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THE EFFECTIVENESS OF MICRONUTRIENTS IN IMPROVING CD_4^+ T-CELL COUNT AND BODY WEIGHT OF HIV POSITIVE PATIENTS IN IMO AND ABIA STATES OF NIGERIA

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ABSTRACT

This work investigated the effect of micronutrients on HIV/AIDs patients whose CD4+ T- Cell count are greater than 350/µL and devoid of secondary infections. $CD4^+$ T-cell count were determined on registration and at 3 monthly interval for 2 years for those on immunase (a multivitamin mineral drug from vitabiotics), Vitamin E and Vitamin C. Men and women with $CD4^+$ T-cell > 350/µL. without secondary infection. The Micronutrients increased both the $CD4^+$ T-cell count and body weight between initiation of treatment and 24 months post-registration in more than sixty percent (60%) of **(** 1,232 men and women**)** patients. These increases were statistically significant ($p<0.05$). In less than forty percent (<40%) of patients, the mean $CD4^+$ T-cell count and weight increased initially when the patients were taking the vitamins regularly, but declined due to non- compliance to prescription. These improvements on health, social and psychological wellbeing of the patients may in part be due to the involvements of these micronutrients in biochemical/metabolic pathways of the patients.

KEYWORDS: CD_4+ count, Immunase, HIV/AIDs, Micronutrients, Men, Women.

INTRODUCTION

The first case of AIDS was identified in Nigeria in 1986. The HIV/AIDS prevalence rate rose from 1.8% in 1998 to 5.8% in 2001. Since 1991, the Federal Ministry of Health has carried out a national HIV/syphilis sentinel seroprevalence survey every 2 years. In 2003, it was estimated that there were 3,300,000 adults living with HIV/AIDS in Nigeria. Out of this, 1,900,000 representing 57% are women[1]. The result for children could not be ascertained because of difficulties in obtaining data. In 2005, the prevalence rate has dropped to 4.4 and about 168 treatments centres have been created with over 100,000 people on treatment [1]. However, these figures reflected hospital diagnosed cases because most people due to ignorance and cultural believe are not willing to come forward for HIV screening except when they have cause to visit a hospital for medical treatment. It is also worthy of note that greater population of Nigerians live in the rural areas where the facilities for diagnoses are lacking and deaths in these areas are attributed to cultural beliefs such as witchcraft and gods. This emphasizes the fact that the figures could be much higher.

The results of the HIV/STI integrated biological and behavioural surveillance survey conducted in Nigeria among high-risk groups in Anambra, Cross-River, Edo, FCT, Kano and Lagos States showed an average prevalent rates of 37.4% and 30.2% among brothel based female sex workers (FSW) respectively [2] and non-brothel based female sex workers (FSW). The prevalence among the armed forces, police and transport workers are 3.1%, 3.5% and 3.7% respectively while among the men sex men (MSM), intravenous drug users (IDUs) the prevalence rates are 13.5% and 5.6% respectively [2]. These figures seem to support the proposition that Nigeria may be witnessing cases of sub-epidemics in a generalized epidemics if the prevalence among the general population is compared to those among specific high-risk populations .[2]

In the 2003 survey, the national prevalence rate has dropped to 5% from 5.8% in 2001. However, it was found that individual state prevalence rates in the federation vary from as low as 1.2% in Osun State to as high as 12% in Cross Rivers State. As many as 13 out of Nigerian's 36 states had prevalence rates of over 5%. These figures give support to the claim that there are explosive, localized epidemics in some states of Nigeria .[1]

At 5.6%, HIV/AIDS prevalence rates are highest for young people between the ages of 20 and 24 compared with other age groups. Nigeria's STD/HIV control estimates that over 60% of new HIV infections are in the 15 - 25 year old group [1]. In 2004 it was estimated that

there were about 300,000 deaths from AIDS and 2 million AIDS orphans in Nigeria. There has been an alarming increase in the number of HIV positive children in recent years, 90% of whom contact the virus from their mothers [3].

HIV/AIDS/STD control programme structures exist in Federal, States and Local Government Levels but are confined to the health sector alone. Although, many other partners have been involved namely non-governmental organization (NGO), community based organization (CBO), religious organizations, bilateral and multilateral organization, co-ordination of these efforts were weak and the programme were very much donor driven and project oriented.

