

Exercise & Yoga as an intervention for enhancing subjective wellbeing in HIV-positive individuals

Abstract:

Background: Human immunodeficiency virus (HIV) infection worsens the frailty of individuals making them vulnerable and compromising their quality of life. Auxiliary to this, considerable stigma & social rejection are associated with HIV infection contributing to anxiety & depression. Research has verified the beneficial effects of exercise; yoga on the physical & psychological health across populations & therefore this study was conducted to assess its effects in HIV positive individuals.

Methodology: 60 HIV patients were divided into 3 groups randomly; Group 1 (medical treatment), Group 2 (aerobic training) & Group 3 (yoga training). Intervention was started after informed consent & ethical approval for 6 weeks. Outcome measures used were BMI, Six-minute walk test, Hamilton Anxiety scale, & SF-36. The data was then calibrated & analyzed by ANOVA & Chi-Square t-Test

Results: After 6 weeks of treatment, the BMI, anxiety levels and quality of life tested showed a significant change in Group 2 & 3. Also, there was a considerable decrease in anxiety among patients in Groups 1 & 2. Quality of life was much better in Groups 2 & 3 compared to Group 1

Conclusion: Exercises significantly improve physical & psychological health status, well-being & quality of life in HIV positive individuals. Aerobic training showed superior developments than yoga.

Keywords: HIV positive patients, Exercise training, Aerobics, Yoga, Physical wellbeing, Psychological Health, Quality of life.

27 Article:

28 Introduction:

29 Human immunodeficiency virus (HIV) & Acquired immune deficiency syndrome (AIDS) is a significant threat
30 to health & wellbeing of human population. HIV is a retrovirus that progressively lowers the body's CD4+ cell
31 counts & impairs the immune system¹. Many unfavorable metabolic & morphological abnormalities are
32 associated with HIV particularly body composition & muscle wasting. The standard treatment for HIV is a
33 combination of medicines called Highly Active Anti-Retroviral Therapy (HAART). These slow the rate at
34 which the virus multiplies & promotes favorable virological control, which significantly decreases the morbidity
35 & mortality associated with HIV. Although the introduction of HAART has improved longevity among HIV
36 patients, HIV & its therapy have been associated with the development of several metabolic complications &
37 may put patients at an increased risk of metabolic & cardiovascular diseases^{2,3}.

38 The increased chronicity of HIV infection has been mirrored by increased prevalence of disablement in the HIV
39 positive individuals. Thus, the needs of these individuals have increasingly included the management of
40 impairments (problems with body function or structure – pain, weakness), activity limitations (difficulties in
41 executing daily living activities) & participation restriction (social involvement difficulties, inability to work)⁴.

42 Substantial body tissue wasting has been reported in HIV positive individuals. Factors causing this are⁵ –

- 43 • Mal absorption
- 44 • Disruption of biochemical pathways
- 45 • Endocrine dysfunction
- 46 • Lipodystrophy
- 47 • Toxic effects of chemotherapeutic medical agents
- 48 • Muscle atrophy
- 49 • Nervous system disorders – demyelination, neuropathy, neurosensory & neuromuscular disorders.
- 50 • Myopathies
- 51 • Fatigue
- 52 • Physical inactivity
- 53 • Psychogenic factors

54 Exercise is one possible management strategy for addressing these issues. It has potential prophylactic benefits
55 associated with improved lean body mass, strength, psychological status & cardiovascular fitness⁶.

The cost of improved immune function & life expectancy for HIV infected patients on HAART is severe metabolic complications. These individuals are now living longer, but with more chronic disease. Participation in an exercise program may be an important pharmacological alternative to improve the metabolic & morphological features of HIV/AIDS. Aerobic exercise training & yoga have been used in managing signs & symptoms of other chronic illness & is also widely used in health promotion & rehabilitation programs to improve physical endurance⁷. Therefore, this study was conducted to study the effects of exercises (aerobic & yoga) on the subjective wellbeing of HIV positive individuals.

Methodology:

60 HIV positive subjects between the age group of 20 to 40 years (mean age 33.25) with CD4 lymphocyte counts between 200 & 500 cells/mm³ were included from the HIV clinic of the medicine outpatient department of a public sector hospital. On receiving the approval of the institutional ethics committee, written consent from each patient was obtained prior to commencement of the study. After the initial screening, patients without signs of opportunistic infections & co-morbid conditions were included & randomly divided into 3 groups: Group 1 (medical line of treatment), Group 2 (aerobic exercises) & Group 3 (yoga). After the study completion, this trial was registered with the Clinical Trials Registry – India (CTRI).

