



# HERBAL DRUGS USED IN THE TREATMENT OF HIV & AIDS

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**Abstract:** The increasing prevalence of HIV/AIDS has led to in-depth exploration of alternative and complementary treatments, especially herbal medicine. This review article provides a critical analysis of the use of herbal drugs in treating HIV/AIDS, focusing on their traditional and modern applications. We delve into various herbal remedies, examining their active compounds, how they work, and the clinical evidence that backs their effectiveness. The review comprehensively brings together findings from multiple studies, highlighting both the potential advantages and hurdles linked to incorporating herbal therapies into conventional treatment plans. Furthermore, we tackle safety concerns, potential drug interactions, and emphasize the significance of standardization in herbal preparations. This article strives to enhance understanding of herbal medicine as a valuable part of holistic HIV/AIDS management by offering a thorough overview, thus promoting additional research and clinical investigations.

**Keywords:** Herbal medicine, HIV infection, AIDS, Medicinal plants, Anti-viral, efficacy.

## 1. Introduction:

Using plant extracts that have been identified and processed, herbal medicine, also known as phytotherapy, is the use of medicinal plants to prevent and treat illnesses. It contains both traditional and widely used treatments in each nation.<sup>[1]</sup> As natural goods, herbs vary from person to person in terms of their chemical

makeup, ranging from rigorous therapy to the use of plant extracts in accordance with Western traditional medical practices.<sup>[2]</sup> The information, abilities, and practices associated with different traditions, beliefs, and experiences that are utilized to preserve health and prevent, diagnose, treat, or cure illnesses are known as traditional medicine. both emotional and physical ailments.<sup>[3]</sup>

### 1.1 History of Herbal Medicine:

The French physician Henri Leclerc (1870–1955) is credited with coining the term herbal medicine. The Rig Veda, the Atharva Veda, the Charakas, and the Sushrut Samhita are examples of ancient Indian literature. Ancient tribal and scientific traditions serve as the foundation for traditional medicine.<sup>[4]</sup> Herbal treatments for age-related illnesses including osteoporosis and memory loss, as well as other ailments like diabetes, arthritis, and liver disease, are referenced in ancient literature. away from Sri Lanka to other nations, and is highly influential and philosophical in the Atharva Veda (c. 1200 BC). The Charak Samhita and Sushrut Samhita (c. 1000–500 BC) are well-known for their descriptions of over 700 plants.<sup>[5]</sup> Numerous pharmaceutical items have been developed and manufactured in recent years using fresh insights gained by studying the properties of biological compounds found in food, plants, and medicinal plants.<sup>[4]</sup> Herbal medications are the most effective therapy for numerous disorders. The efficacy of plants and herbs has been demonstrated by several investigations.<sup>[6]</sup>

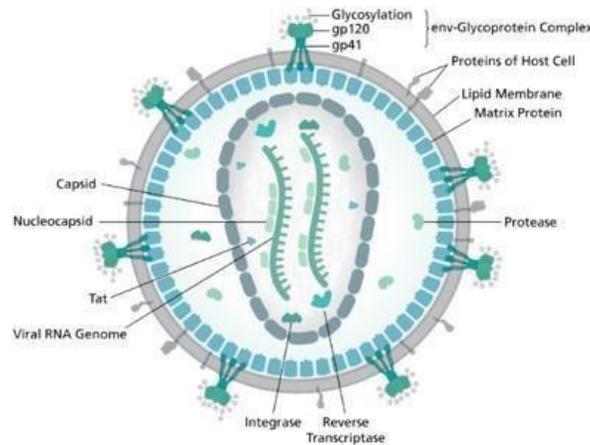
## 2. HIV & AIDS:

### 2.1 Introduction:

AIDS is an acronym for acquired immunodeficiency syndrome, and HIV is an acronym for human immunodeficiency virus. The virus that causes AIDS is called HIV. HIV does not transfer from person to person; it only affects humans. A communicable infectious agent known as the human immunodeficiency virus is the cause of AIDS, an infectious disease that results in widespread immunosuppression.<sup>[7]</sup> The illness often develops in phases, starting with a latent stage that is followed by an asymptomatic latency period and first symptoms include fever, weakness, disorientation, joint pain, arashes, and systemic lymphadenopathy. Fever, weight loss, nocturnal sweats, diarrhea, thrust, skin lesions, and sadness are typical symptoms in the intermediate stage. Since the first instance was discovered in 1981, it has been a severe and potentially fatal health issue. It is also the most rapidly spreading disease of during the century.<sup>[8]</sup> Bats, mosquitoes, and other animals do not spread the disease. It is not passed down from one generation to the next, making it non-hereditary. A healthy individual can contract it from an infected one. The body weakens. The immune system's deficiency in CD4+ cells is the root reason.

