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A comparative study of smear positive tuberculosis between patients with and without HIV/AIDS in Kano, Nigeria

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ABSTRACT: *Background:* Tuberculosis is a major health problem in sub-Saharan Africa. With the epidemic of human immunodeficiency virus (HIV) spreading unabated, tuberculosis notification and notification rates are increasing at an alarming speed in various parts of the continent. Efforts to control the disease are failing in regions where HIV infection is common particularly in sub-Saharan Africa, partly because advanced HIV disease foils the standard tests used to diagnose TB.

Methods: A total 200 patients who were diagnosed as having clinical PTB were screened for TB using the standard ZN staining technique. One hundred had HIV while the second hundred were HIV negative. For HIV diagnosis, patients were screened and confirmed using the recommended National Algorithm .

Results: A total of 200 results were analyzed. One hundred are those with confirmed HIV infection and another 100 were non-HIV infected individuals. Both groups were screened for PTB using the same protocols and technique. Eight patients were found to be SS+ in the HIV infected group while 9 were SS+ in the non-HIV infected group.

Discussion: There is need for our laboratory technicians to improve in the quality of ZN staining technique as excess transmission of tubercle bacilli in the community caused by increased number of HIV associated tuberculosis cases in Kano and Nigeria in general will be contained only to the extent that patients with infectious tuberculosis are swiftly identified and properly treated and cured.

Key Words: Tuberculosis; Human Immunodeficiency Virus (HIV); Acquired Immune Deficiency Syndrome (AIDS).

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Introduction

Tuberculosis is a major health problem in sub-Saharan Africa. With the epidemics of human immunodeficiency virus(HIV) infection spreading unabated, tuberculosis notification and notification rates are increasing at an alarming speed in various parts of the continent (1). The diagnosis of Pulmonary Tuberculosis (PTB) in low income countries often relies on direct sputum smear microscopy for Acid Alcohol Fast Bacilli staining technique (AFB) or Ziehl Neelsen staining (ZN) technique.

Although microscopy is less sensitive than culture (2), it has sufficient sensitivity to identify most infectious cases of PTB (3) and is relatively simple for passive case finding. In the developing world, PTB is the leading cause of death among people with HIV infection. Efforts to control the disease are failing in regions where HIV infection is common particularly in sub-Saharan Africa, partly because advanced HIV disease foils the standard tests used to diagnose TB (4).The HIV-TB co-infection is a great problem and early diagnosis of TB would save much lives in People Living With HIV and or AIDS (PLWHA).Unfortunately both destroy cell mediated immunity (CMI) and enhance the fast progression of one another, hence they are often called "*the twin killers*". The risk of death in HIV infected patients with tuberculosis is twice than in HIV infected patients without tuberculosis ¹. Individual presenting with one of the two must be screened for the other i.e. presence of one raises a high index of suspicion of the probable presence of the other. Unfortunately for TB as the secondary opportunistic infection (OI), often it is not always easy to detect in HIV infected person by the conventional TB-screening methods in the developing countries.

Unfortunately, delay in diagnosis is common. Such delays can increase the risk of a poor outcome and lead to further transmission of tuberculosis, including the precipitation of outbreaks in health care and institutional settings (5). A school of thought believes that PTB smear positivity would be fewer among patients that are co-infected compared to those with only PTB because of the known immune suppression that is worse among dually infected patients. However, this has not been confirmed scientifically in Nigeria. This is what has informed the basis for this study. We are unaware of any such previous study in this centre.

Method

Two hundred patients who were clinically diagnosed as having Pulmonary Tuberculosis who were referred from various clinical Departments within and outside the teaching hospital for AFB sputum smear constituted the bulk of the study population within the study period. The study was carried out within the twelve months of 2006. One hundred were those who were HIV negative while one hundred were HIV positive.The standard Ziehl Neelsen (ZN) or AFB staining technique as described by Monica Cheeseborough was used for the study. Samples were taken as three consecutive overnight sputum specimens or the newly recommended WHO standard as on the spot sample, overnight sample and again on the spot sample. In either regimen, 3 specimens were mandatorily collected from all the 200 patients involved in this study. A result is defined as smear positive (SS+) if one has at least one plus(+) to two pluses (++) in at least one of the three specimens. While for HIV screening, patients were screened using the recommended National Algorithm by Capillus and Genie 11 kits while *Determine kit served as tie breaker where there was an inconclusive report* concomitantly and patients status was considered positive if both tests were reactive. Positive and negative controls were used for quality assurance.

