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# ROLE OF AYURVEDA IN THE MANAGEMENT AND PREVENTION OF HIV- AIDS

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## ABSTRACT

HIV, human immunodeficiency virus and AIDS means Acquired immunodeficiency syndrome continue be a major global public health issue including India. There are some antiretroviral drugs which inhibits the reproduction of HIV but no anti-HIV drug has been established till. Modern medical science recommend some nutrient to full fill the immunodeficiency produce by HIV which is also insufficient. Ayurveda is a huge store of herbal, mineral and herbomineral drugs for various diseases. Though the HIV and AIDS has not mentioned in any text book of Ayurveda directly, but there are so many indirect references of viral diseases and its hazards along with its management has been found in Ayurveda. Lisa virus which is RNA virus similar to HIV and its illness has been described under the heading of Alark visha. Immunodeficiency has been also described under the heading of ojakshaya. Herbal drugs like Bhumyaamalaki, Sunthi, Syamaparni, Austakhandus, Aak Samundarphala, Amar bel, Indian walnut, Haridra and Guduchi has been prove its anti-retroviral efficacy in lab study. Shilajatu Rasayana, Ashwagandha, Tulsi, Pippali, Amalaki and Yashtimadhu has also prove its effectiveness to improve immunodeficiency caused by AIDS. Thus by using Ayurvedic drugs HIV-AIDS can be managed effectively, though there is need of clinical trials to prove the anti-HIV effect of drugs.

**KEYWORDS:** Bhumyaamalaki, Sunthi, Syamaparni, Austakhandus, Aak Samundarphala, drugs.

## 1 INTRODUCTION

The word AIDS stand for Acquired Immuno Deficiency Syndrome caused by an RNA virus HIV (Human immunodeficiency virus). AIDS continues to be a major global public health issue. AIDS was first reported in 1981 and 25.3 millions people have died of AIDS related illiness.[1] In 2014, an estimated 36.9 million people were living with HIV (including 2.6 million children) – a global HIV prevalence of 0.8%.[2] The vast majority of this number live in low- and middle- income countries. In the same year, 1.2 million people died of AIDS-related illnesses.[3] 25.8 million people living with HIV are in sub-Saharan Africa, accounting for 70% of the global total.[4] Only 54% of all people living with HIV know that they have the virus.[5] India has the third largest HIV epidemic in the world. In 2013, HIV prevalence in India was an estimated 0.3%. This figure is small compared to most other middle-income countries but because of India's huge population (1.2 billion) this equates to 2.1 million people living with HIV. In the same year, an estimated 130,000 people died from AIDS-related illnesses.[6] Overall, India's HIV epidemic is slowing down, with a 19% decline in new HIV infections (130,000 in 2013) and a 38% decline in AIDS-related deaths between 2005 and 2013. Despite, this 51% of deaths in Asia are in India.[7] HIV prevalence in India varies geographically. The five states with the highest HIV prevalence (Nagaland, Mizoram, Manipur, Andhra Pradesh and Karnataka) are in the south or east of the country. Some states in the north and northeast of the country, report rising HIV prevalence.[8] Though the description of HIV and AIDS is not found in any text book of Ayurveda, the infectious diseases and epidemiology has been described under the heading of *upsargik and janpadodhvansh* respectively. *Acharya Sushruta* has mentioned the Sah-shaya.[9] (sleeping with an infected man or women) as one of the mode of transmission of contageious disease. It means that *Acharya Sushruta* has also mentioned the disease transfer with sexual contact. There are so many references found in Ayurveda which may be link up with viral diseases indirectly. HIV causes immunodeficiency which was also mentioned in Ayurvedic text under the heading of Oja-kshaya. *Acharya Sushruta* has mentioned the *Agantuj* cause for the Oja-kshaya which may be indicated external causative agents like HIV. Ayurveda is the store of herbal, mineral and herbomineral medicines for the management of various diseases. Some of the medicines will be helpful and play major role to cure and prevent the HIV AIDS. This article is highlighted the role of Ayurveda in the prevention and management of HIV AIDS.

