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Research Article

An Ethno-Pharmacologic Survey of Medicinal Plants in Ethiopia: A Systematic Review for Establishing Medicinal Plant Park Research Project in the Case of West and South West Oromia Forest Ecologic Areas, West Ethiopia

Tamirat Alemu[1*], Tamirat Deressa[1], Ginenus Fikadu[1], Busha Gemechu[1], Meberate Dufera[1], Tena Regasa[1], Getahun Duguma[1], Geremewu Kinati[1], Ayantu Mosisa[1], Tigist Desalegn[1], Dinka Dugasa[1], Sultan Suleman[2], Fanta Gashe[2], Awol Jemal[2]

[1]*Department of Pharmacy, Wollega University, Nekemte, Ethiopia*

[2]*Department of Pharmacy, Jimma University, Jimma, Ethiopia*

ABSTRACT

Background and objective: Globally the estimate of medicinal plant species range from 35,000-50,000 species and out of this about 4000-6000 species have entered the world market of medicinal plants, however, only about one hundred species having been used as a source of modern drugs. Ethiopia is endowed with rich flora, having more than 6,500 species of vascular plants; out of which an estimated 12% are endemic and about 887 species are used as medicinal plants to treat nearly 300 physical and mental disorders. Around 1000 identified medicinal plant species are reported in the Ethiopian flora; however, others are still not identified. About 300 of these species are frequently mentioned by different authors. Researchers estimated that about 60% of the flora to be medicinal and most sources give about 10% of the vascular flora to be medicinal. Modernization and acculturation have contributed in making the younger generation unwilling to practice and retain traditional knowledge. Environmental degradation, charcoal making, collection of fuel wood construction materials and the need for agricultural land resulted in major threat to medicinal plants and indigenous knowledge. Therefore, this study will focus on gathering and documenting use and management of traditional medicinal plants and the associated ethnomedicinal and ethnopharmacologic knowledge through an ethno-pharmacologic survey of medicinal plants in west and south west Ethiopia.

Methods and materials: A systematic review for establishing medicinal plant park research project in west and south west Oromia forest ecologic areas, west Ethiopia. This is believed to add up to the country's database of medicinal plants and in documenting indigenous knowledge of the people and for the establishment of medicinal plant park/garden in the wollega university or in west and south west Oromia forest ecologic areas. Review of published literature on ethno-botany/ethno-pharmacologic survey of medicinal plants from 1990 to 2020. The documented medicinal plants will be isolated through *in-situ* and *ex-situ* conservation for the purpose of establishing medicinal plant parks at west and south west forest ecologic areas.

Results: Our systematic review identified 627 records through the database search and 5 additional records through the manual search for gray literature. After duplicates were removed, 491 studies were screened based on their titles and abstracts. 486 articles were assessed for eligibility. As a result of this assessment, 486 studies met the inclusion criteria and were included in the systematic review. Eventhough majority of the research paper have been carried out

Correspondence to: Tamirat Alemu, Department of Pharmacy, Wollega University, Nekemte, Ethiopia; E-mail: tamiratalemu@yahoo.com

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ethnomedicinal and ethnopharmacological studie intensively,they did not change their finding in to projects for the sustainability of the medicinal plants and the indigeneous knowledge of traditional healers.

Conclusion and Recommendation: An intensive ethnomedicinal and ethnopharmacolgical studies of medicinal plant have been carred out in west and south west Ethiopia, where most forest ecologic areas laocated. *In-situ* and *ex-situ* conservation of these medicinal plants are a crucial importance for further ethno-pharmacologic trial and massive production of herbal remedies

Keywords: Ethnomedicine; Ethnopharmacology; Medicinal plant; Medicinal plant park; Forest ecologic areas; Oromia, Ethiopia

INTRODUCTION

Ethnobotany is a broad term referring to the study of direct interrelations between humans and plants. The indispensable dependency of human up on plants for their livelihood was primarily started by domestication and dates back 10,000 years. From plants, humans can obtain food, pesticides, medicines, fuel, fodder, construction materials, tools and derives aesthetic and spiritual fulfillments. Thus indigenous knowledge on plants appeared when humans started and learned how to use plants. Over centuries, indigenous people have developed their own locality specific knowledge on plant use, management and conservation. The complex knowledge, beliefs and practices generally known as Indigenous Knowledge (IK) or traditional knowledge develops and changes with time and space, with change of resources and culture [1].