Currently, very few Nigerians have access to basic HIV/AIDS prevention, care, and support or treatment services. About 852,846 people are estimated to require anti-retroviral therapy (ART). At present there are 446 antiretroviral treatment sites for HIV/AIDS in Nigeria and 359,181 HIV positive people are currently on ARV [4]. Despite these gruesome statistics, there is no cure in sight. Current treatment is based on the use of antiretroviral (ARV) drugs targeted against HIV at various steps in viral replication [5]. Although ARV drugs can reduce viral load in the bloodstream, they neither cure HIV infection nor restore the immune system.

HIV virus is known to persist indefinitely in reservoirs of latently-infected cells and emergence of drug-resistant strains is common. Furthermore, the effectiveness of ARVs in having any clinical benefits at all depends upon a number of factors, particularly the CD4 count and the nutritional status of patients at the point at which ARV treatment is commenced [6, 7]. Additionally, drugs are highly toxic and are often associated with adverse side effects to various organs of the body, including the bone marrow and liver, [8,9-11], cellular mitochondria [12], and with lipodystrophy and dyslipidemia [13]. Consequently, there is need for safe and effective, nontoxic therapy that can not only restore the immune system and keep virus multiplication/spread in check but also block AIDS progression without harming cells of the host.

Data on effectiveness of management of HIV positive patients not currently on HAART due to higher CD4 counts is not available, indicating the need for micronutrients treatment success evaluation in clinical care in Imo and Abia states south east of Nigeria. Hence, the investigation is based on the effect of micronutrients in improving CD4+ T – cell count and body weight of HIV positive patients in Imo and Abia states of Nigeria.

METHODOLOGY

The study was carried out between January, 2007 and December, 2009 in major HIV treatment sites located in Imo and Abia States, South East of Nigeria. The states are densely populated with many unplanned urban settlements devoid of adequate medical facilities. These centres are some of the treatment centres well equipped to manage HIV/AIDS in Nigeria. They have the equipment and specialized laboratory staff trained to determine the parameters under investigation.

All the antiretroviral naïve patients confirmed HIV positive registered in January, 2007 were followed up for a period of two years and they included the following: 608 male patients and 624 female patients. Basic clinical examinations such as weight, skin appearance and general clinical appearance were documented on registration and at 3 monthly intervals for a period of two years.

The $CD4^+$ T-cell count was determined in our standard Laboratories on registration and at 3 monthly intervals for 2 years for those on micronutrients (Immunase, a multivitamin/mineral drug from Vitabiotic, 1000IU of Vitamin E and 1000mg of Vitamin C). These include: men with $CD4^+$ T-cell > 350/μL, and women with $CD4^+$ T-cell >350/μL without serious secondary infection such as tuberculosis who are not currently on highly active antiretroviral therapy.

Statistical analysis

Data was exported to STATA 10 software (Stata Corporation, College Station, Texas). Descriptive and univariate analysis were performed on quantitative data. Mean values were used to group CD4 count. The Wilcoxon sign rank test was used to compare changes in continuous variables while chi square (χ^2) test was used to test the statistical significance of categorical variables by regimen group. Independence correlation structure was used to account for repeated observations from CD4 count on the same patient over time. Patient who died, stopped treatment or transferred out to another treatment facility were also censored at the time of event. A p-value <0.05 was considered to be significant for all test conducted.

RESULTS

The effects of micronutrients on CD4+ T- cells counts in men and women were as shown in Fig.1. Administration of micronutrients increased progressively the CD4+ T – cell count to about 900cells/mm^3 . The decline in the secluded graph after 12months was due to non-

compliance to the prescription. Similar results as shown in Fig.2 were obtained on the effects of micronutrients on body weight in men. The body weight also increased steadily during the periods of therapy.

The effect of the micronutrients on CD4+ T-cell count in women is as shown in Fig 3. The body weight increased progressively for 12months and later tapers upward in a non- steady fashion during the second half of the drug administration. However, the stipping downwards of the secluded group is due to non-compliance. The effect of the micronutrients on body weight of women is as shown in Fig 4. The body weight increased progressively in the first twelve months and declined horizontally subsequently.

