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Biochemical Studies of Tuberclosis and HIV Cases in Parts of Abia, Anambra and Imo States

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Abstract

Aim: The biochemical of tuberculosis (TB) and (HIV) patients in parts of Abia, Anambra and Imo States, were carried out using, standard biochemical procedures.

Methods: Two hospitals were chosen from each of the three States, namely: St. Charles Borromeo Specialist Hospital Onitsha and Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi, Federal Medical Centre (FMC) Umuahia and Abia State University Teaching Hospital (ABSUTH) Aba, and Federal Medical Centre (FMC) Owerri and Imo State University Teaching Hospital (IMSUTH) Orlu from January 2013 to December 2014. . The biochemical parameters analyzed were glutathione peroxidase (GPX), Vit. C, Vit. E, Uric acid, Malondialdehide (MDA), total cholesterol, triglyceride, HDL – cholesterol, LDL-cholesterol, Urea, creatinine, Na+, K+, Cl-, and HC03 in HIV patients (n=50:M=20; F = 30) and in PTB patients (n=50: M=30; F = 20) newly diagnosed (untreated) adults of 18years and above compared with apparently normal (control) individuals who are HIV and PTB seronegative of the same age range, location and n=50: M=20; F = 30 in each of the six selected hospitals in Abia, Anambra and Imo States.

Results: The results showed significantly increased concentrations of MDA and Uric acid ($P<0.05$) and significantly reduced concentrations of Vit. C Vit E and GPX ($P<0.05$) both in TB patients and HIV patients when compared with the control subjects. It equally revealed significantly increased Urea in all the selected hospitals and reduced Na+ concentration(ABSUTH) ($P<0.05$) in HIV patients when compared with the control subjects, while creatinine, Cl- and HC03- mean differences were not significant when compared with the control subjects ($P>0.05$). PTB patients revealed significantly increased Na+, decreased K+, increased Cl-, and decreased HC03- and urea ($P<0.05$) when compared with the control subjects while mean difference of creatinine though elevated was not statistically significant ($P>0.05$). Also revealed were significantly reduced concentrations of total cholesterol, triglyceride, HDL and LDL – Cholesterols in PTB patients ($P<0.05$) when compared with their control subjects. Similar trends were observed in HIV positive patients except that concentration of triglyceride was significantly increased ($P<0.05$) when compared with the control subjects.

Conclusion: Electrolyte imbalance was observed among the patients which equally exposes them to other health problems such as irregular heartbeat, numbness and high blood pressure among other diseases coupled with high level of lipid peroxidation which has been observed playing role in atherosclerosis, ischemia-reperfusion, heart failure, Alzheimer's disease, rheumatic

arthritis, cancer, and other immunological disorders. Meanwhile, there is likelihood of severe oxidative stress due to observed antioxidant depletion that further exposes the patients to Cancer and cardiovascular diseases (CVD. Therefore, decreasing the formation of lipid peroxidation products and balancing the electrolytes and antioxidants could be beneficial in limiting all the deleterious pathological conditions so as to guarantee their good health.

Keywords: Biochemical; Tuberclosis,; HIV; Cases; Abia; Anambra; Imo

Introduction

Public health, a collective action to improve the health of the members of a community. Epidemiology is a tool for improving public health. Epidemiological, biochemical and histological studies of Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) have become necessary in parts of Abia, Anambra and Imo states due to the luming burden of health and economic hardship these diseases have placed on countries in sub Saharan Africa like Nigeria that is already battling with dwindling health and economic situation. The effect of prevention and control program of Tuberculosis in Nigeria is slow [1]. TB-HIV co-infection which have worsened the situation of carriers and tremendously encouraged the spread of the disease which according to WHO has led to a sharp increase of TB infected patients in Nigeria. Nigeria is ranking 4th in terms of incidence [2].

