

CHAPTER 3

LITERATURE SURVEY

(Survey of Modern Literature)

3.1 INTRODUCTION

Given the myriad psychosocial stressors and issues encountered by HIV infected children and youth, comprehensive mental health care services remain crucial. HIV+ children also have a wide range of psychiatric conditions (Vranda and Mothi, 2013). Untiring efforts are being put in by scientists and the medical fraternity of different systems of medicines in an attempt to help individuals with HIV/AIDS and fulfill the vision of UNAIDS to end HIV/AIDS by the year 2030. This chapter initially presents the need for the application of complementary and alternative medicines. Later, the chapter presents a report of a survey of modern literature in the area of importance and application of yoga to manage HIV/AIDS and associated issues within the scope of this thesis viz., immune parameters, quality of life and cognitive functions; and ways to combat the same. The later part of the chapter, with due considerations to the aspects discussed in Chapter 2 (Literary Review), presents a relook into the current approach towards combating HIV/AIDS to provide a more promising strategy towards combating HIV/AIDS. Finally, the chapter presents the problem formulation, aim and objectives for the current research.

3.2 HIV, IMMUNE SYSTEM AND YOGA

HIV infection breaks down an individual immune system making them vulnerable to a host of life-threatening opportunistic infections and neurological disorders. It could also result in unusual malignancies (Nayyar *et al.*, 2018). HIV induces loss of the capacity of T cells to secrete various antiviral cytokines (one of the mediators helping in bidirectional interaction

between the immune system and central nervous system) (Vajpayee, Negi and Kurapati, 2013).

Stress is a factor that alters the number of immune cells and dysregulates cytokine both of which affect the overall immune system (Arora and Bhattacharjee, 2008). Several studies suggest that yogic techniques help in improving the immune functioning (Jam *et al.*, 2009; Menon and Glazebrook, 2013; Field, 2016; Rao *et al.*, 2017; Falkenberg, Eising and Peters, 2018). Yoga has shown to improve immune function in regular practitioners of yoga among young healthy individuals (Lim and Cheong, 2015). This, in turn, reduces psychological and psychosocial effects induced in a person as a result of HIV. Thus yoga also is an excellent practice to manage stress which in turn helps in improving the effectiveness of the immune system and thus be able to make an individual manage any situation from the common cold to AIDS better (Arora and Bhattacharjee, 2008).

Mindfulness meditation training can buffer CD4+ T lymphocytes' decline in HIV-1 infected adults (Creswell *et al.*, 2009). In an RCT involving 245 HIV infected individuals, Mindfulness-Based Stress Reduction (MBSR) program has also shown improvement in the CD4 cell counts in HIV positive individuals (SeyedAlinaghi *et al.*, 2012). Yoga also promotes the health of HIV infected mothers, enhance the efficacy of ART in preventing vertical progression of HIV (mother to child transmission of HIV) and helps reduce ART related side effects (Bhargav *et al.*, 2012). Several other reports also show that yoga helps in improving immune system functioning in health issues (Arora and Bhattacharjee, 2008; Morgan *et al.*, 2014; Rao *et al.*, 2017; Falkenberg, Eising and Peters, 2018). Overall, mind-body techniques, which influence immune responses that are virus-specific is gaining the interest of the scientific community (Morgan *et al.*, 2014).

3.3 HIV, QUALITY OF LIFE AND YOGA

HIV infection worsens the well-being of individuals making them vulnerable and compromises their quality of life (Verma, Kamble and Krishnan, 2018). Thus individuals diagnosed with HIV/AIDS have been shown to suffer from poor QOL (Molina *et al.*, 2017). QOL is an important issue in HIV positive individuals and studies have shown that the QOL scores were significantly lower among persons with lower CD4 counts (Nirmal *et al.*, 2008; Kumar *et al.*, 2014). The poor QOL also is attributed to reasons like stigma, depression, cultural beliefs, etc. (Aranda-Naranjo, 2004; Holzemer *et al.*, 2009). However, one study also shows that HIV does not influence QOL in HIV infected children and is better than in cases where children suffer from other childhood chronic illnesses (Gupta, Nanda and Kaushik, 2013). Further depression and cognitive disorders are also a prevalent comorbid mental disorders in HIV positives (Sharon *et al.*, 2012; Masiello *et al.*, 2014; Goldberg and Short, 2016; Chaponda *et al.*, 2018). Depression is reported in up to 45% HIV/AIDS patients (Tymchuk *et al.*, 2018). Yoga also is known to reduce chronic pains in patients living with HIV (Gura, 2002; Kamradt, 2017).

