Review Paper

A Review on Ethnobotanical Study of Traditional Medicinal Plants Used for Treatment of Liver Problems in Ethiopia

ABSTRACT

Traditional medicine plant is used for human aliments treatment throughout the world primary health care need practiced typically liver problems by indigenous practitioners. This research review was employed with objective of ethnobotanical study on the medicinal plants emphasize on the compiled and documentation of indigenous knowledge associated with the treatment of liver problems by these plants reported from different ethnic group of Ethiopia. By using published and unpublished research articles, a total of 46 journals meeting inclusion criteria were used for analyzing and compiling this review literature. The ethno-medicinal use of 114 plant species belonging to 90 genera and 50 families were reported and documented from eight regions of Ethiopia. The highest family in terms of species number was Euphorbiaceae accounts 13 (11.4%) species and followed by Asteraceae 12 (10.53%) species and Fabaceae 10 (8.77%) species. Herbs were dominant habit 48(42.11%) followed by shrubs 33 (28.95%). Most of the medicinal plant species (52.7%) were collected from the wild. The most frequently cited plant species were *Justicia schimperiana* 9 (12.5%) followed by *Phytolaca dodecandra* 8 (11.11%), *Croton macrostachyus* 7 (9.72%). The most frequently utilized plant parts for treatment of liver disease was root (24.78%) followed by leaf (23.89 %). The medicinal plant preparations were administered through oral most commonly used route of application 99 (88.39%) followed by dermal & oral 4 (3.57%) and dermal application 3 (2.68%). The healers used different method of preparation for application such as crushing, concoction, decoction, chewing, powdering, etc. This review indicated that the liver problem is common disease in Ethiopia. Adapting a recommended diagnostic and treatment using physical diagnosis by indigenous healers/ practitioners attempted curing liver problem and implementing prevention and control policies in the general population needs an urgent attention in the country.

Keywords: Ethnobotany, Indigenous knowledge, Liver problems, Medicinal plants

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Introduction

Traditional medicine is used throughout the world as it is dependent on locally available plants, which are easily accessible, and capitalizes on traditional wisdom-repository of knowledge, simple to use and affordable in cost compared to modern medication of western (54, 56). These medical systems are heavily dependent on various plant species and plant based products. Traditional systems of medicine are popular in developing countries and up to 80% of the population relies on traditional medicines or folk remedies for their primary health care need practiced by indigenous practitioners (47). In Ethiopia, most of the human population dependent on traditional medicine plants for primary healthcare services or human aliments treatment (41).

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Most studies included surveys of utilization of medicinal plants for the treatment different diseases in different parts of Ethiopia, as recommended by traditional healers /practitioners (52). Among the various types of plants identified those claimed to be used for liver problem/disease treatment. Liver is the largest organ in the body. Liver diseases remain serious health problems and are caused, among others, by drugs, chemicals, and alcohol. Although liver disease is stereotypically linked to alcohol or drugs or chemicals, the truth is that there are over 100 known forms of liver disease caused by a variety of factors and affecting everyone from infants to older adults worldwide (49, 50-52). Chronic liver disease is a major cause of morbidity and mortality throughout the world. Conventional medical therapy for many common liver disorders, including non-alcoholic fatty liver disease and viral hepatitis, has limited efficacy and potentially life-threatening side effects. This has increased dependence on complementary and alternative medicine (CAM), especially herbal therapy. Various medicinal plants and their formulations and dosage are used in traditional medicine for their liver disorder effects and a number of herbal preparations are available on the market traditionally since ancient time (52, 53, 55).

Although the diagnosis of the major liver problems can be made by herbalists or practitioners with history taking, physical examination of the patient which was the baseline for modern laboratory examinations for treatment in

modern technology. As (52, 53) stated comparative studies on medicinal plants in different cultures or ethnic groups of a country or among different countries may contribute to the identification of the most usable species of plant for treating different aliments typically liver cases and its related disorder. A considerable amount of research has been conducted worldwide and in Ethiopia too on medicinal plants and ethnobotany with an emphasis on field surveys and documentation of people indigenous knowledge on the usage of traditional medicinal plants that used for curing of liver complication. Hence, we found it worthwhile to go through ethnobotanical information on traditional medicinal plants used for treatment of human liver problem in Ethiopia from different ethnic groups and perspective and compile existing information as a basis lead for further investigations into these plants. Hence, the main objective of this review was ethnobotanical study on the medicinal plants emphasize on the compiled and documentation of indigenous knowledge associated with the treatment of liver problems by these plants reported from different ethnic group of Ethiopia.

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Methods

The present review literature on the major herbal medicine that have contributed the most in the protection of liver diseases/problems in Ethiopia were assessed from different sources. Relevant information searched and analyzed on traditional medicinal plants pertaining to treat liver problems of Human. On this regard, a systematic analysis and review of research literature associated to medicinal plants used for traditional medication of liver disease practiced by indigenous people which were conducted from different ethnic groups and years in the past to present. These help to profound indigenous practice which make a difference in medicinal plant selection for treatment of liver problems along the ethnicity based on the availability of plants in the districts or locality.

Approaches of Article Selection

A comprehensive research literature search strategy was carried out from webs (Google search): Ethno-botanical/ethno-medicinal studies reporting on medicinal plants used for traditional liver problem treatment in Ethiopia were congregated by the following concrete search approaches: Unpublished MSc thesis or/ and PhD dissertation research reports using Google search engine and local university websites; Published articles of journal using international scientific databases including PubMed, Science direct, Researchgate, Web of Science, Google scholar, AJOL, Hinari, etc.

All possible literature search was made to address the expected objectives using the following important initial key terms: Ethiopian medicinal plants, anti-liver problems plants, Traditional knowledge medicinal plants, Medicinal Plants/Medicinal herbs, Indigenous knowledge, Plants/Herbal/Medicine/Remedies, Folk Medicine/Folk remedies/ Home remedies/ Herbal remedies, Ethnobotany/Ethnobotanical, Ethnopharmacology/ Ethnopharmacological, Ethnomedicine/ Ethnomedicinal, Ethnopharmaceutical, Medico-cultural.

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Inclusion and Exclusion Criteria

The author selected the articles based on the relevancy and clearness of the data related to the traditional medication. The reliable and related articles/theses/ dissertation were downloaded from the sources and critically inspected for inclusion in the review. The comprehensive literature or article screening was made on the following inclusion and exclusion criteria.