WHO 2010 report that more than 2 billion people (about one third of the world population). With Sub Saharan Africa having highest prevalence. TB-HIV co-infection has highest prevalence in sub Saharan Africa [3]. It will interest you to know that from 1990 to 2011, 34 million people have been infected and are living with HIV worldwide. 23.5 million live in sub Saharan Africa [4]. From the obvious points above, Nigeria and her citizens are not exempted from the attack of these dangerous and contagious diseases. Enormous pathological changes accompany the infection of these two diseases in body chemistry and cells of infected individuals, hence, the biochemical (Antioxidants, Electrolytes, Urea and Creatinine and Lipid profile) and histological studies (Sputum cytology) in addition to the epidemiological survey became necessary with a view to informing the NTBLCP and NACA the target areas that may need quick intervention both in strategy and process and to update the care givers of these patients on the necessary changes that may be occurring in their body which will guide them in their management decisions [5].

In the light of this, this study is done to determine the attendant biochemical statuses of HIV cases (patients) with a view to generating pieces of information that will lead to the positive repositioning of the management and control of these two dangerous contagious diseases in parts of Abia, Anambra, and Imo States.

Materials And Methods

Subjects: A total of 600 confirmed TB (M-30, F-20) and HIV (M-20, F-30) positive subjects/Patients 18 years and above and 50 apparently normal (controls) subjects (M-30, F-20) were randomly selected from six hospitals (IMSUTH Orlu, FMC Owerri, NAUTH Nnewi, St Charles Borromeo Hospital Onitsha, FMC Umuahia and ABSUTH Aba) to participate in the study. i.e. 50 subjects/patients from each of the six selected hospitals in the three states respectively. All of them were fully informed of the details of the research work and consent was obtained prior to the study.

Participation was voluntary and questionnaire was issued to obtain demographic information of the participants such as age, sex, marital status and occupation. Ethical approval for the study was obtained from the ethical committees of the hospitals.

Blood Sample Collection: 10ml hypodermic syringe and needle was used to collect 10ml of whole blood from each TB and HIV positive patients from the dorsal vein using standard clean venipuncture technique and were transferred into pre-labeled lithium heparin tubes. The blood specimens were used for the estimation of the biochemical parameters using standard operating procedures (SOPs) approved by Clinical and Laboratory Standards Institute (CLSI) (formerly known as NCCLS).

Biochemical assay: Urea was determined by Diacetyl monoxime method, Creatinine (Jafee Slot Method), Glutathione Peroxidase, Vitamine C, Vitamin E, MDA and uric acid according to electrolytes (ise, comparative method (humalyte) bicarbonate (phosphoenol pyruvate carboxylase method. TC, TG, HDL-C, LDL-C were determined using colorimetric enzymatic methods [6-12].

Statistical analysis

Data generated from this study were analyzed using simple percentages, frequency tables, student's t-test and

analysis of variance (ANOVA). Each result was expressed as mean +/- SD. Each of the parameters analyzed was compared with control. Significance of mean differences were determined using SPSS Version 20 and was accepted at $p < 0.05$. Pearson's correlation coefficient was determined at 5% level of significance.

Results

	Control	ST CHARLES	IMSUTH	ABSUTH	FMCU	Nauth	FMCO	P Value
VIT C	1.44±0.185	0.688±0.119	0.801±0.245	0.849±0.253	0.771±0.180	0.801±0.155	0.803±0.174	0.000*
VIT E	1.22±0.274	0.634±0.156	0.592±0.206	0.638±0.229	0.559±0.140	0.579±0.140	0.604±0.163	0.000*
GPX	32.27±9.321	20.61±2.529	21.26±2.339	21.58±2.626	20.784±2.625	21.524\2.747	21.604±2.631	0.000*
UA	4.44±0.925	4.790±0.859	5.406±1.013	5.430±1.087	4.824±0.858	5.348±1.048	5.386±1.158	0.000*
MDA	1.68±0.799	7.251±1.125	2.17±1.005	2.882±1.097	6.263±1.351	2.917±1.163	2.878±1.084	0.000*

Table 1: Comparison of the antioxidant profile of the HIV patients in the six selected hospitals with their respective controls (n=50) X ± SD.

