

Traditional Medicinal Plants for Ethnoveterinary Medicine Used in Kilte Awulaelo District, Tigray Region, Northern Ethiopia

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Abstract

Background: Ethnoveterinary is the scientific study of the relationships between livestock and plants. Traditional medicine is still remaining as the main resource for livestock treating health problems. Hence, the purpose of the study was to conduct ethnoveterinary study on medicinal plant species used to treat diseases of livestock in Kilte Awulaelo District, Tigray, Ethiopia. **Methods:** An ethnoveterinary study of medicinal plants was conducted in the District. The study employed common ethnoveterinary methods including semi-structured interviews, field observations, preference ranking exercises and paired comparisons. A total of 72 informants were purposefully selected, with the help of local administrators, elders and other members of the local community. **Results:** A total of 50 species belonging to 44 genera and 27 families in which family Solanaceae is represented by 8 species (16%), followed by family Euphorbiaceae with 5 species (10%) used as medicine. Present survey reveals that some plants have multiple medicinal uses, while some were being used to cure only one disease. Likewise some of the diseases are being treated by many plants while some diseases treated by one plants species. The males above 40 years were found to be more knowledgeable regarding uses of medicinal plants than women and youngsters. Mostly leaves of the plants used as medicine. The major threats found to be drought followed by over grazing. **Conclusion:** Kilte Awulaelo District is relatively rich in medicinal plant Knowledge and practice. It is concluded that the plant resources in this area are used to treat different diseases of livestock. The medicinal plants were exposing to various anthropogenic and natural factors. The participation of the local people, awareness rising through training or education on sustainable utilization and management of plant resources, establishment of forest protected areas should be encouraged. Conservation of medicinal plants, conservation and promotion of indigenous knowledge by promotion of research activities are required.

Keywords: Ethnoveterinary, Medicinal plants, Kilte Awulaelo District, Eastern Tigray, and Ethiopia.

Introduction

The use of plant by man is dated back to the human existence on earth. In most developing countries, particularly in Sub-Saharan Africa, disease remains one of the principal causes of poor livestock performance leading to an ever-increasing gap between supply and demand for livestock products (Sori *et al.*, 2004). Ethnoveterinary medicine which refers to traditional animal health care knowledge and practices comprising of traditional immunization, beliefs and the use of herbal remedies to prevent and treat disease problems of livestock (Swaleh, 1999; Amenu, 2007). Ethnoveterinary medicine provides traditional medicines, which are locally available and usually cheaper than standard treatments (Mesfin and Obsa, 1994).

In Ethiopia as elsewhere in most developing countries, animal disease remains one of the principal causes of poor livestock performance (Sori *et al.*, 2004). Ethiopia is one of the leading countries of Africa in livestock population (Giday and Ameni, 2003). Although, Ethiopia is rich in its livestock population, it is one of the countries in the world with the lowest unit output (Mesfin and Obsa, 1994). The poor health condition and of its livestock has partially been responsible for the low productivity (Giday and Ameni, 2003).

Besides, most modern drugs are expensive and not affordable by the majority of Ethiopian farmers and pastoralists, most of them rely on their traditional knowledge practices and locally available materials (mainly plants) in the control of diseases of their domestic animals (Mesfin and Obsa, 1994; Giday and Ameni, 2003; Sori *et al.*, 2004). Therefore, proper documentation and understanding of farmers' knowledge and practices about the treatment, prevention and control of various ailments is important in designing and implementing successful livestock production.

Materials and methods

Kilte Awulaelo District is located in Eastern Zone of Tigray Regional State, Northern Ethiopia, with a total of 18 Kebeles. The District is geographically located between $39^{\circ}30' - 39^{\circ}45' E$ and $13^{\circ}45' - 14^{\circ}00' N$ at a distance of 825 km north of Addis Ababa. It borders with Howzien and Sease Tsadamba in the north, Atsbi Womberta in the east, Douga Tembien in the west and Mekelle (Enderta) in the South (Unpublished data, Kilte Awulaelo plan and finance, 2010) Fig. 1 Map of the research Area.