Outcome measures used in the study:

- Body Mass Index (BMI) ⁸: measured with weight & height of an individual.
- Exercise tolerance testing ⁹: was conducted using a 6 minute walk test. Before starting, the basal values for blood pressure, heart rate & respiratory rate were recorded. Patients were encouraged to walk as far as possible & the distance was noted. The values post test were documented & compared between the 3 groups.
- Hamilton Anxiety Scale (HAS) ¹⁰: is a series of semi-structured questions related to symptoms of anxiety. The interviewer then rates the individuals on a 5point scale for each of the 14 items. 7 items of the scale specifically address psychic anxiety while the remaining 7 tackle somatic anxiety. For the 14 items the score ranges between 0 – 4. (0 – no anxiety, 1 – mild anxiety, 2 – moderate, 3 – severe & 4 – grossly disabling anxiety) The total anxiety score ranges from 0 – 56.
- SF-36 Scale ^{11, 12}: is a set of generic, coherent & easily administered quality of life questionnaire. This multipurpose, short-form health survey has 36 questions yields an 8point scale profile of functional

health & well being along with psychometrically based physical & mental health summary measures.

Each question is directly transformed into a 0-100 scale, the lower the score the more disability. The 8 sections include:

- Vitality
- Physical functioning
- Bodily pain
- General health perceptions
- Physical role functioning/limitations
- Emotional role functioning/limitations
- Social functioning
- Mental health

A strength of the SF-36 a concurrent measurement of mental & physical health status.

Procedure:

Group 1: received medical intervention in medicine out patient department.

Group 2 (aerobic exercises)¹³: performed 3 times per week for 6 weeks with intensity for 40-50% of target heart rate. Exercises were performed for 30 mins per session that included a warm up phase (5 mins), aerobic phase (20 mins) and cool down phase (5 mins).

- Warm Up Phase:

- General upper & lower limb movements
- Forward bend
- Side stretch
- Trunk rotations
- Side lunges
- Arm swings

- Aerobic Phase:

- Marching
- High step marching
- Brisk walking
- Stepping
- Jogging

- Cool Down Phase:

- Stretching – sitting, lying
- Breathing exercises
- Slow movements
- Supine position
- Relaxation

Group 3 (yoga): Yoga is an ancient exercise form which combines physical training with a strive for mental & spiritual wellbeing. Patanjali described the yogic practice in the form of eight limbs (Ashtanga Yoga) the main three parts of yoga are- exercise, breathing and meditation¹⁴. This group performed asana & pranayama in 30 mins, 3 times per week for 6 weeks. Each asana was repeated 3-4 times and was maintained for 3-5 breaths. Patients were asked to concentrate fully on their relaxed breathing pattern.

- Asanas: are physical postures to develop & strengthen the muscles. They help build stamina of the organs & systems of the body, promoting positive health and overall well-being¹⁵.

Standing	Sitting	Prone
Tadasana	Padmasana	Shalabhasana
Trikonasana	Vajrasana	Bhujangasana
Parvatasana	Yogmudrasana	Naukasana
Ekshatapadasana	Gaumukhasana	Dhanurasana

- Pranayama: or breath control is aimed to achieve organized breathing & reduce symptoms of anxiety. The session is ended with a pranayama. It incorporates breathing practices aimed at bringing into utilization all the lobes of the lungs for continuous & rhythmic breathing. The patients are, thus, subjected to deep relaxation after physical postures, that in turn reduces anxiety.

Results:

This is a prospective, randomized study aiming to analyze the effects of exercises (aerobic & yoga) on aerobic function, quality of life & the psychological status & well-being in HIV positive individuals. All the patients (20 in each group) remained in the study for a follow up of 6 weeks. The ANOVA & Chi Square test was used for statistical analyses.

141 Table 1: Comparison of changes in mean BMI after treatment between the groups.

Duration in Weeks	Mean BMI (kg/m ²)		
	Group 1	Group 2	Group 3
Baseline	21.80 + 1.55	20.69 + 1.20	21.32 + 0.83
At 6 weeks	21.59 + 1.43	21.25 + 1.30	21.37 + 0.88
Difference	*-0.21 ± 0.36	*0.56 + 0.37	0.064 + 0.15

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143 Inference: The mean BMI showed a significant change after 6 weeks. In Group 1, a negative value was observed
 144 compared to Group 2 while Group 3 showed no significant change.

