

Full Length Research Paper

Survey of herbal remedies used by Fulani herdsmen in the management of animal diarrhoea in Plateau State, Nigeria

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The Fulani herdsmen of Nigeria are known to use herbs for the treatment and control of different human and livestock diseases. This study was designed to identify and document the medicinal plants used by the Fulani herdsmen in Plateau State, Nigeria, in the management of animal diarrhoea, and to harness such plants for the purpose of drug development. Open-ended questionnaires and guided dialogue techniques were used to interview the Fulani pastoralists in nine Local Government Areas (LGAs) spread across the three senatorial districts of Plateau State. Seventy-nine plants were mentioned as being used for treatment and control of diarrhoea in animals. Fabaceae was the most common family mentioned followed by Combretaceae, Moraceae and Verbanaceae. The leaves were mentioned as the most common plant part used. Most anti-diarrhoeal preparations are administered by drenching while a few others are mixed with feed, salt or potash to improve palatability. The Fulani herdsmen have appreciable understanding of medicinal plants and could constitute a relevant source of information about herbal remedies. Plateau State has a large reserve of medicinal plants used for the management of diarrhoea in livestock; such plants are potential sources of novel anti-diarrhoeal medicaments.

Key word: Animal diarrhoea, Fulani, herbs, Plateau State, Nigeria, survey.

INTRODUCTION

The Fulani tribe found mainly in Central, Western and Northern Africa hold a large number of livestock population. In Nigeria and most parts of Africa, mobile pastoralism is the dominant system of livestock management practiced by pastoralists. This involves the movement of herdsmen, their families, and herds from one grazing area to another with availability of fodder, water and animal health as determining factors (Adekunle

et al., 2002). The economic burden of diseases worldwide (Bennett et al., 1999) and the declining provision of animal health services in developing countries have undermined the efficiency of livestock production by Fulani nomads in Nigeria (Ilemobade, 2009). It is generally believed that Fulani herdsmen have good knowledge of medicinal plants because as they move from one place to another they depend on these plants to tackle their health challenges as well as those of their animals.

More recently veterinarians and other scientists in recognition of the fact that livestock owners possess considerable understanding of herbal remedies and their application in disease management (Adekunle et al., 2002) have intensified their efforts towards harnessing

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Abbreviations: LGA, Local Government Areas; WHO, World Health Organization; ABU, Ahmadu Bello University.

this knowledge in dealing with livestock diseases and other problems (Adekunle et al., 2002).

Most livestock diseases present diarrhoea as a symptom with adverse effects reported to include anorexia, weight loss, general malaise and death (Gattuso and Kamm, 1994). Current management of diarrhoea is achieved using drugs such as antibiotics, atropine sulphate, loperamide, kaolin, anthelmintics, fluid and electrolyte replacement therapy (Hall, 2011; Sur and Bhattacharya, 2006).

Despite the availability of a vast spectrum of approaches for diarrhoeal management, many people in developing countries still rely on herbal drugs for the management of diarrhoea. World Health Organization (WHO) has encouraged studies for the treatment and prevention of diarrhoeal disease using traditional medical practices (Atta and Mounair, 2004). The use of herbal medicines is common among peasant farmers and pastoralist because orthodox medicines have been found to be either not available or too expensive as a result; the Fulanis have resorted to the use of indigenous plants as remedy for animal diseases (Abubakar et al., 2007; Ibrahim, 1984). Furthermore, several investigators have contributed to reports which establish the use of plants in the treatment of diarrhoea in South Africa (De Wet et al., 2010; Appidi et al., 2008; Mathabe et al., 2006), Mozambique (Ribeiro et al., 2010), India (Tetali et al., 2009) and Sokoto State, Nigeria (Etuk et al., 2009).

A review of available literature shows that such survey has not been conducted in Plateau State, Nigeria. The state has a large population of Fulani nomads probably due to the favourable climate all year round (FAO, 2009). The need to preserve and transfer indigenous knowledge from one generation to another is imperative in order to prevent the rapid depletion of such knowledge (Prance, 1991; Cox, 1990) This study is therefore intended to record the medicinal plants used for the treatment of diarrhoea by Fulani herdsmen in Plateau State, and to evaluate such plants for the purpose of developing new drugs.

