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REVIEW

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Phytochemical analysis of some selected traditional medicinal plants in Ethiopia

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Abstract

Background: This review of relevant medicinal plants is based on the fundamental knowledge accumulated by indigenous people of Ethiopia and to identify which types of selected medicinal plants for phytochemical analysis were analyzed and which one is not analyzed at Ethiopian levels. In this review, the most traditional medicinal plant species found and used in Ethiopia are chosen.

Results: The qualitative phytochemical analysis, some of which are the most important phytochemicals such as phenolic, tannins, alkaloids, saponins, cardiac glycosides, steroids, terpenoids, flavonoids, phlobatannins, anthraquinones, and reducing sugars are studied by the researcher. Most studies have revealed that some phytochemicals are present in some medicinal plants while some are absent. The phytochemical properties of some species were studied like *Artemisia afra* (Ariti), *Aloe Vera* (Erret), *Yzygium guineense* (Dokuma), *Ruta chalepensis* (Tenadam), *Ocimum grattissimum* (Damakese), *Nigella sativa* (Tikur Azmud), *Lepidium sativum* (Feto), *Hagenia abyssinica* (Kosso), *Croton macrostachyus* (Bisana), and *Rhamnus prinoides* (Gesho).

Conclusions: This review has shown that traditional medicinal plants whose phytochemical properties are not studied have various medicinal purposes like treating mastitis, preventing boils, hemorrhoids, congestion, headache, hepatitis, liver, vertigo, stomatitis, kidneys, liver, and vision for treating anemia, hemorrhoid coughs, fluxes, and stomatitis in most animals and human beings. So that identifying the plants based on the investigation and analysis of phytochemical properties of such plant species are more important than Ethiopian levels.

Keywords: Medicinal plants, Phytochemicals analysis, Bioactive compounds, Traditional medicines, Ethiopian levels

Background

Medicinal plants still play important roles in the daily lives of people living in developing countries of Asia and Africa, including Ethiopia. Medicinal plants not only serve as complements or substitutes for modern medical treatments, which are often inadequately available but also enhance the health and security of local people. Thus, these plants play indispensable roles in daily life and are deeply connected to diverse social, cultural, and economic events associated with life, aging, illness, and death (JAFICOAF 2008). Medicinal plants are used to treat and diagnose diseases and infections. From ancient times, plants have been rich sources of effective and safe medicines (Russell-Smith et al. 2006).

The world health organization (WHO) defined traditional medicine as the total combination of knowledge and practices that can be formally explained or used in the prevention and elimination of physical, mental, or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing. About 75–90% of the rural population in the world (excluding western countries) relies on traditional medicines as their only health care system. This is not only because of poverty where people cannot afford to buy expensive modern drugs, but traditional systems are also more culturally acceptable and meet the psychological needs in a way modern medicine does not (Fassil Kibebe 2001).

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Ethnomedicinal practices are believed to be one of the potential bases for the development of safe and effective treatments. Ethiopia has a long history of a traditional health care system, but studies on traditional medicinal plants (TMP) have been limited in comparison to the country's multiethnic, cultural, and flora diversity (Fentahun et al. 2017), Also, the use of medicinal plants to treat infections is an old practice in large parts of Ethiopia to solve health problems for livestock and humans (Redda et al. 2014; Giday et al. 2009; Regassa 2013; Abera 2014; Tamene 2020; Mulatu 2020).

Main text

Increasing traditional medicines and natural plant products

The main phytochemical components, present in medicinal plants are tannins, alkaloids, saponins, cardiac glycosides, steroids, terpenoids, flavonoids, phlobatannins, anthraquinones, and reducing sugars. As proposed by WHO, the primary health care of most population of developing countries depend on traditional medicines and mostly natural plant products (Vines 2004). Like the worldwide countries, populations of Ethiopia use traditional medicines in both rural and urban areas. Traditional practice and activities have a long history in many areas in the Ethiopia and it will continue to give useful and applicable tools for treating disease (Helen et al. 2019).

Different traditional medicinal plant species are studied by different researchers in the world and in the Ethiopian. Ethiopia comprises people with many languages, cultures, and beliefs. This makes for a rich and diverse knowledge and practice of traditional medicine, including herbal remedies (Helen et al. 2019). There are different literature reviews that investigated and studied the Ethnobotanical and Ethnopharmacological evidence of some Ethiopian medicinal plants traditionally used for the Treatment of Cancer, skin problems, leprosy, and external parasites, Evil eye, and wound treatment in the Ethiopia. However, there is no report that could show phytochemical composition and its expanded pharmacological application in the folk medicine of some traditional medicinal plants in the country of Ethiopia. Moreover, this knowledge of identifications of studied and unstudied phytochemical composition of medicinal plants in Ethiopia can serve as the baseline data for researchers and analyzers for the further study of traditional medicinal plants in Ethiopia (Helen et al. 2019).

The medicinal power of traditional plants species lies in phytochemical components that cause definite pharmacological action on the human body (Naseem 2014). Based on their metabolism activity in the plant, phytochemicals components are generally can be mainly divided into two groups, which are primary which has mainly sugars, amino acids, chlorophyll and proteins, and secondary constituents while secondary constituents consist of alkaloids, flavonoids, saponins, tannins, phenolic compounds and many more (Krishnaiah 2007).

The most important components of the medicinal plant were isolated by the extraction methods by using the right solvent. Each researcher in the published articles in this review, different methods of extraction such as ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and aqueous (water) were used to the phytochemical composition of plant species. The objective of this review was to collect and summarize the information about the medicinal plant and to classify the plants based on the studies of their phytochemical composition as well as this provides information for the research community to conduct further scientific investigations in Ethiopia's medicinal plants.

Materials and methods

In this review, the data and information on the traditional medicinal plants in Ethiopia were collected from the published papers, which are available online in different forms such as books, published articles, and research reports. Different online sources such as Google Scholar and gray literature were the source of published articles by browsing the different words or terms like medicinal plants and Ethiopian traditional plants. For this review, scientific name, family name, local name, and important, obtained from the published articles that were obtained online, and the data are shown in Table 23.

There are various traditional medicinal plants used to treat different illnesses and diseases in Ethiopia which did not describe plant species by scientific names; and review articles, are excluded. For this review paper, a total of 53 plant species that are recognized and grown in Ethiopia are documented. From those plant species, the phytochemical composition of some plant species is studied by a researcher and some are not studied. The most important components of the medicinal plant were isolated by the extraction methods by using different solvents. In all reported literature, different solvent such as ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and water was used as solvent.

