Treatment outcome of Tuberculosis at a specialist hospital in North Western Nigeria - A 30 months retrospective study

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Date Received: Dec. 28, 2017
Date Revised: Jan. 08, 2018
Date Accepted: Mar. 10, 2018

Author Contributions

MAS BA UA conceived idea, MAS BG YI BAM planned the study, MAS BG drafted the manuscript, BAM UA KBS collected data, did statical analysis and interpretation, all critical reviewed manuscript & approved the final version to be published.

Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

ABSTRACT

Background: Tuberculosis (TB) is one of the global leading causes of morbidity and mortality and Nigeria is among the six countries that accounted for 60% of the new cases in 2015. Directly Observed Treatment Short course (DOTS) lead to improved treatment outcome with overall reduction in morbidity and development of multidrug resistant TB. The current goal of TB treatment is to achieve 85% treatment success.

Objective: To determine the type and form of TB, treatment outcome and Human Immunodeficiency Virus (HIV) status of patients managed at the DOTS clinic of Ahmad Sani Yariman Bakura Specialist Hospital (ASYBSH), Gusau - Nigeria.

Methodology: A retrospective study of patients managed for tuberculosis at the DOTS clinic over a 30 months period (Jan 2015 to June 2017). All patients that have completed treatment over the study period were enrolled. Relevant Information from the register was retrieved. Tuberculosis treatment outcomes were assessed according to World Health Organization (WHO) and National Tuberculosis and Leprosy Control Program (NTLCP) guidelines.

Results: Of the 415 patients, 76(18.3%) were children while 339(81.7%) were adults. Males were 254 (61.2%), with a M: F ratio of 1.6:1. 348 (83.9%) had pulmonary TB while 67 (16.1%) had extra pulmonary TB. Majority (97.6%) of the patients were new cases, while 4 (1.0%) were relapse. 184 (44.3%) had their treatment completed, 161 (38.8%) were cured, with a successful treatment outcome of 83.1%.

Conclusion: The patients were mostly males with smear positive pulmonary TB and HIV uninfected. Treatment outcome in these patients was close to the WHO bench mark. Nonetheless, it shows that childhood TB is still under diagnosed and under treated as the number of paediatric cases were low.

Key Words: Tuberculosis; DOTS; Treatment outcome; NW Nigeria

This article may be cited as: Sakajiki MA, Garba B, Ibrahim Y, Mohammed BA, Abdullahi U, Sada KB, Ibrahim TM. Treatment outcome of Tuberculosis at a specialist hospital in North Western Nigeria - A 30 months retrospective study. Pak J Chest Med 2018; 24 (1):04-9.

Background

Tuberculosis (TB) is one of the global leading causes of morbidity and mortality, with an estimated 10.4 million new TB cases worldwide in 2015.[1] This included 5.9 million (56%) men, 3.5 million (34%) women and 1.0 million (10%) children (of which <15 years accounted for 6.3%).[1] Tuberculosis, human immunodeficiency virus (HIV) co-infection accounted for 11.1% of these TB cases. Nigeria is among the six countries that accounted for 60% of the new cases.[1] In the same year, 480 000 new cases of

multidrug-resistant TB (MDR-TB) and 100 000 cases of rifampicin-resistant TB (RR-TB) were reported to be eligible for MDR-TB treatment.[1] According to the 2015 global TB report,[1] the disease is still under reported and under diagnosed due to the gap of 4.3 million between notifications of new cases and the estimated number of incident cases.

The World Health Organization (WHO) set up Directly Observed Treatment Short-course (DOTS) strategy which is made up of five operational components, together with government commitment to TB control.[2] It includes diagnosis and follow-up through sputum microscopy, use of standardized short-course drug regimens, accurate cohort recording and analysis, regular uninterrupted supply of drugs, and direct observation of commitment by a health facility.[2] It has been shown that DOTS lead to improved treatment outcome with overall reduction in morbidity and development of multidrug resistant TB.[2]

The current goals of WHO through the STOP TB partnership is to achieve 85% treatment success and 70% case detection.[3] The latest International target has been set for the period 2015-2035 to achieve 95% reduction in TB deaths and 90% reduction in TB incidence rate (<10/100,000) when compared with 2015.[4,5] With this new target, by 2025 it is expected that the TB treatment success rate should reach ⩾ 90% in all countries.[5]

Various studies conducted in different parts of Nigeria have shown that the treatment outcome for TB were below the WHO benchmark of 85%.[6-11]

Objective

To determine the type and form of TB, treatment outcome and HIV status of patients managed at the DOTS clinic of ASYBSH, Gusau, Nigeria.

