

Traditional Medicinal Plants Used for the Treatment of Urological and Urogenital Diseases in Ethiopia: A Review

Kebede Feyisa^{1,*}, Wondu Feyisa², Ture Girma³, Teyiba Kemal⁴

Kebede Feyisa^{1,*}, Wondu Feyisa², Ture Girma³, Teyiba Kemal⁴

¹Department of pharmacy, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, ETHIOPIA.

²Department of Midwifery, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, ETHIOPIA.

³Department of Biology, College of Natural and Computational Sciences, Dilla University, Dilla, ETHIOPIA.

⁴Department of Pharmacy, College of Health and Medical Science, Haramaya University, Harar, ETHIOPIA.

Correspondence

Kebede Feyisa

Pharmacognosy unity, Department of pharmacy, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, ETHIOPIA.

E-mail: kebedefeyisa2008@gmail.com

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ABSTRACT

Introduction: Ethiopia is recognized as one of the richest biodiversity in Africa. The present review aimed to compile relevant information on medicinal plants traditionally used to manage urogenital diseases in Ethiopia. **Methods:** Different literatures published specifically on ethnobotanical use of medicinal plants in scientific journals, books, theses and proceedings were reviewed. Data from literatures were analyzed using statistical package for social sciences (SPSS) Version 20 and an Excel spreadsheet and reported using descriptive statistics, frequency, and percentage. **Results:** A total of 146 medicinal plants are reported in the reviewed literature. It was distributed in 127 genera and 64 families. *Cucurbitaceae* (7.51%), *Asteriaceae* (7.51%), *Euphorbaceae* (6.20%) and *Apiaceae* (4.80%) were family's accounts of high number of species. A higher diversity of medicinal plants was reported from Southern nations and nationalities (44.5%), Oromia (41.1%) and Amhara (27.4%) regional states. The most frequently reported growth form of medicinal plants indicated in the review was herbs (46.8%), followed by shrubs (32.6%). Root (36.2%) and leaves (35.3%) were the most used parts. Decoction (26.1%), concoction (16.5%) and pounding (11.9%) were the most frequently reported remedy preparation methods and were administered orally. **Conclusion:** The present review indicated that urogenital diseases were managed with different medicinal plants throughout the regions of Ethiopian needed scientifically confirmed in order to produce safe and effective drugs from natural products.

Key words: Ethnobotany, Urological diseases, Medicinal plants, Traditional medicine, Ethiopia.

INTRODUCTION

Ethnobotany is the study of the uses of plants in all its complexity by specific ethnic groups. It describes that how they manage and use plants available around them including all the beliefs and cultural practices associated with the use. Indigenous people living in specific area have developed their own empirical knowledge concerning medicinal substances, their potential health benefits, and the potential toxicological risks associated with such remedies. Therefore, studying ethnopharmacological is important in documenting and compiles information on useful medicinal plants. Indigenous cultural practices on medicinal plants documented throughout the world, especially in developing countries including Ethiopia.¹

Ethiopia is one of the six plant biodiversity rich regions in the world due to various types of climatic, topographic and soil features.²⁻⁴ Knowledge of the medicinal plants of Ethiopia and of their uses provides a vital contribution to human healthcare needs throughout the country.^{5,6}

Human beings use plants for the treatment of various diseases.⁷⁻⁹ Approximately 80% of the world's population, especially for millions of people in the vast rural areas of developing countries, uses plant-derived drugs for primary healthcare demands.¹⁰⁻¹² In Ethiopia, about 80% of the human population and 90% of livestock based on traditional indigenous medicine as a primary source of healthcare¹³⁻¹⁵ with more than 95% of traditional preparations are plant origin¹⁹ and this is mainly due to the inaccessibility of modern

medical systems, economic, religion and cultural factors.¹⁶⁻¹⁸

Many researches showed that medicinal plants are disappearing throughout the world including Ethiopia. Medicinal plants, their resources and knowledge about their usage have to be preserved before they lose forever because of population growth, agricultural expansion, deforestation and environmental degradation.²⁰ Consistent recording indigenous knowledge of medicinal plants is, therefore, important for drug discovery especially from natural products.^{21,22}

Today medicinal plants play a significant role for the treatment of different types of diseases and disorders. Various types of plants identified in Ethiopia claimed to be used for treatment of urogenital problems. Urinary tract diseases have affected humankind since ancient times and can persist, with serious medical consequences throughout the world. Considering kidney is one of the vital organs in our body carrying diverse physiological processes,²³⁻²⁵ urogenital disorders are a serious health problem affecting millions today and caused by, among others, chemical, drugs and infections.^{24,26}

Urinary tract disease refers to any problems anywhere in the urinary system, including benign prostate hyperplasia, urinary tract infections, kidney stones, enuresis (urinary incontinence) and renal failure.^{25,27-30} Urinary tract infections and urogenital disorders like syphilis and gonorrhea are prevalent throughout the world as well as in Ethiopia. Urogenital problems are important because of their magnitude and their interaction with sexual transmitted diseases.^{31,32} N. gonorrhoea and Syphilis

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were the leading pathogens that caused vaginal discharge, urethral discharge and genital ulcers.³²

In developing countries, managing of urology related disorders are challenging due to unavailability of effective drugs, their adverse effects and costs.^{24,25} Phytochemical screening based on indigenous cultural practices is an effective alternative because of their wide biological activities, safety and lesser costs. A number of herbal medicines and remedies have been reported for its significant urology related disorders activity, which is probably due to the presence of effective compounds in those medicinal plants.²⁴ Hence, the present review aimed to record compiled information on indigenous medicinal plants used traditionally for the treatment of urogenital and related diseases from different ethnobotanical studies across the regional states of Ethiopia.

METHODS

A literature review was carried out on pre-reviewed papers on herbal medicines and their traditional uses to treat urological and urogenital diseases shown on the scientific database (Web of science, Medline, Science direct and Google scholar). Article published anytime were included in the review and key terms like traditional medicine, ethnobotany, ethnopharmacology, phytomedicine, medicinal plants, indigenous knowledge, traditional use, Ethiopia and urological or urogenital diseases were used to search the engine.

Screening and criteria

Screening of journal articles was carried out using title and abstract. Eligible literatures were screened and downloaded for further inclusion and exclusion criteria.

Inclusion criteria

Ethnobotanical surveys reporting on the use of plants for urological and urogenital disorders, human use only, literature containing full information on the scientific and family name, part used, preparation method and type of ailment treated by medicinal plants, and conducted at any time in Ethiopia were included.

