
<td>Juice made from the tuberous root is used in diabetes.</td>
</tr>
<tr>
<td>7</td>
<td><em>Bombax ceiba</em> L.</td>
<td>Simul</td>
<td>Bombacaceae</td>
<td>Juice made from immature roots is used in diabetes.</td>
</tr>
<tr>
<td>8</td>
<td><em>Brassica oleracea</em> L.</td>
<td>Badhakopi</td>
<td>Brassicaceae</td>
<td>Squeeze and drink <em>Brassica oleracea</em> leaves to treat diabetes.</td>
</tr>
<tr>
<td>9</td>
<td><em>Cajanus cajan</em> (L.) Millsp.</td>
<td>Arhar</td>
<td>Fabaceae</td>
<td>Juice made from immature roots is used in diabetes.</td>
</tr>
<tr>
<td>10</td>
<td><em>Catharanthus roseus</em> (L.) G. Don.</td>
<td>Nayantara</td>
<td>Apocynaceae</td>
<td>Fresh leaf extracts or fresh leaf may be chewed in empty stomach.</td>
</tr>
<tr>
<td>11</td>
<td><em>Centella asiatica</em> (L.) Urban.</td>
<td>Thankuni</td>
<td>Apiaceae</td>
<td>Fresh leaf extracts 2-3 tea spoon in empty stomach nearly 21 days in the early diabetic conditions.</td>
</tr>
<tr>
<td>12</td>
<td><em>Citrollus lanatus</em> (L.)</td>
<td>Tormuj</td>
<td>Cucurbitaceae</td>
<td>The bark of the red ripens fruit is dried and powdered. Powder being taken 5-10 gm with water in empty stomach.</td>
</tr>
<tr>
<td>13</td>
<td><em>Coccinia cordifolia</em> (L.) Cogn.</td>
<td>Telakucha</td>
<td>Cucurbitaceae</td>
<td>Vegetable made from young leaves are used in diabetes.</td>
</tr>
<tr>
<td>14</td>
<td><em>Curcuma longa</em> L.</td>
<td>Holud</td>
<td>Zingiberaceae</td>
<td>About 8 gm of raw turmeric were grinded, mixed with water and ½ tea spoon of honey and taken for 1 month after meal.</td>
</tr>
<tr>
<td>15</td>
<td><em>Erythrina variegata</em> L.</td>
<td>Madar</td>
<td>Fabaceae</td>
<td>Fresh roots were grounded for obtaining juice. 25 ml juice was taken for 1 week without water.</td>
</tr>
<tr>
<td>16</td>
<td><em>Ficus racemosa</em> L.</td>
<td>Jogadumur</td>
<td>Moraceae</td>
<td>Ripe fruits are eaten as remedy for diabetes. It is used as a supportive medicine for the diabetes treatment.</td>
</tr>
<tr>
<td>17</td>
<td><em>Ichnocarpus frutescens</em> (L.) R.Br.</td>
<td>Loilata</td>
<td>Apocynaceae</td>
<td>Powdered root is used in diabetes.</td>
</tr>
<tr>
<td>18</td>
<td><em>Kalanchoe pinnata</em> (Lam.) Pers.</td>
<td>Patharkuchi</td>
<td>Crassulaceae</td>
<td>About 10 numbers of fruits were grounded and juice were mixed with honey and taken every day.</td>
</tr>
<tr>
<td>19</td>
<td><em>Leucas aspera</em> L.</td>
<td>Setodron</td>
<td>Lamiaceae</td>
<td>The plant is believed to be a liver corrective herb. It is used as a potherb during diabetic treatment.</td>
</tr>
<tr>
<td>20</td>
<td><em>Momordica charantia</em> L.</td>
<td>Korolla</td>
<td>Cucurbitacea</td>
<td>Fresh extracts of fruit juice one ounce to be taken empty stomach in the morning. A cup of decoction of whole plant taken orally twice daily to treat diabetes.</td>
</tr>
<tr>
<td>21</td>
<td><em>Moringa oleifera</em> L.</td>
<td>Sajna</td>
<td>Moringaceae</td>
<td>Soak leaves in boiled water for few minutes and drink the water regularly/repeatedly for some weeks to treat diabetes.</td>
</tr>
<tr>
<td>22</td>
<td><em>Murraya Koinigii</em> (L.) Spreng.</td>
<td>Curry Leaf</td>
<td>Rutaceae</td>
<td>Leaf extract, 2-3 tea spoon early in the morning.</td>
</tr>
<tr>
<td>23</td>
<td><em>Musa sapientum</em> L.</td>
<td>Kachakola</td>
<td>Musaceae</td>
<td>Cook and eat mature and unripe fruit or make flour out of it and eat to treat diabetes.</td>
</tr>
<tr>
<td>24</td>
<td><em>Phyllanthus emblica</em> L.</td>
<td>Amloki</td>
<td>Phyllanthaceae</td>
<td>About 10 numbers of fruits were grounded and juice were mixed with honey and taken every day.</td>
</tr>
<tr>
<td>25</td>
<td><em>Spinacea oleracea</em> L.</td>
<td>Palongshak</td>
<td>Amaranthaceae</td>
<td>About 200 gm of whole plant mixed with a most equal amount of fresh carrot and grounded to obtain juice which is taken every day in empty stomach.</td>
</tr>
</tbody>
</table>
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</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td><em>Solanum xanthocarpum</em> L.</td>
<td>Katabegu</td>
<td>Solanaceae</td>
<td>The juice extract of the fresh fruits (1-3) is taken as a remedy to the high blood glucose in the body.</td>
</tr>
<tr>
<td>27</td>
<td><em>Syzygium cumini</em> (L.) Skeels.</td>
<td>Kalojam</td>
<td>Myrtaceae</td>
<td>Seed powder about 1 teaspoonful is taken with water in the morning in empty stomach and also in the evening before meals.</td>
</tr>
<tr>
<td>29</td>
<td><em>Scoparia dulcis</em> L.</td>
<td>Bondhanay</td>
<td>Scrophulariaceae</td>
<td>Fresh leaves 5-6 in number are eaten or chewed for three times a day before meals.</td>
</tr>
<tr>
<td>30</td>
<td><em>Triticum aestivum</em> L.</td>
<td>Gom</td>
<td>Poaceae</td>
<td>Cook and eat prepared <em>Triticum aestivum</em> flour to treat diabetes.</td>
</tr>
<tr>
<td>31</td>
<td><em>Tinospora cordifolia</em> (Wild.) Miers.</td>
<td>Gulancha</td>
<td>Menispermacae</td>
<td>Leaf stalk powder mixed with neem paste is used in diabetes.</td>
</tr>
<tr>
<td>32</td>
<td><em>Vigna mungo</em> L.</td>
<td>Mug</td>
<td>Fabaceae</td>
<td>About 50 gm of raw seeds grounded and soaked in 1 cup of milk overnight and taken for 20 days.</td>
</tr>
<tr>
<td>33</td>
<td><em>Xanthium indicum</em> in Koenig &amp; Roxb.</td>
<td>Ghagra</td>
<td>Asteraceae</td>
<td>Vegetable made from young leaves are used in diabetes.</td>
</tr>
</tbody>
</table>

