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Assessment of Indigenous Knowledge on Prevention and Control of Camel Diseases; in Borana Zone, Oromia Regional State, Ethiopia

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Abstract: Assessment of indigenous knowledge of Borana pastoralists was conducted starting from November 2015 to March 2016 to assess their indigenous knowledge on prevention and control of Camel diseases. The study was undergone in two representative districts, particularly in Yabello and Borana districts by eye to eye contact interview and collection of the plants predicted by the Borana pastoralists and some of its Botanic name was undergone at Department of Plant Biology and Biodiversity Management Herbarium, National Herbarium, Science Faculty, Addis Ababa University and their botanical (species) names were identified and deposited in the same Herbarium. To overcome camel health problems, pastoralists usually uses two medicinal plants particularly magado (mineral salt) together with oda (*Ficus sycomorus*) (40.74%) and Harken (*Euphorbia polyacantha* Boiss) (10.26%). Further research that targets identification of the indigenous knowledge for the prevention and control of camel disease should be conducted as it is scientifically and economically contributing factor for camel productions in pastoral area.

Key words: Plant · Traditional Medicine · Botany Name · Borana and Pastoralist

INTRODUCTION

The pastoral communities have developed and adapted coping strategies to survive during disasters for generation. The strategies practiced and adapted were based on indigenous knowledge, skill and resource of pastoralists to ensure survival, productivity and well-being of their livestock health. The traditional knowledge has been described as a cumulative body of knowledge, practice and belief, evolving through adaptive processes and handed over through generations by cultural transmission [1]. Traditional medicines used throughout the world as it is heavily dependent on locally available plant species and plant-based products and capitalizes on traditional wisdom-repository of knowledge [2]. The wide spread use of traditional medicine could be attributed to cultural acceptability, economic affordability and efficacy against certain type of diseases as compared to modern medicines. Thus, different local communities in countries across the world have indigenous experience in various medicinal plants where they use their perceptions and experience to categorize plants and plant parts to be used when dealing with different ailments [3].

Modern veterinary medicines are not well developed in the country, nor are modern drugs available adequately to fight animal diseases. It is estimated that the traditional remedies are sometimes the only source of therapeutics for nearly 80% of human population and 90% of livestock in Ethiopia of which 95% are plant origin [3]. Ethiopian farmers and pastoralists rely on traditional knowledge, practices and locally available materials, plants in particular, to control and manage livestock diseases. The Ethiopians have used traditional medicines for many centuries, the use of which has become an integral part of the different cultures in Ethiopia, due to cultural acceptability, efficacy against certain diseases and economic affordability [4]. The indigenous peoples of different localities in the country have developed their own specific knowledge of plant resource uses, management and conservation [5]. The traditional ways of livestock treatment against disease appear to be a viable alternative to tackling the livestock health problems.

In Ethiopia, especially Borana pastoralists have tremendous indigenous knowledge and skills in disease control and prevention which have developed over generation. A particular problem regarding the major

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camel diseases in the Borana lowland is that traditional knowledge accumulated over centuries have not been appreciated and the local competence of pastoral people have not been assessed and compared to the more modern scientific approach. In addition, pastoralist in Borana suffers from a wide range of camel sudden death for which detail information is lacking.

Hence, the objectives of the study were to assess and document indigenous knowledge used in camel disease prevention and control.

MATERIALS AND METHODS

Study Area Description: The study was conducted from November 2015 to March 2016 at Yabello and Moyale districts of Borana Pastoral area of Ethiopia that are located at 565 and 766 kilometers far from the capital Addis Ababa, respectively. The Borana zone has predominantly a semi-arid climate. The annual temperature varying between 21°C and 38°C with little seasonal variations and rainfall ranges from 350 mm to 900 mm, with considerable spatial and temporal variability in quantities and distribution [6]. The zone is characterized by bimodal rain with 60% occurring in the long rainy season (*Gana*) extending from mid-March to May and erratic short rain season (*Hagayaa*) from mid-September through mid-November. The other two seasons are the cool dry (*Adolessa)* extending from June to August and the major dry season (*Bonna*) from December to February [7].

