Original Paper

Counseling Therapy With Hatha Yoga on Adherence Level, Nutritional Status, and Quality of Life Among HIV-Infected Adolescents

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ABSTRACT

Introduction: HIV infection and AIDS are associated with numerous challenges, and infected people experience extreme despair, fear, anxiety, and depression. However, counseling therapy and yoga techniques may help ease stress-related illness, produce internal strength through relaxation, and enhance immunity.

Objective: This study aimed to evaluate the effectiveness of counseling therapy and Hatha yoga on the adherence level, nutritional status, and quality of life (QOL) of HIV-infected adolescents.

Materials and Methods: A randomized controlled trial study was conducted. Through the simple random method, 388 (195 in the experimental and 193 in the control group) HIV-infected adolescents were selected. The data of HIV-infected adolescents and caregivers were collected from four main Antiretroviral Therapy clinics in Chennai, India, through Standardized Antiretroviral Therapy adherence, QOL, and a structured nutritional assessment questionnaire. Motivational counseling was given to the experimental group, and the researcher demonstrated selected asanas. The data were collected from both groups at 0, 3, and 6 months intervals. The descriptive statistics of mean, standard deviation, and inferential statistics of the student independent t test and Chi-square test were used to determine the effectiveness of interventional variables in both groups.

Results: The Mean±SD age of the experimental group of adolescents was 13.6±2.2 years, and that of the control group was 13.8±2.4 years. There is an improvement range in the experimental vs the control group for the components of adherence level (13.4% vs 4.9%) and QOL (15.1% vs 0.9%) at a significance of P=0.001 with a 95% confidence interval. Also, the nutritional gain score was significantly increased to 9.3% vs 1.5% (P=0.05). Regarding CD4 (cluster of differentiation 4) count, the baseline mean score was 664.86 vs 669.72, whereas, in the sixth month, it significantly increased to 840.35 vs 703.35 (P=0.001).

Conclusion: Motivational counseling and behavior modification of yoga efficiently improved health status and well-being among HIV-infected adolescents in the experimental group compared to the control group.

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Highlights

• Adherence to antiretroviral therapy is associated with the nutritional status and quality of life of HIV-infected adolescents.

• Counseling therapy and Hatha yoga improved adherence level, nutritional status, and quality of life in the experimental group.

• After the intervention, the baseline CD4 count was increased in the experimental group.

• The overall low-cost intervention of yoga makes it the best solution to build a chance for safe and healthy adults in the future.

Plain Language Summary

The youth people (10-24 years old) are our future as well as the world's greatest resource. However, the HIV epidemic has brought a terrible toll on adolescents (10-19 years) and created many concerns like non-adherence to antiretroviral therapy and being underweight due to regimen fatigue, stigma, loss of parents/caregiver support, and financial burden. The paradigm of HIV prevention has shifted to treatment. Now prevention strategies recognize the essential need for educational strategies, psychosocial interventions like counseling, and the implementation of behavior modification interventions like yoga. These interventions motivate adolescents to take their medications and have the confidence to assume responsibility and maintain well-being in society. The study findings showed an improvement in adherence level, nutritional status, rise in CD4 count, and quality of life. Motivational counseling, along with behavior modification of yoga, can improve the health status and well-being of HIV-infected adolescents in the experimental group.

Introduction

Today, the epidemic of the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) was different from the early scenario. From 2012 to 2017, antiretroviral therapy (ART) resulted in better infection management, and now more than 52% of children infected by vertical transmission reach adolescence and adulthood [1]. Optimal adherence to ART is a serious challenge for adolescents living with HIV (ALHIV). Adolescence is the only age group where HIV-related mortality is not declining [2]. The concomitant group of adolescents' relationships is generally shifted from family- to peer-oriented and faces many concerns, especially non-adherence to ART due to disclosure, regimen fatigue, stigma within their schools, homes, communities/self-stigma, loss of parents/caregivers' support, underweight, and financial burden [2, 3]. The sub-optimal and poor adherence to ART increases the viral load, lowers immunity power, reduces food intake, and raises the medical complications that directly impact the quality of life (QOL) and lead to the need for a second-line regimen for ALHIV [4].

