ROLE OF CLINICAL PHARMACIST IN ASSESSMENT OF THE RISK FACTORS CONTRIBUTING TO POOR THERAPEUTIC OUTCOME IN HIV/AIDS PATIENT IN TERTIARY CARE HOSPITAL SANGAREDDY- A PROSPECTIVE - INTERVENTIONAL STUDY

C. Sandhya madhuri [1*],R.Shashivarna[2], G.Rahul raj[3] Palash Mandal[4], Dr.Kalukoori Navya[5], Dr.Azmath Farhana[6],Dr.N.Sandeepthi[7],N.Jhancy Laxmi bai[8]

[1*]Student at Arya college of pharmacy, sanga reddy , kandi

[2]Student at Arya college of pharmacy, sanga reddy , kandi

[3]Student at Arya college of pharmacy, sanga reddy , kandi

[4]Student at Arya college of pharmacy, sanga reddy , kandi

[5]Assistant Professor, Department of Pharmacy practice, Siddhartha Institute of Pharmacy

[6]Assistant Professor, Department of Pharmacology,School of Pharmacy,Anurag University.

[7] Associate professor, Department of pharmaceutics,Vignan institute of pharmaceutical sciences,Deshmukhi village, yadadri ,buvanagiri dist

[8]Assistant professor, Department of pharmaceutics,Arya college of pharmacy,sangaReddy ,kandi

***Corresponding author E-mail**: nellutla.jhancy@gmail.com

ABSTRACT:

BACKGROUND

HIV continues to be a major global public health issue, having claimed 40.1 million [33.6–48.6 million] lives so far. There were an estimated 38.4 million [33.9–43.8 million] people living with HIV at the end of 2021, 650 000 [510 000–860 000] peopledied from HIV-related causes and 1.5 million [1.1–2.0 million] people acquired HIV. To reach the new proposed global 95–95–95 targets set by UNAIDS, we will need to redouble our efforts to avoid the worst-case scenario of 7.7 million HIV-related deaths over the next 10 years. Exposure to the risk factors influences patient health outcomes, particularly in chronic conditions such as HIV leading to progression of the disease and reduced quality of life. To forestall these, risk variables of poor immune recovery should be assessed and addressed appropriately. This study aimed at assessing the risk factors of poor immune recovery in HIV-infected patients.

AIM

To assess the Risk factors contributing to the poor therapeutic outcomes inHIV/AIDS patients in Tertiary care hospital.

OBJECTIVES

To identify and evaluate the prevalence of factors associated with poor therapeutic outcomes, to provide effective patient counselling, to assess patient adherence to ART and risk level individually pre and post counselling.

METHODOLOGY

A Prospective Interventional study was carried out at Tertiary care Hospital, sangareddy. A structured proforma was designed to collect patient data. Morisky medication adherence scale was used to assess the subject medication adherence to calculate the adherence score. Individual risk factor assessment was done to calculate the prevalence of risk factor both in pre and post pharmacist counselling. Patients were provided with patient counselling about disease, medication adherence and risk factors contributing to poor therapeutic outcomes.

RESULTS

The present study was conducted in sangareddy District Government Hospital with total of 101 subjects. Out of these 101 subjects 58(57.42%) were females and43(42.57%) were males. The maximum no. of patients falls between the age group of 31 to 40 years and are from rural areas 92(91.08%), 88.8% of patients have social history and 62.3% of population were illiterates. Paired T test was used to assess the risk level pre and post pharmacist intervention. Prior counselling 59 patients with (58.41%) were found to be low adherent, 15 patients with (14.86%) were moderately adherent, and 27 patients with (26.73%) were highly adherent. After follow up low adherence was reduced to 15 with (14.85%), moderate and high adherence shown improvement among 15 patients with (47.52%), and 38 patients with (37.62%) respectively which showed a significant difference due to change in risk level**(P<0.05)(POR=2.38, 95CL=4.72-5.57).** Prior to counselling 10 patients with (9.90%) were at low risk, 63 patients with (62.37%) were at moderate risk, 28 patients with (27.72%) were at high risk and 0 patients at no risk, which showed significant difference**(P<0.01)** after counselling with 1 patient (0.10%) at high risk, 20 (19.80%) at moderate risk, 73 (72.27%) at low risk, and 7 (6.93%) were at no risk.

CONCLUSION

This study concludes that clinical pharmacists-led interventions can significantly lower HIV/AIDS patients risk level and increases medication adherence to ART, CD4 count improvement and decrease in DRPs in PLWHA demonstrating the importance of an optimal pharmaceutical care plan. Clinical pharmacists are essential in the evaluation of risk factors contributing to poor therapeutic outcome in HIV/AIDS patients, in providing patient counselling, and in raising awareness of the magnitudeof the risk factors.

Further research in particular longitudinal studies is needed to explore the complex interaction of these factors and to inform policies and programs for the prevention and management of risk factors in HIV/AIDS patients.

KEY WORDS: HIV/AIDS, Anti Retro viral Therapy (ART), Adherence, Risk Factors.

INTRODUCTION:

Acquired immunodeficiency syndrome **(AIDS)** is a chronic infectious disease causedby **Human immunodeficiency virus (HIV)** is characterised by spectrum starting from primary infection with or without the acute syndrome by relatively long period of asymptomatic stage after which in most patients progress to advanced and life- threatening disease.

Since 1981 when the first cases of AIDS were reported in the United States, HIV/AIDS infection has spread rapidly to many countries over the years and become a global challenge. The disease continues to affect millions of peopleirrespective of age or sex. HIV/AIDS epidemic has emerged as one of the most serious and enormous health problems within about two decades in India. AIDS was 1st recognised in USA in 1981 among homosexual males: pnuemocystic carnie pneumonia was seen among 5 five homosexual and Kaposi sarcoma was diagnosed in 26 homosexuals with the virus. HIV virus isolated from patients with lymphadenopathy in 1983 and on 1984. The viruswas clearly demonstrated to be the causative agent for AIDS.

The major mode of transmission of HIV/AIDS worldwide is heterosexual contacts particularly in developing countries, other routes of transmission include transfusion of infected blood and blood products, occupational products, prenatal transfusion and others. The two most important risk of HIVinfection are having sexual contact with many partners and having STDs

Epidemiology

Global situation and trends: Since the beginning of the epidemic, more than 70 million people have been infected with the HIV virus and about 35 million people have died of HIV. Globally, 38.4 million [33.9–43.8 million] people were living with HIV at the end of 2021. An estimated 36.7 million [32.3-41.9 million] of adults aged 15–49 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions. The WHO African region remains most severely affected, with nearly 1 in every 25 adults (4.1%) living with HIV and accounting for nearly two-thirds of the people living with HIV worldwide.

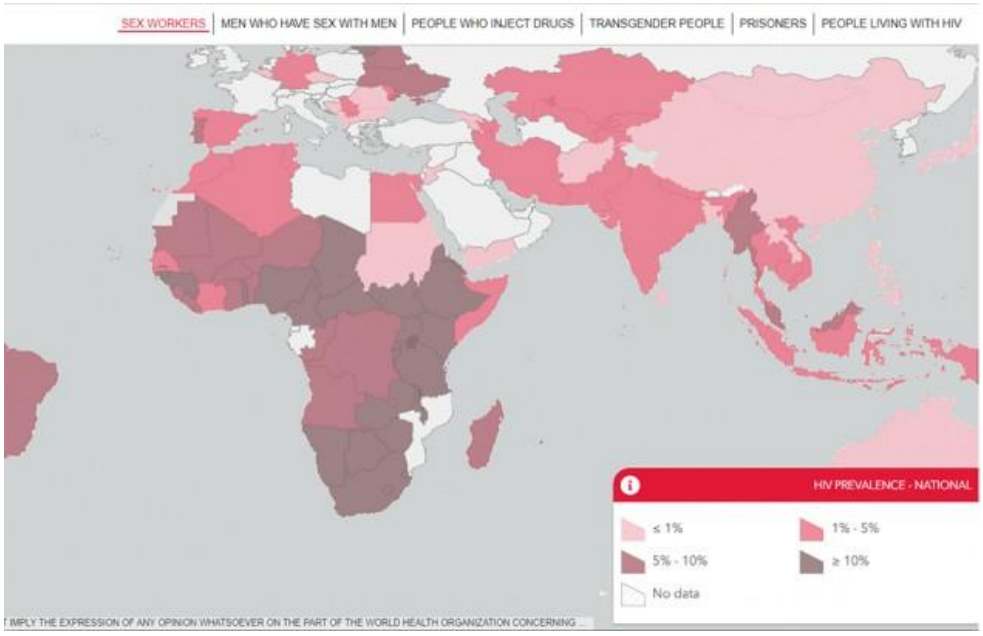


Fig no 1.1.1: Estimated HIV prevalence rate-2021

Source: Global HIV&AIDS statistics – UNAIDS

Number of People Living With HIV/AIDS (PLWHA) of all ages:

As of 2021, the global number of people living with HIV is 38.4 [33.9−43.8] million, compared to 27.4 million [23.1–32.6 million] in 2000. This reflects continued transmission of HIV despite reductions in incidence, and the benefits of significantly expanded access to antiretroviral, which have helped

to reduce the number of people dying from HIV-related causes, especially since 2004 when mortality peaked. Sub-Saharan Africa remains most severely affected, with 1 in every 25 adults (4.1%) living with HIV and accounting for over two-thirds of the people living with HIV worldwide. In 2017, that number reached 25.8 million [22.0–30.2] million.

Table no: 1.1.1 Estimates rates of Prevalence of HIV among adults aged 15 to 49 by WHO region:

S.NO.	WHO Region	Prevalence of HIV among adults aged 15 to 49(%)
1,	Africa	4.1[3.4-4.8]
2,	Americas	0.5[0.4-0.6]
3,	South-East Asia	0.3[0.2-0.4]
4,	Europe	0.4[0.4-0.4]
5,	Eastern Mediterranean	0.1[<0.1-0.1]
6,	Western Pacific	0.1[<0.1-0.2]
	(WHO) Global	0.8[0.6-0.9]

Key Populations:

The World Health Organization (WHO) defines key populations as populations who are at higher risk for HIV irrespective of the epidemic type or local context and who face social and legal challenges that increase their vulnerability. They include sex workers, men who have sex with men, transgender people, people who inject drugs, and people in prison and other closed settings. In addition to experiencing elevated HIV risk and burden and facing legal and social issues, these populations historically have not received adequate priority in the response to the HIV epidemic, especially in countries with generalized HIV epidemics.

The five key populations:
- *men who have sex with men*
- *people in prisons and other closed settings*
- *people who inject drugs*
- *sex workers*
- *transgender people*

AIDS-related deaths:

AIDS-related deaths have been reduced by 64% since the peak in 2004 andby 47% since 2010.In 2021, around 650 000 [510 000-860 000] people diedfrom AIDS-related illnesses worldwide, compared to 1.9 million [1.3 million–2.7 million] people in 2004 and 1.3 million [910 000–1.9 million] people in 2010.AIDS-related mortality has declined by 53% among women and girls and by 41% among men and boys since 2010. 40.1 million (33.6 million-48.6 million) people have died from AIDS related illness since the start of the epidemic.

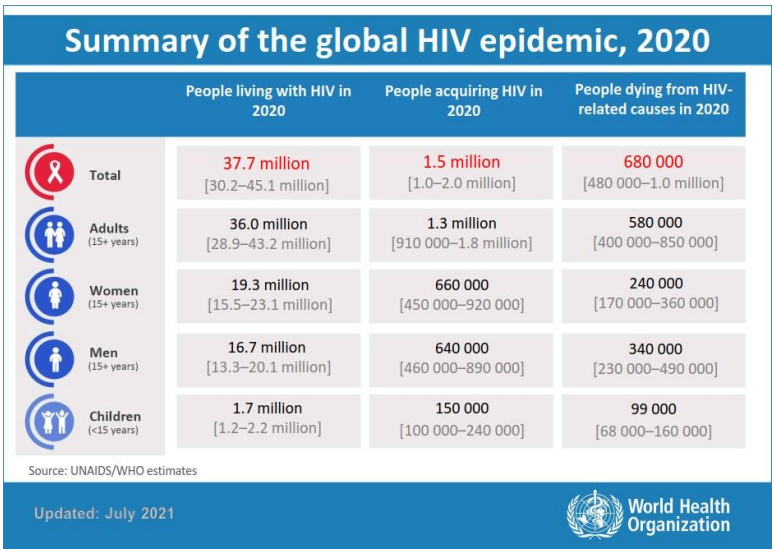


Fig no: 1.1.2 Summary of global HIV epidemic, 2020Source:

UNAIDS/WHO estimates

Number of people newly infected with HIV/AIDS

Situation and trends New HIV infections have been reduced by 54% since the peak in 1996.In 2021, around 1.5 million [1.1 million–2.0 million] people were newly infected with HIV, compared to 3.2 million [2.4 million–4.3 million] people in 1996.Women and girls accounted for 49% of all new infections in 2021.Since 2010, new HIV infections have declined by 31%, from 2.1 million [1.5 million–2.9 million] to 1.5 million [1.0 million–2.0 million] in 2020.Since 2010, new HIV infections among children have declined by 53%, from 320 000
[210 000–510 000] in 2010 to 150 000 [100 000–240 000] in 2020.

