

Medicinal Plant Species Used to Treat Tonsillitis in Ethiopia: A Systematic Review

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Abstract

In various areas of Ethiopia, different plant species have been reported having a medicinal role for ailment tonsillitis. However, the ethnomedicinal information on those medicinal plant species that cure the ailment is not summarized in a way that gives general information and initiates further study. Therefore, the objective of this review paper was to summarize the ethnomedicinal information about medicinal plant species that used to treat tonsillitis in Ethiopia. The result of the review indicated that herbs and leaves are the most utilized growth forms and part of the plants respectively during remedy preparation for the ailment tonsillitis in Ethiopia. Similarly, fresh plant materials, and water are the most applied condition of plant parts and diluent added correspondingly. Chewing and oral route of application are the most widely used methods of remedy preparation and administration correspondingly, for the ailment in the country. Utilization of herbs and leaves can be seen as an advantage from the conservation point of view of medicinal plant species that used to treat the ailment since herbs can be cultivated when they are in short supply and are also available as compared to other growth forms. Similarly, use of leaves can reduce damage to the medicinal plant species as compared to the use of other plant parts such as roots. However, the utilization of fresh materials should be reduced as much as possible. *Rhannus prinoides* L'Hér. and *Zingiber officinale* Roscoe are the most commonly used medicinal plant species for the ailment in Ethiopia.

Keywords: ailment, conservation, growth form, remedy

1. Introduction

Ethnobotany is a scientific study of how peoples interact with plant resources within their ethnic groups. It gives particular emphasis on traditional cultures (Getaneh and Girma, 2014) and plays an important role in the discovery of new products from plants (Katewa, 2009). Plants provide a variety of use for every life form (Schippmann et al., 2002). Since ancient times they have been crucial sources of both defensive and remedial traditional medicine preparations for both human beings and livestock. (Ghanthi and Manickam, 2008; Lulekal et al., 2008; Zerabruk and Yirga, 2012).

Ethiopia is a country characterized by a wide range of ecological, climatic and edaphic conditions. Such a wide range of ecological, climatic and edaphic settings, makes the country an important regional center for biological diversity in terms of both fauna and flora (Kelbessa et al., 1992; Friis et al., 2011; Zerabruk and Yirga, 2012). Because of high biological diversity of flora, the country owns a wide range of potentially useful medicinal plants, wider indeed than available in many other areas of the world (Abebe, 1986). According to UNEP. (1995), Ethiopia is believed to be home for about 6,500 species of higher plants, with approximately 12% endemic plant species.

Starting from ancient time medicinal plants form the basis of traditional healthcare systems for the majority of the population of developing nations (Mesfin et al. 2014). Like many other developing nations, in Ethiopia, there is also a long history of using medicinal plants to treat a variety of ailments (Giday et al., 2009). Nearly 80% of the country's population relies on traditional medicine to meet their health care needs (Bekele, 2007; Bekalo et

al., 2009). The widespread use of traditional medicine could be attributed to cultural acceptability (Tesfaye et al., 2009), efficacy against certain types of diseases (Omoruyi et al., 2012), physical accessibility and affordability (Zerabruk and Yirga, 2012).

Tonsillitis is an inflammation of the tonsils (Alasmari et al., 2017; Bartlett et al., 2015). Cause of the ailment can be a viral or bacterial infection (Hibbert et al., 2019; Alasmari et al., 2017; Georgalas et al., 2009). According to Alasmari et al. (2017), tonsillitis most frequently occurs in children. Fever, sore throat, foul breath, difficulty in swallowing are some symptoms of the ailment.

Like other human ailments, there are modern treatments for tonsillitis such as providing antibiotics and surgery (tonsillectomy). However, these modern treatments, especially surgery, do have their own side effects and may cause death (Georgalas et al., 2009). Thus, there is a need to explore alternative therapies, particularly from plant sources as these are cost-effective and possess minimal side effects, and are also easily available.

