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Investigating Clinical potential of Moringa oleifera on the cholesterol, BMI and blood triglyceride level in HIV/AIDs patient on Antiretroviral Combination Regimen.

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Abstract

Background/aim: Antiretroviral drugs has unwanted effects that are potentially severe enough to make patients stop compliance. The likelihood of more severe side effects increases if these treatments are taken for longer periods of time. This study aims to assess the therapeutic impact of Moringa oleifera on blood triglyceride and cholesterol levels in HIV/AIDS patients taking antiretroviral combo therapy.

Method: A total of one hundred and forty (140) HIV adult patients comprising of 84 females and 56 maleswho have been monitored to be on Tenofovir/Lamivudine/efavirenz (300/300/600mg) TLE combination for a minimum of six months, before commencement of the study. Moringa oleifera (200mg), was to be used by the patients from the first day of visit to third day of visit (visit 0, 1 and 2) . Blood samples were collected during each visit and analyzed for important biomarkers.

Result: Significant reduction in blood triglyceride and cholesterol level ($P<0.01$) where observed in subjects in visit 1 and 2 when compared to day 0. Also, there was significant improvement in blood triglyceride and cholesterol level ($P<0.01$) in visit 2 compared to first visit of TLE regimen when compared to patients that did not received Moringa oleifera. No significant improvement in cholesterol and triglyceride level ($P<0.01$) were observed in patients that did not receive moringa.

Conclusion: From the study it can be suggested that Moringa oleifera can be beneficial in improving metabolic parameters in HIV/AIDs patients

Keyword: Moringa oleifera, blood, cholesterol, tenofovir, triglyceride

INTRODUCTION

HIV is a sexually transmitted infection (STI) that is typically transmitted through contact with an infected or nursing person. weakens the immune system to the point where it develops into AIDS in the absence of ARV medications.As the virus prevents and dampens the function of defense cells, individuals infected over time become immunocompromised[1,2]. The HIV affects the body immune system and decreases its tendency to fight against body intruders[3]. The effectiveness of the immune system is frequently assessed in relation to virus detection and therapy using CD4 cell counts. Immunodeficiency causes a propensity to succumb to illnesses that a healthy immune system would ordinarily fend against, such as infections, tumors, and other conditions[4,5]. AIDS, is the advanced point of HIV case which can take months to years to manifest if not managed. AIDS, manifested by the presentation of certain cancers, infections etc[6,7]. The symptoms of HIV/AIDS vary, depending on individuals and the stages of infection[8].

HIV, destroys the immune system and untreated HIV reduce the level of CD4 cells which are T cell. HIV, is roughly spherical about 120 nm in diameter, around 60 times smaller than athe size of human RBC[8,9]. It is made-up of positive-sense single-stranded RNA that codes for the virus's 9 genes[10,11]. The proteined is coded as HIV env gene, which allows the virus to attach to host cells and infuse the viral sheet with membrane of target cells, releasing it contents into the cell and provoking the infectious circle[12,13]. This process and high density means that broadly antibodies are so far been identified[14,15].

HIV is prevented by antiretroviral drugs at various points in the virus' "life cycle"[16,17,18]. Binding, reverse transcription, integration, fusion, cytoplasmic expression, replication, proviral transcription, assembly and budding, release, and maturation process[19] are included in this. In many regions of the world, Moringa oleifera Lam (Moringaceae) is a plant that is extremely beneficial. It serves several crucial purposes. Different plant components provide a good supply of protein, vitamins, beta-carotene, amino acids, and other essential elements. The Moringa leaves are often consumed in a variety of ways[20]. Common ailments such as typhoid fever, malaria,cuts, swellings, hypertension and diabetes are managed using the leaves of the plant[21]. They are also used by breastfeeding mothers[22], they remove free radical and toxic substance from the body[23]. This work aims at evaluating the clinical effect of blood triglyceride and cholesterol level by Moringa oleifera on in HIV/AIDs patient taking antiretroviral combination regimen.