Exclusion criteria

Experimental studies, data from the review and unknown scientific name were excluded from the review.

Data extraction and review process

The data were screened from articles according to inclusion/exclusion criteria and the following data were extracted from each eligible document on medicinal plants. Family and botanical name of the medicinal plants, growth form of the plant, appropriate plant part used, preparation conditions, method of preparation, routes of administration and respective distribution across the country (Table 1). SPSS version 20 and an Excel spreadsheet were used to analyze the data. Descriptive statistics was used to summarize the result and presented using charts and tables.

RESULTS

Distributions of medicinal plants across the regions

Search of scientific database recorded 146 plant species, distributed in 121 genera and 64 families that are used traditionally for the treatment of different urological and urogenital disorders in Ethiopia (Table 1). Regarding family distribution accounted with high medicinal species were *Cucurbitaceae* 11 (7.51%), *Asteriaceae* 11 (7.51%) followed by *Euphorbaceae* 9 (6.20%) and *Apiaceae* 7 (4.80%) as shown in (Figure 1).

The review showed that eligible studies on medicinal plants used to manage urological and urogenital disorders were reported mainly from

the Southern nations, nationalities, and people (SNNPR) region,^{5,33-45} Oromia,^{17,46-65} Amhara⁶⁶⁻⁷⁶ and Tigray regional states (Table 1). There are various types of urological and urogenital disorders forms were reported to be managed by medicinal plants in Ethiopia. Urine retention (23.4%), kidney problem (12.4%), kidney infections (7.3%) were among the frequently reported urological disorders. Gonorrhoea (31.2%) followed by impotency (9.2%) and syphilis (3.7%), were among urogenital disorders reported frequently. The most frequently cited species were: *Foeniculum vulgare* (17), *Croton macrostachus* (6), *Phytolacca dodecandra* (5), *Ferula communis* (4), *Catha edulis* (4), *Acoanthara shimperi* (4) and *Lycopersicon esculentum* (4).

Growth forms, utilized parts and preparation of traditional medicine

In this review, herbs were the highest proportion being represented by (46.8%), followed by shrubs (32.6%) and trees (13.8%) (Figure 2). The review indicated that roots (36.2%), leaves (35.3%), fruits (6.4%) and barks (4.1%) were the most frequently used medicinal plant parts as shown in (Figure 3). Most of the plant remedies used for treatment of urological and urogenital disorders is prepared from fresh parts (56.4%) of medicinal plants followed by dried form (32.6%).

Mode of preparation and administration

Results of this review showed that there are different methods of preparation of medicinal plants depend on the type of plant species, plant parts and their chemical constituents. Accordingly, in this review, decoction (26.1%) was most frequently used techniques for the preparation of medicinal plants followed by concoction (16.5%), pounding (11.9%) and crushing (10.1%) and water (57.3%) was the most common solvent used to prepare medicinal plant remedies as shown in (Table 1). Honey and tella (local alcohol) were the most used as an additive to the remedy accounts by 7.3 % and 6.0%, respectively. 20.2% of medicinal plant remedy was prepared without any additive as shown in (Figure 4).

Medicinal plant remedies used to treat urological and urogenital disorders were commonly administered through oral route (94.5%), followed by dermal (2.8%), tied (0.9%) (Table 1).

DISCUSSION

Ethno-medicinal and ethnobotany studies suggested base-line information about traditionally used medicinal plants to modern drugs. In Ethiopia today, the traditional medicine has been trusted and highly appreciated. Ethnobotany and ethnopharmacology are useful strategies for drug discovery⁹³ and searching for potent drugs based on traditional use has proven to be more predictive.⁹⁴⁻⁹⁶

The current review identified 146 medicinal plant species find applications traditionally to treat urological and urogenital disorders. The finding in this review revealed that there is high species diversity of medicinal plants across the regional states in Ethiopia. Southern nations, nationalities and people, Oromia, Amhara and Tigray national regional states were the regions those accounts high species diversity. This might be related to area of the region, population density, cultural practices, existence of diversified ethnic groups, and religious practices.⁹⁷⁻¹⁰⁰ This might also indicate the climatic nature respective to regional states.

In this review, urine retention, kidney problem, kidney infections and gonorrhoea and impotency were the common urological and urogenital disorders managed traditionally by medicinal plant remedies, respectively. *Cucurbitaceae*, *Asteriaceae*, *Euphorbaceae* and *Apiaceae* are the most frequently medicinal plants families being used in terms of their species for the treatment of urological and urogenital disorder

Table 1: Lists of medicinal plants traditionally used for the treatment of urogenital diseases in Ethiopia.

