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Prevalence of active pulmonary tuberculosis in human immunodeficiency virus seropositive adult patients in University College Hospital, Ibadan, Nigeria

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Summary

Infection with Human Immunodeficiency Virus (HIV) has reached a pandemic proportion. There is a resurgence of tuberculosis (TB) Worldwide, this return of an old enemy has been attributed to a number of factors among which HIV infection has emerged as the strongest known risk factor determining the outcome of infection with Mycobacterium tuberculosis (M. tuberculosis). Pulmonary tuberculosis (PTB) accounts for more than 80% of TB cases and is the main problem on account of its frequency and infectivity. There have been studies determining prevalence of HIV in TB cases but that of prevalence of PTB in HIV infected patients have been limited. This study was undertaken to establish the prevalence of active PTB in HIV seropositive adult patients in University College Hospital (UCH), Ibadan. Fifty-eight confirmed HIV-seropositive adults patients were studied. All subjects were interviewed and examined. Subjects with positive respiratory symptoms and signs had their sputum examined and cultured for M. tuberculosis and had chest radiograph done. In this study, the prevalence of active PTB in HIV-seropositive subjects was 32.8%. The TB prevalence shows a bimodal distribution at the extremes of age, while the age group 30-39 years had the lowest prevalence of 23.3%.

Keywords: Prevalence, active pulmonary tuberculosis, human immunodeficiency virus.

Résumé

L'infection du virus de l'immunodéficience humaine a atteint une proportion pandémique. Il y a une ré-émergence de tuberculose (TB) dans le monde entier. Cette retournée de l'ancien ennemi a été attribuée à un nombre de facteur parmi lequel l'infection au VIH émergeait comme le plus grand risqué déterminant l'infection avec la tuberculose mycobactérienne (T.M.). La tuberculose (TBP) contribué à plus de 80% des cas tuberculeux et de problème majeur du point de vue fréquence et infectivité. Des études ont été faites pour déterminer la prévalence du VIH chez les tuberculeux; mais celles de la prévalence de la tuberculose pulmonaire chez les patients sero-positif avaient été limitées. Cette étude a été entreprise pour établir la prévalence de la tuberculose pulmonaire active chez les patients adultes séropositifs au Centre Hospitalier Universitaire (UCH), Ibadan, Nigeria. Cinquante huit adultes confirmés séropositifs étaient étudiés. Tous les patients étaient interrogés et examinés. Les sujets avec des symptômes de problème respiratoires ont eu leur salive analysée et cultivée pour *M. Tuberculeux* et ont fait une radiographie de la cage thoracique. La prévalence de la tuberculose pulmonaire active chez les patients séropositif était de 32.8%. Cette prévalence tuberculeuse montre une distribution bimodale aux âges extrêmes. Cependant le groupe d'âge entre 30-39 ans avait la plus faible prévalence de 23.3%.

Introduction

The current high global magnitude of the TB problem has been established [1]. As at 1990, it was approximated that one-third of the world's population was infected with *M. tuberculosis* of which in 1990, an estimated 8 million people developed TB World wide and 2.6 to 2.9 million died. The majority of these cases and death occurring in Asia and Africa [1]. This return of an old enemy has been attributed to a number of factors including homelessness, increased drug abuse, overcrowding among the poor and the upsurge in HIV/AIDS problem [2,3].

In immunocompetent individuals, two species (*M. tuberculosis hominis* and *M. tuberculosis bovis*) commonly cause diseases. Other species, the atypical mycobacteria (including *M. avium*), can for all practical purposes be considered to be non pathogenic for the immunocompetent host [4]. Unlike some other organisms, *M. tuberculosis* is a virulent pathogen and therefore able to cause disease in patients with minimal immunosuppression who are infected with HIV [5], *M. avium* is rare in Africa [6].

TB is a communicable disease and by far the most common route of infection is person-to-person spread via respiratory route [7,8]. TB affects almost every organ in the body, but PTB accounts for more than 80% of TB cases [9]. In West-African adults, the adult post-primary PTB is commoner than the primary type [10].

That HIV/AIDS have a profound effect on the incidence of active PTB has been reported in studies [11-16] in various parts of the world. There have also been studies [17,18] indicating the prevalence of HIV seropositive in PTB patients. However, studies [19,20] determining the prevalence of PTB in HIV subjects have been limited, and in UCH, Ibadan is non-existent.

