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Use of traditional medicinal plants for management of diabetes mellitus in Jorhat district of Assam, India

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Abstract

Diabetes Mellitus is a chronic metabolic disease which is characterized by high levels of sugar in the blood. The number of people with diabetes in India has increased from 26 million in 1990 to 65 million in 2016. Environmental and lifestyle changes resulting from industrialization and migration to urban environment from rural settings may be responsible to a large extent for epidemic of diabetes in Indians. In India majority of the population depends on traditional medicines for the management of diabetes from ancient times. In the present study, effort has been made to describe perspectives and practices of diabetic patients regarding use of traditional medicines and role of traditional medicines in the management of diabetes in Jorhat District of Assam. The study was performed in both in urban and rural area and a total of 180 numbers of diabetic patients comprising of 90 each from urban and rural areas were selected. It has been recorded that majority of the respondents were sedentary worker irrespective of their localities. Of course, among urban population sedentary worker is more (74.44%) as compared to rural population (64.44%). Majority of the respondents irrespective of localities were aware that diabetes is an inherited disease and 23.33% of rural population used only traditional medicine for management of diabetes mellitus while it was observed that majority of urban (55.56%) as well as rural (48.89%) respondent used combination of conventional and traditional medicine. The Respondents were in a view that these traditional medicines have no side effects; hence can be combined with conventional medicine for effective control of blood glucose. It was also recorded that more number of diabetic patients from rural locality (23.33%) used only traditional medicine than the urban locality (6.67%) and high cost of conventional medicine was the main reason for choosing traditional medicines. Mostly the traditional medicine was used in raw form and administered once daily. Respondents from both urban and rural had mentioned 12 numbers of medicinal plants and were administered either individually or in combination. The most cited plants were *Momordica charantia*, *Azadirachta indica*, *Trigonella foenum-graecum* and *Moringa oleifera* suggesting a prominent role of these plants in the herbal treatment of diabetes in Jorhat district of Assam. *Momordica charantia* was the most preferred plant in both urban (48.89%) and rural (58.89%) area and *Trigonella foenum-graecum* was the second most popular plant used by the diabetes patients to reduce hyperglycemia in both urban (42.22%) and rural (50.00%) areas of the district.

Keywords: Diabetes mellitus, medicinal plants, traditional medicine, Assam, India

Introduction

Diabetes Mellitus is a chronic metabolic disease which is characterized by high levels of sugar in the blood. Diabetes is a global public health problem whose burden is evident in developing countries such as India (Kaveeshwar and Cornwall, 2014) [9]. The number of people with diabetes in India has increased from 26 million in 1990 to 65 million in 2016. Indian Council of Medical Research-INDIA DIABetes (ICMR-INDIAB) study conducted in four different zones of rural and urban India showed that the prevalence of diabetes and prediabetes are higher compared to previous studies (Anjana *et al.*, 2017) [1]. Environmental and lifestyle changes resulting from industrialization and migration to urban environment from rural settings may be responsible to a large extent, for this epidemic of Type 2 diabetes in Indians. Obesity, especially central obesity and increased visceral fat due to physical inactivity and consumption of a high-calorie/high-fat and high sugar diets are major contributing factors. As several of the factors associated with diabetes are potentially modifiable, this epidemic of diabetes can be curbed if proper measures are taken to increase physical activity and reduce obesity rates in adults. In India majority of the population depends on traditional medicines for the management of diabetes mellitus from ancient times. Studies reported that 80% of people in developing countries depend on traditional medicines as the primary remedy for various ailments (Ekor, 2014 and Solana *et al.*, 2015) [5, 15].

Traditional medicines derived from plants are the most commonly used form of treatment for a range of health problems including diabetes. Traditional medicines play an important role in primary health care in many developing countries. The Most traditional medicines used are common foods which include vegetables, flowers, fruits, seeds, spices, and herbs. Some foods provide health benefits beyond their nutritional value and are effective in the prevention and treatment of various diseases (Rahmatullah *et al.*, 2009 and Liu, 2003) [14, 11]. The objective of this study was to describe perspectives and practices of diabetic patients regarding the use of traditional medicines and the role of traditional medicines in the management of diabetes in Jorhat District of Assam.

Materials and Methods

The study was performed in both in urban as well as rural region of Jorhat district of Assam. A total of 180 numbers of diabetic patient comprising of 90 diabetic patients from urban area and 90 diabetic patient from rural areas were selected for the study. Data were collected using a questionnaire which contained both closed and open-ended questions. Through this questionnaire socioeconomic information were collected and it contained questions on treatment choices, use of traditional medicines, the reasons for choosing to use traditional medicines, the source of the medicines, the diabetes-associated complications for which each medicine was used, and the effectiveness of the medicines. Interviews were conducted in Assamese language and based on a semi-structured question form with answers recorded. Medicinal plants being mentioned by the informant were recorded with local names. The respondents were asked to show the

preparation method and quantity use for the treatment of diabetes.