Njuguna conducted a multi-level cross-analysis among 10096 adolescents and young adults under ART for more than 6 months and identified that more than 80% of them were virally suppressed [5]. A systematic analysis emphasized that behavioral support, economic strengthening, and home-based intervention care improved ART adherence [6]. The school support intervention increased school retention and helped to reduce the risk of HIV infection [7]. Another study stated that ALHIVs face many struggles with adherence to ART and need to develop interventions tailored to both ALHIVs and their caregivers [8]. Another study among HIV-infected adolescents emphasized that interventions to improve adherence should address psychosocial factors such as treatment, fatigue, disclosure, and family and household dynamics in addition to streamlining service delivery between the school and clinic [9].

In this scenario, healthcare professionals must support adherence levels, maintain a positive attitude, and establish trust with adolescents and their families. Psychosocial intervention counseling therapy is essential to improve the QOL and creates a positive outcome on depression, anxiety, and mental well-being of people with HIV [10, 11]. Audi stated that HIV-positive adoles-

cents need educational interventions in psychosocial support and peer support groups [12]. Individual and group counseling, including family-centered counseling and adolescent peer support, are distinctive treatment modalities for improving ART adherence amongst adolescents with HIV [13, 14].

The National Center for Complementary and Integrative Health (NCCIH) in India included yoga as a complementary health approach in mind and body practices [15, 16]. In the western world, yoga is regarded as a holistic approach to health. The "healing comes from inside" strongly recommends that yoga relieves stress, harmonizes the mind, regulates breathing, and enhances circulation. Regular yoga practice can aid to endure the immune system in concurrence with a comprehensive HIV management program [17]. The meta-analysis stated that Hatha yoga is the most common form of yoga practice (asana posture) for effective treatment in reducing anxiety symptoms. Also, its effectiveness is positively associated with the overall number of hours practiced [18]. A 6-month yoga program on HIV-infected children/adolescents significantly improved the immune parameters of CD4 count and reduced viral load [19].

Yoga cannot replace professional counseling in connection with major grief, but yoga techniques can aid in easing anxiety and fear, producing inner strength through relaxation, declining depression, and boosting the immune system [20]. Medical yoga incorporates appropriate breathing techniques, mindfulness, and meditation. It has maximum benefits and can have important psychological benefits, as the practice of yoga can help increase mental energy and positive feelings and decrease negative feelings of depression and anxiety [21]. All the above research evidence proves that regular yoga practices and counseling therapy related to adherence to ART regimen, nutrition, and QOL increase immunity, improve nutritional status, and enhance the overall well-being of ALHIV.

Materials and Methods

The researcher adopted the quantitative and experimental design of a randomized controlled trial. Among 544 samples, the simple random technique was used to select 400 adolescents and divided equally into the experimental and control group in 2016. The subjects aged 10 to 17 years and on ART for more than 3 months attending the ART clinic were included (Figure 1).

Considering s=7.6 [22], a=2.58, b=1.28, d=3, the sample size was calculated at 191 per group using the power analysis method and based on the prevalence studies formula. With 10% dropout rates, the final required sample size was 210 per group (minimum). For statistical significance, the investigator fixed the sample size of 200 per group.

The study instruments in this study consisted of 4 questionnaires:

1. Demographic Questionnaire: It collects the characteristics of HIV-infected adolescents/caregivers and background information of HIV-infected adolescents,

2. The National Institute of Allergy and Infectious Diseases (NIAID) and AIDS Clinical Trial Group (ACTG) Adherence Assessment Questionnaire, No: QL0757(000)/00-00-00 [23], and the Pill count method. It assesses the patient's adherence which is interpreted based on the maximum level of the score as 95%-100% = optimal, 80%-95% = suboptimal, and < 80% = poor adherence.

3. The Nutritional Assessment Questionnaire: It collects all anthropometric variables based on National Centre on Health Statistics and WHO standards to assess malnutrition [24], which is interpreted based on the 'Z' score as Z score < 2.0 normal, 3.0 < Z score < - 2.0 moderately malnourished, and severely malnourished Z score < - 3.

