

Effect of H-ABT Therapy on Fatigue and Depression among Adolescent HIV Patients- An Experimental Study

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Abstract

Background: HIV is no longer a terminal disease due to antiretroviral treatments; instead, it is a chronic condition which include fatigue and depression leading to poor quality of life. According to studies, fatigue and depression significantly affect quality of life and the presence of disabilities that limit physical function in HIV-infected people.

Aim: To evaluate the effect H-ABT Therapy on Fatigue and Depression in Adolescent living with HIV and its impact on individual QOL.

Methods: The study included 30 adolescent participants with age between 10-19 years diagnosed with HIV. The intervention consisted of three 30-minute H-ABT Therapy sessions each week for four weeks. Patients were evaluated using the Medical Outcomes Study HIV scale, the Beck Depression Inventory, and the fatigue severity scale at the beginning and completion of the intervention.

Results: The mean difference of FSS, BDI, MOS-HIV-PHS AND MOS-HIV-MHS score was 0.84 ± 0.35 , 7.47 ± 2.93 , 9.17 ± 3.43 and 16.47 ± 5.69 which showed statistically highly significant difference with p value ($p < 0.001^*$) respectively.

Conclusion: The study concluded that H-ABT Therapy (Art Therapy, Binaural Beats and Tai Chi Exercises) were beneficial in the improvement of fatigue, depression symptoms and Quality of Life in Adolescent patients living with HIV.

Keywords: Adolescent, HIV, Fatigue, Depression, Tai chi, Binaural, Art therapy

1. Introduction

The Human Immunodeficiency Virus (HIV) is a virus which targets on the immune system and weakens people's defences against a variety of infections, eventually leading to acquired immunodeficiency syndrome (AIDS), is one of the world's most serious public health challenge, causing significant morbidity, mortality, and poor quality of life (Naoroibam et al., 2016) & (HIV/AIDS, 2022). The global statistics showed in 2020 alone, 410,000 [194,000-690,000] young people between the ages of 10 to 24 were newly infected with HIV, of whom 150,000 [44,000-310,000] were adolescents between the ages of 10 and 19 (UNAIDS, 2022). In India estimated adult HIV prevalence (15-49 years) was 0.21% in 2021 (Adolescent and Young Adult Health, 2022). The number of People Living with HIV (PLHIV) is estimated at around 24 lakhs. Southern states have the largest number of PLHIV viz.

Maharashtra, Andhra Pradesh, and Karnataka are the top three (Adolescent Development and Participation / UNICEF India, 2022).

According to WHO, adolescent HIV is the second leading cause of death (Adolescent and Young Adult Health, 2022). The reports mentioned that many adolescents do not know the modes of transmission of this disease even though the high prevalence of HIV/AIDS is noted (Atkinson et al., 2008). Adolescents living with HIV have a poorer access to antiretroviral treatment, care retention, treatment adherence and viral suppression. A major contributor to these issues is limited provision of adolescent friendly services, such as psychosocial intervention, physiotherapy care and support (Adolescent and Young Adult Health, 2022). As, India will gain benefit socially, politically and economically if this enormous number of adolescents are kept safe, healthy, educated and equipped with information and life skills to support the country's continued development (UNICEF India, 2022). They are a valuable human resource and an essential component of the development process. Adolescent health will contribute to the community's overall health (Lal, 2017).