The observation, identification, description and experimental investigation of the ingredients and the effects of the ingredients and the effects of such indigenous drugs are a truly interdisciplinary field of research which is very important in the study of traditional medicine. Ethnopharmacology is thus defined as the interdisciplinary scientific exploration of biologically active agents traditionally employed or observed by man [2].

Objectives

General objective: To assess ethno-pharmacologic survey of medicinal plants in Ethiopia: A systematic review for establishing medicinal plant park research project in west and south west Oromia forest ecologic areas, west Ethiopia.

Specific objectives:

- Medicinal plants used as treatment of human disease
- Plants used as treatments of animal disease
- Medicinal plants used as food
- Poisonous medicinal plants
- Plants used as spices, preservatives, etc.
- To prepare medicinal plant park/garden by planting and conservation of identified medicinal plants in the wollega university or in the forest eclogical areas like 'Komto mountain' area
- To identify traditional medical practitioner and assess their practice
- To gather, record and document indigenous knowledge of the people on medicinal plants in the study area
- To collect and identify traditional medicinal plant specimens used in the study area for treatment of human and livestock health problems
- To document the management and conservation measures practiced in the study area
- To design strategies for conservation and sustainable management of medicinal plants in the study area
- To document the on-going efforts towards building the ethnobotanical database of Ethiopia in order to facilitate further actions in the management and utilization of medicinal plants
- To identify active ingredients/principles present in a selected medicinal plants used in traditional medicine
- To test the efficacy of a selected herbal medicine used in the study area

MATERIALS AND METHODS

Research project study area and period

The first phase of medicinal plant park will be established in the Wollega zones, Oromia regional state from July 15 to August 15, 2020. However currently, according to the FDRE, Wollega was divided in to four zones *i.e.*, east Wollega zone, Horro Guduru Wollega zones, west Wollega zone and Kellem Wollega zone. Each of them is located at different distance from the capital city of the country Addis Ababa [3].

The project areas, east Wollega (Capital city, Nekemte is located at 9°06'N; 36°31'E), Horo Guduru Wollega zone (capital city, Shambu is located 9°06'N; 36°31'E), west Wollega (capital city, Gimbi is located at 9°09'N; 35°51'E) and Kelem Wollega zone(capital city,Dembi Dolo is located 9°09'N; 35°51'E) are characterized by dry season (winter) and wet season (summer), where the rainfall varies from 1200 mm to 2400 mm and 1100 mm to 2450 mm and the annual mean temperature varies from 16.8°C to 29.1°C and 18°C to 32°C respectively (Figure 1) [4].

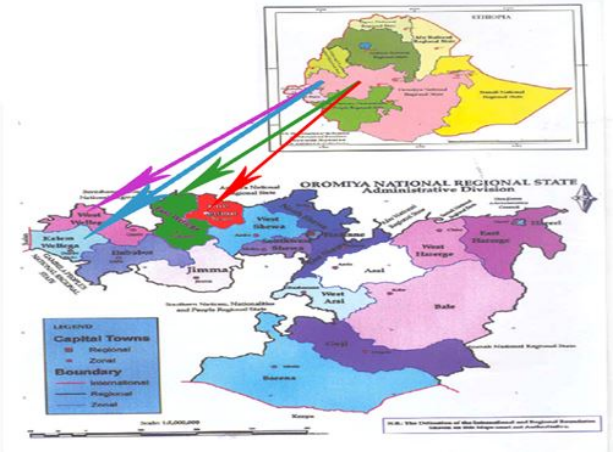

Figure 1: Mapping showing the research project area.

The second phase of the medicinal plant park establishments will be replicable to other west oromia zones like Ilu Abba Bora, Jimma, etc (Figure 2).

Figure 2: Mapping showing Ethiopia, Oromia and the four Wollega zone.

Study design

Review of published literature on ethno-botany/ethno-pharmacologic survey of medicinal plants. The documented medicinal plants will be isolated through *in-situ* and *ex-situ* conservation for the purpose of establishing medicinal plant parks at west and south west forest ecologic areas [5].

Search strategy and selection criteria

We searched for studies that reported the ethno-pharmacology and ethno-botany of medicinal plants, using a systematic review approach that followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). We searched Medline from inception (coverage from 1990) to 30 May 2020 and Scopus (from 1990 to 30 May, 2020) for all relevant studies that examined ethnobotanical, phytochemical, ethnopharmacological studies and management/conservation of medicinal plants used by traditional healers and indigenous peoples. We used the following search terms; ethnobotanical or phytochemical or ethnopharmacological combined with plant parts used, method of preparation or use, disease treated, 'traditional medical practitioner/indigenous peoples with indigenous knowledge'. No time, geographical area or language limits were applied. We hand-searched the reference lists of all recovered documents for additional references. Abstracts of all reports were read and full papers retrieved for those appearing to fulfill selection criteria, as it is detailed below [6].