	Control	ST CHARLES	PV	IMSUTH	PV	ABSUTH	PV	FMCU	PV	NAUTH	PV	FMCO	PV
Urea	22.72± 3.487	27.040± 6.047	0.000*	25.926± 6.158	0.000*	27.160± 4.590	0.000*	26.416± 5.786	0.000*	27.060± 5.467	0.000*	26.850± 5.003	0.000*
Creat.	0.682± 0.101	0.685± 0.120	0.788	0.671± 0.125	0.788	0.663± 0.112	0.436	0.663± 0.118	0.383	0.664± 0.119	0.788	0.663± 0.118	0.788
Na+	137.740± 3.212	136.780± 2.367	0.09	136.740± 2.515	0.113	134.51± 7.860	0.044*	136.800± 3.136	0.25	136.740± 2.746	0.063	136.800± 3.136	0.055
K+	3.896± 0.457	3.836± 0.399	0.09	3.830± 0.438	0.092	3.864± 4.188	0.057	3.878± 0.393	0.162	3.872± 0.416	0.05	3.778± 0.393	0.056
Cl-	101.220± 2.112	100.800± 2.203	0.1	100.920± 2.632	0.1	101.060± 2.621	0.061	101.240± 2.5270	0.06	100.900± 2.7190	0.099	101.300± 2.53	0.11
HCO-3	23.560± 3.559	22.600± 3.591	0.053	23.620± 3.101	0.075	23.960± 3.103	0.101	24.000± 3.232	0.14	23.700± 2.977	0.115	24.120± 3.101	0.075

PV: Value; *: Significant

Table 2: Comparison of the renal function profile of the HIV patients in the six selected hospitals with their respective controls (n=50) X ± SD.

	Control	ST Charles	IMSUTH	ABSUTH	FMCU	NAUTH	FMCO	P Value
Total Chol	143.880± 20.028	136.440± 16.738	126.440± 10.738	130.660± 13.536	126.460± 10.232	128.340± 8.034	128.800± 7.586	0.000*
Triglyceride	108.640± 17.501	120.020± 17.234	122.020± 17.234	129.220± 8.883	122.680± 16.391	124.460± 12.030	129.920± 8.789	0.000*
HDL	42.740± 5.978	33.040± 5.082	31.040± 5.082	31.240± 4.382	32.740± 5.557	30.400± 5.442	32.360± 5.442	0.000*
LDL	78.080± 17.057	62.860± 8.630	67.860± 8.630	71.300± 8.760	69.200± 9.544	72.380± 10.493	70.820± 9.550	0.000*

Table 3: Comparison of lipid profile of HIV patients in the six selected hospitals with their respective controls (n=50) X ± SD.

	Control	ST Charles	IMSUTH	ABSUTH	FMCU	NAUTH	FMCO	P Value
VIT C	1.44±0.185	0.797±0.128	0.810±0.133	0.746±0.818	o.785±0.125	0.769±0.172	0.803±0.174	0.000*
VIT E	1.226±0.274	0.790±0.175	0.789±0.241	0.761±0.199	0.786±0.226	0.807±0.178	0.776±0.162	0.000*
GPX	32.274±9.321	27.254±8.130	26.936±7.982	25.776±6.995	27.288±8.154	27.688±7.928	25.850±6.803	0.000*
UA	4.440±0.925	5.256±0.806	5.240±0.842	5.292±0.798	5.318±0.765	5.268±0.765	5.224±1.030	0.000*
MDA	1.680±0.799	1.889±0.745	2.138±0.942	1.741±0.760	1.943±0.788	1.959±0.802	1.637±0.693	0.000*

Table 4: Comparison of the antioxidant profile of PTB patients in the six selected hospitals with their respective controls (n=50) X ± SD.