Results

A total of 200 results were analyzed. One hundred are those with confirmed HIV infection and another 100 were non-HIV infected individuals. Both groups were screened for PTB using the same protocols and technique. Eight patients were found to be smear positive (SS+) in the HIV infected group while 9 were smear positive (SS+) in the non-HIV infected group.

Tables 1 and 2 show the age and gender distributions of the two groups respectively. The age group 25-44 had the highest proportion of SS+ in HIV positive persons while 15-24 and 45-54 were positive among the non-HIV infected group although the proportion was higher by one. The difference was not statistically significant.

Table 1: age distribution of SS+ patients between HIV and non-HIV infected groups

Age Group	HIV positive patients	NO of SS+ (%)	Non-HIV patients	NO of SS+ (%)
15-24	9	1(11.1)	29	3(10.3)
25-34	42	3(7.1)	24	-
35-44	41	3(7.3)	20	-
45-54	7	1(14.3)	19	4(21.1)
Above 54	1	-	13	2(15.4)

Table 2: gender distribution of SS+ patients between HIV and non-HIV infected groups

Gender	HHIV positive patients	NO of SS+ (%)	Non-HIV patients	NO of SS+ (%)
Males	50	4	50	4
Females	50	4	50	5

Discussion

It is a known fact that HIV infection foils the standard TB screening tests in particular ZN staining technique (4). Nevertheless in this our present study, the findings show no significant difference between the two groups in the number of smear positivity. Although Theo reported that at best, smear microscopy can detect around 45-60% of people who have active TB, wherever HIV co-infection is prevalent (6) but it is important to note that there are some common factors that may contribute in the quality of the obtained result. PTB suspects are required to submit 3 sputum specimens (7) on the assumption that this optimizes the smear positivity yield. But reducing the number of sputum smears per patient may be advantageous

where repeated diagnostic visits may not be feasible and the quality and yield of smear microscopy may be affected by factors such as workloads, training and motivation of laboratory staff (7). The overnight sputum sample is believed to be the best specimen to give high yield of SS+ but due to the time limit and the low level of compliance from patients, the WHO recommended the new sampling method i.e. on the spot sample collection, then overnight sample and again on the spot sample. This new strategy has reduced the number of days spent by patients visiting the lab but yet hasn't reduce the work burden among the laboratory technicians. Our study also shows that PTB is more common among those in early adulthood (15-24) and late adulthood (45-54) years of age (normal) in persons that are HIV negative. On the other hand, it followed the pattern of highest HIV distribution among those that are HIV positive.

Schoch *et al* in similar studies in Zimbabwe reported two-thirds of all SS+ patients in his studies were HIV infected (8). Although the same technique was applied in his studies as in this one, but he didn't give full account of the HIV stages whether immunological or clinical.

The Kinyoun and the ZN basic fuchsin stains are the traditional methods used for visualizing mycobacteria in clinical specimens in most developing countries contrary to the US and other developed countries where an auramine-rhodamine stain with fluorescent microscopy is used because it is more sensitive and less time consuming. Other screening methods like the mycobacterial culture, Nucleic Acid Amplification tests and molecular typing (DNA fingerprinting) are all highly sensitive (5) but not affordable to most of the developing world.

The above mentioned techniques for now in settings like ours remain things to dream of. That means, it is important for laboratory technicians to improve on quality of ZN staining and also for the clinicians to realize the tight and continuous marriage between HIV and TB. High level of clinical acumen rather than relying on such screening tests as sputum smear or radiographic techniques is desirable. Excess transmission of tubercle bacilli in the community caused by increased number of HIV associated tuberculosis cases in Kano and Nigeria in general will be contained only to the extent that patients with infectious tuberculosis are swiftly identified and properly treated and cured. To achieve these goals then the laboratory technicians have to improve as mentioned above and the clinicians alike.

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