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The Study of Patients with HIV, their Quality of Life and Longevity in Vijayapura

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Abstract

Objective: To assess the association between CD4 count and quality of life among people living with HIV receiving antiretroviral therapy in a tertiary care setting. ***Methodology:*** A hospital based cross sectional study was carried out among 55 previously diagnosed HIV positive individuals who was above 18 years old attending a tertiary care centre in Vijayapura in the period of March 2024 - December 2025. Data was collected regarding sociodemographic characteristics, duration of ART, CD4 count, comorbidities, adherence and quality of life measures using the MQOL-HIV questionnaire. Statistical analysis was done with the aid of Spaes 20 version of software. p - < 0.05 was assumed to be significant. ***Results:*** The average age was 45.31±11.38 years and 56.4% of the sample was women. Participants were receiving antiretroviral therapy for a mean of 7.3 (5.3) years. Almost 42% of patients had CD4 below 250 cells per cubic millimeter. About 60% of the patients rated their quality of life as poor or very poor. Statistical analysis showed that the presence of a significant relationship between CD4 count and quality of life (χ^2 = 24.147, p=0.01). Patients whose CD4-counts were over 250 cells per cubic millimeter were more likely to report good quality of life, (65.6% of patients) compared to those with less than 250 cells per cubic millimeter. Factors often associated with a reduction of the quality of life were poor mental health (56.4%), low socioeconomic status (58.1%) and co-infections (76.4%). Adherence to treatment was good - seen with a high (81.8%) percentage and associated with better outcomes. ***Conclusion:*** Higher CD4 counts are significantly associated with improved quality of life among PLHIV. Early diagnosis, timely ART initiation, and integrated psychosocial support are essential to enhance long-term outcomes and longevity.

Keywords: HIV, CD4 count, Quality of life, ART adherence, Psychosocial factors

INTRODUCTION

Human Immunodeficiency Virus (HIV) infection is a major global public health challenge despite miraculous progress in diagnosis, treatments and prevention strategies. Since its discovery in the early 1980s, HIV has gone from a rapidly killing disease to a chronic, treatable disease thanks to the widespread distribution of combination antiretroviral therapy (ART)(1). Globally, millions of people are living with HIV, with much illness and death occurring, particularly in low- & middle-income countries (2). With an HIV prevalence of 0.2% to 0.3% in the adult population and concentrated HIV cases in certain high-risk groups and in the southern states of the country, India has the third-largest HIV burden in the world.(3,4) The introduction of combination ART in the mid-1990s led to a significant reduction in the number of deaths from both an HIV-related cause and opportunistic infections and increased the life expectancy of people living with HIV (PLHIV) (5). Recent cohort studies demonstrate that life expectancy at 20 years has increased by over 10-15 years over the past two decades and this is more pronounced in those who initiate ART early and who have higher CD4 cell counts. (6,7). Yet, even with these gains, PLHIV still live slightly fewer years than for the general population; this is even more likely for those who go on treatment when their immune system is already weakened (6,8).

CD4+ T- lymphocyte count has always been an important indicator of the state of immunity and the progression of HIV disease. Lower than normal counts are dramatically associated with increased risk for opportunistic infections, hospital admissions and death. (9) Studies have consistently shown that an earlier start of ART at higher CD4 levels is associated with better outcomes in terms of immune recovery and less systemic inflammatory response, and also long-term outcomes (7,10). Thus, current guidelines recommend that ART