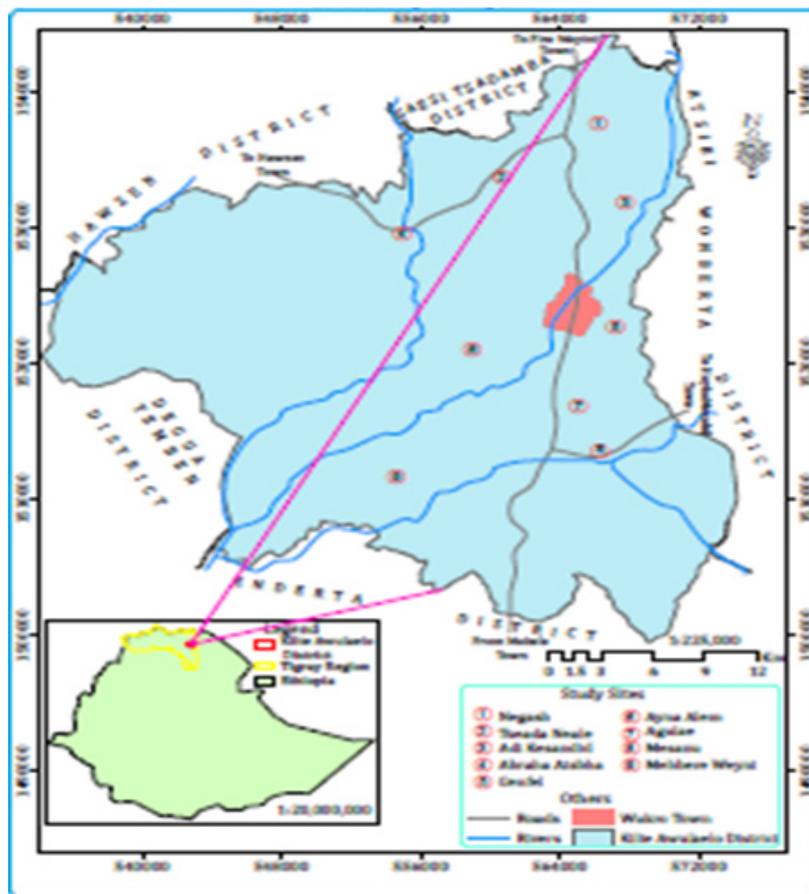


Figure 1. Map of the Kiltse Awlalo District (modified based on GIS of Ethiopia); red and black dots showing selected study kebeles.

Altitude of the District ranges from 1900 to 2460 meters above sea level. The District covers an area of 101,758 hectare, of which 21,620 hectares used for farmland, 7,930.85 hectares used for grazing, 44,134 hectares are enclosure area and 28,073.15 hectares are hills and homes (MoARD. (2007).

Methods

Following Martin (1995) and Cotton (1996), semi-structured interviews were employed and observation was made to collect ethnoveterinary data in the field. Information regarding local names of plants used, wild or cultivated, part(s) used, condition of plant part used (fresh/dried), methods of preparations, routes of administration, methods of application, diseases treated, noticeable adverse effects of remedies (vomiting, pain or others), indigenous knowledge transfer, uses of the medicinal plant species other than medicine, existing threats to these species and traditional conservation practices were gathered during the interviews. The necessary information about the plants such as habit, habitat, and altitude were observed. Each collection was given a collection code.

The collected specimens were then pressed and dried, and identified in the National Herbarium (ETH), Addis Ababa University. The identification work was performed by using the volumes of the Flora of Ethiopia and Eritrea and by comparing with authentic specimens deposited in the National Herbarium (ETH), Addis Ababa University and by getting assistance from taxonomists. The results were then noted and tabulated.

Results

During the study, sixty one (84.72%) male and eleven (15.28%) female informants were part of the stud. Of 72 informants, nineteen 26.39% were found between the ages 20-39, twenty five 34.72% were between the ages 40-59 and the remaining twenty eight 38.89% were above sixty. Of the collected medicinal plants most of them were mentioned by males whereas, females explained the use of few medicinal plants. The knowledge of traditional medicinal plants of the study area was in the hand of male elders. This was evidence that informant ages above 40 were 53 (73.61%) and of which about 45 informants (62.5%) were males.

The people of the District classify the vegetation of the study area are different (Table 1). The vegetation of the study area is dominated by *Acacia etbaica* as one move away from houses and *Opuntia ficus-indica* is common around houses.

Table 1 Emic categorization of vegetation

Etic category	Etic category
Bush land	Kutquat
Grassland	Meda
Relatively with few forest	Bereka
Plantation (enclosed area)	Kulkul bota (Deni)

A total of 50 species were collected during the study used to treat 19 livestock ailments (Appendix 1). These species elonging to 44 genera and 27 families. Family Solanaceae is represented by 8 species (16%), followed by family Euphorbiaceae with 5 species (10%), Fabaceae and Lamiaceae with 4 species (8%) each, Asclepiadaceae with 3 species (6%), Acanthaceae, Asteraceae, Malvaceae and Vitaceae with 2 species (4%) each and the rest 18 families have one species (2%) each.

The results depict plant parts for veterinary uses are herbs (22 species, 44%) followed by shrubs (19 species, 38%), trees (6 species, 12%) and climbers (3 species, 6% (Table 2).

Table 2 Growth forms of medicinal plants used for livestock ailment treatment

Growth form	No of species	Percent of species
Herb	22	44
Shrub	19	38
Tree	6	12
Climber	3	6

The majority of these plants were wild (37 species, 74%), some were harvested from cultivated area (6 species, 12%) and few were collected from both cultivated and wild habitats (7 species, 14%).

Leaves are widely used plant parts for a range of preparations than the other parts accounting for 25 preparations (40.98%), followed by roots 21 preparations (34.43%) for livestock ailment treatment (Fig 2).

