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Yoga as a complementary therapy for HIV/AIDS

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ABSTRACT

HIV/AIDS is a global pandemic. Human immunodeficiency virus (HIV) is an infection that targets the immune system. Acquired immunodeficiency syndrome (AIDS) is the disease's advanced stage. The first well-documented case of HIV in humans was found in Congo in 1959. During HIV infection, the worst effect is on our body's immune system due to which the number of CD4+ cells, an important cell in our body, starts decreasing and ultimately this infection takes the form of AIDS. It is possible to avoid this because after this infection, it takes more than 10 years for it to take the form of AIDS. if Yoga therapy is adopted during this period, then the rate of this infection can definitely be reduced. Previous studies showed that Yoga therapy increased the number of vital cells like CD4+. Swami Kuvalayananda introduced Yoga therapy to India in the 1920s. Yoga therapy that involves physical movement or postures, breathing techniques, kriyas and meditation. These practices promote organ system harmony and balance, resulting in improved health and sense of well-being. Various studies have shown that Yoga improved mental health and quality of life of people living with HIV. The study concluded that Yoga therapy can be included as a complementary therapy in the treatment of HIV/AIDS.

Key words: *HIV/AIDS, Yoga, Yoga therapy, CD4+, Asana, Pranayama, Meditation*

INTRODUCTION

HIV/AIDS is a global pandemic.[1] Human immunodeficiency virus (HIV) is an infection that targets the immune system. Acquired immunodeficiency syndrome (AIDS) is the disease's advanced stage. In 2022, 630 000 people died of HIV-related causes, and 1.3 million [1.0-1.7 million] people became infected.[2] As of 2016, approximately 36.7 million people were living with HIV worldwide, with the number of new infections that year being approximately 1.8 million.[3] This is down from 3.1 million new infections in 2001.[4] Just over half of the infected population are women and 2.1 million are children. This resulted in approximately 1 million deaths in 2016, down from a high of 1.9 million in 2005.[3] Sub-Saharan Africa is the most affected region. In 2010, an estimated 68% (22.9 million) of all HIV cases and 66% (1.2 million) of all deaths occurred in this region. This means that about 5% of the adult population is infected and is believed to be the cause of 10% of child deaths. Here, unlike other areas, about 60% of cases are women. South Africa has the largest population of people living with HIV of any country in the world, at 5.9 million.[5] Life expectancy has fallen in the countries most affected by HIV/AIDS; For example, in 2006 it was estimated to have declined from 65 to 35 years in Botswana.[6] Mother-to-child transmission has declined to less than 5% in Botswana and South Africa by 2013, with improvements in many other African countries due to better access to antiretroviral therapy.[7] South and Southeast Asia is the second most

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affected; In 2010 there were an estimated 4 million cases in the region, or 12% of all people living with HIV, resulting in approximately 250,000 deaths. Of these, approximately 2.4 million cases are in India.[5] During 2008, approximately 1.2 million people aged 13 and over were living with HIV in the United States, resulting in approximately 17,500 deaths. The US Centers for Disease Control and Prevention estimated that year, 236,400 people or 20% of infected Americans were unaware of their infection.[8] Approximately 675,000 people in the United States have died from HIV/AIDS since the beginning of the HIV epidemic in 2016. As of 2015 in the United Kingdom, there were approximately 101,200 cases, resulting in 594 deaths.[9] By 2017, the number of people living with HIV in Canada was estimated at 36.9 million.[10] HIV rates are lowest in North Africa and the Middle East (0.1% or less), Eastern Asia (0.1%), and Western and Central Europe (0.2%).[5] According to 2009 and 2012 estimates, the most affected European countries, in descending order of prevalence, are Russia, Ukraine, Latvia, Moldova, Portugal and Belarus.[11]

