ORIGINAL ARTICLE

ASSESSMENTS OF HAEMATOLOGICAL PARAMETERS IN HIV PATIENTS PRESENT IN AND AROUND SALEM DISTRICT TAMILNADU, INDIA

S. Sathiyavathi and *K. Pugazhendy

Department of Zoology, Annamalai University, Annamalainagar, 608 002

ABSTRACT

HIV is a multisysytemic disease that suppresses haematopoietic system. Hematological are among the most common clinicopathological manifestations of HIV patients on ART. Capillary or venous blood is used for almost all estimations made on blood. Consequently, the development and assessment of indigenous antiretroviral drugs with minimal abnormalities becomes a necessity. The objective of this investigation was to assess potential haematological that may be associated with Haemoglobin and RBC Fragility, sedimentation, corpuscles and packed cell volume

Keywords: RBC, WBC, HIV, ART

1.INTRODUCTION

HIV infection is the chief cause of morbidity and mortality among adults and children. At the end of 2007, 40 million persons worldwide were living with HIV or AIDS (UNAIDS, 2006). Anaemia is a frequent complication that occurs in 20-80% of HIV-infected persons and is associated with faster disease progression and mortality (Belperio and Rhew, 2004). This makes it more common than thrombocytopenia or leucopenia in patients with AIDS (Attili et al., 2008). Therefore, interventions to prevent anaemia may lead to improved health and survival potential of HIV-infected persons (Doukas 1992).

HIV/AIDS is a gradual silent killer. The greatest problem with HIV/AIDS menance is that most people infected do not know and many are afraid to go for test to know their status thereby affecting many people. HIV/AIDS is a global pandemic (Cohen et al., 2008). As on 2012, approximately 35.3 million people have HIV worldwide with the number of new infections that year being about 2.3 million. This is down from 3.1 million new infections in 2001 of these approximately 16.8 million are women and 3.4 million are less than 15 years old. Sub-sahara Africa is the region mostly affected. In 2010, an estimated 68% (22.9) of all HIV cases and 66% of all deaths (1.2 million) occured in this region .This means that about 5% of the adult population is infected (UNAIDS, 2013) and it is believed to be the cause of 10% of all deaths in children (Mandell and Doland 2010). Here in contrast to other regions women compose nearly 60% of cases. South Africa has the largest population of people with HIV of any country in the world at 5.9 million .Life expectancy has fallen in the worst-affected countries due to HIV/AIDS; for example in 2006 it was estimated that it had dropped from 65 to 35 years in Boswana (Levy,1993). Mother-to-child transmission, as of 2013, in Bostwana and South Africa has decreased to less than 5% with improvement in many other Africa nations due to improved access to antiretroviral therapy (UNAIDS, 2011).

Human Immunodeficiency virus (HIV) is a retrovirus that causes Acquired Immunodeficiency Syndrome (AIDS) a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections and cancers to thrive. Infection with HIV occurs by the transfer of blood, semen, vaginalfluids; HIV is present as both free virus particles and virus within infected immune cells. Many HIV- positive people are unaware that they are infected with the virus. For example, in 2001 less than 1% of the sexually active urban population in Africa had been tested and this proportion is even lower in rural population.

It is imperative to determine the baseline levels of some these haematological parameters because the complications of HIV infection are multi-factorial affecting all aspect of the body system. This will guide the physicians in the choice of their prescription.

2.MATERIAL AND METHODS

STUDY AREA
Salem is one of the largest district of Tamil Nadu before it was bifurcated into two administrative districts viz. Salem and Dharmapuri districts. Again it was divided to form

Corresponding author: Dr.K.Pugazhendy, Department of Zoology, Annamalai University, Annamalainagar, 608 002

Namakkal District. Salem is a city and a corporation in Salem district in the Indian state of Tamil Nadu. Located in the north central part of the southernmost state of India, it is the fifth-largest city of Tamil Nadu, after Chennai, Madurai, Coimbatore and Trichy. Almost completely surrounded by hills, Salem is also a part of the Kongu Nadu (Coimbatore and Erode) region. Salem is at the base of the renowned tourist destination of Yercaud hills. The city is surrounded by a natural amphitheatre of hills formed by the Nagaramalai to the north, the Jeragamalai to the south, the Kanjanamalai to the west, and Godumalai to the east. It is divided by the Thirumanimuthar in the main division. Salem is a Geologist's paradise, surrounded by hills and the landscape dotted with hillocks.