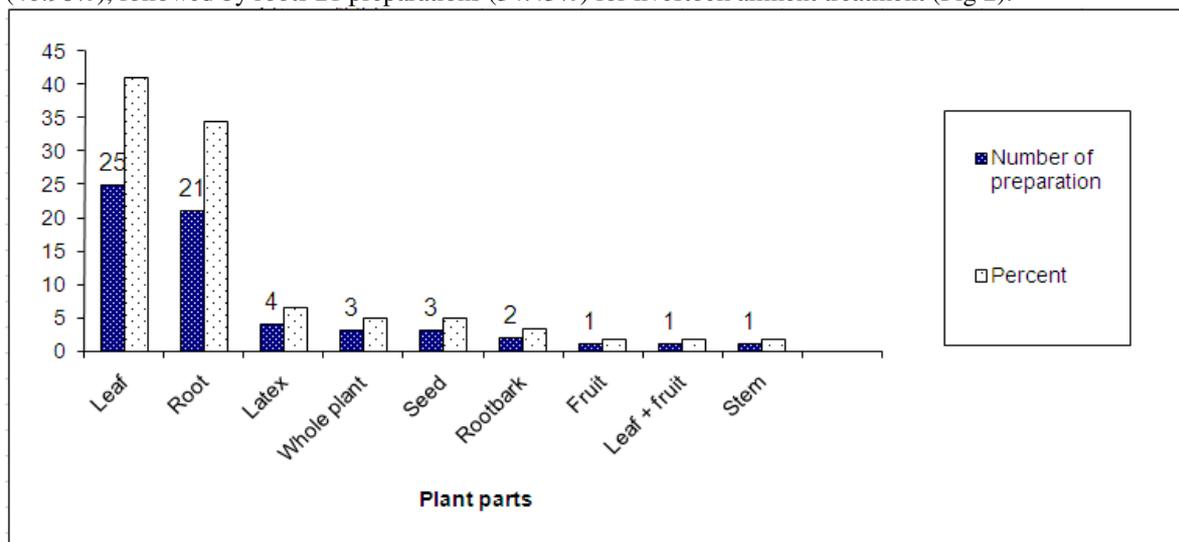


Figure. 2 Plant parts of medicinal plants preparation for livestock ailment treatment

According to the results, crushing 42 (65.63%) and unprocessed preparation 8 (12.5%) were the main methods of remedy preparations for livestock ailment treatment (Table 3).

Table 3 Methods of preparation of medicinal plants for livestock

Forms of preparation	Total responses	Percent of total
Crushing	42	65.63
Unprocessed	8	12.5
Collecting juice	4	6.25
Chewing	3	4.69
Grinding	3	4.69
Fumigant (smoke and vapour)	2	3.13
Decoction	1	1.56
Firing	1	1.56
Total	64	100

Similarly, the frequent applied modes of administration of ethnoveterinary medicine include creaming, rubbing and smearing were the widely used modes of administration accounting for 19 (29.69%), followed by drinking

16 (25%) of the reports (Fig. 3).

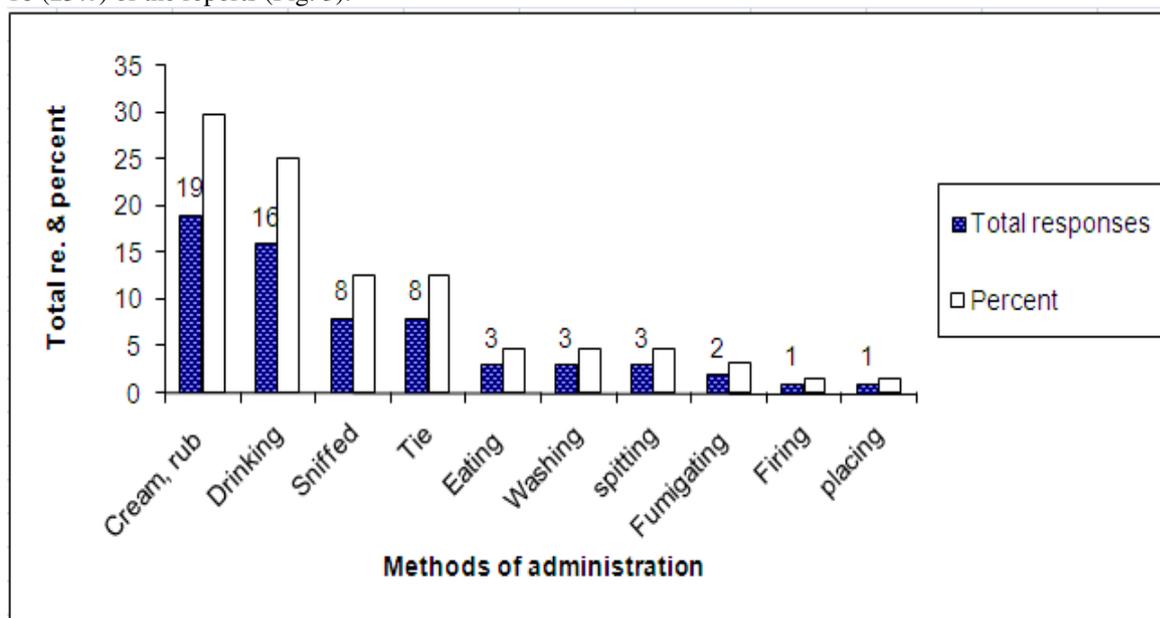


Figure. 3 Methods of administration of medicinal plants for livestock

Major livestock diseases and plant species used by the people of the study area

Nineteen livestock diseases were found to be treated with 50 plant species. Anthrax ranked first since it is treated with 15 species of plants. Dislocated bone is treated with 7 plant species. Snake bite and lice (fleas) also treated with 6 species of plants. Swelling, eye infection and urine retention are also treated with 5 plant species (Appendix 2).

Informants ranked drought as the most serious threat to medicinal plants followed by over grazing and fire wood (Table 4). Over grazing and fire wood are the other factors, following drought, that pose threats to medicinal plants.