The practice of Yoga in the Indian subcontinent has been documented as early as 3000 B.C Yoga is an ancient mind-body practice that involves physical movement or postures, breathing techniques, and meditation. Regular Yoga practice promotes organ system harmony and balance, resulting in Improved health and sense of well-being.[12] Swami Kuvalayananda introduced this new application of Yoga to India in the 1920s. He and his colleagues applied the methods of modern medical science to study the physical effects of Yoga and develop therapeutic applications of Yoga. Over the next decades, research was carried out in this field at the All-India Institute of Medical Sciences, Delhi and also on the nutritional status and lifestyle of various Indians. Yoga therapy often results in improvement based on medical and yogic diagnostic criteria.[13] Medical Yoga Therapy or “Yoga Chikitsa” is the dynamic state of physical and mental ease, coupled with spiritual well-being. Medical Yoga is defined as the use of Yoga practices for the prevention and potential treatment of medical conditions.[14]

We aimed to understand the HIV/AIDS and determine whether Yoga interventions would improve outcomes related to stress processes, psychological and behavioral health, overall quality of life, and biomarkers of HIV disease progression.

HIV/AIDS

Origin

The origin of HIV/AIDS and the circumstances leading to its emergence remain unresolved.[15] Both HIV-1 and HIV-2 are believed to have originated in non-human primates in west-central Africa and transferred to humans in the early 20th century.[16] HIV-1 appears to have originated in southern Cameroon through the evolution of SIV (CPZ), a simian immunodeficiency virus (SIV) that infects wild chimpanzees (the HIV-1 chimpanzee subspecies Pan troglodytes comes from SIVCPZ endemic in troglodytes).[17] The closest relative of HIV-2 is SIV (smm), a virus of the sooty mangabey (Cercocebus atys atys), an old-world monkey living in coastal West Africa (from southern Senegal to western Ivory Coast).[18] New World monkeys such as the owl monkey are resistant to HIV-1 infection, possibly due to the genomic fusion of two viral resistance genes.[19] The first well-documented case of HIV in humans was found in Congo in 1959. The virus may have been present in the United States in the mid-to-late 1950s, with a sixteen-year-old male named Robert Rayford showing symptoms in 1966 and dying in 1969. In the 1970s, cases of infection were reported. Parasites and becoming ill with what was called "gay enteric disease", but which is now considered AIDS.[20] The earliest retrospectively described case of AIDS is believed to be that of Arvid Noe in Norway in 1966.[21]

Classifications

Two main clinical staging systems are used to classify HIV and HIV-related disease for surveillance purposes: the WHO disease staging system for HIV infection and disease, and the CDC classification system for HIV infection. The CDC’s classification system is more often adopted in developed countries. Since the WHO staging system does not require laboratory tests, it is suitable for resource-restricted situations such as those encountered in developing countries, where it

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can also be used to guide clinical management. Despite their differences, both systems allow comparison for statistical purposes.[22-24]

The World Health Organization first proposed a definition of AIDS in 1986. Since then, the WHO classification has been updated and expanded several times, the most recent version being published in 2007. The WHO system uses the following categories:

Primary HIV infection: May be either asymptomatic or associated with an acute retroviral syndrome.[23]

Stage I: HIV infection is asymptomatic in which the CD4+ T cell count (also called CD4 count) is more than 500 per microliter (µl or cubic mm) of blood. This may include generalized lymph node enlargement.[23]

Stage II: Mild symptoms, which may include minor mucosal manifestations and frequent upper respiratory tract infections and a CD4 count of less than 500/µl.[23]

Stage III: Advanced symptoms, which may include unexplained chronic diarrhea lasting more than a month, serious bacterial infection including pulmonary tuberculosis, and CD4 count less than 350/µl.[23]

Stage IV or AIDS: Severe symptoms, including toxoplasmosis of the brain, candidiasis of the esophagus, trachea, bronchi or lungs, Kaposi's sarcoma, and CD4 count less than 200/µl.[23]

The U.S. Centre for Disease Control and Prevention also created a classification system for HIV and updated it in 2008 and 2014. This system classifies HIV infection based on CD4 count and clinical symptoms, and describes the infection in five groups. In those over six years of age it is:[24],[25]

Stage 0: Less than 180 days between a negative or indeterminate HIV test followed by a positive test.