These CD4+ cells, sometimes referred to as T cells, helper cells, or white blood cells, defend humans against infections.<sup>[9]</sup>

## 2.2 Structure of HIV:



**Fig 1. HIV-1 Virion** <sup>(6)</sup>

**Gp120:** - Because of its molecular weight, it is called 120. Because it is crucial for attaching to surface receptors, it is essential for viral entrance into cells.

**GP41:** - It is a component of the protein complex of retroviruses, such as the virus that causes HIV. A group of viruses with envelopes that use reverse transcriptase to replicate inside their host cells. It goes after a host cell.

**Lipid Envelope:** - The lipid envelope is the covering that the virus attaches itself to.

**P17:** - It is the primary structural protein of viruses. It appears to be a circle. Reverse transcription, integration, and protease are the three enzymes needed for HIV replication.

**Protease:** - The life cycle of HIV, the retrovirus that causes AIDS, depends on the retroviral aspartyl protease. This enzyme creates the natural protein components of the infectious HIV virus by correctly dissociating newly generated polyproteins.

**Integrase:** - The retrovirus produces the enzyme integrase, which enables the integration of its genetic material into the infected cell's DNA.

**RNA:** - The genetic material of all living things, including the majority of viruses, is stored in lengthy DNA strands. Since RNA makes up their genes, retroviruses are unique.

**Capsid:** - It is a protein shell that encloses the genetic material of the HIV.

**MHC Proteins:** - MHC proteins are incorporated into the HIV-1 envelope as a virion from the host cell surface.<sup>[6]</sup>

## 2.3 Types of HIV:

Two main types of HIV have been identified so far,

- (i) **HIV-1:** It regularly goes by the moniker HIV and is the cause of the global epidemic. It is a very diverse virus that mutates easily. It is a virus that is always changing. HIV-1 comes in a variety of strains that can be

categorized into groups and sub-types, including M & O. There are at least 10 known genetically different sub-types within group M, ranging from A to J.

(ii) **HIV-2:** Furthermore, there is another unique group of diverse viruses in Group O. HIV-2 is mostly seen in West Africa and is less severe and rare. Mostly found in West Africa, HIV-2 is less aggressive and less common.<sup>[10]</sup>

## 2.4 Etiology:

AIDS and HIV symptoms differ depending on the infection stage. When you initially contract HIV, you might not exhibit any symptoms, but two to six weeks following infection, you might start to feel like you have the flu. In addition to other ailments that may indicate you have HIV, the primary symptoms of the condition are fever, headache, sore throat, edema, and redness. The T group (CD4 lymphocytes) and white blood cells, which make up the body's immune system, are progressively destroyed by the virus as it grows in the lymph nodes. For as long as eight or nine years, or even longer, no symptoms may appear.<sup>[11]</sup> In addition to causing long-lasting symptoms like enlarged lymph nodes, diarrhea, weight loss, fever, coughing, and breathing difficulties, the virus continues to propagate and devastate the immune system. Before it is deemed full-blown AIDS, the last stage of HIV, which occurs around ten years after infection, will exhibit more severe symptoms.<sup>[12]</sup>

## 2.5 Causes:

Sexual contact between two people is the cause of it. Intimate interactions between people are the source of that. The immune system, the body's defense mechanism against infections, is weakened and damaged when an individual contracts HIV.<sup>[13]</sup>

### 2.5.1 It is cause by:

1. To keep yourself safe, don't share syringes or needles for drugs.
2. Oral, vaginal, or other forms of sexual contact with an HIV-positive individual.
3. HIV infection appears to be more likely to occur during unprotected sexual contact with an infected partner if you have other STD's such syphilis, herpes, or gonorrhea.
4. An HIV-positive mother can spread the virus to her unborn child throughout pregnancy, childbirth, and breastfeeding.<sup>[14,15]</sup>

## 2.6 Transmission:

An infected individual can spread HIV to another person by:

- a) Blood (including menstrual blood)
- b) Semen
- c) Vaginal secretions
- d) Breast milk<sup>[16]</sup>

### 2.6.1 Activities That Allow HIV Transmission

1. Sexual contact without protection .
2. Direct blood contact, such as via injection needles, blood transfusions, mishaps in medical facilities, or specific medical supplies.
3. Only mother-to-child transmission of HIV is known to occur (before or during birth). It is spread by coming into contact with mucous membranes by contaminated blood, semen, or vaginal and cervical secretions.
4. Injecting blood or blood products that are contaminated. Both vertical transmission from an infected mother to the fetus and breast milk transmission from the mother to the child are possible.<sup>[17]</sup>