Table 4 Priority ranking factors perceived as threats to medicinal plants based on their level of destructive effects (values 1-6 were given: 1 is the least destructive threat and 6 is the most destructive threat)

Threats	Informants										Total	Rank
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉			
Drought	1	3	2	6	6	6	6	6	6	6	42	1 st
Agricultural expansion	2	4	4	5	3	5	4	3	5	5	35	4 th
Fire wood	5	5	6	3	2	4	5	5	3	3	38	3 rd
Over grazing	6	6	5	4	5	3	3	4	4	4	40	2 nd
Soil erosion	3	2	3	2	4	2	2	2	2	2	22	5 th
Others	4	1	1	1	1	1	1	1	1	1	12	6 th

*Key: Where R represented respondents

Conservation status and management measures on medicinal plants

The local communities did not give much attention for management of traditional medicinal plants. Deforestation, overgrazing and recurrent drought resulted in the reduction in number and diversity of trees and shrubs used for medication. The principal threatening factors of medicinal plants were drought, overgrazing and fire wood collection.

According to the informants, nowadays search for some medicinal plants especially trees and some shrubs required a lot of time and travelling long distances. Fifty five (48.25%) species of trees, shrubs and climbers were rarely encountered in the study area, 49 (42.98%) plant species were commonly found and the rest 10 (8.77%) plant species were moderate or occasionally found. Means that they were not found as frequently as the common one but they were relatively better than the rare species in abundance.

Discussion

A remarkable traditional medicinal plant knowledge and practice was documented from the study area. Elders had greater knowledge and use of medicinal plant species than younger people and most are males. Similar results were observed in different part of Ethiopia (Teklehaymanot and Giday, 2007; Giday *et al.*, 2009). This may indicate that the indigenous medicinal plant use knowledge was declining among the younger generation.

This may be due to the influence of modernizations. But this result disagrees with the observation by Bekalo *et al.* (2009) with majority of informants interviewed were in the age class of less than 50.

Ethnoveterinary plant species used by people of the study area

It is encouraging to find out that 50 medicinal plants are still in use in the study area for the treatment of several livestock diseases, Even though the area is in a large scale environmental degradation and recurrent droughts taking place. Comparative studies were undertaken in two Districts (Ofa and Raya-Azebo) and other study in Ofla District, Southern Tigray came up with 83 and 113 plant species of medicinal importance (Giday and Ameni, 2003; Abdurhman, 2010). On the other hand, the study in five Districts of the region came up with a large number of medicinal plants, about 259 species (Birhane *et al.*, 2011). In addition to this, most plant species that were identified during this study were also mentioned by different authors to have been used medicinally elsewhere in the region. The existence and utilization of such a common large number of medicinal plants by people in the study area indicates that the majority of the people use indigenous medicinal practices to take care of medication problems.

During the survey, the majority of medicinal plants were obtained from wild vegetation. Except few herbs, trees and some cultivated crops. This result also agrees with the study by Giday (2001). In another study, Giday and Ameni (2003), found that (60%) of the cited medicinal plant species were collected from wild areas. Similar results were obtained in other studies (Yineger *et al.*, 2008; Bekalo *et al.*, 2009; Abdurhman, 2010; Yirga, 2010b). Wild habitats are subjected to the loss of a number of plant species due to different anthropogenic factors.

In this study, nearly half of the medicinal plants are herbs; this may indicate their relatively better abundance in the area as compared to others. They might be owing to the easily occurrence of these species in the study area and high level of abundance. In the same way high number of herbs and shrubs for medicinal purpose were also previously reported by Teklehaymanot and Giday (2007) indicated the dominance of herbs (52%) in the list of the identified medicinal plants, and Amenu (2007) noted that, herbs constitute the largest category (31.5%) followed by shrubs 30.3%. Comparable results were also observed in Bekalo *et al.* (2009); Birhane *et al.* (2011). Nevertheless, the study observed by Lulekal *et al.* (2008), disagrees with this result. They argued that, of the medicinal plants of Mana Angetu District shrubs made up the highest proportion (47.83 %), followed by herbs (23.91 %). However, it is a fact in the country that woody plants (forest and wood land species) are declining and most of the easily available plants become the herbs and the trend of using more of herbaceous plants could be advantageous as it is easier to cultivate them when they are in short supply. Naturally, there are more herbaceous plant species as compared to trees and shrubs.

The result of this study showed that leaf is the most used plant part in the preparation of the remedies than the other plant parts in the study area. Many studies conducted in different parts of Ethiopia also showed that leaves are used more than the other parts of a plant (Giday, 2001; Giday and Ameni, 2003; Yineger and Yewhalaw, 2007; Yineger *et al.*, 2008; Bekalo *et al.*, 2009; Yirga, 2010c). In contrast to this, the results observed by Birhane *et al.* (2011) indicated that, root followed by leaf and stem were the most commonly harvested plant parts in five Districts of Tigray Region. In addition, this result disagrees with the result observed by Lulekal *et al.* (2008) in which, the most commonly used plant parts for herbal preparations in the Mana Angetu District were roots (33.91%) and leaves (25.65%). So it may be argued that this result is very important for the existence of the plant, because this practice helps to reduce the rate of threat on plant species or helps for sustainable harvesting of plants since removal of an appreciable amount of leaf is tolerated by the plant. Medicinal plant harvest that involves root, rhizomes, bulbs, barks and stem have serious effect on the survival of mother plant. An estimate of the threat to medicinal plants can be made from the type of plant and the part used. Harvesting the root of a tree poses more of a threat than collecting the fruits, seeds, and leaves (Ragunathan and Abay, 2009).