	Control	ST Charles	PV	IMSUTH	PV	ABSUTH	PV	FMCU	PV	NAUTH	PV	FMCO	PV
Urea	22.720± 3.487	19.760± 2.622	0.000*	20.020± 3.171	0.000*	19.620± 4.448	0.000*	20.060± 2.379	0.000*	19.400± 2.806	0.000*	18.940± 2.461	0.000*
Creat.	0.682± 0.101	0.686± 0.091	0.788	0.693± 0.096	0.788	0.688± 0.092	0.436	0.692± 0.098	0.383	0.691± 0.092	0.788	0.691± 0.094	0.788
Na+	137.740± 3.212	139.780± 3.621	0.000*	139.78± 3.338	0.000*	139.480± 3.740	0.044*	149.270± 2.417	0.000*	139.640± 3.635	0.000*	139.760± 3.751	0.049*
K+	3.896± 0.457	2.986± 0.517	0.000*	3.026± 0.520	0.000*	3.379± 0.388	0.016*	3.152± 0.436	0.000*	3.096± 0.457	0.46	3.018± 0.517	0.000*
Cl-	101.220± 2.112	103.920± 3.762	0.000*	104.07± 3.764	0.000*	104.360± 3.595	0.000*	102.659± 3.117	0.052	103.240± 3.771	0.00*	103.540± 3.737	0.000*
HCO-3	23.560± 3.559	19.520± 2.500	0.000*	20.680± 3.089	0.000*	20.420± 2.250	0.000*	17.825± 3.469	0.000*	19.600± 2.725	0.000*	19.360± 2.256	0.000*

Table 5: Comparison of the renal function profile of PTB patients in the six selected hospitals with their respective controls (n=50) X ± SD.

	Control	ST CHARLES	IMSUTH	ABSUTH	FMCU	NAUTH	FMCO	P Value
Total Chol	143.88± 20.028	125.760± 8.807	119.080± 11.710	121.100± 7.619	128.820± 8.719	127.730± 18.033	122.400± 10.085	0.000*
Triglyceride	108.640± 17.501	102.84± 17.791	102.64± 14.832	105.940± 17.106	102.700± 15.391	101.520± 17.462	97.720± 17.079	0.000*
HDL	42.740± 5.978	33.060± 4.731	31.760± 4.387	32.000± 4.575	33.340± 4.569	32.462± 5.946	33.880± 5.723	0.000*
LDL	78.080± 17.057	71.960± 8.223	66.260± 9.319	68.040± 6.047	74.540± 8.410	76.160± 10.614	70.300± 6.562	0.000*

Table 6: Comparison of lipid profile of the PTB patients in the six selected hospitals with their respective controls (n=50) X ± SD.

Discussion

Tuberculosis (TB) and HIV have been closely linked since the emergence of AIDS. Worldwide, TB is the most common opportunistic infection affecting HIV-seropositive individuals. It remains the most common cause of death in patients with AIDS and HIV infection has contributed to a significant increase in the worldwide incidence of TB [13].

The analysis however showed decline in the antioxidants. Deficiency of antioxidants was indicated in the results of antioxidants that were conducted on the HIV and TB patients as all of the GPX, Vit C and Vit E were reduced when compared to the control. This deficiency of antioxidants might markedly increase oxidative stress which possibly might adversely affect the immune system [14]. This study also showed increased lipid peroxidation measured by MDA concentrations both in HIV and TB seropositive patients. The possibility of counteracting oxidative stress by a pool of proper antioxidants plus an appropriate diet mainly in patients whose blood antioxidant deficiencies can be easily rebalanced may have real health benefit and represent a

promising way of inhibiting the progression of disease. Moreso, supplements of vitamin E and C suggestingly may reduce oxidative stress in HIV and produce a trend towards a reduction in viral load and so can be pooled and be given a clinical trial especially in HIV-infected persons who cannot afford new combination therapies [15].

Renal function parameters were mostly normal in HIV seropositive patients but mostly were low in PTB positive patients for potassium and bicarbonate whereas sodium and chloride were elevated. It showed in this study that patients with PTB should have their electrolytes monitored as it is an important aspect of TB management [16]. The pattern of electrolytes, urea and creatinine observed in this study of pulmonary tuberculosis and HIV patients will definitely be of help in the differential diagnosis and in the understanding of the pathophysiology of the two disease conditions [17]. Besides, it was discovered in this study that PTB & HIV affected those in their productive years of 18-47 age range and males are more affected than females by PTB while females are more affected than males by HIV [18,19].

Conclusion

Therefore, to manage HIV and TB patients efficiently and effectively, important biochemical analyses should be conducted regularly and more concerted effort should be made by all and sundry, government, non-governmental organizations and individuals to step up interventions that will bring TB and HIV spread to a halt in these states.

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