Methodology

This was a retrospective study of patients managed for tuberculosis at the DOTS clinic of ASYBSH, Gusau, Zamfara State, Nigeria over a 30 months period (Jan 2015 to June 2017). The hospital started clinical activities in March 2013 while DOTS clinic commenced in January 2015. Gene Xpert machine was acquired in the hospital in October 2016, before then only sputum smear microscopy was available for detection of Acid fast bacilli (AFB).

All patients that have completed treatment over the study period were included in the study. Information retrieved from the register included age, gender, form of TB, type of TB, HIV status and treatment outcome. The results of AFB (using Ziehl Neelsen method) and Gene Xpert MTB/Rif resistance were also assessed. Culture and drug susceptibility testing for Mycobacterium tuberculosis (MTB) are not performed in our hospital due to lack of facilities.

Operational definition:

Clinical case and **treatment outcome** definitions were used according to the standard definitions of NTLCP[12] and WHO guidelines.[13]

Smear-positive tuberculosis: A patient with at least two sputum positive for AFB microscopy; or a patient who had only one sputum positive for AFB microscopy, and chest radiographic abnormalities consistent with active pulmonary TB.

Smear-negative tuberculosis: Symptomatic illness in a patient with at least two sputum smear examinations negative for AFB on different occasions in whom pulmonary tuberculosis is later confirmed by culture, biopsy, or other investigations.

Extra pulmonary TB (EPTB): Tuberculosis of organs other than the lungs.

Treatment outcomes: Tuberculosis treatment outcomes were classified as follows:

1. Cured - sputum smear positive patient who was sputum negative in the last month of treatment and on at least 1 previous occasion.
2. Treatment completed – Patient who has completed treatment but who does not meet the criteria to be classified as a cure or a failure.
3. Treatment failure- Any TB patient who is sputum smear positive at 5 months or later during treatment.
4. Died - Patient who died from any cause during the course of treatment (regardless of the cause of death).
5. Lost to follow up - Patient whose treatment was interrupted for two consecutive months or more after registration.
6. Not evaluated - A TB patient for whom no treatment outcome is assigned (includes case of transferred out to another treatment unit) where the treatment outcome is unknown.
7. Transferred out - A TB patient who has been transferred to another local government area to continue his/her treatment and for whom treatment outcome is not known.
8. Removed from TB treatment register- Patient who became MTB detected/Rif resistance detected at any point of their treatment and who is moved to

2nd line treatment register.

The WHO classified treatment outcome as successful (cure or treatment completed) or unsuccessful (default, treatment failure or death).[14]

Ethical approval: An ethical approval for the study was obtained from the Institutional Ethical Committee.

Statistical analysis: Data was entered into the Microsoft Excel and transferred into the Statistical Package for Social Sciences version 21 (Chicago Illinois) for cleaning and analysis. Quantitative variables were presented as mean±standard deviation and as frequencies/ percentages; while qualitative variables were analysed using Chi square, McNemar's and Fisher's exact tests where applicable. The level of significance p was set at ⩽ 0.05.

Results

Of the 415 patients, 76 (18.3%) were children below the age of 18 years; while 339 (81.7%) were adults. The mean age ± SD was 32.78 ± 1.82 years, with a range of 7 months to 85 years.

Majority of the patients belonged to the 25-34 years age group as shown in Table 1.

Males were 254 (61.2%) and females were 161 (38.8%), with a M:F ratio of 1.6:1. There were more male adults than female adults or children which was significant (χ^2 = 18.504, p=0.000).

Pulmonary TB was seen in 348 (83.9%) and extra pulmonary TB in 67 (16.1%), of which 216 (52.0%) males had pulmonary TB while 38 (9.2%) had extra pulmonary TB which was not significant (χ^2 = 0.678, p = 0.410). Only 9.4% of the patients were HIV positive of which majority had pulmonary TB, which was not significant (Fisher's exact p = 0.064) as shown in Table 2.

Majority (97.6%) of the patients were new cases, while 4(1.0%) were relapse, 3(0.7%) were TB patients with unknown previous TB treatment history, 2(0.5%) were treatment after failure and 1(0.2%) was treatment after lost to follow up.

154 (37.1%) were smear positive while 213(51.3%) were smear negative, no documented result for 48 (11.6%) of the patients (mostly children). GeneXpert MTB/RIF detected MTB in 54 (13.0%) of which 2 (0.5%) were MTB/RIF resistant, while MTB was not detected in 40 (9.6%), the remaining patients were not tested. There was no significant difference between gender with AFB detection (Fisher's exact p = 0.219) nor with MTB detection (Fisher's exact p = 0.681).