## 2. AIMS AND OBJECTIVE

- To study the fundamental and conceptual pathogenesis of HIV AIDS as per Ayurveda.
- To evaluate elaborate and discussion about role of Ayurveda in the prevention of HIV AIDS.
- To evaluate elaborate and discussion about role of Ayurveda in the management of HIV AIDS

## 3. MATERIAL AND METHOD

The material concern with this research article has been reviewed from *brithtriya* and its related commentators, laghutriya and textbook of modern medicine. Index, non index national and international peer review journals belonging to Ayurveda and medical science has been also referred to collected material concern to this research topic.

## 4. Conceptual Study

### 4.1 HIV and AIDS as per Modern science

Some people have a Doubt between HIV and AIDS. So to differentiate those basic differences are given below: HIV stands for Human Immunodeficiency Virus. It is the name of the virus which infects our immune system and damages it severely over a period of time. Viruses, such as HIV, never go away. When a person becomes infected with HIV, that person becomes "HIV positive" and will always be HIV positive. Over time, HIV disease infects and kills white blood cells called CD4 lymphocytes (or "T cells") and can leave the body unable to fight off certain kinds of infections and cancers. AIDS stands for Acquired Immuno–Deficiency Syndrome. A healthy person usually has a CD4, (white blood cells) count of between 600 and 1,200. When the CD4 count drops below 200, a person's immune system is severely weakened and that person is then diagnosed with AIDS, even if he or she has not become sick from other infections. After the diagnosis of AIDS is made, the current average survival time with antiretroviral therapy is estimated to be now more than 5 years, but because new treatments continue to be developed and because HIV continues to evolve resistance to treatments, estimates of survival time are likely to continue to change. Antiretroviral medication can prolong the time between HIV infection and the onset of AIDS. Without antiretroviral therapy, death normally occurs within a year. Most patients die from opportunistic infections or malignancies associated with the progressive failure of the immune system.[10]

HIV stands for Human Immunodeficiency Virus. It is the name of the virus which infects our immune system and damages it severely over a period of time. Viruses, such as HIV, never go away. When a person becomes infected with HIV, that person becomes "HIV positive" and will always be HIV positive. Over time, HIV disease infects and kills white blood cells called CD4 lymphocytes (or "T cells") and can leave the body unable to fight off certain kinds of infections and cancers.

### 4.2. Classification

The HIV is classified into 2 types- HIV 1 and HIV 2. HIV type 1 and HIV type 2 are two distinct viruses. Worldwide, the predominant virus is HIV-1 and generally when people talk about HIV without specifying the type of virus they are referring to HIV-1. The relatively uncommon HIV-2 virus is concentrated in West Africa, but has been seen in other countries. Classification of HIV 1: The strains of HIV-1 can be classified into four groups.[11] The most important group, M, is the 'major' group and is responsible for the majority of the global HIV epidemic. The other three groups are N, O and P. Subtypes within HIV-1 group M. Within group M there are known to be at least nine genetically distinct subtypes of HIV-1. These are subtypes A, B, C, D, F, G, H, J and K. Additionally, different subtypes can combine genetic material to form a hybrid virus, known as a 'circulating recombinant form' (CRFs), of which quite a few have been identified.[12]

## 5. MORPHOLOGY OF HIV

Electron microscopy shows that the HIV virus is an icosahedral structure containing numerous external spikes formed by the two major envelope proteins, the external gp120 and the transmembrane gp41. The virus buds from the surface of the infected cell and incorporates a variety of host proteins, including major histocompatibility complex (MHC) class I and II antigens. into its lipid bilayer. The structure of HIV-1 is schematically diagrammed in.[13]