The Borana plateau of 95, 000 km^2 gently slopes from high mountain massifs in the north (1650 meter above sea level (m.a.s.l)) to the south bordering Kenya (1000 m.a.s.l) with a slight variation due to central mountain ranges and scattered volcanic cones and craters [8].

The largest proportion of the Borana zone (62.5%) can be classified as lowlands with a semi-arid to arid climate. Nomadism and semi-sedentarism are typical livestock-rearing practices in these areas. Animal husbandry in the area is characterized by extensive pastoral productions system and seasonal mobility. As aridity increases, the principal stock shifts gradually from cattle combined with small stock to camels combined with small stock with a relative degree of the social and cultural values accounting for differences. Camel herd movement may move the whole herd to water points and to relatively better areas where green fodder is available, or by herd splitting where lactating and young animals are kept around homesteads and moving the rest to distant located forage areas [9].

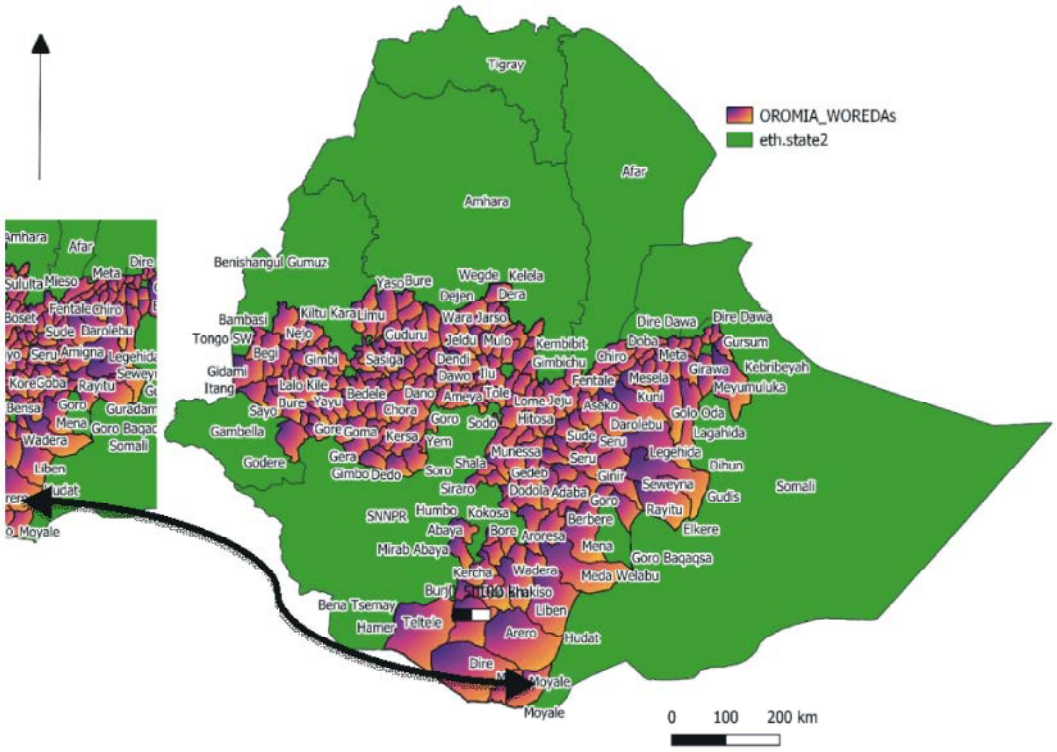

Fig. 1: Map of study area designed by QGIS 3.4

Study Districts: Two districts were purposely selected for the study because of accessibility.