Species	Family	GF	PU	Condition	MoP	RA	Fr	Region	References
<i>Acacia bussei</i> Harms	Fabaceae	Tree	Leaf	Fresh	Concoction	Dermal	1	Somali	92
<i>Acalypha fruticosa</i> Forsk	Euphorbiaceae	Shrub	Leaf	Fresh/Dry	Decoction	Oral	1	Oromia	47
<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Root	Fresh	Crushing	Tied	1	Tigray	82
<i>Acokanthera schimperi</i>	Apocynaceae	Shrub	Leaf/root	Fresh/Dry	Decoction/ pounding	Oral	4	Oromia, Afar, SNNPR	57, 89, 59, 40
<i>Aerva javanica</i>	Amaranthaceae	Shrub	Root	Fresh	Crushing	Oral	1	Dire dawa	86
<i>Aframomum corrorima</i>	Zingiberaceae	Herb	Bulb	Dry	Powdering	Oral	1	Tigray	84
<i>Agapanthus praecox</i>	Alliaceae	Herb	Bulb	Fresh	Pounding	Oral	1	SNNPR	35
<i>Albizia schimperiana</i>	Fabaceae	Herb	Leaf	Dry	Pounding	Oral	1	SNNPR	35
<i>Allium cepa</i>	Alliaceae	Herb	Bulb	Fresh	Pounding	Oral	1	SNNPR	35
<i>Allium porrum</i> L.	Alliaceae	Herb	Bulb	Fresh	Concoction	Oral	1	SNNPR	36
<i>Allium sativum</i> L.	Alliaceae	Herb	Bulb	Fresh/Dry	Concoction	Oral	1	SNNPR	36
<i>Aloe megalacantha</i> Bark.	Aloaceae	Shrub	Root	Dry	Crushing	Smear	2	Tigray	82
<i>Amaranthus caudatus</i> L.	Amaranthaceae	Shrub	Seed	Fresh/Dry	concoction	Oral	2	Oromia, SNNPR	50, 35
<i>Anethum graveolens</i> L.	Apiaceae	Herb	Whole part leaf	Fresh/Dry	Decoction	Oral	3	Oromia, Tigray	82, 50
<i>Apodytes dimidiata</i>	Metteniusaceae	Tree	Leaf	Fresh	Concoction	Oral	1	Oromia	59
<i>Argemone mexicana</i> L.	Papaveraceae	Herb	Leaf	Fresh	Concoction	Oral	1	SNNPR	37
<i>Artemisia afra</i> Jack.	Asteraceae	Shrub	Leaf	Fresh/Dry	Decoction/ powdering	Oral	2	Amhara	73
<i>Asepalum eriantherum</i>	Cyclocheilaceae	Shrub	Root	Fresh	Decoction	Oral	1	Somali	92
<i>Asparagus africanus</i> L.	Asparagaceae	Shrub	Root/leaf	Fresh/Dry	Pounding/ decoction	Oral	2	SNNPR, Tigray	33, 83
<i>Asparagus leptocladodius</i>	Asparagaceae	Shrub	Leaf	Dry	Concoction	Oral	1	Oromia	46
<i>Becium filamentosum</i> (Forssk.)	Lamiaceae	Shrub	Flower	Dry	Pounding	Oral	1	Afar	89
<i>Berkheya spekeana</i>	Asteraceae	Shrub	Root	Fresh	Squeezing	Oral	1	SNNPR	35
<i>Brucea antidysenterica</i>	Simaroubaceae	Shrub	Leaf	Dry	Concoction	Oral	2	Oromia, SNNPR	63, 42
<i>Buddleja polystachya</i> Fre	Loganiaceae	Shrub	Root	Dry	Infusion	Oral	1	SNNPR	34
<i>Cadaba farinosa</i>	Capparidaceae	Shrub	Root	Fresh/Dry	Decoction	Oral	2	Oromia	60
<i>Calotropis procera</i> (Ait.)	Asclepiadaceae	Shrub	Flower	Dry	Powdering	Oral	1	Tigray	83
<i>Calpurnia aurea</i> (Alt.)	Fabaceae	Shrub	Root/seed	Dry	Decoction/ powdering	Oral	2	Tigray, SNNPR	83, 37
<i>Carissa spinarium</i>	Apocynaceae	Shrub	Root	Fresh/Dry	Pounding	Oral	1	Benishangulugumuz	87
<i>Carissa spinarum</i> L.	Apocynaceae	Shrub	Root	Fresh	Pounding	Oral	1	Oromia	49
<i>Casuarina cunninghamiana</i> Miq.	Casuarinaceae	Tree	Root	fresh/dry	Concoction	Oral	1	SNNPR	37
<i>Catha edulis</i> (Vahl.)	Celastraceae	Shrub	Stem/leaf	Fresh/Dry	Decoction/ crushing	Oral	4	Oromia, SNNPR, Amhara	52, 37, 39, 75
<i>Centella asiatica</i> (L.)	Apiaceae	Herb	Leaf	Dry	Pounding	Dermal	1	SNNPR	5
<i>Cirsium englerianum</i> O. Hoffm.	Asteraceae	Herb	Root	Fresh/Dry	Concoction	Oral	1	SNNPR	37
<i>Cissampelos mucronata</i>	Menispermaceae	Climber	Root	Fresh	Squeezing	Oral	1	Oromia	60
<i>Citrus aurantiif</i>	Rutaceae	Tree	Leaf			Oral	1	Dire dawa	85
<i>Clematis hirsute</i>	Ranunculaceae	Climber	Root	Fresh	Crushing	Oral	1	Tigray	81
<i>Clerodendrum myricoides</i>	Lamiaceae	Shrub	Leaf/root	Fresh/Dry	Decoction	Oral	2	Tigray, SNNPR	82, 45
<i>Coccinia sp. Burger Tu</i>	Cucurbitaceae	Creepers	Tuber	Dry	Infusion	Oral	1	Oromia	47
<i>Cofea Arabica</i>	Rubiaceae	Shrub	Leaf	Fresh	Pounding	Oral	1	SNNPR	35
<i>Commicarpus sinuatus</i>	Nyctaginaceae	Herb	Leaf	Fresh	Concoction	Oral	1	Oromia	46
<i>Cordia Africana</i>	Boraginaceae	Shrub	Bark	Fresh	Crushing	Oral	1	Tigray	78
<i>Crabbea velutina</i>	Acanthaceae	Shrub	Leaf	Dry	Pounding	Oral	1	Oromia	62
<i>Cratava adansonii</i> D.C.	Capparidaceae	Shrub	Root	Dry	powdering	Oral	1	Oromia	49
<i>Crepis rueppellii</i>	Asteraceae	Herb	Root	Fresh	Chewing	Oral	1	SNNPR	35
<i>Croton macrostachyus</i>	Euphorbiaceae	Tree	Leaf/bark/ root	Fresh	Squeezing/ decoction	Oral	7	Tigray, Amhara, Oromia, Benishangulugumuz	77, 83, 68, 55 59, 87
<i>Cucumis dipsaceus</i> Ehrenb	Cucurbitaceae	Creepers	Leaf	Dry	Decoction	Oral	1	Oromia	47
<i>Cucumis ficifolia</i>	Cucurbitaceae	Herb	Root	Dry	Powdering	Oral	1	Amhara	75
<i>Cucumis ficifolius</i>	Cucurbitaceae	Herb	Root	Fresh/Dry	Pounding	Oral	3	Amhara, Oromia	67, 76, 58
<i>Cucumis melo</i> L.	Curcurbitaceae	Liana	Fruit	Fresh	Concoction	Oral	1	SNNPR	36