In various areas of Ethiopia different plant species have been reported having a medicinal role for ailment tonsillitis (Chekole, 2017; Zenebe et al., 2012; Tegene, 2018; Tolossa et al., 2013). However, the ethnomedicinal information on medicinal plant species that cure the ailment is not summarized in a way that gives general information and initiates further study. Therefore, the objective of this review paper was to summarize the ethnomedicinal information available about medicinal plant species that used to treat tonsillitis in Ethiopia.

2. Materials and Methods

In order to generate data for the review, published research articles on ethnobotanical studies of medicinal plants in Ethiopia were collected. Among the collected studies, only those that provide ethnobotanical information on the ailment tonsillitis were used as a source of data for the review. Microsoft office excel 2016 was used to summarize all the information obtained using descriptive statistics and draw graphs.

3. Medicinal Plants Reported

Fifty-one medicinal plant species that belong to 31 families reported having a medicinal role for an ailment of tonsillitis (table 1). The families with the highest number of reported species were Fabaceae and Asteraceae (each consisting of 7 species) followed by Lamiaceae which contains 4 species (Figure 1A).

Table 1. List of medicinal plant species used to treat tonsillitis

No.	Species	Source
1	<i>Cyphostemma adenocaula</i> (Steud. Ex A. Rich.) Desc. ex Wild & R.B.Drumm.	Giday et al., 2016
2	<i>Verbena officinalis</i> L.	Giday et al., 2016
3	<i>Otostegia fruticosa</i> (Forssk.) Schweinf. Ex Penzig	Getaneh and Girma, 2014
4	<i>Cynoglossum amplifolium</i> Hochst. ex A.DC.	Birhan et al., 2018
5	<i>Thunbergia alata</i> Bojer ex Sims.	Birhan et al., 2018
6	<i>Acmella caulirhiza</i> Del.	Tegene, 2018; Maryo et al., 2015
7	<i>Schinus molle</i> L.	Tegene, 2018; Birhanu et al., 2015
8	<i>Zingiber officinale</i> Roscoe	Tegene, 2018; Temam & Dillo, 2016; Maryo et al., 2015
9	<i>Clematis longicauda</i> Steud ex. A. Rich.	Ayele et al., 2015
10	<i>Buddleja polystachya</i> Fresen.	Meressa, 2018
11	<i>Otostegia integrifolia</i> Benth.	Meressa, 2018
12	<i>Rhus retinorrhoea</i> Oliv.	Chekole, 2017
13	<i>Inula confertiflora</i> A. Rich.	Chekole, 2017
14	<i>Kalanchoe laciniata</i> (L.) DC.	Chekole, 2017