Inclusion criteria: Published and unpublished ethno-botanical and ethnomedicinal surveys reporting on anti-liver problems medicinal plant(s), conducted at any time period in Ethiopia. All liver related problems were included from original literature reported as liver disease, liver disorder, hepatitis, jaundice, etc. The inclusion was restricted to original research articles published in English language studied in all parts of the Ethiopia. if the information is not clearly stated or missed for analyzing, then rephrasing/correction was made, particularly local name and habit of the plants, and misspelled scientific names were retrieved from Natural Database for Africa (NDA), Version 2.0 and Google searching.

Exclusion criteria: The following types of research data were excluded by looking the tangible data that used for analysis: Published and unpublished ethno-botanical and ethno-medicinal surveys lacking information on anyone of the following: study areas/localities, scientific plant names, informant's involvement and not reporting information about anti- liver problems medicinal plants; Non-open access journal articles or partially accessed (abstract only) articles; Review articles, historical documents or experimental studies or article from other countries.

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Data Analysis

The collected Ethnobotanical data reported medicinal plants used for treatment of liver problems and associated indigenous knowledge was entered in to Excel spreadsheet and summarized using descriptive statistics. The spreadsheet data filter facility was employed to determine frequencies and percentage of citations so as to identify the most common use, parts used and route of administration and habit of medicinal plants preferred for treatment of liver problem throughout the country. The results were presented using pie charts, bar chart and tables.

Result and Discussion

Overview of Ethnobotanical Studies on Medicinal Plants

Ethno-medicinal and ethnobotany studies on plants demand standard procedures for botanical identification and reliable documentation of indigenous knowledge pertaining to plant distribution, management and traditional medicinal use in Ethiopia. By searching different webs (Google search), a total of 46 original ethno-medicinal studies representing from eight different regions in Ethiopia were included in this review. Both published and unpublished (M.Sc. and Ph.D. thesis) research reports were reviewed. Study quality inconsistencies were noted with regard to sampling and number of knowledgeable informants, as well as completeness of herbal remedy recipe, prescription and dosage and antidote information reported. Current literature survey reflects potentially important information gaps and need for standardization of ethno-medicinal studies on indigenous medicinal plants in Ethiopia. This regional distribution of anti-liver problem medicinal plants indicated that prevalence of the disease in the locality and practiced for treatment using their indigenous knowledge. From these regions of Ethiopia, majority of the medicinal plants species used for treatment of liver problems reported from Oromia region accounts (36.59%) and followed by Amhara (25%), SNNPR (18.90%), Tigray (6.71%) and least in Dire Dawa (1.22%) (Figure 1 and Table 2). The remaining three regions of Ethiopia: i.e. Gambella, Somali, Benshangul Gumuz and Addis Ababa could not report compiled information on medicinal plants used for curing of liver diseases traditionally.

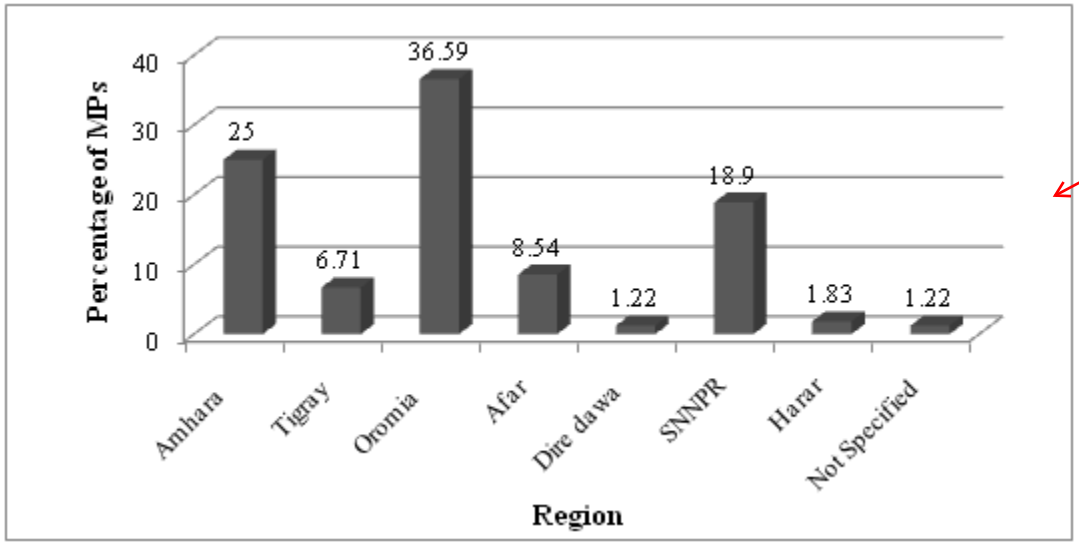

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Figure 1: Distribution of medicinal plants used for treatment of liver problem in Ethiopia

On this review, medicinal plants used for treatment of liver problems in different parts of the country reported by different authors selected for analysis with respect to number of citation and geographical distribution in the regional state of Ethiopia. On this regard, the most commonly cited medicinal plant species by different authors were *Justicia schimperiana* 9 (12.5%) (1, 2, 11, 16, 29, 31, 34, 43, 45) followed by *Phytolaca dodecandra* 8 (11.11%) (11, 22, 23, 32, 34, 35, 37, 44), *Croton macrostachyus* 7 (9.72%) (1, 3, 13, 18, 32, 34, 46), *Rumex abyssinicus* (13, 18, 29, 46) and *Cucumis ficifolius* (1, 21, 34, 41) each represented by 4 (5.56%) and it indicated that these medicinal plants are the most preferable one for treatment of liver problems by the traditional healers in different locality (Table 2). The biodiversity of Ethiopian flora offers great possibilities in the search for natural medicinal plants that used for treatment of various liver disorders. This diversity of plants helps for preparing medicine to treat liver and its related problems. There are various reports of plants being used in treatment of jaundice and hepatitis worldwide. The use of medicinal plants selected as a source of drugs to cure various diseases in local community is as old as humankind itself. Even to the present day, medicinal plants are available as cheap and accessible source of drug for most of developing and also in developed countries (48).

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Medicinal Plants and Associated Indigenous Knowledge

In this reviewing, a total of 114 medicinal plants used for treatment of liver problems were reported from 46 articles (40 published and 6 unpublished journals) by different authors conducted from different ethnic groups of Ethiopia. These information were recorded primarily from the informants the study area by researchers as being used for treatment of liver problems in the country. These plant species are belongs to 50 families and 90 genera. Of these, family Euphorbiaceae was represented by 13 (11.4%) species followed by Asteraceae which was represented by 12 (10.53%) species, Fabaceae was represented by 10 (8.77%) species and Lamiaceae 7 (6.14%) species, Amaranthaceae 5(4.39%) species, Cucurbitaceae and Moraceae represented by 4 species each, 4 families represented by 3 species each, 8 families represented by 2 species each and 31 families represented 1 species each (Figure. 2). The detail of all identified medicinal plants with their respective family, vernacular name, habitat and habit was presented in (Table 2).