According to the results, the herbal remedies are prepared using fresh material; some species are also used in the case of dried plant material. There were species in which the local people use either dried or fresh materials, which is a common observation of different studies on various health problems in different parts of Ethiopia (Giday and Ameni, 2003; Amenu, 2007; Yineger and Yewhalaw, 2007; Yineger *et al.*, 2008; Bekalo *et al.*, 2009; Yirga, 2010b). As these plants are used in both forms, the chance of using the medicinal plants under different seasons of the year is increased. In this result, most of the medicinal plants were used in the fresh form; so using of them under different seasons of the year might be decreased. They are used only when they are available.

Proportionally, a high number of the medicinal plants preparation was crushing, chewing, decoction and unprocessed part. The local people employ several methods of preparation of traditional medicines. A similar study showed that different preparations and application methods of medicinal plants were mentioned (Yineger and Yewhalaw, 2007; Yineger *et al.*, 2008; Yirga, 2010b; Birhane *et al.*, 2011). However, the results observed in Lulekal *et al.* (2008) indicated that, concoction (60 species, 26.1%) constituted the highest type of preparation form. The results also disagreed with finding by Abera (2003) in which (33.3%) plants are prepared as decoction

and (30.8%) as vegetable drug.

In this study, most of the remedy prescriptions involved the use of single plant species or a single plant part. But some of the preparations were also made from mixture of different plant species with addition of water and different additives. The study also revealed that a single plant species could be used to treat more than one disease. In agreement with this result it was reported by Giday *et al.* (2009) that 50% of the Bench people remedies were prepared without the use of diluents, while 40% were prepared with the addition of water. According to the authors Giday *et al.* (2009), water was the most frequently used diluent in the preparation of remedies.

The results indicated that creaming; rubbing and smearing were the highest reported followed by drinking and fumigating (smoke & vapour). Comparative findings were conducted by Abdurhman (2010), at Ofla District, Northern Ethiopia, indicated that drinking was the highest with 24.50%, followed by 21.90% creaming, rubbing and smearing.

There are various routes of administration of traditional medicinal plants in the study area. The greater proportions of medicinal plants were applied externally. Internally (oral, local, nasal and oracular) applications were slightly lower. In agreement with this study it was reported by Giday *et al.* (2009) that (39%) of the remedies prepared by Bench People were applied on the skin while 33% were taken orally and 16% administered through the eyes. However, it disagrees with the investigation by Bekalo *et al.* (2009) in Konta Special Wereda, Southern Nations, Nationalities and Peoples Regional State, Ethiopia, in which most medicinal plant preparations were taken internally (79.7%) out of which drinking takes the leading proportion (67.8%). Not only that but also this results disagrees with the results by Sori *et al.* (2004) in which it reported that the most widely practiced administration of medicinal plant preparations was oral administration.

With regard to the administration for treatment, there is no agreement in measurement or unit used among the informants. Getahun (1976) indicated that lack of precision and standardization as one of the drawbacks for the recognition of traditional health care system. Birhane *et al.* (2011) noted that, there were variation in quantity of remedies, unit of measurement of remedies, duration and time of use of preparations prescribed by healers for the same kind of health problems. Giday (2001) also indicated that, the preparation of most of the remedies are rough and therefore lack precision.

Major livestock diseases and the plant species used

The diseases of livestock being treated by a number of species are coupled with the frequent occurrence of the diseases and limited accessibility of plant species for treatment. This indicates that the popularity of these species among the informants and the widespread nature of the indigenous knowledge for treating the diseases. Similar findings were identified by Amenu (2007); Seid and Tsegay (2011).

The findings of the current study showed that medicinal plant species were under serious threat mainly due to drought, overgrazing and fire wood collection. Since most of the cited medicinal plant species were wild, they were exposed to various anthropogenic and natural factors. However, a comparative study by Yiniger and Yewhalaw (2007) at Sekoru District, Southwestern Ethiopia observed that, deforestation (40%), drought (17.5%), agricultural expansion (12.5%) and fire (12.5%), were the principal threats to medicinal plant species. Another study by Abdurhman (2010) at Ofla District, Northern Ethiopia, indicated that fire wood collection, agricultural expansion and drought were the most common threats to medicinal plant species.

In the study area, almost all vegetation types especially those of the trees and shrubs are highly depleted. Most of the ethnoveterinary plant species were reported to be rarely encountered. This might be due to impact of anthropogenic pressure and natural conditions. The local communities did not give much attention for management of traditional medicinal plants. This could be explained by the lack of knowledge as important medicinal plants are known by few local healers, and the habitat of the plants (most of the plants were found too far from home gardens) which makes their management difficult. There is little practice of cultivating medicinal plants in the area. Similar findings were conducted in Giday (2001); Yiniger *et al.* (2008); Abdurhman (2010). Deforestation, overgrazing and recurrent drought resulted in the reduction in number and diversity of trees and shrubs used for medication. According to the informants, nowadays search for some medicinal plants especially trees and some shrubs, required a lot of time and travelling long distances; for example, *Hagenia abyssinica*.

