

PREVALENCE OF SPUTUM SMEAR POSITIVE TUBERCULOSIS AMONG PATIENTS AT UNIVERSITY OF MAIDUGURI TEACHING HOSPITAL.

*Zailani SB, ¹Gabdo AH, ¹Yusuph H, [±]Ahidjo A ¹Mustapha SK, , , [¶]Malami SA

Departments of Medical Microbiology, Medicine,¹ and Radiology[±], College of Medical Sciences, University of Maiduguri, Nigeria; and Department Pathology,[¶] College of Health Sciences, Usmanu Danfodiyo University, Sokoto Nigeria.*

Correspondence: Dr. Zailani SB

Department of Medical Microbiology, University of Maiduguri Teaching Hospital
Maiduguri, Borno-Nigeria. zailanisb@yahoo.com

Abstract

Background; Sputum examination is of great value in making a diagnosis of pulmonary TB and in follow-up of patients' progress under antiTB treatment. The prevalence of smear positive cases of pulmonary TB among hospital patients differs from one place to another and reflects the level of risk posed to close contacts of patients with pulmonary tuberculosis.

Objective: To determine the prevalence of sputum smear positive tuberculosis amongst pulmonary tuberculosis patients at the University of Maiduguri Teaching Hospital.

Methods; This was a retrospective study in which the records of all patients treated for tuberculosis at the University of Maiduguri Teaching Hospital between January 2001 and December 2003 were retrieved and analyzed. Information obtained from the records

included demographic data and results of routine three early morning sputum specimens collected from the patients for the diagnosis of pulmonary tuberculosis using Ziehl Nielsen (ZN) staining technique for the detection of acid-fast bacilli (AFB).

Results; A total of 1369 patients, among whom 815 (59.5%) were males and 554 (40.5%) were females qualified for recruitment into this study. Age group 31-40 years had the highest smear positive cases and those below 10 years had the lowest. The overall prevalence of sputum smear positive tuberculosis was 12.78%.

Conclusion: The prevalence of sputum smear positive pulmonary tuberculosis of 12.78% is lower than that of studies in other parts of Nigeria. HIV screening should be incorporated into the DOTs programme of

the National Tuberculosis and Leprosy Control Programme

Key words: Smear positive tuberculosis, prevalence, Nigerians.

INTRODUCTION

Tuberculosis is a major public health problem in most developing countries. According to the World Health Organisation (WHO) about one third of the world's population is infected with mycobacterium tuberculosis (TB) and 20 million have active disease.^{1,2}

Annual increase in TB cases in many sub-Saharan African countries is in excess of 10%.^{3,4} The mortality due to TB is close to three million per year, making it the leading cause of death from a single pathogen.^{2,5}

Without appropriate chemotherapy, the death rate from TB is approximately 50%.⁶ For persons enrolled in a typical national treatment programme and treated with isoniazid, thiacetazone, and/or streptomycin the death rate is approximately 20%.⁷ Based on these, the estimated annual number of deaths from TB in the developing world is greater than 2.5 million,⁸ or approximately 6.5% of all deaths. Amongst persons in the 15-59 years age bracket, the annual number of deaths is estimated at 18.5% and 26% of preventable deaths.^{8,9}

Sputum examination is of great value in making a diagnosis of pulmonary TB and in follow-up of patients' progress under antiTB treatment.

Direct sputum smear examination is occasionally negative even in a patient with far advanced disease especially in patients with dual infection with HIV/AIDS. Most hospitals in developing countries rely on smear microscopy for identification of acid-fast bacilli (AFB).^{10,11}

The prevalence of smear positive cases of pulmonary TB among hospital patients differs from one place to another. It ranges between 50 and 60% of cases of pulmonary TB in well-equipped laboratories¹² with values between 20 and 30% obtained in other centres.¹³

Few reports exist on the hospital prevalence of smear positive pulmonary TB among hospital patients in the northern part of Nigeria. The aim of this study was therefore to look at the prevalence of smear positive pulmonary TB among patients at the University of Maiduguri Teaching Hospital (UMTH).

MATERIALS AND METHODS

This retrospective study was conducted at the University of Maiduguri Teaching Hospital after obtaining clearance from the ethical committee. One thousand five hundred and fourteen folders of patients treated for pulmonary tuberculosis between January

2001 and December 2003 were retrieved and information regarding demographic data e.g. age, gender, occupation, etc were recorded. HIV status was not documented in the records, as it did not form part of the National Tuberculosis and Leprosy Control Programme (NTBLCP) in the hospital. Sputum smear results were also recorded. One hundred and forty five folders did not satisfy entry criteria due to incomplete information.