In all, the micronutrients increases both the CD4+ T- cell c ount and weight between initiation of treatment and24months post- registration (except in women's weight) in more than sixty percent (60%) of232 men and women patients. These increases were statistically significant ($p<0.05$). In less than forty percent (40%) of patients, the mean CD4+ T-cell count and weight increased initially when the patients were taking the vitamins regularly, but declined due to non-compliace to prescription.

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DISCUSSION

In this study, effort was made to assess the effectiveness of micronutrients (vitamins and minerals) in increasing CD4+ T-cell count and body weight of men and women in Imo and Abia States of Nigeria. This group of people were not qualified for Highly Active Anti-retroviral Therapy (HAART) according to National Anti-retroviral Therapy (ART) guidelines in Nigeria .[14]

The relationship between nutrition, infection and immunity is well established since the early1940s [15,16]. It is for instance well recognized that nutritional deficiency can lower body immunity and predispose individuals to microbial infection. Conversely, nutritional supplementation can improve immune function and prevent resistance to infection. In this study, micronutrients improved the CD4+ T-cell count and body weight in both men and women respectively. During the period of micronutrient therapy, the patients health,

physical and social wellbeings were improved thereby retarding the progression and deterioration of the infection. The mechanism of these effects may in part be due to the involvements of these nutrients in secondary metabolism in the body [14].

Furthermore, nutrients supplementation in asymptomatic HIV infected individuals was shown to delay the onset of AIDs [17,18], supporting involvement of nutritional status as a contributory factor in AIDs development. Since those whose CD4+ T-cells counts greater than 350 cells/mm^3 do not benefit from HAART, government should take urgent steps to include the micronutrients as fundamental part of the comprehensive package of care for HIV/AIDs patients and make it free all the patients involved. Adequate nutrition, which is best achieved through consumption of a balanced diet, is vital for health and survival for all individuals regardless of HIV status. However, in resource – limited setting like Imo and Abia States as well as the rest of Nigeria, where balanced diet is not easily affordable, there is the need for inclusion of micronutrients as part of the package of HIV/AIDs management.

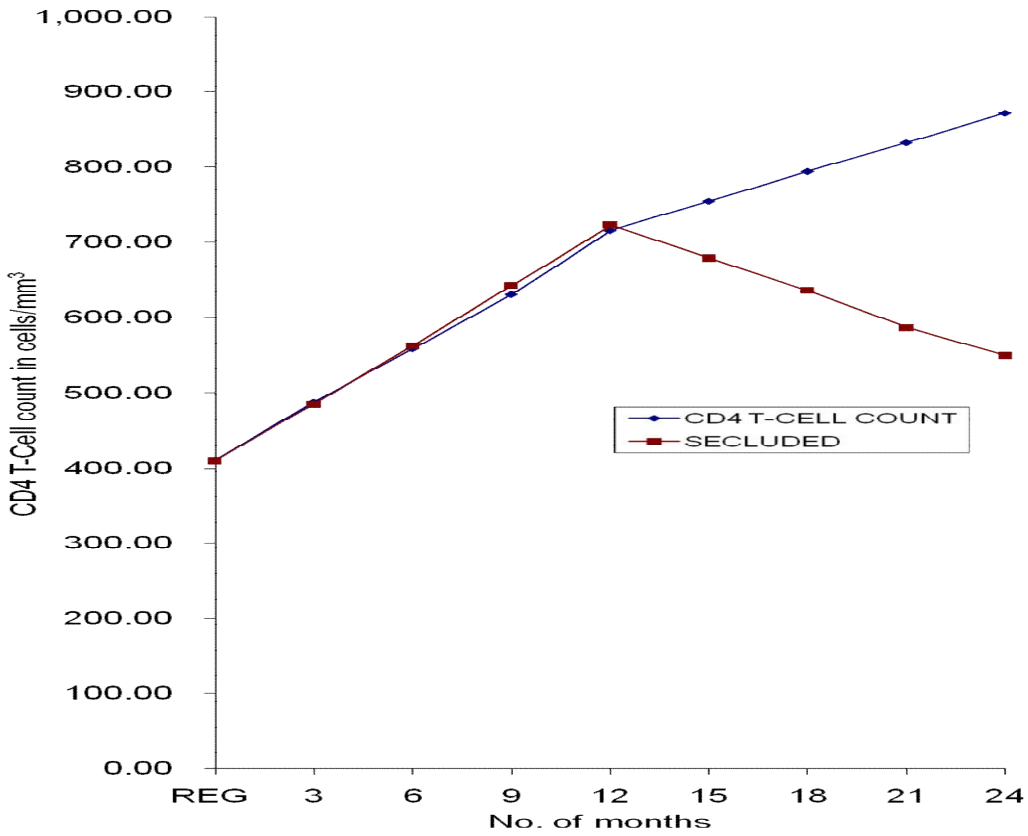

Figure 1: Effect of micronutrients on CD4$^+$ T-cell count in men.