## 6. REPLICATION CYCLE OF HIV

HIV is an RNA virus whose hallmark is the reverse transcription of its genomic RNA to DNA by the enzyme reverse transcriptase. The replication cycle of HIV begins with the high- affinity binding of the gp120 protein via a portion of its V1 region near the N terminus to its receptor on the host cell surface, the CD4 molecule. The CD4 molecule is a 55-kDa protein found predominantly on a subset of T lymphocytes that are responsible for helper or inducer function in the immune system. It is also expressed on the surface of monocytes/macrophages and dendritic /Langerhans cells. Once gp120 binds to CD4, the gp120 under- goes a conformational change that facilitates binding to one of a group of co-receptors.[14] Following binding of the envelope protein to the CD4 molecule, the conformation of the viral envelope changes dramatically and fusion with the host cell membrane occurs via the newly exposed gp41 molecule penetrating the plasma membrane of the target cell and then coiling upon itself to bring the virion and target cell together. Fol- lowing fusion, the HIV genomic RNA is uncoated and internalized into the target cell. The reverse transcriptase enzyme, which is contained in the infecting virion, then catalyzes the reverse transcription ofthegenomic RNA into double-strand DNA. The DNA translocates to the nucleus, where it is integrated in a somewhat, but not completely, random fashion into the host cell

chromosomes through the action of another virally encoded enzyme, integrase. Sites of HIV integration into the nuclear DNA are preferential for active genes and regional hotspots. This provirus may remain transcriptionally inactive (latent) or it may manifest varying levels of gene expression, up to active production of virus. Cellular activation plays an important role in the life cycle of HIV and is critical to the pathogenesis of HIV disease. following initial binding and internalization of virions into the target cell, incompletely reverse-transcribed DNA intermediates are labile in quiescent cells and will not integrate efficiently into the host cell genomeunless cellular activation occurs shortly after infection. Further more, some degree of activation of the host cell is required for the initiation of transcription of the integrated proviral DNA into either genomic RNA or mRNA. This latter process may not necessarily be associated with the obvious expression of the classic cell surface markers of activation. In this regard, activation of HIV expression from the latent state depends on the interaction of a number of cellular and viral factors. Following transcription, HIV mRNA is translated into proteins that undergo modification through glycosylation, myristylation, phos- phorylation, and cleavage. The viral particle is formed by the assembly of HIV proteins, enzymes and genomic RNA at the plasma membrane of the cells. Budding of the progeny virion occurs through specialized regions in the lipid bilayer of the host cell membrane known as lipid rafts, where the core acquires its external envelope The virally encoded protease then catalyzes the cleavage of the gag-pol precursor (see below) to yield the mature virion. Progression through the virus replication cycle is profoundly influenced by a variety of viral regulatory gene products. Likewise, each point in the replication cycle of HIV is a real or potential target for therapeutic intervention (see below). Thus far, the reverse transcriptase and protease enzymes have proven clinically to be susceptible to pharmacologic disruption (see below). Recently, inhibitors of virus–target cell fusion have shown therapeutic promise, and inhibitors of the viral enzyme inte- grase are in clinical trials.[15]

HIV GENOME illustrates the arrangement of the HIV genome schematically. Like other retroviruses, HIV-1 has genes that encode the structural proteins of the virus: gag encodes the proteins that form the core of the virion (including p24 antigen); pol encodes the enzymes responsible for reverse transcription and integration; and env encodes the envelope glycoproteins. However, HIV-1 is more complex than other retroviruses, particularly those of the nonprimate group, in that it also contains at least six other genes (tat, rev, nef, vif, vpr, and vpu), which code for proteins involved in the regulation of gene expression. Several of these proteins are felt to play a role in the pathogenesis of HIV disease; their various functions are listed in Fig. Flanking these genes are the long terminal repeats (LTRs), which contain regulatory elements involved in gene expression (Fig.). The major difference between the genomes of HIV- 1 and HIV-2 is the fact that HIV-2 lacks the vpu gene and has a vpx gene not contained in HIV-1.[16]

**7. Transmission**

- HIV is primarily found in the blood, semen, or vaginal fluid of someone who is infected with the virus and is transmitted in four ways:
- Having unprotected sex (anal, oral or vaginal) with someone infected with HIV Sharing needles and syringes with someone infected with HIV.
- Being exposed to the virus as a fetus or infant before or during birth or through breastfeeding from an HIV-infected mother.
- Receiving a transfusion of HIV-infected blood or blood products.[17]