Result and Discussion

All total 180 respondents were surveyed out of which 50 per cent respondents were from urban and rests were from rural localities. The socio-economic profiles of the respondents are presented in Table 1. From the Table it is observed that majority of the respondents were belonged to the age group of 45-55 years (42.22% in urban and 45.56% in rural).

Table indicates that among the urban respondents 61.11 per cent were graduate followed by HS passed (18.89%) while among the rural respondents majority were HS passed (53.33%) followed by HSLC passed (22.22%).

Majority of urban respondents were involved in service (54.44%) and business (31.11%) while majority of the rural respondents were involved in farming (76.67%). Unemployment was recorded to be more among urban respondents (12.22%) as compared to rural respondents (7.78%)

It is evident from the Table that majority of the respondents were sedentary worker irrespective of their localities. Of course, per cent of respondents performing sedentary work is more in urban population (74.44%) as compared to rural population (64.44%); while, 18.89% of urban respondents and 27.78% of rural respondents were moderate workers. Duration of disease was more than 10years for majority of the respondents of both the localities.

Food habit of majority of the respondents from urban (92.22%) and rural (94.44%) were recorded to be non vegetarian.

Table 1: Socioeconomic characteristics of the participants in the quantitative component of the study (N=180).

Sr. No.	Particulars	Urban (N=90)		Rural (N=90)	
		No	Percentage	No	Percentage
1.	Gender				
a)	Male	45	50.0	45	50.0
b)	Female	45	50.0	45	50.0
2.	Age				
a)	25-35	13	14.44	14	15.56
b)	35-45	15	16.67	17	18.89
c)	45-55	38	42.22	41	45.56
d)	55-65	24	26.67	18	20.00
3.	Education				
a)	Under matric	2	2.22	8	8.89
b)	HSLC passed	6	6.67	20	22.22
c)	HS passed	17	18.89	48	53.33
d)	Graduate	55	61.11	9	10.00
e)	Post graduate	6	6.67	5	5.56
f)	Ph.D./Doctorate	4	4.44	0	0.00
4.	Occupation				
a)	Service	49	54.44	5	5.56
b)	Business	28	31.11	9	10.00
c)	Farming	2	2.22	69	76.67
d)	Unemployed	11	12.22	7	7.78
5.	Type of work				
a)	Sedentary	67	74.44	58	64.44
b)	Moderate	17	18.89	25	27.78
c)	Heavy	6	6.67	7	7.78
6.	Duration of disease				
a)	1-5 Years	21	23.33	13	14.44
b)	5-10 years	37	41.11	28	31.11
c)	>10years	32	35.56	49	54.44
7.	Food habit				
a)	Vegetarian	7	7.78	5	5.56
b)	Non- Vegetarian	83	92.22	85	94.44

Perceptions of the respondents towards the disease, Diabetes mellitus and its treatments with traditional medicine has been

recorded and presented in Table 2.

Table 2: Respondents' perceptions in the quantitative component of the study (N=180)

Sr. No.	Particulars	Urban (n=90)	%	Rural (n=90)	%
1	Diabetes Mellitus is :				
a)	Inherited	81	90.00	72	80.00
b)	Associated with age	75	83.33	53	58.89
c)	Associated with sex	68	75.56	32	35.56
d)	Due to Unhealthy food habit	72	80.00	49	54.44
e)	life style oriented	42	46.67	12	13.33
f)	due to stress	23	25.56	13	14.44
g)	Reason unknown	9	10.00	18	20.00
2.	Choice of treatment				
a)	Traditional	6	6.67	21	23.33
b)	Conventional	34	37.78	25	27.78
c)	Conventional and traditional	50	55.56	44	48.89
3.	Reason for use of traditional medicine				
a)	High cost of Conventional medicine	33	36.67	37	41.11
b)	Easily available	11	12.22	15	16.67
c)	No side effect	13	14.44	16	17.78
4.	Source of traditional medicine				
a)	Practicing patients	31	34.44	42	46.67
b)	Books	8	8.89	14	15.56
c)	Friends and relatives	17	18.89	9	10.00
5.	Method of use				
a)	Raw form	85	94.44	65	72.22
b)	Cooked from	2	2.22	11	12.22
6.	Frequency of use				
a)	Once a day	30	33.33	49	54.44
b)	Twice a day	26	28.88	16	17.78