Ecosystem conservation should be implemented through *ex-situ* and *in-situ* conservation of medicinal plants for sustainable harvesting methods in the collection of medicinal plants.

Conclusion

Kilte Awulaelo District is relatively rich in medicinal plant knowledge and practice. Eventhough, the area was highly degraded and sparse in plant species coverage.

The majority of the reported medicinal plant species were from the wild habitat. This indicates that giving of less attention of the medicinal plants by the community, mean that not cultivating plant for medicinal purpose. As a reason of this they are subjected to the loss of a number of plant species due to different anthropogenic factors.

Herbs were reported by more species used for preparation of traditional remedies followed by shrubs. Leaves were also found to be the most frequently used plant parts followed by roots for preparation of livestock remedies. Herbal remedies are prepared using fresh material, while some species are used in the case of dried plant material. Crushing, chewing, decoction and unprocessed part are the four main methods of preparation. Creaming, rubbing and smearing were the highest reported case followed by drinking of the modes of administration. The greater proportion of application of medicinal plant preparations was external, internal application being slightly lower. With regard to the dosage of traditional medicinal plants, there is no agreement on measurement. This will have negative consequence on the health of the society. Droughts, over grazing and fire wood collection are the major threat to medicinal plants in the area. As the vegetation of the area was exposed to many factors ex-situ and in-situ conservation strategies are crucial for conservation. Further biological studies should also be conducted on the reported medicinal plant species of the study area so as to utilize them in drug development.

Competing interests

The authors declare that they have no competing interests.

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Appendix 1 List of Medicinal plants used to treat livestock ailments (Ha=habit, H=herb, T=tree, Sh=shrub, Cl = climber, PU=partes used, Sb=stem bark, L=leaves, R=root, RB=root bark, W.pa= whole plant part, CP=condition of preparation, F=fresh, D=dry, F/D=fresh or dried)

Scientific name	Family Name	Local Name (Tigrigna)	Ha	PU	CP	Ailment Type	Method of preparation	Administration Route
<i>Acacia etbaica</i>	Fabaceae	Seraw	T	L	F	Swelling	Crushed mixing with latex of <i>Euphorbia abyssinica</i> and creaming the infected part	External
				L	F	Eye infection	Chewing and spit drop of it to the eye	Local
				Stem	F/D	Anthrax	Burning (firing) and attaching to the infected parts	External
<i>Achyranthes aspera</i>	Amaranthaceae	Muchehe	H	R	F/D	Eye Infection	Chewing and spit the liquid to the infected eye	Local
				R	F/D	Anthrax	Crushed with roots of <i>Solanum incanum</i> and whole parts of <i>Hypoestes forskalii</i> then add water and drunk with glass	Oral
				R	F/D	Snake bite	Chewing and swallowed the fluid	Oral
				L	F	Wound	Crushed and placing to the site	External
				R	F/D	Donkey's Malaria	Crushed and adding through nose	Nasal
<i>Galium boreo-aethiopicum</i>	Rubiaceae	Mendef adgi	H	R	F/D	Donkey's malaria	Crushed and dropping through nose	Nasal
				R	F/D	Donkey's malaria	Crushed and dropping through nose	Nasal
<i>Aloe megalacantha</i>	Aloaceae	Ere	Sh	R	F/D	Dislocated bone	Tied in their ear	External
				Latex	F	External wound	Cutting a leaf and cream the latex to the wound until treated	External
				Latex	F	Ticks (livestock)	Cutting and then creaming the infected parts by the latex	External
				W.pa	F	Snake bite	Crushed and drunk or Chewing and swallowing the fluid	Oral
<i>Anethum graveolens</i>	Apiaceae	Shilan	H	W.Pa	F/D	Urine retention	Crushed, Filtering the fluid and drunk	Oral
							Boiling and then drunk the water	Oral
<i>Calotropis procera</i>	Asclepiadaceae	Ginda	Sh	L & Latex	F	External wound	Crushed with leaves of <i>Ficus palmata</i> and creaming the infected until treated	External
				Latex	F	Swelling	Cutting and creaming the infected parts	External
<i>Buddleja polystachya</i>	Budlejaceae	Metere	Sh	L	F	Leeches	Crushed and adding through the nose	Nasal
<i>Calpurnia aurea</i>	Fabaceae	Hitsawts	T	L	F	Lice and ticks	Crushed and dressing or washing for few seconds	External
<i>Chenopodium murale</i>	Chenopodiaceae	Hamli qiweo	H	L	F	Swelling	Crushed and tie in the infected parts	External
				L	F	External wound	Crushed and placing or creaming in the damaged parts	External
<i>Clematis hirsuta</i>	Ranunculaceae	Hareg	Cl	R	F	Anthrax	Crushed and creaming with butter	External
<i>Clerodendrum myricoides</i>	Lamiaceae	Shiwha	Sh	R	F	Urine retention	Crushed, add water Filter and drunk using glass	Oral
				Stem	D	Snake bite	Placing of its one tip part in fire then burning to the bite side	External
<i>Clutia abyssinica</i>	Euphorbiaceae	Tewshealalito	Sh	L	F	Internal parasite	Crushed and drunk the fluid	Oral
<i>Cucumis ficifolius</i>	Cucurbitaceae	Ramborambo	H	L	F	Anthrax	Crushed, with leaves of <i>Dyschoriste radicans</i> mixed with honey and placed in the infected parts	External
				R	F/D	Abdominal pain	Crushed with bark of <i>Croton macrostachyus</i> , dried and eating by mixing with butter or chewing or crushing and drunk the fluids.	Oral
<i>Cyphostema adenocaulle</i>	Vitaceae	Aserkuca asergundi	Cl	R	F/D	Snake bite	Crushed, filtering and drunk the fluid	Oral
<i>Cyphostemma junceum</i>	Vitaceae	Etse zewye	H	RB	F	Snake bite	Crushed and eating with honey	Oral
<i>Datura stramonium</i>	Solanaceae	Mestenagr	H	L	F	Anthrax (livestock)	Crushed with leaves of <i>Solanum marginatum</i> and leaves of <i>Malva verticillata</i> and then creaming the affected parts	External
				L	F	External wound	Crushed and Creaming in the infected parts	External
<i>Dodonia angustifolia</i>	Sapindaceae	Tahses	T	L	F	Dislocated bone	Crushed and placed or tied in the damaged part	External
<i>Dregea schimperii</i>	Asclepiadaceae	Shanqoq	Cl	L	F	Rabbis	Crushed And to be drunk	Oral
<i>Echinops</i>	Asteraceae	Dander	H	R	F/D	Dislocated bone	Tied around the damaged parts	External

