

Original Article

Survey of Some Medicinal Plants Employed for Managing Diabetes Mellitus in Hadejia Town, Nigeria

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Diabetes is a widely spread disorder that disturbs humans in the underdeveloped as well as the developed countries worldwide. The figure of those people suffering from the disease is shooting up specifically in Nigeria. A study of traditional plant use was carried out to formalize common herbal plants already in use for the management of Diabetes Mellitus (DM) in Hadejia town, Jigawa state, Nigeria. Formal meetings were organised to document details about the medicinal plants used in the treatment of DM and their topical names, methods of preparation/administration, plant parts in use, and the demographic characteristics of the interviewees in the study. Sixty (60) participants were interviewed, of which 45% were within the age group of 31-40 years, 38.3% were within the age group of 41-50 years, while 10% were within the age group of 51-60 years. Most of the participants were married (91.6%), male (71.6%), farmers (23.3%) and traditional medicine practitioners (26.6%). Further, half (50%) of the participants were attending Islamic schools; some were not having a formal education with a percentage of (33.3%). Also, fifteen (15) plants which belong to 12 families were documented as being used for the management of DM in Hadejia town. The families Amaryllidaceae, Fabaceae, Myrtaceae, and Combretaceae, were the highly pronounced families in this research, while leaves, stem bark, and roots were the most commonly used plant parts. A high level of consensus was observed (0.67) among the participants. This work was carried out in order to provide background data on the herbal plants in use traditionally for the management of DM in the study area.

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INTRODUCTION

From the early stages of human civilisation, mankind has been using medicinal plants for its healing power. Nature has been a source of medicinal agents for several years whereby quiet a number of modern drugs have been isolated from natural sources (Wais *et al.*, 2012). Many of these isolations were based on the uses of the agents in traditional medicine. Traditional medicine sourced from plants continues to play a vital role in healthcare with the majority of the world's inhabitants relying solely on traditional medicines for their principal health care (Khan *et al.*, 2014). In the presence of the planetary flow of drug resistance, increasing costs of synthetic products, adverse effects and toxicity, products from traditional medicine continue to play a major role in the lives of people worldwide (Jouad *et al.*, 1998).

In Africa, specifically Nigeria, a large number of plants medicinal features were revealed and were adopted in the management of numerous ailments (Modak *et al.*, 2007). Majority of these natural plants are used as seasonings, food, and for medicinal reasons (Nwaogu *et al.*, 2007). Nevertheless, the general understanding of plants by the topical people paves the way as comprehended by the community of a specific ethnic group,

because facts about a specific plant differ from both ethnic groups (Wais *et al.*, 2012).

Diabetes mellitus is characterised by interruptions in the major metabolic pathways which results in abysmal blood glucose (sugar) that could lead to intense conditions (Rang *et al.*, 1991). Further, it is a disorder of metabolism as a result of obliteration in insulin-producing β cells in the pancreas for type I diabetes while the body muscle and the liver cells sensitivity to insulin action will drastically decrease for type II diabetes (Oyedemi *et al.*, 2009). The International Diabetes Federation has estimated that the number of people with diabetes is expected to rise from 415 million in 2015 to 642 million by 2040 if no urgent action is taken (IDF, 2015). The major challenges to the management of diabetes mellitus are diverse and formidable, as well as the conventional drugs available for its management in the health care system are expensive (Nwaogu *et al.*, 2007). Modern drugs are extensively used in the control of diabetes mellitus, but in return various problems such as ineffectiveness, side effects have also been noticed with the drugs used in the management of diabetes mellitus (Sefidkon *et al.*, 2012).

In Africa, communities with the highest number of diabetes cases were reported from Nigeria with approximately 3.9 million people affected (IDF, 2013). Traditional medicinal plants with their