Stage 1: CD4 count ≥ 500 cells/µl and no AIDS-defining condition.

Stage 2: CD4 count 200 to 500 cells/µl and no AIDS-defining condition.

Stage 3: CD4 count ≤ 200 cells/µl or AIDS-defining conditions.

Transmission

HIV is spread by three main routes: sexual contact, exposure to infected body fluids or tissues, and from mother to child during pregnancy, delivery, or breastfeeding (known as vertical transmission).[26] There is no risk of contracting HIV through contact with feces, nasal secretions, saliva, spit, sweat, tears, urine, or vomit, unless these are contaminated with blood.[27] It is also possible to be co-infected with more than one type of HIV - a condition known as HIV superinfection.[28] The most common way of transmission of HIV is sexual contact with an infected person. The second most common method of HIV transmission is through blood and blood products.[26] Blood-borne transmission can occur through needle sharing during intravenous drug use, needle-stick injury, transfusion of contaminated blood or blood product, or medical injection with unsterilized instruments. The risk from needle sharing during drug injection is between 0.63% and 2.4% per task, with an average of 0.8%.[29]

Sign and Symptoms

There are three main stages of HIV infection: acute infection, clinical latency, and acquired immunodeficiency syndrome; AIDS.

1. Acute Infection

The initial period after contracting HIV is called acute HIV, primary HIV, or acute retroviral syndrome.[22],[23] Many individuals develop influenza-like illness or mononucleosis-like illness 2-4 weeks after exposure, while others have no significant symptoms.[30] Symptoms occur in 40-90% of cases and most commonly include fever, large tender lymph nodes, swollen throat, rash, headache, fatigue, and/or sores in the mouth and genitals.[23] The rash, which occurs in 20-50% of cases, appears on the trunk and is classically maculopapular.[31] Some people also develop opportunistic infections at this stage.[23] Gastrointestinal symptoms such as vomiting or diarrhea may occur. Neurological symptoms of peripheral neuropathy or Guillain-Barré syndrome also occur. The duration of symptoms varies, but is usually one or two weeks.[22]

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2. Clinical Latency

The initial symptoms are followed by a stage called clinical latency, asymptomatic HIV, or chronic HIV. Without treatment, this second stage of the natural history of HIV infection can last from about three years to more than 20 years (on average, about eight years).[32],[33] While there are usually few or no symptoms in the beginning, towards the end of this stage many people experience fever, weight loss, gastrointestinal problems, and muscle aches. 50% to 70% of people develop persistent generalized lymphadenopathy, which is characterized by unexplained, non-painful enlargement of more than one group of lymph nodes (other than the groin) for more than three to six months.[22]

3. AIDS (Acquired Immunodeficiency Syndrome)

Acquired immunodeficiency syndrome (AIDS) is defined as an HIV infection with either a CD4+ T cell count less than 200 cells per µL or the occurrence of specific diseases associated with HIV infection. In the absence of specific treatment, about half of people infected with HIV develop AIDS within ten years. The most common precancerous conditions alerting to the presence of AIDS are Pneumocystis pneumonia (40%), cachexia as in HIV wasting syndrome (20%), and esophageal candidiasis. Other common symptoms include frequent respiratory tract infections.[22]

Additionally, people with AIDS often have systemic symptoms such as prolonged fever, sweating (especially at night), swollen lymph nodes, chills, weakness, and unexpected weight loss. Diarrhea is another common symptom, present in about 90% of people with AIDS. They may also be affected by opportunistic infections and a variety of psychiatric and neurological symptoms independent of cancer.[34],[35]

Diagnosis

HIV/AIDS is diagnosed through laboratory testing and then staged based on the presence of certain signs or symptoms. HIV testing is recommended by the United States Preventive Services Task Force for everyone ages 15 to 65, including all pregnant women. Additionally, testing is recommended for people at high risk, including anyone with a sexually transmitted disease. In many areas of the world, one third of HIV carriers learn that they are infected only in the advanced stages of the disease when AIDS or severe immunodeficiency becomes apparent.[31],[36]