The main aim of this review is to collect and summarize the information about the medicinal plant and to classify the plants based on the studies of their phytochemical composition as well as to provide information for the research community to conduct further scientific investigations on the Ethiopia medicinal plants.

Results and discussions

Phytochemical analysis

Traditional medicine plays a significant role in the healthcare of the people in developing countries, including Ethiopia, and medicinal plants provide a valuable contribution to this practice (Tesfahuneygn and Gebreegziabher 2019). In this review, around 33 medicinal plants species were identified from published articles. The different parts of the plant such as root, leaves, and fruit, in which these different parts have many traditional values, pharmacological uses, and phytochemical constituents were mentioned. From few medication values of plant parts, to treat rheumatism, madness, snakebite, chest pain, jaundice chest pain, malaria, headache, cough, etc. All the medicinal plants are shown in the table form with the scientific name, families, local name, and importance. Most plants were reported and investigated in Ethiopia. As reported by many authors, some medicinal plants with their scientific name, family, local name and their importance are shown in Table 23, and these plant species listed in this review were often used by the people in Ethiopia.

Phytochemicals

Analysis of the phytochemical properties of the medicinal plants used to show and isolate the drug, lead compounds and components from the parts of the plant. The unique biological activity of the plants can be identified by their phytochemicals properties. Most parts of the plants used for the analysis of the phytochemical properties were leaves, roots, stem barks, and fruits. In this review, medicinal plants were investigated for phytochemical constituents of ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and aqueous (water) extraction of different phytochemicals.

In this review, the most published articles recognized the presence of phytochemical components in the plants was indicated by the positive sign (+) and the absence of phytochemical components in the plants, by the negative sign (−) as shown in table.

Alkaloids

Alkaloids are one of the main and largest components produced by plants, and they are metabolic byproducts that are derived from the amino acids (Naseem 2014). Based on the published articles in these reviews, alkaloids were extracted from the different parts of the plants using different solvents such as ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and aqueous (water). These types of solvents extract phytochemical components from medicinal plants like leaves, roots, stem bark, and fruits.

Flavonoids

Flavonoids consist of a large group of polyphenol compounds having a benzoyl-γ-pyrone structure and are ubiquitously present in plants. They are synthesized by the phenylpropanoid pathway. Available reports tend to show that secondary metabolites of a phenolic nature including flavonoids, are responsible for the variety of pharmacological activities (Mahomoodally et al. 2005; Pandey 2007). Flavonoids are hydroxylated phenolic substances and are known to be synthesized by plants in response to microbial infection (Dixon et al. 1983). In this review, flavonoids were detected in most plant species but in some medicinal plants were not present the same plant but different solvents like *eucalyptus* and *Agenda Abyssinia* leaves.

Tannins

The term tannin is widely applied to a complex large biomolecule of polyphenol nature having sufficient hydroxyls and other suitable groups such as carboxyl to form strong complexes with various macromolecules (Navarrete 2013). In this present review, tannins were detected in most plant species like peel and *juice of Citrus medica, mango* (*Mangifera indica L.*) leaves, *Avocado fruit* (*Persea Americana*), *Dioscorea alata leaf*, of *Leucas aspera L.* leaf and root, *Ocimum gratissimum Linn* leaf, *Rhamnus prinoides* root, extract of *Rhizomes*, *Zingiber officinale* and *Curcuma longa* and also for different solvent give different response for the same plant species like *Bersama abyssinica* leaf, F*lax seeds*, *Nigella sativa*, *Ruta chalepensis* leaves, and *Syzygium guineense* and not totally detected in part of plants like *Lepidium sativum* seeds and love *Gilbetii* root. Tannins are generally used in the tanning process and used as healing agents in inflammation, burn, piles, and gonorrhea (Boroushaki et al. 2016).

Saponins

Saponins are an important group of plant secondary metabolites that are widespread throughout the plant kingdom. Saponins are basically phytochemicals that are found in most vegetables, beans, and herbs (Francis et al. 2002; Haralampidis et al. 2002). In this review, saponins were detected in most medicinal plants like *citrus fruit juice*, of *Mango* (*Mangifera indica L.*) leaves, *Avocado fruit* (*Persea americana*), *Leucas aspera L.* leaf, and root, *Rhamnus prinoides* root, *Bitter* (*Vernonia amygdalina*) leaf and Stem bark of *Vernonia amygdalina* in common plant species and some plants were shown different results, that depends on solvent and also not totally detected in part of the plant such as *Bersama abyssinica*

leaf, *Dioscorea alata* leaf, love *Gilbertii* root, and *Flax seeds*.

Steroids

The word steroid is derived from sterol, which is a natural or synthetic chemically active hormone-like element. A steroid is one of a large group of chemical substances classified by a specific carbon structure. Steroids include drugs used to relieve swelling and inflammation, such as prednisone and cortisone; vitamin D; and some sex hormones, such as testosterone and estradiol (Hill et al. 2007). For this review, Steroids were detected in most plant species like *citrus fruit juice*, peel and *juice of citrus Medica*, *Flaxseeds*, *Nigella sativa*, *Ocimum gratissimum Linn* leaf, *Syzygium guineans* root, and Root and Stem bark of *Vernonia amygdalina* in common plant species while in some plant species were shown variable result that depends on the given solvents and not totally detected in the part of the plant like *Rhamnus prinoides* root.

Terpenoids

Terpenoids are small molecular products synthesized by plants and are probably the most widespread group of natural products. Terpenoids show significant pharmacological activities, such as antiviral, antibacterial, antimalarial, anti-inflammatory, inhibition of cholesterol synthesis, and anti-cancer activities (Boroushaki et al. 2016). As mentioned earlier, Terpenoids were detected in most analysis plant species such as *citrus fruit juice*, *Hagenia abyssinica* leaves, *Leucas aspera L.* leaf and root, *Flax seeds*, *Ocimum gratissimum linn* leaf, *Ruta chalepensis* leaves, and *Syzygium guineans* root while in some plants its result depends on the types of solvents.

Phenolic

Phenolic compounds are secondary metabolites, which are produced in the shikimic acid of plants and pentose phosphate through phenylpropanoid metabolization (Derong Lin et al. 2016). In this review, phenolic was detected in most the medicinal plants like citrus fruit juice, peel and juice of citrus *medica, mango* (*Mangifera indica L.*) leaves and *Avocado* fruit (*Persea Americana*), *eucalyptus* leaves, *Flax seeds*, *Rhamnus prinoides* root, of *Rhizomes*, *Zingiber officinale,* and *Curcuma longa* but some medicinal plant is given different response and depend on the solvents.