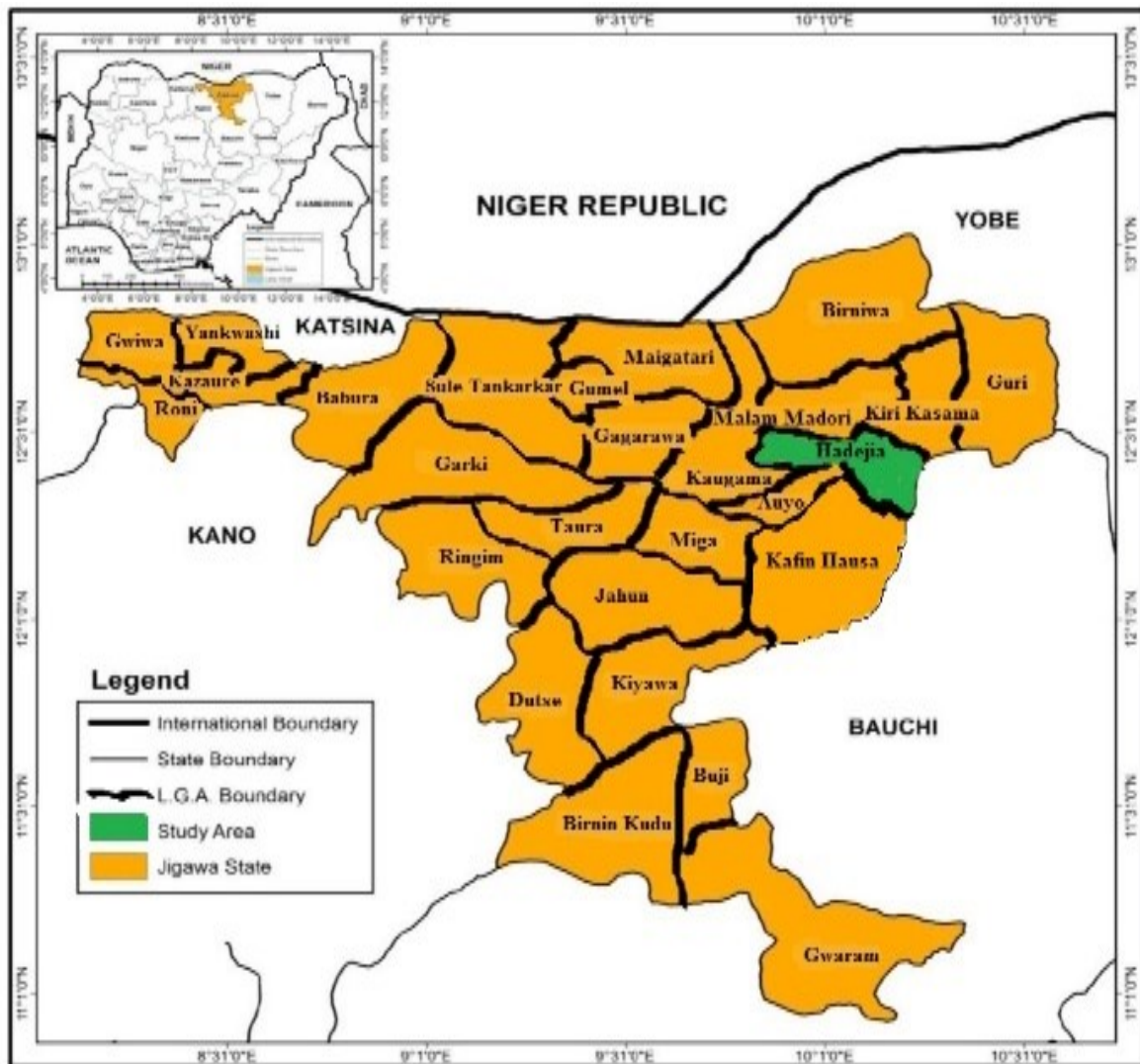
various biological constituents have been used effectively by communities for a long time to treat diseases. Currently, specifically in rural settlements in which quite a number of people lack access to advanced antidiabetic drugs, medicinal plants proceeds to play a vital role in the management of diabetes mellitus (Ajaiyeoba *et al.*, 2006). Consequently, this study was carried out to conduct a survey on traditional plants medically in use in the control of diabetes mellitus in Hadejia town.

MATERIALS AND METHODS

Study Area

The study was carried out at Hadejia LGA, Latitude 12° 27' N and Longitude 10° 2' E Jigawa State, Nigeria. It has a land area of 305 km² and a population of 105,698 according to the 2006 census by the National Population Commission. The predominant occupations of the inhabitants of the study area are farming, hunting and trading. The area has both wet and dry seasons that range from June - September and from October - May respectively.

Figure 1: Map of the study area



Sample Population

Purposive sampling technique was used in sampling the population for study (Bitrus *et al.*, 2016). Respondents were comprised of Traditional Medicine Practitioners (TMP's), Herbalists, farmers, nomads, and traditional birth attendants and grouped into different age groups without gender discrimination.

Data Collection

Relevant authorities as well as individual respondents were contacted for permission prior to the commencement of the study. Semi-structured questionnaires by oral interview employing the local language (Hausa) was used in collecting the data. With the help of Dr Mu'azu Kudan, Department of languages, Hausa unit, Sule Lamido University Kafin Hausa, the questionnaires were translated to Hausa and used for the data collection and then back-translated to English after data collection. Questionnaires were filled by the interviewer and direct questions were avoided. Confirmation of the information given by the respondents was made by making one more visit after the first visit.