<i>Cucumis prophetarum</i> L.	Cucurbitaceae	Herb	Whole part	Fresh	Concoction	Oral	1	Afar	89
<i>Cucurbita pepa</i> L.	Cucurbitaceae	Herb	Fruit	Dry	Decoction	Oral	1	SNNPR	36
<i>Cucurbita pepo</i> L.	Cucurbitaceae	Herb	Seed	Dry	Decoction	Oral	2	Oromia, Tigray	49, 83
<i>Cuminum cyminum</i> L.	Apiaceae	Herb	Leaf/fruit	Fresh/Dry	Pounding	Oral	2	Oromia	62
<i>Cussonia ostinii</i> Chiov.	Araliaceae	Tree	Bark	Dry	Pounding	Oral	1	Amhara	73
<i>Daucus carota</i> L.	Apiaceae	Herb	Root	Fresh	Squeezing	Oral	1	Amhara	67
<i>Ehretia cymosa</i>	Boraginaceae	Shrub	Leaf	Fresh	Concoction	Oral	1	Oromia	54
<i>Ekebergia capensis</i>	Meliaceae	Tree	Bark	Fresh	Concoction	Oral	1	Oromia	17
<i>Embelia schimperi</i>	Poaceae	Shrub	Fruit	Fresh	Concoction	Oral	1	SNNPR	35
<i>Erthrina brucei</i>	Fabaceae	Shrub	Bark	Fresh	Crushing	Oral	1	SNNPR	42
<i>Euclea divinorum</i>	Ebenaceae	Shrub	Root	Fresh/Dry	Squeezing/ powdering	Oral	2	Tigray, Oromia	83,60
<i>Euclea racemosa</i>	Ebenaceae	Shrub	Root/leaf	Fresh	Decoction	Oral	2	Amhara	68
<i>Euphorbia ampliphylla</i>	Euphorbiaceae	Tree	Latex	Fresh	Coocking	Oral	1	SNNPR	43
<i>Euphorbia cactus</i> Boiss	Euphorbiaceae	Shrub	Latex	Fresh	Squeezing	Oral	1	Tigray	83
<i>Euphorbia depauperata</i>	Euphorbiaceae	Tree	Root	Fresh	Decoction	Oral	1	Oromia	50
<i>Euphorbia somalinsis</i>	Euphorbiaceae	Herb	Steem	Fresh	Crushing	Dermal	1	Dire dawa	86
<i>Ferula communis</i> L.	Apiaceae	Herb	Root/leaf/ steem	Fresh/Dry	pounding/ concoction	Oral	4	Amhara, oromia	67, 68, 70, 60
<i>Ficus vasta</i> Forssk.	Moraceae	Tree	Bark	fresh	Chewing	Oral	1	SNNPR	39
<i>Foeniculum vulgare</i>	Apiaceae	Herb	Whole part/seed	Fresh/Dry	Decoction/ concoction	Oral	17	Dire dawa, Harari, Tigray, SNNPR, Amhara, Oromia	85, 86, 90, 91, 80, 83, 84, 34, 67, 68, 70, 60
<i>Gnidia glauca</i>	Thymelaceae	Liana	Root	Dry	Chewing	Oral	1	Benishangulmuz	87
<i>Gnidia stenophylla</i> Gilg	Thymelaceae	Herb	Leaf	Fresh	Infusion	Oral	1	SNNPR	34
<i>Grewia ferruginea</i>	Tiliaceae	Shrub	Fruit	Fresh/Dry	Decoction	Oral	2	Harari, Oromia	90, 46
<i>Guizotia abyssinica</i> L.	Asteraceae	Herb	Seed	Dry	Concoction	Oral	1	Amhara	76
<i>Helichrysum sp</i>	Asteraceae	Shrub	Leaf	Fresh	Powdering	Dermal	1	Amhara	67
<i>Hypericum annulatum</i>	Hypericaceae	Herb	Leaf	Fresh	Macerating	Oral	1	Tigray	84
<i>Hypericum quartianu</i> A. Rich	Hypericaceae	Shrub	Root	Dry	Crushing	Oral	1	Amhara	68
<i>Hypoestes forskalii</i>	Acanthaceae	Herb	Leaf	Dry	Decoction	Oral	1	SNNPR	34
<i>Impatiens tinctoria</i>	Balsaminaceae	Herb	Root	Fresh	Crushing	Oral	2	SNNPR	42
<i>Juniperus procera</i> Hochst ex.	Cupressaceae	Tree	Fruit	Fresh/Dry	Decoction	Oral	1	Amhara	68
<i>Kalanchoe densiflora</i> Rol	Crassulaceae	Herb	Leaf	Fresh	Squeezing	Dermal	1	Oromia	49
<i>Kleinia abyssinica</i>	Asteraceae	Herb	Rhizome	Fresh	Chewing	Oral	1	Oromia	47
<i>Lactuca inermis</i> Forssk.	Asteraceae	Herb	Leaf	Fresh	Decoction	Oral	1	SNNPR	41
<i>Lagenaria siceraria</i>	Cucurbitaceae	Herb	Fruit	Fresh/Dry	Macerating	Oral	2	Oromia, SNNPR	52, 37
<i>Leptadenia sp.</i>	Asclepiadaceae	Herb	Root	Fresh	Decoction	Oral	1	Dire dawa	87
<i>Leucas abyssinica</i>	Lamiaceae	Shrub	Root	Fresh/Dry	Decoction	Oral	1	Tigray	82
<i>Lycopersicon esculentum</i>	Solanaceae	Herb	Leaf	Fresh	Decoction	Oral	4	SNNPR, Amhara, Tigray	34, 67, 71, 84
<i>Marantochloa leucantha</i>	Marantaceae	Herb	Leaf	Fresh	Concoction	Oral	1	SNNPR	5
<i>Maytenus arbutifolia</i>	Celastraceae	Shrub	Root	Dry	Infusion	Oral	1	Amhara	67
<i>Melhania zavattarii</i> Cufo	Sterculiaceae	Shrub	Fruit	Fresh	Concoction	Oral	1	Oromia	47
<i>Millettia ferruginea</i>	Fabaceae	Tree	Root	Dry	Decoction	Oral	1	Amhara	67
<i>Momordica foetida</i>	Cucurbitaceae	Herb	Root	Fresh	Exudate	Oral	1	Oromia	56
<i>Moringa stenopetala</i>	Moringaceae	Tree	Leaf	Fresh	Concoction	Oral	1	SNNPR	45
<i>Nigella sativa</i> L.	Ranunculaceae	Herb	Seed	Dry	Chewing	Oral	1	Oromia	62
<i>Osyris quadripartite</i> Decn	Santalaceae	Herb	Root	Dry	Concoction	Oral	1	Oromia	60
<i>Panicum hochstetteri</i>	Poaceae	Herb	Leaf	Fresh	chewing	Oral	1	Oromia	56
<i>Pavetta oliveriana</i> Hiern	Rubiaceae	Shrub	Leaf	Fresh/Dry	Decoction	Oral	2	SNNPR, Oromia	33, 54
<i>Pavonia urens</i> Cav.	Malvaceae	Herb	Root	Dry	Powdering	Oral	1	Amhara	66
<i>Pentas lanceolata</i>	Rubiaceae	Herb	Root	Dry	Infusion	Oral	1	SNNPR	5
<i>Peponium vogelii</i>	Cucurbitaceae	Climber	Fruit	Fresh	Chewing	Oral	1	SNNPR	38
<i>Phagnalon abyssinicum</i>	Asteraceae	Herb	Leaf	Fresh	Squeezing	Oral	1	Amhara	67
<i>Phoenix reclinata</i>	Arecaceae	Tree	Root	Fresh	Decoction	Oral	1	Amhara	67
<i>Phytolacca dodecandra</i> L.	Phytolaccaceae	Shrub	Stem/leaf/ root/bark	Fresh/Dry	concoction/ macerating	Oral	5	Oromia, Tigray, Amhara, Benishangulmuz	48, 56, 83, 74, 87
<i>Pittosporum abyssinicum</i> Del	Pittosporaceae	Tree	Leaf	Fresh	Decoction	Oral	1	SNNPR	40
<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Herb	Root/leaf	Fresh	Concoction	Oral	3	Oromia, Amhara, Dire dawa	55, 72, 86

