International Journal of Mycobacteriology 3 (2014) 163–167

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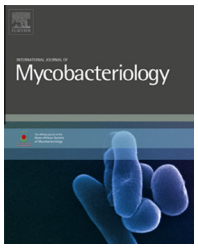

Diagnosis of smear-negative tuberculosis in Nigeria: Do health care workers adhere to the national guidelines?

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ARTICLE INFO

Article history:
Received 4 July 2014
Accepted 10 July 2014
Available online 5 August 2014

Keywords:
Tuberculosis
Smear negative
Diagnosis
National guidelines

ABSTRACT

Objective: The study sought to assess the extent to which healthcare workers (HCWs) adhere to the National Tuberculosis Program (NTP) guidelines for the diagnosis of smear negative tuberculosis in Nigeria.

Method: This was a cross-sectional retrospective desk analysis of case files of 280 smear negative pulmonary TB in six States in southern Nigeria.

Results: About 93% of the 280 patients had their first set of sputum smear microscopy tests done, but only 3.6% had the second set of diagnostic tests as prescribed by the NTP guidelines. Only 45.7% (128/280) received broad spectrum antibiotics after their first smear microscopy. 98% had a chest X-ray done, while 93.6% (262/280) had HIV counseling and testing (HCT), out of which 45.0% were HIV positive. Overall, only 2 patients (0.7%) were diagnosed in strict compliance with the NTP guidelines. There was no significant difference in the pattern of diagnosis of smear negative TB cases and smear positive TB cases.

Conclusion: The adherence of HCWs to the NTP guidelines for diagnosis of smear negative TB is apparently sub-optimal and needs improvement.

Introduction

Sub-Saharan Africa, including Nigeria, has witnessed a significant increase in the incidence of tuberculosis (TB) in the past few decades attributed to the increasing prevalence of HIV. The trend shows a disproportionate increase in smear negative cases relative to smear positive pulmonary TB. The diagnosis of smear negative TB in resource-poor settings is associated with significant difficulties, especially in HIV-infected patients [1–5]. This is believed to be a consequence of the following: the association between decreased host immunity and reduced sputum-smear positivity; difficulty in excluding other HIV-related diseases when making a diagnosis of smear-negative PTB; and an increase in false-negative sputum smears because of overstretched resources [6].

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http://dx.doi.org/10.1016/j.ijmyco.2014.07.005

The World Health Organization (WHO) recommends that the diagnosis of sputum smear-negative pulmonary TB should be based on the following criteria: at least 2 negative sputum smears (including at least 1 early-morning specimen); chest radiography findings consistent with TB; and lack of a response to a trial of broad-spectrum antimicrobial agents. For such patients, if facilities are available, sputum cultures should be obtained. In persons with known or suspected HIV infection, the diagnostic evaluation should be expedited [7]. Although non-response to the broad spectrum antibiotics may suggest TB, a positive response does not exclude it. The primary goal of an antibiotics trial is to treat concomitant bacterial infections that are common both in TB and non-TB patients [8].

In resource-constrained settings, the diagnosis of sputum smear-negative pulmonary TB relies heavily on the clinical judgement of a medical officer, both in the interpretation of the chest radiograph as well as the assessment of the patient's clinical status. Thus, making a diagnosis of smear-negative pulmonary TB is more or less subjective depending on the expertise of the physicians, particularly in settings where sputum culture is not available.

Previous studies have highlighted the need for an accurate and prompt diagnosis of smear negative pulmonary TB. Misdiagnosis of smear negative pulmonary TB often results in low coverage of early treatment, increased transmission of the disease, increased morbidity and an untimely death. At the same time, diagnosing or classifying individuals who do not have the disease as smear positive patients also leads to wastage of valuable resources, including time and materials [1].