Plant Collection and Identification

Respondents were made to collect the plant species to avoid errors due to variation in local names. Standard identification guides and monographs were employed for specie identification.

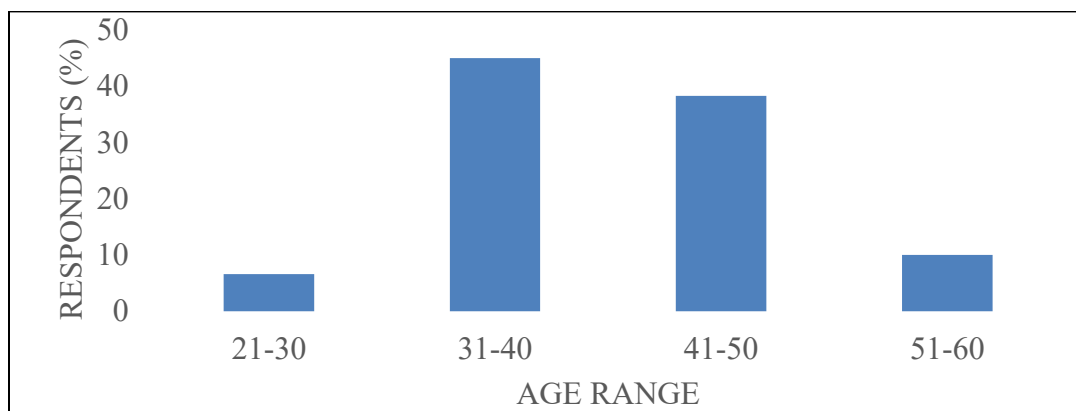
Data Analysis

Data generated were presented using frequencies and percentages. Results on medicinal plant knowledge were analysed using informant consensus factor (ICF) measure. The ICF was calculated using the relation: $ICF = \frac{(n_{ur} - n_t)}{n_{ur} - 1}$ (Mesfin *et al.*, 2009), where n_{ur} is the number of citations for each particular ailment and n_t is the number of species reported to cure that ailment.

RESULTS AND DISCUSSION

In this study, 60 respondents were encountered. Among the respondents, the majority were older (*Figure 2*). This clearly indicates a wide margin between older generation and the younger generation in terms of traditional medicine knowledge. This finding agrees with the reports of Bussmann & Sharon, (2006), Musa *et al.*, (2011), Mahwasane *et al.*, (2013), Ayeni & Aliyu (2018).

Figure 2: Age characteristics of respondents and the use of medicinal plants



Also, among the respondents, the male counterpart (43, 71.7%) had the highest number of representation compared to the female counterpart (17, 28.3%). It is generally believed that awareness on practices involved in traditional medicine are usually transferred to first born sons in the family.

This could be the reason why in this study, the male respondents were more than the female respondents (Zakariya, A. M., Personal communication). This finding agrees with the report of Debella *et al.*, (1999), Addis *et al.*, (2002), Crump *et al.*, (2004).

In terms of occupation of the respondents, traditional medicine practitioners (TMPs) comprised (26.6%) of all the respondents and was closely followed by farmers with (23.6%) respondents. Nomads (11.6%) comprised the least among the respondents (*Table 1*). The high percentage recorded for TMPs can be associated

with their dominance in the community and the free will to share their knowledge. The educational status of the respondents saw a majority of them (33.3%) not having any form of education, this could be associated with socio-cultural perception of education in the community (*Table 1*).

Table 1: Occupational and education representation of respondents in Hadejia town

		n	%
Occupation	Traditional medicine practitioners	16	26.6
	Famers	14	23.3
	Herbalists	13	21.6
	Traditional birth attendants	10	16.6
	Nomads	7	11.6
Educational Level		0	
	No formal education	20	33.3
	Primary School	10	16.6
	Secondary School	0	0
	Tertiary institution	0	0
	Islamic	30	50

Fifteen (15) medicinal plants were classified into 12 families. Families' Amaryllidaceae, Fabaceae, Myrtaceae and Combretaceae recorded (2) species each while all the other families had single species representations (*Table 2*). Heinrich (2008) reported in his study that, plant families applied in traditional medicine are regarded as families of importance

when viewed from a cultural perspective and relating to the effectiveness of the bioactive constituents of member species; so when these factors are combined, tend to have an impact on and determines the choice of medicinal plant for medical applications by the communities.

