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Ethno-pharmacological activity of Ethiopian traditional medicine for the management of leukemia: A review

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Abstract
Ethiopia is one of the richest countries of plants species and the people are widely uses traditional medicine as primary health care. Leukemia prevalence is one of the three mostly presented cancer type in the country. However, traditional medicine practice, secrecy and scientific evaluation of medicinal plant not will understudy and complied. This study was to review published Ethno-pharmacological evidences of Ethiopian medicinal plants uses for the management of leukemia. A systematic literature search uses from: Google scholar, pub med and science direct data base were using a key word: hemato-protective activity, anti-leukemia, anti-proliferative activity, cytotoxicity. The present literature review revealed that about 92 Anti- Leukemiamedicinal plants species have been identified in Ethiopia. Among all plant species were reported for their traditional use to treat different types of Leukemia. However, 82 species were scientifically studied for their in vitro cytotoxic on human leukocyte 60 (HL-60) cell lines, acute monocytes leukemia cell line and free radical scavenging activities. The efficacy of most Ethiopian medicinal plant for the management of leukemia is not well understudy with scientific research. Screening of medicinal plants for anti-leukemia activity and other types of cancer provides a huge space for development of strong anticancer agents.

Keywords: Anti-proliferative, cytotoxicity, anti-leukemia, ethno-pharmacology

1. Introduction
Leukemia is comprise a heterogeneous group of clonal disorders of hematopoiesis, affecting both hematopoietic stem cells (HSC) and progenitor cells within the myeloid and lymphocytic lineages .the main feature is stem-cell-derived haemopoiesis with altered proliferation and differentiation leading to an excessive accumulation of abnormal Leukemia cells in the bone marrow and peripheral blood [1]. A global leukemia incidence varies by geographical distribution, types and subtypes regarding to WHO Analysis on cancer database, according to (international agency research on cancer GLOBOCAN estimate) in 2018, were present 437,033 (2.4%) new case and caused 309,006 (3.2) death [2].Furthermore, leukemia is one of the major types of cancer in children before the age of 15 years. Up to 80 % are an acute lymphoblastic leukemia, 17 % acute myeloid leukemia and 3% chronic myeloid leukemia with some variation of ALL and AML incidence rate in the world [3]. A study conduct in Ethiopia, from estimated 3707 of all cases from pediatric age Group were leukemia being the majority of cancer (29%) and the fourth most comments cancer type, crude incidence rate was 2.8 in the year 2015 [4]. Perhaps According to the WHO 2018 report, leukemia is one of the three mostly presented cancer types in the country, and 6.6%, 8.5 % and 7.36% was recorded for incidence, mortality and prevalence rate respectively. Treatments for both children and adult leukemia are different between the patients, severity and symptoms. Current regime of therapies has three typeschemotherapy, steam cell transplantation and positive all therapies [5]. During this time there are success on treating different types of leukemia though Target Therapies, Genetic and epigenetic targets, and Immunotherapies [6]. However, higher rate of refractory/resistance and relapsing still challenge on modern medicine era [7]. Thus, novel treatment development is needed for successful achievement on deeper and prolonged remission.
Plants have been the main source of medicines since ancient times. Practically all human societies have utilized plants not only as sources of nutrition but also as therapy against diseases and ailments. Plants contain various phytochemicals and these phytochemicals can play an important role in reducing occurrences of many diseases by boosting up various organ functions of the human body, by acting as antioxidants and by supplying necessary nutrients. Many traditional healing herbs and their parts have been shown to have medicinal value and can be used to prevent, alleviate or cure several human diseases [8]. It is estimated that 70–80% of people worldwide rely chiefly on traditional, largely herbal medicine to meet their

primary healthcare needs [9, 10]. A major portion of the global population in developing countries still relies on botanical drugs to meet its health needs. The attention paid by health authorities to the use of herbal medicines has increased considerably, both because they are often the only medicine available in less developed areas and because they are becoming a popular alternative treatment in more developed areas. It has also been observed that a number modern drugs has been derived from plants used by the indigenous people [11, 12]. Ethiopia is contains a richen amount of different species of flora. And the people of Ethiopians especially on the ruler area are closely interest to uses of plant for the prevention and curing different animal and human disease [13]. For centuries, the people heavily relied on traditional medicine to treat various physical and mental disorders. It is estimated that about 80% of the Ethiopian population, predominantly in rural areas, use traditional medicine due to its accessibility and affordability [14]. In Ethiopian context traditional medicine/alternative medicine widely practicized for the different types of cancer including leukemia due to choice by cancer patient because of community and cultural acceptance, cost and accessibility [15].