<i>Kebericho</i>									
<i>Euclea racemosa</i> subsp. <i>schimperii</i>	Ebenaceae	Keleaw	Sh	RB	F/D	Snake bite	Crushed, add water and drunk the fluids by glass	Oral	
<i>Euphorbia abyssinica</i>	Euphorbiaceae	Kulqual	T	Latex	F	Swelling	Smearing by the latex on affected part.	External	
<i>Euphorbia petitiiana</i>	Euphorbiaceae	Hindukduk	H	R	F/D	Dislocated bone	Tied around the damaged parts	External	
<i>Euphorbia tirucali</i>	Euphorbiaceae	Kinchib	Sh	Latex	F	Swelling	Smearing the swallowed part by the latex.	External	
<i>Gomphocarpus purpurascens</i>	Asclepiadaceae	Tseba dimu	H	R	F/D	Wound (livestock)	Crushed and creaming	External	
<i>Hypoestes forskalii</i>	Acanthaceae	Girbia	H	R	F/D	Malaria	Crushed and to be eaten mixed with honey	Oral	
				W.pa	F	Anthrax	Crushed alone or mixed with seeds of <i>Lepidium sativum</i> , roots of <i>Solanum incanum</i> , roots of <i>Achyranthes aspera</i> and roots of <i>Verbascum sinaiticum</i> , filtering the fluid and drunk	Oral	
<i>Hypericum annulatum</i>	Hypericaceae	Akti	H	L	F	Eye infection	Dried, Grinding and creaming with butter	Local	
<i>Justicia schimperiana</i>	Acanthaceae	Shimieya	Sh	L	F	Dysentery	Crushed, add water and drunk	Oral	
<i>Laggera tomentosa</i>	Asteraceae	Kash koshe	Sh	L	F	Leeches	Crushed and adding the fluids through their nose	Nasal	
<i>Premna oligotriche</i>	Lamiaceae	Sasa	Sh	W.pa	F/D	Synerosis cerebri	Placing on fire and fumigating the smoke	External	
<i>Lepidium sativum</i>	Brassicaceae	Shimfa	H	Seed	D	Swelling (both)	Crushed and creaming on the affected part	External	
				Seed	D	Anthrax	Crushed mixed with whol parts of <i>Hypoestes forskalii</i> , roots of <i>Solanum incanum</i> and roots of <i>Verbascum sinaiticum</i> , filtering the fluid and drunk	Oral	
<i>Leucas abyssinica</i>	Lamiaceae	Siwa karni	Sh	L	F	Eye infection	Chewing and spit drop of it to the eye	Local	
				R	F/D	Urine retention	Tie in their tails	External	
<i>Lycopersicum esculantum</i>	Solanaceae	Komodere	H	L	F	Leeches	Crushed and adding through their nose	Nasal	
<i>Malva verticillata</i>	Malvaceae	Enkialftha	H	L	F	External wound	Crushed and creaming	External	
				L	F	Anthrax	Crushed with leaves of <i>Datura stramonium</i> and leaves of <i>Solanum mariginatum</i> and creaming the parts	External	
<i>Melia azadrachta</i>	Meliaceae	Limo (nim)	T	L	F	External wound Both	Crushed and creaming	External	
<i>Nicotiana glauca</i>	Solanaceae	Chenawi (tegegwe)	Sh	L	F	Lice and ticks (livestock)	Crushed with water then washing or dressing or creaming	External	
				L	F	Leeches (livestock)	Crushed, filtering and adding through the nose	Nasal	
<i>Nicotiana tabacum</i>	Solanaceae	Timbako	H	L	F	Leeches (livestock)	Crushed and add through their nose	Nasal	
				L	F	Scabies and lice (livestock)	Crushed, adding water and washing	External	
<i>Opuntia ficus-indica</i>	Cactaceae	Beles (kulqual bahri)	Sh	L	F	Anthrax	Slashed, placing around fire and attaching to the infected parts	External	
				L	F	Lice or fleas	Crushed, creaming and washing	External	
<i>Otostegia integrifolia</i>	Lamiaceae	Chiendog	Sh	L	F/D	-Lice or Fleas	Placing in fire and fumigating	External	
<i>Plumbago zeylanica</i>	Plumbaginaceae	Afthi	H	R	F/D	Wound (livestock)	Grinding and creaming the infected parts.	External	
<i>Plumbago zeylanica</i>	Plumbaginaceae	Afthi	H	R	F/D	Wound (livestock)	Grinding and creaming the infected parts.	External	
<i>Pterolobium stellatum</i>	Fabaceae	Qentefefe	Sh	R	F	Dislocated bone	Operating the damaged parts and then placing the root with butter	Local	
<i>Ricinus communis</i>	Euphorbiaceae	Guile	H	L	F	External wound	Crushed and placing or putting or tied on the wound	External	
<i>Rumex nepalensis</i>	Polygonaceae	Dengele (shembobata)	H	R	F	Fire burn	Crushed by mixing with urine and then creamed on the damaged parts	External	
<i>Schinus molle</i>	Anacardiaceae	Tikur berbere	T	L	F	Bloating	Crushed and drunk	Oral	
<i>Sida schimperiana</i>	Malvaceae	Tifaria	Sh	R	F/D	Dislocated bone	Tied in their tail	External	
				R	F/D	Abortion (livestock)	Tied in their tail	External	
<i>Solanum hartifolium</i>	Solanaceae	Alalmo kalbi	Sh	R	D	Abortion (livestock)	Tied in their tail	External	
				L & fruit	F	Anthrax (livestock)	Crushed and creaming with honey or penetrating and squeezing to the infected parts or Crushed, filtering and drunk the fluid	External	
<i>Solanum incanum</i>	Solanaceae	Niesheton Engule	Sh	R	F	Abdominal pain	Chewed and swallowed the fluid	Oral	
				RB	D	External wound infection	Dried, grinding and creaming to the infected parts	External	
				R	F/D	Anthrax (both)	Crushed with seeds of <i>Lepidium sativum</i> , whol parts of <i>Hypoestes forskalii</i> , roots of <i>Achyranthes aspera</i> and roots of <i>Verbascum sinaiticum</i> , filtering the fluid and drunk	Oral	
<i>Solanum mariginatum</i>	Solanaceae	Aby Ungule	Sh	Seed	D	External wound infection	Grinding and creaming the infected part	External	
				Fruit	F	Problem in breathing (livestock)	-Crushed and adding through their nose	Nasal	
				L	F	Anthrax	Crushed with leaves of <i>Datura stramonium</i> and leaves of <i>Malva verticillata</i> and then creaming to the parts or Crushed, filtered and drunk the fluids	External & - Oral	
<i>Trigonella foenum-graecum</i>	Fabaceae	Abeake	H	Seed	D	Abdominal pain	Grinding, adding water and drunk	Oral	
				Seed	D	Swelling	Grinding with ('Ater') and creaming the effected parts	External	
<i>Verbascum sinaiticum</i>	Scrophulariaceae	Tirnake (handega)	H	L	F	External wound	Crushed and creaming	External	
				R	F/D	Anthrax	Crushed with seeds of <i>Lepidium sativum</i> , roots of <i>Solanum incanum</i> and whol parts of <i>Hypoestes forskalii</i> , filter the fluid and drunk	Oral	
				R	F/D	Dislocated bone	Crushed and eating with honey	Oral	
							Tied around on th affected part	External	