15	<i>Ajuga integrifolia</i> Buch. -Ham. ex D. Don	Chekole, 2017
16	<i>Rhamnus prinoides</i> L'Hér.	Chekole, 2017; Zenebe et al., 2012; Birhanu et al., 2015; Gebeyehu et al., 2014 Chekole, 2017
17	<i>Artemisia absinthium</i> L.	Chekole, 2017
18	<i>Garcinia livingstonei</i> T. Anders	Birhanu and Haji, 2017
19	<i>Rumex nepalensis</i> Spreng.	Temam & Dillo, 2016; Maryo et al., 2015
20	<i>Solanum incanum</i> L.	Temam & Dillo, 2016; Maryo et al., 2015
21	<i>Vernonia amygdalina</i> Del.	Temam & Dillo, 2016
22	<i>Acacia etbaica</i> Schweinf.	Wondimu et al., 2007
23	<i>Acacia nilotica</i> (L.) Willd. ex. Del.	Wondimu et al., 2007
24	<i>Acacia tortilis</i> (Forssk.) Hayne	Wondimu et al., 2007
25	<i>Leucas abyssinica</i> (Benth.) Briq.	Wondimu et al., 2007
26	<i>Senna occidentalis</i> (L.) Link.	Mesfin et al., 2009; Bekele and Reddy, 2015
27	<i>Lepidium sativum</i> L.	Zenebe et al., 2012
28	<i>Ximenia americana</i> L.	Zenebe et al., 2012; Jima and Megersa, 2018
29	<i>Ziziphus spina-christi</i> L.	Zenebe et al., 2012
30	<i>Erythrina abyssinica</i> Lam. ex DC.	Kebebew and Mohamed, 2017
31	<i>Trichodesma zeylanicum</i> (Burm.f.) R. Br.	Mengesha, 2016
32	<i>Achyranthes aspera</i> L.	Tolossa et al., 2013; Yirga, 2010
33	<i>Aframomum corrorima</i> (Braun) Jansen	Maryo et al., 2015
34	<i>Clematis longicauda</i> Steud. ex A. Rich	Maryo et al., 2015
35	<i>Dovyalis abyssinica</i> (A. Rich.) Warb.	Maryo et al., 2015
36	<i>Echinops kebericho</i> Mesfin	Maryo et al., 2015
37	<i>Juniperus procera</i> Hochst. ex Endl.	Maryo et al., 2015
38	<i>Lysimachia ruhmeriana</i> Vatke	Maryo et al., 2015
39	<i>Momordica foetida</i> Schumach.	Maryo et al., 2015
40	<i>Oxalis corniculata</i> L.	Maryo et al., 2015
41	<i>Plantago lanceolata</i> L.	Maryo et al., 2015
42	<i>Schefflera abyssinica</i> (Hochst. ex A.Rich.) Harms	Maryo et al., 2015
43	<i>Bersama abyssinica</i> Fresen.	Giday et al., 2009
44	<i>Microglossa pyrifolia</i> (Lam.) O.Kuntze	Giday et al., 2009
45	<i>Ritchiea albersii</i> Gilg	Giday et al., 2009
46	<i>Capparis tomentosa</i> Lam.	Tefera and Kim, 2019
47	<i>Carissa spinarum</i> L.	Regassa, 2013
48	<i>Ricinus communis</i> L.	Regassa, 2013
49	<i>Acacia pilispina</i> Pic. -Serm.	Gebeyehu et al., 2014
50	<i>Kalanchoe petitiiana</i> A. Rich.	Gebeyehu et al., 2014
51	<i>Plumbago zeylanica</i> L.	Gebeyehu et al., 2014