2. Material and Method

Systematic literature searches were uses from: Google scholar, pub med and science direct data base were using a key word: hematoprotective activity, anti-leukemia, anti-proliferative activity, cytotoxicity on leukemia cell line of Ethiopian medicinal plants.

Table 1: Ethno-pharmacological activity of Ethiopian traditional medicinal plant uses for the management of Leukemia

Plant species	Plant part	Extract type	IC_{50} TPH-1	IC_{50} HL-60 Cell line	Selectivity index	References
A. abyssinica	Leaves	LP	41.65 + 10.47	-	<1	[16]
	Leaves	LC	113.32 + 15.61	-	<1	1[6]
	Stem	SP	116.43 + 20.46	-	<1	[16]
	Stem	SC	117.28 + 14.50	-	<1	[16]
	Root	RP	22.41+ 4.73	-	<1	[16]
	Root	RC	154.15 + 30.38	-	<1	[16]
A. schimperiana	Leaves	LP	94.77 + 29.50	-	<1	[16]
	Leaves	LC	13.01 + 0.49	-	<1	[16]
	Leaves	LM	10.23 + 0.92	-	<1	[16]
	Stem	SBP	133.04 + 40.07	-	<1	[16]
	Stem	SBC	1.05 + 0.03	-	<1	[16]
	Stem	SBM	2.06 + 0.66	-	<1	[16]
	Root, bark	RBP	11.01 + 1.03	-	<1	[16]
	Root, bark	RBC	1.18 + 0.16	-	<1	[16]
	Root,bark	RBM	2.41 + 0.76	-	<1	[16]
Aloe spp.	Leaves	LE	133.22 + 73.08	-	<1	[16]
	Stem	SP	81.14 + 20.65	-	<1	[16]
	Stem	SC	84.64 + 21.92	-	<1	[16]
	Stem	SM	90.58 + 8.78	-	<1	[16]
	Root	RP	106.09 + 8.20	-	<1	[16]
	Root	RC	15.20 + 3.53	-	<1	[16]
Crotalaria agatiflora (Fabaceae)	Seeds	MeOH	-	>500	>2.69	[17]
		CH_2Cl_2	-	>500	>2.69	[17]
Crotalaria axillaries	Seeds	MeOH	-	196.84	1.56	[17]
		CH_2Cl_2	-	NT	_	[17]
	Leaves	MeOH	-	489.77	3.57	[17]
		CH_2Cl_2	-	196.16	3.32	[17]
Crotalaria emarginella	Leaves	MeOH	-	266.69	1.94	[17]
		CH_2Cl_2	-	380.69	7.84	[17]
Crotalaria fascicularis	Twings	MeOH	-	>500	>3.33	[17]
		$CH_2Cl_2CH_2Cl_2$	-	>500	>8.79	[17]
Crotalaria incana	Pods	MeOH	-	>500	>7.73	[17]
		CH_2Cl_2	-	>500	>9.49	[17]
	Twing	MeOH	-	404.61	6.53	[17]
		CH_2Cl_2	-	>500	>17.51	[17]
	Leaves	MeOH	-	232.22	5.01	[17]
		CH_2Cl_2	-	>500	>10.35	[17]
	Seeds	MeOH	-	>500	>3.03	[17]
		CH_2Cl_2	-	>500	>3.45	[17]
Crotalaria gillettii	Areal part	MeOH	-	>500	>4.47	[17]
		CH_2Cl_2	-	>500	>4.80	[17]
	Leaves	MeOH	-	>500	4.43	[17]
		CH_2Cl_2	-	NT	_	[17]
Crotalaria laburnifolia	Leaves	MeOH	-	>500	>9.93	[17]
		CH_2Cl_2	-	332.39	6.46	[17]
	Pods	MeOH	-	468.75	5.67	[17]
		CH_2Cl_2	-	>500	>5.32	[17]
	Seeds	MeOH	-	>500	>2.74	[17]
		CH_2Cl_2	-	>500	3.08	[17]

