

Differences in the health profile and outcomes of treatment between non-retreatment and retreated groups of Tuberculosis patients in Botswana

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Abstract

In health sciences, the profile of the studied population has important implications because of the need to take into account personal characteristics of patients in devising and applying the findings for policy and treatment purposes. This study was conducted to establish the profile of retreatment tuberculosis (TB) patients as well as the outcomes of treatment in these patients in comparison to non-retreatment patients in Kanye District in Botswana. This study was conducted using a review of records of TB patients treated in Kanye District of Botswana. Eligible patients were identified by using TB register available at each clinic and the databases in the electronic TB registers at the district level. Overall, a total of 1209 patients were treated for TB during the study period. Of this, 99 were retreatment cases, yielding a prevalence of 9.1%. The mean age of the study population was 46.63 (± 3) years; the majority of them were males (51.7%) and 40 years old or less (57.7%). Compared to the non-retreatment cases, patients retreated or retreatment cases were significantly older than 40 years (67.3% versus 58.9%, $p=0.00009$) and were of the male gender (72.4% versus 54.2%, $p=0.00001$). The outcomes of treatment in retreatment cases were poorer as compared to non-retreatment cases in that the overall treatment success was 51.5% versus 75.3%; non-retreatment cases were at least two times more likely to be successfully treated than retreatment cases ($OR=2.35 [1.51, 3.66]$, $p=0.00017$). In conclusion, non-retreatment cases differed from retreatment cases not only in terms of their socio-demographic characteristics but also about treatment outcomes. Interventions such as prescribing of effective regimens containing newer drugs and adherence support should be contemplated.

Keywords: Tuberculosis, re-treatment, outcomes, Botswana

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Introduction

In health sciences, the profile of the studied population has important implications because of the need to take into account personal characteristics of patients in devising and applying the findings for policy and treatment purposes (Elissen et al, 2016; Silva Machado et al, 2012). Similarly, outcomes of treatment have been known to vary based on the individual features that act as facilitators or barriers to healthy behaviors as well as factors affecting adherence to treatment (Makwakwa et al, 2014; Malangu, 2008; Sanjobo et al, 2009).

With regard to tuberculosis treatment, retreatment cases include patients who need to be treated *de novo* despite having had a full or partial course of treatment. For the treatment of tuberculosis to be successful, anti-tuberculosis drugs should be taken for a minimum period of six months if it is non-resistant pulmonary tuberculosis or sometimes 12 to 24 months in the case of extra-pulmonary and resistant tuberculosis (Naing et al, 2001; Hasker et al, 2008).

It is well known that treatment default could result in treatment failure, the emergence of drug-resistant tuberculosis might increase the cost of treatment and even death of the patients (Pooran et al, 2013). Moreover, contacts of retreatment tuberculosis cases with a prior poor treatment outcome are known to be at increased risk of tuberculosis infection (Baliashvili et al, 2015). For the above reasons, it is important to identify the profile of retreatment cases that were not cured so that they can be targeted for focused management interventions. Therefore, this study was conducted to establish the profile of retreatment tuberculosis patients as well as the outcomes of treatment in these patients in comparison to non-retreatment patients in Kanye District in Botswana.

Methods

This study was conducted using a review of records of tuberculosis patients treated in Kanye District of Botswana from January 2009 to December 2013. This district is located in the mountainous region of Southern Botswana; being bordered by Moshupa, Lobatse, and Jwaneng districts; its population was estimated to be 47,007 people in 2001 (Botswana Statistics Census, 2011). With regard to patients treated for tuberculosis, no sampling was conducted, all patients treated for tuberculosis during the study period were included in the study. By December 2013, the total number of patients treated for tuberculosis in the district was 1209. The records of all patients that were treated at the study sites were included; the records of patients not suffering or not registered as TB re-treatment cases outside the study period were excluded. Eligible patients were identified by using the TB (tuberculosis) registers available at each clinic and the electronic TB register at the district level. Ethics approval for the study was obtained from the Medunsa Research Ethics Committee of the University of Limpopo and permission to collect data from the health authorities in Botswana.

Data analysis

Data collected were captured into a spreadsheet and analysed using Stata 10. The accuracy of data capturing was performed using a printout. Descriptive statistics were calculated, and a comparison was made between retreatment cases and non-retreatment cases. Inferential statistics were performed with the level of statistical significance being set at a p-value of less than 0.05 as statistically significant.

Results

Overall, a total of 1209 patients were treated for TB during the study period. Of this, 99 were retreatment cases, yielding a prevalence of 9.1%. The mean age of the study population was 46.6 (± 3) years; the majority of them were males (51.7%) and 40 years old or less (57.7%).