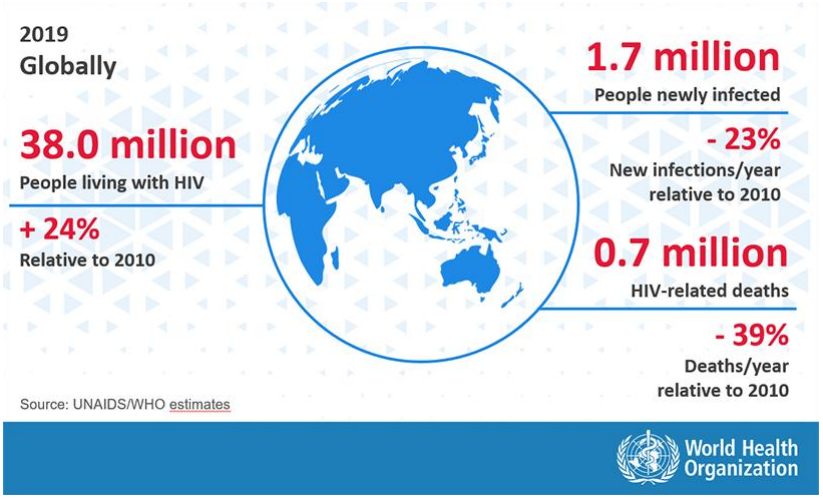


Fig no: 1.1.3 No. of People Newly Infected with HIVSource:

UNAIDS/WHO and HIV.gov

INDIAN SCENARIO OF HIV/AIDS:

Since the first case of Acquired Immuno-Deficiency Syndrome (AIDS) was announced in US in the early 1980s, it has spread rapidly around the world, and it continues to be a major health problem.

HIV/AIDS Burden in India

India is burdened with a larger HIV/AIDS epidemic than any other country in the world. The first serological evidence of HIV infection in India appeared in 1986 in Chennai of Tamil Nadu State and the second case in Mumbai. HIV has since been detected in 29 of India's 32 States and 3 territories. Populations with high-risk behaviour for contracting HIV in the country include Female SexWorkers (FSW), Men who have Sex with Men (MSM), Injecting Drug Users (IDU), Single Male Migrants and Long-Distance Truckers. The last two groups are also referred to as Bridge Population. These populations are termed as high-risk groups (HRG).

The estimates of the number of people who are HIV-positive are very sensitive to the assumptions, many of them untested, on which these estimates are based. The National Family Health Survey (NFHS-3) (2005-06) was the first to provide data on what is happening at the general community level and it forced international agencies to scale down their figures. While HIV causes only 3.7 per cent of global mortality, it receives 25 per cent of all health aid. Additionally, it receives a large portion of domestic expenditure, which often exceeds domestic health budgets.

According to NFHS-3, the nationwide HIV prevalence rate for the population age 15-49 is 0.28 percent. This translates into 1.7 million HIV positive persons age 15-49 in India in April 2006, the midpoint of the NFHS3 survey. The HIV prevalence rate is 0.22 percent for women and 0.36 percent for men age 15-49. The prevalence rates for the six states are: Manipur: 1.13 percent; AndhraPradesh: 0.97 percent; Karnatak0.69 percent; Maharashtra: 0.62 percent; Tamil Nadu: 0.34 percent; and Uttar Pradesh: 0.07 percent. This important new information about HIV prevalence has spurred the Government of India and international agencies to greatly reduce the official estimate of HIV prevalence for India to 2.47 million Indians, down from the official estimate of 5.2 million for the previous year.

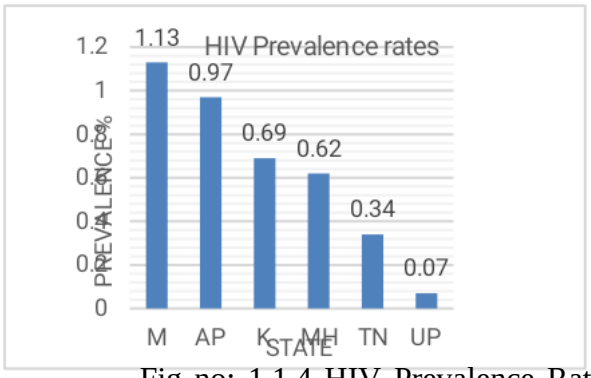


Fig no: 1.1.4 HIV Prevalence Rate in India

Source: NACO India estimations

India undertakes periodic HIV estimations exercise—under the aegis of the National AIDS Control Organisation (NACO) and with technical assistance of the Indian Council of Medical Research-National Institute of Medical Statistics (ICMR-NIMS)—to make the most critical evidences on the HIV epidemic at national and state/Union Territory (UT) level available for programme planning. Initiated in 1998. According to 2009 estimates of the NACO, which are released in March 2012, the number of people living with HIV (PLHA) are 2.3954 million. Of the PLHA, 1.469 million are males (61.34 per cent) and 0.926 million are females (38.66 per cent). While there were 34 million (31.4 million - 35.9 million) people in the world, who were living with HIV in 2011. In India, 0.12 million people became newly infected in India, while worldwide, 2.5million (2.2 million - 2.8 million) people became newly infected with HIV in 2011. In 2011, 1.7 million (1.5 million - 1.9 million) people died from AIDS related causes worldwide, while in India, there were 0.17 million people died from AIDS related causes. Adult HIV prevalence rate in India is 0.31.

Adult HIV prevalence, HIV population size, HIV incidence, annual new HIV infections, annual AIDS-related deaths and need for prevention of mother to child transmission (PMTCT) of HIV services are critical epidemiological estimates generated at national and state/UT level. Adult prevalence and HIV population estimates provide insight to the status of HIV in the geographic area: its level, trend, and overall burden of disease at the inter-state level.

HIV/AIDS Burden in Telangana State

The epidemic of HIV/AIDS in India varies in scope from state to state. Maharashtra and Manipur States in the country are identified as high HIV incidence States in the country by 1994 as per National AIDS Control Organization (NACO). State-wide picture of HIV/AIDS according to 2009 estimates it is evident from the table that highest number of persons living with HIV (24.79 per cent), children living with HIV, new infections and AIDS related deaths are found in Andhra Pradesh. Next, highest number of HIV persons living with HIV are found in Karnataka (12.18 per cent). At the next level, West Bengal, Tamil Nadu, Gujarat and Bihar are the States withhighest number of persons living with HIV/AIDS. HIV prevalence rate is more in Manipur.

Telangana is the Sixth largest state in India, is one of the most severely affected states by HIV epidemic. Contributing almost 10.5 percent of the total estimated PLHA burden of the country. There are 1.58 Lakhs persons living with HIV/AIDS in the state.

1.2 Etiology:

HIV is a member of the lentivirinae (lenti, meaning "slow") subfamily of retroviruses. Lentiviruses are characterized by their indolent infectious cycle. There are two related but distinct types of HIV, HIV-1 and HIV-2, found mostly in western Africa, consists of six distinct phylogenetic lineages designed as subtypes (clades) A through F. HIV-1 also can be categorized based on phylogeny. Three groups of HIV-1 are currently recognized: M (main), N (new or non-M, non-O), and O (outlier). The nine subtypes of HIV-1 group M are identified as A through D, F through H, and J and K. Mixtures of subtypes are referred to as circulating recombinant forms. HIV-1 subtype B is primarily responsible for the epidemic in North America and Western Europe.

The origin of HIV is of considerable interest. The accumulated evidence suggests that HIV that HIV in humans was the result of a cross-species transmission (zoonosis) from primates infected with simian immunodeficiency virus (SIV). Phylogenetic and geographic relationshipssuggest that HIV-2 arose from SIV that infects sooty mangabeys.

HIV

: Human immunodeficiency virus (HIV) is grouped to the genus Lentivirus within the family of Retroviridae, subfamily Ortho retroviridae and the infectionresults from 1 of 2 similar retroviruses (HIV-1 and HIV-2) retrovirus are enveloped RNA viruses defined by their mechanism of replication via reverse transcription to produce DNA copies that integrate in that host cell genome.

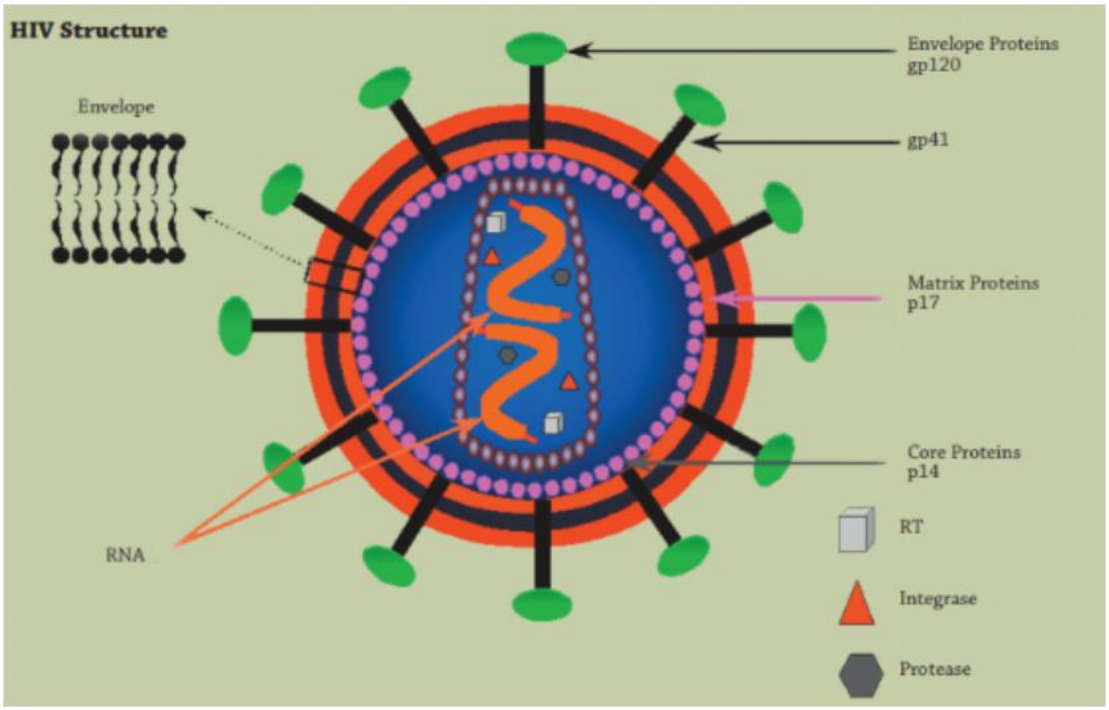


Fig no:1.2.1 HIV Structure

The HIV genome consists of two identical single-stranded RNA molecules that are enclosed within the core of virus particle. The genome of the HIV provirus, also known as proviral DNA, is generated by the reverse transcription of the viral RNA genome into DNA, degradation of the RNA and integration of the double-stranded HIV DNA into the human genome. The DNA genome is flanked at both ends by LTR (long terminal repeat) sequences. The 5' LTR region codes for the promotor for transcription of the viral genes. In the direction 5' to 3' the reading frame of the gag gene follows, encoding the proteins of the outer core members (MA, p17), the capsid protein (CA, p24), the nucleocapsid (NC, p7) and a smaller, nucleic acid-stabilising protein. The gag reading frame is followed by the pol reading frame coding foe the enzymes protease (PR, p12), reverse transcriptase (RT, p51) and RNase H (p15) PR RT plus RNase H (together p66) and integrase (IN, p32). Adjacent to the pol gene, the env reading frame follows from which the two envelope glycoproteins gp120 (surface protein, SU) and gp41 (transmembrane protein, TM) are derived.

1.3 Pathophysiology:

HEALTHY IMMUNE SYSTEM

The immune system consists of lymphoid organs and tissues, including the bone marrow, thymus gland, lymph nodes, spleen, tonsils, adenoids, appendix, blood, and lymphatic vessels. All components of the immune system are vital in the production and development of lymphocytes, or white blood cells. B lymphocytes (or B-cells) and T lymphocytes (or T-cells) are produced from stem cells in the bone marrow. B cells stay in the bone marrow to complete the maturation process, but T lymphocytes travel to the thymus gland to complete their maturation.