4. NIAID ACTG - QOL Assessment-Revised Questionnaire for 5-11 years No: QL4004(000)/00-00-00 [25] and 12-20 years No: QL4005(000)/00-00-00) [26]: It assesses the quality of life, which includes the areas of general health ratings, physical functioning, psychological well-being, social role functioning, health care services, and symptom distress management. The QOL maximum score was 338, and the minimum score was 71. Based on the highest score level, it was interpreted as 76-100% = good, 51-75% =moderate, and 0-50% poor QOL.

The reliability of the tool was assessed by using Cronbach alpha and the inter-rater method. The alpha values for the following tools were ART adherence of 0.87 and QOL of 0.88, and the 'r' value of the nutritional status was 0.90.

The study data were collected from 400 HIV-infected adolescents/caregivers through an in-depth structured interview and observation of hospital records. The initial assessment score was taken as the baseline (month 0). On the same day, the experimental group received a

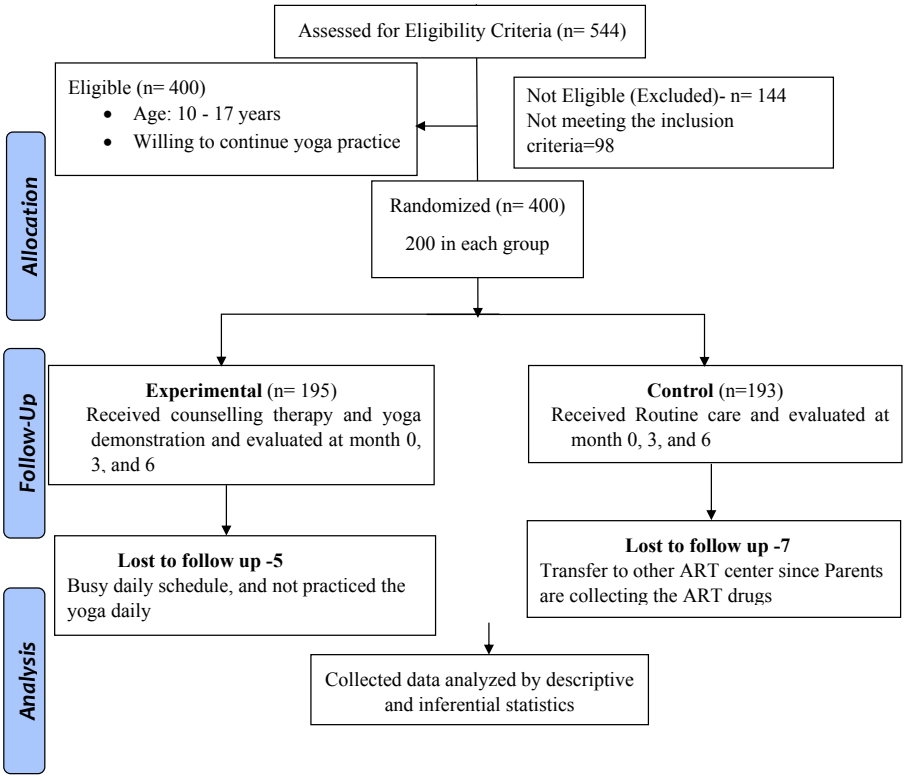

Figure 1. CONSORT flow diagram for the participants

counseling section on improvement in adherence level, nutritional status, and strategies to enhance QOL (Table 1). The selected asanas like Padmasana, Vajrasana, Trikonasana, Ardha Matsyendrasana, Ushtrasana, Bhujangasana, Shavasana, and Pranayama were demonstrated by the researcher and instructed to do a re-demonstration by the study samples (Table 2). They were also given brochures for practicing selected asanas every day for a minimum of 15-20 min at their homes. The investigator had been given a diary for an interventional aid to improve adherence and instructed to maintain daily practice after the drug intake and yoga practice.