MATERIALS AND METHODS

The data was collected through oral interview of Fulani herdsmen from 9 selected local government areas of Plateau state Nigeria (Figure 1) which spread across the 3 senatorial zones of the state during the months of October to December 2010. Letters were written seeking for assistance and cooperation of the Local Government Agricultural Departments in mobilizing community leaders and Fulani herdsmen. The Local Government Areas (LGAs) surveyed include; Bassa, Jos East, Jos South and Barkin-Ladi in the Northern zone; Bokkos and Pankshin in the Central Zone; Langtang North, Shendam, Qua'an-Pan and Wase in the Southern Zone. The selected LGAs are known to have high population of cattle and favourable environment for livestock production (Bertu et al., 2010).

The Fulani pastoralists were interviewed using a well structured, open-ended questionnaire and guided dialogue techniques (Jacob et al., 2004). The questionnaire was designed by the team based on the needed information and validated by the epidemiology and

extension units of the Institute. The team was made up of five veterinarians, one pharmacist, one pharmacologist and two trained veterinary extension officers. Members of the team were randomly divided into two on a rotational basis, with one extension officer in each group at any given time. Fulfulde and Hausa languages were used to conduct the interview. Active participation in the survey was gained by giving out some incentive to stimulate cooperation. These included free consultancy services by the veterinarians, remuneration in some instances for the field staff and the promise to organize seminar for the communities visited after the conclusion of the research.

Those who consented to participate in the survey were asked to share their knowledge and experiences on the medicinal plants used in their communities to manage diarrhoea. Information was received on part(s) of the plant used, methods of herbal preparation, mode of administration, dosage estimation, the effectiveness of the herbal remedy and adverse effects observed. The conversation was built on trust, with the clear understanding of the aim of the survey (Okoli et al., 2002). Plants claimed to be beneficial in the treatment of diarrhoea were collected based on the guided field-walk method (Rashid et al., 2010). The plant specimens collected were pressed, labelled with their local names where available and sent to the herbarium of the Department of Biological Sciences, Ahmadu Bello University (ABU), Zaria, and Identified, authenticated and voucher number assigned by Mallam U.S Gallah.

RESULTS

One hundred and five questionnaires were administered directly during the survey. A total of 87 (82.86%) respondents admitted having used antidiarrhoeal medicinal plants or were still using them to treat their animals. Eighteen (17.14%) had no knowledge of herbs or medicinal plants used for the treatment of diarrhoea in animals. Most of the respondents were able to give adequate description of the nature of the diarrhoea often seen in their animals.

Data generated from the survey indicated seventy-nine (79) medicinal plants as remedies in use for diarrhoea management out of which twenty-eight (28) were properly identified by their scientific nomenclature and local names (Table 1). The 28 plants scientifically identified represents 23 genera distributed among 17 families (Table 1), with the families Fabaceae (21.43%) having the highest frequency of occurrence followed by Combretaceae (17.86%). Moraceae and Verbanaceae had 2 (7.14%) members each while all other families were mentioned once (3.57%). *Khaya senegalensis* 26 (24.76%) was the most common plant mentioned followed by *Adansonia digitata* 10 (9.52%). *Vitex doniana* was mentioned 9 (8.57%) times while *Combretum glutinosum*, *Terminalia avicennioides* and *Terminalia macroptera* were mentioned 7(6.67%) times each.

Various parts of these plants in use were also indicated (Figure 2), with the leaves being the most commonly mentioned (42.86%). Plant parts to be used are usually prepared by soaking the fresh or dried plant parts in water and the extract administered by drenching. In some cases, the plant materials are mixed with feed and/or potash to improve palatability.