Yoga is known to improve quality of life in individuals in general (Rakhshani, 2014) and also in individuals with health issues like the breast cancer receiving radiotherapy (Vadiraja *et al.*, 2009; Chandwani *et al.*, 2010), chronic lower back pain (Tekur *et al.*, 2010; Patil *et al.*, 2018), pregnancy (Rakhshani *et al.*, 2010), type II diabetes (Satish and Lakshmi, 2016) and osteoarthritis (Ebnezar *et al.*, 2011). Yoga has improved the status of depression in type II diabetes patients (Satish and Lakshmi, 2016). Thus, overall, the factors contributing to low QOL like depression, anxiety, self-esteem, etc. have also been individually studied with an intervention of yoga.

In particular, with reference to HIV, a six-week yoga intervention on 60 HIV+ adults in the age group of 20 to 40 years showed improvement in the quality of life (Verma, Kamble and

Krishnan, 2018). Yoga intervention given to a group of 82 HIV+ individuals (age group not mentioned) on ART showed improvement in sleep quality (David and Delia, 2017). A study of 61 adult HIV+ individuals showed that *Sudarshan kriya* yoga improved the quality of life (Mawar *et al.*, 2015). A randomized controlled trial with 24 HIV women involving mindfulness-based cognitive therapy program showed significant improvement in quality of life (Samhkaniyan *et al.*, 2015). Most of the studies on yoga and QOL deduce that primarily it is the relaxation brought about by techniques such as yoga and meditation which helps overcome co-morbidities associated with diseases. Thus yoga can lead to better QOL even during periods of stress (Arora and Bhattacharjee, 2008). A recent review also showed that yoga show encouraging results in decreasing physical and psychological symptoms and improving quality of life and health in people living with HIV (Ramirez-Garcia *et al.*, 2019). Overall, yogic practices involving mindfulness and relaxation techniques show improvements in QOL and health of individuals living with HIV; and are getting wider acceptance globally (Ramirez-Garcia *et al.*, 2019).

3.4 HIV, COGNITIVE FUNCTIONS AND YOGA

HIV positive individuals face neurocognitive disorders (Malaspina *et al.*, 2011) and are frequently associated with poor cognitive function (Puthanakit, Aulpibul and Louthrenoo, 2010). Children with HIV infection are also at high risk of developing cognitive impairments (Willen, 2006). A study of 93 HIV infected children in Uganda revealed that HIV+ were significantly deficient with reference to cognitive and motor functions. A comparison was made with 106 un-infected HIV children (Counts *et al.*, 2012).

There are a number of studies that show that yoga has a very good role in improving cognitive functions both among normal individuals and a wide range of clinically ill cases. Some of them are reported here. Yoga is also known to improve psychological status and cognitive functions (Ferreira-Vorkapic *et al.*, 2015). Yoga improves the cognitive functions

of school children from an economically disadvantaged background (Chaya *et al.*, 2012). Even a short term yoga program as short as 10 days is shown to improve school children's performance in cognitive functions tested through the digit letter substitution test (Reddy and Kumari, 2015). Meditation, which is a part of yoga could be a potential non-pharmacological process to improve attention, memory and cognitive flexibility (Neuroscience *et al.*, 2014). Yoga also improves concentration and attention span among type II diabetes patients (Satish and Lakshmi, 2016). Even in the case of ADHD, yoga has shown improvement in school going children (Abadi, Madgaonkar and Venkatesan, 2008). Yoga training in children has shown greater improvement in executive functions especially when the EF demands were greatest (Manjunath and Telles, 2001). On similar lines mindfulness, training also has shown greater improvements in executive functions in children when initial functioning was poor than those when the initial status was better off (Flook *et al.*, 2010).

