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CD4 profile of positive HIV/AIDS patients undergoing antiretroviral drug therapy attending general hospital Alkaleri, Bauchi State, Nigeria

Abstract

About 34 million people globally are estimated to be currently diagnosed with HIV/AIDS and approximately 2.7 million new infections that progress to AIDS happens each year. Currently there is a reduction of 25 percent of HIV infected cases in Nigeria over the recent decades though the disease remains an alarming situation since over 3 million Nigerians live with it and the number is rising. This study was carried out to determine the profile of progression and regression of CD4 count status of identified HIV/AIDS patients who are under ART when they come for a repeat or follow up at the General Hospital Alkaleri Bauchi State Nigeria.

The study targeted 80 patients 12 males and 68 females. HIV serologic testing was done using parallel testing with Determine HIV 1/2 and UniGold HIV 1/2 rapid tests. The confirmed HIV positive patients were taken to the Centre for Comprehensive Care, Alkaleri where CD4 counts were assessed using BD FACS count system before starting ART. Immunologic responses were assessed by CD4 counts every two weeks after the commencement of ART and on a monthly basis for successive three months. CD4 counts at the beginning of the study were as low as 8 cells/mm³ and as high as 220 cells/mm³.

Patients were categorized into three groups based on their CD4 counts: Low is defined as containing less than 100 cells/mm³, intermediate is anything between 100 and 200 cells/mm³ while high is anything greater than 200 cells/mm³. Values were obtained from 429 participants; they had a mean baseline CD4 count of 126 cells/mm³ and after receiving treatments for 14 weeks had a mean CD4 count of 278 cells/mm³. Specific immunologic responses whereby gains in CD4 count were noted at 2 weeks post ART commencement were also noted across the study sites. Our regression analysis also showed that the baseline of CD4 counts between 100-200 cells/mm³ registered statistically significant higher response to therapy mea- sure ($P < 0.01$; $t = 19.7332$) compared with the patients with CD4 count < 100 cells.mm³ or > 200 cells.mm³.

The study supported that confirmation of the effectiveness of the ART as a method of raising the CD4 levels, and therefore a confirmation of CD4 counts as a positive outcome indicator for the ART. Consequently, these findings were of potential significance for enhancing strategies regarding the management of HIV.

Keywords: CD4 profile, antiretroviral therapy, HIV/AIDS, blood, patients, chemotherapy

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Introduction

Human Immunodeficiency Virus (HIV) is a retrovirus discovered in 1984, by Barre-Sinoussi, Montagnier and colleagues at the Institut Pasteur, Paris, and was initially known as Lymphadenopathy-Associated Virus.[1] In the same year, Popov Gallo and others were able to establish cell cultures that are chronically and continuously productive of the virus.[2] More isolates from patients with AIDS and AIDS related diseases in United States, Europe and Central Africa about this virus as HIV-1.[2]

In 1985, another human retrovirus, which is different from HIV-1 was isolated from West Africans. Known first as LAV 2 and then renamed HIV 2, this virus has also been linked to AIDS and related illness development.[3] At present HIV-1 and HIV-2 are known to be the causes of AIDS and related diseases. HIV-1 has circulated worldwide, whereas HIV-2 is restricted to West Africa with the occasional scooping to Europe and South America.[3]

Infections with HIV are present all over the world, with developing, restricted-resource countries being most affected.[4] According to WHO of 2024 88.4 million People have become infected with HIV since the start of the epidemic. According to the UNAIDS, WHO, and UNICEF reports in2024, 34.9 million- 43.1million of adults and children who were alive by the end of the year 2024 were HIV positive.