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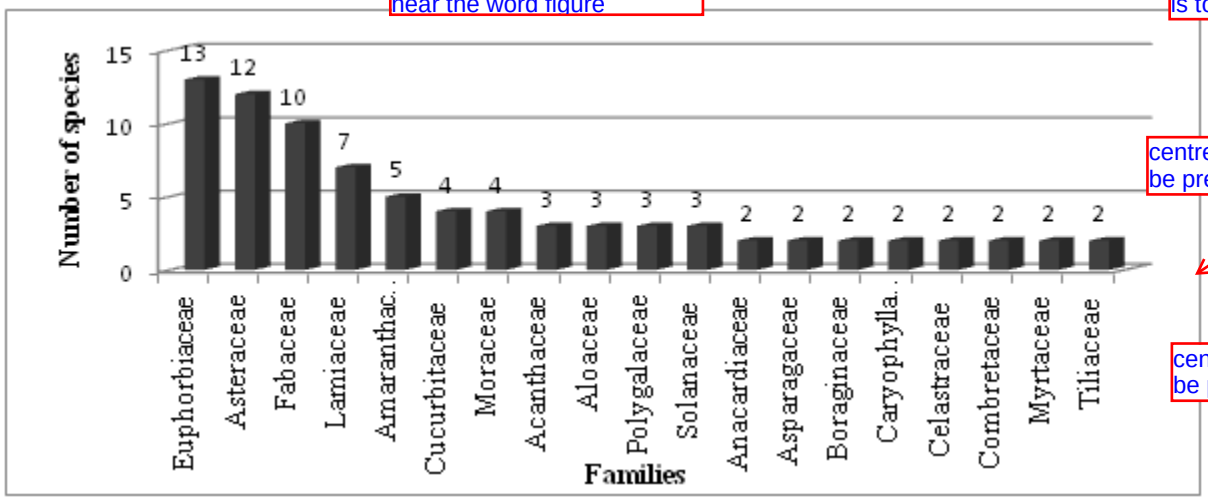

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Figure 2: The top ninteen representative families of medicinal plants used for treatment of liver problems reported in Ethiopia.

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This review literature is a good indicator for the presence of a considerable diversity of plant species in Ethiopia. The existence and utilization of such a large number of medicinal plants by indigenous people in the specified area indicates that majority of the people used and continue to use indigenous medicinal plant practices to cater medication liver problems. The herbalists collected the medicinal plant from natural environment, forest, farm land and even there was a relaxed practice to cultivation medicinal plants in the areas. There are various reports of plants being used in treatment of liver problems in Tribal Communities of Paschim Medinipur District, West Bengal, India *Mentha spicata* dry leaves powdered and eaten with chilli and *Achryanthes aspera* root is crushed to powder and boiled in water (48). In similar report, leaves of *Ricinus Communis* in India community used for treatment of liver diseases (50)

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Habits of the Medicinal Plants

The assessment on the habits of the medicinal plants depicted that herbs constituted the highest fraction 48 species (42.11%) followed by shrubs 33 species (28.95%), trees 23 species (20.18%) and climbers 10 species (8.77%) (Figure 3). Disagreement with research reported by (6) indicated mostly shrub was frequently used for remedy preparation for different human aliments treatment. This could be due to the fact that naturally there are more herbs than woody plants species are overused because of their diverse use value for human beings. It might also indicate that the threats that exist on other growth form particularly shrubs and trees. This might show that there is abundance of herbs because the area is rich with average rain fall for most of the regions of Ethiopia. This made conducive for growth of herbs and collected easily. Therefore, the trend of using more of herbaceous plants could be advantageous as it is easier to cultivate them when they are in short supply and even naturally grown in natural environment or simply they are annual. Relatively high number of herbs and shrubs for medicinal purpose treating different human aliments were also previously reported in Ethiopia (13).

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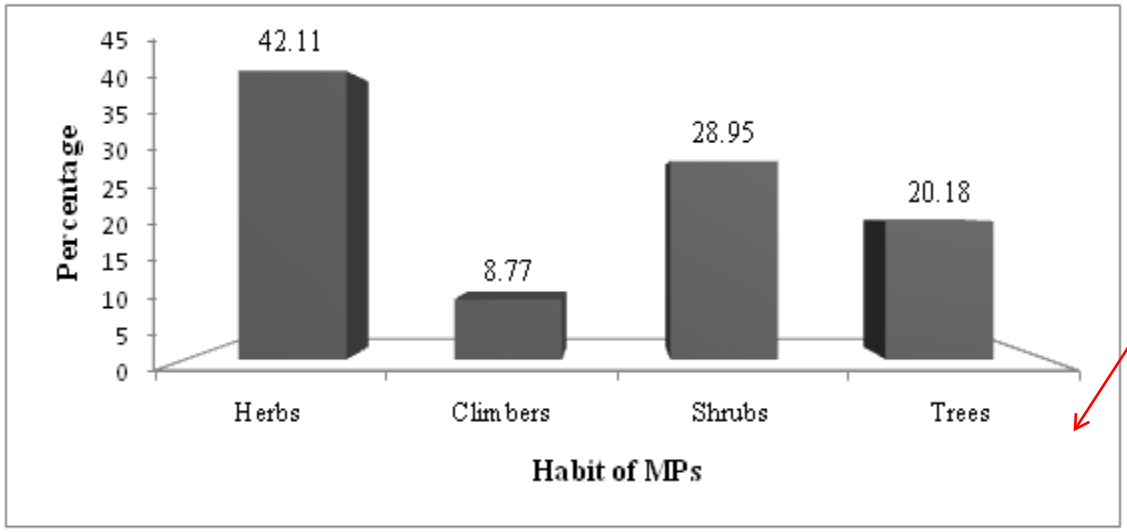

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Figure 3: Habit of medicinal plants used for treatment of liver problem in Ethiopia

Plant parts used for the Treatment of Liver Problems

With regard to the plant parts used for medicinal purposes, different parts of the plants were reported to be used for medicines. The most frequently utilized plant parts was root (24.78%) followed by leaf (23.89 %), combination parts (two parts combined) (21.24%), whole part (8.85%) and bark (5.31%) whereas flower, fiber, stem and Aerial apex of plant parts were the least used (0.88 %) each (Figure 4). This review is in agreement with the work of (2, 6, 35) that reported in Ethiopia, root is one of the most extensively used plant part in remedy preparation used for treatment of multiple diseases but disagreed with the report of (1, 4, 5) that reported leaf was mostly preferred for remedy preparation and flower parts was highly utilized for treatment of jaundice and Hepatitis in India people (54).