<i>Podocarpus falcatus</i>	Podocarpaceae	Shrub	Stem	Fresh	crushing	Oral	1	SNNPR	45
<i>Protea gaguedi</i>	Proteaceae	Tree	Leaf	Fresh	Pounding	Oral	1	SNNPR	35
<i>Prunus Africana</i>	Rosaceae	Tree	Root/bark	Fresh/Dry	Concoction	Oral	3	Oromia, SNNPR	52, 36, 37
<i>Pupalia lappacea</i> (L.)	Amaranthaceae	Herb	Whole part	Fresh	Concoction	Oral	1	Oromia	47
<i>Rhamnus prinoides</i>	Rhamnaceae	Shrub	Leaf	Fresh	Pounding	Oral	1	Benishangulgumuz	87
<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Leaf	Fresh	Crushing	Oral	1	Oromia	52
<i>Rosmarinus officinalis</i>	Lamiaceae	Herb	Leaf	Dry	Concoction	Oral	1	Dire dawa	85
<i>Rothea myricoides</i>	Lamiaceae	Shrub	Leaf	Fresh/Dry	Decoction	Oral	1	SNNPR	40
<i>Rubus apetalus</i>	Rosaceae	Shrub	Root	Dry	Decoction	Oral	1	SNNPR	38
<i>Rumex abyssinicus</i> Jacq.	Polygoniaceae	Herb	Root	Dry	Decoction	Oral	3	SNNPR	34
<i>Rumex nepalensis</i> Spreng	Polygoniaceae	Herb	Whole part	Fresh	Concoction	Oral	1	SNNPR	36
<i>Ruta chalepensis</i> L.	Rutaceae	Herb	Leaf	Fresh	Chewing	Oral	1	SNNPR	39
<i>Sansevieria ehrenbergii</i>	Dracaenaceae	Herb	Root	Dry	Concoction	Oral	1	Amhara	67
<i>Seddera hirsute</i> Hall.f.	Convolvulaceae	Shrub	Whole part	Fresh/Dry	Pounding	Oral	1	Afar	88
<i>Senna didymobotrya</i>	Fabaceae	Shrub	Leaf	Dry	Powdering	Oral	1	SNNPR	42
<i>Senna occidentalis</i> (L.)	Fabaceae	Herb	Root	Fresh/Dry	Powdering/ concoction	Oral	2	Oromia, SNNPR	52, 37
<i>Sida rhombifolia</i> L.	Malvaceae	Shrub	Root	Fresh	Concoction	Oral	1	Amhara	68
<i>Sida schimperiana</i>	Malvaceae	Shrub	Root	Fresh	Chewing	Oral	2	Amhara	70, 76
<i>Solanum americanum</i> Miller	Solanaceae	Herb	Root	Fresh/Dry	Decoction	Oral	2	Oromia	59
<i>Solanum anguivi</i> Lam.	Solanaceae	Herb	Root	Fresh	Chewing	Oral	2	Amhara, Oromia	70, 61
<i>Solanum incanum</i> L.	Solanaceae	Shrub	Root	Fresh/Dry	Pounding	Oral	2	Tigray, Somali	83, 92
<i>Solanum indicum</i>	Solanaceae	Herb	Fruit	Dry	Pounding	Oral	2	SNNPR	35, 44
<i>Stereospermum kunthianum</i>	Bignoniaceae	Tree	Bark	Fresh	Squeezing	Oral	1	Oromia	55
<i>Syzygium guineense</i>	Myrtaceae	Tree	Root/leaf	Fresh	Chewing/ concoction	Oral	2	SNNPR	35
<i>Thalictrum rhyndhocarpum</i>	Ranunculaceae	Herb	Root	Fresh	Concoction	Oral	2	Amhara, SNNPR	68, 5
<i>Thymus serullatu</i>	Lamiaceae	Herb	Root	Dry	-	Oral	1	Dire dawa	85
<i>Tragia cinerea</i> + (pax)	Euphorbiaceae	Climber	Root	Dry	Decoction	Oral	1	Amhara	67
<i>Tragia cordata</i> Michx.	Euphorbiaceae	Climber	Root	Dry	Decoction	Oral	1	Oromia	55
<i>Tribulus terrestris</i>	Zygophyllaceae	Herb	Whole part	Fresh	Crushing	Oral	1	Dire dawa	86
<i>Trifolium rueppellianum</i> Fresen	Fabaceae	Herb	Seed	Fresh	Decoction	Oral	1	SNNPR	36
<i>Urtica dioica</i> L.	Urticaceae	Climber	Root	Fresh/Dry	Pounding	Oral	1	SNNPR	41
<i>Urtica simensis</i> Steudel	Urticaceae	Herb	Root	Fresh	Infusion	Dermal	1	Oromia	17
<i>Urtica sinesis</i>	Urticaceae	Herb	Leaf	Fresh	Concoction	Oral	1	Dire dawa	85
<i>Verbena officinalis</i> L.	Verbenaceae	Herb	Leaf	Fresh	Crushing	Oral	1	Oromia	50
<i>Vernonia amygdalina</i>	Asteraceae	Shrub	Leaf	Fresh	Chopping	Oral	1	Oromia	54
<i>Withania somnifera</i>	Solanaceae	Shrub	Fruit	Dry	-	Oral	1	Dire dawa	85
<i>Xanthium spinosum</i> L.	Asteraceae	Herb	Root	Fresh	Squeezing	Oral	1	Dire dawa	86
<i>Ximenia caffra</i>	Olaceae	Tree	Root	Dry	Decoction	Oral	1	SNNPR	35
<i>Zehneria scabra</i> L.	Cucurbitaceae	Creoper	Leaf	Fresh	Squeezing	Oral	2	SNNPR	35
<i>Zingiber officinale</i>	Zingiberaceae	Herb	Rhizome	Fresh	Chewing	Oral	1	SNNPR	35