MATERIALS AND METHOD

A Longitudinal “Randomized Comparative Trial” (LRCT) study was designed as applicable in clinical investigation involving minimum two patient treatment groups, over a period of time. This study is designed in line with a part of the FDA (Food and Drug

Administration)/WHO Phases during "randomized controlled clinical trials" (RCCT) of drugs. However, details about the application of RCCT have been clarified by FDA/WHO which made the purpose of such investigation explicit; stating that it was designed to affirm and or set aside hypothetical clinical claims[24] of administrable substances. Groups were group in 3 visits as baseline (commencement), four weeks follow-up and twelve weeks from commencement of study.

Recruitment procedure

Subjects were recruited at the out-patient department of a Teaching Hospital HIV-clinic. Prospective participants were officially and properly informed prior to the exercise, doubts were cleared and benefits x-rayed to the patients. The Longitudinal Randomized Comparative Trial (LRCT) was employed and used.

Procedure

The study involved a total of 140 HIV adult subjects (84 females, 56 females) who have been on Tenofovir 300mg, Lamivudine 300 mg and efavirenz 600mg (TLE) combination for a mimum period of 6 months. patients were groups as underweight, normal weight, over weight and obese. On first visit, blood samples of the subjects on combination regimen for at least 6 month were taken for analysis. Capsules of Moringa oleifera, 200mg, were given to each subject to be taken from visit 0 to twelve weeks of study. Subjects blood samples were collected at visit 0, 1 and 3 and analyzed for needed parameters.

Ethical approval

Ethical approval was granted by the "University of Port Harcourt Research Ethics Committee"referenced as UPH/R&D/REC/---

Patient consent

Patient consent were collected and approved In line Didia (2008)

Data analysis

Descriptive statistics, was used to express variation in characteristics (with continuous data stated as mean (S.D) while categorical data as frequency [%]). Dunnette T3 Post Hoc test of multiple comparisons was used to compare means, while binary logistic regression was used to predict factors contributing to the changes in variables. Variables interaction were tested at 95% confidence level; with P≤0.05 taken to be significant.

RESULT

Effect of cholesterol and triglyceride level of ART subject taking TLE on visit day 0

Based on classification

Underweight patients = six subjects

normal weight = seventy six patients

overweight = forty four patients

obese = fourteen subjects (table 1).

Moringa oleifera on ART patient taking TLE on visit day 1

There were significant differences (P<0.001) in mean values of TLE/Moringa patients, between visit 0 and visit 1 in the level of blood cholesterol. Also, there was no observed significant improvement in TLE and Moringa (visit 1) and TLE and patients not administered Moringa (visit 1) in the level of serum triglyceride of the subjects (table 2 and 3)

Effect of Moringa oleifera on ART patient taking TLE on visit day 2

There was significant, (P<0.001) improvement in the serum values of the TLE and Moringa subjects, between visit 0 and visit 2 in cholesterol and triglyceride levels, while there was no significant differences, (P<0.001) between TDF and Non Moringa, (visit 2) and TDF/Non Moringa (visit 0) in the level of serum cholesterol and triglyceride (3 and 4).

Table 1: Anthropometric and Socio-demographic classification of the study population on visit 0

Sex		N	Mean±S.D	S.E
Age(yrs.)	Male	54	39.11±10.44*	1.43
	Female	86	35.63±8.34	0.89
	Total	140	36.01±9.42	0.78
Weight(kg)	Male	53	69.00±9.75	1.3
	Female	87	66.43±12.3	1.26
	Total	140	67.38±11.2	0.91
Height(m)	Male	53	1.71±0.07**	0.02
	Female	87	1.64±0.05	0.02
	Total	140	1.66±0.07	0.02
BMI(kgm-^{2})	Male	53	23.77±3.25	0.43
	Female	87	24.79±4.61	0.45
	Total	140	24.41±4.18	0.34

Table 2: The test of mean and descriptive characteristics of the HIV patients on tenofovir based at Visit 0 (Baseline)