should be initiated in all individuals with no correlation to CD4 count in order to maximize survival and quality of life (11). While survival is important, it doesn't illustrate the entire well-being of people with HIV. With HIV now generally acknowledged to be a chronic disease, interest has moved to health-related quality of life (HRQOL) as an important outcome measure (12). The World Health Organization defines quality of life (QOL) as a person's perception of his position in life in his culture, with his values, goals, expectations and concerns (13). For PLHIV quality of life refers to physical health, psychological health, independence, social relationships, environment, and spirituality (14).
Several studies have associated immune status to the quality of life. Better physical functioning and mental health and higher social participation are related to higher CD4 counts and suppressed viral loads (15,16). On the other hand, low levels of CD4 (less than 200 cells/mm3) are associated with worse QOL scores across several domains.(17) In addition to immunological factors, socioeconomic status, employment, level of education, stigma, depression, and social support have a significant influence on QOL outcome among PLHIV.(18-20) Psychological factors - particularly depression and anxiety - are very common and rates range from 22% to 38% (21). Depression adversely affects ART adherence, immune recovery as well as the overall QOL.(22) Stigma and discrimination perpetuate social exclusion, unemployment and economic insecurity and add to the psychosocial burden of HIV infection (23).

Although many studies in international populations have been done focusing on QOL among PLHIV, regional differences exist, due to variation in socioeconomic conditions, cultural beliefs, access to healthcare and patterns of stigma (24,25). In India in particular, in semi-urban and rural areas, data of association immune status and quality of life in patients taking a long time ART are rare. Understanding these relationships are essential to design integrated HIV care models that are not only focused on viral suppression, but also psychosocial and economic determinants of health. Therefore, the present study was done to assess the quality of life, the immune system, the nonadherence level to their drug treatment, and the comorbidities involved by people living with an HIV in an ART regime in a tertiary care center of Vijayapura, Karnataka. In particular, the aim of the study was to establish the association of CD4 count and quality of life in order to gain insight into longevity related factors and necessity of holistic HIV care strategies.

Aim of the study

To evaluate the association between CD4 count and quality of life among people living with HIV receiving antiretroviral therapy.

Objective

To assess the association between CD4 count and quality of life among people living with HIV receiving antiretroviral therapy in a tertiary care setting

METHODOLOGY

This is a cross-sectional study conducted in the hospital that aims to assess the relationship between CD4 count and quality of life of people living with HIV and taking antiretroviral therapy (ART). It was carried out from BLDE Deemed to be University, Shri BM Patil Medical College, Hospital and Research Centre, Vijayapura, Karnataka. Participants they came from both outpatient (OPD) and inpatient (IPD) services of the Department of General Medicine. The research covered the period from March 2024 to December 2025. This population was adults who were already diagnosed with HIV and came to the tertiary care centre for routine follow up or treatment. Fifty-five eligible subjects were recruited. Sample size has been calculated based on the formula $n=(Z\times\sigma/d)$ where a 95% confidence level, 5% significance and a margin of error of 1.5 and standard deviation of 5.5 were entered, which resulted in a minimum sample size of 55.

Inclusion Criteria

Adults aged more than 18 years who were previously diagnosed with HIV infection and receiving ART for at least one year were included in the study.

Exclusion Criteria

- Newly diagnosed HIV-positive individuals
- Pregnant women with HIV
- Patients unwilling to provide informed consent

Data Collection

After taking an informed consent, the participants were interviewed by a structured proforma. Information acquired included sociodemographic information (age, gender, education, marital status, occupation, economic background, etc.). Clinical history was recorded notating the year of diagnosis, length of time on antiretroviral therapy, any opportunistic infections (for example, tuberculosis) and comorbidities. We also evaluated adhering to treatments and psychosocial factors, such as mental health status, social support and stigma. Quality of life was assessed using the Multidimensional Quality of Life (MQOL)-HIV questionnaire which includes the physical, psychological, social, and environmental areas on the quality of life. Recent CD4 count values were obtained from the hospitals for determining immune status. The participants were separated into two groups for comparison - those with CD4 counts of < 250 cells/mm3 and those with CD4 counts of >= 250 cells/mm3.

Data Analysis

Data were entered into MS Excel and analysed in the software package, with version 20 of the social sciences software package, (SPSS). Continuous variables were presented as mean plus SD, and categorical variables were presented as number and percentage. For normally distributed continuous variables we have used independent t test, while Mann Whitney u test was used for non normal data. Categorical variables were

compared using the Chi - square test or Fisher's exact test where appropriate. Statistical significance was determined at $p < 0.05$ and tests were two-tailed.