It is estimated that in 2024, 630,000 people died due to AIDS related illness. Nevertheless, the expansion of antiretroviral therapy has saved about 2.5 million AIDS-related deaths since 1995 within developing countries only.[4]

The HIV prevalence rate of HIV in the country as 2023 was 1.9 million people living with the infection, of which 1,3% were adults, 74,000 were new cases of HIV infections and 51,000 AIDS-related deaths.[3]

CD4 count is a strong parameter of immunologic status and it is applied to evaluate the stage of HIV disease and to predict the presence of the complications. HIV take a toll on the CD4 count; this results in immunosuppression if the infection is left for a long time (Peter and Matthew, 2001). Research promotes assessment for and the start of antiretroviral therapy among patients with CD4 counts of

200 or less per microliter.[3] While the optimal time to start therapy in asymptomatic patients with CD4 counts above 200 cells/mm³ is still under discussion.[3] In accordance with the principles of scientific management of antiviral therapy, therapy is initiated with CD4 counts below 350 cells/mm³.[3]

Therefore, this study sought to assess the CD4 status of HIV/AIDS clients under ART at the General Hospital Alkaleri, Bauchi State-Nigeria.

Materials and methods

Study area

The study was conducted at the General Hospital, Alkaleri Bauchi State, Nigeria.

Ethics consideration

Ethical approval was sought and obtained from the ethical committee of GHA Bauchi state. The informed consent of the subjects was also obtained for the study.

Inclusion criteria

Participants included in this study were only HIV/AIDS positive patients between 18 to 60 who have been under ART for six months and who also gave their consent.

Exclusion criteria

Those patients who were pregnant and those on other drugs aside from antiretroviral drugs were excluded from the study.

Sampling technique

A systematic random sampling method was employed in selecting the participants based on the inclusion criteria. The selection of samples was based on a system of intervals in a numbered population. That is for every three patients, one was picked without bias.

Laboratory analysis

Voluntary counseling and testing

As a result of HIV awareness campaigns, patients present themselves to the Voluntary Counseling and Testing (VCT) Centre at General Hospital Alkaleri (GHA) for HIV screening. Certain patients receive referrals for a diagnostic test because of chronic or recurrent opportunistic infections. During a pre-Test counseling which is given at the VCT Center, the counselor educates the client on why he or she should be tested for HIV, how the test is done and what the outcome means. Screening of HIV is done normally and any patient who is diagnosed of HIV is advised to attend the CCC for additional services.

At the Center for Comprehensive Care (CCC), counseling and living positively with HIV comprises of patient reconciliation to HIV positive status, living a positive life despite the HIV status, and knowledge on how to strengthen their immune system through ART. The patient initial registration information includes the CD3, CD4, and CD8 T cell counts, and they start their ART after the evaluation.

Blood sample collection, screening for HIV and CD4 T cell determination

HIV screening was conducted using two parallel tests simultaneously: The Determine HIV 1/2 test from Abbott Laboratories, USA, and the Trinity Biotech Uni-Gold HIV test from Trinity Biotech, USA. Whole blood Samples collected from right hand finger were used in the tests.. The Determine HIV 1/2 test was carried out according to the instruction provided in the test manual)[2]

The method used involved placing a droplet of whole blood onto the sample pad of a labelled test card: Finally, after all the blood was absorbed, one drop of chase buffer was added. In order also for a comparison to be made with the conventional reading results, the results were read after 15 minutes (up to 60 minutes). This was true if there was two red bars of equal intensities, one in the control window of the strip and the other in the patient window of the strip. Again, a negative result was checked from a single bar in the control window which was red and a lack of bar in the patient window.

Screening for HIV using determine HIV ½ Test

Uni-Gold Triniry Biotech test on blood samples was done as recommended.[2] In brief, the test procedures involved dropping two microlitre samples of whole blood from a finger prick on to the sample port of each labelled test device. Two drops of wash reagent were then put into the substrate. After a 10-minute incubation, results were interpreted as follows: these include a line in the test region and the control region, which suggested a positive result, while simply a line in the control region suggested a negative result.

Enzyme linked immunosorbent assay (ELISA)

Inconsistencies between the two rapid tests were supplemented with an ELISA using the third generation Murex HIV 1.2.0 kit sourced from Murex Biotech Limited United Kingdom. The procedure followed the manufacturer's protocol of Gains and Synods.[5] The Murex HIV 1.2.0 kit also had formula for result calculation with a mean of absorbance and a cutoff of the result at 0.280. Findings suggestive of a negative test were recorded if the sample absorbance was below the cutoff value while a value equal and above the cutoff value would be suggestive of a positive test.