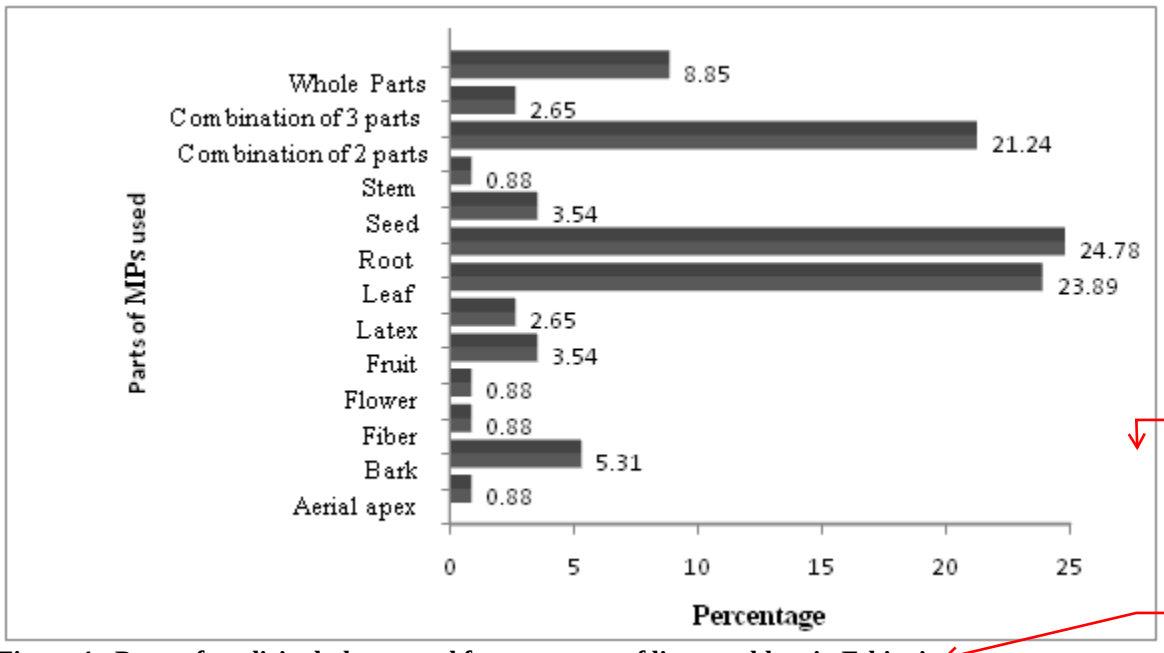

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Figure 4: Parts of medicinal plants used for treatment of liver problem in Ethiopia

Preparation, Dosage and Route of Administration of Medicinal Plants

Plant parts were prepared as medicine using fresh and dried plant materials. The dependency of the inhabitants on fresh materials in the study area including the removal of fresh leaves and roots put the plants under serious threat than the dried form, as fresh materials are harvested directly and used soon with its extra deterioration with no

chance of preservation i.e. not stored for later use. However, during this review local healers were argued that fresh materials are effective in treatment as the contents are not lost before use compared to the dried forms. This review revealed that different forms of preparations were investigated. These include: homogenizing in water, crushing, decoction, squeezed, chewing, smoking, extract with cold water, chopping and concoction. Wherein, medicinal plant parts were reported mostly to be crushing (20.18%), combination of two methods (18.42%), combination of three methods (13.16%), powdering (7.02%), grinding (6.14%), boiling with water (4.39%), decoction (4.39%), squeezing and pounding during preparation of remedies. Research conducted on medicinal plants used for the treatment of jaundice and hepatitis based on socio-economic documentation in India by (54) decoction was the major method for preparation of remedy practiced by indigenous healers.

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One herbal preparation was taken by mixing with different ingredients recommended antidotes includes drinking milk, eating honey, bread of black *tef* and occasionally slow down of drinking water accordingly. In similar manner different preparations and application methods of medicinal plants were mentioned for internal and external use in which water is mostly used to dilute plant preparations while some remedies are prepared from dry and fresh plant parts.

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Table 1: Mode of preparation reported traditional medicinal plants for treatment of liver problems

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Mode of preparation	Frequency	Percentage
Crushing	23	20.18
Squeezing	3	2.63
Decoction	5	4.39
Concoction	1	0.88
Steaming	2	1.75
Smoking	1	0.88
Cooking	2	1.75
Chewing	2	1.75
Fumigating	1	0.88
Powdering	8	7.02
Chopping	1	0.878
Grinding	7	6.14
Pounding	3	2.63
Creaming	1	0.88
Boiling with Water	5	4.39
Washing	2	1.75
Baking	1	0.88
Heat	1	0.88
Four or more methods	9	7.89
Combination of three methods	15	13.16
Combination of two methods	21	18.42

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This review of literature indicated that herbal remedies were prepared by healers and used medicinal plants for treatment of liver problem in the form of fresh 84 species (73.68 %) while 17 species (14.91%) were prepared and used either fresh or dry form of condition (Figure 6).

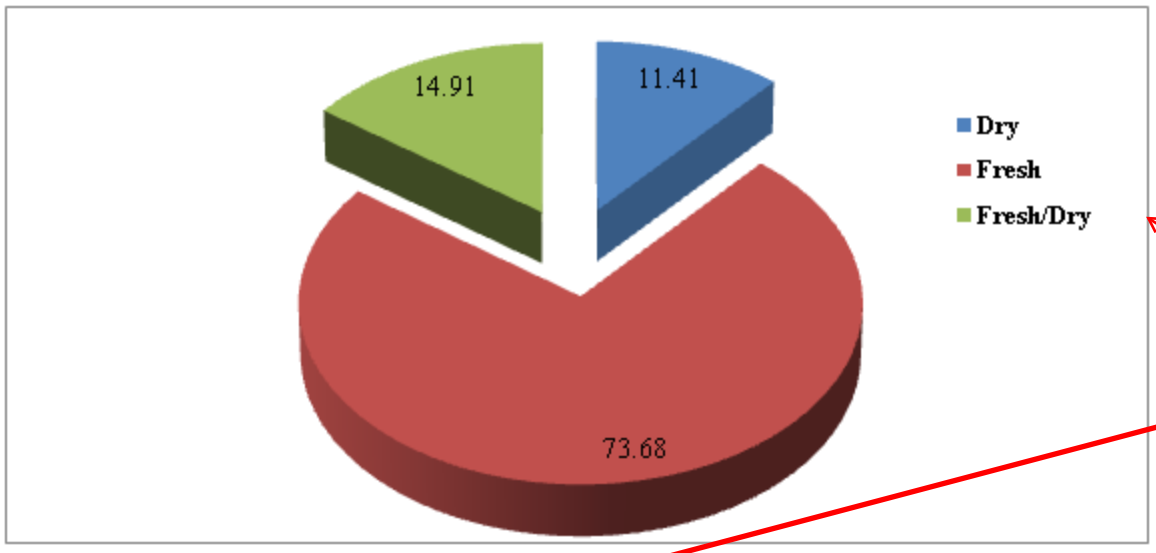

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Figure 6. Condition of remedy preparation