Results

Table 1: Baseline Clinical Characteristics of Study Participants

Variable	Mean ± SD / n (%)
Age (years)	45.31 ± 11.38
Female	31 (56.4%)
Male	24 (43.6%)
Duration of ART (years)	7.3 ± 5.3
Mean CD4 count (cells/mm³)	365.7 ± 234.5
CD4 <250 cells/mm³	23 (41.8%)
CD4 ≥250 cells/mm³	32 (58.2%)
Presence of co-infection	42 (76.4%)
Past history of tuberculosis	13 (23.6%)
Adherent to ART	45 (81.8%)
Non-adherent	10 (18.2%)

The mean age of the study population was 45.31 ± 11.38 years, with a slight female predominance (56.4%). The average duration of ART was 7.3 ± 5.3 years, indicating long-term treatment exposure in most participants. The mean CD4 count was 365.7 ± 234.5 cells/mm³, reflecting considerable variability in immune recovery. More than half of the participants (58.2%) had CD4 counts ≥250 cells/mm³, while 41.8% remained immunocompromised (<250 cells/mm³). A high proportion (76.4%) had associated co-infections, and 23.6% reported a past history of tuberculosis. Treatment adherence was observed in 81.8% of patients, indicating good compliance with ART.

Table 2: Overall Quality of Life among Participants

Quality of Life Category	n (%)
Good	22 (40.0%)
Poor	23 (41.8%)
Very Poor	10 (18.2%)

Assessment of quality of life revealed that only 40% of participants reported good QOL, whereas 41.8% reported poor and 18.2% reported very poor QOL. Overall, 60% of individuals experienced suboptimal quality of life despite being on ART, indicating that viral suppression and treatment duration alone may not fully translate into improved well-being.

Table 3: Association Between CD4 Count and Quality of Life

Quality of Life	CD4 <250 (n=23)	CD4 ≥250 (n=32)	χ^2 (p-value)
Good	1 (4.3%)	21 (65.6%)	
Poor	13 (56.5%)	10 (31.3%)	24.147 (0.01) *
Very Poor	9 (39.1%)	1 (3.1%)	

A statistically significant association was observed between CD4 count and quality of life ($\chi^2 = 24.147$, $p = 0.01$). Among individuals with CD4 ≥250 cells/mm³, 65.6% reported good QOL, compared to only 4.3% in those with CD4 <250 cells/mm³. Conversely, 39.1% of participants with CD4 <250 reported very poor QOL, while only 3.1% of those with higher CD4 counts reported very poor QOL. These findings indicate that better immune status is strongly associated with improved quality of life.

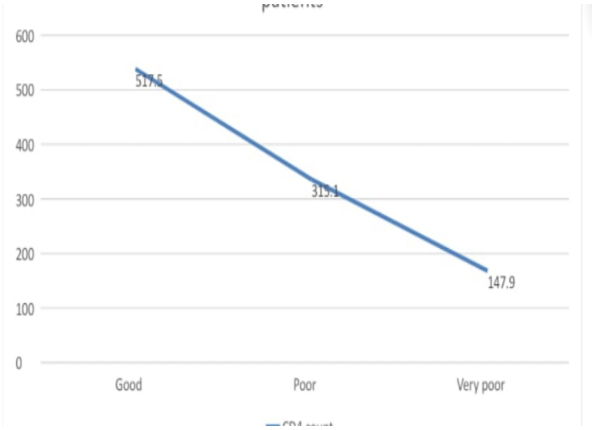

Figure 1: Comparison of Mean CD4 Count Across QOL Categories

The comparison of the mean CD4 count across the quality-of-life categories has demonstrated a progressive decay in immunological status with higher degree of QOL deterioration. Patients reporting good QOL had the highest mean CD4 cells count and those reporting very poor QOL had the lowest mean CD4 cells count.