Although yoga is known to improve psychological and CFs there is no standardization of practices with respect to frequency and duration of practice (Ferreira-Vorkapic *et al.*, 2015). Hence more studies would be required for the same and also in specific reference to the HIV+ subgroups.

In a study involving diverse 177 HIV positives, the practice of spirituality has shown 2-4 times increased survival of HIV positives (Ironson, Kremer and Lucette, 2016).

3.5 NUTRITION AND HIV

Food is the basic and inevitable need of one and all. Lack of good quality and quantity of food leads to malnutrition. Malnutrition results in a deficiency of the immune system and the body becomes increasingly vulnerable, leading to infection of the host (Enwonwu, 2006). By far, the most common cause of acquired immune deficiency worldwide is severe malnutrition (Punt *et al.*, 2019)

Children with malnutrition have shown decreased ability of killer lymphocytes to recognize and destroy foreign bodies (Enwonwu, 2006). Malnutrition results in the deficiency of macronutrients. A chronic deficiency of macronutrients leads to protein-energy malnutrition (Morley, 2007). Particularly in children, protein-energy malnutrition is known to cause widespread atrophy of lymphoid tissues, particularly T-lymphocyte areas (Kumar *et al.*, 2004). This leads to impairment of antibody production to T-dependent antigens. This further causes impairment in adaptive immunity and leads to reduced ability of the patients to ward off infections (Chandra, 1999).

Malnutrition is considered to be a marker for poor prognosis among subjects infected with HIV and hence Nutritional management is considered to be an integral part of care for subjects infected with Human Immunodeficiency Virus (HIV) (Nerad *et al.*, 2003). Coincidentally, in both malnutrition and HIV, there is reduced CD4 and CD8 T-lymphocyte numbers (Chandra, 1999). As malnutrition reduces the capacity of the body to fight infection, we can anticipate that by improving the nutrition it should be possible to contain the progression of the infection.

Along with education and counseling, nutritional support is also on focus in improving the QOL of people living with HIV/AIDS. Incorporating components of nutrition and its management goes a long way in improving QOL and better survival in HIV-infected subjects (Duggal, Chugh and Duggal, 2012).

Hence, proper nutrition is the basic necessity for a person to keep themselves away from not only deadly diseases like HIV/AIDS but also any disease for that matter.

3.6 YOGA MODULES FOR HIV

Several yoga modules have been used in studies related to HIV. Bhargav *et al.* (Bhargav *et al.*, 2010) recommends a comprehensive yoga module for Hematopoietic Inhibition in HIV-1

infection (Bhargav *et al.*, 2010). The module includes a residential module for 4 weeks with the follow-up home practice session for 16 weeks.

The residential program includes a yoga practice of approx. 11 hours/day which includes om meditation, special techniques, Bhagavad-Gita chanting, Pranic Energization Technique, pranayamas, notional corrections, Yogic relaxation techniques (*yoganidra, nidrusandha*), cyclic meditation, Mind Sound Resonance Technique and laughter sessions.

The home practice includes the practice of approximately 7 hours/day which includes meditation, special techniques, pranayamas, Pranic Energization Technique, Yogic relaxation techniques, cyclic meditation and Mind Sound Resonance Technique. The paper reports only a theoretical module and no empirical evidence is reported.

Another module described by Cade *et al.* was designed for HIV+ adults with cardiovascular risk factors, the components of which are as follows:

-) Bandhas and ujjayipranayama
-) Shitalikaran vyayama (5 minutes)
-) Suryanamaskara (7 minutes),
-) Standing asanas (25 min).
-) Seated asanas (10 min).
-) Lying supine asanas (5 min).
-) Shavasana (7 min).