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Regarding the route of application medicinal plants the eminent method was mainly 99 (88.39%) through oral followed by the combination of dermal and oral 4 (3.57%), Dermal 3 (2.68%), and dermal and nasal 2 (1.79%), smoking (0.89%) account the least number (Figure 5). After preparing the remedy properly, the required dosage of medicine taken mostly through oral because the healers assumed that it assuring the effectiveness for curing human diseases (53). According to healers, preparations were prescribed to patients differently for different age groups. The dosage prescription for children was mostly lower than for adults. Dosages were estimated using lids, spoons, cups, glasses, pinches or handfuls. The amounts of remedy and prescription rates were generally dependent on the degree and duration of the degree and severity of the disease. Treatment durations varied between a minute to some days (1-39). Although the diagnosis of the major liver problems can be made by herbalists or practitioners with history taking, physical examination of the patient which was the baseline for modern laboratory examinations for treatment in modern technology. But the diagnosis for the problem still inadequate.

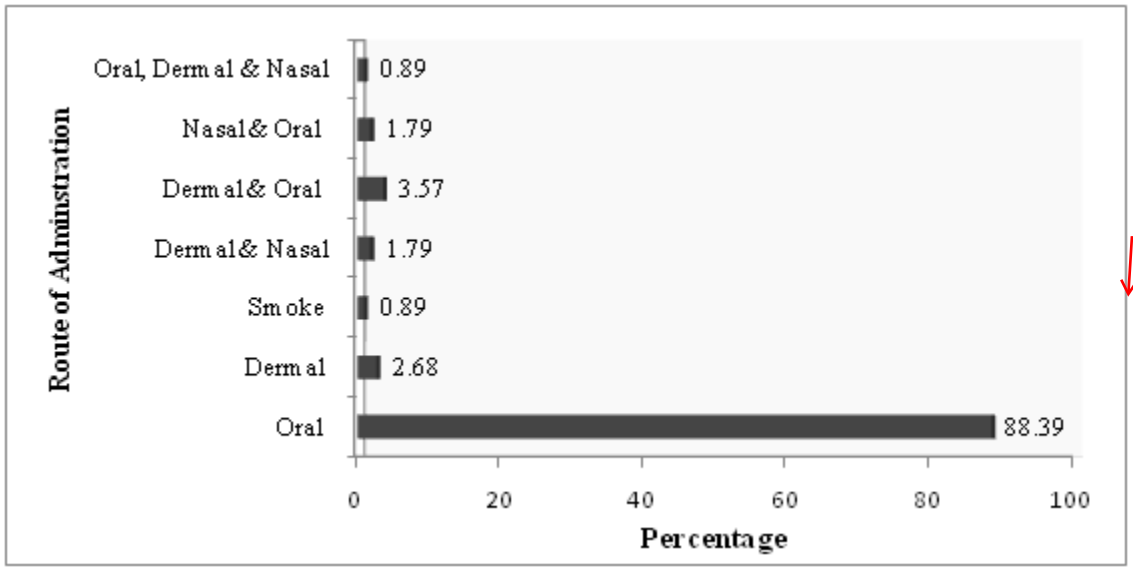

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Figure 5: Route of administration of medicinal plants used for treatment of liver problem in Ethiopia

Table 2: List of Medicinal Plants Used for Treatment of Liver Problem in Ethiopia: - **Hb**=Habit (T=Tree, Sh=Shrub, H=Herb, Cl=Climber); **PU**=part use (L=Leaves, R=Roots, B=bark, Fr= Fruit, S=Seed, Fl=flower, La=latex, Fb=fiber, AP=Aeral part, AA=aerial apex, WP=Whole plant); **RA**=Route of administration (O=Oral, D=Dermal, N=Nasal); **Language** (Oro=Oromia, Am=Amharic, Dw=Dawuro, Sd= Sidama, Gd= Gedeo, Tg=Tigray, Bn=Bench, Sk=Sheko, Hd=Hadiya) , **Fr**.=frequency