Although operational research is necessary to determine the most cost-effective approaches to the diagnosis and

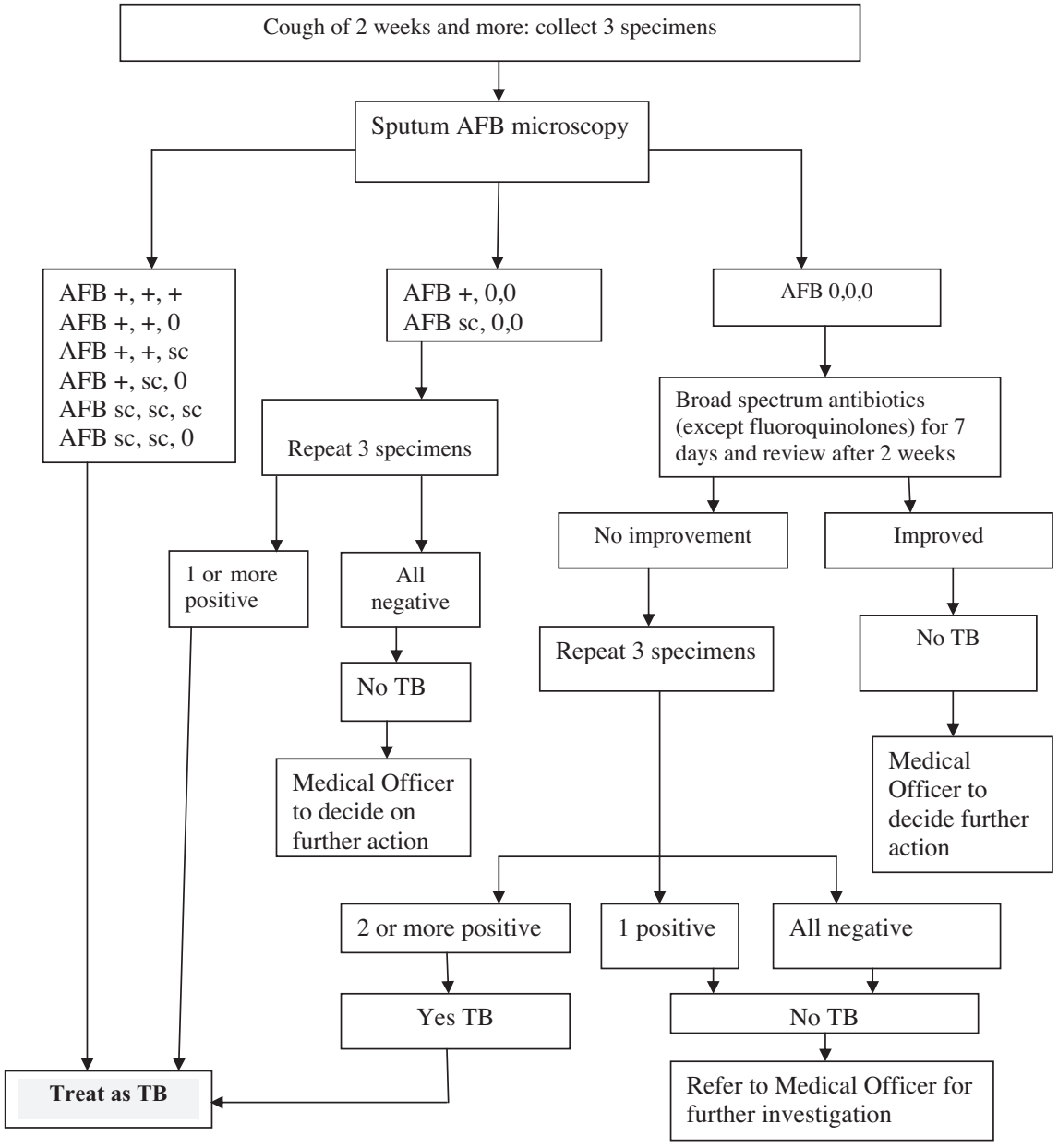

Fig. 1 – National algorithm for diagnosis of TB.

treatment of smear-negative PTB, substantial improvement could be obtained by implementing the effective measures already available, such as improved adherence to diagnostic and treatment guidelines. In recognition of these challenges and the threat posed by the HIV epidemic, a number of countries have revised their protocol to accommodate these developments.