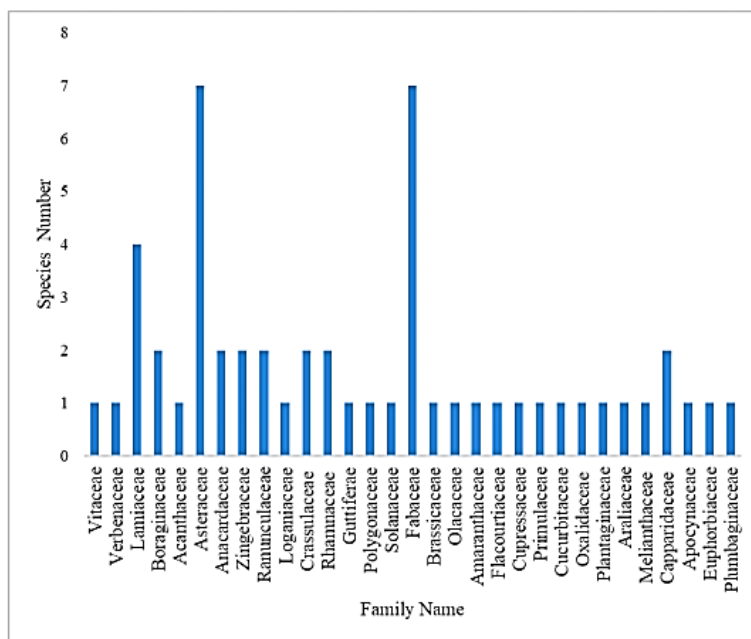


Figure 1. Families of medicinal plant species that used to treat tonsillitis

4. Growth Forms and Parts of Medicinal Plant Species

Analysis of the growth form of medicinal plants used to treat tonsillitis showed that herbs occupy the highest proportion (42%) followed by trees (31%), shrubs (19%) and climbers (8%) (Figure 2a). The highest use of herbaceous plants as compared to the other growth forms can be a result of their availability (Giday et al., 2009) or the higher possibility of obtaining pharmacologically active compounds in herbs as compared to the other growth forms (Thomas et al., 2009). The socio-cultural beliefs and practices of the healers in treating the ailment may also contribute to the high use of herbs (Abebe, 2019).

The plant parts used to treat tonsillitis include leaves, roots, fruits, flower, bark, seed and shoot tip (Figure 2b). The most commonly used plant parts for herbal preparations were leaves (40%), followed by roots (30.91%) and bark (12.73%) (Figure 2b). Common utilization of leaves in the preparation of remedies can be a result of the relative easiness of finding this plant part as compared with the others (Getaneh and Girma, 2014).

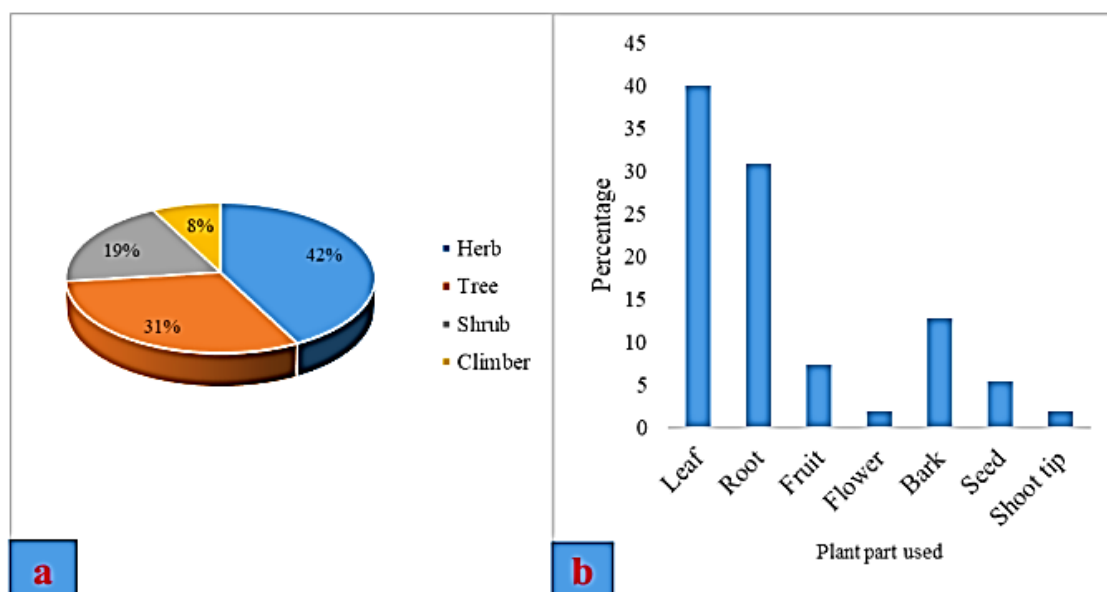


Figure 2. (A) Growth form, (B) Parts of medicinal plant species that used to treat tonsillitis

Most of the remedies (84.37%) which are used for an ailment of tonsillitis were prepared from fresh plant materials (Figure 3a). Some were prepared from dry parts (9.37%) and the remaining others favorably from both fresh and dry plant materials (6.25%). The highest use of fresh plant materials in the preparation of remedies can be due to the availability of plentiful plant materials around the healers or user's localities which can be picked at any time (Giday et al., 2009; Mesfin et al., 2014). The highest use of fresh materials can be also an effort not to lose volatile oils found in the plant materials (Mesfin et al., 2014). The belief of users or healers that fresh materials are effective in healing ailments can be the other reason for the highest use of these plant materials (Maryo et al., 2015).