PARAMETERS	*Descriptive statistics*				*T-test of mean difference*	
	Sex	N	Mean±S.D	S.E	t-value	P-value
CHOL (mmol/l)	Male	56	4.52±1.02	0.13	2.58	0.012
	Female	84	4.09±0.96	0.10		
	Total	140	4.26±1.00			
TG (mmol/l)	Male	56	1.44±0.49	0.06	2.30	0.024
	Female	84	1.25±0.47	0.04		
	Total	140	1.33±0.48			

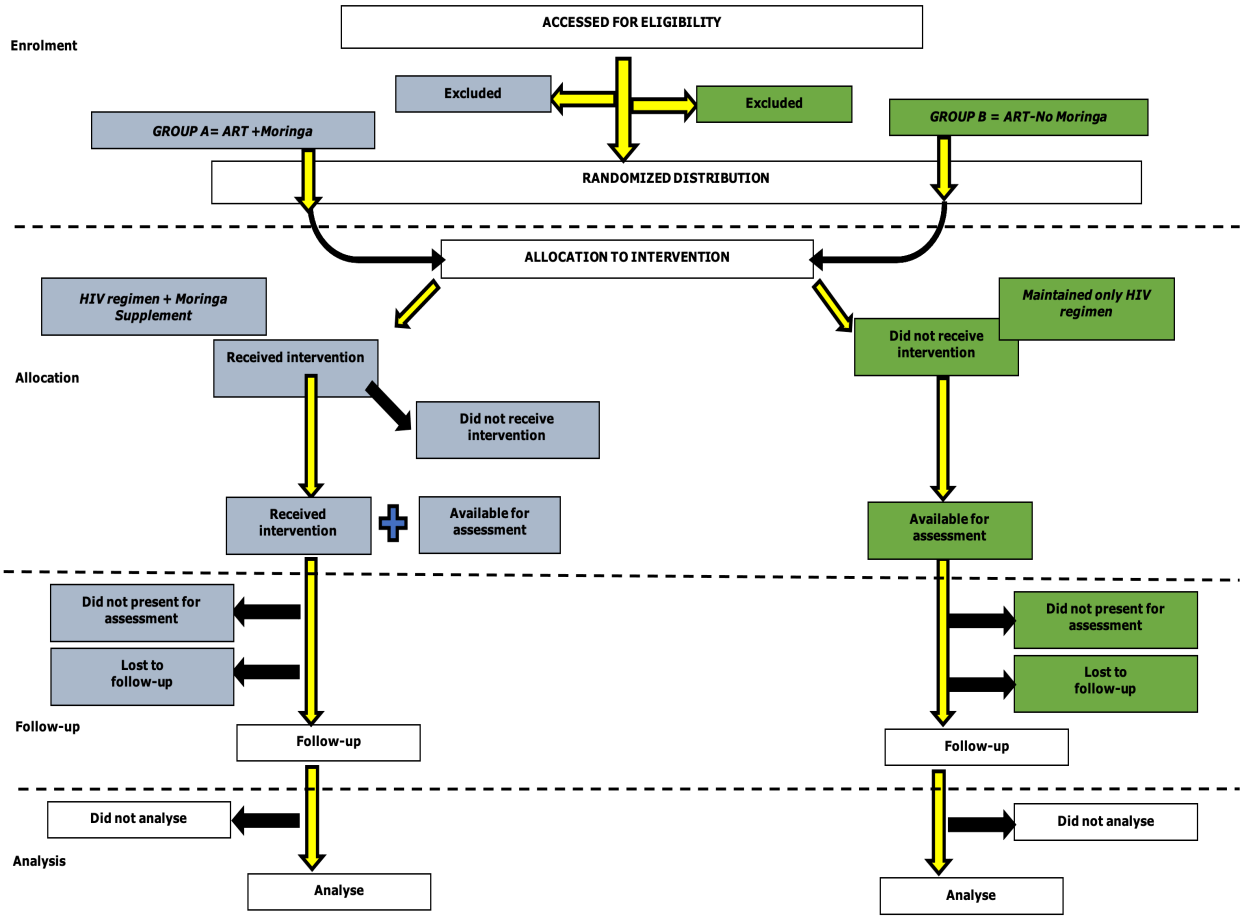

Figure 1: Schulz et al. (2010) Random Comparative Trail model, with modification

Table 3: Metabolic profile of the HIV Female patients on tenofovir based ART

Parameters	Visits	Mean±S.D	Min	Max	S.E	95% C.I for Mean	
						Lower Bound	Upper Bound
CHOL (mmol/l)	Visit 0	4.08±0.96	2.19	6.30	0.11	3.87	4.28
	Visit 1	3.99±0.78	2.03	6.42	0.08	3.82	4.16
	Visit 2	4.83±4.39	3.19	43.98	0.48	3.88	5.78
	Total	4.30±2.65	2.03	43.98	0.17	3.97	4.63
T.G (mmol/l)	Visit 0	1.24±0.48	0.30	2.31	0.06	1.13	1.36
	Visit 1	1.27±0.38	0.24	2.22	0.05	1.10	1.36
	Visit 2	1.15±0.48	0.23	3.19	0.06	1.06	1.25