In Nigeria, the algorithm for diagnosis of sputum smear negative pulmonary TB is as shown below [9] (see Fig. 1).

The objectives of the algorithm are to ensure standardization of diagnosis and reduce the delay in diagnosis, as well as provide a basis for monitoring the quality of the National TB Program (NTP). However, since adoption of the guidelines, there has not been any systematic effort to validate them for sensitivity and specificity and/or assess the level of compliance by health workers in the field. This study is aimed at ascertaining the degree of compliance to the NTP guidelines by health workers at the primary, secondary and tertiary levels of the healthcare delivery system. The main issues looked at include: the pattern of diagnosis of smear-negative PTB and the degree to which clinicians actually followed the criteria for diagnosing smear negative PTB in practice.

Methodology

The study was carried out in selected healthcare facilities supported by the German Leprosy and Tuberculosis Relief Association (GLRA) in six States in southern Nigeria. The States include: Ebonyi and Enugu in the south-east geopolitical zone; Bayelsa and Rivers in the south-south zone; and Ekiti and Ogun in the south-west zone. From each State, the healthcare facilities were selected purposively in the ratio of 2:6:2 for tertiary, secondary and primary healthcare facilities, respectively. Case files of all sputum smear negative pulmonary TB cases seen in the second quarter of 2010 (April to June) were selected and reviewed using a questionnaire. The following data were collected: age, sex, sputum smear result (1st and 2nd batches), CXR, HIV counseling and testing (HCT), administration of antibiotics, date of commencement of treatment following diagnosis, and whether the patient was seen by a medical officer.

Data collected were entered and analyzed using SPSS version 17. Findings were presented using relevant frequency tables, and the test of association was carried out using chi-square test. *P*-Value of 0.05 was assumed to be statistically significant.

Table 1 – Socio-demographic characteristics of the patients.

Socio-demographic characteristics of patients	N = 280	%
Age (in years)		
5–14	6	2.1
15–24	22	7.9
25–34	104	37.1
35–44	53	18.9
45–54	35	12.5
55–64	36	12.9
65+	24	8.4
Sex		
Male	137	48.9
Female	143	51.1

Limitation of the study

CXR findings were not included, and the basis of diagnosis of smear-negative PTB was not specified.

Result

A total of 280 patient records were reviewed comprising 143 (51.1%) females and 137 (48.9%) males (see Table 1).

More than half of the patients studied (56.1%) were aged between 25 and 44 years. One hundred and fifty patients (54.2%) visited a secondary health care facility; the remainder visited either a primary (23.6%) or tertiary (22.1%) healthcare facility. The majority of them (92.5%) were attended to by a medical doctor, and they included all but one of those who visited a tertiary health facility, and 94.7 and 81.8% of those who visited secondary or primary healthcare facilities, respectively. About 93% of the subjects had a first set of sputum smear diagnostic tests done, while only 3.6% of the patients did the second set of sputum smear tests. One hundred and twenty-eight (45.7%) of them received broad-spectrum antibiotics after the first set of sputum smear results and were asked to return after completing treatment. About 90% of them had a chest radiograph done. HIV counseling and testing (HCT) was offered to 262 (93.6%) patients, and a total of 118 patients (45.0%) were HIV positive, while the remainder (55.0%) were HIV negative.

Only two (0.7%) patients were diagnosed in total compliance with the diagnostic criteria, which included two smear negative results, two-week antibiotics trial, and a chest radiograph prior to commencing anti-TB therapy, as well as HCT (see Table 2).