Many people who are HIV-positive do not have symptoms of HIV infection. Often people only begin to feel sick when they progress toward AIDS (Acquired Immunodeficiency Syndrome). Sometimes people living with HIV go through periods of being sick and then feel fine. While the virus itself can sometimes cause people to feel sick, most of the severe symptoms and illnesses of HIV disease come from the opportunistic infections that attack a damaged immune system. It is important to remember that some symptoms of HIV infection are similar to symptoms of many other common illnesses, such as the flu, or respiratory or gastrointestinal infections. As early as 2-4 weeks after exposure to HIV (but up to 3 months later), people can experience an acute illness, often described as “the worst flu ever.” This is called acute retroviral syndrome (ARS), or primary HIV infection and it’s the body’s natural response to HIV infection. During primary HIV infection, there are higher levels of virus circulating in the blood, which means that people can more easily transmit the virus to others. Symptoms can include: Fever with Chills, Rash, Night sweats, Muscle aches, Sore throat Fatigue, Swollen lymph nodes, Ulcers in the mouth.[18]

Symptoms of HIV/AIDS in Women It's possible that a woman infected with HIV-- the virus that causes AIDS, could display no symptoms, it's more typical that women infected with HIV will experience some subtle signs and symptoms of HIV that they may not perceive as warning signs of HIV infection. The three most common symptoms experienced by women after exposure to HIV are:

- Frequent or severe vaginal infections
- Abnormal Pap smears
- Pelvic infections such as PID that are difficult to treat
- Recurrent vaginal yeast infections
- Pelvic inflammatory disease or PID
- Pap smears that indicate abnormal changes or dysplasia
- Genital ulcers
- Genital warts
- Severe mucosal herpes infections.[19]

WHO clinical staging of HIV disease in adults and adolescents.[20]

**Category A**
Consists of one or more of the conditions listed below in an adolescent or adult (13 years) with documented HIV infection. Conditions listed in categories B and C must not have occurred. Asymptomatic HIV infection Persistent generalized lymphadenopathy Acute (primary) HIV infection with accompanying illness or history of acute HIV infection.

**Category B**
Consists of symptomatic conditions in an HIV-infected adolescent or adult that are not included among conditions listed in clinical category C and that meet at least one of the following criteria: (1) The conditions are attributed to HIV infection or are indicative of a defect in cell-mediated immunity; or (2) the conditions are considered by physicians to have a clinical course or to require management that is complicated by HIV infection. Examples include, but are not limited to, the following: Bacillary angiomatosis Candidiasis, oropharyngeal (thrush) Candidiasis, vulvovaginal; persistent, frequent, or poorly responsive to therapy Cervical dysplasia (moderate or severe)/cervical carcinoma in situ Constitutional symptoms, such as fever (38.5C) or diarrhea lasting 1 month Hairy leukoplakia, oral Herpes zoster (shingles), involving at least two distinct episodes or more than one dermatome Idiopathic thrombocytopenic purpura Listeriosis Pelvic inflammatory disease, particularly if complicated by tuboovarian abscess Peripheralneuropathy.

**Category C**
Conditions listed in the AIDS surveillance case definition. Candidiasis of bronchi, trachea, or lungs Candidiasis, esophageal Cervical cancer, invasivea Coccidioidomycosis, disseminated or extrapulmonary Cryptococcosis, extrapulmonary Cryptosporidiosis, chronic intestinal (1 month's duration) Cytomegalovirus disease (other than liver, spleen, or nodes) Cytomegalovirus retinitis (with loss of vision) Encephalopathy, HIV-related Herpes simplex: chronic ulcer(s) (1 month's duration); or bronchitis, pneumonia, or esophagitis Histoplasmosis, disseminated or extrapulmonary Isosporiasis, chronic intestinal (1 month's duration) Kaposi's sarcoma Lymphoma, Burkitt's (or equivalent term) Lymphoma, primary, of brain Mycobacterium avium complex or M. kansasii, disseminated or extrapulmonary Mycobacterium tuberculosis, any site (pulmonarya or extrapulmonary) Mycobacterium, other species or unidentified species, disseminated or extrapulmonary Pneumocystis carinii pneumonia Pneumonia, recurrenta Progressive multifocal leukoencephalopathy Salmonella septicemia, recurrent Toxoplasmosis of brain Wasting syndrome due to HIV.