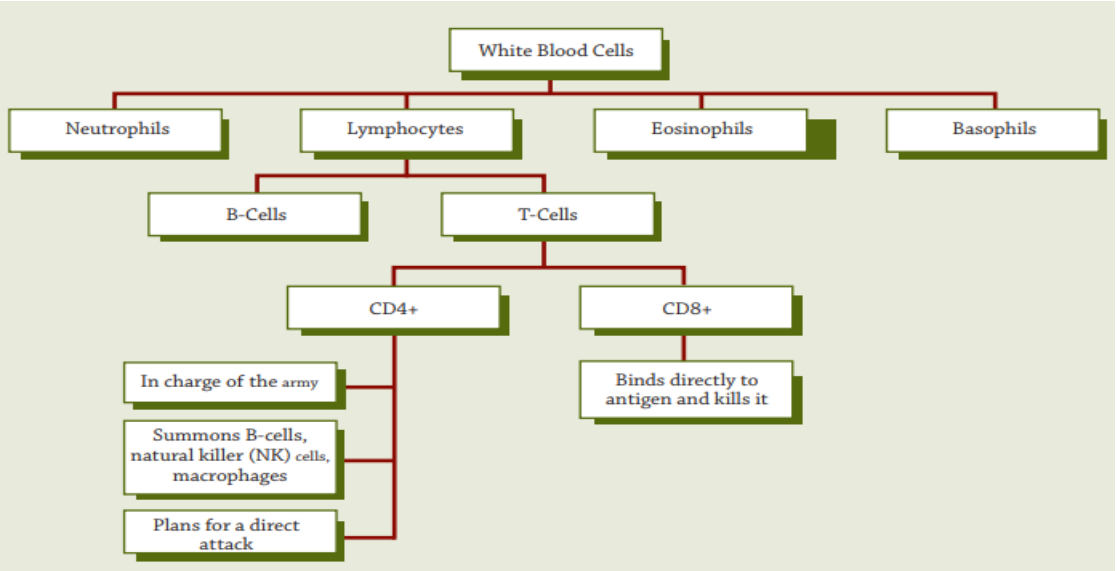


Fig no:1.3.1 Immune response by White Blood Cells

The main function of B lymphocytes is humoral (antibody) immunity. Each B cell can recognize specific antigen targets and can secrete specific antibodies. Antibodies function by coating antigens, which makes the antigens more vulnerable to phagocytosis, or by triggering the complement system, leading to an inflammatory response. T lymphocytes have two major functions: regulation of the immune system and killing of cells that bear specific target antigens. Each T cells has a surface marker, such as CD4+, CD8+ and CD3+, that distinguishes it from other cells. CD4+ cells are helper cells that activate B cells, killer cells, and macrophages when a specific target antigen is present. There are two main types of CD8+ cells. The first type, cytotoxic CD8+ cells, kills cells infected by viruses or bacteria, as well as cancer cells. The second type of CD8+ cells, T-suppressor cells, inhibits or suppresses immune responses. Phagocytes include monocytes and macrophages, large white

blood cells that engulf and digest cells carrying antigenic particles.

HIV Life Cycle (HIV invasion of immune cells):

The HIV life cycle includes six phases: Binding and Entry, Reversetranscription, Integration, Budding, and Maturation.

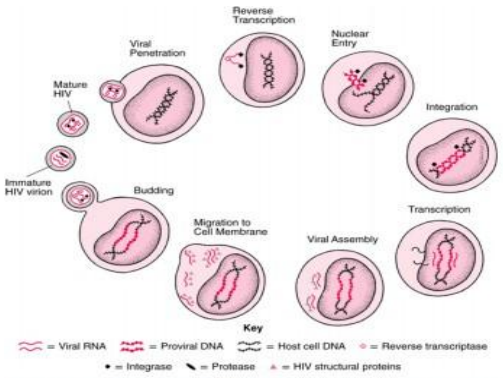
- **Binding and Entry:** The envelope proteins gp120 and gp41 bind to CD4+ cell receptors and coreceptors on the outside of CD4+ cells and macrophages. The chemokine receptors CCR5 and CXCR4 facilitate viral entry. T-cell tropic viruses require CXCR4 to bind, and macrotropic strains of the virus require CCR5. R5 is the most common virus transmitted during acute infection, and later during infection X4 is the virus that is most common. The presence of a homozygous inactive mutation of the CCR5 allele has caused resistance to infection by the R5 virus. The joining of the proteins and receptors and coreceptors fuses the HIV membrane with the CD4+ cell membrane, and the virus enters the CD4+ cell and macrophage. The HIV membrane and the envelope proteins remain outside of the CD4+ cells, whereas the core of the virus enters the CD4+ cell. CD4+ cell enzymes interact with the viral core and stimulate the release of viral RNA and the viral enzymes reverse transcriptase, integrase, and protease.

- **Reverse Transcription:** The HIV RNA must be converted to DNA before it can be incorporated into the DNA of the CD4+ cell. This incorporationmust occur for the virus to multiply. The conversion of HIV RNA to DNAis known as reverse transcription and is mediated by the HIV enzyme reverse transcriptase. The result is the production of a single strand ofDNA from the viral RNA. The single strand of this new DNA then undergoes replication into double stranded HIV DNA.

- **Integration**: Once reverse transcription has occurred; the viral DNA can enter the nucleus of the CD4+ cell. The viral enzyme integrase then inserts the viral DNA into the CD4+ cell's DNA. This process is known as integration. The CD4+ cell has now been changed into a factory used to produce more HIV.

- **Replication:** The new DNA, which has been formed by the integration of the viral DNA into the CD4+ cell, causes the production of messenger DNA that initiates the synthesis of HIV proteins.

Budding: The HIV proteins and viral RNA, all the components needed to make a new virus, gather at the CD4+ cell membrane to form new viruses. These new viruses push through the different parts of the cell wall by budding. Many viruses can push through the wall of one CD4+ cell and contain all the components necessary to infect other CD4+ cells. These new viruses leave the CD4+ cell and contain all the co



HIV attaches to and penetrates host T cells, then releases HIV RNA and enzymes into the host cell. HIV reverse transcriptase copies viral RNA as proviral DNA. Proviral DNA enters the host cell's nucleus, and HIV integrase facilitates the proviral DNA's integration into the host's DNA. The host cell then produces HIV RNA and HIV proteins. HIV proteins are assembled into HIV virions and budded from the cell surface. HIV protease cleaves viral proteins, converting the immature virion to a mature, infectious virion.

- **Maturation:** The new virus has all the components necessary to infect other CD4+ cells but cannot do so until it has matured. During this process, the HIV protease enzyme cuts the long HIV proteins of the virus into smaller functional units that then reassemble to form a mature virus. The virus is now ready to infect other cells.

1.4 Clinical Presentation:

Clinical Presentation of primary HIV infection may vary, but patients often have an acute retroviral syndrome or mononucleosis-like illness. Symptoms often last 2 weeks, and hospitalization may be required for 15% of patients. Primary infection is often associated with a high viral load and development of an immune response that for a period of time suppresses, but does not eliminate, viral replication. During this period, HIV is trapped by follicular dendritic cells in the lymphoid tissue and replicates in the germinal centre. The amount of HIV RNA in plasma falls substantially at this point, and symptoms resolve gradually. This decline coincides with the development of an immune response to HIV. The clinically latent period, however, is not virologically latent because HIV replication and immune system deterioration are ongoing. A persistent decrease in CD4 cells is the most measurable aspect of this immune system destruction. Plasma viral load, on the other hand, will appear to have stabilized at particular level or "set point".

STAGE 1: ASYMPTOMATIC/PERSISTENT GENERALISEDLYMPHADENOPATHY

STAGE 2: EARLY [MILD] DISEASE

STAGE 3: INTERMEDIATE [MODERATE] DISEASE

STAGE 4: LATE [SEVERE] DISEASE [BASICALLY EQUIVALENT TO AIDS]STAGE 1: [ASYMPTOMATIC]

No symptoms,

Persistent generalised lymphadenopathy

STAGE 2: [MILD SYMPTOMS]

Moderate weight loss [less than 10% of body weight],

Recurrent respiratory tract infections,

Oral and skin lesions

STAGE 3: [MODERATE SYMPTOMS]

Severe weight loss [more than 10% of body weight], chronic diarrhoea,

Persistent fever, oral lesions or, candidiasis, Pulmonary tuberculosis, severe bacterial infectionsAnaemia, thrombocytopenia, Neutropenia.

STAGE:4 [SEVERE SYMPTOMS]

Wasting syndrome [more than 10% of body weight], recurrent bacterial infection, opportunistic infections, encephalopathy, nephropathy, cardiomyopathy, malignancy.

Physical Examination:

It is essential to have a thorough physical examination for clinical staging andscreening details the specific physical signs related to HIV/AIDS that should be screened.

Table: 1.4.1 Physical Examination for Clinical staging

General	Record vital signs, body weight, height and body mass index (BMI), temperature, blood pressure, pulse rate, respiratory rate,pallor & icterus
Appearance	Unexplained moderate or severe weight loss, HIV wasting • Rapid weight loss is suggestive of active Opportunistic Infections, especially if associated with fever • Gradual weight loss (not caused by malnutrition or other

	obvious illness) is suggestive
	of HIV infection
Consider conditions	• "Track marks" and soft tissue infections which are commonamong IDUs
other than HIV	Malaria, Tuberculosis, Syphilis, Gastrointestinal Infections,Bacterial
	Pneumonia, Pelvic Inflammatory Disease, Viral Hepatitis otherthan HIV
Skin	Look for signs of HIV-related and other skin problems. Theseinclude
	diffuse dry skin, typical lesions of PPE, especially on the legs,Seborrheic
	Dermatitis on the face and scalp
	• Look for Herpes Simplex and Herpes Zoster or scarring of previous Herpes
	Zoster (especially multi-dermatome)Start
	with posterior cervical nodes
Lymph nodes	• PGL (Persistent Glandular Lymphadenopathy) typically presents as
	Multiple bilateral, soft, non-tender, mobile cervical nodes, otherthan axillary or inguinal nodes
	• Tuberculous lymph nodes typically present with constitutional symptoms
	such as fever, night sweats and weight loss
	Look for signs suggestive of HIV infection including whiteplaques on
Mouth	tongue, cheeks and roof of mouth (oral candida), white stripedlesions
	on the side of the tongue (OHL) and cracks at the corners of themouth
	(Angular Cheilitis)
	• Difficulty in swallowing is commonly caused by oesophageal candida
	The most common problems are TB, CAP and PCP
	• Signs and symptoms are cough, shortness of breath,
Chest	

Abdomen ***Neurological*** ***Ano-genital***	haemoptysis, weight loss / poor weight gain in children, fever, night sweats,congestion or consolidation • Perform a chest X-ray PA view Hepatosplenomegaly, masses and local tendernessPerform comprehensive neurological examination. • Fundus examination if CD4 less than 100 Herpes Simplex and other genital sores / lesions, vaginal orurethral discharge; perform PAP smear

RESULTS:

Table 4.1: Distribution of Subjects Based on Gender

Gender	**Total** Number of Subjects **N=101**	Percentage
Female	**58**	**57.42%**
Male	**43**	**42.57%**

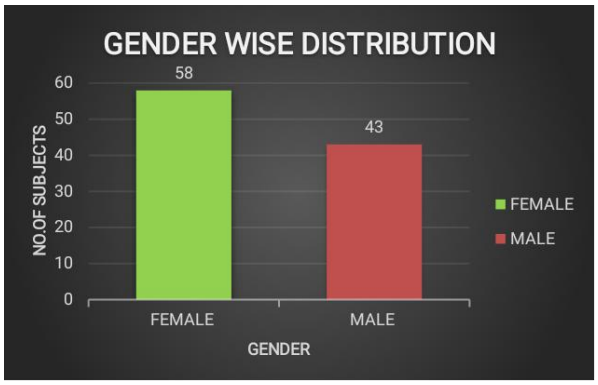


Fig No-4.1: Distribution of Subjects Based on Gender

Out of 101 subjects 58(58%) were found to be females and 43(43%) were found tobe males. Female patients are at higher risk compared with male patients.