Mycobacterium tuberculosis was detected in 37 (26.8%) patients with smear positive TB, and in 16 (11.6%) with smear negative TB, this was significant (McNemar's χ^2 test p=0.001). More males 36 (66.7%) had MTB detected compared to 18 (33.3%) females, though not significant (Fisher's exact p= 0.681), and 100.0% of the RR TB were seen in males. Similarly, more males were smear positive 101(65.6%) compared to 53 (34.4%) females, which was also not significant (p = 0.219).

Table 1: Distribution of number of patients according to age range

Age range (years)	Frequency (n)	Percentage (%)
<15	58	14.0
15-24	76	18.3
25-34	111	26.7
35-44	67	16.1
45-54	37	8.9
55-64	38	9.2
≥ 65	28	6.7
Total	415	100.0

Table 2: HIV status according to form of TB

HIV status	Form of TB	
	Pulmonary n (%)	Extra pulmonary n (%)
Positive	37(8.9)	2(0.5)
Negative	311(74.9)	65(15.7)
Total	415	100.0

n= number, %= percentage

Table 3: Treatment outcome of patients managed at the DOTS clinic according to gender

Treatment outcome	Males no (%)	Females no (%)	Total no (%)
Cured	105 (25.3)	56 (13.5)	161(38.8)
Treatment completed	101 (24.3)	83 (20.0)	184 (44.3)
Transferred out	24 (5.8)	11(2.7)	35 (8.4)
Died	18 (4.3)	11(2.7)	29 (7.0)
Treatment failure	2 (0.5)	0 (0.0)	2 (0.5)
Lost to follow up	2 (0.5)	0 (0.0)	2 (0.5)
Removed from register	2 (0.5)	0 (0.0)	2 (0.5)
Total	254 (61.2)	161(38.8)	415 (100.0)

n= number, %= percentage

Most of the patients (44.2%) had their treatment completed while 38.8% were cured as shown in Table 3, particularly in males. The overall successful treatment outcome was 83.1%, while unsuccessful outcome was seen in 8.4% of the patients. More males died from the disease than females, with 7 (24.1%) of the mortalities having HIV TB co infection, while the remaining 22 (75.9%) where HIV negative. HIV/TB co infected patients had higher mortality than HIV negative TB patients (p = 0.0124).

Discussion

This is the first documented study on treatment outcome of tuberculosis patients from Gusau, Zamfara State, North Western Nigeria. The retrospective method of this study is similar to many reports on treatment outcome of TB patients from Nigeria[6-11] and other countries across the globe.[16-18, 20,21]

More males were treated for TB than females, which is similar to reports from Bayelsa,[2] Nassarawa,[6] Ibadan,[8] Abia,[9] Ogbomosho,[10] Ekiti,[11] Abuja,[15] Ethiopia,[16-18] Anambra[19] and Russia.[20] This contrasts findings from Ife[7] and Ethiopia,[21] where more females were treated for TB. Reason for male preponderance may be more exposure to risk factors for TB than females, although not proven by the study design. Global TB report has shown that more males than females are affected by the disease.[1] Another reason could be as a result of socio-cultural factors in the area that expose male to overcrowding which could lead them to becoming infected. A study in Bangladesh on access of TB diagnosis and treatment showed that women have poor access to public outpatient clinic than men, hence the underutilization of the DOTS services by females.[22]

The 25-34 year age group constitute the group with highest TB infection similar to findings by Tessema et al from North West Ethiopia,[18] Ndubuisi et al from Anambra[19] and Beza et al from Demba Ethiopia,[21] but contrast report by Erhabor et al from Ife[7] where age group 16-25 years predominated. Majority of the patients fall within 15-44 years which is the age range of the active workforce, this has a negative impact on socioeconomic well being of the society.

Children below 15 years of age represented 14.0% of the study population, similar to 13.7% reported from Demba Ethiopia.[21] This is higher than 6.2% obtained at Ife,[7] but lower than 18.7% from North West Ethiopia.[18] This reflects findings from the global TB report[1] which showed that in 2015 only 6.3% of TB patients were children <15 years of age. This shows TB is still under diagnosed and under reported in children.

The finding of the TB patients being predominantly pulmonary than extra pulmonary conforms with other studies.[6,8,10,11,17,18,21] Reason for this could be explained by the fact that TB cases are primarily pulmonary and is easier to diagnose than extra pulmonary that requires high index of suspicion.