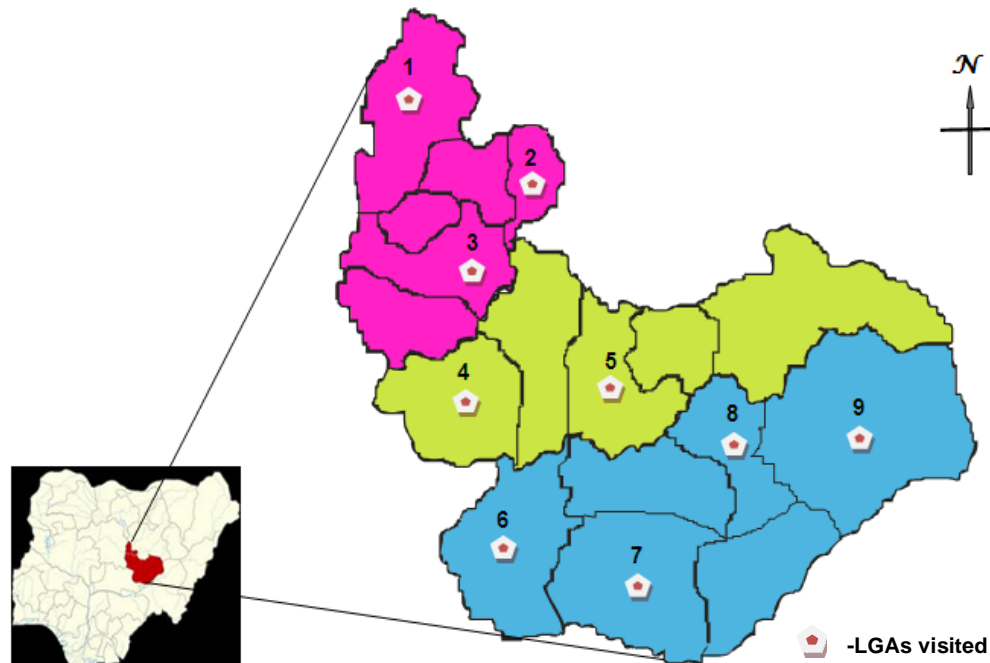


Figure 1. Map of Plateau State, Nigeria showing LGAs visited. Bassa (1), Jos East (2), Barkin-Ladi (3), Bokokos (4), Pankshin (5), Qu'an Pan (6), Shendam (7), Langtang North (8) and Wase (9) LGAs. Pink – North, Green – Central and Blue – Southern geopolitical zones.

DISCUSSION

Cattle-rearing is the main occupation of Fulani herdsmen in Nigeria while other ethnic groups usually engage in livestock farming as a secondary occupation (Abdu et al., 2000). Out of the 105 Fulani herdsmen interviewed in this survey, 87 (82.86%) indicated that they use herbal remedies to manage animal diarrhoea, while 18 (17.14%) stated that they rely on orthodox veterinary preparations. This agrees with earlier reports on the relevance of different traditional healing practices in Nigeria as well as other parts of the world (Abdu et al., 2000; Mathias, 1994; McCorkle, 1986). The reliance of pastoralists on herbal remedies for both prophylactic and therapeutic purposes in Nigeria has been reported (Abdu et al., 2000; Kudi and Myint, 1999).

The Fulani herdsmen exhibited good knowledge of the pathology of various animal diseases and the corresponding plant(s) used in the treatment. Most of them were able to clearly describe the type of diarrhoea passed by their animals which they called “saaroo or dauda”. Others could identify and name disease conditions responsible for diarrhoea such as: helminthosis (goli), white scour in calves (shanin-koje or gortoyel), fascioliasis (hanta) and rinderpest (bushiya). Their understanding of animal diseases is partly due to experiences gathered during grazing and interaction with butchers when they take sick animals for slaughter (Ibrahim, 1984).

From Table 1, *K. senegalensis* 26 (24.76%) and *A. digitata* 10 (9.52%) are the plants commonly used by Fulani herdsmen in the management of diarrhoea in livestock. Another survey of ethnoveterinary practices of agropastoralist in eleven selected states of Nigeria also reported that *K. senegalensis* and *A. digitata* as the most common plants used as remedies for various livestock diseases (Abdu et al., 2000). Other plants mentioned were *V. doniana*, 9 (8.57%), *T. avicennioiodes* and *T. macroptera* 7 (6.67%) times each. These medicinal plants are either used singly or in combination with other plants. A similar checklist of the plants listed in Table 1 has been reported in a survey of ethnoveterinary plants useful in the treatment of poultry diseases in Ekiti State, Nigeria (Kayode et al., 2009). Thus, agreeing with reports that medicinal plants have a wide range of application in the treatment of different animal species (Eisenberg et al., 1998).