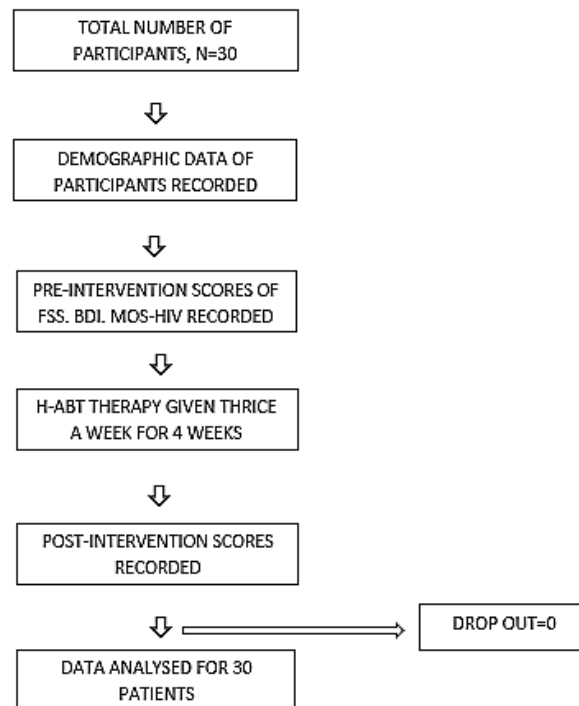
HIV symptoms vary upon the progression of infection. Mental disorders such as major Depressive disorder, generalized anxiety, and agoraphobia are commonly found in Adolescents living with HIV. Out of all these, depression is the most prevalent comorbid mental disorder with a higher prevalence of 22–38% among HIV-infected patients. Depression also has poor adherence to ART and influence CD4 count negatively (Atkinson et al., 2008). Along with Depression, Fatigue is the commonest symptom seen in ALWH which is associated with their impaired physical function and poor quality of life. Breitbart et al.'s 1998 study found that fatigue was associated with decreased quality of life, larger levels of general psychological distress, and significantly reduced physical functioning in HIV-positive individuals.

Numerous therapies that involve actively engaging in creative activities, such as art, have been found to provide significant advantages for overall well-being, quality of life, physical health, and social interaction. One form of music therapy called Binaural beats has been demonstrated to produce pleasurable and positive emotions by stimulating the auditory system and guiding the brain towards a desired frequency (Sung et al., 2017). Both Tai Chi, a mind-body technique promoting physical and psychological well-being, and art therapy, which has been demonstrated to reduce stress and enhance mental health irrespective of artistic skill or background, offer significant benefits for overall well-being (Ibañez et al., 2020) & (Ciasca et al., 2018). The objective of the current research is to find a suitable combination of alternative and complementary medicines that can enhance the quality of life for people living with HIV/AIDS. Specifically, the study aims to investigate how H-ABT Therapy can alleviate fatigue and depression in ALWH and improve their overall well-being.

2. Methods

The study was an experimental study with a pre-post study design conducted in tertiary care hospital Aurangabad, Maharashtra, India from 26th sept 2022 to 21st February 2022. The Institutional Ethical Committee provided the necessary ethical approval. Before taking part in the trial, each subject provided written informed consent. The participants were age between 10-19 years adolescent diagnosed with HIV, both male and female who are able to follow the commands, FSS score more than 4 and BDI score more than 17 were included in the study. Participants who are Adolescent living with any other illness, Un co-operative patient were excluded from the study. Based on prior studies that took effect size consideration, the sample size was calculated thirty (30). All the subjects were enrolled using non-probability sampling design and convenience type of sampling technique. All the outcome measures were recorded by the therapist prior to the intervention (Baseline measures) and post intervention (i.e., after 4 weeks).

3. Flow Chart



4. Outcome Measures

- 1. Fatigue severity scale:** FSS involves the subject rating his or her level of fatigue by using a brief questionnaire. It includes of a nine-item scale that assesses how subjectively fatigue feels and to what extent it interferes with daily activities and impairs quality of life. Participants are presented with statements that needs to be rated upon the level of agreement and disagreement. These items are to be responded upon the basis of last 2 weeks experience. Higher the score, higher the level of fatigue.(Lerdal, 2022)
- 2. Beck Depression Inventory:** The BDI consists of 21 items, with the first 13 reflecting cognitive-affective symptoms (such as sorrow and guilt) and the remaining 8 reflecting somatic or vegetative symptoms (such as disturbed sleep or eating). Clinical depression is suggested by cognitive-affective scale scores of 11 or higher or by a total score of 16 or higher (Jackson-Koku, 2016).
- 3. Medical Outcomes Study HIV (MOS-HIV):** It is a QOL evaluation that Wu created in 1996 to assess the state of health. It has been widely applied in research on the HIV/AIDS acquired immune deficiency syndrome. It consists of 35 items that cover 11 QOL dimensions, such as perception of overall health, physical functioning status, bodily pain experienced, perceived role functioning, social functioning, mental health, energy/vitality, cognitive functioning, and health-related distress. By standardizing the results of each domain, the Physical Health Summary Score (PHS) and Mental Health Summary Score (MHS) were also determined.The subscale domains were rated on summated rating scales ranging from 0 (worst state of health conceivable) to 100 (best condition of health possible) (Alcocer-Bruno et al., 2020)