Spp.	Family	Hb	Local	PU	Mode preparation	Condition	RA	Region	References	Fr.
Abrus precatorius L.	Fabaceae	Cl	Badaluwa(Dw)	S	Crushed and concocted	Fresh	Oral	SNNPR	(39)	1
Acacia abyssinica Benth.	Fabaceae	T	Girar (Am)	L	Crushed	Fresh	Oral	Amhara	(24)	1
Acacia seyal Del.	Fabaceae	T		L	Crushed	Fresh	Oral	Afar	(33)	1
Acacia tortilis (Forssk.) Hayne	Fabaceae	T	Assel	R	Crushed and Decoction	Fresh	Oral	Dire Dawa	(28)	1
Acalypha indica L.	Euphorbiaceae	H	------	L	Decoction and extract	Fresh	Oral	Afar	(33)	1
Acalypha villicaulis A. Rich.	Euphorbiaceae	H	Wak'ak'uwa (Dw)	R	Crushed	Fresh	Oral	SNNPR	(39)	1
Achyranthes aspera L.	Amaranthaceae	H	Telenj (Am)	L	Ground and powdered	Fresh	Oral	Amhara	(32)	1
Acmella caulirhiza Del.	Asteraceae	H		WP	Concocted, crushed, powdered	Fresh	Oral	Oromia	(45)	1
Acokanthera schimperi (A. DC.) Schweinf.	Apocynaceae	T	Merz/Mirez(Am)	AA	Crushed and fumigate	Fresh/dry		Amhara	(11)	1
Adhatoda schimperiana Hochst.ex.	Acanthaceae	Sh	Simiza (Am)	L	Boiled; crushed	Fresh	Oral	Amhara	(37, 38)	2
Afrocarpus falcatus (Thunb.) C.N.Page	Podocarpaceae	T	Dagucho	L	Crushed	Fresh	Oral	SNNPR	(15)	1
Ajuga integrifolia Ham.Buch.	Lamiaceae	H	Armagusa (Oro)	WP	Heat	Fresh	Oral	Oromia	(25)	1
Aloe gilbertii Sebsebe & Brandham	Aloaceae	H	Hargessa(Oro)	La	Crush and extract	Fresh	Oral	Oromia	(6)	1
Aloe macrocarpa Tod.	Aloaceae	H	Hargessaa (Oro)	R	Concocted, crushed	Fresh	Oral	Oromia	(45)	1
Aloe monticola Reynolds	Aloaceae	H	Genenno (Had.)	La	Squeezing	Fresh	Oral	SNNPR	(31)	1
Amaranthus caudatus L.	Amaranthaceae	H	Bertefi (Oro)	S	Crushed and homogenizing with water, powdering	Fresh/dry	Oral	Oromia	(41)	1
Amaranthus hybridus Linn.	Amaranthaceae	H	-----	Fr	Bake	Fresh	Oral	Oromia	(40)	1
Arisaema schimperianum Schott	Araceae	H	Amoch (Am)	L, Fr	Crushed and Concoction; homogenizing with water	Fresh	Oral	Oromia	(41)	1
Aristolochia bracteolata Lam.	Aristolochiaceae	Cl	----	WP	Crushed	Fresh	Oral	Afar	(33)	1
Asparagus africanus Lam.	Asparagaceae	Cl	Shuko (Oro)	L,Fr	Concoction , chewing	Fresh	Oral	Oromia	(41)	1
Asparagus leptocladodius Chiov.	Asparagaceae	Cl	Keleme sere (Oro)	L,R	Crushed, Concoction and infusion	Fresh	Oral	Afar, Oromia & Harar	(4)	2
								Oromia	(6)	
Aspilia gillettii Wild.	Asteraceae	H	----	L,R	Crushed	Fresh	Oral	Oromia	(6)	1
Balanites rotundifolia (van Tiegn.) Blatter	Balanitaceae	T	----	L,B	Chewed	Fresh	Oral	Afar	(33)	1

Bersama abyssinica Fresen.	Melianthaceae	T	Xewerako (Sd)	B	Crushed	Fresh	Oral	SNNPR	(15)	1
Bidens macroptera (Sch. Bip. ex Chiov.) Mesfin	Asteraceae	H	Kello (Oro)	R	Crush and Concoction and homogenizing with water	Fresh	Oral	Oromia	(41)	1
Boerhaavia plumbaginea Cav.	Myrtaceae	H	-----	L	Decoction	Fresh	Dermal	Ethiopia	(3)	1
Boswellia microphylla Chiov.	Burseraceae	T	------	B	Crush and squeezing	Fresh	Oral	Oromia	(10)	1
Brucea antidysenterica J. F. Mill.	Simaroubaceae	T	Aballo (Am) Kilisa adi (Oro)	L, Fr	Boiling and steaming	Fresh	Smoke ,Oral	Amhara	(35)	2
								Oromia	(40)	
Cadaba glandulosa Forssk.	Capparidaceae	Sh		L	Crushed		Or, Der	Afar	(33)	1
Calpurnea aurea (Alt.) Benth	Fabaceae	Sh	Cekkatta (Sd), Digta (Am)	S, L	Crushed; boil and inhale	Fresh	Oral, Smok	SNNPR.	(26)	2
								Amhara	(37)	
Carica papaya L.	Caricaceae	T	Papaya	S,L,R	Crushed; pouring and squeezing	Fresh/Dry	Oral	Oromia	(41, 43)	3
								Tigray	(14)	
Catha edulis	Celastraceae	Sh	Jimaa (Dw)	L	Decoction	Fresh	Oral	SNNPR	(39)	1
Celosia polystachia (Forssk.) C.C. Towns.	Amaranthaceae	H	----	L	Crushed	Fresh	Oral	Afar	(33)	1
Cineraria deltoidea Sond.	Asteraceae	H	---	WP	Crushed and concoction, homogenizing with water	Fresh	Oral	Oromia	(41)	1
Cirsium englerianum O. Hoffm.	Asteraceae	H	Umbahoo(Oro)		Squeezed	Fresh	Oral	Oromia	(46)	1
Cissampelos mucronata A.Rich.	Menispermaceae	H	Kawuro (M)	L	Ground	Dry	Oral	SNNPR	(17)	1
Citrus aurantifolia	Rutaceae	T	Lomi	Fr	Ground	Dry	Oral	Tigray	(14)	1
Clerodendrum myricoides (Hochst.) R.Br. ex Vatke	Lamiaceae	Sh	Marasisa (Oro)	Fr	Concocted, crushed, powdered	Fresh	Oral	Oromia	(41)	1
Clutia lanceolata Forssk.	Euphorbiaceae	H	Fiyele feji (Am)	L, R	Ground , powdered	Dry	Oral	Amhara	(32)	2
								SNNPR	(31)	
Coccinia abyssinica	Cucurbitaceae	Cl	Ushushiya (Dw)	R	Crushed	Fresh/dry	Oral	SNNPR	(39)	1
Combretum sp.	Combretaceae	T	Fongera	R,B	Ground	Fresh/dry	Oral	Amhara	(32)	1
Cordia africana Lam.	Boraginaceae	T	Wanza (Am), Awhi (Tg)	L,R,B	Crushed, boiled; decoction and chewed	Fresh	Oral	Amhara	(19, 32)	3
								Tigray	(1)	
Crepis ruepellii Sch. Bip.	Asteraceae	H	Kartasa (Oro)	R	Concoction, Crushed, Powdered	Fresh/dry	Oral	Oromia	(41)	
Croton macrostachyus Del.	Euphorbiaceae	T	Makanisaa (Oro), Missana (Am), Tambok (Tg)	Wp	cooked; boiled and pounded; decoction; paste; boiling; powdering	Fresh/dry	Oral	Oromia	(46)	7
								Amhara	(18, 32,34)	
								Tigray	(1, 13)	
								Ethiopia	(3)	
Cucumis dipsaceus Ehrenb. ex Spach	Cucurbitaceae	Cl	Hare goge (Oro)	R, Fr	Crushed, Concoction	Fresh	Oral	Afar, Oromia & Harar	(4)	2