Table 4.2: Distribution of Subject Based on Age

Age	Total No of Subjects N=101	Percentage
10 – 20	**1**	**0.99%**
21 – 30	**11**	**10.89%**
31 – 40	**39**	**38.61%**
41 – 50	**31**	**30.69%**
51 – 60	**12**	**11.88%**
61 -70	**6**	**5.94%**

71 – 80	**1**	**0.99%**

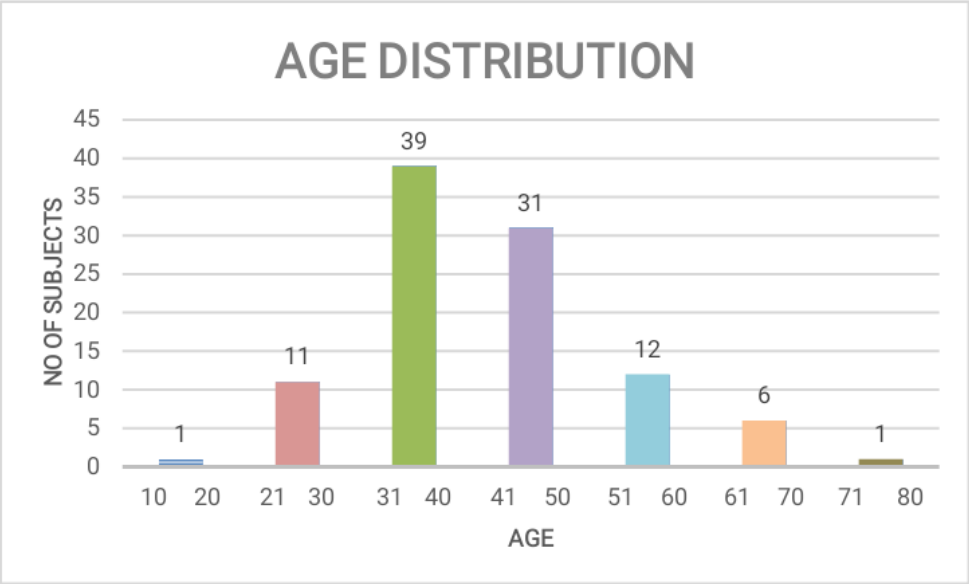


Fig No-4.2: Distribution of Subjects Based on Age

Out of 101 patients, 1 patient is found in the age group between 10-20 years of age with (0.99%) followed by 11 patients in the age group between 21-30 years with (10.89%) 39 patients were found in the age group between 31-40 with (38.61%) followed by 31 patients were found in the age group 41-50 years with (30.69%) followed by 12 patients were found in the age group 51-60 years with (11.88%) followed by 6 patients were found in the age group 61-70 years with (5.94%) followedby 1 patient were found in the age group 71-80 years with (0.99%).The maximum no. of patients falls between the age group of 31 to 40 years

Table 4.3: Distribution of Subjects Based on Region

Region	Total No of Subjects N=101	Percentage
Rural	92	91.08%
Urban	9	8.91%

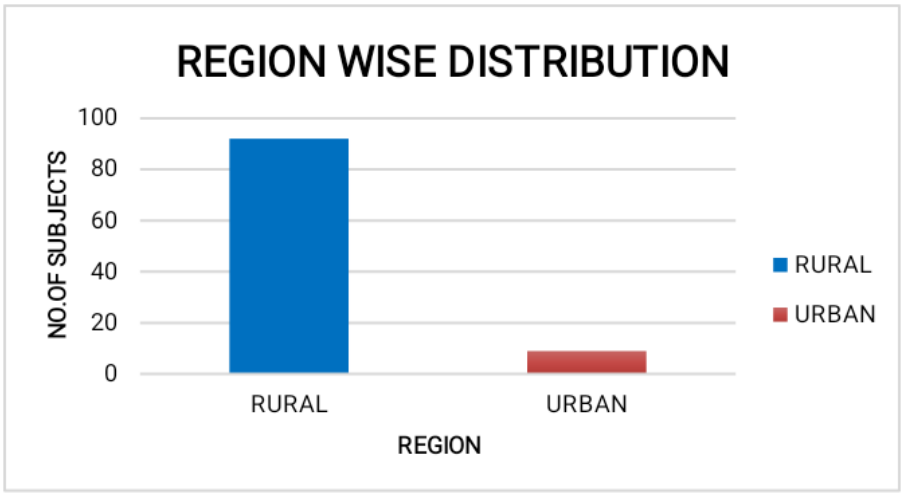


Fig No-4.3: Distribution of Subjects Based on Region

Out of 101 patients, the maximum no of patients is from rural areas 92(91.08%)followed by 9 patients from urban area with 8.9%.

Table-4.4: Distribution of Subjects Based on Marital Status:

Marital Status	**Total** Number of Subjects **N=101**	Percentage
Single	**4**	**3.96%**
Married	**97**	**96.03%**

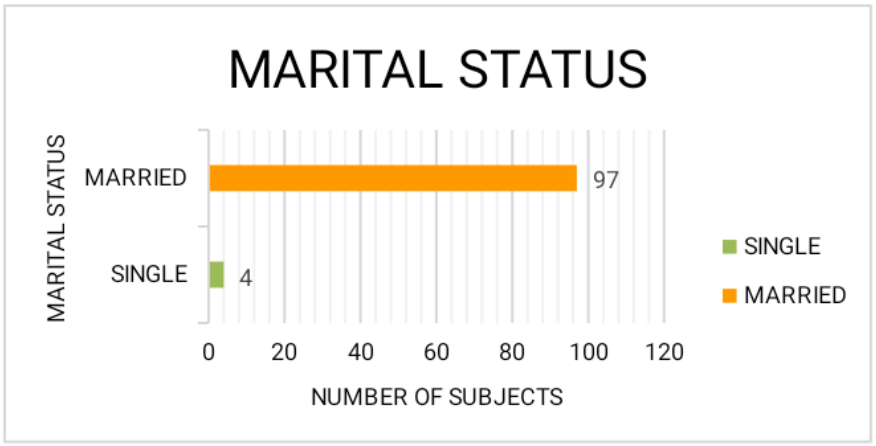


Fig No-4.4: Distribution of Subject Based on Marital

Statusout of 101 patients 97(96.03%) were married and 4(3.96%) were single.

Table 4.5: Distribution of Subject Based on Social History

Social History	**Total** Number of Subjects **N=101**	Percentage
Smoking	**23**	**22.77%**
Alcohol	**17**	**16.83%**
Others	**51**	**50.49%**

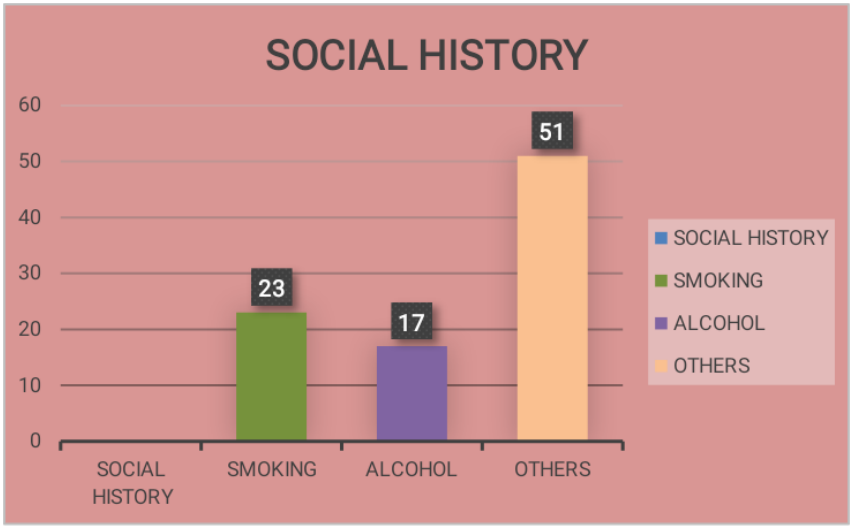


Fig No-4.5: Distribution of Subject Based on Social History

Out of 101 patients, social habits of population were 11% neither had alcohol or smoking habit and 22.77% were smokers (current and past), 16.83% were alcoholic(current and past) and 50.49% were Current and past drinkers of palm wine (KALLU)

Table 4.6: Distribution of Subject Based on Literacy Rate

Educational Status	**Total** Number of Subjects **N=101**	Percentage
Illiterate	**63**	**62.37%**
Primary School	**14**	**13.86%**
Secondary School	**19**	**18.81%**
Higher Education	**5**	**4.95%**

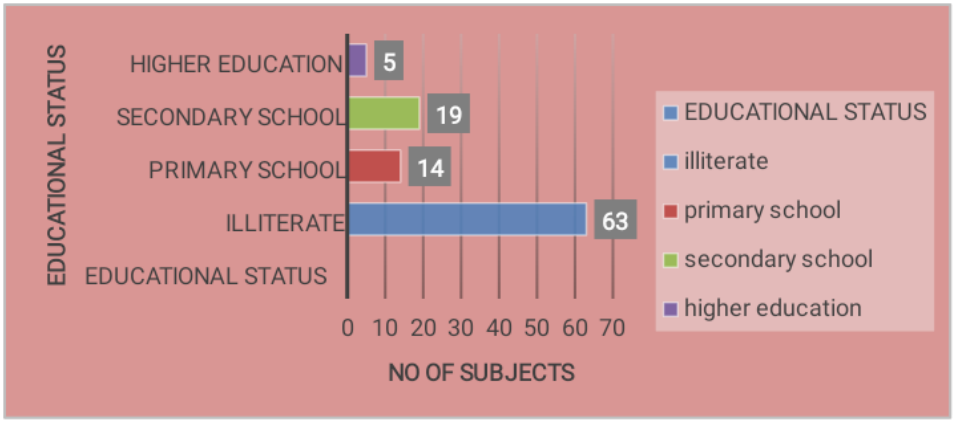


Fig No-4.6: Distribution of Subject Based on Standard of Education

Out of 101 patients,63 (62.37%) of the population in our study group were illiteratesand the remaining 14 (13.86%),19(18.81%),5(4.95%) was primary school, secondaryschool, college and above

Table 4.7: Distribution of Subject Based on Occupation:

Occupation	**Total** No of Subjects **N=101**	Percentage
Farmer	**54**	**53.46%**
Non-Agriculture	**28**	**27.72%**
House Wife	**18**	**17.82%**
Student	**1**	**0.99%**

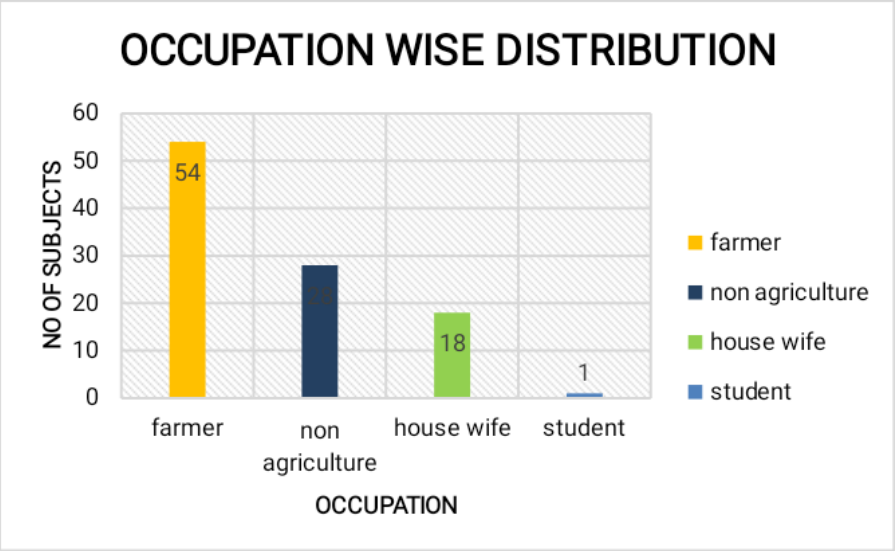


Fig No-4.7: Distribution of Subjects Based on Occupation Out of 101 patients 54(53.46%) were farmers and remaining 28(27.72%),18(17.82%),1(0.99%) were non-agricultural workers, house wife and students respectively

Table 4.8: Distribution of Subjects Based on Comorbidities

Comorbidities	**Total** No of Subjects **N=101**	Percentage
Hypertension	**6**	**5.94%**
Diabetes mellitus	**2**	**1.98%**
Cardiovascular disease	**3**	**2.97%**
Renal Disease	**2**	**1.98%**
Others	**1**	**0.99%**
No	**87**	**86.13%**