Some of the patients managed in secondary (4.6%) and tertiary (19.3%) healthcare facilities were diagnosed without a sputum smear result. A greater proportion (66.1%) of those treated in the tertiary healthcare facilities was more likely to have received broad-spectrum antibiotics. Most of those who were not offered HCT were from the secondary healthcare facilities (11.2%); while about 20% and 10% of those seen in the primary and secondary healthcare facilities respectively had no chest radiograph. Although, primary healthcare facilities (50.0%) reported the highest proportion of HIV positive cases, there was no significant difference in proportion of HIV positive cases relative to the level of healthcare facilities ($X^2 = 1.08$, $p = 0.583$). The likelihood of having a chest radiograph done was associated with a higher level of healthcare facility. Patients seen in the tertiary facilities were less likely to have commenced treatment within 6 days of the first batch of sputum results ($X^2 = 17.62$, $p = 0.007$) (see Table 3).

There was no significant difference in pattern of management of sputum-smear PTB between HIV positive and HIV negative patients except for timing of commencement of anti-TB therapy. Those who were commenced on treatment at 14 weeks or more were more likely to be HIV positive ($X^2 = 6.19$; $p = 0.045$).

Table 2 – Pattern of management of smear-negative PTB at various levels of health facilities.

Diagnosis	Total N = 280 (%)	Level of healthcare facility		
		Primary N = 66 (%)	Secondary N = 152 (%)	Tertiary N = 62(%)
Had 1st batch of sputum smear test done				
Yes	261 (93.2)	66 (100)	145 (95.4)	50 (80.7)
No	19 (6.8)	0 (0.0)	7 (4.6)	12 (19.3)
Received broad spectrum antibiotics				
Yes	128 (45.7)	17 (25.8)	70 (46.1)	41 (66.1)
No	84 (30.0)	29 (43.9)	54 (35.5)	1 (1.6)
DNK	68 (24.3)	20 (30.3)	28 (18.4)	20 (32.3)
Had 2nd batch of sputum smear test done				
Yes	10 (3.6)	2 (3.0)	6 (3.9)	2 (3.2)
No	270 (96.4)	64 (97.0)	146 (96.1)	60 (96.8)
Had CXR done				
Yes	251 (89.6)	53 (80.3)	138 (90.7)	60 (96.8)
No	29 (10.4)	13 (19.7)	14 (9.3)	2 (3.2)
Had HCT				
Yes	262(93.5)	66(100.)	135 (88.8)	61 (98.4)
No	18 (6.5)	0 (0.0)	17 (11.2)	1 (1.6)
HIV serostatus (n = 262)	N = 262(%)	N = 66 (%)	N = 135 (%)	N = 61 (%)
Positive	118(45.0)	33 (50.0)	60 (44.4)	25 (41.0)
Negative	144(55.0)	33 (50.0)	75 (55.6)	36 (59.0)
Interval between first batch sputum and commencement of treatment (in days) (n = 264)	N = 264(%)	N = 66 (%)	N = 148 (%)	N = 50 (%)
0–6	173(65.5)	37 (56.1)	112 (75.7)	24 (48.0)
7–13	58 (22.0)	18 (27.3)	22 (14.9)	18 (36.0)
14–20	12 (4.6)	5 (7.6)	4 (2.7)	3 (6.0)
21+	21 (7.9)	6 (9.1)	10 (6.8)	5 (10.0)

Table 3 – Pattern of management of Sputum-smear PTB in relation to HIV serostatus.

Diagnosis		Level of healthcare facility X^2			p-Value
	Total N = 262 (%)	HIV Positive N = 118 (%)	HIV Negative N = 144 (%)		
Had 1st batch of sputum smear test done					
Yes	244 (93.2)	110 (93.2)	134 (93.1)	0.00	0.958
No	18 (6.8)	8 (6.8)	10 (6.1)		
Received broad spectrum antibiotics					
Yes	123 (46.9)	55 (46.6)	68 (47.2)		
No	75 (28.7)	28 (23.7)	47 (32.7)	4.21	0.121
DNK	64 (24.4)	35 (29.7)	29 (20.1)		
Had 2nd batch of sputum smear test done					
Yes	10 (3.8)	4 (3.4)	6 (4.2)	0.11	0.744
No	252 (96.2)	114 (96.6)	138 (95.8)		
Had CXR done					
Yes	235 (89.7)	107 (90.7)	128 (88.9)		
No	27 (10.3)	11 (9.3)	16 (11.1)	0.22	0.635
Interval between first batch sputum result and commencement of treatment (in days) (n = 247)	N = 247 (%)	N = 110 (%)	N = 137 (%)		
0–6	160 (61.1)	74 (62.7)	86 (59.7)		
7–13	54 (20.6)	17 (14.4)	37 (25.7)	6.19	0.045
14–20	12 (4.6)	10 (8.5)	2 (1.4)	df = 2	
21+	21 (8.0)	9(7.6)	12 (8.3)		