The investigator gave special attention to a few adolescents who had learning difficulties practicing the asana. For these adolescents, the investigator had given extra time of 15-20 minutes for a maximum to learn the asana on the same day itself, i.e., the total time taken for each sample was 45 minutes to 1 hour. The intervention was given to the study group for up to 6 months; however, in the control group, subjects were in routine care as conventional management. The effect of the intervention was assessed at 3 and 6 months later by collecting required data from caregivers and adolescents in the study group. Brief instructions were given to the control group at the end of the sixth month. The collected data were analyzed by SPSS version 16. Descriptive statistics of mean, standard deviation, and inferential statistics of the student independent t test and Chi-square test were used to determine the effectiveness of intervention variables in both groups.

Results

A total of 388 samples were divided into experimental (n=195) and control groups (n=193). The Mean±SD age of the experimental group adolescents was 13.6±2.2 years, and the control group was 13.8±2.4 years. Also, half of the participants, i.e., 49% of the experiment and 56% of the control group, were males. Regarding educational status, most participants, 77% in the experimental group and 85% in the control group had a middle level of education. Also, 85% of the experimental group and 77% of the control group belonged to the Hindu religion. The Mean±SD age of the caregivers was 44.3±13.5 years, and that of the control group was 45.5±12.2 years. Also, the majority, i.e., 70% of the caregivers of the experimental group and 66% of the caregivers of the control group, were females. Also, 64% of children were taken care of by their caregivers, and the remaining adolescents in both respective groups were taken care of by biological mothers.

Table 1. Counselling therapy and its duration

		Counseling Therapy	Duration
Adherence Counselling	Month 0	Assess the knowledge regarding disease and health status Assess the knowledge regarding treatment and follow-ups Discuss the subject's living conditions and social support Discuss treatment plan Discuss the proposed adherence strategy Identify barriers to adherence Fix a date for the next appointment	10 to 15 min
	Months 3 & 6	Assess the knowledge regarding disease and health status Assess the knowledge regarding treatment and follow-ups Provide information on side effects Proposed adherence strategy. Review barriers and how to address them. Fix a date for the next appointment.	7 to 10 min
Nutritional Counselling	Month 0	Need for a healthy and nutritious diet for HIV and AIDS Nutritional consequences of HIV Essential antioxidants and micronutrients Assessing dietary habits Identifying changes needed Setting goals Making dietary change Identifying barriers to change Finding support General advice as per the need of the Sample	10 to 15 min
	Months 3 & 6	Identify the lacking area and give suggestions to reduce barriers Symptom assessment and suggesting the needed diet Educational management of nutrition Issues	7 to 10 min
QOL Counselling	Month 0	Strategies/practices that enhance QOL Avoid stressful life, and instruct do activities of dancing, playing, walking, and gardening can all help to get relieved from stress Symptomatic management tips shared for minor illnesses like headache, nausea, dry mouth, anemia, cough, hair loss, etc., Suggested that the selected asanas help build muscles, strengthen bones, and promote health.	10 to 15 min
	Months 3 & 6	Need-based counseling Symptomatic management Redemonstration of asana	7 to 10 min

Table 2. Selected asanas and its benefits

Asanas	Duration	Benefits
Padmasana	1-2 min	Relives stress, relax, and increases concentration power and energy
Vajrasana	1-2 min	It enhances blood circulation in the lower abdomen, improves digestion, and relieves constipation
Trikonsana	2-3 min each side	It helps to expand the chest, efficiency of the thymus gland, and increase general immunity
Ardha Matsyendrasana or Ushtrasana	1 min on each side or 1 min	Increases appetite, enhances digestion and reduces gastrointestinal problems.
Bhujangasana	1-2 min	Increase rich blood supply to the spinal region, clear chest, and cure respiratory problems
Shanthiasana	3-5 min	Relives stress and relaxes the mind, especially the abdominal muscles
Pranayama (Alternative nostril breathing)	3 min	Improves lung functions and reduces lung diseases

Regarding clinical information, in the experimental group, nearly half (55%) of the adolescents were diagnosed before 5-10 years, 28% were less than 10 years, and only 16% were less than 5 years, and all the adolescents had the infection through vertical transmission. Considering the HIV stages, the majority of 71% are in stage I, and the remaining 29% are in stage II. Considering about consumption of ART, 67% of the participants consumed for 1-5 years, 26% for more than 5 years, and only 7% for 3 months to 1 year.