Even though there are so many medicinal plants in Ethiopia, this review of the phytochemical analysis shows that some medicinal plants were studied by the investigator in different areas of Ethiopia, while some traditional plants are not studied. According to the data of published articles, the extraction techniques of the medicinal plants were mainly digestion and aqueous-alcohol extraction. From Tables show that phytochemical investigation results are available in the Ethiopia area levels.

Above the Table 1, phytochemical screening of alkaloids, tannins, saponins, flavonoids, phenols and phytosterols were the secondary metabolites found in the crude extract of *Echinops amplexicaulis*, *Ruta chalepensis*, and *Salix subserrata*. The methanol extracts of *Echinops amplexicaulis* and *Salix subserrata* contain most of the secondary metabolites.

In terms of the qualitative phytochemical investigation of the medicinal plants, the medicinal plants extract had different phytochemicals constituents such as saponins, tannins, alkaloids, terpenoids, anthraquinones, phenolic compounds, cardiac glycosides, and flavonoids (Table 2).

Phytochemical investigations from these medicinal plants have shown a large number of organic complex and biologically active compounds.

The results of the qualitative phytochemicals analysis showed that the leaf extracts of *Lippia adonis var.* koseret also indicated the presence of tannins, flavonoids, polyphenols, alkaloids and saponins, while in the case of ethyl acetate alkaloids were not detected and tannins were absent in petroleum ether extract (Table 3). Amino acids and carbohydrates were absent in all three extracts.

Table 1 Phytochemical results of *Echinops amplexicaulis, Ruta chalepensis and Salix subserrata* (Lencho Megersa Marami et al. 2021)

Plant Name (Part)	Solvents	Phytochemical constituents					
		Saponins	Alkaloids	Flavonoids	Phytosterols	Phenols	Tannins
Echinops amplexicaulis (Root)	Methanol	++	++	+	−	−	+
	Petroleum ether	+	++	−	−	−	+
Ruta chalepensis (Fruit)	Methanol	++	++	++	+	++	++
	Petroleum ether	+	+	+	−	+	+
Salix subserrata (Leaf)	Petroleum ether	++	++	−	+	+	−
		++	++	−	−	+	+

−, the absence of chemical constituents; +, slightly detected; ++, moderate amount

Table 2 Phytochemical results of medicinal plants (Taye Kebede et al. 2021a, b)

Scientific name (parts)	Solvent	Major phytochemicals in the crude extract of medicinal plants							
		Saponins	Tannins	Alkaloids	Terpenoids	Anthraquinone	Flavonoids	Phenolic	cardiac glycoside
CE (fruit)	Methanol	+	++	+++	+	+	+++	+++	++
	Aqueous	−	++	++	+	−	+	+++	++
ED(Bark)	Methanol	+++	−	++	+	+	+++	+	+
	Aqueous	++	−	+	−	++	++	++	−
LA(leaf)	Aqueous	++	+	+++	+	+++	++	+	−
	Methanol	++	+	+	−	+++	++	+	−
DP(leaf)	Aqueous	−	+	+++	+	++	+	−	+
	Methanol	+++	+++	++	+				
C P(root)	Aqueous	+	++	−	−	++	+	++	+
	Methanol	+	−	−	+	+	+	+	++
RA(root)	Aqueos	+	+	+	++	+++	+	++	−
	Methanol	+++	+	++	+	++	−	++	+
PA(leaf)	Methanol	++	+	++	+++	−	++	++	−
	Aqueous	+	−	++	+	++	++	++	+

−, the absence of chemical constituents; +, slightly detected; ++, moderate amount

Table 3 Phytochemical results of *Lippia adoensis var.* koseret (Yordanos Germam and Tegenu Mekuria 2021)

S.N	Chemical constituents	Methanol	Petroleum ether	Ethyl acetate
1	Alkaloids	++	++	–
2	Phenolics	++	++	++
3	Tannins	++	–	++
4	Flavonoids	++	++	++
5	Saponins	++	++	–
6	Carbohydrate	–	–	–
7	Amino acid	–	–	–

−, the absence of chemical constituents; +, slightly detected; ++, moderate amount

In this review, phytochemical screening of *Bersama abyssinica* leaf in Table 4 shown that the most published articles recognized the presences of specific phytochemical components in the plants was indicated by the positive sign (+) and the absence of phytochemical components in the plants, by the negative sign (−). These phytochemical constituents in *Bersama abyssinica* leaf were shown variable results that depend on the given solvents and are not totally detected in *Bersama abyssinica* leaf.

The results in Table 5 show that there are phytochemical components in *Citrus fruit juice* concentrates. These phytochemical constituents all are found in citrus fruit

Table 4 Phytochemical results of *Bersama abyssinica* leaf (Mathewos Anza1 et al. 2015)

S.N	Chemical constituents	Petroleum ether	Chloroform	Ethyl acetate	Methanol
1	Alkaloids	+	+	+	+
2	Flavonoids	+	+	+	+
3	Glycosides	+	+	+	+
4	Phenols	−	−	+	+
5	Tannins	−	−	+	+
6	Coumerins	−	−	+	+
7	Anthraquinones	−	−	+	+
8	Steroids	−	−	−	+
9	Polysterols	−	−	−	+
10	Triterpenenes	−	−	−	+
11	Saponins	−	−	−	−

+, the presence; −, the absence of chemical constituents

Table 5 Phytochemical results of *Citrus fruit juice* concentrates (Ehigbai et al. 2016)

S.N	Chemical constituents	Tangerine	Grape	Lemon	Lime	
1	Alkaloids	++	+	+	+	
2	Phenols	+	+++	+	+	
3	Flavonoids	+	+	+	+	
4	Steroids	++	+	+	+	
5	Terpenoids	++	+	+	+	
6	Reducing sugar		+	+	+	++
7	Saponins	+	++	+	+	
8	Cardiac glycosides	+	+	−	++	

+, slightly detected; ++, moderate amount; +++, high amounts chemical constituents

Table 6 Phytochemical results of peel and juice of *Citrus medica* (Aveen Nozad 2015)

S.N	Chemical constituents	Ethyl acetate	Ethanol 80%
1	Carbohydrates	+	+
2	Alkaloids	−	−
3	Flavonoids	+	+
4	Phenols	+	+
5	Tannins	+	+
6	Saponins	−	−
7	Steroids	+	+
8	Terpenoids	−	−
9	Amino acids	−	+
10	Coumarin	+	+
11	Anthraquinones	−	−
12	Cardioactive glycosides	+	+