### 2.6.2 The likelihood of HIV transmission hinges on the following factors:

1. The amount of HIV in the contaminated fluid.
2. The quantity of liquids given to the body.
3. The T4 cells are accessible to the contaminated fluid.<sup>[18]</sup>

### 2.6.3 Fluids with a high concentration of HIV include:

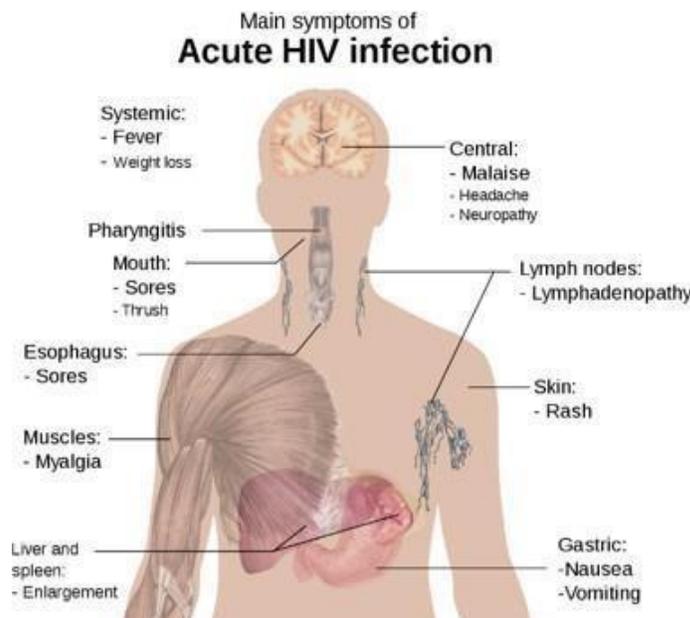
Semen  
Menstrual flow  
Blood and blood components  
Vaginal secretions  
Breast milk  
Pre-ejaculatory fluid<sup>[19]</sup>

### 2.6.4 Fluids with a low concentration of HIV include:

Pus  
Tears  
Saliva  
Urine  
Vomiting  
Feces  
Nasal mucosa<sup>[20]</sup>

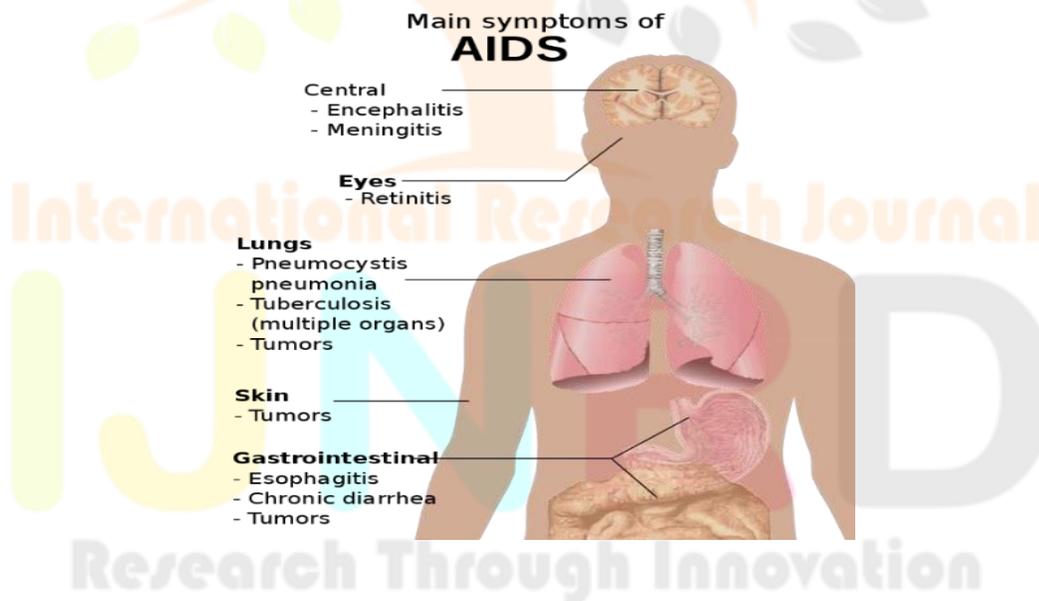
## 2.7 Symptoms:

- a) For longer than three months, big lymph nodes or “swollen glands” that may expand
- b) Recurrent fevers, sweats, skin rashes, or persistently flaky skin
- c) Temporary memory loss
- d) Delayed development or recurrent illness in children, coughing and dyspnea
- e) Seizures and impaired coordination
- f) Trouble swallowing
- g) Disorientation and forgetfulness
- h) Persistent nausea, cramps diarrhea or vomiting
- i) Vision loss
- j) Inexplicable weight loss
- k) Lack of Energy
- l) Anorexia
- m) Exhaustion
- n) Frequently occurring fevers and sweats
- o) Recurrent yeast infections that are persistent
- p) In women, pelvic inflammatory illness that is not alleviated by therapy<sup>[21,22,23]</sup>



**Fig 2.** Main symptoms of acute HIV infection <sup>(6)</sup>

### 2.7.1 AIDS Progression:



**Fig 3.** Main symptoms of AIDS <sup>(6)</sup>

### 2.8 Diagnosis:

HIV is usually identified by looking for antibodies to the virus in your blood or saliva. Regrettably, it can take up to 12 weeks for your body to produce these antibodies. HIV antigen, a protein produced by the virus immediately upon infection, can now be detected by a novel test. Shortly after catching the virus, this test enables prompt confirmation of a diagnosis.<sup>[24]</sup>

### 2.8.1 Here are the various tests used to identify HIV/AIDS:

- a) Sensitivity Test
- b) Specificity Test
- c) False Negative Test
- d) False Positive Test
- e) Antibody Test
  - 1) Enzyme-linked immunosorbent assay (ELISA)
  - 2) Western Blot Test
- f) Antigen Test
- g) Polymerase Chain Reaction (PCR)
- h) Home Test
- i) Test for Traylor Treatment
  - 1) CD4 Count
  - 2) Viral Load
  - 3) Drug Resistance <sup>[25]</sup>

### 2.9 Treatment:

Significant progress has been made in HIV treatment during the past 25 years, from 1986 to 2011. Over 30 medications have been created, each of which targets a distinct stage of HIV replication and falls into at least four classes. <sup>[26]</sup>

#### 2.9.1 These steps include:

- 1) HIV RNA reverse transcription to proviral DNA.
- 2) Proviral DNA integration into the host cell genome.
- 3) HIV RNA binding to receptors and entrance into the host cell.
- 4) The action of HIV protease causes HIV to mature beyond elementary school. <sup>[27]</sup>

HIV is treated with antiretroviral medications. These medications work well against the retrovirus known as the human immunodeficiency virus (HIV). They have the potential to significantly improve and prolong life.