In the baseline assessment of the experimental group, the mean ART adherence scores were 85.36in the pretest and 98.74 in the post-test score. The mean difference in ART score with 95% CI was 13.38, and the percentage gain score was 13.4%. However, in the control group, the adherence gain score was only 4.9%. The Chi-square test had a very high significance at P=0.001. It denoted significant changes in the adherence level of HIV-infected adolescents in the experimental group compared to the control group. The student independent t test had a very high significance at P=0.001. Thus, there was a remarkable improvement in the QOL of HIV-infected adolescents in the experimental group compared to the control group (Table 3).

Regarding the nutritional status of HIV-infected adolescents, based on the 'Z' score, the baseline assessment showed that 28% of participants were malnourished in the experimental group, whereas after 6 months, the figure reduced to 19%. The percentage-wise gain score was 9.3%. The Chi-square value of 9.48 is significant at P=0.05. However, in the control group, the percentage of the gain score was only 1.5%. It signified a notable improvement in the nutritional status of HIV-infected adolescents in the experimental group compared to the control group (Table 4).

Considering immunity status, the level of CD4 count in the experimental group at month 0 assessment was 300-600 cells/mm^3 in 47% of participants, 601-900

Table 3. Effectiveness of level of adherence and quality of life of HIV-infected adolescents

Variables	Group	Assessment Time	Mean±SD	Mean Difference Lower-Upper	P
Adherence Score	Experimental	Baseline	85.36±5.04	13.38 (11.91-14.84)	0.001*
		6th month	98.74±11.3		
	Control	Baseline	85.60±4.85	4.94 (3.26 -6.61)	0.11*
		6th month	90.54±7.12		
Quality of life score	Experimental	Baseline	163.66±6.22	51.97 (49.97-53.97)	0.001**
		6th month	215.64±16.1		
	Control	Baseline	162.93±4.85	3.09 (2.48-3.70)	0.19**
		6th month	166.02±5.33		

*The Chi-square test; **Student independent t test

Table 4. Effectiveness of nutritional status of hiv-infected adolescents

Nutritional Status	No. (%)			
	Experimental Group		Control Group	
	Baseline	6th Month	Baseline	6th Month
Normal	140 (71.8)	158 (81.1)	137(71.0)	140(72.5)
Malnourished	55 (28.2)	37(18.9)	56 (29.0)	53(27.5)
Gain Score (%)	9.3		1.5	
P*	0.05		0.99	

*Chi-square test

Table 5. Effectiveness of level of CD4 count of HIV-infected adolescents in the experimental and the control group

Level of CD4 Count (cells/mm³)	No. (%)			
	Baseline		6th Month	
	Experimental	Control	Experimental	Control
300-600	92(47.2)	95(49.2)	18(9.2)	58(30.1)
601-900	77(39.5)	80(41.5)	119(61.0)	109(56.5)
901-1200	19(9.7)	13(6.7)	46(23.6)	23(11.9)
> 1200	7(3.6)	5(2.6)	12(6.2)	3(1.5)
Mean±SD	666.8±221.6	669.7±174.7	840.3±231.6	703.3±165.7
P*	0.24		0.001	

*The Chi-square test

cells/mm³ in 40%, 901-1200 cells/mm³ in 10%, and only >1200 cells/mm³ in 3.6%. In contrast, the level of CD4 count in the month 6 assessment was 601-900 cells/mm³ in 61% of participants, 901-1200 cells/mm³ in 24%, 300-600 cells/mm³ in 9%, and >1200 cells/mm³ in 6%. The Chi-square test showed significance at P=0.001 (Table 5).

Discussion

In the present study, half of the adolescents had been diagnosed with HIV before 5-10 years old; they got the HIV infection through mother-to-child transmission, and the majority of the participants were in stage I and on ART for more than 3 to 5 years in both groups. Another study found that the majority of adolescents aged 0-19 years old had HIV vertically than behaviorally [27]. Another study identified that patients who started ART with a low CD4 cell count significantly progressed their life expectancy if they gained a good CD4 cell count and undetectable viral load [28]. Sife AS et al. concluded that home-based care interventions, including medical care and psychological support, positively improved the CD4 count and well-being of HIV/AIDS patients in the studied population [29].