+, the presence; −, the absence of chemical constituents

Table 7 Phytochemical results of *mango (Mangefera indica L.)* leaves and *Avocado* (*Persea americana*) fruits (Lalisa Wakjira Duresa and Daniel Manaye 2017)

S. No	Chemical constituents	Ethanol	
		***Mango* (*Mangefera indica L.*)**	***Avocado* (*Persea americana*)**
1	Alkaloids	+	+
2	Terpenoids	−	+
3	Saponins	+	+
4	Tannins	+	+
5	Phenolics	+	+
6	Flavonoids	+	+

+, the presence; −, the absence of chemical constituents

juice concentrates except cardiac glycosides were not detected in lemon and they indicated highly medicinal values. It can be suggested that the presence of phenols, alkaloids, flavonoids, saponins, steroids, and reducing sugar in *Citrus fruit juice* indicates are highly medicinal value.

From Table 6, flavonoids, phenols, tannins, steroids, coumarin and cardioactive glycosides: have shown positive tests of ethyl acetate, and methanol extracts of peel and juice of *citrus medica,* while some phytochemical positive test and totally not detected like (anthraquinones, alkaloids, and terpenoids). These secondary metabolites are known to be biologically active and play significant roles in the bioactivity of medicinal plants because the medicinal values of the medicinal plant lie in these phytochemical compounds which produce a definite and specific action on the human body.

Based on the given data from Table 7, phytochemical screening of ethanol extract of *mango* (*Mangifera indica L.*) leaves and *Avocado* (*Persea americana*) fruits almost all are were detected but terpenoids were not detected in *Mango* (*Mangifera indica L.*). The phytochemical are naturally occurring chemicals in plants which serve as medicinal for the protection of human disease; the phytochemicals are nonnutritive plants chemical that have protection or disease preventive properties.

In this review, the phytochemical analysis revealed the presence of flavonoids, phenols, and tannins while the terpenoids positive test of methanol extract and the remaining phytochemical components are were not detected. These results show that phytochemical depend on solvents (Table 8).

Table 9, the presence of flavonoid, tannin, and phenol in methanol extract. The acetone extract obtained from the eucalyptus leaves was screened for phytochemicals. Qualitative phytochemical screening of acetone extract of eucalyptus leaves demonstrated the presence of saponins, carbohydrate, tannin, and phenol, while quinone, fat, protein, and flavonoid were absent.

In this review, the methanol, ethanol, n-hexane, and petroleum ether extract obtained from the *Hagenia abyssinica* leaves were screened for various phytochemicals from Table 10. Qualitative phytochemical screening of methanol extract of *Hagenia abyssinica* leaves

Table 8 Phytochemical results of *Dioscorea alata* leaf (Abhishek Das et al. 2014)

S.N	Chemical constituents	Aqueous	Methanol (70%)
1	Carbohydrates	+	+
2	Alkaloids	−	−
3	Flavonoids	+	+
4	Phenols	+	+
5	Tannins	+	+
6	Saponins	−	−
7	Terpenoids	−	−
8	Terpenoids	−	+
9	Anthraquinones	−	−
10	Glycoside	−	−

+, the presence; −, the absence of chemical constituents

Table 9 Phytochemical results of *Eucalyptus* leaves (Shubhreet Kaur et al. 2019)

S. No	Chemical constituents	Methanol	Acetone
1	Quinones	+	−
2	Saponins	−	+
3	Hansch carbohydrates	+	+
4	Tannins	+	+
5	Phenols	+	+
6	Flavanoids	+	−
7	Proteins	−	−
8	Fat	+	−

+, the presence; −, the absence of chemical constituents

Table 10 Phytochemical screening of results of *Hagenia abyssinica* leaves (Tesfaye Wolde et a l. 2016)

S. N	Chemical constituents	Methanol	Ethanol	*n*-hexane	Petroleum ether
1	Saponins	+	+	−	+
2	Tannins	−	+	−	−
3	Flavonoids	+	+	+	−
4	Anthraquinones	−	−	+	−
5	Phenols	+	+	+	−
6	Terpenoids	+	+	+	+
7	Alkaloids	−	+	−	−
8	Steroids	+	−	−	−
9	Glycosides	+	−	−	−
10	Phlobatannins	+	−	−	−

+, the presence; −, the absence of chemical constituents

demonstrated the presence of saponins, flavonoids, phenols, terpenoids, steroids, and glycosides, while tannins, anthraquinones, and alkaloids were absent.

Table 11 Phytochemical results of *Lepidium sativum* seeds (Yasudha et al. 2019)

S. No	Chemical constituents	Methanol	Ethyl acetate	Petroleum ether
1	Flavonoid	+	+	+
2	Alkaloid	−	+	−
3	Stereol and polyterpenes	+	+	−
4	Tannin	−	−	−
5	Saponiside	+	+	−

+, the presence; −, the absence of chemical constituents

Phytochemical analysis of ethanol extract of *Hagenia abyssinica* leaves demonstrated the presence of saponins, tannins, phenols, terpenoids, and alkaloids, while steroids, glycosides and phlobatannins were absent. A similarity that phytochemical screening of *n*-hexane extract of *Hagenia abyssinica* leaves demonstrated the presence of flavonoids, anthraquinones and terpenoids but saponins, tannins, alkaloids, steroids, glycosides, and phlobatannins are not detected and *Hagenia abyssinica* leaves extracted by petroleum ether were obtained presence of phytochemical only saponins and terpenoids, while other phytochemicals are not detected.

Phytochemicals screening in the plant extracts revealed the presence of flavonoid, stereol and polyterpenes, and saponified present in both methanol and ethyl acetate extract of *Lepidium sativum* seeds and also flavonoids were present in petroleum ether extract of *Lepidium sativum* seeds while other phytochemical components were not detected (Table 11).

In this review, phytochemical screening of the aqueous, methanol, and hexane extracts of *Leucas aspera L.* leaf and root revealed the presence of various medically active constituents from Table 12. Almost all phytochemical compounds present in the aqueous, methanol, and hexane extracts of *Leucas aspera L.* leaf and root were identified except cholesterol and steroids in the parts of leaf and root by aqueous. These plants indicate highly medicinal values.