HIV Testing

Most people infected with HIV develop specific antibodies (i.e., seroconvert) within three to twelve weeks after initial infection. Primary HIV is diagnosed by measuring HIV-RNA or P24 antigen before seroconversion.[22]

Prevention

Sexual Contacts - Consistent condom use reduces the risk of HIV transmission in the long term by approximately 80%.[37] When condoms are used consistently by a couple in which one person is infected, the rate of HIV infection is less than 1% per year.[38] There is some evidence to suggest that female condoms may provide the same level of protection.[39] Using a vaginal gel containing tenofovir (a reverse transcriptase inhibitor) immediately before sex reduces infection rates in African women by approximately 40%.[40]

Pre-exposure - Antiretroviral treatment in people living with HIV whose CD4 count is ≤ 550 cells/µL is a very effective way to prevent HIV infection of their partner (a strategy known as treatment as prevention, or TASP Is). TASP is associated with a 10- to 20-fold reduction in transmission risk.[41],[42] Pre-exposure prophylaxis (PrEP) with daily doses of tenofovir drugs, with or without emtricitabine, is effective in people at high risk, including men who have sex with men, HIV-positive couples, and young heterosexuals in Africa.[40],[43] It may also be effective in intravenous drug users, with one study finding a 0.7 to 0.4 risk reduction per 100 person-years.[44]

Post-exposure - A course of antiretrovirals given within 48 to 72 hours after exposure to HIV-positive blood or genital secretions is called post-exposure prophylaxis (PrEP). Use of single agent zidovudine reduces the risk of HIV infection after needle-stick injury by five times. As of 2013, the recommended prevention regimen in

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the United States includes three drugs - tenofovir, emtricitabine, and raltegravir - as this may further reduce the risk.[45] PrEP treatment after sexual assault is recommended when the perpetrator is known to be HIV positive, but is controversial when their HIV status is unknown.[46] The duration of treatment is usually four weeks.[47]

Mother to child

Programs to prevent vertical transmission of HIV (from mothers to children) can reduce transmission rates by 92-99%.[48],[49] This primarily involves the use of a combination of antiviral medications during pregnancy and after birth, and potentially including bottle-feeding rather than breastfeeding.[49],[50] If replacement feeding is acceptable, feasible, affordable, sustainable, and safe, mothers should avoid breastfeeding their infants; However, if this is not the case, exclusive breastfeeding is recommended during the first months of life. If exclusively breastfed, provision of extended antiretroviral prophylaxis to the infant reduces the risk of transmission.[51] In 2015, Cuba became the first country in the world to eliminate mother-to-child transmission of HIV.[52]

Treatment

There is currently no cure, nor is there any effective HIV vaccine. Treatment includes Highly Active Antiretroviral Therapy (HAART), which slows the progression of the disease.[53]

Misconceptions

There are many misconceptions about HIV and AIDS. Three misconceptions are that AIDS can be spread by casual contact, that having sex with a virgin will cure AIDS[54],[55] and that HIV can only infect gay men and drug user.[56],[57] In 2014, some of the British public incorrectly thought that kissing someone (16%), sharing a glass (5%), spitting (16%), touching a public toilet seat (4%), and coughing or Sneezing (5%) can cause HIV.[58] Other misconceptions are that any act of anal sex between two uninfected gay men can lead to HIV infection, and that open discussion of HIV and homosexuality in schools will increase AIDS rates.[59],[60]

Yoga as a prevention

HIV infection does not cause sudden harm to the body. After getting infected, the person gradually becomes more and more ill. For this, this infection has been divided into four stages. These four stages have been explained in detail above. In HIV infection, we observed that the most prominent symptom is the decline in the number of CD4+ T cells.[61]