Salem is a transit point for travel between Chennai, Bangalore, Thiruvananthapuram, Coimbatore, Madurai, Ernakulam, Cochin, Pondicherry, Trichy, Kanniyakumari and other places. National Highway 68 or NH 68 runs between Ulundurpettai and Salem in the Indian state of Tamil Nadu for a total of 134 km (80 miles). It connects with NH 7 and NH 47 at Salem. NH 68 connects NH45 and SH 69 at Ulundurpettai. National Highway 47, commonly referred to as NH 47, is a busy highway that runs through some parts of Tamil Nadu and the south-west coast of Kerala state in India. The highway touches the cities of Salem, National Highway 7, commonly referred to as NH 7, is a busy highway that runs through of Uttar Pradesh, Madhya Pradesh, Maharashtra, Andhra Pradesh, Karnataka, and Tamil Nadu state in India. The road is a part of National Highway network of India, and it is officially listed as running over 2369 km from Varanasi to Kanyakumari. It is the longest national highway in India.

COLLECTION OF BLOOD SPECIMENS FROM PATIENTS

Capillary or venous blood is used for almost all estimations made on blood. Capillary blood is usually obtained from a finger or thumb and the most convenient place is on the thumb about half a centimeter from the side of the nail the tip of the finger have been used. Maximum number of hours allowed between the taking of blood and actual examination. Haemoglobin and RBC 24 hours. Fragility, sedimentation, corpuscles and packed cell volume -3 hours. Platelet count and blood films should not be done with stored blood.

HAEMOCYTOMETER

The Haemocytometer Neubauer counting chamber having a total ruled area of 9.sqmm. It consisted of a centrally heavy ruled area of 1.sqmm in size and four others of the same size in each corner. The central area is divided into 25 squares and each square in sub-divided into 16 squares. For total RBC counts. One each at the corner and the centre (that is so small squares). The four outer 1.sq.mm area are divided into 16 squares. These squares are used for WBS counts

STATISTICAL ANALYSIS
The data were analysed with t-test and statistical significance was set at P<0.05

Ethics: Oral consents were made to the subjects prior to sample collection.

3.RESULTS

RBC AND WBC

The estimated RBC content in the 100 patients of before and after ART treatment are graphically illustrated (Fig. 1). The observed RBC content after the ART treatment among the 100 samples only three patients recorded above 50% level of RBC are 49(53.34%),71(55.09%),91(90.47%) for the patients. Where as, the lower level of RBC which is below 10% were noticed in twenty nine patients. The percentage changes over the treatment were 4(3.45%),7(7.145%), 10(5%), 11(2.38%), 12 (2.38%),12(5.26%), 17(3.44%), 18(8%), 19(9.37%), 20 (3.33%), 21 (7.14%), 23(8.57%), 29 (2.55%), 32 (2.5%), 32 (2.5%), 35(2.56%), 35(2.56%), 38(6.0%), 40 (6.45%), 41(5.40%), 45(6.45%), 50(10%), 52(3.23%), 54(7.59%), 56(5.72%),76(2.5%), 79(6.25%), 81(3.22%), 88(8.5%), 93(7.14%) and 97(3.44%) for 29 patients respectively.