Phytochemical screening of the love *Gilbertii* root suggests the presence of major phytochemicals in the root extracts (Table 13). Dichloromethane: methanol of roots showed the presence of alkaloids, anthraquinones, and flavonoids whereas; tannins, saponins, and terpenoids were not presented.

As result in Table 14, screening for phytochemicals in the plant extracts almost all presents in both acetone and methanol extracts of *Flax seeds,* while some phytochemical is not detected like tannins, saponins in acetone extract of *Flax seeds* and also saponins were

Table 12 Phytochemical results of *Leucas aspera L.* leaf and root (Yasudha et al. 2019)

S. N	Phytochemical constituents	Leaf			Root		
		Aqueous	Methanol	Hexane	Aqueous	Methanol	Hexane
1	Carbohydrates	+	+	+	+	+	+
2	Cholesterol	−	+	+	−	+	+
3	Steroids	−	+	+	−	+	+
4	Proteins	+	+	+	+	+	+
5	Amino acids	+	+	+	+	+	+
6	Flavonoids	+	+	+	+	+	+
7	Terpenoids	+	+	+	+	+	+
8	Saponins	+	+	+	+	+	+
9	Tannins	+	+	+	+	+	+
10	Phlorotannins	+	+	+	+	+	+

+, the presence; −, the absence of chemical constituents

Table 13 Phytochemical results of love *Gilbertii* root (Milkyas et al. 2016)

S. N	Chemical constituents	dichloromethane: methanol (1:1)
1	Alkaloids	+
2	Tannins	−
3	Anthraquinones	+
4	Saponins	−
5	Terpenoides	−
6	Flavonoids	+

+, the presence; −, the absence of chemical constituents

presented by methanol extract of flaxseeds. In addition to this phytochemicals screening of ethanol and water extract of flaxseeds almost phytochemical components presents and some phytochemicals not totally detected. These secondary metabolites are known to be biologically active and play significant roles in the bioactivity of medicinal plants because the medicinal values of the medicinal plant lie in these phytochemical compounds which produce a definite and specific action on the human body.

This review was shown in the (Table 15) phytochemical analysis of petroleum ether and ethyl acetate seed extract of *Nigella sativa* contains tannins, steroids, terpenoids and alkaloids, flavonoids, phenol, glycosides and steroids were found in the extract and are potent methanol soluble while some phytochemicals were not presented since it depends on the solvents.

In the present review, phytochemical screening of methanol and aqueous extracts of *Ocimum gratissimum Linn* leaf showed that the presence of tannins, phlorotannins, steroids, terpenoids, flavonoids and cardiac glycosides with steroidal ring whereas, saponins and sugar were not present in methanol solvent and also alkaloids were not absent in Table 16. These detected phytochemical compounds are known to have beneficial importance in medicinal as well as

Table 14 Phytochemical results of *Flaxseeds* (Hanaa et al. 2017)

S. N	Chemical constituents	Acetone 70%	Ethanol 70%	Methanol 70%	Water
1	Steroids	+	++	++	+
2	Terpenoids	+	+++	++	+++
3	Tannins	−	−	+	−
4	Saponins	−	−	−	−
5	Anthocyanin	+	++	+	+
6	Emodins	+	+	+	+
7	Alkaloids	+	−	+	−
8	Glycosides	+	−	++	−
9	Flavonoids	++	+	+++	+
10	Phenols	++	+++	++	+

+++,++,+and − refer to high, moderate, low and absent amounts respectively of phytochemical constituents

Table 15 Phytochemical results of *Nigella sativa* (Abdurohaman Mengesha Yessuf. 2015)

S. N	Chemical constituents	Petroleum ether	Ethyl acetate	Methanol
1	Alkaloids	−	−	+
2	Flavonoids	−	−	+
3	Phenol	−	−	+
4	Tannins	+	+	−
5	Glycosides	−	−	+
6	Steroids	+	+	+
7	Saponins	−	−	−
8	Terpenoids	++	+	−

+, the presence; −, the absence of chemical constituents

Table 16 Phytochemicals results of *Ocimum gratissimum Linn* leaf (Akinmoladun et al. 2007)

S. N	Chemical constituents	Methanol	Aqueous
1	Alkaloids	+	−
2	Saponins	−	+
3	Tannins	+	+
4	Phlobatannins	+	+
5	Anthraquinones	−	+
6	Steroids	+	+
7	Terpenoids	+	+
8	Flavonoids	+	+
9	Cardiac glycosides With steroidal ring	+	+
10	Deoxy—sugar	−	+

+, the presence; −, the absence of chemical constituents

Table 17 Phytochemicals results of *Rhamnus prinoides* root (Teklit Gebregiorgis Amabye 2015)

S. N	Chemical constituents	Aqueous	Methanol/ Water
1	Alkaloids	−	+
2	Steroid	−	−
3	Triterpene	+	+
4	Saponins	+	+
5	Tannins	+	+
6	Flavonoids	−	−
7	Flavones	−	−
8	Phenols	+	+
9	Glycosides	+	+
10	Cardiac glycosides	+	+
11	Anthraquinones	−	−
12	Resins	+	+

+, the presence and −, the absence of chemical constituents

Table 18 Phytochemical results of *Rhizomes*, *Zingiber officinale* and *Curcuma longa* (Alemayehu Mekonnen and Welday Desta 2021)

S. N	Chemical constituents	*Rhizomes*	*Zingiber Offcinale*	*Ccurcuma Longa*
1	Phenolic	+	+	+
2	Flavonoids	+	+	+
3	Alkaloids	−	−	−
4	Glycosides	+	+	+
5	Tannins	+	+	+

+, the presence; −, the absence of chemical constituents

physiological activities. In this manner, isolating and identifying these bioactive compounds, new drugs can be formulated to treat various diseases and disorders.

Table 17 shows the phytochemicals detected in *Rhamnus prinoides* root extract. Tests for triterpenes, saponins, tannins, phenols, glycosides, cardiac glycosides, and resins were positive in both aqueous and methanol/water extracts. Alkaloids were detected only in the methanol/water extract while steroids, flavonoids, flavones, and anthraquinones were not detected in both aqueous and methanol/water extracts. These phytochemicals may be responsible for the medicinal value of *Rhamnus prinoides*.

Phytochemical screening of ethanol/water (1:1) extract of Rhizomes, *Zingiber officinale,* and *Curcuma longa* showed the presence of phenolic, flavonoids, glycosides, and tannins whereas alkaloids were not present (Table 18).