Data on opportunistic infection

Patients data on bacterial, fungal, viral and parasitic opportunistic infections was recorded from their files as documented before commencement of chemotherapy.

CD4 counts determination

CD4 count was done using the flow cytometer BD FACS Count (Becton Dickinson, USA) which incorporates the use of FACSCoumt (Becton Dickinson, USA) as described (WHO, 2021. As mentioned above the BD FACSCount is the hardware and software, the reagents and controls are also provided within the system. The specimen has a two-color immunofluorescence technique to quantify absolute numbers of CD3, CD4, and CD8 T cells also the CD4/CD8 ratio.

The BD FACSCount reagent kit includes two matched reagents: monoclonal antibodies conjugated with fluorochromes and a settled number of fluorochrome-labeled polystyrene beads. In one tube of the pair, there is CD4 and CD3 conjugate and in the other tube there is CD8 and CD3 conjugate. This kit also contains formaldehyde fixative. It entails mixing whole blood with reagent tubes and processing the samples to produce data which is recorded on record tabulation sheet.

Every patient had his/her CD4 count measured not only before instituting ART but also after commencement of the same. Assessments were made at two weeks following the therapy session and monthly thereafter for three months.

Statistical analysis: The goodness of fit of the patients to their respective CD4 counts and viral loads outcomes were based on chi-square tests results.

The Kruskal-Wallis test was used to compare mean CD4 counts a mean viral loads during therapy.

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Results

In all, 80 participants were recruited, from a population of patients that tested HIV reactive in duplicate, by two rapid screening assays (Determine HIV 1/2, USA and Trinity Biotech Uni-Gold, USA). The participants were 12 male participants and 68 female participants with different ages (Table 1). All the female participants were non pregnant.

Table 1 Gender and age of the study population

Age in Years	Male	Female	Total
< 21	0	5	5
21-25	2	11	13
26-30	3	18	21
31-35	2	23	25
36-40	3	6	9
> 40	2	5	7
Total	**12**	**68**	**80**

Discrepancy rate of parallel testing was 7.5% among the six females among the eighty patients evaluated during the study. Among these, 4 (5.0%) patients were positive with Determine HIV 1/2 but negative with Trinity Biotech Uni-Gold test and 2 (2.5%) were negative with Determine HIV 1/2 but positive with Trinity Biotech Uni-Gold test.

Table 2 CD4 Levels and corresponding clinical manifestations of patients

CD levels	Mean CD4 counts	No. of patients infections	Opportunistic
<100 cells/ mm^3 of blood	54	27(33.75%)	Chronic Weakness Chronic Diarrhoea Kaposi's Sarcoma Candidiasis of the Oesophagus Tuberculosis Pneumonia Persistent/ Consistent Fever
100-200 cells/ mm^3 of blood	151	42(52.5%)	Pneumonia Tuberculosis Chronic Diarrhoea Oral Candidiasis Persistent generalized lymphadenopathy Phodenopathy
>200 cells/ mm^3 of blood	210	11(13.75%)	Oral Candidiasis Recurrent upper respiratory infections Herpes Zoster

The 6 discordant cases had their serum samples retested using an ELISA with a sensitive Murex HIV 1.2.0 kit sourced from Murex Biotech Limited United Kingdom. As a result, the values measured with absorbance above 0.280 were confirmed as the HIV-positive samples in all six test subjects. The absorbance values were 0.342, 0.416, 0.402, 0.384, 0.301, and 0.408.

CD4 level and clinical manifestation

The CD4 counts of the patients in this study at recruitment were between a high of 220 cells/mm^3 and a low of 8 cells/mm^3. CD4 counts were categorized according to signs and symptoms and associated opportunistic infections into three groups. Of them, 27 patients (33.75%) had CD4 < 100 cells/mm^3 on admission, with mean CD4 of 54. Most of these patients had chronic weakness, diarrhea, tuberculous disease, Kaposi's skin lesions, esophagitis candidiasis, herpes simplex, and pneumonia.