The estimated WBC content in the 100 patients before and after ART treatment are illustrated (Fig.2). The observed WBC content after the ART treatment among the 100 samples only seventeen patients recorded above 50% level of WBC are for 9(11.77%), 10 (95.2%), 39(65.01%), 48(95.12%), 49(135.77%), 65(58.41%), 68(99.21%), 69(210%), 72(75.60%), 74(58.18%), 77(135.77%), 80(142.85%), 82 (92.68%), 84 (50.94%), 88 (58.18%), 97 (90.25%) and 98(118.91%) for the patients respectively. Where as, the lower level of WBC is below 10% were noticed in twenty five patients. The percentage changes over the treatment were 12(4.22%), 14(4.73%), 16(9.94%), 23(5.11%), 28(8.75%), 34(3.44%), 38(5.72%), 41 (6.21%), 50(8.33%), 51 (8.10%), 52(4.56%), 53(2.7%), 54(2.63%), 56 (1.02%), 58(8.75%), 59(3.44%), 6(10.03%),66(6.49%),70 (9.09%),79 (7.56%),81 (5.55%), 85(3.005%),92(7.0%) and 93 (8.80%) for 25 patients.

4.DISCUSSION

The study seeks to evaluate some haematological indicators of abnormalities in HIV infected patients administered with Winniecure chemotherapeutic agent used in the treatment of HIV/AIDS in some parts of Salem was the largest district of Tamil Nadu in India . HIV infection has been reported to cause diverse degree of immunopathogenesis in man Watkins *et al.* (1990) and this carries enormous haematologic and biochemical consequences. The haematologic implications of HIV infection is dominated by peripheral blood cytopeniaswhich,have become more common with the advent of antiretroviral(AR) therapy. Winniecure has been shown to inhibit viral replication and could restore human immunity ecessitating its use in the region as anti-HIV medication. As an antiretroviral therapy, it could trigger haematologic consequences as also seen in other AR drugs .