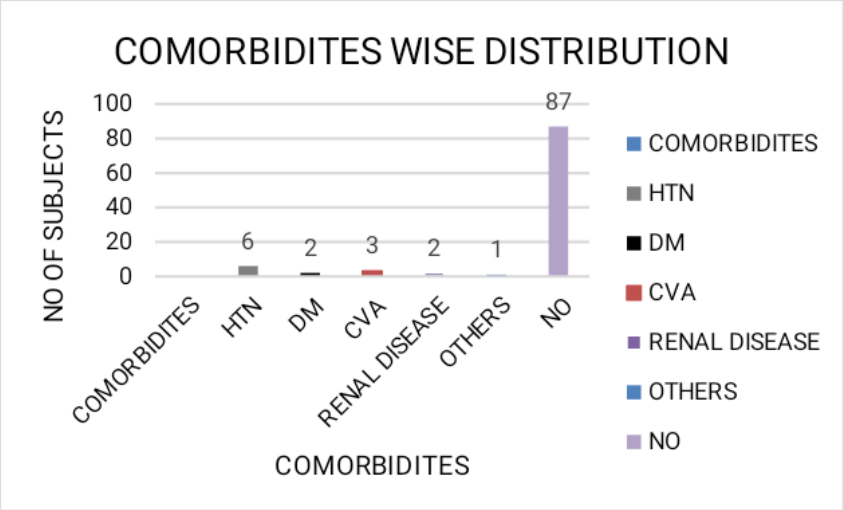


Fig No-4.8: Distribution of Subjects Based on Comorbidities

Out of 101 patients, it was observed that majority of our study population were notpresent with any comorbidities87 (86.13%) and the remaining 6(5.94%),2(1.98%),3(2.97%),2(1.98%),1(0.99%) was presented with hypertension, Diabetes mellitus, cardiovascular disease, renal disease and others respectively

Table 4.9: Distribution of Subject Based on Route of Infection

Route Of Infection	**Total** No of Subjects **N=101**	Percentage
Heterosexual	**100**	**99.00%**
Homosexual	**0**	**0**
From Mother to Child	**1**	**0.99%**

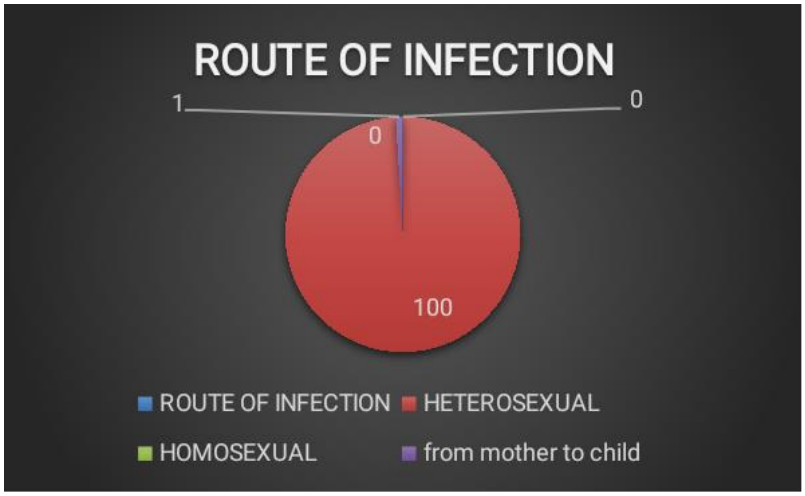


Fig No – 4.9: Distribution of Subjects Based on Route of Infection

out of 101 patients 99(99%) were heterosexual with mode of transmission multiplepartner and spouse,1 (0.99%) mother to child.

Table 4.10: Distribution of Subjects Based on Female Patients

Female Patients	**Total No of SubjectsN=58**	Percentage
Patient Delivered Live BornInfants	**34**	**58.62%**
Child Infected with HIV	**7**	**12.06%**

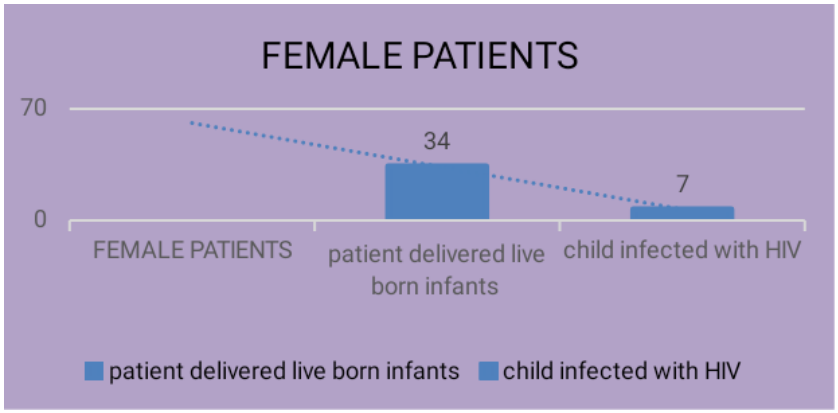


Fig No-4.10: Distribution of Subjects Based on Female Patients

Out of 58 female patient's ,34 (58.62%) of the 58 female patients gave birth to livingchildren and 7(12.06%) of the children were HIV Positive

Table 4.11: On Tb Medication

On Tb Medication	**Total** No of Subjects **N=101**	Percentage
Yes	**82**	**81.18%**
No	**19**	**18.81%**

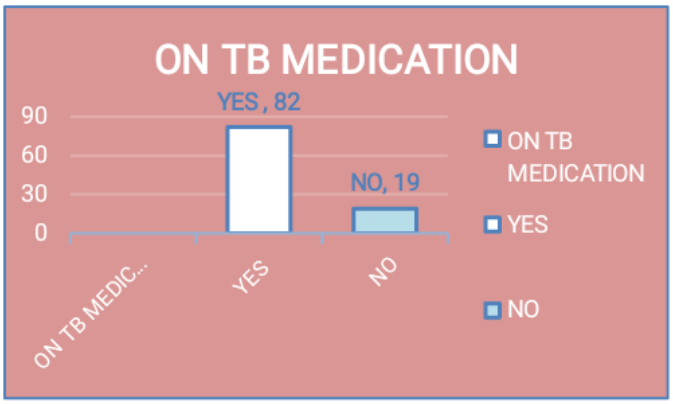


Fig No-4.11: Distribution of Subject Based on Use of Tb Medication

Out of 101 patients, 82 (81.18%) patients were on TB medication followed by 19(18.81%) were not on TB Medication.

Table 4.12: Distribution of subject based on non-adherence

Non-adherence	Total No of Subjects N=101	Percentage
Yes	77	76.23%
No	24	23.76%

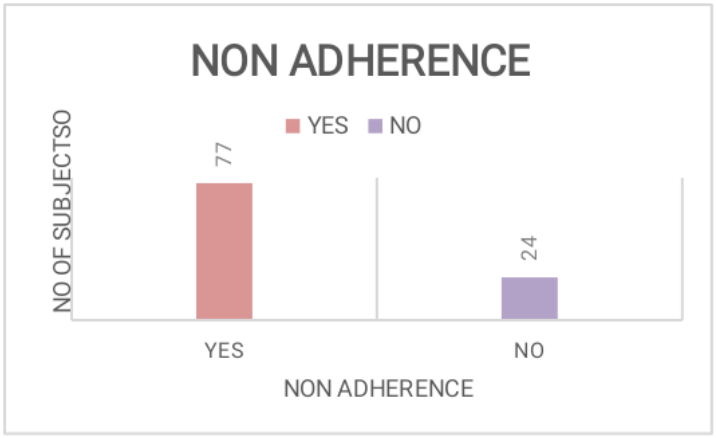


Fig No-4.12: Distribution of Subject Based on Non-adherence.

Table 4.13: Distribution of Subject Based on Reason for Non-adherence

Reasons For Non-adherence	**Total** No of Subjects **N=101**	Percentage
Too Busy	**15**	**14.85%**
Fear Of Stigma	**47**	**46.53%**
Stock Was Finished	**14**	**13.86%**
Polypharmacy	**1**	**0.99%**

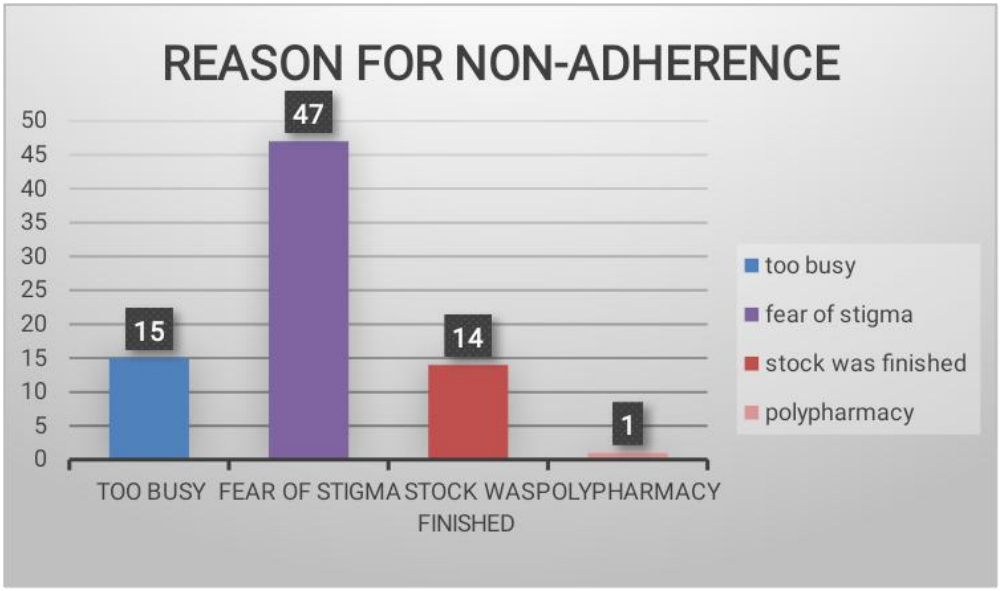


Fig No-4.13: Distribution of Subjects Based on Reasons for Non-adherence.

Out of 101 patients,77 (76.23%) patients failed to take their prescribed medicationsfor a variety of reasons, including polypharmacy 1(0.99%), fear of social stigma 47(46.53%), being too busy to remember to take their medication 15(14.85%), and running out of supplies 14(13.86%). And the remaining 24(23.76%) patients were adherent to prescribed medications.

Table 4.14: Distribution of Subject Based on Missing Clinical Schedules

Missing Clinical Schedules	Total No of Subjects N=101	Percentage
Yes	77	76.23%
No	24	23.76%

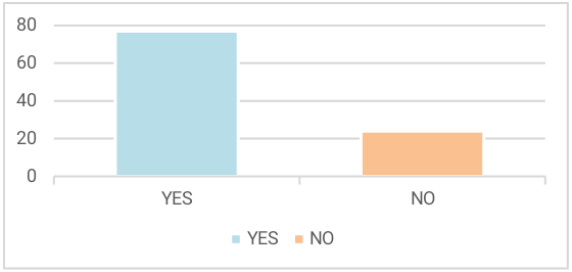


Fig No-4.14: Distribution of Subject Based on Missing Clinical Schedules

Table 4.15: Distribution of Subject Based on Reason for Missing Clinical Schedules

Reason For Missing Clinical Schedules	**Total Number of SubjectsN=101**	Percentage
Clinical Schedule NotConvenient	**41**	**40.59%**
Too Busy/Travelling	**19**	**18.81%**
Financial Difficulty	**16**	**15.84%**
Waiting Time Too Long	**1**	**0.99%**

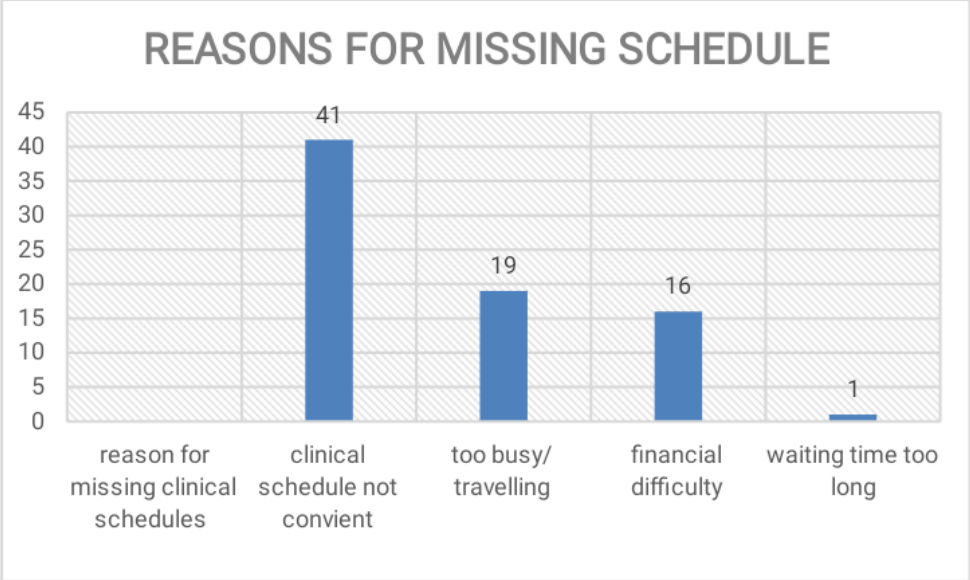


Fig No-4.15: Distribution of Subject Based on Reason for Missing ClinicalSchedules

Out of 101 patients, Patients miss their appointments 77 (76.23%) of the time for avariety of reasons, such as an inconvenient clinical schedule 41(40.59%), being toobusy or travelling 19(18.81% of the time), having financial difficulties16 (15.84%), and having to wait too long 1(0.99% of the time) and the remaining 24(23.76%) patients never missed their clinical schedule.