. The intervention was for 20 weeks with an average one hour practice per day and 2-3 days practice a week. There were no significant differences in the results of the cardiovascular disease risk factors between pre and post-intervention. While there are several other studies that report the use of yoga for HIV, the yoga module is either not clearly explained or is not available in the public domain.

3.7 ADVERSE EFFECTS OF ART

Antiretroviral Therapy (ART) remains to be the “gold standard” in HIV treatment, it is recommended to be taken life long (Buell *et al.*, 2016). However, modern medicine is still unable to find a cure for HIV making it one of the most dreaded pathogens of the 21st century (Bhatti, Usman and Kandi, 2016). Further, ART leads to serious medication-related adverse effects mainly explained by mitochondrial toxicities, and the situation will get worse in the near future. Indeed, ART is associated with an increased risk of developing cardiovascular disease, lipodystrophy, pre-diabetes and overt diabetes, insulin resistance and hyperlactatemia/lactic acidosis (Nansseu and Bigna, 2017). A study involving 394 HIV positive individuals report that a total of 880 adverse effects were reported which was on average greater than two adverse effects experienced per patient. The majority of adverse effects were central nervous systems and peripheral nervous systems, metabolic disorders, gastrointestinal (GI), headache, fatigue, loss of appetite, burning sensation (Gelaw *et al.*, 2018). The side effects of ART can have a negative impact on health-related quality of life (Quatremère *et al.*, 2017) (Table 3.1). Women seem to be more affected by side effects of ART and researchers have called attention towards the large number of side effects experienced by women living with HIV (Quatremère *et al.*, 2017).

Table 3.1: Typical adverse effects of ART

Category of issue	Typical issues	References
Gastrointestinal	Nausea, diarrhea, vomiting, taste perversion, constipation, dyspepsia, abdominal pain, hepatotoxicity, and pancreatitis	(Tayal <i>et al.</i> , 2010; Tadesse <i>et al.</i> , 2014; Gelaw <i>et al.</i> , 2018)
Nervous system (Both Central Nervous system and Pheripheral Nervous System)	Headache, vision problems, tinnitus, insomnia, paresthesia, pain/numbness/tingling in extremities, peripheral neuropathy, somnolence, excessive sleep at night, memory problems, loss of olfactory function, and hearing impairment	(Tayal <i>et al.</i> , 2010)
Hematological	Anemia, bilirubinemia, increased urate, and blood in the urine	(Tadesse <i>et al.</i> , 2014)
Psychological	Anxiety, confusion, depression, nightmares, elation, and delusions	(Tayal <i>et al.</i> , 2010; Tadesse <i>et al.</i> , 2014)

Category of issue	Typical issues	References
Metabolic	Abnormal fat distribution (lipodystrophy), anorexia, dyspnea, fatigue, lethargy, and weight gain	(Tayal <i>et al.</i> , 2010; Tadesse <i>et al.</i> , 2014; Gelaw <i>et al.</i> , 2018)
Dermatological	Skin rash, facial discoloration, pruritus	(Tadesse <i>et al.</i> , 2014)
Musculoskeletal	Body aches and vague chest pain	(Tayal <i>et al.</i> , 2010)
Cardiovascular issues	an increased risk of developing cardiovascular disease, lipodystrophy, prediabetes and overt diabetes, insulin resistance and hyperlactatemia/lactic acidosis	(Smith <i>et al.</i> , 2010; Nansseu and Bigna, 2017)
Serious adverse reactions	Affect a variety of organ systems	(Anwikar <i>et al.</i> , 2011; Nansseu and Bigna, 2017)
Fatigue related issues	Routine fatigue and dizziness	(Renju <i>et al.</i> , 2017; Gelaw <i>et al.</i> , 2018)
Miscellaneous	Hypersensitive reactions, oral ulcerations, fever, and irregular menstrual cycles	(Tayal <i>et al.</i> , 2010)

3.8 NEED FOR COMPLEMENTARY AND ALTERNATIVE MEDICINES

HIV/AIDS is not yet curable. The medications given to combat HIV/AIDS are known to have ample side effects. While research is on to find ways to reduce the side effect of various types of treatments currently available for HIV, individuals also use complementary therapeutic strategies to manage the side effects. There are reports which indicate the use of a variety of CAM by 30-100% of people living with HIV/AIDS (in Malaysia) the results of which range from both excellent to adverse effects; and thus seek a more systematic study on CAM (Hasan *et al.*, 2010).

