Original Research Article

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

Abstract:

Background: Human immunodeficiency virus (HIV) infection worsens the frailty of individuals making them vulnerable and compromises their quality of life. Auxiliary to this, considerable stigma and social rejection is associated with HIV infection contributing to anxiety and depression. Research has verified 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 started for 6 weeks after an informed consent and ethical approval. Outcome measures used were BMI, Six-minute walk test, Hamilton Anxiety scale, and SF-36. The data was recorded and analyzed for statistical significance.

Results: After 6 weeks of treatment, a significant change was noted in the BMI, levels of anxiety and quality of life especially in Group 2 and 3. Also, there was a considerable increase in the physical and mental functioning among patients in Groups 2 and 3 compared to Group 1.

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) is a significant threat to health and well-being of human population. HIV is a retrovirus that progressively lowers the body's CD4+ cell counts and impairs the immune system[1]. With 35.3 million people globally and 2.6 million people in India living with HIV till the year 2012, it is of serious concern. The recent advances in the medical field are complementing early detection of HIV patients by effective screening and diagnosis. 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 been associated with 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 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] Exercise has 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. Researchers have 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. [12,13,14,15]

Yoga has been said to play an important part in the rehabilitation of patients with HIV.[16] Joseph and Nair, in their study observed a trend of increase in the CD4 counts following a yoga intervention.[17] Similarly, integrated yogic practice was found to reduce depression and boost immunity in HIV infected individuals by Naoroibam and Metri.[18]

Therefore, this study was conducted to investigate the effects of exercises (aerobic 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, where the patients did not know which group they were allocated to. 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 and height of an individual.
- Exercise tolerance testing[20]: was conducted using a 6-minute walk test. Before starting, the basal values for blood pressure, heart rate and respiratory rate were recorded. Patients were encouraged to walk as far as possible and the distance was noted. The values post test were 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 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 and 4 – grossly disabling anxiety) 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 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 strength of the SF-36 questionnaire is that, it's 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 the intensity of 40-50% (mild) of target heart rate (mild exercise intensity). Target heart rate is the rate at which the heart beats to achieve the level of exertion, that is 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. Exercises were performed for 30 minutes per session that included a warm up phase (5 minutes), aerobic phase (20 minutes) and 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): Patanjali described the yogic practice in the form of eight limbs (Ashtanga Yoga) the main three parts of yoga are- exercise, breathing and meditation[25]. This group performed asana and pranayama in 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.

Pranayama or breath control is aimed to achieve organized breathing and 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 and rhythmic breathing. The patients are, thus, subjected to deep relaxation after physical postures, that in turn reduces anxiety.[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:

Table 1: Comparison of changes in mean (Standard Deviation) 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	0.05 ± 0.15

Inference: The mean BMI showed a change after 6 weeks wherein, Group 1 showed a reduction while Groups 2 and 3 showed an increase.

Table 2: Comparison of changes in mean (Standard Deviation) 6-minute walk distance after treatment between the groups.

Duration in Weeks	Mean 6 MWD (meters)		
	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

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

Table 3: Comparison of changes in mean (Standard Deviation) HAS scores after treatment between the groups.

Duration in Weeks	Mean HAS scores		
	Group 1	Group 2	Group 3
Baseline	20.70 ± 6.75	12.89 ± 5.50	15.61 ± 6.45
At 6 weeks	19.00 ± 7.73	9.72 ± 7.51	11.39 ± 4.29
Difference	1.70 ± 2.39	3.17 ± 2.57	4.22 ± 3.34

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

Table 4: Comparison of changes in mean (Standard Deviation) physical functioning scores after treatment between the groups.

Duration in Weeks	Mean Physical functioning scores		
	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 (Standard Deviation) 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 6: Comparison of changes in mean (Standard Deviation) 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 mean general health perception also improved significantly in both Groups 2 & 3.

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 and disease progression which reduced on introduction of aerobic exercises and yoga.[27, 28]

The practice of Yoga can provide many physical, emotional, mental and spiritual benefits. On a physical level, Yoga poses (asana) can increase flexibility, strength, balance and coordination. It helps stabilizing emotions. It also helps to reduce anxiety, stress and is easily adapted to one's level of energy and stamina[29, 30]. The meditative aspect of yoga is often achieved through an individual's mental focus on asana and prana. Pain reductions are achieved by regulating the pain gate mechanism through the secretions of natural endorphins and encephalins. Pranayama also causes muscles to relax, reduces tension achieving calmer, slower respiration aiding in pain management [31, 32].

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[33]. 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%[34]. It was also stated that the optimum duration for aerobic training can be 20 – 30 minutes, frequency 3

times per week and moreover, optimum training period found to be effective for HIV patients was of 6 weeks[35, 36].

As depicted in Table 1, at the end of 6 weeks, the mean BMI was observed to reduce in Group 1 while Groups 2 and 3 showed an increase with the increase in Group 2 greater than Group 3. This increase in BMI 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[37].

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. 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. Furthermore, yogic poses on a physical level increase flexibility, strength, balance and coordination. Hence, both these groups show significant improvements in the walk distance. Similar findings were reported by O'Brien et al, Lasater and other researchers.[29, 32, 33, 36].

Table 3 represents the changes in the mean HAS scores. Group 2 showed a more significant decrease 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, 38]. Even group 3 showed significant decreases in the anxiety levels owing to the relaxing and calming effect of the asana and pranayama[39, 40].

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 Tables 4,5and 6, Group 2 shows significant variations compared to Group 3 and 1. 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.

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 both aerobic exercises and yoga individually improve the physical and psychological health status, well-being and quality of life of HIV positive 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. It also illustrated that aerobic exercises produced significant improvement in BMI, exercise capacity, reduced anxiety, pain and overall general health more than yoga. Moderate intensity exercises not only improved the physical fitness but also improved the quality of life of a HIV positive individual.

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