**Figure 1.** Analysis of the data based on habit showed that leading medicinal plants species.

**CONCLUSION**

The present study reveals that traditional ethno-botany practices still play a very important role in Joypurhat, Bangladesh. Ethno-botany practices not only play an important role of primary health care but also play a vital role of conservation of phytodiversity and cultural diversity. Based on the observations, it is expected that the results of this study will lead to phytochemical and pharmacological investigations. The result could also serve as a base to develop phytomedicine in combating diseases.

**ACKNOWLEDGEMENTS**

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**REFERENCES**

A.H.M. Mahbubur Rahman “Ethno-Botanical Survey of Anti-Diabetic Medicinal Plants Used by the Santal Tribe of Joypurhat District, Bangladesh”


A.H.M. Mahbubur Rahman “Ethno-Botanical Survey of Anti-Diabetic Medicinal Plants Used by the Santal Tribe of Joypurhat District, Bangladesh”


[33] Rahman AHMM, Hossain MM and Islam AKMR. Taxonomy and Medicinal Uses of Angiosperm weeds in the wheat field of Rajshahi, Bangladesh. Frontiers of Biological and Life Sciences 2014; 2(1): 8-11

[34] Rahman AHMM, Jahan-E-Gulsan SM, Naderuzzaman ATM. Ethno-Gynecological Disorders of Folk Medicinal Plants Used by Santhals of Dinajpur District, Bangladesh. Frontiers of Biological & Life Sciences 2014; 2(3): 62-66


A.H.M. Mahbubur Rahman “Ethno-Botanical Survey of Anti-Diabetic Medicinal Plants Used by the Santal Tribe of Joypurhat District, Bangladesh”


[64] Uddin MZ, Khan MS, Hassan MA. Ethno medical plants records of Kalenga forest range (Habiganj), Bangladesh for malaria, jaundice, diarrhea and dysentery. Bangladesh Journal of Plant Taxonomy 2001; 8(1): 101-104


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Dr. A. H. M. Mahbubur Rahman was born in Adamdighi of Bogra district, Bangladesh on 31st August, 1975. He passed S.S.C. examination from Adamdighi I.P.J. High School, Bogra in 1990 and H.S.C. examination from New Govt. Degree College, Rajshahi in 1992. Dr. Rahman as a research scholar and as a teacher of very high standard. Dr. Rahman was a student of Department of Botany, Rajshahi University in B.Sc. Honours and M.Sc. classes. He was all along a good student and obtained well deserved first class second position in B.Sc. Honours and first class first position in M.Sc. examinations 1995 (held in 1997) and 1996 (held in 1999), respectively. Due to his brilliant success, he achieved Shahid Habibur Rahman Hall Gold Medal and University Award (the highest award of Rajshahi University). After passing M.Sc. in 1999 he joined as a research fellow in this department and started research work on Plant Taxonomy under the supervision of Professor Dr. A.K.M. Rafiul Islam and submitted a thesis for M. Phil. Degree in 2003 and obtained the degree in 2004. Dr. Rahman completed his Ph.D. degree from Rajshahi University, Rajshahi in 2009 in the field of Plant Taxonomy. He joined as a Lecturer in the Department of Botany, University of Rajshahi in 25-09-2004 and he promoted to Assistant Professor in 26-09-2005. At present he is an Associate Professor in this department. His research experience is 17 years and teaching experience is 11 years. He has guided 1 Ph.D, 42 B.Sc. (Honours) and 15 M.S. research fellows. He is an Editorial Board Member of 21 International Journals. He has published 57 research articles in different national and international refereed journals and published 6 online books from Lambert Academic Publishing (LAP), Germany. His specialization is Plant Taxonomy, Ethno-botany, Biosystematics and Molecular Plant Systematics.