The widely used methods of preparation of the remedies used for the ailment tonsillitis was chewing (42.11%) followed by crushing (26.32%). Other methods of remedy preparation that were used for ailment tonsillitis include squeezing, fumigating, boiling, and unprocessed each accounting 21.05%, 5.26 %, 2.63%, and 2.63% respectively (Figure 3b).

The majority of remedies (71.06%) used to treat tonsillitis prepared without adding diluents. whereas some prepared by adding water (23.68%), and few by adding butter (2.63%) and tea (2.63%) (Figure 3c). More use of water as compared to butter and tea in the preparation of remedies can be due to the relative ease of finding water (Giday et al., 2009). Its contribution to enhancing the efficacy and healing conditions of the remedies may also have attributed to its use (Abebe, 2019).

The common route administration of remedies for the ailment tonsillitis was oral (89.1%) followed by nasal and dermal each accounting 5.45% (Figure 3d). According to Abebe (2019), the selection of the route of administration of remedies is dependent on the ailment treated. Thus, the common use of oral administration of remedies during the treatment of tonsillitis is caused by the location of the ailment since tonsillitis occurs in the mouth.

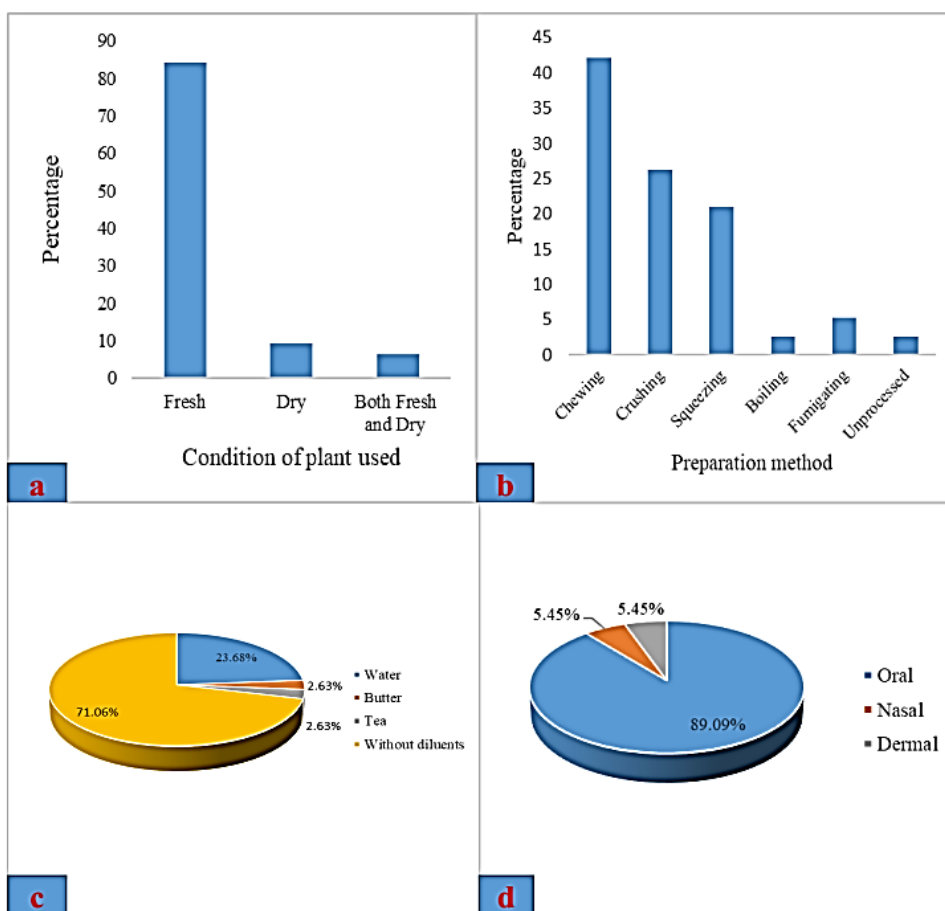


Figure 3. (A) Condition of plant part used, (B) Preparation method, (C) Diluents used, (D) Route of administration of medicinal plants used to treat tonsillitis