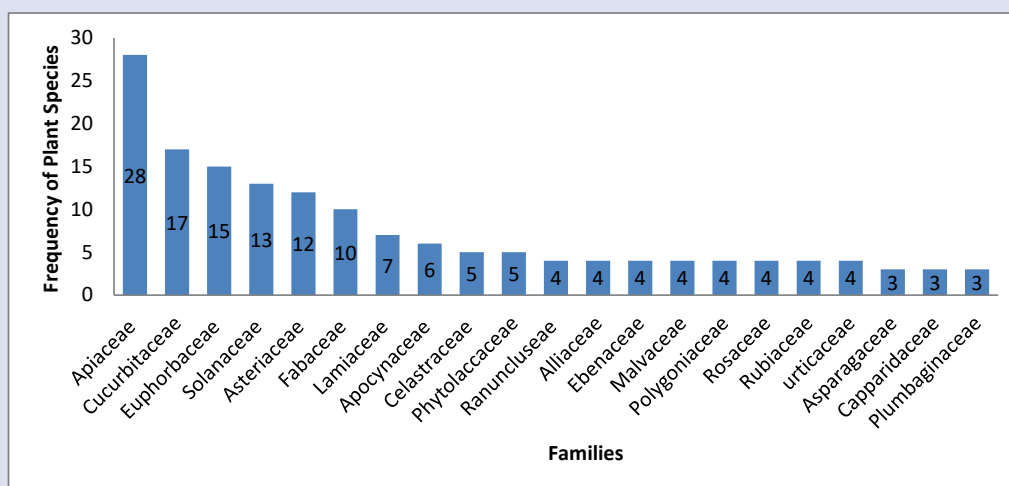


Figure 1: Plant families frequently reported for the treatment of urological and urogenital diseases in Ethiopia.

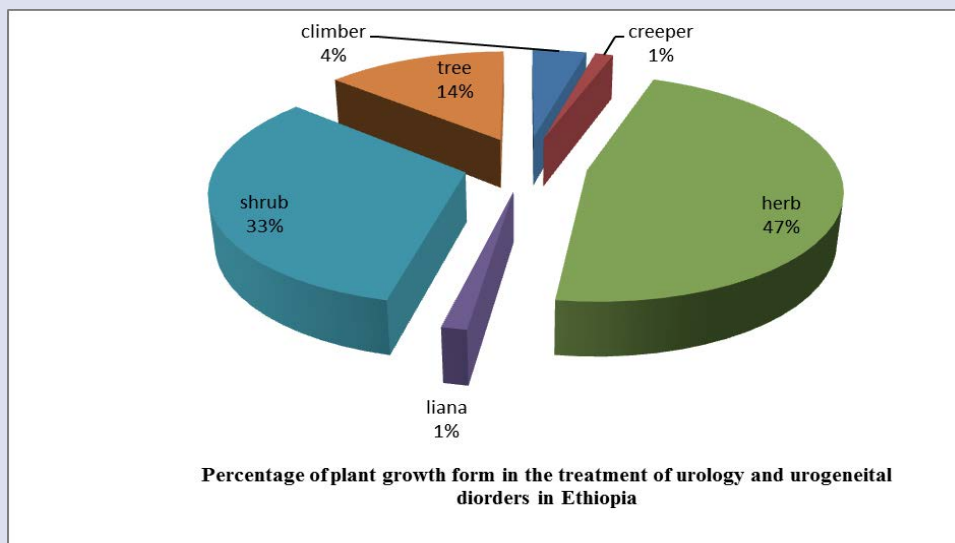


Figure 2: Proportion of growth form of medicinal plants used for treatment of urological and urogenital disorders in Ethiopia.

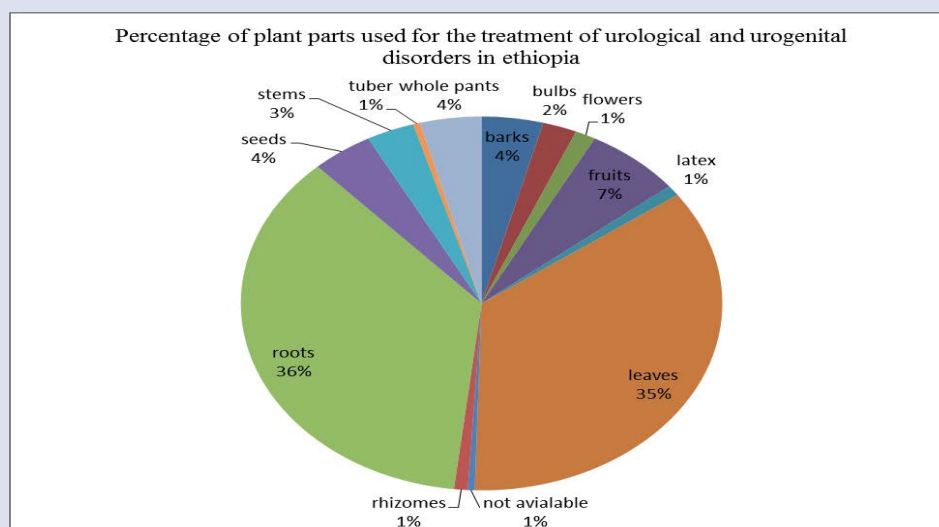


Figure 3: Proportion of medicinal plant parts used for treatment of urological and urogenital diseases in Ethiopia.

