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Outcome of Childhood Tuberculosis at a Specialist Hospital in Gusau, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors GBI and MAS conceptualised and designed the study, performed the statistical analysis, drafted the manuscript and critically revised the manuscript. Authors YI and ITM obtained the data, performed statistical analysis and revised the manuscript. Authors AMM, YT and OSO reviewed the analyses of the study, literature searches and revised the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Tuberculosis (TB) is a chronic infectious disease that is preventable and curable, yet a major cause of childhood morbidity and mortality. Tuberculosis prevalence and mortality are under-estimated in many high burden countries. Directly Observed Treatment Short course (DOTS) enhances treatment outcome with an overall reduction in morbidity and development of multidrug resistant TB.
Objective: To determine the pattern and outcome of childhood tuberculosis managed at the DOTS clinic in Gusau, Nigeria.
Methodology: A retrospective study of children managed for TB at the DOTS clinic over a 30

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months period. The clinic serves both children and adults. All children (≤ 18years) treated for tuberculosis over the study period were included. Relevant information from the register was retrieved and analysed accordingly. Treatment outcomes were assessed according to World Health Organisation (WHO) and National Tuberculosis and Leprosy Control Programme (NTLCP) guidelines**.** "Cured'' and "treatment completed'' outcomes were classified as treatment successful.
Results: Of the 415 patients managed, 76(18.3%) were children; males were 30(39.5.2%), with a M: F ratio of 1:1.5. Mean±SD age was 8.89±5.38 years, with 29(38.2%) being in the 0-5 years age group. Pulmonary TB (PTB) was seen in 58(76.3%), more females had pulmonary TB than males, which was not significant ($\chi 2=1.350$, $p=0.245$). Seventy-five (98.7) were new cases, with 1(1.3%) treatment after failure.
Acid-fast bacilli (AFB) were positive in 12(15.8%) while GeneXpert MTB/RIF sensitivity was detected in 7(9.2%). Majority 51(67.1%) completed treatment, 12(15.8%) were cured, 9(11.8%) were transferred out, 3(3.9%) died, while 1(1.3%) was lost to follow up; with the successful outcome of 82.9%.
Conclusion: Treatment outcome using DOTS strategy was excellent, with a success rate close to 85.0% of WHO benchmark. The proportion of childhood TB indicates that childhood TB as compared to the adult cases is still under diagnosed and undertreated.

Keywords: Childhood; DOTS; gusau; tuberculosis; outcome.

1. INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease that is preventable, treatable and curable; yet still a significant cause of childhood morbidity and mortality. To decrease transmission of the disease, effective identification, diagnosis and treatment of infectious TB patients is required [1]. A proven strategy to ensure patients' adherence to anti-tuberculous medication is the use of DOTS therapy [2].

DOTS involves mainly an early diagnosis of quality provided sputum-smear microscopy and standardised short-course anti-TB treatment given under direct and supportive observation [3]. Other components are a regular, uninterrupted supply of high-quality anti-TB drugs, standardised recording and reporting; and sustained political and financial commitment. It aimed at ensuring that patient with TB complete treatment to cure and prevent the development of drug-resistant TB in the community [3].

Evidence has suggested that TB prevalence and mortality are under-estimated in many high burden countries including Nigeria [4-7]. DOTS is associated with significantly improved treatment outcome with an overall reduction in morbidity and development of multidrug-resistant TB [1].

1.1 Objective

To determine the pattern and outcome of childhood tuberculosis managed at the DOTS clinic in Gusau, Zamfara State, Nigeria.

2. METHODOLOGY

This was a retrospective study of children managed for tuberculosis at the DOTS clinic of Ahmad Sani Yariman Bakura Specialist Hospital (ASYBSH), Gusau, Zamfara State, Nigeria over a 30 months period (1st Jan 2015 to 30th June 2017). All patients who have completed treatment over the study period were included in the investigation. GeneXpert machine was acquired in the hospital in October 2016, before that only sputum smear microscopy and gastric washout were available for detection of Acid fast bacilli (AFB). Relevant information from the register were retrieved and analysed accordingly. Tuberculosis treatment outcome was assessed according to WHO [8] and NTLCP [9] guidelines.

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.

"Cured'' and "treatment completed outcomes" were referred to as treatment successful while outcomes such as death, default and treatment failure were considered unsuccessful.

3. RESULTS

Of the 415 patients managed at the DOTS clinic over the study period, 76(18.3%) were children ≤18 years. Males were 30(39.5.2%), with a M:F ratio of 1:1.5. Mean±SD age was 8.89±5.38 years (range of 7 months to 17 years). Majority were aged 5 years and below as shown in Table 1.