	Twigs	MeOH	-	401.58	4.01	[17]
		CH_2Cl_2	-	173	2.94	[17]
C. macrostachys	Leaves	BP	42.78 + 51.67	-	-	[16]
	Bark	BC	87.36 + 19.79	-	-	[16]
	Leaves	LP	76.45 + 25.41	-	-	[16]
	Leaves	LC	>400	-	-	[16]
	Stem	SBP	192.14 +65.72	-	-	[16]
	Stem	SBC	180.33 +61.45	-	-	[16]
	Root, bark	RBP	189.33 +62.88	-	-	[16]
	Root, bark	RBC	161.65 +72.34	-	-	[16]
Crotalaria mildbraedii	Twigs	MeOH	-	>500	>5.30	[17]
		CH_2Cl_2	-	>500	>9.72	[17]
	Leaves	MeOH	-	>500	>4.69	[17]
		CH_2Cl_2	-	>500	>19.74	[17]
Crotalaria phillipsiae	Twigs	MeOH	-	407.37	5.76	[17]
		CH_2Cl_2	-	435.22	34.35	[17]
	Leaves	MeOH	-	>500	>4.40	[17]
		CH_2Cl_2	-	>500	>10.16	[17]
Crotalaria pycnostachya	Pods	MeOH	-	390.40	5.54	[17]
		CH_2Cl_2	-	290.84	4.34	[17]
	Leaves	MeOH	-	188.77	3.35	[17]
		CH_2Cl_2	-	356.06	7.10	[17]
Crotalaria spinose	Pods	MeOH	-	463.68	4.15	[17]
		CH_2Cl_2	-	280.13	6.15	[17]
Cynoglossum geometricum (Boraginaceae)	Leaves	MeOH	-	183.95	1.81	[17]
		CH_2Cl_2	-	312.62	4.88	[17]
E. kebericho	Leaves	FHP	142.77 +65.27	-	-	[16]
	Flower head	FHC	118.62 +49.88	-	-	[16]
	Leaves	LP	115.70 + 7.30	-	-	[16]
	Leaves	LC	41.79 + 3.17	-	-	[16]
	Stem	SP	149.20 +62.51	-	-	[16]
	Stem	SC	199.63 +47.55	-	-	[16]
	Root	RP	31.03 + 4.00	-	-	[16]
	Root	RC	140.52 +39.23	-	-	[16]
	Root	RM	>400	-	-	[16]
E. brucei	Leaves	FB	>400	-	-	[16]
	Flower	FC	21.46 + 1.64	-	-	[16]
	Leaves	LP	139.17 +43.52	-	-	[16]
	Stem	SBP	152.13 +22.07	-	-	[16]
	Stem	SBC	21.52 + 2.80	-	-	[16]
	Root, bark	RBP	200.83 +49.70	-	-	[16]
	Root, bark	RBC	48.26 + 6.65	-	-	[16]
	Root, bark	RBM	48.98 + 0.88	-	-	[16]
Heliotropium cinerascens (Boraginaceae)	Twing	MeOH	-	247.91	1.84	[17]
		CH_2Cl_2	-	161.31	0.72	[17]
	Flowers	MeOH	-	-	-	[17]
		CH_2Cl_2	-	-	-	[17]
Heliotropium steudneri	Leaves	MeOH	-	>500	>5.00	[17]
		CH_2Cl_2	-	>500	>10.24	[17]
Heliotropium somalense	Leaves	MeOH	-	>500	>3.69	[17]
		CH_2Cl_2	-	>500	>10.19	[17]
	Twings	MeOH	-	>500	>4.63	[17]
		CH_2Cl_2	-	193.93	7.12	[17]
J. schimperiana	Leaves	LP	230.14+127.14	-	-	[16]
	Flower	FC	192.52 +68.56	-	-	[16]
	Leaves	LP	91.76 + 39.16	-	-	[16]
	Leaves	LC	372.75 + 70.40	-	-	[16]
	Stem	SBP	129.60 + 24.70	-	-	[16]
	Stem	SBC	370.63+135.02	-	-	[16]
	Root	RP	>400	-	-	[16]
	Root	RC	>400	-	-	[16]
P. capense	Leaves	BP	151.03 + 60.15	-	-	[16]
	Bark	BP	126.49+25.13	-	-	[16]
	Leaves	LP	93.24 ± 18.34	-	-	[16]
	Leaves	LC	232.46±118.39	-	-	[16]
	Stem ,bark	SBP	96.60 ± 4.60	-	-	[16]
	Stem ,bark	SBC	>400	-	-	[16]