A. digitata (baobab) is commonly found in the northern part of Nigeria. Earlier works have reported its use in the management of diarrhoea, malaria and cough (De Caluwe et al., 2009; Woolfe et al., 1977). The anthelmintic effect of *K. senegalensis* (mahogany) has been reported (Ndjonka et al., 2010). Apart from eliminating matured adult worms, the plant has also been shown to have ovicidal activity (Chiezey et al., 2000). These may justify its use in diarrhoea management.

Fabaceae is the most common plant family reported in this study, having 6 genera (21.43%), followed by

Table 1. Medicinal plants used in the management of diarrhoea by Fulani herdsman in Plateau State.

S/N	Botanical/Scientific name	Family	Common Name (Eng)	Nigeria language name (H; Y; I; F)	Folkloric Evidence of Use	Leaves	Stem bark	Roots	Fruits	Seeds	Flower	Whole
1	<i>Acacia albida</i>	Fabaceae (Mimosaceae)	Apple-ring Acacia, Winter Thorn	H: Gawo	1 (0.95%)	+	+	-	-	-	-	-
2	<i>Adansonia digitata</i> ,	Bombacaceae	Baobab Tree, Judas Fruit	H: Kuka	10 (9.52%)	+	-	-	-	-	-	-
3	<i>Aloe buettneri</i>	Liliaceae	West African aloe	H: Zabuwa; F: Zabuwahi	2 (1.90%)	+	-	-	-	-	-	-
4	<i>Anogeissus leiocarpus</i>	Combretaceae	African Birch	H: Marke; Y: Pako dudu, ayin	2 (1.90%)	+	+	-	-	+	-	-
5	<i>Bauhinia rufescens</i>	Fabaceae	Bauhinia	H: Matsagi, Kalgon Allah; F: Nammare	1 (0.95%)	+	-	-	-	-	-	-
6	<i>Boswellia dalzielii Hutch</i>	Burseraceae	Frankincense tree	H: Ararabi; Hano; F: Mangalede	1 (0.95%)	-	-	-	-	-	-	-
7	<i>Carica papaya</i>	Caricaceae	Paw-paw	H: Gwanda	2 (1.90%)	-	+	-	-	+	-	-
8	<i>Combretum glutinosum</i>	Combretaceae	-	H: kantakara, Baushe	7 (6.67%)	+	-	+	-	-	-	-
9	<i>Combretum lamprocarpum</i>	Combretaceae	-	H: Bauli; F: Buski daneehi; Zindi; Y: ajantiro	2 (1.90%)	+	-	-	-	-	-	-
10	<i>Erythrophloeum africanum</i>	Fabaceae	African blackwood	H:Goska; F: Naretibahi	1 (0.95%)	-	-	-	-	-	-	-
11	<i>Ficus ingens</i>	Moraceae	Red-leaved fig	F: Nunahi; Bakurahi; H: Kawuri	1 (0.95%)	+	-	-	-	-	-	-
12	<i>Ficus platyphylla</i>	Moraceae	Flake/Red Kano rubber tree	H: Gamji; F: Dundehe	2 (1.90%)	-	+	-	-	-	-	-
13	<i>Khaya senegalensis</i>	Meliaceae	African Mahogany	H: Madaci	26 (24.76%)	-	+	-	-	-	-	-
14	<i>Kigelia africana</i>	Bignoniaceae	Cucumber or Sausage tree	H: Nonon giwa; F: Jillarehi	2 (1.90%)	-	+	-	-	-	-	-
15	<i>Mitragyna inermis</i>	Rubiaceae	False abura	H: Giyayya; F: Koli	1 (0.95%)	-	-	-	-	-	-	-
16	<i>Moringa oleifera</i>	Asclepiadaceae	Drumstick Tree	H: Zogale	1 (0.95%)	+	+	-	-	+	-	-
17	<i>Parkia biglobosa</i>	Fabaceae (Mimosaceae)	African locust bean; Monkey cutlass tree	H: Doruwa	3 (2.86%)	-	+	-	-	-	-	-
18	<i>Piliostigma reticulatum</i>	Leguminosae Caesalpinaceae	English: camel's foot (Etkin).	H: 'kalgo; F: Batehi; Y: abafin; I: okpo atu	1 (0.95%)	+	-	-	-	-	-	-
19	<i>Piliostigma thonningii</i>	Fabaceae	camel's foot, monkey bread, Rhodesian bauhinia	Kalgo / Kargo (Hausa)	1 (0.95%)	+	-	-	-	-	-	-
20	<i>Prosopis africana</i>	Fabaceae	Iron wood; Axlewood	H: Kirya; F: Kwahi	3 (2.86%)	-	+	-	-	-	-	-
21	<i>Psidium guajava</i>	Myrtaceae	Guava	H: Gwaiva	1 (0.95%)	+	-	-	-	-	-	-