The phytochemical analysis of *Ruta chalepensis* leaves extract in methanol showed that phytochemical components include; alkaloids, flavonoids, terpenoids, cardiac glycosides, phenols, saponins, tannins and anthraquinones and steroids were not present. Steroids, terpenoids and saponins were additionally present in both ethyl acetate and acetone extract, and also flavonoids, terpenoids, and anthraquinones were detected in the n-hexane extract, while others were not totally found in Table 19.

In Table 20, the presence of steroids, terpenoids, saponins, flavonoids, flavonoids, tannins, alkaloids, phenol, and glycosides were present in both dichloromethane/methanol and methanol extracts and steroids and terpenoids also were present in n-hexane extract whereas other phytochemicals components were not detected.

From Table 21, it can be seen that the sample extracts showed positive tests for the presence of alkaloids, saponin, tannins, phlorotannin, glycosides, and flavonoids except for anthraquinones. Therefore, *Bitter* (*Vernonia amygdalina*) is the most frequently used for medicinal purposes.

Table 19 Phytochemical results of *Ruta chalepensis* leaves ((Ketema Alemayehu Destaw and Engidaw Seid Mustofa 2019)

S. N	Chemical constituents	Methanol	Ethyl acetate	Acetone	*n*-hexane
1	Alkaloids	+	−	−	−
2	Flavonoids	+	−	−	+
3	Steroids	−	+	+	−
4	Terpenoids	+	+	+	+
5	Cardiac glycosides	+	−	−	−
6	Phenols	+	−	−	−
7	Saponins	+	+	+	−
8	Tannins	+	−	−	−
9	Anthraquinones	+	−	+	+

+, the presence; −, the absence of chemical constituents

Table 20 The phytochemical results of *Syzygium guineens* root (Ei Ei Aung et al. 2020)

S. N	Chemical constituents	*n*-hexane	Dichloromethane: methanol (1:1)	Methanol
1	Steroids	+	+	+
2	Terpenoids	+	+	+
3	Saponins	−	+	+
4	Flavonoids	−	+	+
5	Tannins	−	+	+
6	Alkaloids	−	+	+
7	Phenol	−	+	+
8	Glycosides	−	+	+

+, the presence; −, the absence of chemical constituents

Table 21 Phytochemical results of *Bitter* (*Vernonia amygdalina*) leaf (Audu Inusa et al. 2018)

S. N	Chemical component	Aqueous
1	Alkaloid	+
2	Saponins	+
3	Tannins	+
4	Phlobatannins	+
5	Anthraquinones	−
6	Glycosides	+
7	Flavonoids	+

+, the presence; −, the absence of chemical constituents

In this review, the results revealed the presence of alkaloids, steroids, glycosides, saponin, and phlorotannin methanol extracts from the root and stem bark of *Vernonia amygdalina* whereas only tannins and phenols were not detected (Table 22). Therefore, the phytochemical screening results reveals that the presence of these phytochemical constituents supports the use of the *Vernonia amygdalina* plant in folklore medications

Table 22 Phytochemical results of Root and Stem bark of *Vernonia amygdalina* (Raimi et al. 2020)

S. N	Chemical constituents	Ethanol	
		Root	Stem bark
1	Alkaloid	++	++
2	Steroids	+++	+
3	Glycosides	+++	+++
4	Flavonoids	++	+
5	Tannins	−	+++
6	Saponins	++	+++
7	Phlobatannins	++	++
8	Phenol	-	+++

+, present; −, Absent; ++, moderately present; +++, Highly present of phytochemical constituents

and it is probable that these phytochemicals are responsible for the healing properties.

A total of 53 traditional medicinal plants were identified in this review. All of the reviewed plants have direct traditional uses for treating either ailment with cancer-like symptoms (determined by the traditional practitioner) or for laboratory-confirmed cancer cases. Medicinal plants have continued to be the most affordable and easily accessible source for the treatment of several human and livestock ailments in Ethiopia. Besides treating cancer, the plants selected in this review are also cited for their various traditional uses, including for the treatment of eczema, leprosy, rheumatism, gout, ringworm, diabetes, respiratory complaints, warts, hemorrhoids, syphilis, and skin diseases (Table 23). The output calls for the need for further phytochemical and pharmacological investigation giving priority to those plants which have been cited most for their use to treat cancer.

In Ethiopia, there are increasing demands for many most popular, more available, and effective plant species by the people. As stated by the different authors in the above Tables, different phytochemicals were investigated