5. Common Plant Species Used To Treat Tonsillitis

Plant species *Rhamnus prinoides* L'Hér., *Zingiber officinale* Roscoe, *Acmella caulirhiza* Del., *Schinus molle* L., *Rumex nepalensis* Spreng., *Solanum incanum* L. and *Ximenia americana* L. are the identified medicinal plant species which were used by traditional healers in more than one areas (different locations) within the country (Table 2). Accordingly, plant species *Rhamnus prinoides* L'Hér. and *Zingiber officinale* Roscoe are the first and second most common plant species that were used to treat tonsillitis in Ethiopia. The availability or efficacy of these medicinal plant species may have attributed to their common use.

Table 2. Commonly utilized plant species used to treat tonsillitis

Species	Name of areas in which the species used to treat tonsillitis	Number of areas	Species Rank (Based on the number of areas in which the species used to treat tonsillitis)	Source
<i>Zingiber officinale</i> Roscoe	Bale Zone; Hadiya Zone; Kembatta Tembaro (KT) Zone	3	2	Tegene, 2018; Temam & Dillo, 2016; Maryo et al., 2015
<i>Rhamnus prinoides</i> L'Herit.	North Wollo Zone; Asgede Tsimbila District, Tigray Region; Wollega Zone; West Gojjam Zone	4	1	Chekole, 2017; Zenebe et al., 2012; Birhanu et al., 2015; Gebeyehu et al., 2014
<i>Acmella caulirhiza</i> Del.	Bale Zone; Kembatta Tembaro (KT) Zone	2	3	Tegene, 2018; Maryo et al., 2015
<i>Schinus molle</i> L.	Bale Zone; Wollega Zone	2	3	Tegene, 2018; Birhanu et al., 2015
<i>Rumex nepalensis</i> Spreng.	Hadiya Zone; Kembatta Tembaro (KT) Zone	2	3	Temam & Dillo, 2016; Maryo et al., 2015
<i>Solanum incanum</i> L.	Hadiya Zone; Kembatta Tembaro (KT) Zone	2	3	Temam & Dillo, 2016; Maryo et al., 2015
<i>Ximenia americana</i> L.	Asgede Tsimbila District, Tigray Region; Bale Zone;	2	3	Zenebe et al., 2012; Jima and Megersa, 2018
<i>Achyranthes aspera</i> L.	South Omo; Endrta District, South-eastern Tigray	2	3	Tolossa et al., 2013; Yirga, 2010

6. Conclusion

From the result of the review, it can be concluded that herbs and leaves are the most utilized growth forms and part of the plants respectively during remedy preparation for the ailment tonsillitis in Ethiopia. Similarly, fresh plant materials, and water are the most applied condition of plant parts and diluent added respectively. Chewing and oral application are the most widely used methods of remedy preparation and administration correspondingly, for the ailment in the country. Utilization of herbs and leaves can be seen as an advantage from the conservation point of view of medicinal plant species that used to treat the ailment since herbs can be cultivated when they are in short supply and are also more commonly available as compared to other growth forms. Similarly, the use of leaves can reduce damage to these medicinal plants as compared to other plant parts like roots. However, the use of fresh plant materials should be reduced as much as possible (for example people can reduce their dependence on fresh materials by using only dry materials, for those medicinal plant species that can be used in both fresh and dry forms) since their use may contribute to the over utilization of the medicinal plant species. *Rhamnus prinoides* L'Hér. and *Zingiber officinale* Roscoe are the most commonly used plant species for the treatment of tonsillitis in Ethiopia.

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