Infectious diseases as per Ayurveda Though HIV is not mentioned in any text of Ayurveda directly, infectious diseases and epidemiology has been found in Ayurveda under the heading of upsargik vyadhi and janopadhwans. Even the viruses and viral diseases has been mentioned along with its management indirectly. Achyara sushurta has mentioned these diseases under the heading of upsargik vyadhi.[21] According to Achyara these diseases spread through breath, by taking food and sleeping along with infected persons, by using cloths, ornaments and cosmetics of infected person and doing sexual intercourse with the infected male and female. The main cause of transmission of AIDS is also unprotected sexual intercourse with the infected male or female.

AIDS as per Ayurveda AIDS is the immune deficiency syndrome which causes due to inhabitation of immunity. In Ayurveda Immunity has been explained under the concept of ojas. Clinical features of ojas, its formation, features of derangement-Visramsa Vyapat and Kshaya.[22] [23] Here AIDS and its opportunistic infections have been correlated with Ojo Kshaya. The virus invades the Rasadi sapta dhatus and causes decrement in their quality and quantity. In Ayurveda, Ojus is the essential substance of all dhatus and determines the capacity of the individual to combat the disease (Vyadhibala virodhitvam) and the power to the resist the virulence of disease (Vyadhi utpadaka pratibandhakatvam) causing factors in future.[24]

**8. Defination & Introduction of Ojas**
*Oja Dhatu* is defined as an invisible source of strength and energy in the body. *Oja Dhatu* is a source of physical and mental strength and it must be preserved by the all living being.

*Oja Dhatu* is the resistance to decay and degeneration of the body and provides natural immunity against disease. It is the essence of all dhatus and it represents the signs of growth and formation.

1. It is antagonistic to the strength and virulence of disease.
2. It was the capacity to inhibit or bind the causes or factors of disease.

The capability of a person to live, to enjoy to do day-to-day routine work and his health etc. are manipulated by some factors. Out ot three dosha, kapha is held responsible for conferring the strength required to perform vigorous physical work & vyayama-shakti, on the one hand and the power to resist and overcome forces or factors that bring about disease and deca (vyadhi-kshamatva) on the other This function represent the strength (bala) of a person. Both bala and *Oja Dhatu*s are also synonyms of kapha. The concept of drug and practices that incerase resistance to disease is vyadhi-kshamatva. But it is a diffecult task to validate the claim of such practices unless there are objective and quantitative parameters of bala and *Oja Dhatu* (strength and energy) which are alleged to be increased.

Acharya Charak has mentioned of Shleshmika *Oja Dhatu* through his commentator, 'Chakra panidatta' has differentiated this from another 'Ashhta-bindu *Oja Dhatu*'. chakrapanidatta a described that Shleshmika *Oja Dhatu* is not the 'Ashhta-bindu *Oja Dhatu*' here but it is apar *Oja Dhatu*. it is transported through the *Oja Dhatu*-vaha dhamani and is similar in quality to shuddha shleshhma.

chakrapanidatta has observed that 'The implication of the description of two kind of *Oja Dhatu* viz., para and apar. the quantity of shleshmik *Oja Dhatu* is 'ardhanjali and para *Oja Dhatu* is Shad-bindu. Apar *Oja Dhatu* are seated in Dhamani connected with 'hridya' and para *Oja Dhatu* in 'hridya' only.

**Factor Responsible for Oja Kshaya[25]**

There are two type responsible factor *Oja Dhatu* Kshaya.

| | |
|---|---|
| **1. Sharirik (Physical)** | a. Abhighatat (Trauma)<br>b. Kshayat (loss of Dhatus)<br>c. Shramat (Physical hard work than strength)<br>d. Ksudha (Hunger) |
| 2. **Manasik (Mental)** | a. Kopat (Anger)<br>b. Shokat (Grief)<br>c. Dhayant (Mental tension) |

**Oja kshaya (loss of oja)**

Oja vikruti according various acharya 1. Acharya sushruta has stated Murchchha, Mansa-kshaya, Moha, Pralap, and Maran (Mrutu) clinical manifestation of oja while Acharya Charak and Vagbhat has stated Vibheti, Durbala-abhikshanam, Vyatit-indriya, Dushchhaya, Druman, Ruksha and Kshama.