Role of CD4+ cells in our body - These cells fight infection and act as protective structures of our immune system. As its deficiency increases in our body, this infection causes more harm to our body. CD4+ T cells are direct effectors of antiviral immunity. These cells help B cells produce stronger and longer-lived antibody responses. Antibodies protect the body against many viruses, including HIV. CD4+ T cells maximize the expansion of the antiviral CD8+ T cells population during the primary immune response and also facilitate the formation of virus-specific memory CD8+ T cell populations.[62]

Effect of Yoga on CD4+ - A study conducted on HIV positive children/adolescents looked at the effect of a *6*-month Yoga program and found that practicing Yoga could significantly improve immune parameters. There was significant improvement in CD4 and viral load after Yoga practice, CD4 cells increased and viral load decreased. The CD4/CD8 ratio returned to normal range. Yoga can also improve the quality of life of children/adolescents.[63] A study of the effects of *6* weeks of Yoga practice on 29 men with prostate cancer found that the Yoga group had increased numbers of circulating CD4+ and CD8+ T-cells, greater production of interferon-gamma by natural killer cells, and increased levels of natural observed increased Fc receptor III expression in killer cells. Yoga exercise improved life quality, boosted immune response and reduced inflammation in men with prostate cancer. Yoga can be very beneficial for these types of patients.[64] A study conducted on 173 HIV positive people looked at the effects of Mindfulness-based Stress Reduction (MBSR). CD4 count increased from baseline up to 9 months post-treatment after 8 weeks of exercise, positive effects were also seen on the

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Medical Symptom Checklist (MSCL), therefore MBSR appears to have the strongest potential to improve self-reported physical symptomatology.[65] A study conducted on 195 people showed that Motivational counselling, along with Yoga, showed effective in increasing ART adherence and CD4+ count among HIV-infected adolescents in experimental group compared with control group. Findings of this study proved that adherence counseling and Yoga practice contributed significantly to the overall health and well-being of HIV-infected adolescents.[66] Structured exercise including running and Yoga, performed over a 2-year period, has been found to be beneficial for antiretroviral therapy (ART)-treated children infected with HIV, leading to increases in sCD14, TNF-α, IFNγ, and IL-10 levels is mediated through reduction. Improvements in these inflammatory markers could potentially reduce the risk of cardiovascular disease and insulin resistance in HIV-infected children and adolescents on ART.[67] Data from a case study show that naturopathy and Yoga-based lifestyle intervention serves as an adjunctive therapy that complements standard care, improves adherence and reduces HIV-associated clinical markers, such as hemoglobin, weight, and CD4+ Counting promotes health outcomes.[68]

Effect of Yoga on mental health and quality of life - The practice of Yoga contributes significantly to the overall health and well-being of HIV-infected adolescents.[66] The practice of Yoga also points to improvements in health-related quality of life (HRQoL).[69] The practice of Yoga also has a very favorable effect on the mental health of HIV-infected individuals. This has also been confirmed in many studies. The findings of one study show that one month's practice of integrated Yoga reduces depression in HIV-1 infected adults. May occur and improve immunity.[70] Yoga interventions appear to improve the psychological health and quality of life of HIV-positive individuals.[71] One study points to improvements in psychomotor performance of cognitive function with the practice of Yoga.[63] A study showed that practicing Yoga is helpful in reducing stress in people suffering from HIV and substance abuse problems.[72] Among traditional lifestyle modifications, Yoga is a low-cost, simple to administer, non-pharmacological, popular behavioral intervention that can reduce blood pressure in pre-hypertensive HIV-infected adults with mild-moderate cardiovascular disease risk factors.[73]

Conclusion

The findings of all these studies show that Yoga improves the decline in the number of CD4+ T cells that occurs during HIV infection, and shows positive effects in cardiovascular problems and mental health problems. Yoga has also achieved amazing results in improving the quality of life of people suffering from HIV infection. To prevent any virus infection, it is important to strengthen the defense system of our body. The results of Yoga practice show that Yoga practice increases the number of cells that enhance our immunity. Yoga also plays a very positive role in treating problems like swelling. Therefore, we can say that Yoga can play a huge role in the treatment of AIDS epidemic. Therefore, the practice of integrative Yoga should be included as a complementary therapy.

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