Table 1. Contd.

22	<i>Solanum dasyphyllum</i>	Solanaceae	-	H: Gautan Kaji;	1 (0.95%)	-	-	-	+	-	-	-
23	<i>Starchytarpheta angustifolia</i>	Verbanaceae	Devil's coach whip	H: Tsarkiyar kuusuu, Wutsiyan kadangare	2 (1.90%)	+	-	+	-	-	-	-
24	<i>Striga hermonthica</i> (Del.) <i>Benth</i>	Scrophulariaceae	Witchweed; purple witchweed	H: Wuta-wuta; F: Turguel	1 (0.95%)	-	-	-	-	-	-	+
25	<i>Terminalia avicennioides</i>	Combretaceae	-	H: Baushe; Y: Igiodan; I: Edo	7 (6.67%)	-	-	-	-	-	-	-
26	<i>Terminalia macroptera</i>	Combretaceae	-	H: Baushe; F: Bodi	7 (6.67%)	+	-	+	-	-	-	-
27	<i>Vitellaria paradoxa</i> Gaertn. (<i>Butyrospermum</i> <i>paradoxum</i>)	Sapotaceae	Sheabutter tree	H: Kadanya; I: okwuma; Y: akú malapa	1 (0.95%)	-	+	-	-	-	-	-
28	<i>Vitex doniana</i>	Verbanaceae	black plum	H: Dinya; F: Bodilohi (Munjiriya); I: Utakiri; Y: Ori-nla	9 (8.57%)	+	+	-	+	-	-	-

* H, Y, I, F: Hausa, Yoruba, Igbo, Fulfulde. +, plant part in use; -, no information on use.

Combretaceae which has 5 (17.86%). A similar observation suggesting that the Fabaceae family may be more likely to have antidiarrhoeal effect than plants from other families has been made (Appidi et al., 2008). The Fabaceae family contains many genera that have been shown to be useful in the treatment of many other ailments besides diarrhoea (Joudi and Ghasem, 2010; Appidi et al., 2008). In contrast, an ethnoveterinary plant survey in Ethiopia reported Asteraceae as the highest, followed by Solanaceae, with Fabaceae and Lamiaceae being third (Yinegar et al., 2007). This difference may be due to the fact that their survey was not specific on diarrhoea but on medicinal plants used in all animal diseases.

It was also observed that the leaves (42.88%) constitute the most frequently used plant part, followed by the stem bark (31.43%) as shown in Figure 2. A similar survey of plant parts used in Dheera town Arsi zone in Ethiopia also reported

that leaves are the most frequently used plant part in herbal preparations followed by the roots (Wondimu et al., 2007).

Communities using herbal medicaments have indicated preference for the use of leaves because it is more convenient collecting leaves than root parts, flowers and fruits (Giday et al., 2009). However, some authors have reported that roots are more commonly collected plant parts in ethnoveterinary practice (Yinegar et al., 2007; Hunde et al., 2004; Tibuti et al., 2003). The use of leaves in combination with other plant parts has also been reported (Ayyanar and Ignacimuthu, 2011).

It is known that leaves are actively involved in photosynthesis and the production of metabolites (Ghorbani, 2005). Thus, the numerous constituents found in leaves could explain their efficacy in the treatment of various ailments in both humans and animals. Collection of leaves for herbal preparations ensures sustainability as long

as some leaves are left on the parent plant (Yinegar et al., 2007). This is opposed to the collection of roots which could be a severe threat for rare and slowly producing plants.