Out of them 42 (52.5%) had CD4 count 100-200 cells/mm^3, mean CD4 count being 151 whose complaints were recurrent fever, pneumonia, tuberculosis, chronic diarrhea and others. Eleven more patients (13.75%) had CD4 count more than 200 cells/mm^3, the mean being 210, with symptoms of persistent generalized Lymphadenopathy, varicella zoster, recurrent upper respiratory tract infections and oral thrush.

The overall mean CD4 count before starting chemotherapy was 126, and all patients commenced treatment. After two weeks of therapy, the mean CD4 count rose to 148, representing a 17.5% increase. At six weeks, the mean CD4 count increased further to 209, a 29.2% rise. By ten weeks, it reached 252, marking a 17.1% increase, and after fourteen weeks, the mean CD4 count rose to 278, reflecting a 9.4% increase (3).

Respond to chemotherapy in terms of CD4 counts

Adherence to chemotherapy was assessed twice in two weeks for a total of 14 weeks and the patients were categorized according to their infection stages. Sixty four patients (80%) had improvement in the CD4 count while 13 patients (16.3%) had a reduction and 3 patients (3.7%) had no change in their CD4 count after two weeks of treatment (Table 3).

Table 3 Effect of chemotherapy on cd4 count two weeks post chemotherapy

Effect of chemotherapy on CD4 counts	Baseline CD4 Count			Total patients
	<100cells	100-200cells	>200cell	
Increased	21(77.8%)	35(83.3%)	8(72.9%)	64(80%)
Decreased	5(18.5%)	6(14.3%)	2(18.2%)	13(16.3%)
No change	1(3.7%)	1(2.4%)	1(9.1%)	3(3.7%)
Total patients	27(33.7%)	42(52.5%)	11(13.8%)	80 (100%)

In the sub-sample that had baseline CD4 counts less than or equal to 100 cells/mm3, 21/27 (77.8%) had an improved CD4 count after two weeks of therapy, 5/27 (18.5%) had the marker reduced and 1/27 (3.7%) had no alteration in their CD4 count (Table 3). Those with baseline CD4 count between 100 and 200 cells/mm^3: 35 (83.3%) had an improved CD4 count while 6 (14.3%) had worsened CD4 count and one patient (2.4%) remained unchanged (Table 3). Of the patients who had a baseline CD4 of greater than 200 cells/mm^3, 8 had improvement to their CD4 count, 2 declined and one remained static to chemotherapy (Table 3).

In the patients who underwent six weeks of chemotherapy, 74 (92.5%) had their CD4 count rise; 6 patients (7.5 %) had their CD4 count fall (Table 4). In patients a baseline CD4 count of <100 cells/mm^3, 25 (92.6%) had higher CD4 counts at the end of follow up while 2 patients (7.4%) had a lower count (Table 4). In the group of patients with baseline CD4 counts ranging between 100 and 200 cells/mm^3,

41 (97.6%) had improved baseline CD4 count whereas there was only one patient (2.4%) with a decline (Table 4). Of the patients with baseline CD4 count of greater than 200 cells/mm³, 8 patients (72.7%) had improved CD4 count, whereas 3 patients (27.3%) had a reduction in CD4 count (Table 4).

Table 4 Effect of chemotherapy on CD4 count six weeks' post

Effect of chemotherapy on CD4 counts	Baseline CD4 count			Total patients
	<100cells	100-200cells	>200cell	
Increased	25(92.6%)	41(97.6%)	8(72.7%)	74(92.5%)
Decreased	2(7.4%)	1(2.4%)	3(27.3%)	6(7.5%)
Total patients	27(33.7%)	42(52.5%)	11(13.8%)	80 (100%)

After ten weeks of chemotherapy, 74 patients (92.5%) showed increased CD4 counts, 4 patients (5%) experienced a decrease, and 2 patients (2.5%) showed no change (Table 5). Among patients with baseline CD4 counts below 100 cells/mm³, 26 (96.3%) demonstrated increased CD4 counts, while 1 patient (3.7%) showed no change (Table 5). For those with baseline CD4 counts between 100 and 200 cells/mm³, 10 patients (90.9%) exhibited increased CD4 counts, while 1 patient (9.1%) had a decrease (Table 5).

