Original Research Article

HIV-positive individuals: Exercise, Yoga and Quality of life

Abstract:

Background: Human immunodeficiency virus (HIV) infection worsens the well-being of individuals making them vulnerable and compromises their quality of life. Auxiliary to this, considerable stigma and social rejection is associated with HIV infection which also contributes to their anxiety and depression. Research has established the beneficial effects of exercise and yoga on the physical and psychological health across diverse populations. This study was, therefore, conducted to assess their effects on HIV positive individuals in an attempt to improve their quality of life

Methodology: 60 HIV patients were divided into 3 groups randomly; Group 1 (only medical treatment), Group 2 (medical treatment and aerobic training) and Group 3 (medical treatment and yoga training). These interventions were conducted for 6 weeks after an informed consent and institutional ethical approval. Outcome measures - BMI, Six-minute walk test, Hamilton Anxiety scale, and SF-36 were used. The data was recorded and analyzed for statistical significance with ANOVA.

Results: After 6 weeks of treatment, Group 2 and 3 showed significant improvements in the physical functioning (p value 0.02) and mental health scores (p value < 0.01). There was significant reduction in anxiety (p value 0.04) and bodily pain (p value < 0.01) in both groups.

Conclusion: Exercises significantly improve physical and psychological health status, well-being and quality of life in HIV positive individuals. Aerobic training showed superior developments than yoga and can be used as an adjunct to medical line of treatment.

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

Article:

Introduction:

Human immunodeficiency virus (HIV) and Acquired immune deficiency syndrome (AIDS) poses a significant threat to the health and well-being of the human population. HIV is a retrovirus that progressively lowers the body's CD4+ cell counts and impairs the immune system [1]. It is of serious concern, when 35.3 million people globally and 2.6 million people in India are living with HIV till the year 2012. Recent advances in medical field complement early detection of HIV patients by effective screening and diagnosis. The highly active antiretroviral therapy (HAART) has increased the life span of an HIV infected patient by many folds. [2,3,4,5,6] These drugs slow the rate at which the virus multiplies and promote favorable virological control, which significantly decrease the morbidity and mortality associated with HIV. Although the introduction of HAART has improved longevity of the HIV patients, the cost of improved immune function and life expectancy have lead to the development of several metabolic and cardiovascular symptoms as severe as lipodystrophy, dementia, depression, insomnia, nervous system disorders like demyelination, neuropathy, neurosensory and neuromuscular disorders, toxic effects of chemotherapeutic medical agents, to other co-morbidities like muscle pain, fatigue, multiple joint aches, myopathies, endocrine dysfunctions, physical inactivity and other psychogenic implications. These individuals are now living longer, but with a more chronic disease. [7 8,9,10]

The increased chronicity of HIV infection has been mirrored by increased prevalence of disablement in the HIV positive individuals. Rusch et al in their study established that the treatment of these individuals should be done holistically by management of impairments (problems with body function or structure – pain, weakness), activity limitations (difficulties in executing daily living activities) and participation restriction (social involvement difficulties, inability to work), thus improving their functional performance.[11] Exercises have been proved to have many potential prophylactic benefits associated with improved lean body mass, strength, psychological status and cardiovascular fitness. Participation in an exercise program may be an important adjunct to pharmacological treatment to improve the metabolic and morphological features in HIV/AIDS. Yoga has been said to play an important part in the rehabilitation of patients with HIV. [12] Joseph and Nair, in their study observed a trend of increase in the CD4 counts following a yoga intervention. [13] Similarly, integrated yogic practice was found to reduce depression and boost immunity in HIV infected individuals by

Naoroibam and Metri. [14] Researchers have, thus, identified the benefits of Aerobic exercise training and yoga amongst HIV positive patients but, very few studies have explored the benefits of these with respect to their quality of life. [15,16,17,18] Therefore, this study was conducted to investigate the effects of aerobic exercises and yoga on the subjective well-being of HIV positive individuals.

Methodology:

60 HIV positive subjects between the age group of 20 to 40 years (mean age 33.25 years) with CD4 lymphocyte counts between 200 and 500 cells/mm^3 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, a written consent from each patient was obtained prior to commencement of the study. After the initial screening, patients without signs of opportunistic infections and co-morbid conditions were included and randomly allocated into 3 groups: Group 1 (medical line of treatment), Group 2 (medical treatment and aerobic exercises) and Group 3 (medical treatment and yoga). The study was single blinded. The aerobic exercises and the yoga protocol were conducted amid patient groups at the hospital out patient department under the guidance of the study investigators. At the time of volunteering, the patients were unaware to which group they were to be allocated randomly. After the study completion, this trial was registered with the Clinical Trials Registry – India (CTRI).