Table 4: Psychosocial and Socioeconomic Factors Associated with Poor Quality of Life

Variable	Poor/Very Poor QOL n (%)
Poor economic status	32 (58.1%)
Poor social life	33 (60.0%)
Poor mental health	31 (56.4%)
Presence of co-infection	42 (76.4%)

A substantial proportion of participants reporting poor or very poor QOL had adverse psychosocial and socioeconomic conditions. Poor economic status was observed in 58.1% of individuals, while 60% reported poor social life. More than half (56.4%) had poor mental health status. Additionally, co-infections were highly prevalent (76.4%), further contributing to diminished well-being. These findings suggest that quality of life in PLHIV is influenced not only by immune status but also by psychosocial and economic determinants.

Table 5: Treatment Adherence and Quality of Life

Adherence Status	Good QOL n (%)	Poor/Very Poor QOL n (%)
Adherent (n=45)	21 (46.7%)	24 (53.3%)
Non-adherent (n=10)	1 (10.0%)	9 (90.0%)

Treatment adherence showed a positive association with quality of life. Among adherent individuals, 46.7% reported good QOL, whereas only 10% of non-adherent participants reported good QOL. Notably, 90% of non-adherent individuals experienced poor or very poor QOL. This suggests that adherence to ART plays a crucial role in maintaining both immune function and overall well-being.

DISCUSSION

The present study assessed the association between the immune status, expressed as CD4 count and quality of life (QOL) among people living with HIV (PLHIV) who were on an antiretroviral therapy (ART) in a tertiary care setting in Vijayapura. The results show a statistically significant relationship between CD4 count and QOL where the presence of higher CD4 count was highly related to a high level of perceived well being. Despite good adherence rates for ART therapy measured in the majority of participants, a significant proportion of the study population continued to report poor quality of life in both studies. of HIV care has a multidimensional nature One of the findings of this study was that there was a significant correlation between CD4 count and QOL (p=0.01). Those with CD4 greater than or equal to 250 cells/mm3 were significantly more likely to report good QOL and those with CD4 less than 250 had disproportionately poor or very poor QOL. This finding is agreeable with several international research studies which have established CD4 count to be a major predictor of health-related quality of life (HRQOL).
Tran et al. reported lower CD4 counts (<200 cells/mm3) to be associated with significantly poorer QOL increase in the physical and social domains. Similarly, Dinsa et al showed advanced clinical stage and lower CD4 levels were significantly associated with lower HRQOL (17). A meta-analysis conducted by Ghiasvand et al. also further confirmed the importance of CD4 count as an important clinical determinant in affecting QOL outcomes (16). From a biological standpoint, lower CD4 count makes one susceptible to opportunistic infections, chronic inflammation, fatigue and functional limitations that results in compromise in physical and psychological domains of life. Therefore, this study findings reinforce the importance to early diagnose and initiate ART as soon as possible, in order to preserve the immune function and optimise the long term well being.

The mean duration of ART in this study was 7.3 ± 5.3 years, indicative of exposure to ART for a long time. Despite this, 41.8% of participants still had CD4 < 250 cells/mm3, so there was incomplete immune recovery among a significant subgroup of participants. This observation is consistent with observations made by May et al. and Trickey et al. who showed that those who started ART at lower baseline CD4 cell counts have sustained survival disadvantages compared with those who started ART earlier (6,7). Even in the modern-day ART era, late initiation of treatment leads to residual morbidity and shortened life expectancy. Recent epidemiological evidence has also shown that delayed diagnosis of HIV infection significantly reduces survival outcomes and long-term health status among patients receiving antiretroviral therapy (26)

This study findings therefore support current WHO and global treatment guidelines that advocate for universal initiation of ART early in the disease course, irrespective of CD4 cell count, that prevents long-term immunological compromise. Although immune status was strongly associated with QOL, psychosocial factors were also a critical factor. In the present study, it was found that 56.4% of the participants had experienced poor mental health and 60 percent had experienced poor social life. These factors were common among people with poor or very poor QOL. This is consistent with the results of Jain et al. who discovered that depression scores were negatively correlated with all the domains of QOL, especially the psychological domain (21). Bing et al found also documented high rates of psychiatric co-morbidities among PLHIV, and greatly affect directly on functioning and treatment (22).