	Total	1.22±0.45	0.23	3.19	0.04	1.18	1.29

Table 4: Metabolic profile of HIV Male patients on TDF taking moringa from visit 0 to 2

Parameters	Visits	Mean±S.D	Min	Max	S.E	95% C.I for Mean	
						Lower Bound	Upper Bound
CHOL (mmol/l)	Visit 0	4.51±1.02*^	2.23	8.14	0.14	4.24	4.79
	Visit 1	4.03±0.81ˡ	2.23	5.77	0.11	3.81	4.25
	Visit 2	3.75±0.72	1.91	5.18	0.10	3.56	3.94
	Total	4.10±0.91	1.91	8.14	0.07	3.96	4.24
T.G (mmol/l)	Visit 0	1.43±0.49*^	0.58	2.83	0.07	1.30	1.56
	Visit 1	1.25±0.40ˡ	0.42	2.17	0.05	1.14	1.35
	Visit 2	1.09±0.55	0.02	3.25	0.07	0.94	1.23
	Total	1.26±0.50	0.02	3.25	0.04	1.18	1.33

Note: S.D=Standard deviation, S.E=Standard error of mean, Min=Minimum, CHOL=Total cholesterol, TG=Triglyceride, N=Distribution, Max=Maximum, P-value=Probability value, t-value=t-test

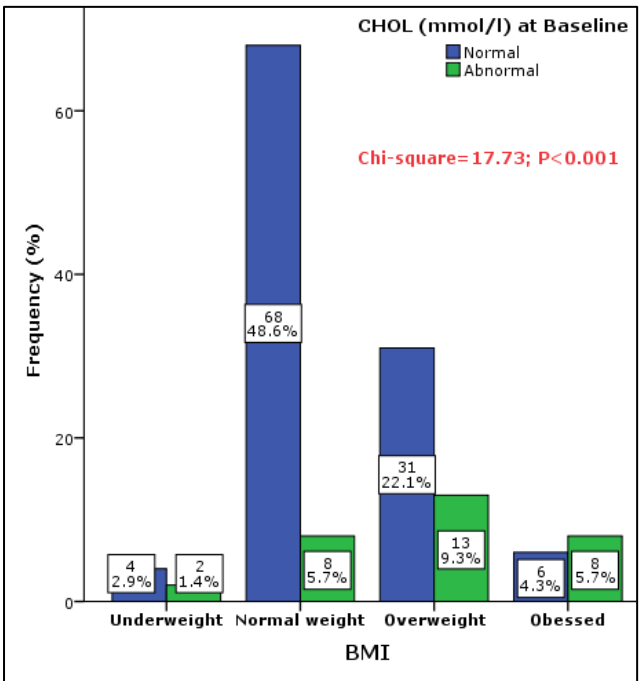

Figure 2: BMI related cholesteroldistribution at Visit 0 (Baseline)