Figure 1. Haematological Parameters of HIV patients (Red blood cells)
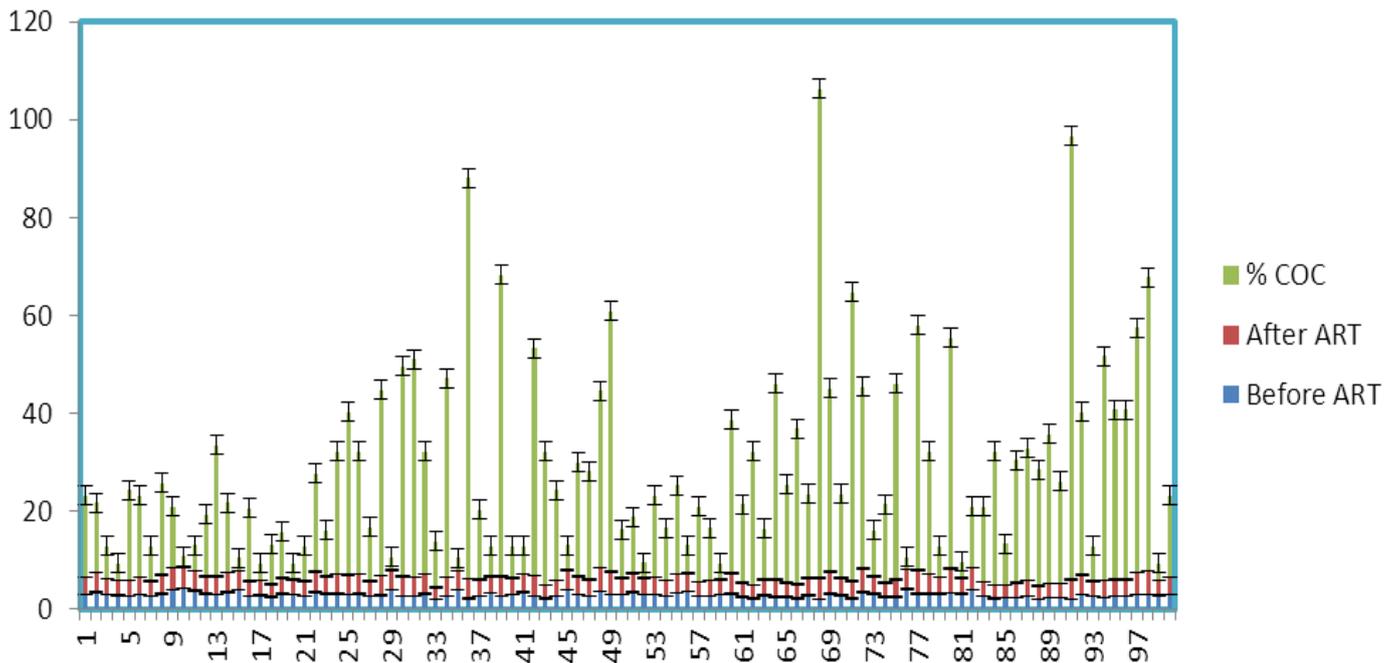
Figure 2. Haematological Parameters of HIV patients (White blood cells)
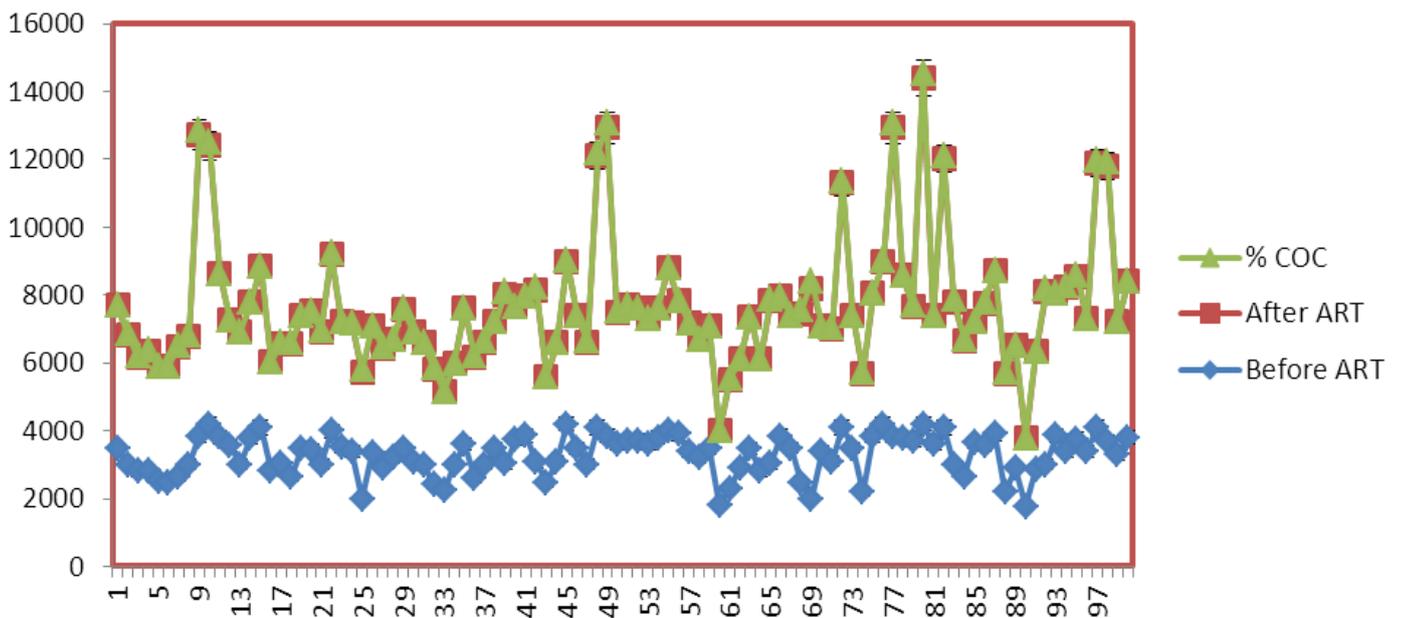
Generally, the overall Red blood cell (RBC) and White Blood Cell (WBC) count is important to monitor because elevation of WBC may indicate infection, lack of response to treatment or an abnormality. The total WBC count shows a consistent significant reduction in all the visits although the reduction, progressive reduction observed in absolute lymphocyte and total WBC may indicate suppressive activity of the antiretroviral drug on the virus with the resultant increase in leucopenia (mild leucopenia; 26.8% to 30%) and lymphocytopenia (moderate lymphocytopenia; 1% to 10%). Leucopenia (a decrease in the number of white blood cells) and Lymphopenia (decrease in lymphoctions) (Al-Aska *et al.,* 2001). The significant reduction found in the lymphocyte count at the 2nd visit follows the pattern already

reported by Stein and his colleagues However, the transient lymphopenia is common and one-third of the patients may have a typical lymphocytes in the peripheral blood smear.