Yabelo: Yabelo is one of the districts in the Borana zone of Oromia Region, Ethiopia. Yabelo is bordered on the south by Dire, on the west by Teltele, on the north by Bule Hora (Hagere Mariam) and on the east by Arero. This town has a latitude and longitude of 4°53'N38°5'E and an elevation of 1857 meters above sea level. It is administrative center of the Borana Zone since its division from Guji Zone in September 2002 and located at distance of 565 km Southern of Addis Ababa [10].

Moyale: Moyale is one of the woredas in the Borana Zone of Oromia Region, Ethiopia. It is located in the southeast corner of the Borana Zone. Moyale is bordered on the south by Kenya, on the west by Dire, on the northwest by Arero, on the north by the Dawa River which separates it from Liben and on the east by the Somali Region. The altitude of this woreda ranges from 1150 to 1350 meters above sea level and located at a distance of 766 km from Addis Ababa. A survey of the land in this woreda shows that 9% is arable, 60% pasture, 21% forest and the remaining 10% is considered swampy, degraded or otherwise unusable. Cereals cultivated include corn, wheat, teff, barley and sorghum; sugar cane, banana and papaya are other important crops [10].

Study Design: Camel owners in the two selected districts of Borana zone were interviewed using structured questionnaire. The questionnaire consists of questions related to indigenous knowledge on disease prevention and controls. A total of 130 camel owners from two selected districts of Borana zone were randomly selected and interviewed.

Data Collections and Analysis: Data in the study area was collected by direct interviewing of camel owners to share their indigenous knowledge on disease prevention and control in 2013/2014. Because of inaccessibility of many remote areas as well as shortage of transportation facilities, the formal sampling procedure was very difficult. Only those individuals were interviewed at market places, at watering points, meeting sites and around their settlement camps. A total of 130 camel owners were interviewed of which 65 individuals were from Moyle and 65 from Yabelo districts.

The data collected through questionnaire survey was then entered to Microsoft Excel spreadsheet. The data analysis was conducted using MINITAB statistical software v.16. Descriptive analyses for proportion or frequency of respondents were used to summaries the data [11].

Traditional Treatment/ Phyto-Therapy of Camel Diseases or Symptoms: Camel owners apply various traditional treatments, including the use of different parts of some medicinal plants against camel diseases. Different preparations, modes and routes of administration of treatment of camel disease were reported by respondents. A total of 22 different plants were known to be used by the respondents to treat camel diseases or symptoms. Of these, 22 medicinal plants, seven of them were submitted to Department of Plant Biology and Biodiversity Management Herbarium, National Herbarium, Science Faculty, Addis Ababa University and their botanical (Species) names were identified and deposited in the same Herbarium. The rest samples are in the process of botan.

The different parts of plants listed in the table 1 were used for treatment of diseases and the bark part of these plants is widely used (55.17%) followed by stem (Figure 2).

Traditional Practices (Indigenous Knowledge) and Route of Administration: The most indigenous knowledge (and medicinal) plants widely used to treat camel diseases are magado (salt) + (combined with) oda (*Ficus sycomorus* [8] scientific name to be further confirmed soon) (42.74%) and harken (*Euphorbia polyacantha* Boiss) (10.26%). The uses of other medicinal plants accounts for less than or equal to 5.13% per plant. Three different routes of administration were used to treat camels namely oral, topical and through nostrils that accounts for 75.21%, 23.93% and 0.85%, respectively.

The Borana pastoralists, in addition to use of medicinal plants, apply various traditional treatments for prevention and control of camel diseases, including Magico-religious therapy, use of animal products like butter and milk, branding and mineral salt (Table 2).

Magico-religeous therapies were practiced by Borana pastoralist to prevent the occurrence of certain diseases. The commonly used Magico-religeous practices are the use of locally called ersigi that is tied at the neck of camels to prevent disease and traditional believes like, evil eye, mastitis and camel sudden death. Fire branding, using red and hot metal rod, was also practiced for the treatment of diseases. Came disease and symptoms which are treated by fire branding are myositis, abscess, hypocalcaemia, wry neck syndrome, Camel, contagious skin necrosis and otitis.