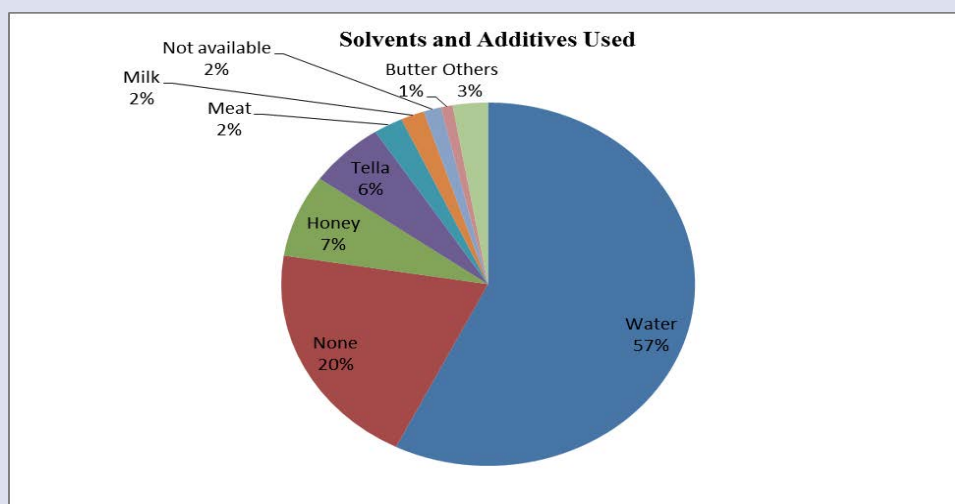


Figure 4: Solvents and additives used for remedy preparation for treatment of urological and urogenital diseases in Ethiopia.

by the Ethiopian traditional healers. This finding agrees with studies done in Ethiopia indicated that high percent those medicinal plant families.^{97,101}

Foeniculum vulgare, *Croton macrostachus*, *Phytolacca dodecandra*, *Ferula communis*, *Catha edulis*, *Acokanthara shimperi*, and *Lycopersicon esculentum* are the most frequently cited medicinal plant species. Frequent citation of particular plant species or families could indicate potentially higher bioactive anti-urolgical and anti-urogenital content.

The present review, growth forms of the medicinal plants depicted that herbs accounted the highest, followed by shrubs and trees. This finding was supported by other studies.^{98,102-106} This could be due to naturally herbaceous plant species accounts in high number in the country because of the average rainfall was high in many regions of Ethiopia. This made conducive for the growth of herbs and found throughout the year. This finding was consistent with the studies previously reported in Ethiopia.¹⁰⁷

Urological and urogenital diseases were treated using different plant parts like leaves, roots, seeds, bark and fruit. The present review showed that, roots were the most frequently reported plant parts used to manage uro-genital problems traditionally, followed by leaves and fruit. The possible reasons might be due to plant root structures, such as tubers and rhizomes rich in the sources of potentially bioactive chemical compounds in respective to the other parts of the medicinal plants. However, frequent utilization of roots for medicinal purpose affect the survival of medicinal plant species. Moreover, many studies agree that the collection of root parts for remedy preparation poses a threat to medicinal plants.^{19,108,109} This will significantly affect the sustainability of the medicinal plants.^{56,82,110}

The review showed that fresh plant materials accounts by (56.4 %) was the most frequent medicinal plant remedy preparation followed by dried form (32.6%). The possible reason for using of fresh plants materials might be due to save time and prevent some chemical loss on drying. Losing of chemical compounds on dry might be decrease the effectiveness of some medicinal plants. However, harvesting medicinal plants in fresh form may results in the extensive misuse of medicinal plants as it compromise the sustainability of the species.⁵⁶

In this review, different methods are used to prepare medicinal plant remedies. Decoction (26.1%) take high account, followed by concoction (16.5%), pounding (11.9) and crushing (10.1). Accordingly, traditional healers frequently used decoction as best method to prepare medicinal plant remedies. This may due to decoction is simple and used for all parts of the plant parts. In decoction, woody plant parts like stem, bark and root can be easily extracted using water as a solvent. Decoction also used to extract fragile parts of the plants since the plant material was easily boiled in water. Drying and powdering is the commonly used technique if the plant material is not easily available throughout the year to use plant material as needed for a long period of time.

Medicinal plants were prepared for the clients using different solvents and additives based on plant materials and type of ailments. Honey, milk, teff flour and water were mixed with appropriate medicinal plant materials as additive, sweetener or considering as antidotes. The remedies were prepared easily without any advanced techniques and complex processing. This may be due the materials are easily available and accessible in their environments without further transport and cost. According to the finding in the present review, water was the common solvent media used for the preparation and administration of medicinal plant remedies. The possible reason was that water extracts phytochemicals from plant materials and available easily.¹¹¹ Practitioners used tella (local alcohol), butter, sugar, enjera, fat, meat and oil to increase the flavor, taste and general suitability of orally administered remedies. The reviewed showed that medicinal plant

remedies used to treat urogenital diseases were primarily administered through the oral route, while rarely dermal tied and smear. Similarly, this result was supported by various ethnobotanical studies in Ethiopia that showed high proportions of remedies were administered orally.^{37,77,102,112} This might be due to oral rout was easy for the majority of clients and taken with different additive like honey and sugar. It might be also due to permit the rapid physiological reaction and increase its curative power in some of the client.⁷⁷

Based on the data from the literature and the result obtained from the review, doses were determined using edibility of the plant parts and age, physical strength and health status of the clients were observed to fix the dose of non-edible medicinal plant remedies. Dose estimation frequency and duration of treatment were also noted. The review indicated that all age groups, special condition and severity of the disease were also considered in determination of the dose and estimated using different measuring techniques commonly spoons, cups, glasses, or handfuls. Frequency of administration was also made to administer herbal remedies and based the disease type, severity and age of the patients. Once, twice or three times per day for one, two, or three consecutive days might be recommended. Lack of precision and standardization is widely acknowledged to be an important drawback of traditional healthcare systems.¹¹³⁻¹¹⁵

Regarding the most cited plants which were used for the treatment of urological and urogenital problems, most of them applied in traditional medicine in many countries. For instance, *Foeniculum vulgare*, *Lycopersicon esculentum*, *Catha edulis*, *Clerodendrum myricoides*, *Croton macrostachyus* and *Pavetta oliveriana* Hiern were frequently cited medicinal plant species for treatment of urinary retention. Moreover, *Foeniculum vulgare* and *Grewia ferruginea* were the most cited species for kidney infections. The most cited plants which were used for the treatment of gonorrhoea and impotency were; *Croton macrostachyus*, *Phytolacca dodecandra*, *Senna occidentalis*, *Euphorbia ampliphylla* and *Ferula communis*, *Sida schimperiana* respectively. Further phytochemical and pharmacological screening are required to investigate new drugs from the mentioned plants in this review, especially those which are the most cited and can be used safely.