Intervention:

The patients had H-ABT therapy for 4 weeks, three sessions per week, for a total of 30 minutes.

- 1. Art therapy-** Patients will be in a comfortable sitting posture along with all the art appliances/supplies needed.

The therapist will guide them to relax themselves and to breath gently. Suitable music will be played in the background to relax the patients. The therapist will then propose to them the topic for artistic creation for the

session and the session will be started. The therapist will guide the patients throughout the session. At the end of the session the therapist will ask the patients to contribute their feelings that surfaced during the activity. This verbal reply from all patients will help to understand each other’s output on artistic creations. The participants can later keep their respective art work. **(Figure -1)**

2. **Binaural beats-** A sound track consisting of recordings of 30-minute alpha binaural beat will be presented to patients. The track will run for the entire 30 minutes of the protocol. The binaural beats will be of 10Hz which will help the brain of patients to produce 10Hz beats corresponding to the alpha pattern of brain wave activity which actively associates with the relaxation. **(Figure -1 and Figure -2)**
3. **Tai chi-**
 - i. **Yang-style-** This includes large sweeping, graceful, and slow movements. Exercise will be started by instructing the patients to acquire stride standing and sweeping the hands to and fro by acquiring a squat position. Later, ward off stance to right side will be acquired followed by roll back stance and press stance to right side, retrieving back push position of hands is adapted followed with cross hand and closing stance.
 - ii. **Chen-style-** Exercise will start with opening position and then the lazily tying coat position is performed where squat stance is adopted with the arms moving in circular motion and simultaneously foot will be moved from left lunge position to wide base squat. Arms will be then moved in cross over and weight will be shifted over to right lunge and ending the movement with wide squat position. Later, turn and lotus kick movement performed with from wide base to left leg weight bearing and arms moved in a flowing movement followed by right leg kick in a circular pattern and again wide base is adopted with right foot moving backward. **(Figure -2)**

Protocol: H-ABT -HIV-ART Therapy, BINEURAL BEATS, TAI CHI

Time	Exercises	Repetition
First 5 mins:	Tai Chi Exercises –	Yang-style- 2 sets 10 repetition chen-style- 2 sets 10 repetitions
Next 20 Mins	Art Therapy-	First week- Painting Second week Drawing Third week- Collage Fourth week- Blow painting
Last 5 Mins:	Tai Chi Exercises	yang-style- 2 sets 10 repetition chen-style-2 sets 10 repetitions

Throughout the treatment binaural beats of alpha frequency 8-13 Hz will be played in the background.

FIGURE -1:

Taichi Pictures with binaural beat:



FIGURE -2

Art therapy Pictures binaural beat:



Statistical Analysis:

SPSS version 23 was used for the statistical analysis. The Gender distribution, Age distribution, and BMI was calculated by percentage method. The homogeneity of pre-test and post-test scores of all the outcome measures was checked by using Shapiro-Wilk. The changes in the pre-test and post-test scores for the Fatigue severity scale, Beck depression inventory scale, MOS-HIV- PHS and MHS scale seemed to follow a Normal Distribution, hence Dependent t-tests were applied. The p-values were contemplated at 0.05.