**9 Preventation of AIDS according to Ayurveda**

1 **Nidan parivarjan[26]**

Acharya Sushruta has said that first prevention of disease is nidanparivarjan means by avoiding the factors responsible for creating the disease we can prevent ourself from disease. In case of AIDS we have to avoid keeping sexual contact with the HIV infected patient.

**2 Achara Rasyana[27]**

Acharya Charak has stated the achara rasyan for human beings to avoid the pragyaa pradh. If the persons follow this achara rasyan AIDS will be prevented.

**3 Treatment**

**Anti- HIV Drugs**

| DRUG | BOTANICAL NAME WTH FAMILY | DOSE |
|---|---|---|
| Bhumyaamalaki[28] | Phyllanthus amarus (Euphorbiaceae) | Churna 3-6 gm |
| Sunthi[29] | Zingiber officinale (Zingiberaceae) | Churna 1-2gm |
| Syamaparni[30] | Camellia sinensis (Theaceae) | 20 ml deocation |
| Austakhandus[31] | Prunella vulgaris (Lamiaceae) | Churna 3-6 gm |
| Aak[32] | Calotropis gigantea (Apocynaceae) | Latex 1/8-1/4 gm and Root churan ½-1 gm |
| Samundarphala[33] | Barringtonia asiatica (Lecythidaceae) | Churna 1-3gm |
| Amar bel[34] | Cuscuta sandwichiana (Cuscutaceae) | Juice 10-20ml |
| Indian walnut[35] | Aleurites moluccana (Euphorbiaceae) | |
| Haridra[36] | Curcuma longa(Zingiberaceae) | Churan 3-6 gm |
| Guduchi[37] | Tinospora cordifolia(Menispermaceae) | Churan 1-3gm |

**Immunity Modulator**

| **DRUG AND BOTANICAL NAME** | **Dose** |
|---|---|
| Shilajatu Rasayana[38] | 1-9 gm |
| Ashwagandha (Withania somnifera)[39] | 3-6 gm |
| Tulsi (Ocimum sanctum)[40] | 3-6gm |
| Pippali (Piper longum)[41] | 500mg -1 gm |
| Amalaki (Emblica officinalis)[42] | 3-6 gm |
| Yashtimadhu (Glycyrrhiza glabra)[43] | 3-5 gm |

**DISCUSSION AND CONCLUSION**

Though the HIV has been discovered in 1982 in human beings, these causative factors and its illness is not new one. Though HIV is not mentioned in any text of Ayurveda directly, infectious diseases and epidemiology has been found in Ayurveda under the heading of

upsargik vyadhi and janopadhwans. The pathogenic invisible organisms (vyakarik sukshamkrimi) has also been found in the ancient text book since vedic period. The viruses has been also mentioned indirectly in the text book of Ayurveda which causes severe illness. Lissa virus which is a type of RNA virus has also described in Ayurveda under the heading of alark visha. Unfortunately HIV is also RNA virus though description is not found directly in any text book of Ayurveda but its hazards has found in all the text book of Ayurveda in the form of ojakshaya which is similar to AIDS pathologically. Acharya Charak has mentioned 3 different modalities in the management of suksham krimi (microorganism) apkarshan, prakritivighat and nindanparivarjan. In the context of the prevention of the HIV the sexual intercourse and achar rasyan is very important. Apkarshan is the process of removal of disease which will be done by giving anti HIV Ayurvedic herbal drugs to kill the virus. In vitro study Bhumyaamalaki, Sunthi, Syamaparni, Austakhandus, Aak, Samundarphala, Amar bel, Indian walnut, Haridra and Guduchi has proved somewhat potent antiretroviral activity. Hence these Ayurvedic herbal drugs can be used to kill the HIV. Ojuskshya which is due to effect of HIV on immunosystem will be cure by giving Ayurvedic herbal immunomodulator like Shilajatu Rasayana, Ashwagandha, Tulsi, Pippali, Amalaki, and Yashtimadhu in therapeutic dose. Thus Ayurveda will have proved better role in the management of HIV and AIDS in future.

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