The use of Complementary and Alternative Medicines (CAM) is a popular adjunct to conventional medicines and is particularly relevant to the HIV epidemic. However, not much consensus is reached on whether the use of CAM interferes with ART uptake or adherence. (Littlewood and Venable, 2011) even though CAM is prevalently used among HIV-positives (Littlewood and Venable, 2008) not much of document base is available on the various complementary and alternative medicines.

A systematic review of RCTs on yoga provides evidence that yoga is not associated with an increased frequency of intervention-related, non-serious, or serious adverse events or of dropouts due to adverse events compared with usual care or exercise when provided with due care (Cramer *et al.*, 2015). This is yet another motivation for the use of yoga as a complementary system of medicine.

3.9 A RELOOK AT THE CURRENT APPROACH TOWARDS HIV/AIDS

While research in the area of HIV/AIDS is pursued across the globe towards finding a cure, there is still no option to combat the medical condition in HIV/AIDS and no cure available yet (Molina *et al.*, 2017). Most medicines currently available or those on trials currently only target slowing down the progression of the disease and increasing longevity. (Makgoko, 2018). some of the medications prescribed to HIV/AIDS individuals have severe adverse reactions and are highly toxic (Molina *et al.*, 2017). Nucleoside reverse transcriptase inhibitors (NRTI) are the most widely used class of drugs in HIV, which is known to be toxic to mitochondria inside the cell resulting in myopathy, neuropathy, hepatic failure and lactic acidosis(Margolis *et al.*, 2014). Not discussing in detail the issue, a warning message indicated on one of the drugs, AZT (Zidovudine) used for patients with HIV/AIDS is worth noting: *“Toxic by inhalation, in contact with skin and if swallowed. Target organ(s) blood, bone marrow. If you feel unwell seek medical advice (show the label where possible). Wear suitable protective clothing”*(Figure 3.1).

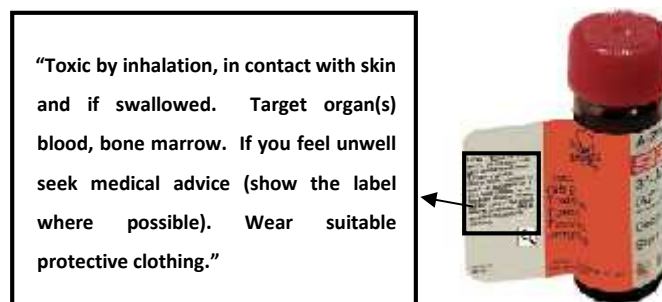


Figure 3.1: The warning on the drug Zidovudine drug bottle

In spite of all its toxicity and side effects, AZT was being used by 21.7 million people across the globe in 2017 (UNAIDS, 2018a).

3.9.1 The condoms formula

Considering the major risk factors of HIV transmission, there are several measures suggested for the prevention of HIV/AIDS. In particular, A-B-C, which stands for Abstinence, Be faithful and Condoms is the strategy considered majorly for the prevention of HIV/AIDS. In particular, the use of condoms to prevent AIDS has been the major emphasis. A relook into this aspect is required. The same is discussed in this section.