5. Results

The total number of males and females were 11 (63%) & 19 (37%). The mean age of the participants was 14.93± 2.37. The mean BMI was 19.06± 3. [Table 1]

Table 1: Demographic data including Gender distribution, Age distribution, and BMI

Factor		
Gender	Female	11 (63%)
	Male	19 (37%)
Age (Years)		14.93± 2.37
BMI (Kg/m ²)		19.06± 3.46

Table 2: Normal distribution of pre-test and post-test scores of all variables in the study by using Shapiro-Wilk

Variable	Time frame	z-value	p-value
Fatigue severity scale score	Pre	0.965	0.413
	Post	0.934	0.050
Beck depression inventory score	Pre	0.945	0.122
	Post	0.976	0.700
MOS-HIV- PHS	Pre	0.967	0.461
	Post	0.971	0.561
MOS-HIV- MHS	Pre	0.980	0.833
	Post	0.972	0.599

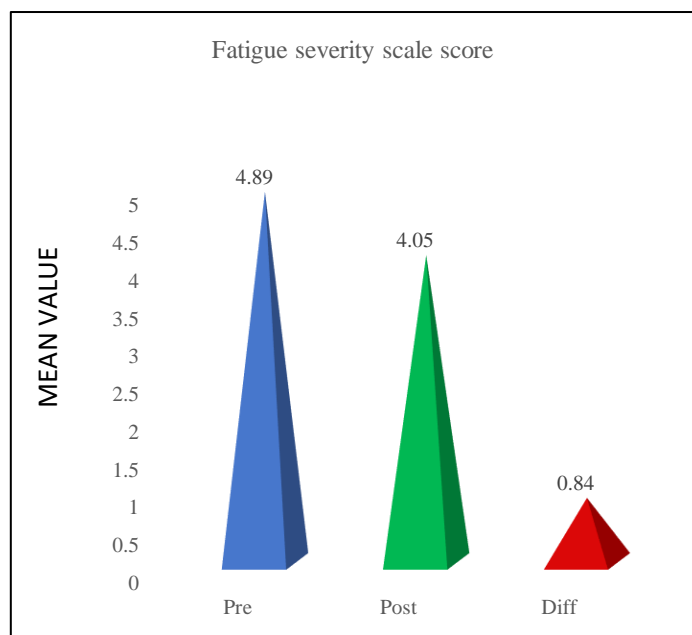
Data set for the variables is normally distributed as all the variables have showed non-significant outcome which indicated the data is homogeneous. [Table 2]

Table 3: Comparison of pre-test and post-test FSS, BDI, MOS-HIV- PHS and MOS-HIV- MHS by Dependent -t test

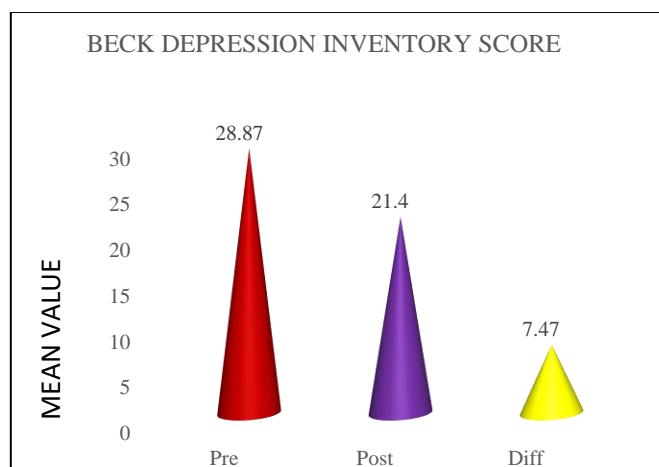
Variable	Pre		Post		Diff		Effect size	t value	p value
	Mean	SD	Mean	SD	Mean	SD			
1. Fatigue severity scale score	4.89	0.50	4.05	0.65	0.84	0.35	2.42	13.268	0.001*
2. Beck depression inventory score	28.87	4.36	21.40	3.64	7.47	2.93	2.55	13.944	0.001*
3. MOS-HIV- PHS	51.43	4.42	60.60	3.04	9.17	3.43	2.67	14.617	0.001*
MOS-HIV- MHS	94.83	5.01	111.30	5.74	16.47	5.69	2.89	15.846	0.001*