Table 1: List of medicinal plants used for control and prevention of camel diseases. All local names, some Botanical names, parts used, routes of administration and indications were also presented

Local name	Botanical name[£]	Parts used	Routes	Preparation	Indications
Walda	-	Root bark	Oral Nostrils	Decoction infusion infusion	Wry neck syndrome Abscess Evil eye
Jirime	*Dichrostachy scinerea* (L.) Wight &Am.	Bark	Oral	Decoction	Retained fetal membrane
Hagarsu	-	Bark	Oral	Decoction Infusion	Retained fetal membrane Plant toxicosis
Gora	-	Root	topical	Moistened Ash	Mastitis
Andaada	-	Root	Oral	Decoction	Overbleeding Retained fetal membrane
Hargeessa	*Aloe sp*.	Whole part	Oral topical	Decoction Ash	Abscess Camel pox
Harken	*Euphorbia polyacantha* Boiss	Stem	topical	Sap	Contagious camel skin necrosis
Adaamaa	-	Stem	topical	Sap	Contagious camel skin necrosis
Sattaweesa	-	Bark	Oral	Decoction	Neck and shoulder paralysis
Wara	-	Stem	topical	Decoction	Mange
Holloboo	-	Stem	topical	Sap	Mange
Hammareesa	*Acacia brevispica* Harms	Root	Oral	Infusion	Joint ill and septicemia
Harooressa	*Grewiavelutina* (Forssk.) Vahl.		Bark	topical	Infusion Mange
Halo	-	Bark	Oral	Decoction	Joint ill septicemia
Qobbo	*Ricinuscommunis* L.	Leaf	Oral	Decoction	Retained fetal membrane
Gaddah	-	Leaf	Oral	Decoction	Camel pox
Bursa	-	Leaf	Topical	Infusion	Swelling of head
Qilxa	-	Root	Oral	Decoction	Abscess
Taboo	-	Leaf	topical	Infusion	Wounds
Hidheesa	*Juniperusprocera* Hochst x Endl.	Leaf	Topical	Smoked	Mastitis
Oargu	-	Leaf	topical	Infusion	Camel pox
Oda	-	Bark	Oral	Decoction	Abscess

[£]-Botanical names were identified in National Herbarium, Science Faculty, Addis Ababa University; sp.-species.

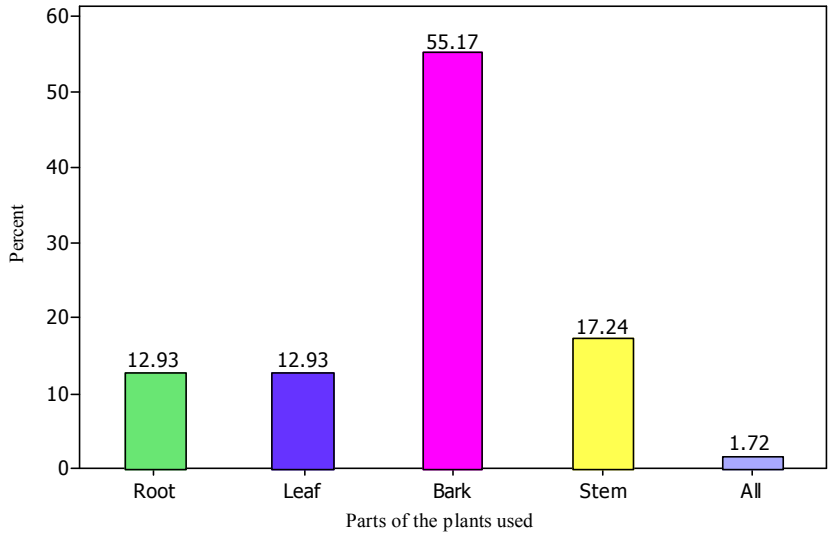

Fig. 2: Summary of plant parts used for the treatment of camel diseases by Borana pastoralists