#### 2.9.2 Antiretroviral drugs are classified as follows:

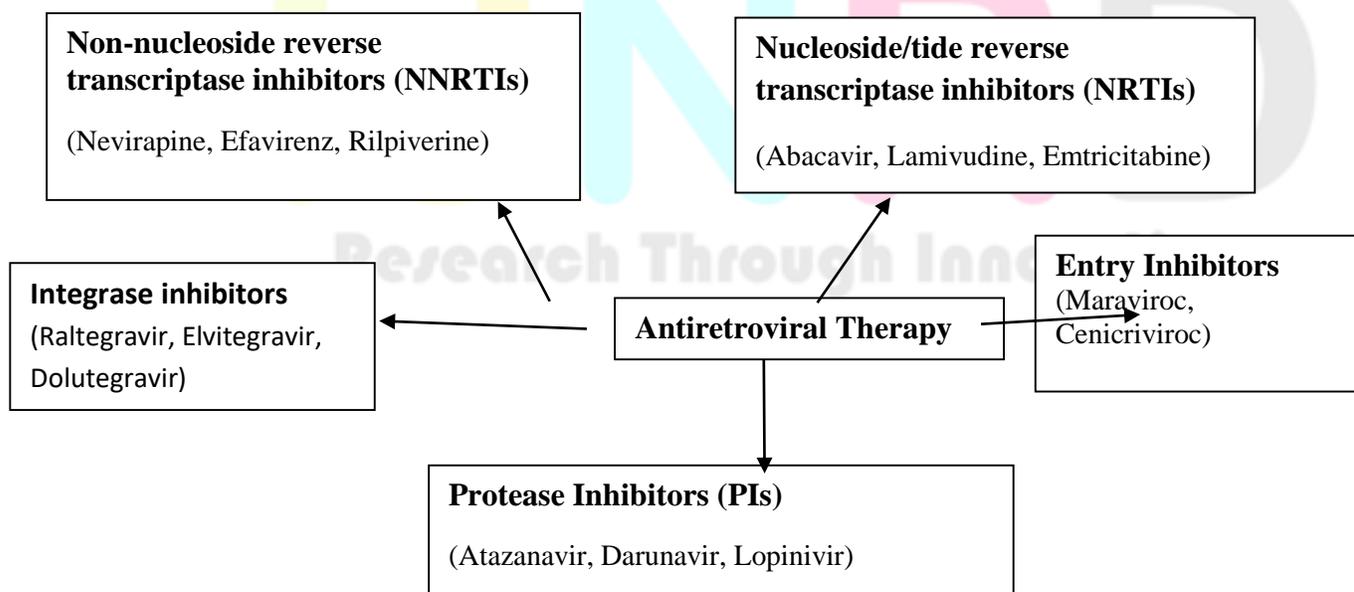


Fig.4 Classification of Antiretroviral Drugs <sup>(28)</sup>

## 2.10 Prevention:

- 1) Used drugs and Needle Share
- 2) Exposure to body fluids
- 3) In Pregnancy
- 4) Mother to Child Transmission
- 5) Sexual Transmission <sup>[29]</sup>

### 2.10.1 Commonly used herbs in HIV-AIDS treatment:<sup>[30,31,32,33,34]</sup>

#### i) Skin immunity:

1. Aloe vera

#### ii) Adaptogen:

1. Ginseng (panax spp.)
2. Withania (Withaniasomnifera)

#### iii) Anti-bacterial:

1. Propolis

#### iv) Anti-inflammatory:

1. Atractylodes (Atractylodesmacrocephala)
2. Tea tree (Melaleuca alternifolia)
3. Turmeric (Curcuma longa)
4. Olive tree (Olea europaea)

#### v) Anti-viral activity:

1. Golden Seal (Hydrastis canadensis)
2. Biscuit root (Lomatium spp.)
3. Neem tree (Azadirachta indica)

#### vi) Anti-carcinogen:

1. Dyer's woad (Isatis tinctoria)

#### vii) Circulatory stimulant:

1. Ginger (Zingiber officinate)
2. Ginkgo (Ginkgo biloba)

#### viii) Depurative:

1. Garlic (Allium sativum)
2. Grapefruit seed (Citrus)

#### ix) Diaphoretic:

1. Boxwood (Buxus sempervirens)

#### x) Digestive carminative:

1. Peppermint (Mentha)



**xi) Expectoant:**

1. Hyssop (*Hyssopus officinalis*)

**2.11 Clinical features:**<sup>[35,36,37]</sup>

1. **METABOLIC MANIFESTATIONS:** HIV infections are associated with a number of metabolic abnormalities, including insulin resistance, lactic acidosis, hyperglycemia, lipodystrophy versus lipoatrophy, and hyperlipidemia.
2. **ORAL MANIFESTATIONS:** During the course of their illness, an HIV-positive patient may develop oral symptoms. Immunocompetent patients rarely have oral cavity immunodeficiency-related reasons.
3. **OCULAR MANIFESTATIONS:** People with HIV are often affected by ocular disorders, which can have a wide variety of causes, from benign HIV retinopathy to viral opportunistic infections that can endanger vision.
4. **CUTANEOUS MANIFESTATIONS:** In people with HIV, cutaneous diseases are frequently prevalent. Lesions are typically linked to either a basic systemic illness or a primary skin disease or infection that can spread to internal organs.
5. **PULMONARY MANIFESTATIONS:** Infectious, noninfectious, and malignant categories can be used to broadly classify pulmonary symptoms of HIV infection.
6. **CARDIAC MANIFESTATIONS:** In a considerable proportion of people, cardiac problems are associated with HIV infection. As HIV patients reach more advanced stages of the disease, cardiac disease becomes more common.
7. **NEUROLOGIC MANIFESTATIONS:** Subacute encephalitis is the most prevalent and serious neurological condition associated with HIV infection. Also referred to as AIDS dementia complex or AIDS encephalopathy.
8. **GENITOURINARY MANIFESTATIONS:** Although full-blown AIDS is not always necessary, HIV usually manifests in those with a low CD4+ T-cell count. Nephrotic-range proteinuria and sub nephrotic proteinuria have different clinical presentations.
9. **RHEUMATOLOGIC MANIFESTATIONS:** Typically oligoarticular, HIV-associated arthritis primarily affects the lower extremities. The etiology of the arthritis is unknown, and it is self-limiting. Due to vaginal or gastrointestinal tract infections, homosexual males may be more susceptible to gonococcal arthritis or post-infectious reactive arthritis.
10. **GI MANIFESTATIONS:** Gastrointestinal symptoms are often seen when HIV infection progresses. *Candida* species can cause odynophagia, dysphagia, or both, which can exacerbate esophageal symptoms in AIDS patients.
11. **HEMATOLOGIC MANIFESTATIONS:** HIV infection is frequently associated with bone marrow suppression, just like other chronic illnesses. In the early stages of HIV infection, cytopenia is uncommon; but, as the disease progresses, its frequency and severity increase.