Of all the precautionary measures for the prevention of HIV/AIDS, the highest importance is given to the promotion of condoms. “Use condoms - Prevent AIDS” is the major punchline in all awareness programs; may it be in schools, colleges, public advertisements, public programs, etc. Further, the National AIDS Control Organization (NACO) in India reports that it has distributed freely or has sold, with the help of the Department of AIDS Control, 90.05 crore condoms during 2013-14. NACO further calls for strengthening condom promotion strategies and the condom promotion activities have gone public. A typical campaign to promote condoms uses a huge condom model, taken in a public procession (Figure 3.2) (NACO, 2014). Such condom promotion programs are quite common in all other programs too, that are aimed at the prevention of HIV/AIDS.



Figure 3.2: A condom promotion chariot!

The basic thought of emphasis on condom promotion is based on the premise that condom use will prevent HIV from spreading (from an infected person to a non-infected one). This addresses only half the problem.

Working on ideas to boost the immune system in the infected individual would constitute a better idea to deal with the epidemic. To this effect giving a fillip to *ojas*, a produce of the semen/sexual energy whose loss bears heavily on the HIV+ individual is vital. Needless to say, indulgence in sexual activity results in spending of the energy resulting in faster progression from HIV+ state to the AIDS state in infected individuals. The basic raw material for the production of *saptadh tuis* the food. From the matter called food, a relatively higher state of matter (matter with higher quantum of energy) - the *saptadh tus* are produced. Each of the *saptadh tus* that is produced from the previous one has a higher quantum of energy (Figure 3.3). Thus, the final one, the *ukra* has the highest quantum of energy. Thus, the expenditure of *ukra* is the expenditure of an equivalent amount of energy, or in other words, loss of *ukra* means loss of an equivalent amount of energy embodied in *ukra*.

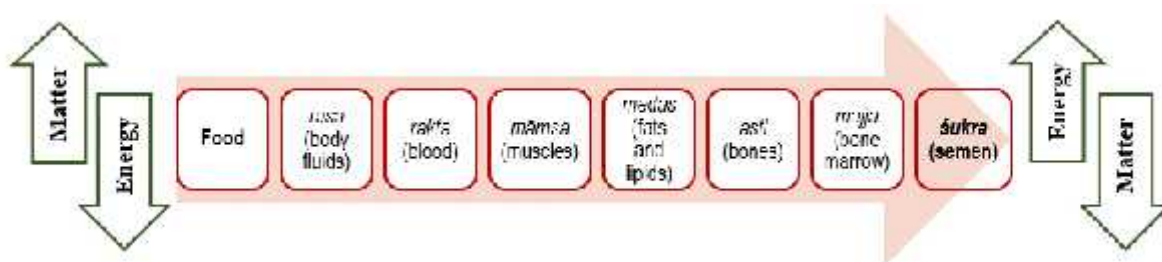


Figure 3.3: Formation of *saptadh tus*

Thus while the use of condoms by HIV positive individuals prevents HIV transfer, it promotes AIDS in the individual and thus is something like HIV positive individuals digging their own grave. Hence it should be strongly advised that an HIV+ individual abstains from any kind of sexual activity to reserve their energies to fight HIV. The HIV positive

individual may resume back to responsible sexual activities once the immune system takes over the HIV; or in other words, when the person becomes HIV negative. For agencies like WHO, UNAIDS, NACO, etc., it would be worthwhile to conduct a study to estimate the correlation between the frequencies of indulgence in sexual activity to the progression of the disease. At this juncture it is worth noting that modifications in behavioral changes; with reduction in cases of people having 2+ non-regular sexual partners by 50%, reduction in cases of individuals having 3+ non-regular sexual partners by over 90%, reduction in cases of individuals having pre-marital sex by around 65% had a major role to play in a successful prevention of HIV cases in Uganda(Green *et al.*, 2006). Behavioral correction with regard to sex, in general, will go a long way in combating the HIV epidemic.

3.9.2 Sex and nature

Involving sex is one of the basic instincts for every animal and hence abstinence from sex looks to be an absurd argument. The Maslow's hierarchy of needs has in its base, the sex along with food, clothing and shelter(Mathipa, Margaret and Maile, 2014). In animals, sexual urge deepens only during certain seasons, called the mating season. For human beings, there is no time or season and also the urge is driven by unnatural factors like peer pressure, desire to fit-in, for recreation, etc. Many of these reasons do not hold any evolutionary compulsion required to propagate the species. Comparable to the origins of non-communicable diseases (where for example we consume much more food than what is required, which becomes the etiology for a disease), it is quite possible that the virus saw an opportunity in the sexual habits of humans and used that as an entry option.