Table 2: Plants used for the management of diabetes mellitus in Hadejia town

No	Plant name	Family	Local name	Part used
1	<i>Acacia nilotica</i> Lam.	Fabaceae	Bagaruwa	Stembark, Leaves
2	<i>Adansonia digitata</i> Linn.	Malvaceae	Kuka	Seeds
3	<i>Allium sativum</i> Linn.	Amaryllidaceae	Tafarnuwa	Bulb
4	<i>Azadirachta indica</i> A. Juss	Meliaceae	Dogon yaro	Stembark, Leaves
5	<i>Anogeissus leiocarpus</i> DC.	Combretaceae	Marke	Stem
6	<i>Balanite aegyptiaca</i> Linn.	Zygophyllaceae	Aduwa	Stembark, Leaves
7	<i>Citrus medica</i> Linn.	Rutaceae	Lemon tsami	Fruit
8	<i>Eugenia caryophyllata</i> Linn.	Myrtaceae	Kanunfari	Seeds
9	<i>Guiera senegalensis</i> J. F. Gmel	Combretaceae	Sabara	Leaves, Root
10	<i>Mangifera indica</i> Linn.	Anacardiaceae	Mangwaro	Leaves, Stembark
11	<i>Moringa oleifera</i> Lam.	Moringaceae	Zogale	Leaves
12	<i>Parkia biglobosa</i> Jacq.	Fabaceae	Dorawa	Fruit
13	<i>Piliostigma malabaricum</i> Roxb.	Fabaceae	Kalgo	Stembark
14	<i>Psidium guajava</i> Linn.	Myrtaceae	Goba	Leaves
15	<i>Ziziphus mucronata</i> Willd.	Rhamnaceae	Magaryar kura	Leaves

Observed among the respondents in the management of diabetes was a common practice of

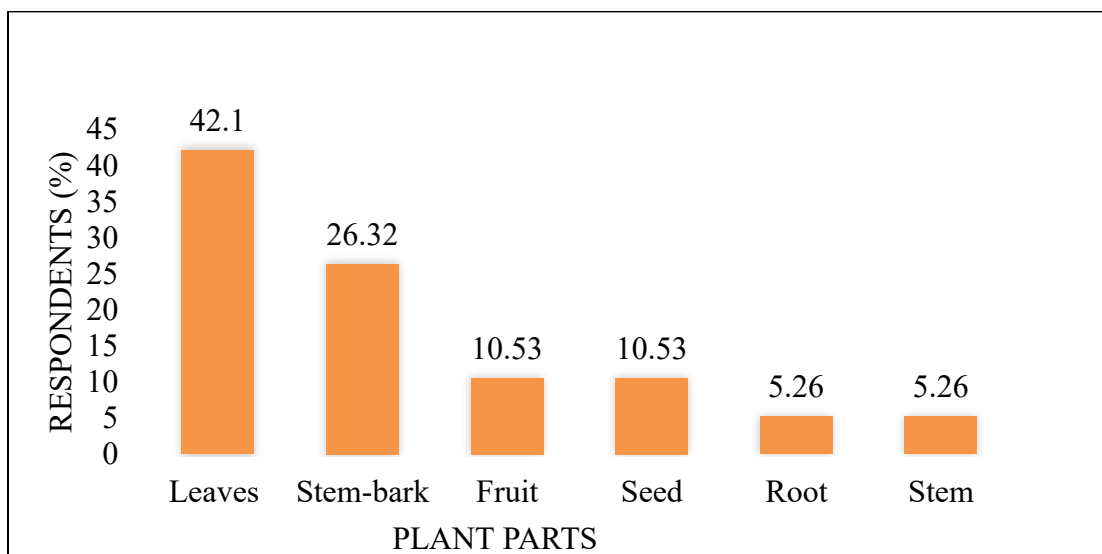
combining one or more medicinal plants, as it is believed that combining the plant species may act

synergistically in bringing about the desired effects. Tiwari & Rao, (2002) and Ebong *et al.* (2008) stated that polyherbal remedies have been known to act as synergistic and/ antagonistic pharmacological agents to produce desired effects having minimal toxic effects.

The most mentioned medicinal plant part were leaves (*Table 3*). This finding agrees with the reports of Offiah *et al.* 2011 and Dike *et al.* 2012).

This plant part occurring as the most mentioned may be attributed to its easy availability and/ as a result of its high phytochemical content (Khan *et al.*, 2014). Scientifically, photosynthesis actively takes place in the leaves as well as the production of secondary metabolites (Ghorbani, 2005); hence, the diverse bioactive constituents present in leaves may be responsible for its efficacy in the treatment of different ailment (Offiah *et al.*, 2011).

Figure 3: Occurrence of plant parts used for the management of diabetes mellitus in Hadejia



CONCLUSION

This study was able to provide an insight into the traditional medicine practice with regards to the treatment of diabetes in Hadejia community. It provided data on medicinal plants traditionally employed for managing diabetes in Hadejia. These findings can be used as a basis for further pharmacological investigations in proving their efficacy as antidiabetic agents.

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