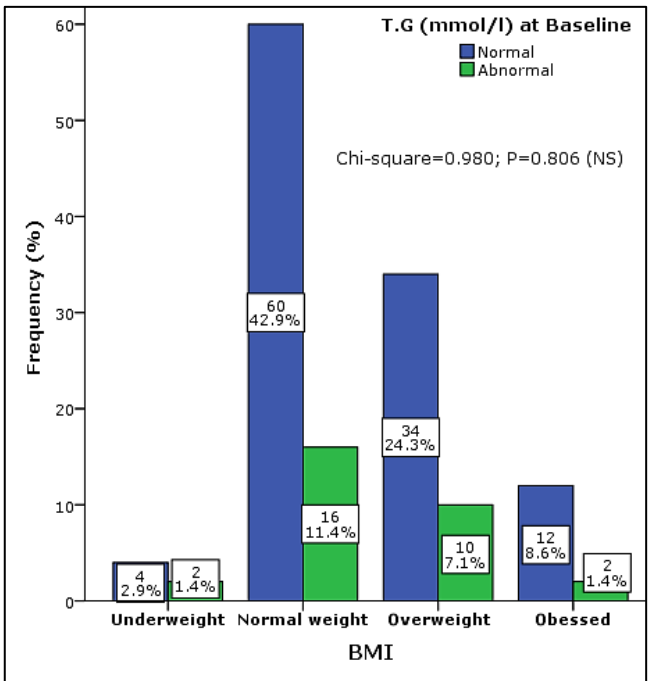

Figure 3: BMI related triglyceride distribution at Visit 0 (Baseline)

DISCUSSION

HIV targets and impairs the body's immunological defenses against a variety of diseases and some cancers, which healthy immune systems can fend against. Infected individuals eventually lose their immunological capacity as the virus kills and damages immune cells. The CD4 cell count is a common way to assess immune function[22,23]. The metabolic profile of both HIV-infected individuals receiving a tenofovir (TDF)-based regimen was identified in the cross-sectional study[24,25]. Combining anti-HIV-1 medications is justified in order to increase the effectiveness of antiretroviral therapy, lower the risk of drug resistance during chronic viral replication, and provide more robust viral suppression[26,27].

The differential observed in the female and male result for CHOL and TG indicates the need for separating reference values in clinical setting. Observed increased TC and TG at the beginning of the study are clearly indicates metabolic interference, of the TDF regimen; hence resulting in higher tendency for plague[28]. Efavirenz and Tenofovir has been reported to worsen lipid profile particularly, in genetic dyslipidemia patients. The non Moringa subjects, showed no significant differences in the serum level of the two biomarkers used during the study. There were improvements in cholesterol and triglyceride from visit 1 and visit 2 when compared to commencement of the study of blood analysis of patients receiving moringa. This is indicative that Moringa oleifera could improve the metabolic side effect linked with taking antiretrovial therapy. This may a consequence chemical constituents in Moringa oleifera.

HIV can be passed from one person to another by the interchange of bodily fluids, including blood, breast milk, semen, and vaginal secretions[29,30]. The viral load of HIV patients taking ARD is lowered, preventing HIV transmission to a sexual partner[31]. These findings are in line with those of Ghasi, et al.[32], Siddiqui and Khan[33], Kumar and Mandapaka[34], and Tété-bénissan et al.[35]. They noticed that M. oleifera might have hypoglycemic and hypocholesterolemic effects. M. oleifera in dietary form decreased blood CHOL, PHOSLIPID, LDL, TG, and VLDL cholesterol but increased "HDL/HDL-total cholesterol ratio," according to Kumar and Mandapaka[36]". The "antilipidemic effect of Moringa"in this study follows the observations of Ghasi et al.[37] and Dubey et al.,[38] as its revealed that the presence of bioactive such as β-sitosterol, played a significant role. Several parts of the plants have ben established as being a good sources of unique carotenoids, phenolic acids, tocopherols, glucosinolates, flavonoids and polyunsaturated fatty acids (PUFAs), highly bioavailable minerals, folate etc. most of these compound, have been established to posses various pharmacological activity.

CONCLUSION

This study found that Moringa oleifera, which is typically renowned for its undesirable side effects, may be helpful for people taking antiretroviral medications. The pharmacology, molecular functions, and mechanisms of action through which this plant improves the biomedical parameters of those taking HIV medications require more research.

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Conflict of interest

There is no conflict of interest

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