We searched the gray literature by seeking reports not published in peer reviewed journals through contacting experts, a search of conference abstracts and reviewing price's monograph (Figure 3).

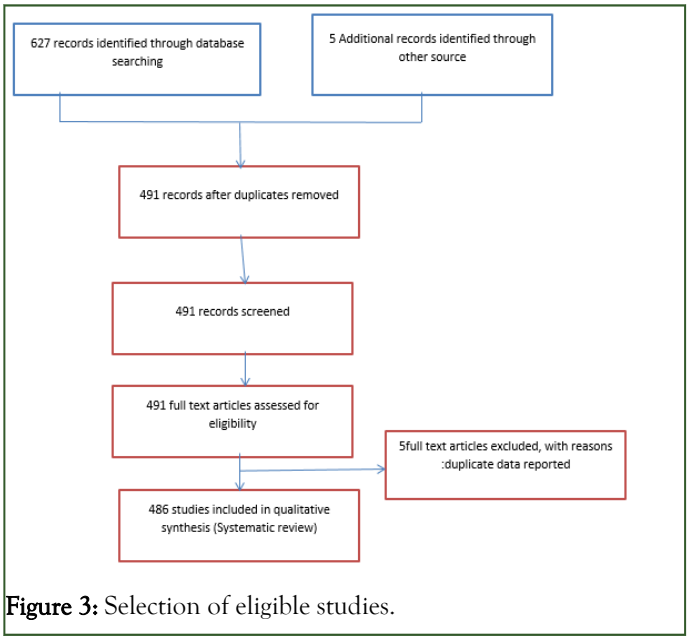

Figure 3: Selection of eligible studies.

Study selection

We screened search results first by title and abstract and then by full text. We disregarded abstracts in the initial screen if they were not observational studies and did not investigate the ethno-pharmacology and ethno-botany survey of medicinal plants. We also excluded studies that did not report original data (e.g. review articles). Abstracts reporting observational studies and/or focusing on medicinal plants were eligible for full-text review. Population-based articles were independently considered for inclusion in the review if the studies reported ethno-pharmacology and ethno-botany survey of medicinal plants or contained adequate information to the use of medicinal plants. By 'population-based' articles we meant studies which involved all residents within a specific area and in which the studied population was representative of that area [7].

When the same data were reported in two or more publications, we selected the most comprehensive source. Lastly, we identified papers outside the search strategy using expert knowledge of active studies and contacting experts. When possible, we contacted authors to provide data not presented in their reports.

Study eligibility and quality assessment

All studies reporting the ethno-pharmacology and ethno-botany of medicinal plants at community level were included. All titles and abstracts of the identified studies were assessed for relevance for the review by authors. Relevant full text articles were retrieved and checked by authors independent of each other. Non-English language papers were translated using google translate (google, mountain view, USA) or by colleagues

proficient in the language in question. The quality of the studies was assessed by two authors, with disagreement resolved by referral to other authors. The quality of the studies in the review was assessed against four criteria: Definition of sampling frame, response rate, use value index/matrix ranking and reporting bias [8].

Data extraction and synthesis

A standardized microsoft excel data extraction form was developed and used to record the following information for all qualifying studies: Study ID, author, title, journal, the year of study, study design, geographical location (area and country), sample size, number of medicinal plants identified, descriptive case data (e.g., method of preparation, plant parts used, habitat) and active ingredient in the plant.

RESULTS

Our systematic review identified 627 records through the database search and 5 additional records through the manual search for gray literature. After duplicates were removed, 491 studies were screened based on their titles and abstracts. 486 articles were assessed for eligibility. As a result of this assessment, 486 studies met the inclusion criteria and were included in the systematic review. Eventhough majority of the research paper have been carried out ethnomedicinal and ethnopharmacological studie intensively, they did not change their finding in to projects for the sustainability of the medicinal plants and the indigeneous knowledge of traditional healers The result of review literature found that studies on TM in Ethiopia can be summarized as ethnobotanical, ethnopharmacological and standardization and formulation of phytomedicine [9].