Stigma, financial instability and the lack of social support are significant contributors to reduced levels of well being. Mahajan et al. emphasised on the role of HIV-related stigma in social isolation, unemployment and lower self-esteem (23). Similarly, Naing et al. and Vo et al. found that income adequacy, employment status and lack of stigma were positively independently linked with improved HRQOL (19). Thus, the finding of this study presents a concern that immune restoration is not enough to guarantee the quality of life; comprehensive HIV care should incorporate psychological counselling, stigma reduction strategies and socioeconomic support systems.

Treatment adherence in this study was fairly high (81.8%), which reflects effective ART program implementation. Similar observations have been reported in previous studies conducted in tertiary care settings where adherence to ART was strongly associated with improved immune recovery and better quality of life among PLHIV (27). However, non-adherents showed significantly worse outcomes in QOL. These findings are parallel to evidence in other studies that finding adherence not only improves viral suppression but also improves physical functioning and psychological stability as well. Jain et al. and Naing et al. also found that poor adherence correlated with poor HRQOL and depressive symptoms (18,22). The relationship between adherence and QOL is two-fold: good adherence helps people's immune system and physical health and better QOL helps adherence behaviours. Therefore, interventions that focus on strengthening the adherence must also include mental health screening and patient-centred counselling.

A high proportion of participants (76.4%) had co - infections and 23.6% reported past history of

tuberculosis. Co-morbid illnesses contribute to recurrent hospitalisation, physical limitations and economic strain and thus have an adverse effect on QOL. Ball et al and Contreras et al have demonstrated the heavy burden of multimorbidity and polypharmacy in ageing HIV populations resulting in a significant negative effect on quality of life and functional independence (24,25). Chronic inflammation, metabolic problems, and non-AIDS comorbidities that appear to be of increasing importance for long-term outcomes in the ART era. This findings of the study gives support on the need for integrated chronic disease management within HIV clinics to address both infectious and non-infectious comorbidity. The results of this study emphasise that CD4 count remains of central importance in determining quality of life in PLHIV even in the modern ART era. Early diagnosis, immediate ART initiation and long-term immune recovery are crucial to help improve long-term outcomes. However, increasing survival is not enough. Holistic models of HIV care should include:

- Routine mental health screening
- Structured adherence counselling
- Socioeconomic support interventions
- Stigma reduction programs
- Integrated management of co-morbid conditions

Such comprehensive strategies are particularly important in semi-urban and resource-limited settings where socioeconomic challenges may amplify disease burden.

This study gives region-specific data from a Tertiary Care Center in Karnataka, bridging the gap in a research study in semi-urban Indian population. There are a number of limitations. The fact that the design was a cross-section mean that we cannot reach causal conclusions nor may the relatively small size of the sample limit our ability to generalize. In addition, the use of self-reported quality-of-life measures may be subject to the problem of reporting bias. The future directions for longitudinal studies using more participants are needed. They should monitor the changes using immune status and quality of life over time and examining the effectiveness of targeted psychosocial interventions. Among those PLHIV on ART, we found that the larger the CD4 count the better the quality of life a participant reported. However, the psychosocial and socioeconomic factors also play an important role in shaping well-being to a considerable extent. Thus, HIV care must have a multidimensional approach with a combination of immunological monitoring with mental health support and social and economic resources.

Conclusion

This study had found a good correlation between CD4 count and quality of life in people with HIV on antiretroviral therapy. People with higher CD4 counts were significantly more likely to report better overall quality of life, highlighting the importance of early diagnosis and early ART, in order to help protect their immune health. Although adherence rates to treatment were high among the participants, many of them maintained that low quality of life mainly because of psychosocial stressors, co-infections and economic hardships. These results demonstrate that the suppression of the virus and the improvement of the immune system is not enough to ensure good living. Comprehensive HIV care requires a holistic-patient centered approach that includes combinations of immune monitoring, mental health support, adherence counselling, and economic support. Enhancing these diverse care strategies is a key to improving the long-term outcomes and extending the life and increasing the quality of life of people living with HIV.

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