This study therefore set out, among other things, to determine the actual prevalence (using standard diagnostic criteria) of PTB in HIV seropositive adult patients without other known predisposing factors in UCH, Ibadan (a typical referral hospital in the western region of Nigeria).

Methodology

The study was carried out in the General- Out Patient, Medical Out-Patient, Surgical Out-Patient Departments and wards of UCH, Ibadan, for one year (between October 1998 and September 1999). A total of 73 consecutive adult patients aged 15 years and above confirmed by western blot serology in UCH to be infected with HIV were seen; but only 58 patients who satisfied the necessary criteria were studied.

Inclusion Criterion

Adult patients infected by HIV

Exclusion Criteria

1. Patients with diabetes mellitus (DM)
2. Chronic renal failure (CRF) patients
3. Alcoholics
4. Patients with known malignancies.
5. Refusal to give informed consent

The method for Western blot is as stated -

Bio-Rad Novopath HIV-1 immunoblot kit was used in the detection of antibodies to viral proteins/antigens:

1. Wash/diluent and the patients samples were incubated with the strip.
2. HIV-1 antibody present in the sample unbound to viral antigens located on the strips as discrete bands.
3. Unbound material were aspirated and the strip was washed.
4. Alkaline phosphatase enzyme-linked antibody to human immunoglobulin was added. After aspirating conjugative, the strip was washed and Alkaline phosphate-substrate solution [5-bromo 4-chloro 3-indolyl/ phosphate (BCIP) with blue tetrazolium (NBT)] was added. Aspiration followed by another wash terminated the enzyme reaction.
5. The strip was then interpreted accordingly using the controls provided as positive or negative.

History and physical examination were carried out on each subject. The information obtained were entered into a prepared questionnaire. The prepared questionnaire included patients' personal data. The thrust of the interview was directed at elucidating clinical symptoms. Suggestion of PTB, such as cough with sputum production, haemoptysis, difficulty in breathing, chest pain, weight loss, fever, night sweats; occurring either singly or in combination. Interview also included history of recent exposure to an index case of PTB, previous history of TB in the subject and history of treatment for TB. Other parts of the interview were designed to exclude possible diabetes mellitus, chronic renal failure, heavy alcohol consumption and known malignancies.

Physical examination of subjects included general examination to detect pallor, weight loss, lymphadenopathy, digital clubbing (for complicated TB). A detailed examination of the chest was carried out on each subject particularly to detect features of PTB such as apical flattening, tracheal deviation, reduced chest movement, reduced chest expansion, increased tactile fremitus, dull percussion note, diminished breath sound, bronchial breath sound, in any of the lung fields.

The investigations carried out are:

1. Sputum microscopy: For patients with productive cough, 3 sputum specimens collected into sterile containers were examined for acid fast bacilli using the Ziehl-Neelsen (ZN) staining method.
2. Sputum culture: Corresponding early morning sputum specimens were cultured for *M. tuberculosis* using Lowenstein-Jensen culture media.
3. Chest Radiograph: Standard postero-anterior chest radiograph done in UCH radiology department was obtained in subjects with symptoms and signs suggestive of pathology in the chest. The chest X-rays were specifically reviewed for evidence of PTB lesions such as pulmonary infiltrates, cavities, nodular and streaky opacities, fibrosis, hilar adenopathy and pleural effusion. The X-rays were reviewed with consultant radiologist.
4. Haematologic Evaluation: Full blood count, erythrocyte sedimentation rate, serum electrolytes, urea, creatinine and fasting blood sugar of each subject were determined.

Diagnosis of PTB was made when a subject has:

- (i) at least 2 samples of sputum positive for acid fast

- (ii) bacilli by ZN staining method and/or sputum culture that is positive for *M. tuberculosis* and/or
- (iii) chest radiograph pattern that is highly suggestive of PTB (based on the advice of the consultant radiologist) that does not improve with antibiotics but shows improvement with chemotherapeutic trial of antituberculosis drugs.

Statistical analysis

All available questionnaire were entered and analysed using the statistical packages EPI-INFO version 6.0 produced by WHO in collaboration with the Centre for Disease Control and Prevention.

Initial data exploration was done by examining the frequency distribution of all variables present in the questionnaire. Tables were constituted for the presentation of the results. Proportion and percentages were used to describe the demographic characteristics of subjects and prevalence of PTB in HIV seropositive adult patients.