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146 Table 2: Comparison of changes in mean 6-minute walk distance after treatment between the groups.

Duration in Weeks	Mean 6 MWD (mtrs)		
	Group 1	Group 2	Group 3
Baseline	411.00 + 52.05	431.00 + 38.47	405.28 + 42.58
At 6 weeks	414.00 + 59.06	514.44 + 52.27	434.44 + 45.27
Difference	3.00 + 10.44	*83.44 + 20.52	*29.17 + 9.12

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148 Inference: The 6-minute walk distance was significantly greater in Groups 2 & 3 (Group 2 greater than Group 3)
 149 whereas the change was not significant in Group 1

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151 Table 3: Comparison of changes in mean HAS scores after treatment between the groups.

Duration in Weeks	Mean HAS scores		
	Group 1	Group 2	Group 3
Baseline	20.70 + 6.75	9.72 + 7.51	15.61 + 6.45
At 6 weeks	19.00 + 7.73	12.89 + 5.50	11.39 + 4.29
Difference	*-1.70 + 2.39	*-6.83 + 2.57	*-4.22 + 3.34

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153 Inference: The mean anxiety levels were considerably lower in all groups (Group 2 greater than Groups 1 & 3)
 154 after 6 weeks.

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156 Table 4: Comparison of changes in mean physical functioning scores after treatment between the groups.

Duration in Weeks	Mean Physical functioning scores		
	Group 1	Group 2	Group 3

	Group 1	Group 2	Group 3
Baseline	60.00 + 16.58	65.12 + 23.25	57.71 + 23.89
At 6 weeks	63.88 + 17.33	91.05 + 9.93	75.00 + 16.20
Difference	*3.89 + 7.23	*25.93 + 16.17	*17.65 + 14.33

Inference: The physical functioning showed significant improvement in all groups (Group 2 greater than Groups 1 & 3) after 6 weeks.

Table 5: Comparison of changes in mean body pain perceived after treatment between the groups.

Duration in Weeks	Mean Body Pain		
	Group 1	Group 2	Group 3
Baseline	65.88 + 14.29	63.47 + 13.01	68.06 + 16.26
At 6 weeks	67.13 + 18.77	91.39 + 11.06	82.78 + 16.95
Difference	1.25 + 6.81	*27.92 + 12.90	*14.72 + 9.43

Inference: The 6 weeks intervention revealed significant change in pain perception in Groups 2 & 3 paralleled to Group 1.

Table 6: Comparison of changes in mean social functioning after treatment between the groups.

Duration in Weeks	Mean Social functioning scores		
	Group 1	Group 2	Group 3
Baseline	76.88 + 15.32	86.39 + 13.96	78.47 + 21.35
At 6 weeks	78.75 + 18.18	96.53 + 5.76	89.58 + 18.32
Difference	1.88 + 11.67	*10.14 + 12.02	*11.11 + 11.25

Inference: At the end of 6 weeks, Groups 3 & 2 presented significant changes when associated to Group 1

Table 7: Comparison of changes in mean general mental health after treatment between the groups.

Duration in Weeks	Mean General Mental Health scores		
	Group 1	Group 2	Group 3
Baseline	38.20 + 15.44	47.11 + 3.27	48.44 + 4.45
At 6 weeks	41.40 + 15.06	70.00 + 7.16	65.11 + 8.96
Difference	*3.20 + 6.31	*22.89 + 11.0	*16.67 + 11.66

Inference: The mean mental health scores presented significant deviations in all groups but greater in Group 2

Table 8: Comparison of changes in mean general health perception after treatment between the groups.

Duration in Weeks	Mean General Health Perception		
	Group 1	Group 2	Group 3
Baseline	25.00 + 12.88	33.06 + 13.63	32.78 + 14.37
At 6 weeks	25.50 + 12.87	55.00 + 10.85	36.11 + 11.95
Difference	0.50 + 6.05	*21.94 + 13.84	*3.33 + 5.69

Inference: The general health perception also improved significantly in Groups 2 & 3.