Table 4.16: Distribution of Subject Based on Adherence

Adherence	Morsiky 1	Morsiky 2
Poor Adherence	**59 (58.41%)**	**15 (14.85%)**
Moderate	**15 (14.86%)**	**48 (47.52%)**
High	**27 (26.73%)**	**38 (37.62%)**

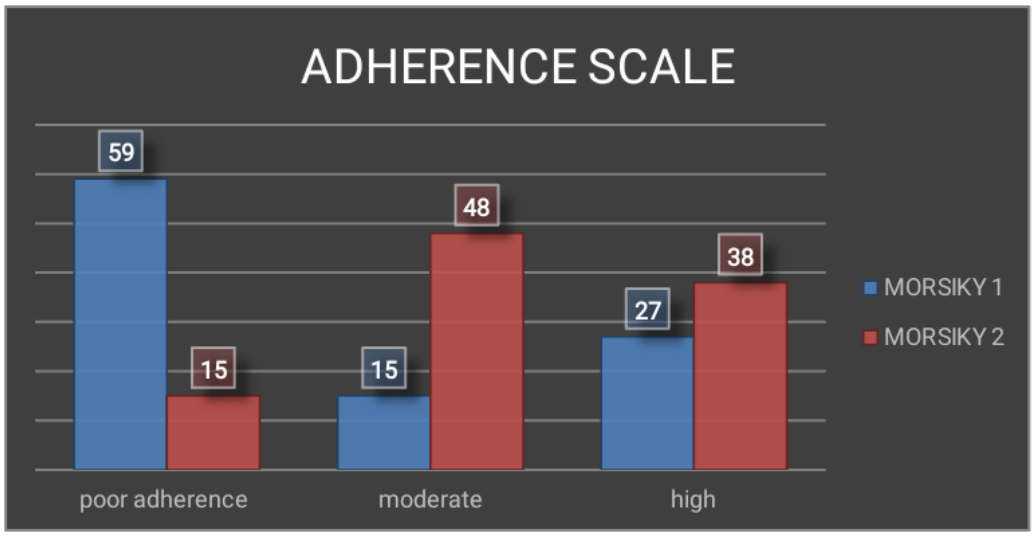


Fig No-4.16: Distribution of Subjects Based on Adherence

. The 8-item Morisky questionnaire's questions were used to gauge medication adherence. The following ratings were used to characterise participant responses:YES=0; NO=1 (Items 1-7) YES=1; NO=0 (Item 5) a=0, b, c=1, d,e=2 (item 8). The
following scores were used to classify patients according to medication adherence,and when the aforementioned scores are added up, we get a total score for medication adherence that correlates between higher scores with higher medicationadherence: 5 = low adherence, 6 or 7 = medium adherence, 8 = high adherence. Pooradherence (58.41%), moderate adherence (14.86%), and high adherence (26.73%) were the patient responses prior to counselling, whereas poor adherence (14.85%), moderate adherence (47.52%), and high adherence (37.62%) were the patient responses following counselling. Following post-counselling, risk indicators often improved. Adherence has increased significantly by 69%.

Table 4.17: Distribution of Subject Based on Reminders

Reminders To Take Arv	**Total** No of Subjects **N=101**	Percentage
Self	**95**	**94.05%**
Family	**6**	**5.94%**

Fig No-4.17: Distribution of Subjects Based on Reminders

Out of 101 patients, Patients take their prescription independently in 95 (94.05%) ofcases, and the remaining 6(5.94%) rely on their families to take ARV pills

Table 4.18: Distribution of Subjects Based on Use of HIV Regimen

HIV Regimen	**Total Number of Subjects N=101**	Percentage
TLD	**86**	**85.14%**
ZLN	**9**	**8.91%**
TLE	**3**	**2.97%**
TL+ATV/R	**2**	**1.98%**

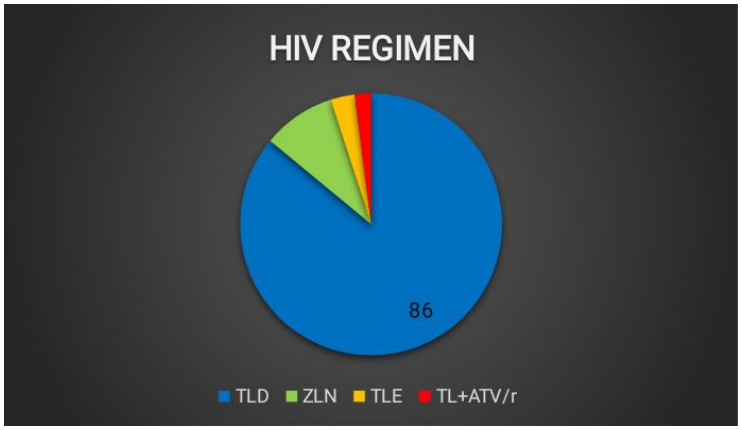


Fig No-4.18: Distribution of Subject Based on Use of HIV Regimen

Out of 101 patients, 86(85.14%) were using TLD HIV REGIMEN, 9 (8.91%) were on ZLN HIV REGIMEN, 3(2.97%) were taking TLE REGIMEN, and 2 (1.98%) were taking TL+ATV/R REGIMEN as a result of ZLN's treatment failure.

Table 4.19: Distribution Of Subjects Based On Adrs

ADR	**Total No of Subjects N=101**	Percentage
Nausea	**66**	**65.34%**
Insomnia	**14**	**13.86%**
Dizziness	**69**	**68.31%**
Mild Rashes	**19**	**18.81%**
Severe Anemia	**3**	**2.97%**
Diarrhea	**10**	**9.90%**
Cough	**19**	**18.81%**
Headache	**35**	**34.65%**
Abdominal Discomfort	**16**	**15.84%**
Severe Skin Rashes	**1**	**0.99%**
Fat Changes	**3**	**2.97%**
Fatigue	**15**	**14.85%**
Confusion	**3**	**2.97%**
Chest Pain	**1**	**0.99%**

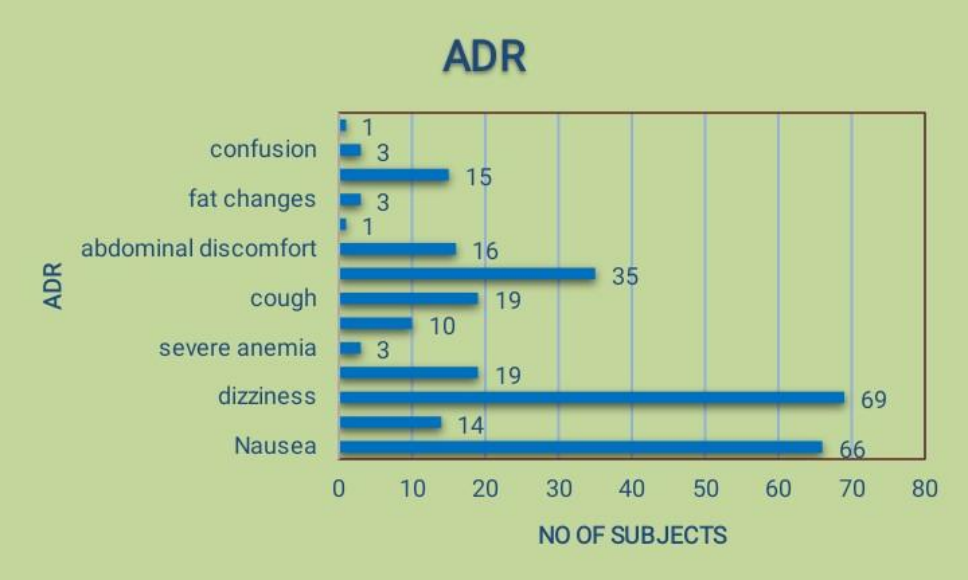


Fig No-4.19: Distribution of Subject Based on ADR

Out of 101 patients, the majority 66(65.34%) and 69(68.31%) of patients complainedof nausea and dizziness, while the remaining patients reported headache 35(34.65%)and mild rashes 19(18.81%), cough 19(18.81%) fatigue 15(14.85%), insomnia 14(13.86%) and abdominal discomfort 16(15.84%), diahorrea10(9.90%), severe anaemia 3(2.97%), changes in body composition 3(2.97%), confusion 3(2.97%), severe skin rashes 1(0.99%), and chest pain 1(0.99%)

Table 4.20: Distribution of Subject Based on Pre and Post Cd4

CountCd4 Count Pre-**Counselling** Post Counselling

<200	2 (1.98%)	0
201-500	48 (47.52%)	32 (31.68%)
>500	51 (50.49%)	68 (67.32%)

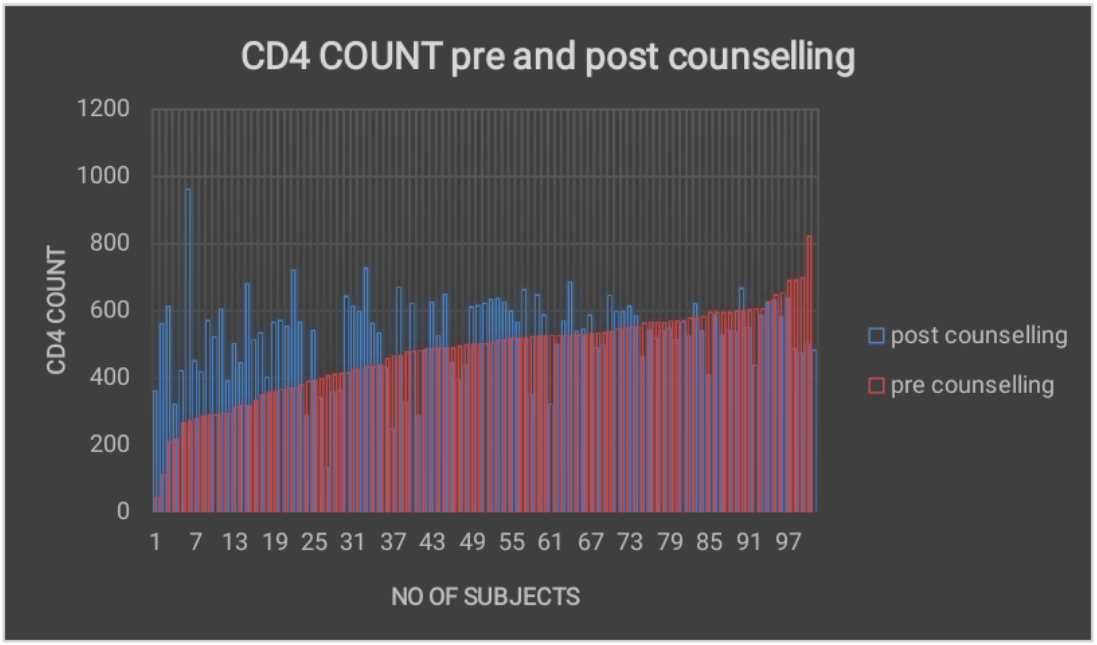


Fig No-4.20 Distribution of Subjects Based on Pre and Post Cd4 Count

out of 101 patients, <200 (1.98%), 201-500 (47.52%), and >500 (50.49%) was the patient CD4 count prior to counselling, whereas <200 (0), 201-500 (31.68%), and >500(67.32%) was the CD4 Count following counselling. Following post-counselling,CD4 count often improved. <200 indicates serious illness, 201-500 indicates abnormal, weakened immune system, >500 indicates good health.