Table 5 Effect of chemotherapy on CD4 count ten weeks post chemotherapy

Effect of chemotherapy on CD4 counts	Baseline CD4 count			Total patients
	<100cells	100-200cells	>200cell	
Increased	26(96.3%)	38(90.5%)	10(90.9%)	74(92.5%)
Decreased	-(%)	3(7.1%)	1(9.1%)	4(5%)
No change	1(3.7%)	1(2.4%)	-(%)	2(2.5%)
Total patients	27(33.7%)	42(52.5%)	11(13.8%)	80 (100%)

Out of 80 treated patients, 73 of the patients (91.2%) had improved CD4 count in the 14th week after chemotherapy, 5 patients (5%) had a reduction of their CD4 count while 2 patients (3.8%) did not have change of their CD4 count from the previous week (Table 6). Of the 27 patients with baseline CD4 <100 cells/mm³; 26 had a rise in CD4 counts while only one patient had a stable CD4 count (Table 6). In the intervention group for patients with the baseline CD4 count between 100 and 200 cells/mm³, 37 patients (88.1%) had their CD4 count rise, 3 patients (7.1%) had a decline, and 2 (4.8%) remained stable (Table 6). Ten patients with baseline CD4 count more than 200 cells/mm³ improved with increase in CD4 count while 1 patient had a decline in CD4 count among the patients of the study (Table 6).

Table 6 Effect of chemotherapy on CD4 count fourteen weeks post chemotherapy

Effect of chemotherapy on CD4 counts	Baseline CD4 count			Total patients
	<100cells	100-200cells	>200cell	
Increased	26(96.3%)	37(88.1%)	10(90.9%)	73(91.2%)
Decreased	-(%)	3(7.1%)	1(9.1%)	4(5%)
No change	1(3.7%)	1(4.8%)	-(%)	3(3.8%)
Total patients	27(33.7%)	42(52.5%)	11(13.8%)	80 (100%)

CD4 profile during chemotherapy

Data on the response of HIV patients to chemotherapy at different stages of HIV was measured over a period of two months that is 14 weeks with the measuring stick being bi weekly. When the baseline count was less than 100 cells/mm³, the mean count for the patients improved from 54 to 242 during the treatment intervention. Mean CD4 cell count at baseline for patients on a booster was between 100 and 200 cells/mm³ = 151, above 200 cells/mm³ = 210 Mean CD4 cell count at 24 weeks on treatment with booster: Increased to 335 for those with baseline between 100 and 200 cells/mm³; and 352 for patients with baseline above 200 cells/mm³ (Figure 1).

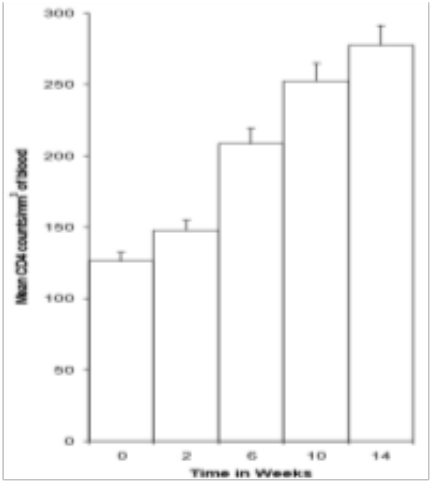

Figure 1 Mean CD4 count during chemotherapy.

While the first two weeks of treatment, patients with a baseline CD4 counts between 100 and 200 cells/mm³ had a significantly better response (P<0.01; t= 12.5032) than those in the other study category of having <100 or >200 cells/ mm³ at baseline. The same group of respondents maintained higher response level after six weeks; F (percent) = 34.153; P < 0.01; t = 6.4687. That is, at week ten, patients who had CD4 count less than one hundred cells per millimeter cube enjoyed a better response compared to the rest of the groups (P < 0.01; t = 4.889). Likewise, after 14 weeks, patients who began with CD4 counts of below 100 cells/mm³ echoed the best response (P < 0.01; t = 0.0053).