The mean difference of FSS, BDI, MOS-HIV-PHS AND MOS-HIV-MHS score was 0.84 ± 0.35 , 7.47 ± 2.93 , 9.17 ± 3.43 and 16.47 ± 5.69 which showed statistically highly significant difference with p value ($p < 0.001^*$) respectively. [Table 3] [Graph 1, Graph 2 & Graph 3]

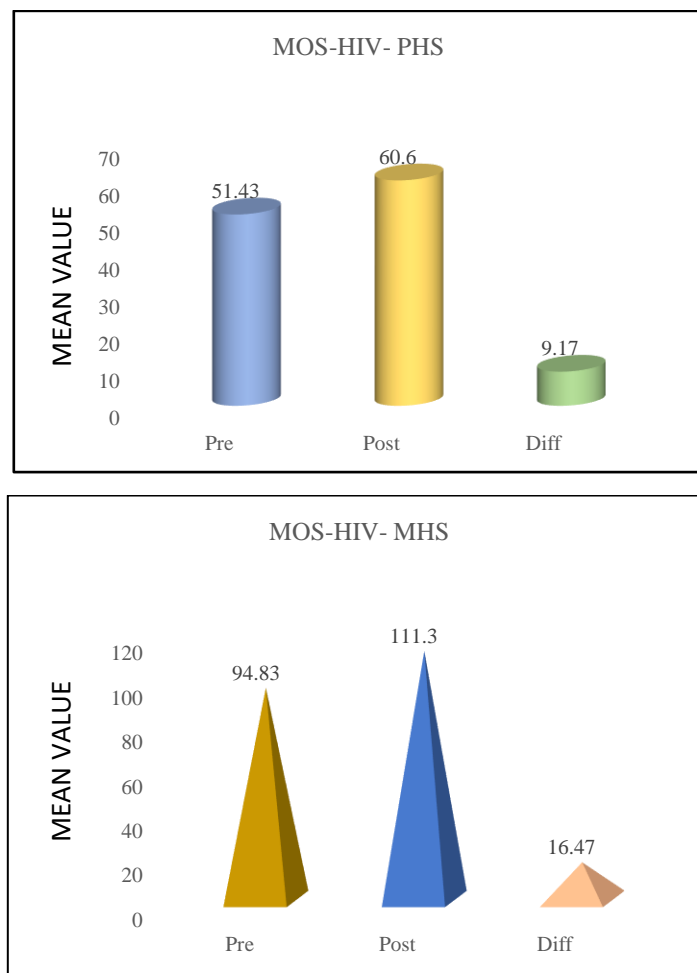
Graph 1: Comparison Pre-test and Post-test scores for the Fatigue severity scale score



Graph 2: Comparison Pre-test and Post-test scores for the Beck depression inventory score



Graph 3: Comparison Pre-test and Post-test scores for the MOS-HIV- PHS and MOS-HIV- MHS



6. Discussion:

The present study reports that significant improvement was observed in symptoms of Fatigue, Depression and Quality of Life in terms of FSS, BDI, MOS-HIV-PHS and MHS score with H-ABT therapy in participants with Adolescent HIV.

Improvement observed in FSS score is very highly significant, the possible reason could be combined of Art Therapy, Taichi and binaural beats which gave a positive response to overcome the levels of fatigue experienced by the HIV adolescent patients. **The Binaural** beats created a soothing environment while practicing the tai chi with breathing pattern of the adolescent patients (Sung et al., 2017). The breathing techniques taught to the HIV adolescents during the course of taichi training helped the patients to compose themselves and maintain a steady breathing even while doing movements due to the proper education provided about breathing technique.