Table 4.21: Distribution of Subject Based on Risk Factors

Risk Factors	Pre-Counseling	Post Counseling	Prevalence	Prevalence Odds Ratio (POR)	Confidence Interval 95%	P Value
Non-Adherence	**72**	**22**	**71.28**	**2.38**	**4.7254 - 5.5746**	**<0.00001**
Socio Economic Factors	**53**	**53**	**52.43**	**0.96**	**0.42-0.61**	**1**
Substance Abuse	**64**	**21**	**63.35**	**1.58**	**0.53-0.72**	**<0.00001**
Intolerance	**66**	**11**	**65.35**	**1**	**0.55-0.75**	**<0.00001**

Toxicity	**1**	**1**	**0.99**	**0**	**-0.007 – 0.027**	**1**
Comorbidities	**15**	**15**	**14.85**	**0.3**	**0.08-0.23**	**1**
ADR	**83**	**16**	**82.17**	**1.34**	**0.74-0.89**	**<0.00001**
Late Diagnosis	**8**	**8**	**7.92**	**0.98**	**0.026-0.133**	**1**
Opportunistic Infections	**83**	**81**	**82.17**	**1.77**	**0.74-0.89**	**> 0.05**
Drug Related Problems	**97**	**16**	**96.04**	**0.34**	**0.92-0.99**	**<0.00001**

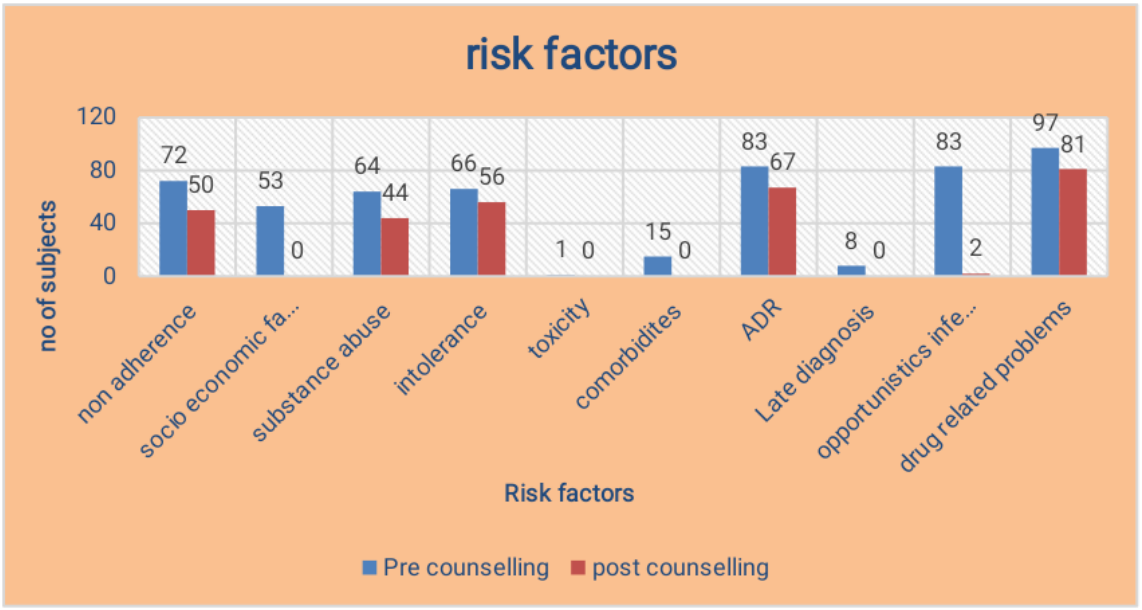


Fig No-4.21: Distribution of Subjects Based on Risk Factors

By asking questions during a face-to-face interview, risk variables were identified

The risk level was determined using the Risk variables questionnaire. Participants' responses were rated using the following scale: YES=1, NO=0. "non-adherence" Preand post counselling showed a significant difference due to the change in risk level(P< 0.00001) (POR=2.38,95CL=4.72-5.57).

"Socioeconomic factors" When asked if they were from a low socioeconomic background, the participants' yes response rate was 52.43%, which remained the same following counselling. No change in risk level between pre- and post- counselling resulted in a non-significant statistical difference (p = 1) (POR=0.96,95CL=0.42-0.61). 'Substance Abuse' when asked if the participants had any social history After counselling, the number of respondents who said yes fell from 63.3% to 20.7%, showed a statistically significant difference (p<0.00001) (POR=1.58,95CL=0.53-0.72). 'Intolerance' Participants who were asked if they were drug intolerant gave a yes answer of 65.3%; after receiving counselling, this numberdropped to 10.8%. There was a statistically significant difference (p<0.00001) (POR=1,95CL=0.55-0.75) in the risk level before and after counselling. 'toxicity' Participants who were asked if they had ever encountered any toxicity gave a yes response of 0.9%, which remained unchanged after counselling. Non-significant statistical difference (p=1) (POR=0,95CL=-0.007 – 0.027) was produced by no change in risk level between pre- and post-counselling. 'comorbidities' Participants gave a yes response of 14.85% when asked if they had any co-morbidities, such as hypertension, diabetes mellitus, CVA or others. This response persisted following counselling. Non-significant statistical difference (p=1) (POR=0.3,95CL=0.08-0.23) was produced by no change in risk level between pre- and post-counselling. 'ADRs' participants who were asked if they had ever encountered an adverse drug reaction answered in the affirmative 82% of the time; this number has since dropped to 15.8%after counselling. Risk level change demonstrates the statistically significant difference (p<0.00001) (POR=1.34,95CL=0.74-0.89). 'Late diagnosis' When participants were asked if they had received a late diagnosis, they gave a yes response with a 7.9% rate, which remained unchanged after the post-counselling.

Non-significant statistical difference (p=1) (POR=0.98,95CL=0.026-0.133) was produced by no change in risk level between pre- and post-counselling 'Opportunisticinfection' When the participant was asked if they had ever had any opportunistic infections, they gave a yes response of 82.17%, that has been lowered to 80.1% followed counselling. Non-significant statistical difference (p>0.05) (POR=1.77,95CL=0.74-0.89) was produced by no change in risk level between pre- and post-counselling 'Drug related problems' When asked if he had a drug related problem, the participant responded "yes" with a response rate of 96.04%, which hasdropped to 15.8% after receiving counselling. Risk level change demonstrates the statistically significant difference (p<0.00001) (POR=0.34,95CL=0.92-0.99).

Table 4.22: Distribution of Subjects Based on Assessment of Risk Level

Assessment Of Risk Level	**Pre-Counselling**	Post Counselling
High Risk	**28 (27.72%)**	**1 (0.10%)**
Moderate Risk	**63 (62.37%)**	**20 (19.80%)**
Low Risk	**10 (9.90%)**	**73 (72.27%)**
No Risk	**0 (0)**	**7 (6.93%)**

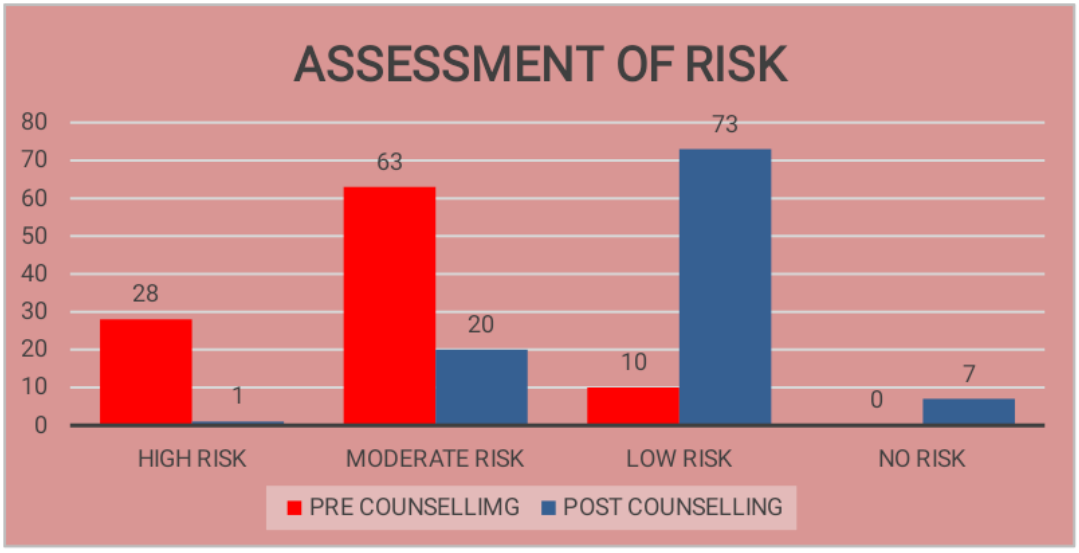


Fig No-4.22: Distribution of Subject Based on Assessment of Risk Level

The following scores were used to classify patients according to Risk level, and when the aforementioned scores are added up, we get a total score for Risk level that correlates between higher scores with higher risk level: 1-3 = low risk, 4-6 = moderate risk, 7-8 = high risk, 9-10 = serious illness. Low risk (9.90%), moderate risk(62.37%), and high risk (27.72%), serious illness (0) were the patient responses priorto counselling, whereas low risk (72.27%), moderate risk (19.80%), and high risk (0.10%) and no risk (6.93%) were the patient responses following counselling.

Following post-counselling, risk level often improved.

The respondents risk level ($p<0.01$) had reduced significantly after the counselling ofthe clinical pharmacist. This suggests that the clinical pharmacist did make a positive impact on the level of risk management in the HIV/AIDS infected patients.

DISCUSSION:

AGE:

Out of 101 patients the most common age group for HIV infection is 31-40 years with a percentage of 38.6% which is in accordance with the work done by **Li Lin Lauet.al** who concluded that individuals who were 30-39 years old (43%) were the victims of HIV new cases.

GENDER:

out of 101 patients 58 patients with percentage of 57.4% are female and 43 patientswith percentage of 42.5% are male which is in accordance with the work done by **Tadele Girum et.al** who concluded that overall prevalence rate of HIV/AIDS is 1.62 times higher among adult women than in men.

1. NON-ADHERENCE:

The most common cause of virologic failure is sub optimal adherence to ART.In relation to parameter 1 out of 101 patients 72 patients (71.28%) were non-adherent in pre counselling which is reduced to 22 patients (21.78%) in post counselling whichis in accordance with the work done by **Ridgeway K et.al** who concluded that the proportion of participants reporting >95% ART adherence was significantly higher among intervention participants (97.4%) compared to control participants (89.9%).

2. SOCIO-ECONOMIC FACTORS:

We cannot alter socio-economic influences so we are unable to demonstrate any progress in these criteria. Out of 101 patients' socioeconomic factors have an impact on 53 patients with 52.43% which is related to the work done by **Pellowskiet.al** who concluded that patients of lower socioeconomic status have increased

HIV/AIDS mortality rates.

3. SUBSTANCE ABUSE:

In relation to parameter 3, 64 of 101 patients had a social history of percentage of63.35% in pre-counselling and is minimized to 21 patients (20.7%) in post counselling which is accordance with the work done by **Manuela G. Neuman et.al who** concluded that substance abuse may negatively impact on medication adherence contributing to HIV progression.

4. INTOLERANCE:

In relation to parameter 4, 66 of 101 individuals exhibit an intolerance to HIV medications, which drops to 11 (10.8%) after counselling which is related to the workdone by **james cutrell et.al** who concluded that significant advances in potency and tolerability of ART have led to very high rates of virologic success for most who remain adherent to therapy.

5. COMORBIDITES:

In relation to parameter 5, 15 out of 101 patients have Comorbidities. Comorbiditiesamong HIV-Positive individuals may increase the potential for polypharmacy causingdrug-drug interactions and may have difficulty in adhering to complex medications.We cannot alter comorbidities so we are unable to demonstrate any progress in thiscriterion. A study **by Jun Yong Choi et.al.,** concluded that age – associated comorbidities did not affect virologic outcomes.

6. TOXICITY:

In relation to parameter 6, 1 out of 101 patients suffer toxicity from HIV Medicationswhich is in accordance with the work done by **Anitha Chawla et.al.,** who concluded that PLWH are at a greater risk of developing fractures, osteoporosis, renal and metabolic disorders, CNS disorders, cardiovascular disease and liver disease.

7. ADR:

In relation to parameter 7, out of 101 patients 83 have at least one ADR which supports the work done by **Mulugeta Asrat et.al.,** who concluded that the periodprevalence of ART adverse effect was 51.4%.

8. LATE DIAGNOSIS:

In relation to parameter 8, 8 out of 101 individuals are diagnosed lately who are at higher risk of progression of disease that supports the work done by **Lin chen et.al.,**who concluded that the efficient stratergies for HIV screening as well as early diagnosis & treatment are necessary to reduce the progression of HIV to AIDS.

9. OPPORTUNISTICS INFECTIONS:

In relation to parameter 9, 83 out of 101 individuals have opportunistic infections which further weakens the immune system which is in accordance with the work done by **Tom Wingfield et.al.,** who concluded that rates of opportunistic infections leading to mortality remain as ongoing cause for concern with one third of patientspresenting late, not access or having access to HIV therapy.

10. DRUG RELATED PROBLEMS:

In relation to parameter 10, 97 out of 101 individuals have drug related problems which is in accordance with the work done by **Eginger et.al.,** who concluded that outof 172, at least one drug error was detected in 54.7% of patients.

LIMITATIONS:

- Sample size was relatively small because it was confined to one hospital andwas limited to participate who are willing to participate in the study.