Outcome measures used in the study were:

- Body Mass Index (BMI) [19]: measured with weight (kg) and height (cms) of an individual.
- Exercise tolerance testing [20]: was conducted using a 6-minute walk test. Before starting the test, the basal values for blood pressure, heart rate and respiratory rate were recorded. Patients were encouraged to walk as far as possible and the total distance covered was noted. The post test values were then documented and compared between the 3 groups.
- Hamilton Anxiety Scale (HAS) [21]: is a series of semi-structured questions related to symptoms of anxiety. The interviewer then rates the individual on a 5-point scale for each of

the 14 items. 7 items of the scale specifically address psychic anxiety while the remaining 7 look into the somatic anxiety. The score ranges between 0 to 4 (0 – no anxiety, 1 – mild anxiety, 2 – moderate, 3 – severe and 4 – grossly disabling anxiety) for each question. The total anxiety score ranges from 0 – 56.

- SF-36 Scale [22, 23]: is a set of generic, coherent and easily administered quality of life questionnaire. This multipurpose, short-form health survey has 36 questions which yields an 8-point scale profile of functional health and well-being along with psychometrically based physical and mental health summary measures. Each question is directly transformed into a 0-100 scale, the lower the score the more is the disability. The 8 domains include Vitality, Physical functioning, Bodily pain, General health perceptions, Physical role functioning/limitations, Emotional role functioning/limitations, Social functioning and Mental health. The SF-36 questionnaire is a concurrent measurement of both mental and physical health status.

Procedure:

Group 1(medical treatment): received HAART with the drugs customized to each patient's impairments in the medicine outpatient department of our hospital.

Group 2 (medical treatment and aerobic exercises) [24]: performed aerobic exercises 3 times per week for 6 weeks with an intensity of 40-50% of target heart rate (mild exercise intensity). Target heart rate is the rate at which the heart beats to achieve a certain level of exertion that determines the intensity of exercise required for cardiovascular fitness. It is generally estimated by calculating a percentage from the maximum heart rate based on the exercise intensity (mild, moderate and severe) targeted. The aerobic exercises were performed for 30 minutes per session inclusive of a warm up phase (5 minutes), an aerobic phase (20 minutes) and a cool down phase (5 minutes).

The warm up phase consisted of general upper and lower limb movements, spinal stretches, trunk rotations, side lunges and arm swings. General marching, high step marching, brisk walking, stepping and jogging covered the aerobic phase while the cool down phase consisted of slow movements, breathing exercises and relaxation in supine lying.

Group 3 (medical treatment and yoga): were introduced to Ashtanga Yoga described by Patanjali [25]. This group performed asana and pranayama for 30 minutes, 3 times per week for 6 weeks. Asanas in yoga are physical postures which aid development of muscles. 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. They help build stamina of the organs and systems of the body, promoting positive health and overall well-being [26]. The asanas were performed in standing (Tadasana, Trikonasana, Parvatasana and Ekhastapadasana), sitting (Padmasana, Vajrasana, Yogmudrasana and Gaumukhasana) and prone (Shalabhasana, Bhujangasana, Naukasana and Dhanurasana) positions during this study.

Pranayama or breath control is aimed to achieve organized breathing and reduce symptoms of anxiety. Each session ended with a pranayama. It incorporates breathing practices aimed at bringing into utilization all the lobes of the lungs for continuous and rhythmic breathing. The patients are, thus, subjected to deep relaxation after physical postures. [26]

All the patients (20 in each group) remained in the study during the 6 weeks' intervention period and responded uniformly to the treatment. There were no non responders observed in the study. The ANOVA test was used for statistical analyses.

Results:

Mean age of the participants was around 33 years and females constituted more than half of the study population. Majority of the participants were educated. Demographic variables of the participants have been shown in Table 1.

Table 1: Demographic variables of the volunteering HIV positive individuals.

Sr. No.	Variables	Category
1	Gender, n (%)	Males – 29 (48.33%)
		Females – 31 (51.67%)
2	Age in years	60
	Mean (SD)	33.25 (± 5.84)
3	HIV years, Mean (SD)	6.9 (±5.7)
4	Education Status, n (%)	60
	< Primary	10 (16.66%)
	Incomplete Secondary	22 (36.66%)
	Upto Secondary	10 (16.66%)
	Graduation	18 (30%)

Comment [o1]: Replace it with either upto middle (8th) or 10th

Table 2 shows the comparison of study variables, before and after the intervention in groups. Group 2 and 3 showed increase in the " 6 Minute walk distance" and the increase was found to be statistically significant (p value = 0.01). After six weeks of intervention, participants of group 2 and 3 significant improvements in the physical functioning (p value 0.02) and mental health scores (p value < 0.01). In addition to this there was significant reduction in anxiety (p value 0.04) and bodily pain (p value < 0.01) in both groups. However BMI showed no significant change in any of the groups.

Table 2: Comparison between the variables tested after the intervention.