Most of the patients treated were new cases, this study is consistent with findings from Nassarawa[6] and Gonder Ethiopia.[16] This can be explained by better awareness of the disease and availability of drug treatment with possible adherence to medications.

Even though HIV-TB co-infection is a common finding, the HIV positive patients were few constituting 9.4%, which is close to 10.9% from Demba Ethiopia[21] but lower than 48.0% from Nassarawa,[6] 16.9% from Abia,[9] 20.0% from Ekiti,[11] 42.7% from Abuja[15] and 13.4% from Gonder Ethiopia.[16] Reason for the low prevalence of HIV TB co infection could be attributable to the fact that Zamfara State has the lowest HIV seroprevalence in the country with 0.9%.[23] Majority of the cases were smear negative pulmonary TB similar to the findings in Demba Ethiopia.[21] Low fatality rate was seen in these patients which is lower than what was reported from Demba Ethiopia.[21]

Smear positivity rate was similar to 37.4% reported from Bayelsa,[2] but higher than 19.1% reported from Gonder Ethiopia,[16] 16.8% from North West Ethiopia,[18] 35.4% from Southern Ethiopia,[17] 20.4% from Demba,

Ethiopia,[21] 34.3% from Kwara,[24] however lower than 84.3% from Abia.[9] Reasons for the variations may be explained by the difference in sample size and age range as some studies did not include children which are mostly smear negative.

Most of the studies on treatment outcome of tuberculosis patients did not describe the Gene Xpert results probably due to lack of availability of the test at time of the study. In this study, Gene Xpert MTB Rif detection was lower than what was reported by Rasaki et al[24] from Kwara. Similarly the Rifampicin resistance rate was also lower than what was reported from Russia[20] and Kwara.[24]

The treatment success rate obtained in this study is close to the WHO bench mark of 85.0% and this research finding corroborate a study from Nassarawa.[6] It is however higher than what was obtained in Bayelsa,[2] Ekiti,[11] Abuja,[15] Gonder Ethiopia,[16] North West Ethiopia,[18] and India,[25] but lower than reports from Ife,[7] Abia,[9] Ogbomosho,[10] South Ethiopia,[17] Anambra[19] and Demba Ethiopia.[21] Reasons for the discrepancies may be attributed to methodology with respect to sample size and age range, however it could also be due to low mortality, default and transfer rates observed.

Tuberculosis mortality in this study is higher than reports from Ife,[7] South Ethiopia,[17] Anambra[19] Russia[20] and Demba, Ethiopia.[21] However, it is lower than reports from Nassarawa,[6] Ibadan,[8] Ogbomosho,[10] Ekiti,[11] Gonder Ethiopia,[16] North West Ethiopia,[18] India[25] and Kano.[26] Even though the mortality rate was 7.0%, it can be improved upon by early diagnosis and treatment of TB patients. Lost to follow up and treatment failure were low, which may be due to adequate counselling of patients and treatment adherence. The lost to follow up rate is lower than reports from Ife,[7] Nassarawa,[6] Ogbomosho,[10] Ekiti,[11] Abuja,[15] Gonder Ethiopia,[16] North West Ethiopia,[18] Anambra,[19] Russia,[20] Demba Ethiopia[21] and India.[25]

The patients transferred were referred to DOTS centres close to their homes to continue TB treatment. The number of patients transferred was higher than what was reported from Ife,[7] Ibadan,[8] Ogbomosho,[10] Ekiti,[11] Demba, Ethiopia[21] and India,[24] but lower than reports from North West Ethiopia,[18] and Russia.[20]

Treatment failure rate was higher than what was obtained from Ogbomosho,[10] Southern Ethiopia[17] and North West Ethiopia,[18] but lower than what was obtained from Nassarawa,[6] Ife,[7] Abuja,[15] Gonder Ethiopia[16] and Anambra.[19] Only 2 patients were removed from the register and referred to centre where drug resistant TB cases are managed.

Conclusion and recommendations

Tuberculosis patients were mostly males with smear positive pulmonary TB and HIV uninfected. The treatment outcome in these patients was close to the WHO bench mark. Nonetheless, it shows that childhood TB is still under diagnosed and under treated.

We recommend early diagnosis by increasing awareness of symptoms of TB through health education so that early enrolment into the DOTS clinic is done to improve the treatment outcome. We also recommend screening children cohabiting with TB infected adults so as to improve the TB detection rates among children.

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