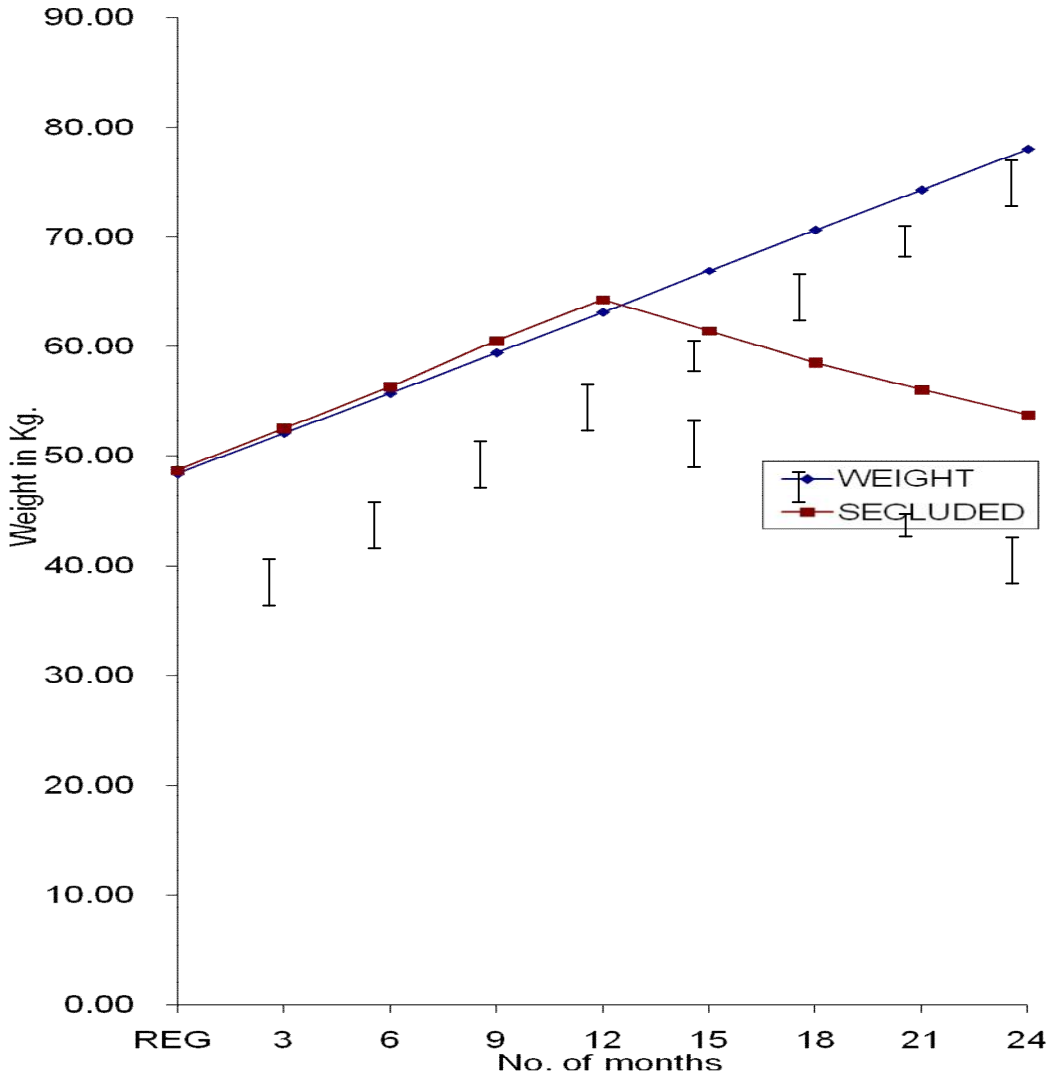

Figure 2: Effect of micronutrients on body weight in men

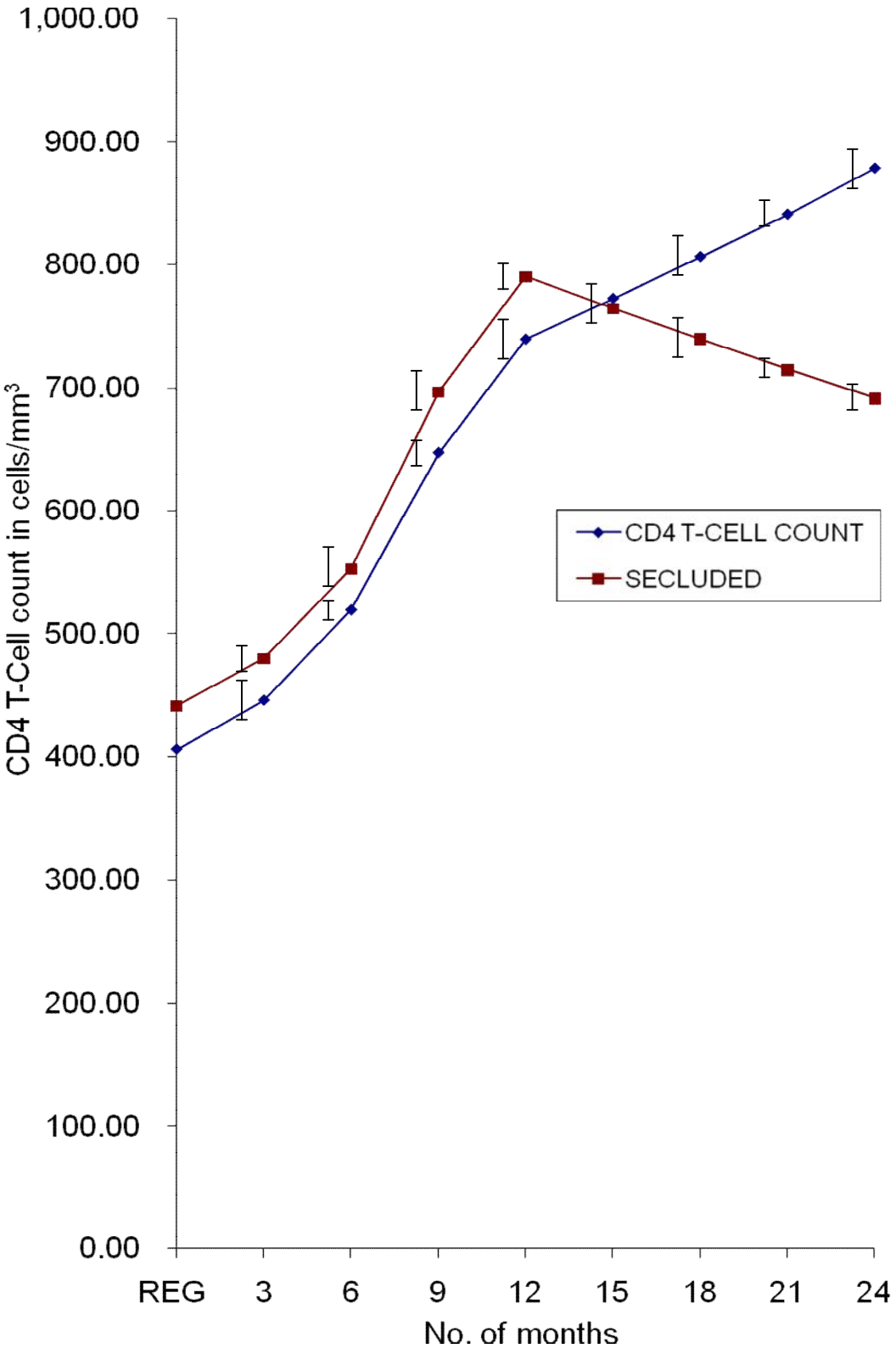

Figure 3: Effect of micronutrients on $CD4^+$ T-cell count in women

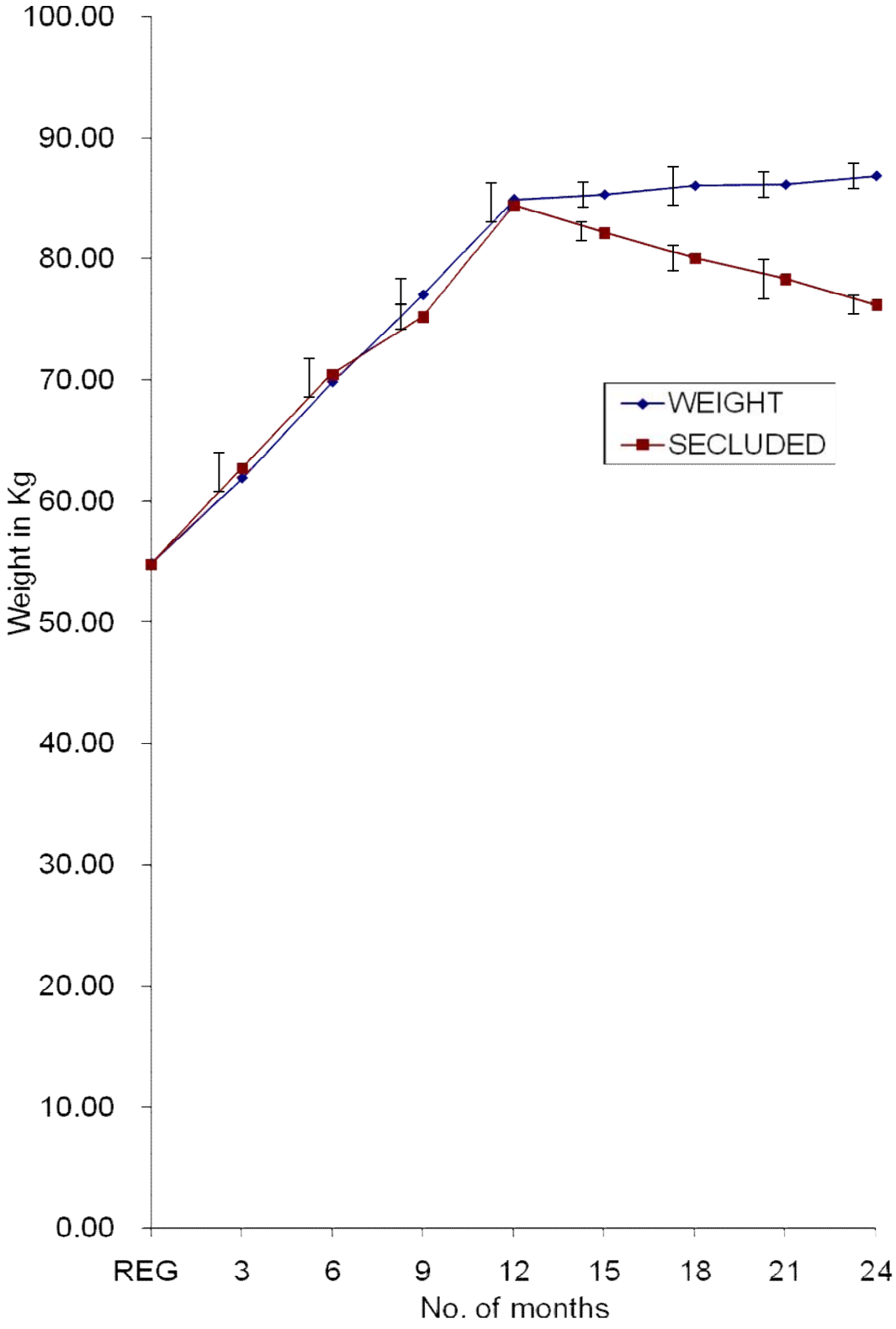

Figure 4: Effect of micronutrients on body weight in women

CONCLUSION

It can be concluded from the investigation that administration of micronutrients to the patients whose CD_4+ T- cell count are greater than 350/µl leads to delay in deterioration of the disease, improves CD $_4$+ T- cell count and enhances the health, physical and social wellbeing of the patients.

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Conflict of interest declaration

The authors declare no conflict of interest concerning the manuscript submitted for publication.

Ethical approval

Permission and approval for the conduct of the research and collection of data were obtained from the ethical committees of Faculty of Pharmacy, University of Uyo, Akwa Ibom State, Federal Medical Centres at Owerri, Imo State and Umuahia, Abia State respectively, all in Nigeria.

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