								Harar	(36)	
Cucumis ficifolius A. Rich.	Curcurbitaceae	Cl	Yemidir Embuay (Am), Ramboambo (Tg), Anchote (Oro)	WP, R	Crushed; Powdered	Fresh/dry	Oral	Tigray Amhara Oromia	(1) (21, 34) (41)	4
Cyathula polycephala Bak.	Amaranthaceae	H	Hacho (Oro)	R	Concoction , Crushed, chewed	Fresh	Oral	Oromia	(41)	1
Cymbopogon commutatus (Steud.) Stapf	Poaceae	H		Ap	Fumigated	Fresh	Oral, Der	Afar	(33)	1
Cynoglossum coeruleum Hochst.	Boraginaceae	H	Qarchaba (Oro)	R	Concoction, Decoction, Crushed	Fresh	Oral	Oromia	(41)	1
Dioscorea alata L.	Dioscoriaceae	Cl	Boyna (Sd)	St	Cooked	Fresh	Oral	SNNPR	(26)	1
Dodonaea angustifolia L. f.	Sapindaceae	Sh	Etancha (Sd), Iticha (Oro)	L	Decoction, crushed, powdered	Fresh	Oral	SNNPR Oromia	(26) (29)	2
Dorstenia barnimiana Schwienf.	Moraceae	H	Work Bemeda (Am)	R	Powdered	Dry	Oral	Amhara Tigray Amhara	(34) (13) (35)	3
Dorstenia foetida (Forssk.) Schweinf.	Moraceae	H	Worq-bemeda	R	Crushed and pounded	Fresh	Oral	Amhara	(19)	1
Euphorbia abyssinica J. F. Gmel.	Euphorbiaceae	T	Kulkual (Am)	R, La	Crushed ; squeezing	Fresh	Oral	Amhara	(11,32, 34)	3
Euphorbia dumalis S. Carter	Euphorbiaceae	H	Dargu adi (Oro)	R	Crushed	Fresh	Oral	Oromia	(6)	1
Euphorbia lathyris L.	Euphorbiaceae	H	Ambuluk(Oro)	Fr	Concocted, crushed	Fresh	Oral	Oromia	(41)	1
Euphorbia schimperiana Scheele	Euphorbiaceae	Sh	Gurii (Oro)	L	Concoction, Crush, chew	Fresh	Oral	Oromia	(41)	1
Euphorbia triaculeata Forssk.	Euphorbiaceae	Sh		L	Crushed	fresh	Na, De	Afar	(33)	1
Fagonia schweinfurthii	Zygophyllaceae	Sh		St,R, WP	Crushed, boiled & fumigating	fresh	Oral, Der	Oromia Afar	(10) (33)	2
Ferula communis L.	Apiaceae	H	Gnida (Oro)	R	Decoction	fresh	Oral	Oromia	(41)	1
Ficus carica L.	Moraceae	Sh	Beles (Am)	L, St	Ground	fresh	Oral	Amhara	(32)	1
Ficus sycomorus L.	Moraceae	T	Odaa (Oro.)	La	Creaming	Fresh	Dermal	Oromia	(5)	1
Flueggea virosa Guill. & Perr.	Euphorbiaceae	Sh	Shasha (Am)	L	Powdered	Dry	Nasal/ Oral	Amhara	(32)	1
Galinsoga paruifolra	Asteraceae	T	Ematiya/bizdiya (Dw)	L,R	Crushed	Fresh	Oral	SNNPR	(39)	1
Galinsoga parviflora Cav.	Asteraceae	H	Midirberbere, (Am)	Fl	Chopped	Fresh	Oral	SNNPR	(17)	1
Gnidia glauca	Thymelaeaceae	Sh	Migra (Dw)	R	Crushed	Fresh	Oral	SNNPR	(39)	1
Grewia villosa Will.	Tiliaceae	Sh		WP	Crushed	Oral	Oral, Nasal	Afar	(33)	1
Hypericum quartinianum A. Rich.	Hypericaceae	Sh	Muke fonii (Oro)	L	Pounding and homogenized in water	Fresh	Oral	Oromia	(2)	1
Indigofera arrecta A.Rich.	Fabaceae	Sh	Wareami (A)	L	Smoked	Dry	Smoke	SNNPR	(17	1

Indigofera articulata Gouan	Fabaceae	Sh	----	R	Powdered	Oral	Oral	Afar	(33)	1
Indigofera spicata Forsk.	Fabaceae	Sh	----	R	Powdered	Oral	Na, Der	Afar	(33)	1
Jatropha curcas L.	Euphorbiaceae	T	Beeroo faranji (Oro)	S	crushed, powdered	Dry	Oral	Oromia	(46)	1
Justicia ladanoides	Acantaceae	H	Mulu muk'uwa (Dw)	L,R	Crushing and rubbing; powdering	Fresh/dry	Derma & Ora	SNNPR	(39)	1
Justicia schimperiana (Hochst. ex Nees) T.Anders.	Acanthaceae	Sh	Shimieya (Tg), Dhumuga(Oro), Tumunigga(Hd), Sensel (Smiza) (Am)	L,R	Crushed; pounded; Concocted, powdered; decocted/squeezed; chopped, crushed, and boiled	Fresh/dry	Oral, Der, nasal	Tigray	(1)	9
								SNNPR	(31)	
								Oromia	(2, 29, 43, 45)	
								Amhara	(11,16, 34)	
Kalanchoe petitana A. Rich.	Crassulaceae	H	Endehula (Am)	L	Powdered	Dry	Oral	Amhara	(32)	1
Kanahala laniflora (Forssk.) R. Br.	Asclepidaceae	Sh	Wundiffo (Oro)	R	Powdered	Fresh/dry	Oral	Oromia	(9)	2
								SNNPR	(8)	
Leucas stachydiformis (Benth.) Hochst. Ex Briq.	Lamiaceae	H	Businae (M)	L,B	chopped and drench (soak)	Fresh		SNNPR	(17)	1
Maytenus arbutifolia (A. Rich.) Wilczek	Celastraceae	Sh	Qartame (Oro)	L,Fr	Concoction , crushed	Fresh	Oral	Oromia	(41)	1
Mentha spicata L.	Lamiaceae	H	Nana	L	Boiling or pounding	Fresh/dry	Oral	Dire Dawa	(28)	1
Microglossa pyrifolia (Lam.) Kuntze,	Asteraceae	Sh	Y/m- meqenet (Sk.)	L	Crushed	Fresh	Oral	SNNPR	(20)	1
Nicandra physaloides	Solanaceae	H	Puqaqiya (Dw) Hawwixii(Oro)	L,B	Crushed	Fresh	Oral	SNNPR	(39)	2
								Oromia	(44)	
Nigella sativa L.	Ranunculaceae	H	Tikur Azmud (Sd)	S	Ground	Fresh	Oral	SNNPR	(42)	1
Oncocalyx schimperi (A. Rich.) M. G. Gilbert	Loranthaceae	Sh		L	Crushed	Fresh	Oral	Afar	(33)	1
Phyllanthus reticulatus	Euphorbiaceae	Sh	Wusiwisiya mala (Dw)	L,R	Crushed	Fresh	Oral	SNNPR	(39)	1
Phytolaca dodecandra L.Heri	Phytolaceae	Cl	Endod (Am), Handoode (Oro)	R, L	Crushed and pounded; Ground	Fresh	Oral	Oromia	(23,22, 44)	8
								Amhara	(11,32, 34, 35, 37)	
Portulaca quadrifida L.	Portulacaceae	H	Akalkaraha (Oro)	WP	chopped, powdered	Fresh	Oral	Oromia	(29)	1
Rhamnus prinoides	Rhamnaceae	Sh	Gesho (Am)	R	Ground	Fresh	Oral	Amhara	(37)	1
Rhus retinorrhoea Steud, ex Olive	Ancardaceae	Sh	Tilem (Am)	L,R	Powdered; Crushed	Fresh/dry	Oral	Amhara	(12)	2
								Oromia	(27)	
Ricinus communis L.	*Euphorbiaceae*	Sh	Qobboo (Oro)	L,R	Crushed	Fresh	Oral	Oromia	(22, 30)	2
Rumex abyssinicus Jacq.	Polygonaceae	H	Dhangago (Oro), Mekemeko (Am)	AP, R	pounded and then decocted; powdered; boiled; crushed,	Fresh/dry	Oral	Oromia	(29, 46)	4
								Tigray	(13)	