Ethnobotanical studies: The documenting of medicinally important plants is mainly aimed at developing database for further studies and conservation of the plants. Ethnobotanical studies in northern Ethiopia. Central plateau and rift valley of Ethiopia, Shirka district, south and central Ethopia, Butajira and Addis Ababa, Jabitehan woreda, W. Gojja m central Shoa and S.W Ethiopia “Zay” people, "Kereyu" people, Boosat woreda two Woredas of southern Tigray and Afar, Yalo Woreda in Afar regional state, Berbere district, Bale zone of Oromia regional state, Hawassa Zuria district are among the studies, which documented some medicinal plants of Ethiopia [10].

Ethnopharmacolgical studies: Based on the ethnobotanical studies or claims of traditional medicine practitioners, researchers are screening the pharmacological activity and phytochemistry of medicinal plants. These studies include anthelmintic, antimicrobial, antimalarial, antiretroviral and antipyretic and antiinflammatory screening of the herbal drugs. Most of the studies indicate that the plants are promising for the claimed medicinal uses.

Standardization and formulation: Since standardization and formulation studies require advanced technologies and well-trained pharmaceutical technologists with an interest on herbal drugs, little is done in the area. The works that can be mentioned are those done by the department of pharmaceutics, school of pharmacy, Addis Ababa univerisity. Launching postgraduate programme in the department has made significant contribution to the works done. Preliminary studies on Plumbago zeylanica, Dodonea viscosa are two examples of the studies carried out on topical preparations of herbal drugs for dermatological disorders. Apart from topical preparations, the extract of seeds of glinuslotoidos has been standardized and formulated as tablets for its anthelmentic activity [11].

DISCUSSION

This review showed the remedial possible of many traditional medicinal plants that can be used by local community of Ethiopia. The wide-ranging knowledge on the traditional medicinal plants in Ethiopia garlanded their probable for enormous chance access to modern healthcare facilities could be considered as the main factors for the continuation of the traditional practice. Ethiopian; In spite of the diverse ecological and agro ecology zones have the chance of actuality medicinal plant growth. Those medicinal plants are still in performance significant function in the executive of different human and livestock disease treatments.

Plant variety residue essential for human well-being in providing an important numeral of habitual and existing remedy required in healthcare. Native population in Ethiopia great engaged plant support customary tablets to get cured from different ailments. Nearly 80% of the Ethiopian inhabitant on plants to prevent and cure various health problems. There are nearby preferable management by traditional healers for some diseases treated. Herbs represent the chief cause of traditional remedies follow by shrubs and tree species. Medicinal plants originate to be the most frequently used plant parts followed by roots for preparation of human and livestock remedies. Traditional medicine preparation mostly involved single plant and mainly by crushing the part used [12].

CONCLUSION

From the result of the review, it can be concluded that; the introduction of modern education, religious factors, environmental degradation and intense deforestation, increased need for farmlands, fuel woods and construction materials in the area are the main causes for reduction in quantity of medicinal plants and associated knowledge. In addition, browsing and grazing by livestock and celebration of ceremonies resulted to the threat of medicinal plants. However, threat due to utilization for medicinal purpose is low compared to the other factors. Generation thought religious, spiritual and cultural related practices has played a significant role in conservation of resources and medicinal plants in the area. However, they have also negative impact to the vegetation and indigenous knowledge of the area.

RECOMMENDATION

From the result of the review based on the research project objectives, it can be recommended that. Resources, especially plant resources are integral to the life of all biota, as they are the primary food producers. Life of world biota is directly or indirectly dependent on plant resources. Thus, indigenous

peoples should be involved in conservation and management plans of plant resources or their indigenous knowledge in their locality. Traditional medicinal plants are central to the indigenous cultures and material needs. Therefore, formal and non-formal education systems should be designed to create positive attitude among the young by integrating in to the curricula about the traditional use of plants in general and medicinal plants in particular.

Recognitions and intellectual property rights should be given to traditional healers, either through certification or through organizing them at community or woreda level, which popularizes their indigenous knowledge and medicinal plants value. Well-known traditional healers of the area should be supported by education, training and finance to have better knowledge of medicinal plant sustainable use. *In-situ* and *ex-situ* conservation activities should be practiced in the project areas through training model farmers to ensure the continuity of threatened medicinal plants. This can be achieved. Encouraging people to grow medicinal plants in home gardens, mixing with crops in farmlands and live fences. Promoting the establishment of local botanical garden at least at woreda level. Encouraging people to protect and enclose ritual and spiritual areas with higher distribution of medicinal plants in the locality.

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