The Table 2 indicates, the majority of the respondents irrespective of localities were aware that diabetes is an inherited disease. Majority of the respondent in both urban (55.56%) and rural (48.89%) used both conventional and traditional medicine, the finding is similar to Bush *et al.*, 2007 [4]; Armstrong *et al.*, 2011 [2] and Kasole *et al.*, 2019 [7]. The Respondents stated that as these traditional medicines have no side effects, therefore it can be combined with conventional medicine for effective control of blood glucose. It was also recorded that less number of diabetic patients from urban

locality (6.67%) uses only traditional medicine than the rural locality (23.33%). According to both the locality the high cost of conventional medicine was the main reason for choosing traditional medicine. Kasole *et al.*, 2019 [7] also reported similar result. Practicing patients were the main source of traditional medicine for both the localities. It is also evident from the Table that preferred method of use of traditional medicine is in raw form for the majority of the respondents in both the localities and they administered mostly once daily.

Table 3: List of medicinal plants cited by diabetic patients used for diabetes treatment in Jorhat district of Assam

Sr. No	Scientific Name	Family	Local Name	Parts Use	Citation by Urban Population	Citation by Rural Population
1.	<i>Momordica charantia</i> L.	Cucurbitaceae	Bittergourd	Fruit	44 (48.89)	53 (58.89)
2.	<i>Trigonella foenum-graecum</i> L.	Fabaceae	Methi	Seed	38 (42.22)	45 (50.00)
3.	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	leaves	32 (35.56)	39 (43.33)
4.	<i>Terminalia arjuna</i> W.&A.	Combretaceae	Arjun	Bark, Seed	7 (7.78)	11 (12.12)
5.	<i>Syzygium cumini</i> L.	Myrtaceae	Kola jamu	Bark, Seed	15 (16.67)	19 (21.11)
6.	<i>Ocimum sanctum</i> L.	Lamiaceae	Tulsi	Leaves	22 (24.44)	34 (37.78)
7.	<i>Centella asiatica</i> L.	Apiaceae	Manimuni	Leaves	9 (10.00)	21 (23.33)
8.	<i>Vinca rosea</i> L.	Apocynaceae	Noyantora	Leaves	5 (5.56)	13 (14.44)
9.	<i>Moringa oleifera</i> L.	Moringaceae	Sojina	Leaves	35 (38.89)	40 (44.44)
10.	<i>Terminalia chebula</i> Retz.	Combretaceae	Silikha	Seed	18 (20)	11 (12.12)
11.	<i>Cinnamomum tamala</i>	Lauraceae	Tej pat	Leaves	19 (21.11)	26 (28.89)
12.	<i>Centella asiatica</i> L.	Apiaceae	Manimuni	Leaves	6 (6.67)	21 (23.33)

Irrespective of locality, 12 numbers of medicinal plants were mentioned by the diabetic patient for anti-diabetic treatment. They were administered individually or combined with other plants (Table 3). Regarding the overall frequency of citation, the most cited plants were *Momordica charantia*, *Azadirachta indica*, *Trigonella foenum-graecum* and *Moringa oleifera* suggesting a prominent role of these plants in the herbal treatment of diabetes in Jorhat district of Assam. *Momordica charantia* was the mostly preferred plant used by the diabetes patients to reduce hyperglycemia in both urban (48.89%) and rural (58.89%) localities. *Trigonella foenum-graecum* was the second most popular plant used by both urban (42.22%) and rural (50.00%) localities. Various studies conducted on the effect of seed extracts of *Trigonella foenum-graecum* revealed a significantly reduced insulin resistance (Losso *et al.*, 2009)^[12] and improved fasting and postprandial blood glucose levels (Kochhar and Negi 2005, Kassaian *et al.*, 2009)^[10, 8]. *Azadirachta indica* was also a popular medicinal plant as stated by the respondents of both the localities. Ocvirk *et al.*, 2013^[13] stated that *Azadirachta indica*, *Syzygium cumini*, *Trigonella foenum-graecum*, *Momordica charantia* were the most cited plants.

Leaves and seed were the major plant parts used by the diabetic patients which is in agreement with other studies (Kadir *et al.*, 2012, Ayyanar *et al.*, 2011, Ocvirk *et al.*, 2013)^[6, 3, 13]. Bark and fruit is also used for some plants like *Syzygium cumini* L and *Momordica charantia* L.

Conclusion

The study was undertaken to assess perspectives and practices of diabetic patients regarding the use of traditional medicines and the role of traditional medicines in the management of diabetes in Jorhat District of Assam. A total of twelve numbers of plants were used by the respondents for the management of diabetes mellitus. The majority of participants used traditional medicines in the management of their diabetes in combination with conventional medicines. Most of them were administered in raw form. High cost of conventional medicine and no side effects were the reason for choosing traditional medicine. The findings revealed a need for scientific validation of these traditional medicine used for the management of diabetes mellitus.

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