Ethical approval

This study was approved by the Joint Ethical Committee of the University College Hospital/University of Ibadan, Nigeria.

Result

A total of 58 adult subjects confirmed to be HIV seropositive were studied. Infection by HIV 1 was the commonest, being the only HIV type found in 56 (96.5%) subjects. One subjects had only HIV 2 infection while another subject had both HIV 1 HIV 2 co-infection.

Table 1 shows the age and sex distribution of the subjects. There were 33 males and 25 females aged between 19 and 62 years. The mean age was 35.2 years. The mean age for male subjects was 35.9 years; while the mean age for female subjects was 34.3 years.

Table 1: Age and sex distributions of subjects

Age	Males	Females	Total (%)
15-19	0	1	1 (2)
20-29	6	8	14 (24)
30-39	20	10	30 (52)
40-49	6	4	10 (17)
50-59	0	2	2 (3)
60-69	1	0	1 (2)
Total	33	25	58 (100)

The largest number of subjects were in age group 30-39 years totalling 30 (52%); this was followed by age group 20-29 years comprising 14 (24%) subjects. Subjects in age group 15-19 years and 60-69 years only formed 4 percent (2 percent each) of the total number.

Prevalence of PTB in HIV seropositive adult patients

Fifty-eight subjects with HIV seropositivity were studied during the one-year period. Nineteen were found to have PTB, this gives a prevalence of 32.8% consisting of 12 females and 7 males.

Seven (21.2%) out of the 33 male subjects with HIV infection had PTB while out of the 25 female subjects with HIV

infection, 12 (48%) had PTB. This difference however is not statistically significant ($X^2 = 4.83, P = 0.31$).

Table 2 shows the distribution of PTB in HIV seropositive subjects according to age groups. The TB prevalence shows a bimodal distribution at the extremes of age of 100% each while the age group 30-39 years had the lowest prevalence of 23.3%.

Table 2: The distribution of PTB in HIV seropositive subjects according to age groups

Age (years)	N	Males (n = 33)	Females (n = 25)	TB Prevalence in group
15-19	1	0	1	100%
20-29	14	1	5	42.9%
30-39	30	3	4	23.3%
40-49	10	3	1	40.0%
50-59	2	0	1	100%
60-69	1	0	0	0.0%
Total (%)	58	7 (21.2)	12 (48)	32.8%

Discussion

The result of this study showed that the double tragedy of HIV/PTB co-infection is common in young adults and middle-aged individuals forming 89.4% of subject. This agrees with the earlier workers [17,18]. This has adverse effects on the socio economic activities of the community because these constitute the group on whom lies the back bone of the economic survival of the country. In this study, females had more HIV/PTB co-infection than males (ratio 2:1.2) which agrees with previous finding of Idigbe *et al* [18] (ratio 2:1.2). The findings of female preponderance in this study contrast that of Wokoma [17] in whose study the ratio of male to female subjects with HIV/PTB co-infection was 1.6:1.

In this study, the prevalence of active PTB in the HIV seropositive adult subjects was 32.8% which is within the range found in Africa (20 - 54%) [7]. Gilks *et al* [19] found a prevalence of 17.9% but the study population during the one-year study period covered acute admissions only. Akinsete *et al* [20] found a prevalence of 15.5% which is lower than that of this study.

The prevalence of active PTB in HIV seropositive adult subjects in U.C.H has hitherto not been documented. It is higher in females (48%) than in males (21.2%) presumably due to pregnancy and child bearing, as these are known to cause reactivation of a dormant tuberculosis focus.

In conclusion it should be noted that the double tragedy of HIV/PTB co-infection affect most commonly individuals in both extreme of life, this has a grave effect on the economy of the family and the nation.

If because of the stigma associated with HIV infection, this group is abandoned, those of them with active PTB will continue to excrete the tubercle bacilli. This may adversely affect the aims and objectives of the National Tuberculosis Control Programme, in that whatever public health gain expected to accrue from treatment of HIV sero-negatives with smear positive PTB will be lost in the untreated HIV infected or AIDS individuals with active PTB.

It is therefore recommended that:

1. Subjects with HIV seropositivity should not be abandoned, search should always be made of treatable

condition which will improve the quality of life.

2. Individuals with HIV/PTB co-infection should be actively identified and encouraged to take their anti-tuberculosis drugs even if there is financial constraints in obtaining anti-retroviral drugs. This will limit the spread of tuberculosis in the community.

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