In the present study, motivational counseling, interventional diary, and yoga increased adherence to ART in the experimental group. Haberer stated that additional interventions like motivational interviews, adherence clubs, and peer/standardized counseling through multimedia technology had improved adherence in the HIV population [30]. Another study determined the effects of an empowerment intervention on ART adherence among Thai youth living with HIV/AIDS. After the intervention, the experimental group had ≥ 95% adherence compared to the control group, showing a significant increase in ART adherence among Thai youth [31]. It denoted a marked improvement in the adherence level of HIV-infected adolescents in the experimental group while taking the medicines regularly with personal responsibility than the control group through supportive education and counseling intervention.

In the present study, the mean difference in QOL gain score showed the effectiveness of strategies to enhance the QOL of HIV-infected adolescents in the experimental group. A meta-analysis reported that among 28 studies, 21 had a substantial interventional effect on at least one QOL domain and the remaining studies showed significant improvement in physical, general, and mental functions among the intervention group [32]. The low-cost approach of yoga supports similar findings that improved the psychosomatic state of HIV patients and are essential to enhancing the QOL of adolescents [29, 33]. This finding shows that the strategies of enhancing QOL counseling and yoga increased the QOL of HIV-infected adolescents in the experimental group more than in the control group.

The nutritional gain score difference showed the effectiveness in enhancing the nutritional status of HIV-infected adolescents in the experimental group. Many studies [34, 35] found a high prevalence of malnutrition among HIV-infected children, which was significantly associated with immunodeficiency [34]. The low level of education and adolescents living without parents may be significant risk factors for malnutrition in this population. In another study, Anita found that after 12 weeks of a yoga training program, nutrient absorption and

physical fitness enhanced among rural school children and adolescents compared to the control group [36]. These findings revealed that reinforcement of nutritional counseling and yoga successfully increase the appetite and weight of HIV-infected adolescents. The findings of the present study were in line with their results.

Professional counseling and regular yoga practice promote health, develop positive attitudes and healthy practices, and improve the self-confidence of ALHIV, which helps to prevent HIV transmission in the future. The present study showed a marked improvement in the CD4 count of the HIV-infected adolescents in the experimental group compared to the control group. A similar study, after 1 month of integrated yoga, revealed a significant reduction in depression scores and a substantial increase in CD4 counts in the yoga group [37]. Joseph and Nair evaluated the effect of naturopathy and yoga intervention on CD4 counts of HIV/AIDS and reported that a growing CD4 count was proportional to the participants following yoga intervention [38].

A systematic review conducted from 1983 to 2015 stated that the combination of relaxation techniques, cognitive-behavioral strategies, and yoga shows encouraging results in decreasing physical and psychological symptoms and improving the QOL and health in HIV [39]. Quigley reported that 12 weeks of yoga intervention among people living with HIV improved health-related QOL cognition, transition, and depression [40]. The present study findings promote that the regular practice of yoga declines stress and increases immunity to ALHIV.

The limitation of the study includes no objective method to confirm the subjects' claim of 100% ART adherence. Most of the information on QOL was obtained mainly from the caregivers, as the adolescents may not have all the details. The intervention strategies include adherence to the maintenance of diary and yoga practices, mainly relying on the adolescents/caregiver's subjective reports.

The complementary yoga approach and educational intervention have many amazing effects like lower stress levels, enhanced optimal adherence, a greater sense of peace, improved physical fitness, and stronger immunity to ALHIV. This study's findings revealed that motivational counseling and regular hatha yoga practices positively influenced the experimental group more than the control group of HIV-infected adolescents.

Ethical Considerations

Compliance with ethical guidelines

The formal permission was obtained from the National AIDS Control Organization (NACO) New Delhi and Tamilnadu State AIDS Control Society (TANSAC). The ethical clearance was obtained from Madras Medical College and Hospital, Chennai (Ethics Committee No.: 30102013). All ethical principles were followed, and the confidentiality of subjects was ensured. Also, the study was registered in Clinical Trial Registration (CTRI/2015/02/005521).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The author declared no conflict of interest.

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