Discussion

Healthcare facilities for the management of TB in Nigeria cut across all levels of healthcare. Although the secondary healthcare facilities accounted for most of the case load seen in this study, in various States the level and type of health facility that accounts for a greater proportion of case loads vary in accordance with functionality and access. Until recently, there was limited involvement of tertiary healthcare facilities in Directly Observed Treatment Strategy (DOTS), which is the primary strategy for TB control in the NTP. An increasing incidence of sputum smear negative PTB in the country now provides the basis for their greater involvement in the NTP. Patients who visited primary healthcare facilities were less likely to be seen by a medical officer because most primary healthcare facilities in the country do not have medical officers.

The study revealed that sputum smear negative TB was often diagnosed without compliance with the national TB control program guideline/protocol. Reasons for non-compliance were not identified; however, low awareness and poor commitment to following the national guidelines were probable reasons. Harries et al. [10] reported that improved adherence to existing guidelines for diagnosis and treatment could go a long way in improving TB care and outcome. Contrary to the national guidelines, most of the patients were diagnosed without two smear negative results, and less than half of them received antibiotics trial despite having a chest radiograph done. Primary healthcare facilities most times do not have radiology services, so patients requiring such services are often referred to higher levels of healthcare. However, access to such services may be limited by distance and cost and may account for a delay in diagnosis of smear negative PTB. In Nigeria, a weak referral system and support constitute a major weakness in the country's healthcare system [11,12]. Chest radiograph findings – though they may not be specific – still constitute an important tool in the diagnosis of sputum smear negative PTB. Higher healthcare facilities were more likely to prescribe antibiotics in the management of suspected smear-negative PTB cases. Consequently, the interval in the completion of antibiotics might have accounted for the delay in initiating treatment seen in tertiary healthcare facilities.

Forty-five per cent of the patients treated were HIV positive. Thus, this study also compared steps taken to manage smear negative PTB from diagnosis until commencement of treatment between HIV positive and HIV negative individuals, but did not assess treatment outcome. It is evident from the study that patients were subjected to the same diagnostic protocol irrespective of their HIV sero-status. Sadly, the HIV-positive individuals were more likely to have commenced anti-TB treatment later compared with the HIV negative individuals. The advent of HIV has resulted in a number of countries revising their algorithm for management of smear negative TB in line with WHO recommendations so as to reduce time taken to diagnose TB in HIV-positive individuals, address challenges of atypical presentation of TB associated with HIV disease and the need to exclude other opportunistic diseases that present like TB. Revision of the guideline became necessary to improve case detection, reduce the burden of co-morbidity and reduce the mortality associated with both illnesses, as HIV-positive patients suffering from TB are more likely to deteriorate faster and die [4–6].

In conclusion, this study highlights the need to carry out further studies to identify factors responsible for non-adherence to the national TB guidelines in the diagnosis of sputum smear negative PTB. The implication of the study is that assessment of adherence to TB management protocol or guideline is a measure of quality assurance, hence a measure of performance of the National TB Control Program. Also, in line with the recommendation of Harries et al. [10], there is a need to validate the current guidelines in line with the current realities, particularly the HIV epidemic which has altered the previously known parameters of the management of smear negative pulmonary TB.

Conflict of interest

None declared.

Acknowledgement

The authors are grateful to TBCAP for their financial support.

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