3.9.3 Sex education

All over the world, several local and international agencies conduct 'educational programs' to create awareness about AIDS. The focus of these programs is mainly to provide education on

safe sex. This can address or aggravate the problem depending on the prevalent social ideology. This is required in regions where pre-marital sex is accepted, but the same can work to adverse effects in regions where pre-marital sex is a taboo as it would result in curiosity on sex-related matters, possibly leading to irresponsible sexual behavior. A reflection of this can be seen in the teen pregnancy data from the US which indicates that out of all the babies born in 2014, 89% of babies were to teenage parents (numbering 249,078 in 2014 and 273,105 in 2013)(Hamilton *et al.*, 2015). Hence sex education/condom awareness program plays an important role in such countries where even the school girls becoming pregnant is a major issue. The ideal way of resolving the problem of adolescents involving in free sex would be to offer them an alternative in the way of realizing their true potential and interests by the introduction and regular practice of yoga and meditation which would also improve their academic performances.

On the contrary, even in the projects like the red ribbon express, an exclusive train project for AIDS education in India, school children seem to be a major target visitors (Anita, 2010; Mahesh, 2010) (Figure 3.4 and Figure 3.5) which seem to overemphasize condom promotion over abstinence.



Figure 3.4: School Children at the Red Ribbon Express



Figure 3.5: The red ribbon express, the HUGE condom model and the adolescents

This, as discussed earlier leads to unnecessary curiosity on sex-related matters, possibly leading to kiddy experimentation and irresponsible sexual behavior. The ideal way of resolving the problem of adolescents involving in free sex would be to offer them an

alternative in the way of realizing their true potential and interests by proper introduction and regular practice of yoga and meditation. To achieve the goal of eliminating HIV by 2030, the focus should be to improve the health of HIV positives along with controlling the spread of the virus. Both of these can be attained by propounding the yoga-based lifestyle. Thus promotion of ‘condom culture’ in the name of AIDS education should be checked. Implied character education could supplement and preferably phase-out sex education.

3.9.4 Additional concerns:

There are several other factors that are required to be addressed for a wholesome approach to manage HIV/AIDS. The following points are worth noting:

- J Alcohol is known to reduce CD4+ cell count, increase the viral load and result in a faster progression of HIV+ to AIDS. Hence there is a need to check this issue especially among HIV positive individuals (Siegel, 1986; Kalichman *et al.*, 2007; Baum *et al.*, 2010; NIAAA, 2010).
- J The use of drugs has played a major role in promoting and spreading AIDS in the west. Appearance of AIDS in the US & Europe in drug users coincided with illicit drug use and the use of alkyl nitrites by homosexuals (Peter, 1992). Hence control over the use of these substances helps face the HIV/AIDS challenge better. Further, drug abuse is also a major factor in HIV/AIDS patients’ ART, nonadherence, and mortality (Ingersoll, 2004)
- J Malnutrition is considered to be a marker for poor prognosis among HIV positive individuals (Nerad *et al.*, 2003). Proper nutrition is key to maintaining the proper immune system and is important for HIV positive individuals (Harichandra and Ramesh, 2017).
- J HIV/AIDS has still been a challenge for over 30 years. A relook into the way it is fought is very much essential.