Total regression analysis carried on the response of the patients throughout the entire 14 weeks of chemotherapy also showed significant difference in the response of the patients those having baseline CD4 counts between 100 and 200 cells/mm³ were more responsive to chemotherapy (P < 0.01; t = 19.7332) as compared to patients those having baseline CD4 counts <100 cells/mm³ or >200 cells/mm³ (Figure 2).

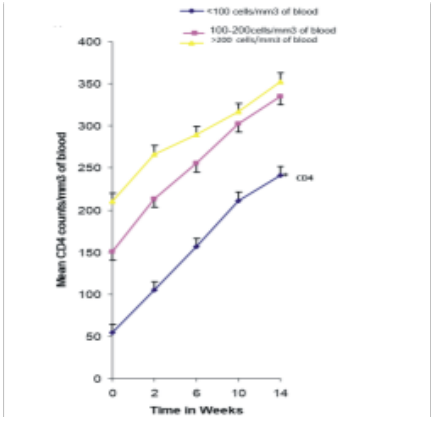

Figure 2 CD4 profile during chemotherapy. Patients categorized according to the level of CD4 counts.

*Asterisk means significantly better response in this category of patients than the patients in the other two categories. P<0.01;t=19.7332

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Discussion and conclusion

Acquired Immunodeficiency Syndrome (AIDS) is a universal issue that is toughest to overcome even for the wealthiest nations and their healthcare systems and is one of the most destructive epidemics in the contemporary world. From the onset of the disease 88.4 million million people have become infected with HIV since the start of the epidemic.[4]

Antiretroviral drugs are considerably grouped depending on the part of the HIV life cycle that they are aimed at. Such drugs are reverse transcriptase inhibitors, protease inhibitors (PIs), and fusion inhibitors. RTIs slow the synthesis of viral DNA by acting on the reverse transcriptase enzyme, PIs prevent formation of new virions by inhibiting the activity of the protease enzyme, Fusion inhibitors prevent HIV from fusing with cell membranes and gaining entry into the host cell. In Nigeria presently, daily dose regimen involves the use of nucleoside RTIs, protease inhibitors and non-nucleoside RTI's.[6] In this study the participants received the two nucleoside reverse transcriptase inhibitors (Lamivudine/ Stavudine) plus one non-nucleoside reverse transcriptase inhibitor Nevarapine according to the NACA 2024 guideline, targeting to inhibit viral replication.[6]

In this study parallel testing gave discordant results with eighty patients, six of these were proved on an additional third testing. Consequently, enzyme-linked immunosorbent assay (ELISA) was performed on the serum samples of these discordant cases to confirm HIV antibodies, and all six cases were HIV positive. These findings concur with previous work, which showed that discordant results by rapid tests are true by HIV.[5] These findings emphasize that discordant negative rapid test results should not be ignored or considered as a true negative without performing further testing.

Patients presented certain symptoms, which were peculiar to them but showed general characteristics and certain diseases. Several patients had two or multiple symptoms diseases and most complained that they did not improve with symptomatic management for the last few months. These were bacterial, viral, fungal, protozoal and parasitic diagnoses, for both, inpatient and outpatient. Pneumocystis carinii pneumonia, viral herpes zoster and simplex, candidiasis, and bacterial tuberculosis infections were often reported in such cases. Chemistries pointed out the degree of immunosuppression and surge in viral replication and conferred vulnerability to other infections. The emergence of these infections prompted HIV to reduce the immune capacity of the body in a gradual process, according to a study done in South Africa Currier.,[7]

According to the current study, common afflicted diseases manifested in individuals with CD4 counts below 100 cells/mm³ included mild and severe pneumonia, Herpes simplex, tuberculosis, ulcerative esophageal candidiasis, Kaposi's sarcoma, chronic diarrhea, and prolonged weakness. Individuals within the range of CD4 cell count between 100 and 200 cells/mm³ often had chronic diarrhoea, tuberculosis, pneumonia and prolonged fever. Lymphadenopathy, thrush, recurrent upper respiratory tract infection and herpes zoster were illnesses presented commonly by individuals with CD4 count >200cells/mm³. CD4 count levels were observed along the continuum of immunosuppression as evidenced by symptoms and diseases present. This finding is in concordance with past research findings, where authors observed that as the CD4 count reduced to optimal-products, the immune system facilitated folk's opportunistic infection hence enhancing the people's frailty Currier.,[7]