<i>Withania somniaifera</i>	Solanaceae	Agol	H	L	F	Eye infection	Boiled in water with leaves of <i>Eucalyptus globulus</i> , roots of <i>Achyranthes aspera</i> , roots of <i>Cynoglossum lanceolataum</i> and leaves of <i>Zehneria scabra</i> and fumigated by its vapor	External
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Appendix 2 List of livestock ailments, number of informants cited and percentage

No.	Ailments	Local name of the ailment	No. of Medicinal plants	Percentage (%)
1	Anthrax	Megerem	15	13.16
2	Snake bite	Teben Zinekeso	6	5.26
3	Ticks	Qurdid	3	2.63
4	Lice and fleas	Qunchae (Kumale)	6	5.26
5	Problem (Difficulty) in breathing	Mitnfas miebay	1	0.88
6	Swelling	Hibet (zigag)	5	4.39
7	Eye infection	Atsmi ayni (Ayni Himam)	5	4.39
8	Urine retention	Atsere Shinti	5	4.39
9	Dysentery	Tsihtsah (Dem Hiwas)	1	0.88
10	Synerosis cerebrals	Zarti	1	0.88
11	Leeches	Aleqti	5	4.39
12	Malaria of donkey	Aso Adgi	3	2.63
13	Rabies	Ebud kelbi Nikas	1	0.88
14	Bloating	Kebdi Minfah	1	0.88
15	Scabies (skin diseases)	Shehor	1	0.88
16	Abortion	Mibreay	2	1.75
17	Dislocated bone	Filuay (likak)	7	6.14
18	Wound	Gudae (kusli)	4	3.51
19	Internal parasite	Efel	1	0.88