Table 23 Some totally 53 medicinal plant of Ethiopia

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
1	*Artemisia Afra*	African wormwood	Ariti (Amharic)	-Smallpox: ground leaves and apply topically -Stomach ache: wrap leaves in enset leaves and put them over fire, squeeze the liquid out of the bundle, drink on empty stomach -Infant growth: decoction of leaves given to infants under six months who are too small		Alves et al. (2007)
2	*Aloe Vera*	Aloe	Erret (Amharic)	-Spikes removed ground with some water to make pulp -Cancer and laxative: mix 1table-spoon of pulp with honey, eaten 2 times a day -Wound healing: apply liquid from pulp to wound -Dandruff: Message pulps into the scalp, sit under the sun for 30 min, and wash hair		Alves et al. (2007)
3	*Vermonia Amygdalina*	Bitter leaf	Grawa (Amharic)	-Stomach ache, worms, and malaria: tender shoots pounded in a mortar and pestle, squeeze juice from the pulp, and drink -Abortion: young leaves eaten to induce abortion		Farombi and Owoeye (2011)
4	*Solanum Nigrum*	Black Nightshade	Tutnaye (Amharic)	The parts leave boiled and then eaten		Atanu et al. (2010)
5	*Yzygium Guineense*	Waterberry	Dokuma (Amharic)	-Preparation: combined with Ziba (Podocarpus gracilior, in the previ-ous listing) in cold maceration -Finally, drink on an empty stomach first thing in the morning, this induces vomiting which is thought to help treat Yellelito		Djoukeng (2005)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
6	*Ruta Chalepensis*	Fringed rue	Tenadam (Amharic)	The leaves part with cold water maceration and drink to relieve stomach ache		Asgarpanah and Khoshkam (2012)
7	*Pentas Lanceolata*	Egyptian Star cluster	Tabatem (Amharic)	-The root washed and chewed, then split on pustules -A ceremony is performed to aid healing. The word "burst" is said to "pop" the painful swellings. Next, the word "spread" is repeated to disperse the pain. Nourishing food is given for recovery		Nayak et al. (2005)
8	*Ocimum Grattissimum*	Clover basil, African basil	Damakese (Amharic)	The part of leaves can be prepared then cold water maceration and drink		Prabhu et al. (2009)
9	*Musa Acuminate*	Wild banana	Muze (Amharic)	-Part used: petiole (leaf stem) Preparation and Administration: broken petiole juice applied to wounds		Sumanthy et al. (2011)
10	*Nigella Sativa*	Black cumin	Tikur Azmud (Amharic)	Part of seed can be prepared and administered: Asthma: chewed Runny nose and the common cold: wrap in small leaf, stick up nose		Sharma et al. (2009)
11	*Linum Usitatissimum*	Flax	Telba (Amharic)	-Part used: seed preparation and administered: seed soaked in water and drink for gastritis		Zanwar et al. (2010)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
12	*Lepidium Sativum*	Cress	Feto (Amharic)	-Part used: seeds. Preparation and administered: small seeds ground into paste-like mustard, eaten for stomach issues and M'utch. Can also be applied topically for M'utch		Atanu et al. (2010)
13	Hagenia Abyssinica	Hagenia	Kosso (Amharic)	Part used: female flowers preparation and Administration: infusion of the female flowers		Thomsen et al. (2012)
14	*Eucalyptus Globulus*	Blue Gum	Nech bahar zafe (Amharic)	-Part used: fruit; leaves Preparation and Administration: Stomach ache: chew top part of fruit Fever: rub leaves on skin to reduce fever Common cold: boil Eucalyptus and damakasse in water and inhaled		Kumar and Laxmidhar et al. (2011)
15	*Foeniculum Volgare*	Fennel	Insilal (Amharic)	Part used: leaves Preparation and Administration: Diuretic: added to soup Clean stomach: chew		Rather et al. (2014)
16	*Drynaria Volkensii*	basket fern	Tekesbila (Amharic)	Part used: rhizome Preparation and Administration: chew rhizome to relieve ache		Mbwambo et al. (2012)
17	*Cupressus Lusitanica*	White Cedar	Yeferenji Tid (Amharic)	Part used: leaves Preparation and Administration: leaves crushed, juice given to animals for diarrhea		Kuiate et al. (2006)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
18	*Dioscorea Alata*	Yam	Boye (Amharic)	Part used: leaves Preparation and Administration: leaves rubbed vigorously on the skin for fundal conditions		Mbwambo et al. (2012)
19	*Croton Macrostachyus*	in the croton family	Bisana (Amharic)	Part used: sap; Preparation and Administration: leaf stem broke and sap applied topically tothe skin (sap dries black)		Ngo Bum et al. (2012)
20	*Citrus Medica*	Citron	Tiringo (Amharic)	Part used: fruit; Preparation and administration: Fruit eaten for high blood pressure		Maria Eliza de Castro Moreira et al. (2013)
21	*Coffea Arabica*	Coffee	Buna (Amharic)	Part used: coffee bean; leaves preparation and administration; cease wound bleeding: apply coffee grounds to wounds stomach ache: drink tea made of coffee leaves mixed with chili and fennel		Stapf and Croton Macrostachyus et al. (2017)
22	*Carica Papaya*	Papaya	Papaya (Amharic)	Part used: seeds; preparation and administration: amoebic dysentery: chew 7 seeds three times a day		Oloyede et al. (2011)
23	*Citrusx Limon*	Lemon	Lomi (Amharic)	Part used: fruit, preparation, and administration: Drink fruit juice to stop vomiting		Arias and Ramón-Laca (2005)
24	*Bersama Abyssinica*	Winged bersama	Teberako (Amharic)	Part used: stem; Preparation: chew stem peelings chewed		Bosch et al. (2008)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
25	*Ajuga Integrifolia*	Bugleweed	Anamuro (Amharic)	Part used: leaves; preparation: cold water maceration Administration: drink		Israili and Lyoussi (2009)
26	*Allium Sativum*	Garlic	Nech shunkurt (Amharic)	Part used: cloves; preparation and administration: Common cold: cloves ground up and mixed with honey, take first thing in the morning on an empty stomach. Malaria: peeled and infused in clarified butter and eaten		Londhe et al. (2011)
27	*Capsicum Annuum/frutescens*	chili peppers	Berebere /mitmitta (Amharic)	Part used: fruit (peppers), preparation: used as spice in food administration: eaten		De Castro Moreira et al. (2011)
28	*Zingiber Officinale*	Ginger	Zengibil (Amharic)	Part used: roots; Preparation and administration: roots chewed for stomach ache		Badreldin et al. (2008)
29	*Vicia Faba*	fava bean	Bakella (Amharic)	Part used: seeds; preparation and administration: raw seed chewed for gastritis		Hussein Abd El-Masksond et al. (2013)
30	*Rhamnus prinoides*	shiny-leaf buckthorn	Gesho (Amharic)	Part used: young leaves; preparation & administration: mix 7 flowers of Yellow Aster with young leaves of gesho chewed in a quid wrapped with cloth or enset leaves. Juice swallowed for swollen tonsils/ lymph nodes		Teklit Gebregiorgis Amabye (2015)
31	*Schinus Molle*	False pepper tree	Qundo berebere (Amharic)	Fruit chewed for sore throat		Marzouk et al. (2006)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
31	*Leucas Martincensis*	Jacq	Raskamer (Amharic)	Part used: leaves, preparation, and administration: leaves crushed and squeeze the juice into eyes; one drop in each eye in the morning and evening		Prabhu et al. (2009)
32	*Embelia Schimperi*	Vatke	Enkoko (Amharic)	Part used: seeds; preparation and administration seeds dried, powdered, and eaten to eliminate hookworms		Machocho et al. (2003)
33	*Rumex Abyssinicus*	Sorrel	Mekmeko (Amharic)	Part used: roots; preparation and administration: root decocted, drink or chewed for Balaamo or Yelelito wolf		Melkamu et al. (2016)
34	Argemone mexicana L	Papaveraceae	Yahyaeshoh (Amharic)	Crush the root or leaf and give with water disease treatment for Influenza and rabies		Worku (2019)
35	Acanthus polystachyus	Acanthaceae	Kucheshile (Amharic)	Orally, crush the root and pound and give with water for diseases treatment of rabies		Worku (2019)
36	Eucalyptus globulusLabill	Myrtaceae	Bargamo/ba rzafiadi (Ormigna)	The leaf is boiled and inhales the vapor/steam for disease treatment of cough, asthma, malaria and sore throat		Amare and Getachew (2019), Mworia et al. (2020)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
37	Artemisia afra Jacq. exWilld	Asteraceae	Ariti (Ormirgna)	Grinded the leaves, soaked in water and drank, and sometimes chew the leaves for treatment stomachache, malarial, fever, coughs, colds, diabetes, sore throat, asthma and headache		Mengistu et al. (2019)
38	Artemisia abyssinicaSch. Bip. ex A. Rich	Asteraceae	Chikugn (Ormigna)	Grinded dried leaf, infusion with water and drank for treatment headache, cough, diarrhea pneumonia and abdominal pain		Tsegay and Mazengia (2019), Teka et al. (2020)
39	Prunus dulcis	Rosaceae	Lewuz (Amharic)	Orally, drink with tea pounded fruit being mixed for diseases treatment herpes simplex virus type 1		Musarra-Pizzo (2019)
40	Acacia etbaica Schweinf.	Fabaceae	Seraw (Amharic)	Orally, crushed bark for diseases treatment of wart.		Worku, (2019)
41	Euphorbia abyssinica	Euphorbiaceae	Kulkual (Amharic)	Root rushing and drink with milk for disease treatment of malaria		BNT and Kim (2022)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
42	*Malva verticillata* L.	Malvaceae	Lut (Ormigna)	Crush the root and mix with water and wash the head for disease treatment headache.		Tefera and Kim (2019)
43	Senna septemtrionalis (viv) H.S. Irwin and and Barneby	Fabaceae	Hamashak (Sidamegna)	Oral, leaf rubbing for disease treatment of snake bite		Tefera and Kim (2019)
44	Gomphocarpus stenophyllus Oliv	Apocynaceae	Chifirig (Amharic)	Root maceration, taken orally once daily for seven days used for the treatment of erectile dysfunction.		Aragaw et al. (2020)
45	Sida tenuicarpa Vollesen	Malvaceae	Chifrig (Amharic)	Leaf mix with honey then eat the mixture at a time of necessity		Tsegay et al. (2019)
46	Rhusnatalensis (Krauss)	Anacardiaceae	Debobosso (Ormigna)	Root extract is mixed with water then drank for used to disease treatment of diarrhea		Mengistu Kebede (2019)
47	Vemonia adoensis Sch.Bep. ex Walp	Asteraceae	feres zeng (Ormigna)	Root is chewed with honey, then drunk the fluid for disease treatment of menstrual disorder		Asmera et al. (2020)