Routine sputum specimens for the diagnosis of pulmonary TB using ZN staining technique had been done for all pulmonary TB patients. Three early morning sputum specimens had been collected from each patient for the detection of acid-fast bacilli (AFB) and ZN technique was performed on each specimen.¹⁴

Microscopical examination was observed, using the 100X oil immersion objective. When any defined red bacilli were seen, the report of AFB was documented as follows:¹⁵ More than 10 AFB/field +++, 1-10 AFB/field ++, 10-100 AFB/100 field +, 1- 9 AFB/100 fields- exact number was reported. Data obtained was analysed using SPSS for Windows version 10. Probability (P) value of less than 0.05 was considered significant.

RESULTS

The total number of patients in this study was 1369, made up of 815 (59.5%) and 554 females (40.5%). The mean age was 34.80 ± 5 with a range of 8-75 years. Table 1 shows the age distribution of the patients. Most of the male patients were in the 31-40 -year age group, while most females aged between 21-30 years with an overall (both sexes) majority being in the 21-30 years age bracket.

Table 2 shows the relationship between age and sputum smear results (positive or negative). Majority of the positive patients were within the age range 21-50 yrs. Age group 31-40 yrs had the highest with those below 10 years being the lowest. The total sputum smear positive cases were 175 (12.78%).

Males had the highest smear positivity rate with a prevalence of 8.0% while it was 4.82% among females. The overall prevalence was 12.78% (table III). There is significant difference in relation to sex ($P < 0.05$).

Table 1: Age and Sex distribution of the patients studied.

Age group	Males No. (%)	Females No. (%)	Total
0-10	5 (0.36)	18 (1.31)	23 (1.68)
11-20	73 (5.33)	70 (5.11)	143 (10.45)
21-30	214 (15.63)	219 (16.00)	433 (31.63)
31-40	257 (18.80)	139 (10.15)	396 (28.93)
41 –50	159 (11.61)	52 (3.80)	211 (15.41)
51-60	62 (4.52)	37 (2.70)	99 (7.23)
61-70	25 (1.82)	15 (1.10)	40 (2.92)
≥ 71	20 (1.46)	4 (0.29)	24 (1.75)
Total	815 (59.53)	554 (40.46)	1369 (100)

Table II: Age distribution of sputum Positivity/Negativity

Age group	Number tested	Sputum positive Number (%)	Sputum negative Number (%)
0-10	23	1 (0.07)	22 (1.60)
11-20	143	18 (1.31)	125 (9.13)
21-30	433	54 (3.95)	379 (27.68)
31-40	396	56 (4.09)	340 (24.84)
41 –50	211	23 (1.68)	188 (13.73)
51-60	99	14 (1.02)	85 (6.21)
61-70	40	5 (0.37)	35 (2.56)
≥ 71	24	4 (0.29)	20 (1.46)
Total	1369	175(12.78)	1194 (87.21)

DISCUSSION

This study revealed that the 21-30 years bracket had the highest (31.63%) number of patients while the age group with the lowest predisposition to PTB was 10 years and below (1.68%). However, the most vulnerable age group amongst the males in this study was 31–40 years and 21–30 years amongst the females. This finding is in agreement with previous studies.^{9, 16,17} This might be as a result of the fact that individuals in their 2nd and 3rd decades of life are more active and are more likely to mix with other people than the elderly and the very young.

The prevalence of sputum AFB smear positivity of 7.96% among males, 4.82% among females and an overall prevalence of 12.78% is low especially in this era of HIV/AIDS. This may not be unrelated to the fact that the method of microscopy did not involve concentrating the sputum as just simple microscopy using ZN technique was used. Concentrating the sputum (petroff's method) for AFB detection might have yielded more positive results. Additionally, sputum culture as well as repeated examinations would have also yielded more positive results. Positive sputum smears for Acid Fast Bacilli (AFB) are said to occur in 31-82% of TB cases associated with HIV disease with sensitivity decreasing in more severely immunocompromised individuals.^{18,}

¹⁹ It could also therefore, imply that our

patients might have presented with immunodeficiency which was not detected as screening for HIV is still not part of the investigations under the NTBLCP.

Onadeko *et al*¹² and Kolawole *et al*²⁰ in Ibadan, reported positive smear cases in 30% and 57% of cases of miliary TB and pulmonary TB, respectively before the era of HIV infection. Wokoma,²¹ in Port Harcourt reported that 39 of the 50 patients (78%) he studied had AFB isolated from their sputum. Eighteen (36%) out of the 50 patients tested positive ELISA tests for both HIV-1 and 2 serogroups. Acid-fast bacilli were isolated significantly more frequently in the sputum of the HIV-negative patients than in HIV-positive group among the patients he studied. Idoko *et al*²² reported sputum positivity rate of 48% in a cohort of 42 patients in Jos. Our finding is lower those of these studies carried out in other parts of Nigeria. This might not be unconnected with the fact that our patients might have been HIV-infected with severe immunocompromise as it has been shown that sputum smear positive rate of PTB in patients with HIV infection is less than in seronegative patients.²³

The prevalence of pulmonary tuberculosis has increased world wide because of the advent of HIV/AIDS.^{2,24} The prevalence of sputum smear positivity was significantly higher in males than females ($P < 0.05$) in this study, a finding that is similar to that of Gopi

*et al.*¹⁶ The reason for this disparity is, however, not clear as one would not expect any disparity between the sexes as far as sputum smear positive rate is concerned, after-all there are as yet no identifiable factors that reduce the chances of a female having sputum smear positive pulmonary tuberculosis as compared to her male counterpart.