Table 2: Summary of traditional treatment practices used for prevention and control of camel diseases by Borana pastoralists

Questions	Category	Number of respondents (%)
Magico-religeous therapy	Yes	35(29.92)
	No	95(70.08)
Mineral salt	Yes	81(62.06)
	No	49(37.04)
Butter	Yes	5(3.84)
	No	125(96.16)
Milk	Yes	50(38.46)
	No	70(61.54
Branding	Yes	130(100)
	No	0(0)
Isolation of sick camels	Yes	64(49.23)
	No	66(50.77)
Quarantine of purchased camels	Yes	41(31.54)
	No	89(68.46)
Move camels from disease outbreaks	Yes	62(47.69)
	No	68(52.31)
Bury died camels	Yes	0(0)
	No	13 0(100)
Burn died camels	Yes	0(0)
	No	130(100)
Access to veterinary service	Yes	55(42.31)
	No	75(57.69)

The Borana pastoralists were used animal products like milk and butter for the treatment of camel disease. Milk from different livestock species especially camel milk was used for various traditional purposes to solve camel health problems. It is used for the treatments of overbleeding, joint ill and septicemia, lymphadenitis, ingestion of toxic plants, camel contagious ectyema and cancer. Butter was also used for the treatments of various camel diseases such as cancer, camel contagious ectyema and swelling of head. The therapeutic effect of butter is due to the action of butyric acid.

Feeding of mineral salt was also practiced in the study areas both for the treatments of diseases and for fattening purposes. Mineral salt locally called "soda dhoqe and magado" were used for the treatments of disease like camel respiratory disease complex, camel pox, abscess, chronic coughing and lymphadenitis. The salt called magado is especially salt which was always included in the treatments of abscess with herbal preparation.

DISCUSSION

Among the indigenous knowledge, uses of medicinal plants are widely practiced to alleviate different diseases and symptoms. The commonly used traditional medicinal plants were Magado (mineral salt) together with oda (*Ficus sycomorus* [8, 12, 13] and harken (*Euphorbia polyacantha* Boiss) (Table 2), that accounts for 40.74% and 10.26%, respectively, among the 22 medicinal plants known to be used in the area. These two medicinal plants accounts for 51% while the remaining 20 medicinal plants account for 49%. This indicates that the share of the remaining 20 medicinal plants is less than 5.5% suggesting it is used only by small number of traditional healers. In particular the wide use of Magado with oda (*Ficus sycomorus*) is interesting in that oda's medicinal use is well document in Borana area [8]. The plant is native to and widely distributed in many African countries including Ethiopia (Appendix1). In Egypt, the plant was namedas Tree of Life (http://en.wikipedia.org/wiki/Ficus-sycomorus, accessed on May 29, 2015) and also reported to have many medicinal values including antibiotic activity [14], majico-religious uses [13], etc.

In conclusion, the direct financial losses due to sudden camel mortality is affecting the livelihood of pastoralists in terms of direct mortality, milk loss, shortage of replacement stock and breeding bulls. It is recommended that further investigation on the etiological agent/s of the sudden camel mortality is important. The high percentage (41%) uses of single medicinal plant, *Ficus sycomorus*, by pastoralists to treat different camel symptoms and diseases (Table 1) suggests that the traditional medicinal importance of the plant in the community. It is recommended that the plant needs further investigation to understand its effect on different pathogenic organisms.

CONCLUSION AND RECOMMENDATIONS

Borana pastoralists have a wealth of indigenous knowledge, primarily medicinal plants, particularly oda (*Ficus sycomorus*) and magado combined with Harken (*Euphorbia polyacantha* Boiss), to tackle health problems associated with their camels. Based on the above conclusion, the following recommendations were forwarded. Further research is needed to identify in vitro antimicrobial activities of the medicinal plants to estimate the optimal dosage, concentration and toxic effects before recommending in target animals.

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