The herbal remedies were often prepared by pounding either the fresh or dried parts of the plants followed by either soaking or boiling them in water, and the infusions or decoctions administered by drenching. These practices have also been reported by other researchers (Ermias et al., 2008; Abdu et al., 2000). Sometimes, the plant portions are mixed with bran or grain and fed to the animals or mixed with potash (kanwa) or salt and given to the animals to lick, an observation corroborated by Abdu et al. (2000).

The dosages often administered varied with the parts of the plant used and the mode of preparation. However most Fulani herdsmen administer the preparations once or twice a day for 3 to 5 days, or keep treating until the animal recovers. Full recovery is confirmed when the

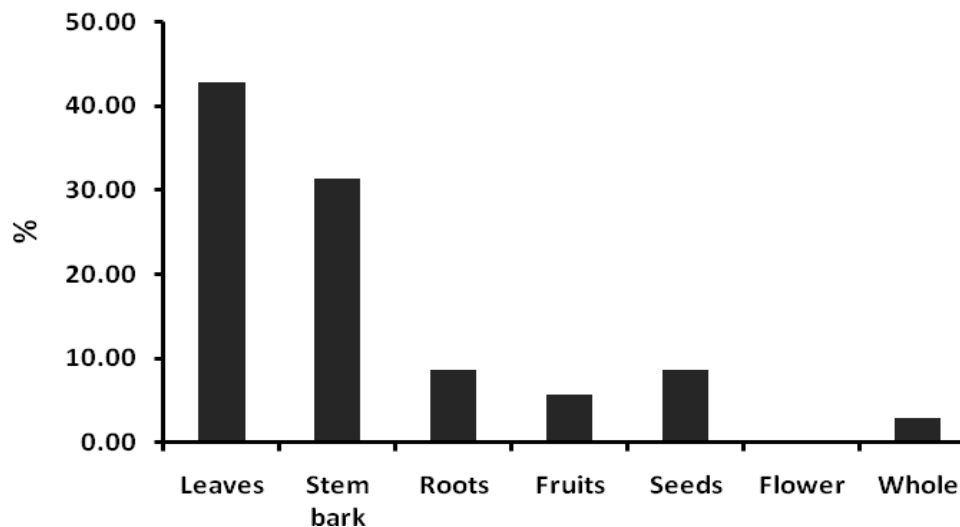


Figure 2. Percentage distribution of medicinal plant parts used in the management of diarrhea by Fulani herdsmen.

animals resume feeding and activities. Similarly, administration of herbal medicines to sick animals by pastoralists for 3 to 7 days once or twice daily or until there is visible improvement of condition has been reported (Abdu et al., 2000).

Most respondents claimed that their herbal remedies were efficacious and healing was achieved without visible adverse effects. A study carried out in Kerala, South India indicated that majority of farmers used traditional medicine because it had no side effects (Padmakumar, 1998). This may be due to their holistic properties (Majumdar, 1989). Some of the plants listed in Table 1 have been investigated in some other parts of Nigeria and the world for their antidiarrhoeal properties using castor oil in rats or mice model as well as the antimicrobial activity of the extracts (Ahmadu et al., 2007; Agunu et al., 2005; Abdullahi et al., 2001; Mujumdar et al., 2000).

During this survey, the researchers experienced unwillingness to part with indigenous knowledge and the problem of inconsistent dosage regimen in the administration of the herbal preparations. This is not uncommon with researches on ethnobotanical surveys (Souto et al., 2011; Bisi-Johnson et al., 2010). The guardians of indigenous knowledge of herbal remedies do not usually document their practices; hence transfer of knowledge to subsequent generations becomes difficult following their demise. This type of survey serves to fill that important gap.

To the best of our knowledge, this is the first report of herbal remedies used in the management of diarrhoea by the Fulani herdsmen in livestock in Plateau State. Plants identified from this study will be evaluated to determine their phytochemical constituents and biological activities in order to validate the claims.

The Fulani herdsmen are a relevant source of information on medicinal plants used for the management of diarrhea in livestock owing to their nomadic nature. Such plants could be harnessed and used as potential drug sources for the production of anti-diarrhoeals that could be used for the treatment and control of diarrhea in livestock. It is therefore, strongly recommended that further studies be carried out on all the above listed plants that were collected during the survey to validate their efficacy in the treatment of diarrhea in animals for the purpose of drug development.

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