### 3. List of Herbal Drug showing Anti-HIV Activity:

Sr. No.	Plant	Family	Part Used	Pharmacological Activity
1.	Curcuma Longa L.	Zingiberaceae	Rhizome	Neuroprotective, Anti-HIV, Antioxidant, Anti-inflammatory
2.	Curcuma zanthorrhiza Roxb.	Zingiberaceae	Rhizome or underground stem	Antispasmodic, Anti-HIV, Antitumor, Antibacterial
3.	Balanites aegyptiacus L. Delie	Zygophyllaceae	Bark, Fruit	Antifungal, Antidiabetic, Anticancer, Anti-HIV, Antiparasitic
4.	Kaempferia parviflora Wall. ex Baker	Zingiberaceae	Rhizome	Cardioprotective, Neuroprotective, Anti-allergic, Anti-HIV
5.	Aloe Vera L. Burm. F.	Xanthorrhoeaceae	Gel & Latex	Anti-HIV, Antifungal, Antiproliferative, Antiulcer
6.	Aloe ferox	Xanthorrhoeaceae	Gel & Dark Sap	Laxative, Anti-HIV, Anti-hyperglycemic, Antitumor
7.	Citrus hystrix DC.	Rutaceae	Fruit bark	Flavoring agent, Anti-HIV, Insecticide, Antibacterial
8.	Cinchona pubescens Vahl	Rubiaceae	Bark	Antimalarial, Antioxidant, Anti-HIV
9.	Rosa woodsii Lindl.	Rosaceae	Leaf	Antioxidant, Antimicrobial, Anti-HIV
10.	Rosa laevigata Michx.	Rosaceae	Fruit	Antiviral, Anti-HIV, Antitumor, Neuroprotection
11.	Scoparia dulcis L.	Plantaginaceae	Leaf	Antiulcer, Analgesic, Anti-urolithiasis, Anti-HIV
12.	Plumbago indica L.	Plumbaginaceae	Root	Hepatoprotective, Anticancer, Anti-HIV
13.	Digitalis purpurea L.	Plantaginaceae	Leaf	Cardiac glycoside, Symptomatic, Anti-HIV
14.	Piper longum L.	Piperaceae	Fruit	Anti-platelet aggregation, CNS depressant, Hepatoprotective, Anti-HIV
15.	Piper elongatum Vahl	Piperaceae	Leaf	Anti-HIV, Antifibrotic, Antidepressant, Antibacterial
16.	Papaver somniferum L.	Papaveraceae	Seed	Antimutagenic, Anti-HIV, Anticarcinogenic, Antiparasitic
17.	Eucalyptus citriodora Hook.	Myrtaceae	Leaf	Antispasmodic, Antiseptic, Diuretic, Anti-HIV, Antitumor
18.	Tinosporasinesis	Menispermaceae	Stem bark	Anti-malarial, Anti-