	Root	RP	73.98 ± 22.44	-	-	[16]
	Root	RC	153.85 ± 34.28	-	-	[16]
P.dodecandra	Leaves	BP	>400	-	-	[16]
	Bark	BC	>400	-	-	[16]
	Leaves	LP	115.89 + 27.76	-	-	[16]
	Stem	SP	80.09 + 19.27	-	-	[16]
	Stem	SC	115.18 + 32.87	-	-	[16]
	Root	RP	155.44 + 48.88	-	-	[16]
	Root	RC	220.40 + 23.05	-	-	[16]
R. prenoides	Bark	BC	>400	-	-	[16]
	Leaves	LP	115.89 ± 27.76	-	-	[16]
	Stem	SP	80.09 ± 19.27	-	-	[16]
	Stem	SC	115.18 + 32.87	-	-	[16]
	Root	RP	155.44 ± 48.88	-	-	[16]
	Root	RC	220.40 ± 23.05	-	-	[16]
Senecio hadensis (Asteraceae)	Leaves	MeOH	-	>500	>8.71	[17]
		CH_2Cl_2	-	>500	>9.54	[17]
	Flowers	MeOH	-	217.65	2.21	[17]
		CH_2Cl_2	-	>500	>4.78	[17]
Solanecio angulatus (Asteraceae)	Leaves	MeOH	-	130.77	2.23	[17]
		CH_2Cl_2	-	>500	>12.13	[17]
Solanecio gigas	Flowers	MeOH	-	412.58	5.77	[17]
		CH_2Cl_2	-	>500	>10.25	[17]
Solanecio manni	Leaves	MeOH	-	>500	>9.88	[17]
		CH_2Cl_2	-	220	8.84	[17]
Artemisia annua	Leaves	Alcohol	-	29.0	_	[18]
Rumex abyssinicus	Leaves	Alcohol	-	29.0	_	[18]
Catha edulis Forsk	Leaves	Alcohol	-	29.0	_	[18]
Xanthium strumarium	Leaves	Water	-	2.63	20	[19]
		Methanol	-	2.63	20	[19]
		Dichloromethane	-	2.63	20	[19]
Glinuslotoides	Firut	n-hexan	-	106.1	_	[20]
		Dichloromethane	-	131.1	_	[20]
		Methanol	-	134.0	_	[20]
		Water	-	128.5	_	[20]

Key: - NT, not tested; MeOH, methanol; CH_2Cl_2, dichloromethane. FH-Flower head, F-Flower, L-Leaf, SB-Stem bark, S-Stem, RB-Root bark, R-Root, B-Berries, SD-Seed (P)-Petroleum ether extract, (C)-Chloroform extract,(M)-Methanol extract.

3. Results

The present literature review revealed that about 92 Anti-Leukemiamedicinal plants species have been identified in Ethiopia. Among all plant species were reported for their traditional use to treat different types of Leukemia. However, 82 Plants species were scientifically studied for their in vitro cytotoxic on human leukocyte 60 (HL-60) cell line, TPH-1 human leukocyte cell line and free radical scavenging activities.

4. Conclusions

Cancer is still a challenging disease in developing countries. Most citizens for serving as primary health care take traditional/ alternative medicine and its account up to 70% in Africa including Ethiopia. The efficacy/effectiveness of most Ethiopian traditional medicinal plant for the management of leukemia is not well understudy with scientific research and advanced molecular level experiments. Screening of medicinal plants for anti-leukemia activity and other types of cancer provides a huge space for development of strong anticancer agents.

Conflict of interest

None declared

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