Pulmonary TB was seen in 58(76.3%) and extrapulmonary TB in 18(23.7%). More females had pulmonary TB than males, which was not statistically significant ($\chi 2=1.350$, $p=0.245$). Seventy five (98.7%) of the patients were new cases, while 1(1.3%) was treatment after failure.

Acid fast bacilli were positive in 11(14.5%) while Gene Xpert MTB/RIF sensitive was detected in 7(9.2%) and only one (1.3%) was HIV positive as shown in Table 2. AFB was not carried out in some children due to difficulty obtaining sample. GeneXpert was positive in 7(9.2%) and MTB was not detected in 8(10.5%), however, 61(80.3%) children did not have GeneXpert done due to lack of availability of the machine.

Fifty one (67.1%) had their treatment completed as shown in Table 3, with 82.9% successful treatment outcome. All the 3(3.9%) deaths occurred in the 6-10 year age group.

Table 1. Frequency distribution of various age groups

Age range (years)	Frequency (Percentage)
0-5	29(38.2)
6-10	17(22.4)
11-15	22(28.9)
16-18	8(10.5)
Total	**76(100.0)**

4. DISCUSSION

Directly Observed Treatment Short course have been found to be effective and efficient in treating TB [1,2]. The study showed more females treated than males, which is comparable to what was reported by Panigatti et al [10] but contrasts reports Ramesh et al,[11] Nandimath et al [12] and Bandichhode et al [13] This contrasts the Global TB report [4] which showed more males being affected than females, reason for the disparity cannot be explained. The under fives were mostly affected which was similar to other studies done by Ramesh et al [11]. Nandimath et al [12] and Bandichhode et al [13] however contrasts findings by Adejumo et al [14]. This could be explained by such age group are prone to infections and some of the children may not have been immunised against tuberculosis, however this was not looked for in this study.

Majority of our patients had PTB, which is similar to reports from other studies [11,13,14] but contrasts findings by Panigatti et al [10]. This is because TB cases are primarily pulmonary and is easier to diagnose than extra pulmonary which requires high index of suspicion.

Most of the patients were new cases similar to findings by Adejumo et al [14] in Lagos and Daemo et al [15] in Ethiopia. This can be explained by better awareness about the disease and availability of drug treatment with increased presentation to the hospital.

Table 2. Results of investigation carried out on the children

Test	Positive result	Negative result	Not done/Not tested
HIV	1(1.3%)	75(98.7%)	0(0.0%)
AFB smear	11(14.5%)	51(67.1%)	14(18.4)

Table 3. Treatment outcome of the cases

Outcome	Frequency (Percentage)
Treatment completed	51(67.1)
Cured	12(15.8)
Transferred out	09(11.8)
Died	03(3.9)
Lost to follow up	01(1.3)
Removed from register	00(0.0)
Total	76(100.0)

The AFB detection rate in this study was low, however it was higher than 5.3% obtained in Kerala [11] and 10.7% in Solapur; [12] but lower than 20.7% reported from Ethiopia [15]. Reason for the low AFB detection rate may be because of rarity of smear positive TB in children and difficulty getting sputum/gastric samples from children. The MTB detection using GeneXpert was also low, and none of the available studies reviewed reported on the yield of GeneXpert in children.

Only 1.3% had HIV/TB co infection, in contrast to 15.4% in Ethiopia [15] and 19.5% in Abuja [16]. Even though the study is hospital based, reason for the low prevalence could be attributable to the fact that Zamfara State has the lowest HIV seroprevalence in the country with 0.9% [17]. However, a previous study in Gusau, Zamfara State by Mado et al [18] reported HIV/TB co infection of 8.0%. The reason for the disparity could be explained by the fact that the previous study was conducted in 2008 when the seroprevalence rate was higher.

The outcome showed majority of the cases completed treatment, with an overall successful outcome close to the 85.0% WHO bench mark. Other studies also showed similar outcome and overall good success rate [10,12-14,19] however our treatment success rate is higher than 77.4% reported by Adejumo et al [14] and 78.9% by Kebede et al [19]. The mortality rate seen in this study was low, which is similar to 3.5% reported from Ethiopia [15] but higher than 1.1% reported from India [12,13]. It is however lower than 6.0% reported from Lagos[14] and 28.4% from Kano [20]. The reason for the differences could be due to difference in methodology (some studies were retrospective others prospective, sample size); timing of presentation; presence of complications and other associated medical problems.

5. CONCLUSION

Treatment outcome of children treated for TB in our centre was good, with a success rate close to WHO benchmark of 85.0%. The proportion of 18.3% childhood TB as compared to the adult cases indicates that childhood TB is still under diagnosed and under treated.

6. LIMITATIONS

The study was retrospective, hence timing of presentation and presence of complications were not looked at.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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