	(Lour.) Merr.			gonorrhoea, Antihelmentic, Anti-HIV, Analgesic
19.	Hibiscus sabdariffa L.	Malvaceae	Flower	Anti-HIV, Antiobesity, Antiurolithicatic, Renoprotective
20.	Cinnamomum verum J. Presl	Lauraceae	Leaf	Anti-HIV, Antifungal, Antibacterial, Anticancer
21.	Cinnamomum loureiroi Nees	Lauraceae	Stem bark	Antiemetic, Anti-diarrheal, Anti-flatulent, Anti-HIV
22.	Salvia officinalis L.	Lamiaceae	Leaf	Anti-Alzheimer's, Anti-obese, Anti-HIV, Anti-diabetic
23.	Mentha Canadensis L.	Lamiaceae	Whole plant	Anti-HIV, Anti-inflammatory, Antioxidant
24.	Mentha arvensis L.	Lamiaceae	Leaf	Anti-allergic, Anti-HIV, Antifertility, Hepatoprotective
25.	Seena occidentalis L. Link	Fabaceae	Leaf	Anti-parasitic, Antimalarial, Anti-viral, Anti-HIV
26.	Seena alata Roxb.	Fabaceae	Aerial part	Laxative, Antidiabetic, Anti-HIV
27.	Seena obtusifolia L. H.S.Irwin & Barneby	Fabaceae	Aerial part	Anti-HIV, Anxiolytic, Hepatoprotective, Hyperlipidaemia
28.	Saraca indica L.	Fabaceae	Bark	Antihyperglycemic, Antipyretic, Anti-HIV, Antihelmentic
29.	Acacia nilotica L. Willd. ex Delile	Fabaceae	Bark	Anti-HIV, Analgesic, Antihypertensive, Antibacterial
30.	Acacia Mellifera (Vahl) Benth.	Fabaceae	Stem bark	Antimicrobial, Anti-HIV, Antibacterial, Antifungal
31.	Acacia catechu(L.f.) Willd	Fabaceae	Resin	Apoptotic, Immunomodulatory, Antioxidant, Anti-HIV
32.	Shirakiopsis indica (Willd.) Esser	Euphorbiaceae	Fruit	Anti-H.pylori, Anti-inflammatory, Cytotoxic, Anti-HIV
33.	Sapium indicum Willd.	Euphorbiaceae	Fruit	Antioxidant, Anti-HIV, Antihypertensive, Cytotoxicity
34.	Ephedra sinica Stapf	Ephedraceae	Stem	Antiobesity, Asthma, Anti-HIV
35.	Euphorbia hirta L.	Euphorbiaceae	Leaves, stem & flowers	Anti-HIV, Antimalarial, Gastroprotective
36.	Phyllanthus niruri	Phyllanthaceae	Whole Plant	Anti-HIV
37.	Maprouneam Africana Muell.	Euphorbiaceae	Roots	Anti-HIV
38.	Ganoderma lucidum	Ganodermataceae	Spores	Anti-HIV,

				Immunosuppressant
39.	Arnebiaeuchroma	Boraginaceae	Roots	Anti-HIV, Anti-inflammatory, Antimicrobial
40.	Xanthocerasorbifolia	Sapindaceae	Wood	Anti-HIV
41.	Soya bean	Fabaceae	Seeds	Anti-diabetic, Memory enhancer, Anti-HIV
42.	Smilax glabra	Smilacaceae	Root & Rhizomes	Immunomodulant, Antihyperglycemic, Anti-HIV, Anti-viral
43.	Crategus pinnatifida	Rosaceae	Fruits & Leaves	Anti-HIV & Anti-thrombotic
44.	Punica granatum	Lythraceae	Flowers, seeds, pericarb, bark & juice	Hypoglycemic, Anti-HIV, Anti-cancer & Antiviral
45.	Garcinia speciosa	Garcinia speciosa	Bark	Antihelicobacter, Antiobesity, Anti-HIV
46.	Acer okamotoanum	Spindaceae	Leaves	Anti-HIV
47.	Palicourea condensate	Rubiaceae	Leaves	Uterotonic, Cytotoxic & Anti-HIV
48.	Calendula officinalis	Asteraceae	Flowers & Leaves	Anti-inflammatory, Astringent, Antiseptic, Antifungal, Cholagogue, Emmenagogue & Anti-HIV
49	Fraxinus sieboldiana	Oleaceae	Bark	Anti-oxidant & Anti-HIV
50	Eclipta prostrate	Asteraceae	Leaves, Roots & Aerial parts	Antiasthamatic, Hepatoprotective, Antibacterial & Anti-HIV

[3,5,10,31,32,33,34,39,40,41,42,43]

**Table 1: List of Herbal Drugs****4. Mainly used Herbal Drugs to treat HIV Infection: -****1) EuphorbitahirtaL.:****Family:** -Euphorbiaceae**Parts Used:** - Stems, Roots, Latex & Seeds**Chemical Components:** -Phytosterol, Triterpenes, Alkanes, Polyphenols, Flavonoids, Tannins.**Application in Medicine:** -Colic, Cough, Dysentery, Eczema, Bronchial Infection, Asthma & Warts.