Conclusion:

The prevalence of sputum smear positive pulmonary tuberculosis of 12.78% is lower than that obtained in other parts of Nigeria. However, this still places close contacts of TB patients at risk, more especially in the era of HIV infection. HIV screening should be incorporated into the DOTs programme of the National Tuberculosis and Leprosy Control Programme.

REFERENCES

- 1 Kochi A. The global tuberculosis situation and the new strategy of the World Health Organization. *Tubercle* 1991; 72:1-6
- 2 Gebre N' K, Kalsson U, Jonsson G, *et al.* Improved microscopical diagnosis of pulmonary tuberculosis in developing countries. *Trans. R Soc. Trop. Med. Hyg.* 1995;89:191-193.
- 3 Raviglione MC, Snider DE, Kochi A. Global epidemiology of tuberculosis morbidity and mortality of a world wide epidemic *JAMA* 1995; 273:220-226.
- 4 Bloom BR, Murray C. Tuberculosis: Commenting on re-emergence of killer. *Science* 1992; 257: 1055-1064.
- 5 Young LS. Treatable aspects of infection due to HIV. *Lancet* 1987; 11:150-156
- 6 Rutledge JA, Crouch JB. The ultimate results in 1654 cases of tuberculosis treated at the Modern Woodmen of America Sanitarium. *Am Rev Tubercle* 1919,2:755-63
- 7 Murray CJL, Styblo K, Rouillon A. Tuberculosis in developing countries burden intervention, and cost. *Bull Int. Union Tuberc Lung Dis* 1990; 65: 6-24
- 8 United Nations 1989. World population prospect: estimate and projections as assessed in 1988. New York: United Nations, 1989.
- 9 Murray CJL, Feachem RG. Adult mortality in the developing world. *Trans R Soc Trop Med* 1990; 84: 21-2.
- 10 Ukwandu NCD. Evaluating the laboratory technique used in diagnosis of sputum producing patients suspected of mycobacterial infection. *Am. Jour. Pub. Health.* 1996; 86: 1071-1073
- 11 Mario C, Raviglione MC, Richard JO. Tuberculosis. In: Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL (eds.).

- Harrison principles of internal medicine*. 15th edition; 2001
McGraw-Hill Medical publication division. P. 296
- 12 Onadeko BO Dickinson R, Sofowora EO. Miliary tuberculosis of the lungs in Nigerian adults. *East Afri Med. J.* 1975; 52: 390.
 - 13 Cheesbrough M. *District laboratory Practice in Tropical Countries*. Part 2, Cambridge University press; 39-43.
 - 14 Kent P, Kubica G. *Public Health Mycobacteriology: a Guide for the Level III Laboratory*. Atlanta, GA: Centers for Disease Control, 1985.
 - 15 Siddiqi K. Lambert ML, Walley J. Clinical diagnosis of smear negative PTB in low-income countries: the current evidence. *Infect Dis.* 2003; 3(5): 288-
 - 16 Gopi PG, Villishayee RS, Apple Gowda BN, *et al.* Tuberculosis prevalence survey based on symptoms questioning and sputum examination. *Indian J of tuberculosis*. 1997; 44; 171-180.
 - 17 Surveillance of tuberculosis in Europe, Among 34 countries with information on new or recurrent status of the cases notified in 1995. 5; 1-2.
 - 18 Klein NC, Duncanson FP, Lenox TH, *et al.* Use of mycobacterial smears in the diagnosis of pulmonary tuberculosis in AIDS/ARC patients. *Chest* 1989; 95: 1190-92
 - 19 Kramer F, Modilevsky T Waliany AR, *et al.* Delayed diagnosis of tuberculosis in patients with human immunodeficiency virus infection. *Am J Med* 1990; 89: 451-6.
 - 20 Kolawole TM, Onadeko BO, Sofowora EO, Esan GE. Radiological patterns of Pulmonary tuberculosis in Nigeria. *Trop Geogr Med* 1975; 27: 339-350
 - 21 Wokoma FS. HIV status of adult Nigerian patients suffering from pulmonary tuberculosis. *Nigerian Medcal Practitioner* 1997; 34:22 - 24.
 - 22 Idoko JA, Anteyi EA, Idoko LO, *et al.* HIV and associated TB in Jos, Nigeria. *Nigerian Medcal Practitioner* 1994; 28:24 - 50
 - 23 Elliot AM. Impact of HIV on tuberculosis in Zambia: a cross-sectional study. *Brit Med J* 1990; 301: 412- 415
 - 24 Harries AD. Tuberculosis and human immunodeficiency virus infection in developing countries. *Lancet* 1990; 335: 478-490.