								Amhara	(18)	
Rumex nepalensis Spreng.	Polygonaceae	H	Germach (Bn), Shabbee (Oro)	R	Decoction, Crushed	Fresh	Oral	SNNPR Oromia	(13) (41)	2
Salvia merjamie Forssk.	Lamiaceae	H	Okota (Oro)	R	Concoction, Decoction, Crush	Fresh	Oral	Oromia	(41)	1
Satureja punctata Benth. Briq	Lamiaceae	H	Lomishet (Am)	L	Cooked	Fresh	Oral	Tigray	(13)	1
Schinus molle L.	Anacardiaceae	T	Tikur berbere (Tg)	L	Crushed and filter	Fresh	Oral	Tigray	(1)	1
Securidaca longepedunculata Fresen.	Polygalaceae	T	Xamanaayii (Oro)	B	Powdering	Dry	Oral	Oromia	(22)	1
Senna petersiana (Bolle) Lock	Fabaceae	Sh	Ramso (Oro)	L	Washed body	Fresh	Dermal	Oromia	(43)	1
Senna alexandrina Mill.	Fabaceae	Sh		B	Crushed and extract	Fresh	Oral	Afar	(33)	1
Sida schimperiana Hochst. ex A.Rich.	Malvaceae	S		R	Boiled and extract	Fresh	Oral	SNNPR	(7)	1
Silene macrosolen A. Rich.	Caryophyllaceae	H	Wagartii (Oro)	R	Concoction, crush, chew	Fresh	Oral	Oromia	(41)	1
Solanum nigrum	Solanaceae	H	Tut'naye (Sd)	L	Boiled	Fresh	Oral	SNNPR	(42)	1
Solanum sp.	Solanaceae	Sh	Puk'ek'iya(Dw)	R	washed/crushed		Oral	SNNPR	(39)	1
Sonchus bipontini Asch.	Asteraceae	H	Kartasa (Oro)	R	Concoction, Crushed or chew	Fresh	Oral	Oromia	(41)	1
Stellaria sennii Chiov. H	Caryophyllaceae	H		R	Decoction	Fresh	Oral	SNNPR	(8)	1
Syzygium guineense (Willd.) DC.	Myrtaceae	T	Duwancho (Sd)	B	Concoction	Fresh	Oral	SNNPR	(15)	1
Terminalia brownie Pers.	Combretaceae	T	Weyba (Am)	B	Boiled and extraction	Fresh	Oral	Amhara	(32)	1
Thymus serrulatus (hoechst ex. Benth)	Lamiaceae	Sh	Tosegn (Am)	L	Decoction	Fresh	Oral	Oromia	(29)	1
Triumfetta heterocarpa Sprague and Hutch.	Tiliaceae	Sh	Yelam tut (Am)	R	Crushed	Fresh	Oral	Amhara	(35)	1
Verbena officinalis	Verbenaceae	H	Atuch (Am)	R	Squeezed	Fresh	Oral	Amhara	(37)	1
Vernonia myriantha Hook.f.	Asteraceae	Sh	Regi (Oro)	L	Crushed , Powdered, chewed	Fresh/Dry	Oral	Oromia	(41)	1
Vernonia sp.	Asteraceae	H	Yesheshuwa (Dw)	R	Powdered	Dry	Oral	SNNPR	(39)	1
Vitis vinifera L.	Vitaceae	H	Weyne (Am)	L,R	Ground	Fresh	Oral	Amhara	(32)	1
Woodfordia uniflora (A. Rich.) Koehne	Lythraceae	H	Itecha (Oro)	R	Crushed	Fresh	Oral	Oromia	(6)	1
Ximenia Americana L.	Olacaceae	T		Fb	Crushed and soaking	Fresh	Oral	Oromia	(10)	1
Zehneria scabra (Linn.f.) Sond.	Cucurbitaceae	Cl	Areg Resa (Am), Harola (Oro)	L, R	pounded and squeezed; Decoction, Crushed	Fresh	Oral	Amhara, Oromia	(21,41)	2

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Conclusion

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This research review revealed that there are considerable numbers of medicinal plants in Ethiopia from different ethnic group which are used to treat liver problems. Hence, medicinal plants still play significant role in the health care of system of the rural community as first choice for curing different diseases. Generally, in Ethiopia 114 medicinal plants used for treating of liver problems were recorded from different authors (46 articles). The most common habit of medicinal plants used by different ethnicity was herbs and shrubs respectively. The most useable part of medicinal plants for treating liver cases was root and leaf. Major medicinal plants that cited by different authors in different areas were *Justicia schimperiana*, *Phytolaca dodecandra* and *Croton macrostachyus*. This review indicates that liver problem is common in Ethiopia and hence it has to be further means of treatment by investigating the phytochemical extraction, screening for clinical test in modern approach. Most of the medicinal plants were harvested from the wild that the natural habitats need to be managed properly to minimize threats of medicinal plants in the near future.

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Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this review paper

Authors' contributions

space alignment

The authors conceptualized the studies, wrote and approved the final manuscript.

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