Discussion:

The introduction of HAART has significantly decreased the morbidity & mortality associated with HIV. Active participation in the management of their disease with a strong sense of personal control is important for optimal health outcomes^{6, 14}. HIV seropositive patients experience psychological distress that impacts their quality of life & disease progression¹⁶. Exercise is well accepted, as an adjunct therapy in the management of chronic illness & therapeutic exercises in HIV patients has been shown to be both beneficial & safe¹⁷.

The needs of individuals living with HIV, as longer their life expectancy becomes, have increasingly included the management of problems with body function or structure, such as pain, weakness, activity limitations & participation restrictions¹⁸. Exercise is a key strategy employed to address the issues of strength, cardiovascular function & psychological status¹⁹.

The practice of Yoga can provide many physical, emotional, mental & spiritual benefits. On a physical level, Yoga poses (asana) can increase flexibility, strength, balance & coordination. It helps stabilizing emotions. It also helps to reduce anxiety, stress & is easily adapted to one's level of energy & stamina^{20, 21}. The meditative aspect of yoga is often achieved through an individual's mental focus on asana & prana. It believed to reduce pain by regulating the pain gate mechanism through the secretions of natural endorphins & encephalins. Pranayama also causes muscles to relax, reduces tension achieving calmer, slower respiration aiding in pain management^{22, 23}. Therefore, this study was conducted to study the effects of exercises (aerobic & yoga) on the subjective wellbeing of HIV positive individuals.

It has been seen that the optimum intensity to improve aerobic capacity is about 70% of maximum heart rate that is equivalent to about 50-55% of maximum aerobic capacity for young adults²⁴. Considering HIV patients

with known issues like easy fatigability, reduced stamina, musculoskeletal pain, lack of exercise & other systemic symptoms, the intensity used in our study was 40-50%²⁵. It was also stated that the optimum duration for aerobic training can be 20 – 30 mins, frequency 3 times per week & moreover, optimum training period found to be effective for HIV patients was of 6 weeks^{26, 27}.

Many patients enrolled in the study showed normal BMI as depicted in table 1. After treatment at the end of 6 weeks, the mean BMI showed a significant change in Group 2 greater than Groups 1 & 3. This change in BMI could be the result of increased demand by efficient aerobic training by patients. Aerobic exercises increase energy, appetite & a sense of well being. As the nutritional status of an individual with HIV infection is important, aerobic exercises are shown to improve the patients overall health²⁸.

Similarly, the 6-minute walk distance showed a significant increase in Groups 2 & 3 compared to Group 1 as illustrated in table 2. Group 2 showed an increased distance compared to Group 3. Aerobic exercises condition the cardiovascular system increasing the oxygen availability to the body. Its other benefits include increased fatigue resistance, toned body, increased lean body mass & general stamina. Furthermore, yogic poses on a physical level increase flexibility, strength, balance & coordination. Hence, both these groups show significant improvements in the walk distance^{20, 23, 24, 27}.

Table 3 represents the changes in the mean HAS scores. Group 2 showed a more significant decrease in anxiety than Groups 3 & 1. This can be attributed to the fact that exercises improve mood, physical endurance and reduces tension & fatigue. It also increases the CD4+ cell counts helping to fight infections and resulting in a sense of well being^{7, 29}. Even group 3 showed significant decrease in the anxiety levels owing to the relaxing & calming effect of the asana & pranayama^{30, 31}.

The SF-36 questionnaire, which concentrates on the patient's experiences, feelings, beliefs, perceptions & convictions regarding their health-related quality of life during the past 6 weeks, consists of close-ended structured questions. These questions relate specifically to 8 quality of life indicators & 2 summary measures that revolve around both physical & mental health. As depicted in tables 4,5,6,7 & 8, Group 2 shows significant variations compared to Group 3 & 1. This further shows that aerobic exercise training is an important therapy to offer HIV positive individuals.

Conclusion:

Our study indicates that both aerobic exercises & yoga individually or combined definitely improve the physical & psychological health status, well-being & quality of life of HIV positive patients. Thus, aerobic exercises &

yoga can be administered safely in HIV positive patients as an adjunct to medical line of treatment bearing in mind the chronicity of the condition. It also illustrated that aerobic exercises produced significant improvement in BMI, exercise capacity, reduced anxiety, pain etc more than yoga. Hence it should be promoted as a non-pharmacological therapy for the treatment of HIV positive patients along with the medical line of treatment.

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