CONCLUSION:

In conclusion, HIV/AIDS and its potential consequences lead to a significant amount of morbidity and mortality. Despite receiving counselling, some people still have riskfactors because of ignorance, which raises their risk of consequences. To encourageits prevention, decrease poor therapeutic outcomes, and improve quality of life, it is crucial to produce prevalence rate estimates, prevalence risk ratios, and knowledge of risk factors. Comprehensive HIV/AIDS patient health promotion, practices and management of risk factors are effective to the advancement of nations in order to prevent the worst-case scenario of 7.7 million HIV-related deaths over the next 10 years.

This study demonstrates that clinical pharmacists-led interventions can significantly lower risk level of HIV/AIDS patients and increases medication adherence to ART, improve in CD4 Count and decrease in DRPs in PLWHA demonstrating the importance of an optimal pharmaceutical care plan. Clinical pharmacists are essential in the evaluation of risk factors contributing to poor therapeutic outcome inHIV/AIDS patients, in providing patient counselling, and in raising awareness of the magnitude of the risk factors.

Further research in particular longitudinal studies is needed to explore the complex interaction of these factors and to inform policies and programs for the prevention and management of risk factors in HIV/AIDS patients.

FUTURE PERSPECTIVES:

- Pharmacists should participate more in risk assessment, whether they workin the public or private healthcare sectors. This may lessen the burden of undetected risk factors, aid in early treatment, and identify those who are at moderate to high risk. It

supports their early adoption of preventive actions.

- It is necessary to conduct follow-up lifestyle interventional studies in personswith moderate to high risk over an extended period of time in order to detectchanges in risk. This might also enhance the subject's quality of life.

Bibiliography:

1. Syed Ia, Sulaiman Sa, Hassali Ma, Syed Sh, Shan Lh, Lee Ck. Factors Associated With Poor Cd4 And Viral Load Outcomes In Patients With Hiv/Aids. J Med Virol. 2016 May;88(5):790-7. Doi: 10.1002/Jmv.24389. Epub 2015 Oct 5. Pmid: 26399724.

2. Chen, L., Yang, J., Zhang, R. Et Al. Rates And Risk Factors Associated With The Progression Of Hiv To Aids Among Hiv Patients From Zhejiang, China Between 2008And 2012. Aids Res Ther **12,** 32 (2015). Https://Doi.Org/10.1186/S12981-015-0074-7

3. Iralu J, Duran B, Pearson Cr, Jiang Y, Foley K, Harrison M. Risk Factors For Hiv Disease Progression In A Rural Southwest American Indian Population. Public HealthRep. 2010 Jul-Aug;125 Suppl 4(Suppl 4):43-50. Doi: 10.1177/00333549101250s408. Pmid: 20626192; Pmcid: Pmc2882974.

4. Da Silva Cm, Mendoza-Sassi Ra, Da Mota Ld, Nader Mm, De Martinez Am. AlcoholUse Disorders Among People Living With Hiv/Aids In Southern Brazil: Prevalence, Risk Factors And Biological Markers Outcomes. Bmc Infect Dis. 2017 Apr 11;17(1):263. Doi: 10.1186/S12879-017-2374-0. Pmid: 28399823; Pmcid: Pmc5387222.

5. Ceylan E, Koç A, İnkaya Aç, Ünal S. Determination Of Medication Adherence And Related Factors Among People Living With Hiv/Aids In A Turkish University Hospital.Turk J Med Sci. 2019 Feb 11;49(1):198-205. Doi: 10.3906/Sag-1802-137. Pmid: 30764598; Pmcid: Pmc7350793.

6. Neupane S, Dhungana Gp, Ghimire Hc. Adherence To Antiretroviral Treatment And Associated Factors Among People Living With Hiv And Aids In Chitwan, Nepal. Bmc Public Health. 2019 Jun 10;19(1):720. Doi: 10.1186/S12889-019-7051-3. Pmid: 31182074; Pmcid: Pmc6558692.

7. Asrat M, Hailu G, Gedefaw M, Tesfa M (2014) Prevalence And Associated FactorsOf Art Adverse Effect Among Plwh On Art In Debre Markose Referal Hospital, North East Ethiopia, 2013. Fam Med Med Sci Res 3: 130.

8. Kara E, İnkaya Aç, Aydın Haklı D, Demirkan K, Ünal S. Polypharmacy And Drug-Related Problems Among People Living With Hiv/Aids: A Single-Center Experience.Turk J Med Sci. 2019 Feb 11;49(1):222-229. Doi: 10.3906/Sag-1807-295. Pmid: 30761883; Pmcid: Pmc7350848.

9. Gerbab**a** Guta Nugus, Mergitu Eliyas Irena, "Determinants Of Active Tuberculosis Occurrences After Art Initiation Among Adult Hiv-Positive Clients In West Showa Zone Public Hospitals, Ethiopia: A Case-Control Study", Advances In Public Health, Vol. 2020, Article Id 8237928, 8 Pages, 2020. Https://Doi.Org/10.1155/2020/8237928

10. Rangarajan S, Donn Jc, Giang Le T, Bui Dd, Hung Nguyen H, Tou Pb, Danh Tt, TranNb, Nguyen Da, Hoang Nguyen Bt, Doan Vt, Nguyen Nq, Pham Vp, Dao Dg, Chen M, Zeng Y, Tieu Tt, Tran Mh, Le Th, Hoang Xc, West G. Factors Associated With Hiv ViralLoad Suppression On Antiretroviral Therapy In Vietnam. J Virus Erad. 2016 Apr 1;2(2):94-101. Pmid: 27482442; Pmcid: Pmc4965252.

11. Schatz K, Guffey W, Maccia M, Templin M, Rector K. Pharmacists' Impact On Opportunistic Infection Prophylaxis In Patients

With Hiv/Aids. J Hosp Infect. 2016 Dec;94(4):389-392. Doi: 10.1016/J.Jhin.2016.09.016. Epub 2016 Oct 1. Pmid: 27810222

12. Navarro J, Pérez M, Curran A, Burgos J, Feijoo M, Torrella A, Caballero E, Ocaña I, Ribera E, Crespo M, Falcó V. Impact Of An Adherence Program To Antiretroviral Treatment On Virologic Response In A Cohort Of Multitreated And Poorly Adherent Hiv-Infected Patients In Spain. Aids Patient Care Stds. 2014 Oct;28(10):537-42. Doi: 10.1089/Apc.2014.0097. Epub 2014 Aug 11. Pmid: 25111167.

13. Abadiga M, Hasen T, Mosisa G, Abdisa E. Adherence To Antiretroviral Therapy And Associated Factors Among Human Immunodeficiency Virus Positive Patients Accessing Treatment At Nekemte Referral Hospital, West Ethiopia, 2019. Plos One. 2020 May 11;15(5):E0232703. Doi: 10.1371/Journal.Pone.0232703. Pmid: 32392244;Pmcid: Pmc7213685.

14. Neuman Mg, Schneider M, Nanau Rm, Parry C. Alcohol Consumption, Progression Of Disease And Other Comorbidities, And Responses To AntiretroviralMedication In People Living With Hiv. Aids Res Treat. 2012;2012:751827. Doi: 10.1155/2012/751827. Epub 2012 Mar 11. Pmid: 22496971; Pmcid: Pmc3310201.

15. King D, Grasso C, Dant L, Elsesser Sa, Crane Hm, Cropsey Kl, Mayer Kh, O'cleirigh C. Treatment Outcomes Associated With Quitting Cigarettes Among Sexual MinorityMen Living With Hiv: Antiretroviral Adherence, Engagement In Care, And Sustained Hiv Rna Suppression. Aids Behav. 2018 Sep;22(9):2868-2876. Doi: 10.1007/S10461- 018-2116-3. Pmid: 29680935.

16. Ceylan E, Koç A, İnkaya Aç, Ünal S. Determination Of Medication Adherence And Related Factors Among People Living With Hiv/Aids In A Turkish University Hospital.Turk J Med Sci. 2019 Feb 11;49(1):198-205. Doi: 10.3906/Sag-1802-137. Pmid: 30764598; Pmcid: Pmc7350793.

17. Oliveira Rds, Primeira Mr, Santos Wmd, Paula Cc, Padoin Smm. Association Between Social Support And Adherence To Anti-Retroviral Treatment In People Living With Hiv. Rev Gaucha Enferm. 2020;41:E20190290. Portuguese, English. Doi:10.1590/1983-1447.2020.20190290. Epub 2020 Jul 13. Pmid: 32667420.

18. Mbengue Mas, Sarr So, Diop A, Ndour Ct, Ndiaye B, Mboup S. Prevalence And Determinants Of Adherence To Antiretroviral Treatment Among Hiv Patients On First -Line Regimen: A Cross-Sectional Study In Dakar, Senegal. Pan Afr Med J. 2019 Jun10;33:95. Doi: 10.11604/Pamj.2019.33.95.17248. Pmid: 31489073; Pmcid: Pmc6711689.

19. Moomba K, Van Wyk B. Social And Economic Barriers To Adherence Among Patients At Livingstone General Hospital In Zambia. Afr J Prim Health Care Fam Med.2019 Apr 16;11(1):E1-E6. Doi: 10.4102/Phcfm.V11i1.1740. Pmid: 31038336; Pmcid: Pmc648914**20.** Legesse Ta, Reta Ma. Adherence To Antiretroviral Therapy And Associated Factors Among People Living With Hiv/Aids In Hara Town And Its Surroundings, North-Eastern Ethiopia: A Cross-Sectional Study. Ethiop J Health Sci. 2019 May;29(3):299-308. Doi: 10.4314/Ejhs.V29i3.2. Pmid: 31447498; Pmcid: Pmc6689727.

21. Cutrell J, Jodlowski T, Bedimo R. The management of treatment-experienced HIV patients (including virologic failure and switches). Ther Adv Infect Dis. 2020 Jan 20;7:2049936120901395. doi: 10.1177/2049936120901395. PMID: 32010443; PMCID: PMC6974747.

22. Kara E, İnkaya AÇ, Aydın Haklı D, Demirkan K, Ünal S. Polypharmacy and drug- related problems among people living with HIV/AIDS: a single-center experience. Turk J Med Sci. 2019 Feb 11;49(1):222-229. doi: 10.3906/sag-1807-295. PMID: 30761883; PMCID: PMC7350848.

23. Fonsah JY, Njamnshi AK, Kouanfack C, Qiu F, Njamnshi DM, Tagny CT, Nchindap E, Kenmogne L, Mbanya D, Heaton R, Kanmogne GD. Adherence to Antiretroviral Therapy (ART) in Yaoundé-Cameroon: Association with Opportunistic Infections, Depression, ART Regimen and Side Effects. PLoS One. 2017 Jan 31;12(1):e0170893. doi: 10.1371/journal.pone.0170893. PMID: 28141867; PMCID: PMC5283684.

24. Tadesse, W.T., Mekonnen, A.B., Tesfaye, W.H. et al. Self-reported adverse drug reactions and their influence on highly active antiretroviral therapy in HIV infected patients: a cross sectional study. BMC Pharmacol Toxicol **15,** 32 (2014). https://doi.org/10.1186/2050-6511-15-32

25. Lau, Li & Quoquab, Farzana & Abdul Hamid, Abu Bakar. (2019). Malaysian AIDS Council: The "PutItOn" Campaign. Asian Case Research Journal. 23. 1-37. 10.1142/S0218927519500019.

26. Girum, T., Wasie, A., Lentiro, K. et al. Gender disparity in epidemiological trend of HIV/AIDS infection and treatment in Ethiopia. Arch Public Health 76, 51 (2018). https://doi.org/10.1186/s13690-018-0299-8

27. Cutrell J, Jodlowski T, Bedimo R. The management of treatment-experienced HIVpatients (including virologic failure and switches). Ther Adv Infect Dis. 2020 Jan 20;7:2049936120901395. doi: 10.1177/2049936120901395. PMID: 32010443; PMCID: PMC6974747.

28. Ridgeway K, Dulli LS, Murray KR,Silverstein H, Dal Santo L, Olsen P, et al. (2018)Interventions to improve antiretroviral therapy adherence among adolescents in low- and middle-income countries: A systematic review of the literature. PLoS ONE 13(1): e0189770. https://doi.org/10.1371/journal.pone.0189770

29. Chawla A, Wang C, Patton C, Murray M, Punekar Y, de Ruiter A, Steinhart C. A Review of Long-Term Toxicity of Antiretroviral Treatment Regimens and Implications for an Aging Population. Infect Dis Ther. 2018 Jun;7(2):183-195. doi: 10.1007/s40121-018-0201-6. Epub 2018 May 14. PMID: 29761330; PMCID: PMC5986685.

30. Wingfield T, Wilkins E. Opportunistic infections in HIV disease. Br J Nurs. 2010 May 27-Jun 9;19(10):621-7. doi: 10.12968/bjon.2010.19.10.93543. PMID: 20665998