Recent studies reported, **Taichi** have also proven to be an effective means of treatment as a complementary or alternative approach for fatigue (Ibañez et al., 2020) & (Coetzee et al., 2019). Due to **Art Therapy** the patients were not only engaged in an additional hobby but also developed concentration and attention and focus (Ciasca et al., 2018). This all learning helped the patient to regulate the breathing, maintaining a composed body posture and effectively overcome the symptoms of fatigue.

The present study showed promising effects with a combination of art therapy, Taichi and binaural beats as the scores calculated post treatment are highly significant among adolescent HIV participants. The listening of binaural beats not only showed effects on depression by projecting the participant in relaxing state but also by regulating the heart rate and systolic blood pressure (Walsh et al., 2017). The listening of beats has positively

activated the parasympathetic nervous system. Literature have also proven that listening can divert the brain into more positive mind state(Sung et al., 2017).

Our study focusses on the significant decline in the depressive symptoms level post given the intervention throughout the one-month time span. Many Studies have reported that art therapy also stimulate positive feelings, values and attitude among the patients(Zhang et al., 2022)& (Bhatt et al., 2020)This has been speculated as the patient can wend the emotions and feelings through the art and also give it an artistic approach. This also concretize the patient's thoughts towards an insight to deal with the daily situations and problems to encounter(Ciasca et al., 2018).

Various studies have encountered that Taichi have proven to be an effective intervention for depressive symptoms with promising positive outcomes than the routine medications. Along with the improvement in depressive symptoms the intervention also proves to be effective to elevate stress, fear of fall, and to improve mood and self-esteem (Wang et al., 2014)& (Brown et al., 2000)

In our study the physical health domain and mental health domain of quality of life showed improvement which could be possible due to reduced symptoms of fatigue and depression(Mahalakshmy et al., 2011) &(Lal, 2017). Also, Post intervention the notable change in the ALWH fatigue scores was seen with increased energy levels and prompt functioning in personal and social environment(*Global HIV & AIDS Statistics — Fact Sheet | UNAIDS, 2022*).The participants in the study were seen to do the task more efficiently after the intervention and were encouraged to develop a better lifestyleMoHFW | GoI, 2021) &(Jain et al., 2016). In our study the mental health score of QOL have also observed to improve with positive signs of mental health functioning and overall wellbeing(Journal et al., 2006).

Literature states that Binaural beat art therapy and Taichi plays a crucial role in improving the emotional wellbeing, decreasing stress, anxiety, depression, and mood disturbances. Also, combines mindfulness, and deep and controlled breathing, soothing music, concentration which may alter the autonomic nervous system and restore homeostasis, thereby relieving the stress induced by the hypothalamus-pituitary-adrenal axis reactivity and shifting the autonomic nervous system's balance toward parasympathetic dominance(Mehra et al., 2016).

7. Clinical Implications

Results highlight the strengths of implementing physiotherapy care in hospitals, NGOS and home-based programs within ALWH. In particular, we found that HABT therapy had benefited by improving the fatigue and depression symptoms in these participants without any problem and harm.

Limitations: There are limitations of this research that need to be acknowledged. We explored the H-ABT therapy in ALWH but we did not consider the socioeconomic status, family role and caregiver role. Also, the participants were taking medications which causes bias.

Future Scope: Firstly, it may be important for both physiotherapists and other healthcare providers to focus on collaborative goal setting in hospital/clinical care while treating ALWH. Secondly, same study can be done by using biomarkers for depression and fatigue or patients living with adult HIV.

Conclusion: The present study concluded that 4 weeks of H-ABT proves to be effective in improving fatigue, depression and quality of life in Adolescent HIV Participants. Therefore, application of H-ABT Therapy in these individuals should be considered which will help them in reducing symptoms and boost the quality of life

DECLARATIONS

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List of abbreviations

HIV- human immunodeficiency virus
ALWH- Adolescents Living with HIV
FSS- fatigue severity scale
BDI-Beck's Depression Inventory
MOS -Medical Outcomes Study
PHS- Physical Health Summary
MHS- Mental Health Summary
QOL- Quality of Life
H-ABT-HIV, Art, Binaural and Taichi

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