In this study, none of the patients had previous treatment taken for HIV. They took stavudine and lamivudine fixed dose twice daily, and nevirapine was taken as a single drug, with a single dose in a day. Nigeria's first-line antiretroviral drugs are among those recommended by its government for adults living with HIV.[6]

Patient's CD4 counts improved after the commencement of therapy. There was a gain of 22 cells/mm³ in mean CD4 count after two weeks on treatment and a peak mean gain of 61 cells/mm³ at six weeks. That cases of raised CD4 counts within the first two weeks signifying patients' response to ARVs treated depicted respond. This result corroborates another study by Ford et al.,[8] who noted that patients' CD4 count rises within nine days of treatment initiation. At the end of the tenth week, a pronounced change in CD4 count was noted; in percentages with all the patients showing a marked improvement in their immune status as it started to counter opportunistic infections. At this point most symptoms and OA had resolved or improved significantly

A number of studies have shown a hike in CD4 counts when patients are put on ARVs. For instance, Ford *et al.,* (2017) noted that antiretroviral therapy had enhanced immune responses in patients with CD4+ T cell counts on therapy. In another observation Ford et al.,[8] observed that with the ARV therapy, the CD4 counts were rising and it was established that ARVs enhance the immunity by raising the CD4 counts.

The patients reacted in an unexpected way to antiretroviral treatment. Those who begun treatment with pattern CD4 tallies between 100-200 cells/mm3 of blood had altogether superior reaction to treatment compared to those with non CD4 checks (less than 100 cells/mm3) and tall CD4 checks (more than 200 cells/mm3). This perception concurs with a prior consider that appeared improved reaction to treatment in patients with medium run CD4 tally (180 cells/mm³; Ford et al.,[8]).

The diminish in CD4 number amid treatment seem to have been credited to determined deft contaminations. Artful contaminations are outward components which will fortify viral replication. With a dynamic viral replication, the rate of CD4 cells pulverization might exceed the rate of generation of more current cells. This seem legitimize why this diminish was watched in a few patients' CD4 tallies indeed when they were put on ARVs.[8]

The cruel CD4 check expanded whereas the cruel viral stack diminished with chemotherapy, an sign of an change in immunologic work. Prior ponders have appeared increments in cruel CD4 tallies and decreased viral loads with treatment. For illustration, one ponder that as the CD4 check expanded, the plasma viral loads diminished amid treatment. In past ponders it was detailed that higher pre-treatment viral stack and lower pre-treatment CD4 number were related with more noteworthy increment in CD4 tallies amid the primary three months of coming about within the recuperation of the safe work.[8]

Made strides proportion of CD4:

CD8 was watched amid the ponder. Ordinarily the proportion of CD4:

CD8 on the fringe blood is approximately 2:

The changes in proportion of CD4

CD8 among patients who began treatment with higher CD4 checks were more critical compared to the patients who begun treatment with lower CD4 counts. The alter in proportion moved forward as treatment advanced and this is often in assertion with a prior consider by Mary (2003) that appeared made strides proportion of CD4:

CD8 amid treatment. The cruel CD3 number expanded amid the fourteen weeks of chemotherapy. This is often in bolster with a prior consider conducted on HIV positive patients on ARVs which detailed an increment in CD3 tally amid treatment. This implies that there was control of harm to the resistant framework and the resistant capacities was being reestablished.

Clinical benefits had been observed between eighth and fourteenth weeks and the clinicians concurred that the reactions to ARVs were apparent. By and large, all the patients reacted well to antiretroviral drugs in spite of the fact that few had a few delay in starting benefits, but delayed treatment appeared surprising advance. Dynamic increments in CD4 number brought about in reconstitution of the resistant framework in most people within the ponder populace, indeed in those with progressed infection who begun antiretroviral treatment at exceptionally more CD4 counts. This significantly decreased the chance of clinical infection movement and passing. CD4 checks or viral stack might be utilized as an exact degree of response to antiretroviral treatment.

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Conflict of interest

The authors declared that there are no conflicts of interest.

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