Table 23 (continued)

S.N	Scientific name	Family	Local name	Part used, mode of preparation, administration and application	Photograph	References
48	Polysphaeria aethiopica Verd	Rubiaceae	Qarraruu (Ormigna)	Root is crushed/grinded or powdered for disease treatment of toothache, scabies, oral inflammation and tubercles		Kebede et al. (2021a, b)
49	Cirsium englerianum	Asteraceae	Adaddoo (Ormigna)	- Leaf is smashed and put on wounds Wound -Mixture of leaf infusion and oil extracted from taken orally for used to malaria, diarrhea Gonorrhea		Kebede et al. (2021a, b)
50	Euphorbia depauperata	Euphorbiaceae	Gurii (Ormigna)	Bark is crushed and mixed with water and applied for disease treatment of skin rash, ringworm, bloody diarrhea, gastritis and constipation		Kebede et al. (2021a, b)
51	Lippia adoensis	Verbenaceae	Urgoo (Ormirgna)	-Leaf are pounded and tied on wound -Crushed leaf then boiled in water use aqueous decoction, concoction taken orally used to disease treatment of stomach ache, diarrhea, and cough		Kebede et al. (2021a, b)
52	Cucumis pustulatus	Cucurbitaceae	Haadhatu (Ormigna)	Mixed crushed parts of root extract in hot water taken orally/drank used to diseases treatment of cough, tubercles and chest pain, cold disease, Pneumonia		Kebede et al. (2021a, b)
53	Rumex abyssinicus	Polygonaceae	Dhangagoo (Ormigna)	Crushed root, homogenized taken with tea or water and drunk for used treatment of ringworm, pain-relieving, hypertension, anti-cancer, malaria and wound healing		Kebede et al. (2021a, b)

in different plant species with different solvent concentrations. Even though different phytochemicals were analyzed for different plant species, their concentration varied from one plant species to another plant species for different parts of the plant. Based on the above information from the Table, one type of phytochemical cannot be detected in all plant species and the concentration of one phytochemical content varies from one part of the plant to another part which mean the concentration of one phytochemical content in leaves can vary from the concentrations of phytochemical contents in root and fruits. Generally, even though there are various medicinal plants in Ethiopia, there are no studies that show enough information about qualitative and quantitative phytochemical contents for most plant species in the country. This may be due to the lack of enough laboratory facilities and modern technology available in the country for improving the synthesis and extraction of phytochemical components for developing the new drug product and drug leading compounds from the different parts of the medicinal plants by the government and private company.

Conclusions

In conclusion, this study showed the wide use of medicinal plants in Ethiopia. Even though there is a wealth of indigenous knowledge transfer is declining from generation to generation as a result of oral transmission. Human beings around the world have spent their lives for a long time to discovering a new drug to diagnose, prevent and treat various diseases. To save their lives from dangerous diseases, a new and powerful drug must be discovered and developed from the different parts of the plant. In order to future promote for development of new drug synthesis and extraction of bioactive components from the parts of the plant, availability, and value of information is very important. From tables, phytochemicals analysis of different medicinal plants revealed the presence of various bioactive compounds such as polyphenols, flavonoids, phenolic compounds alkaloids, saponins, tannins, phlobatannins, glycosides, anthraquinones, steroids, terpenoids, and triterpene. Based on the above data available in the review, most phytochemical components of traditional medicinal plants in Ethiopia are not analyzed. This leads to more traditional plants in Ethiopia are not being recognized by the international scientific organization, not how to use medicinal plants for disease treatment and they do not have scientific names. This review recommended finding further most common medicinal plants to investigate in scientific research and to governing them in the scientific naming system and as well as further studies should focus on green synthesis of heavy metals on different types of medicinal plants in Ethiopia. Based on this review, the studied phytochemical characteristics of medicinal plants in Ethiopia are few, so further study could be needed for examining, and characterizing the properties of unrecognized plant species in Ethiopia.

Abbreviations

CE: Cirsium Englerianum; CP: Cucumis Pustulatus; DP: Discopodium Penninervium; ED: Euphorbia Depauperata; LA: Lippia Adoensis; PA: Polysphaeria Aethiopica; RA: Rumex Abyssinica; WHO: World Health Organization.

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