Nowadays, the world is losing many medicinal plants due to population growth with increasing demand and consumption and deforestation.¹¹⁶ These common human made and natural factors resulted in the loss of plant genetic diversity and threatening the survival of human kind with erosion of some lifesaving medicinal plants of wild genes without proper documentation and preservation.¹¹⁷ Therein, the loss of medicinal plants associates with the missing advantages gained from them and indigenous knowledge associated with the plants.¹¹⁴

CONCLUSION

In the present review, it can be concluded that different type of uro-genital diseases were managed by indigenous medicinal plants knowledge. Herbs were the most growth form of medicinal plants presented while fresh condition was the most frequently reported. *Foeniculum vulgare*, *Lycopersicon esculentum*, *Catha edulis*, *Clerodendrum myricoides* and *Grewia ferruginea* were the most frequently used plants species for the treatment of urinary problems. *Croton macrostachyus*, *Phytolacca dodecandra* and *Senna occidentalis* were the most frequently plant species used for the treatment of gonorrhoea and impotency. It can also be indicated that the activity of these medicinal plants is due their different chemical compounds and put base-line for further experimental studies.

SUMMARY

Uro-genital diseases are serious health problems affecting millions of people around the world. Ethiopia is one of the countries affected

by these diseases in all age groups. Traditional medicine is one of the popular used by people of especially in rural area to manage various diseases including chronic diseases like kidney problems. Kidney is the most vital organ used to regulate different physiological processes amongst the organs urinary tract. Those problems are treated by medicinal plants found in every ethnic groups of the given country and the information gathered in this review is from ethnobotanical and ethnopharmacological use of medicinal species across the regions of Ethiopia.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

ABBREVIATIONS

GF: growth form; PU: parts used; MoP: method of preparation; RA: route of administration; Fr: frequency; SNNPR: Southern nations, nationalities and people region; SPSS: Statistical package for social science software.

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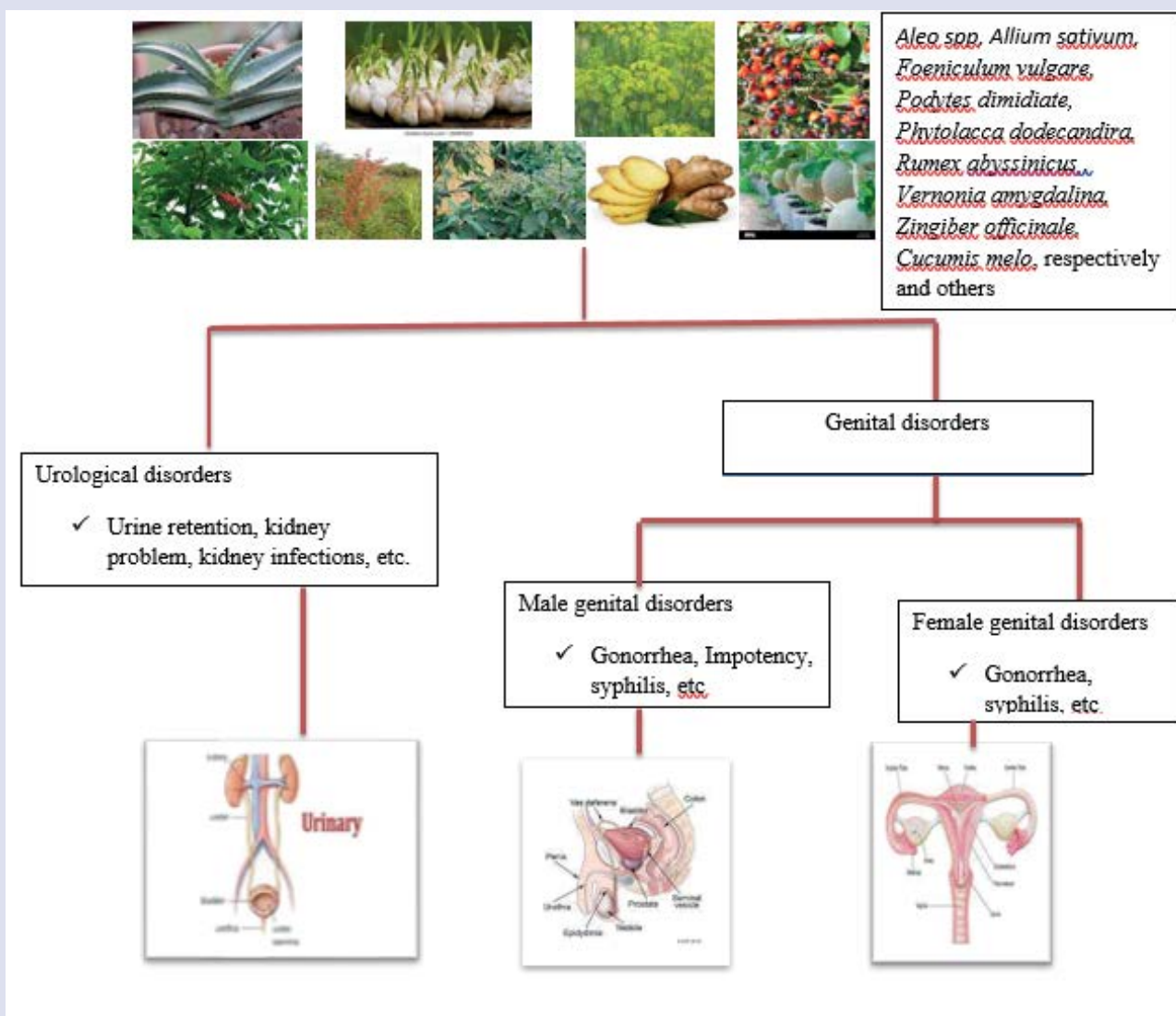
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GRAPHICAL ABSTRACT



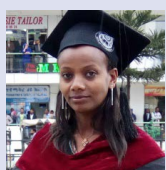
ABOUT AUTHORS



Kebede Feyisa: Currently as a Lecture and researcher at Bahir Dar University, Faculty of Medicine and Health Sciences, Ethiopia. Graduated in B. Pharm from the Department of Pharmacy, Ambo University in 2016, and MSc in Pharmacognosy from Pharmacy School, Addis Ababa University in 2019. My research interests are related to Pharmacognosy, Alternative Medicine, Phytochemistry and Phytomedicine.



Teyiba Kemal: B. Pharm, MSc in Pharmacognosy is a Lecturer at Pharmacy Department, Faculty of Health Science and Medical, Haramaya University, Ethiopia. Her research interests are related to Alternative and Complementary Medicine, Medicinal plants and Pharmacognosy.



Ture Girma: Currently as a Lecturer at Faculty of Natural and Computational Science, Dilla University, Ethiopia. Her research interests are related to ethnobotany and biochemistry.



Wondu Feyisa: Lecturer and researcher from College of Medicine and Health Sciences, Bahir Dar University, Ethiopia. His research interests are related to ethnobotany, gynecology and obstetrics.

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