The mechanism responsible for leucopenia and lymphopenia could be an accumulation of Winniecure metabolites (though not determined empirically). We would not de-emphasize the possibility of a pseudoleucopenia since the result showed a mild leucopenia and an increase in Hb as thetreatment progresses. Further investigation is needed to ascertain this since the study is devoid of CD4 and viral load assessments hence its limitation. Several research works have shown that administration of ART especially Zidovudine (AZT) therapy causes anaemia with a significant reduction in Hb in HIV patients Baroncelli *et al.*(2011) even at 6 weeks of administration Richman *et al.* (1987) and Tierney *et al.* (2001).

These results show that the therapeutic efficacy measured on haematological and biochemical responses are accompanied by a reduction of these (parameters measured) indicators of abnormality. They also suggest possible tendency of the administered ART to drive a shift from the physiological normal ranges of haematological and biochemical (mostly liver damage) indices of healthy status to an elevated rangeyts) are the hallmarks of HIV infection and is thought to be mediated by infection of the virus with subsequent killing of CD4+ T cells. It can also be caused by certain medications such as ART.

5.REFERENCES

Al-Aska A, Al-Anazi AR, Al-Subaei SS, Al-Hedaithy MA, Barry MA, Somily AM, Buba F, Yusuf U, Al Anazi NA: CD4+ T-lymphopenia in HIV negative tuberculous patients at King Khalid University Hospital in Riyadh, Saudi Arabia. *Eur J Med Res*, 2011, 16(6):285–288.

Attili S, Singh V, Rai M, Varma D, AK G: Hematological profile of HIV patients in relation to immune status - a hospital-based cohort from Varanasi, North India. *Turk J Hematol,* 2008, **25:**13-19.

Baroncelli S, Pinnetti C, Genovese O, Tamburrini E, Floridia M: Hematological effects of zidovudine prophylaxis in newborn infants with and without prenatal exposure to zidovudine. *J. Med. Virol,* 2011, 83(3):551–556.

Belperio PS, Rhew DC: Prevalence and outcomes of anemia in individuals with human immunodeficiency virus: a systematic review of the literature. *Am J Med* 2004, 116 (suppl 7A): 27S-43S.

Cohen MS, Hellmann N, Levy JA, Decock K, and Lange J. The J ClinInv 2008; 118**(4):**1244-54.

Doukas MA: Human immunodeficiency virus associated anemia. *Med Clin North Am,* 1992, **76:**699.

Levy JA. HIV Pathogenesis and Long-term Survival. AIDS 1993;7**(11):**1401-10.   Centre for Disease Control and Prevention, 2011.

Mandell B, Doland. International Commitee on Taxonomy of Viruses, 2010.

Richman DD, Fischl MA, Grieco MH, Gottlieb MS, Volberding PA, Laskin OL, Leedom JM, Groopman JE, Mildvan D, Hirsch MS: The toxicity of azidothymidine (AZT) in the treatment of patients with AIDS and AIDS related complex: a double-blind, placebo-controlled trial. *N Engl J Med,* 1987, 317:192–197.

Tierney LM, Mcphee SJ, Paadlcis MA: Current medical diagnosis and treatment. 40th edition. New York USA: Lange Medical Books/McGraw-Hill; 2001. Nicholson RJ, Kelly KP, Grant IS: Leucopenia associated with lamotrigine. *BMJ*, 1995, 310(6978):504.

UNAIDS: 2006. Report on the Global AIDS Epidemic.

Watkins BA, Dom HH, Kelly WB: Specific tropifm of HIV-1 for microghaceus in primary human brain culture. *Sci,*1990, 249(4968):549–553.

*****