**Pharmaceutical Action:** - Antispasmodic, Anti-HIV, Antiasthamatic, Antibacterial.

**Study:** - Extracts of *Euphorbitahirta* L. were found to be effective against HIV-1, HIV-2, and SIVmac251 by Gyuris et al. (Gyuris et al, 2009).<sup>[39]</sup>

## 2) Soya bean:

**Family:** -Fabaceae

**Parts Used:** -Seeds

**Chemical Components:** - Linolic acid, oleic acid, linoleic acid, palmitic acid and stearic acid.

**Application in Medicine:** -Jaundice, Arthritis, Edema & Infertility.

**Pharmaceutical Action:** - Memory Enhancer, Anti-HIV, Anti-diabetic.

**Mechanism &Study:** - Hemagglutinin and a protease inhibitor from mini-black soybeans were found to have anticancer and HIV-1 reverse transcriptase inhibitory properties by Xiu et al. (Xiu et al, 2011).<sup>[40]</sup>

## 3) Smilax glabra:

**Family:** -Smilacaceae

**Parts Used:** -Rhizomes & Root

**Chemical Components:** -Smig lactone & Siglabrol

**Application in Medicine:** - Cancer, Inflammation & Diabetes Mellitus.

**Pharmaceutical Action:** - Antihyperglycemic, Immunomodulant, Anti-HIV, Antiviral & Anti-proliferative.

**Study:** - Smilaxin from *Smilax glabra* rhizomes has been shown to reduce HIV-1 reverse transcriptase activity, with an IC<sub>50</sub> of 5.6 micron (Chu, 2006).<sup>[41]</sup>

## 4) Crataegus pinnatifida:

**Family:** - Rosaceae

**Parts Used:** -Leaves & Fruit

**Chemical Components:** -Hyperin, malic acid, quercetin, Sorbitol & diethylaminehydrochloride.

**Application in Medicine:** - to treat skin cancer

**Pharmaceutical Action:** - Anti-thrombotic & Anti-HIV

**Study:** - Triterpenes from *Crataegus pinnatifida* have been shown to suppress HIV-1 protease, according to Min et al. The extract's concentration was 100 micrograms per milliliter. Additionally, this plant yielded two novel chemicals. These compounds' structures resembled those of ursolic acid and uvaol. Using spectral data, this

similarity was discovered. Both of these substances had potent anti-HIV-1 protease properties. Ursolic acid's IC50 value was 8.0 microM, while uvoal's was 5.5 (Min et al., 1999).<sup>[42]</sup>

## 5) **Punica granatum:**

**Family:** -Lythraceae

**Parts Used:** - Pericarb, Juice, Flowers, Seeds & Bark

**Chemical Components:** - Isopelletierine, fiber, sulphur, vitamin C, magnesium, Pectin, carbohydrates & potassium.

**Application in Medicine:** - Lymphoma, diabetes mellitus, Carcinoma of prostate.

**Pharmaceutical Action:** - Anti-viral, Anti-cancer, Anti-HIV, hypoglycemic.

**Study:** - Punica granatum is a potential topical microbicide and HIV-1 entrance inhibitor, according to Neurath et al. Fruit juice's ability to suppress HIV-1 IIIB was examined in a study. Cell receptors CD4 and CXCR4 were employed. According to this study, Punica granatum may be used to produce an anti-HIV-1 microbicide (Neurath et al, 2004).<sup>[43]</sup>

## 5. **Conclusion:**

HIV/AIDS infections have been treated, prevented, or lessened using a wide variety of therapeutic chemicals made from several medicinal plants. Clinical studies on different parts of medicinal plants have shown that they are effective in combating HIV and have not shown any negative side effects. The medications used to treat HIV can be costly, have negative side effects, increase the risk of adverse drug responses, and even cause drug resistance. Investigating naturally occurring anti-HIV drugs may be made possible by medicinal plant chemical components. More researchers may be inspired to explore alternative HIV treatment approaches by the results and lessons gained from different anti-HIV natural items. It might be wise to investigate these plants further. A new age in HIV treatment may be ushered in by demonstrating their mode of action and encouraging results. Many AIDS patients are seeking help from alternative medical systems such as homeopathy, Ayurveda, Chinese medicine, and Unani. Medicinal plants have been used for centuries to cure AIDS. The goal of ongoing study is to identify plants and the active ingredients in them that have anti-STI properties, such as the ability to combat the human immunodeficiency virus. The ultimate objective is to create a successful strategy for treating and preventing the spread of this illness. The use of medicinal plants has a long history and is common in both industrialized and developing nations. The use of herbal medicine to treat AIDS makes sense. Many substances produced from plants are known to prevent HIV from spreading at various phases of its life cycle. These consist of proteins, quinines, xanthene, phospholipids, lignin, phenolics, alkaloids, carbohydrates, coumarin, flavonoids, and tannin's. Plant bodies and microbicides generated from plants are novel approaches to HIV prophylaxis. As a result, herbal medications can be developed as an affordable, safe, and efficient AIDS treatment option.

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