Variables	Group 1	Group 2	Group 3	p value
Mean BMI*				
• Baseline	21.80 ± 1.55	20.69 ± 1.20	21.32 ± 0.83	0.12
• At 6 wks	21.59 ± 1.43	21.25 ± 1.30	21.37 ± 0.88	
Mean 6 MWD#				
• Baseline	411.00 ± 22.05	431.00 ± 38.47	405.28 ±42.58	0.01
• At 6 wks	414.00 ± 19.06	514.44 ± 52.27	434.44 ± 45.27	
Mean HAS**				
Baseline	20.70 ± 6.75	12.89 ± 5.50	15.61 ± 6.45	0.04
At 6 wks	19.00 ± 7.73	9.72 ± 7.51	11.39 ± 4.29	
Mean Physical Functioning				
Baseline	60.00 ± 16.58	65.12 ± 13.25	57.71 ± 13.89	0.02
At 6 wks	63.88 ± 17.33	91.05 ± 9.93	75.00 ± 16.20	
Mean General Mental Health				
Baseline	38.20 ± 5.44	47.11 ± 3.27	48.44 ± 4.45	< 0.01
At 6 wks	41.40 ± 5.06	70.00 ± 7.16	65.11 ± 8.96	
Mean General Health				

Perception				
Baseline	25.00 ± 12.88	33.06 ± 13.63	32.78 ± 14.37	0.02
At 6 wks	25.50 ± 12.87	55.00 ± 10.85	36.11 ± 11.95	
Mean Bodily Pain				
Baseline	65.88 ± 14.29	63.47 ± 13.01	68.06 ± 16.26	< 0.01
At 6 wks	67.13 ± 18.77	91.39 ± 11.06	82.78 ± 16.95	

Body Mass Index-*, 6-minute walk distance-#, Hamilton Anxiety Scale-**

Discussion:

This is a prospective, randomized study aiming to analyze the effects of exercises (aerobic and yoga) on aerobic function, quality of life and the psychological status and well-being in HIV positive individuals. Active participation in the management of their disease with a strong sense of personal control is important for optimal health outcomes [11, 25]. HIV patients' experience psychological distress that impacts their quality of life. Studies have shown that the introduction of aerobic exercises or yoga programs reduce the disease progression. [27, 28]

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 adults [29]. Considering HIV patients with known issues like easy fatigability, reduced stamina, musculoskeletal pain, lack of exercise and other systemic symptoms, the intensity used in our study was 40-50% [30]. Previous studies suggest that, the optimum duration for aerobic training is 20 – 30 minutes with a frequency of 3 sessions per week. The ideal training period for HIV patients was also found to be for 6 weeks [31, 32].

The demographic characteristics of the patients are explained in Table 1.

As depicted in Table 2, at the end of 6 weeks, a change in the mean BMI was observed. The increasing trend in BMI for Group 2 could be the result of increased demand by the efficient aerobic training. Aerobic exercises increase energy, appetite and a sense of well being. By improving the nutritional status of an individual with HIV infection, aerobic exercises are shown to improve the patient's overall health [33].

Similarly, the 6-minute walk distance showed a significant increase in Groups 2 and 3 compared to Group 1 as illustrated in Table 2. Group 2 showed an increased distance compared to Group 3. Yogic poses on a physical level increase flexibility, strength, balance and coordination leading to improvement in the walk distance but 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 and general stamina and hence probably showed greater changes. Similar findings were reported by O'Brien et al, Lasater and other researchers [28, 29, 30, 33].

Table 2 also represents the changes in the mean HAS scores. Group 2 showed a slightly greater decreasing tendency in anxiety than Groups 3 and Group 1. This can be attributed to the fact that exercises improve mood, physical endurance and reduces tension and fatigue. It also increases the CD4+ cell counts helping to fight infections and resulting in a sense of well being [15, 33]. Group 3 possibly showed decreases in the anxiety levels owing to the relaxing and calming effect of the asana and pranayama [34, 35].

The SF-36 questionnaire, which concentrates on the patient's experiences, feelings, beliefs, perceptions and convictions regarding their health-related quality of life during the past 6 weeks, consists of close-ended structured questions. These questions relate specifically to the 8 quality of life indicators and 2 summary measures that revolve around both physical and mental health. As depicted in Table 2, Group 2 shows significant variations greater than Group 3. This further shows that aerobic exercise training is an important therapy to offer HIV positive individuals. The improved muscle strength and endurance seem to have reduced the overall pain, discomfort and fatigue. The patients were also seen to improve in their social participation owing to this. The general mental health is observed to improve on account of release of the endorphins and encephalins during exercises which relieve stress and elevate the mood. The other domains of SF 36 such as role functioning and vitality also showed favorable changes in both the groups with Group 2 more than Group 3.

This study has created awareness amongst the medical practitioners in our institute towards the benefits of exercises in the subjective well-being of HIV positive individuals. Aerobic exercise

protocol described above is now being used as an adjunct to the medical management in our institute owing to its benefits demonstrated by this study.

Conclusion:

Our study indicates that combining medical management of HIV patients with either aerobic exercises or yoga, significantly improve the physical and psychological health status, well-being and quality of life of these patients. Thus, aerobic exercises and 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. This study illustrates that aerobic exercises not only produced improvement in exercise capacity and overall general health but also reduced anxiety and pain more than yoga. Moderate intensity exercises improved the physical fitness and quality of life of a HIV positive individual.

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