- J) *Ojas*, the essence of *Sapta dh tus* is key to health and vitality. The increase of *ojas* is important to help manage HIV/AIDS.
- J) Factors provoking unnatural sexual behavior to be checked to prevent HIV/AIDS.
- J) Condom promotion better be checked among HIV positive individuals since it promotes the progression of HIV to AIDS.
- J) Abstinence from sex is inevitable for HIV positive individuals, and the conversion of sex energy into *ojas* helps them in fighting HIV.
- J) The promotion of 'condom culture' in the name of AIDS education should be checked. Character education should replace sex education.
- J) Several other factors like drugs, substance abuse and alcoholism promote disease progression, which should be checked among HIV positive individuals.
- J) *S tvik* food conducive for the production of *sapta dh tus* should be an integral part of HIV management.

Yoga is an indispensable tool for HIV positive individuals. Yoga, in general, promotes health and harmony in society. In this background, an integrated approach through the Integrated Approach of Yoga Therapy is worth considering. The same is explained in the following section.

3.10 NEED FOR THE STUDY

In spite of the available evidence on yoga's ability to improve immune functioning, not many studies are reported on immune parameters in specific owing to the cost of blood tests (Field, 2011). A pilot RCT study reports that a one-month yoga intervention showed improvement in CD4 count and depression among the adult age group (Naoroibam *et al.*, 2016). Yet another single-group pre-post study has shown improvement in immunity, depression and anxiety management of HIV adults (Koar, 1995). Yoga has shown improvement in the cognitive functions of normal school children (Telles *et al.*, 2013). Yoga, in general, is

known to also helpful in alleviating depression and improving quality of life in several diseased conditions (Naoroibam *et al.*, 2016). A randomized controlled trial shows that yoga intervention reduces anxiety, depression and negative effects amongst HIV+ and increases CD4 counts. However, there was a marginal increase in viral loads. The authors suggest that a larger and longer trial necessary to validate findings with immune measures (Bhargav *et al.*, 2010).

However, there are hardly any reports on the effect of yoga on children/adolescents with HIV. The current study is an attempt to determine the effect of yoga practice on the immune system, cognitive functions (CFs) and QOL of HIV positive children/adolescents.

There are a number of issues that need to be addressed. It would be very much appropriate to conduct studies on a more wholesome approach to manage the problem of HIV/AIDS. While some studies on the use of yoga are available in the adult range which has proven to be useful, not many studies are available on children/adolescents. In this background, this study is taken up to study the role of the integrated approach of yoga therapy (yoga) on the immune system, quality of life and cognitive functions among HIV positive children/adolescents. The current research is expected to shed some light on the ability of yoga in managing stress, improving the quality of life, reducing viral load, increasing CD4 cell count and improve the CD4/CD8 ratio and in improving the cognitive functions among HIV positive children/adolescents. However, studies conducted on the effect of yoga on children although are available, are quite limited. Hence additional studies on the effect of yoga on children are taken up.

3.11 AIM OF THE CURRENT STUDY

To determine the role of the Integrated Approach of Yoga Therapy in modifying the immune responses, QOL and cognitive functions in HIV Seropositive individuals.

3.12 OBJECTIVES

-)] To study the effect of yoga on immune system parameters
-)] To study the effect of yoga intervention on HIV positive individuals on Quality of Life
-)] To study the effect of yoga intervention on the cognitive functioning of the HIV positive

3.13 RESEARCH QUESTIONS

- Does yoga modify the CD4 cell counts amongst HIV positive individuals?
- Does yoga modify the CD4/CD8 ratio amongst HIV positive individuals?
- Does yoga modify the QOL amongst HIV positive individuals?
- Does yoga modify the cognitive functioning of HIV positive individuals?

3.14 HYPOTHESIS

- Yoga modifies the CD4 cell counts amongst HIV positive individuals
- Yoga modifies the CD4/CD8 ratio amongst HIV positive individuals
- Yoga modifies the QOL amongst HIV positive individuals
- Yoga modifies the cognitive functioning of HIV positive individuals

3.15 NULL HYPOTHESES

- Yoga does not modify the CD4 cell counts amongst HIV positive individuals
- Yoga does not modify the CD4/CD8 ratio amongst HIV positive individuals
- Yoga does not modify the QOL amongst HIV positive individuals
- Yoga does not modify the cognitive functions of the HIV positive individuals