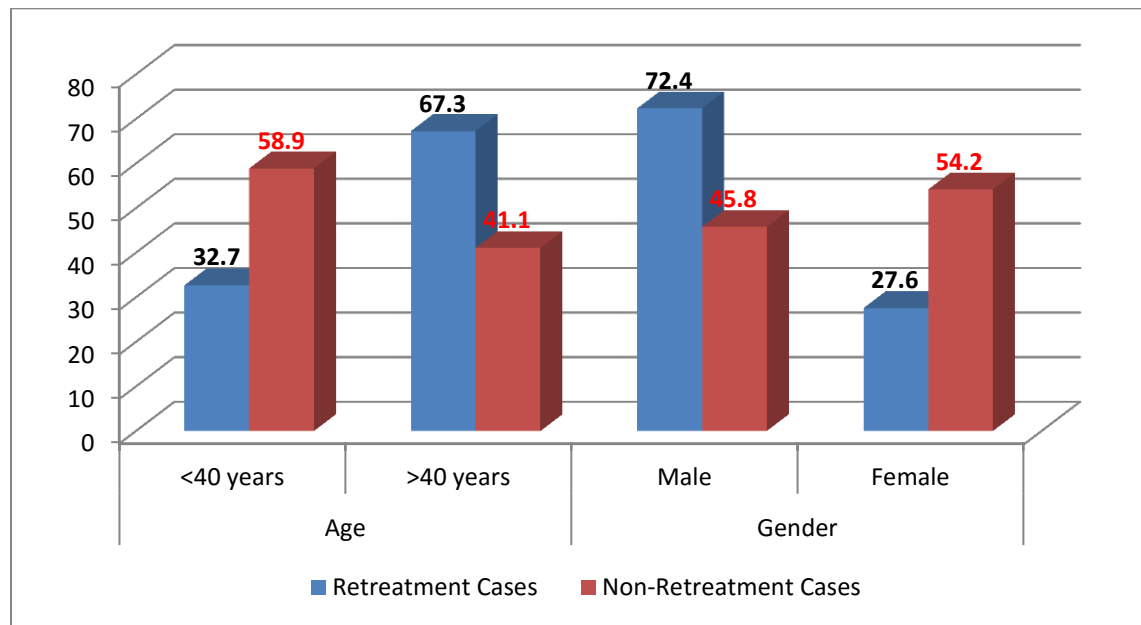


Figure 1: Age and sex distribution among retreatment and non-retreatment cases (n=1209)

Compared to the non-retreatment cases, patients retreated or retreatment cases were significantly older than 40 years (67.3% versus 58.9%, $p=0.00009$) and male (72.4% versus 54.2%, $p=0.00001$). Though pulmonary TB affected both groups at similar rates; in instances of extra-pulmonary TB, retreatment cases suffered significantly more from pleura-sited TB than non-retreatment cases (55.6% versus 3.3%, $p=0.00001$). While TB sited in the peritoneum was more significantly present in non-retreatment cases than in retreatment cases (69.4% versus 11.1%, $p=0.00001$).

Table 1: Sites of extra-pulmonary tuberculosis in non-retreatment and retreatment cases (n=218)

Extra-pulmonary sites	Non-Retreatment Cases		Retreatment cases	
	Frequency	Percentage	Frequency	Percentage
Pleura	7	3.3	5	55.6
Lymph nodes	25	12.0	1	11.1
Peritoneum	145	69.4	1	11.1
Miliary	15	7.2	1	11.1
Joints and bones	7	3.3	0	0.0
Pericardium	9	4.3	1	11.1
Meninges	10	4.8	0	0.0

With regard to co-morbidities, treatment records show that retreatment cases suffered more from HIV and had been more on ART than non-retreatment cases (58.2% versus 36.2%, $p=0.00002$) and co-trimoxazole (53.1% versus 36.0%, $p=0.0001$). Moreover, the outcomes of treatment in retreatment cases were poorer as compared to non-retreatment cases in that the overall treatment success was 51.5% versus 75.3%; non-retreatment cases were at least two times more likely to be successfully treated than retreatment cases (OR=2.35 [1.51, 3.66], $p=0.00017$). In addition, the rates of treatment failures were significantly higher in retreatment cases than the other group; being 4.0% versus 1.3% (OR=3.60 [1.16, 11.21], $p=0.017$). Furthermore, the case fatality rate was higher but not statistically significant in retreatment cases being 11.2% versus 10.0% (OR=1.25 [0.61, 2.36], $p=0.49$).

Table 2: Treatment outcomes in non-retreatment and retreatment cases (n=1198)

Treatment outcome category	Non-retreatment cases		Retreatment cases	
	Frequency	Percent	Frequency	Percent
Success	827	75.3	51	51.5
Death	110	10.0	11	11.1
Failure	14	1.3	4	4.0
Unknown	148	13.5	33	33.3

Discussion

Knowing about the profile of retreatment case patients and the related outcomes of treatment is important to implement a “patient-centered care” approach which is based on a thorough understanding of the patients being served (Silva Machado et al, 2012; Elissen et al, 2016). The findings of this study have shown that male patients who are over 40 years old are more likely to be retreated for TB. This finding is consistent with reports from other studies that pointed out that male gender is a risk factor for default to TB treatment. However, it is concerning that adults over 40 years who are supposed to be responsible and thus more capable of understanding the importance of treatment, appear to be the ones who defaulted more (Ade et al, 2016). The prevalence of retreatment of 9.1% as found in this study is similar to figures reported by other investigators in Southern Africa and elsewhere (Marx et al, 2012; Middelkoop et al, 2012; Kapata et al, 2013). This finding suggests that retreatment is indeed a common phenomenon that should be given due attention.

Although the causes of retreatment were not explored in this study, findings from other researchers suggest that some retreatment cases are due to patients defaulting treatment and or getting re-infected particularly those with compromised immune system such as those who have HIV. Indeed, in this study, patients on retreatment were more likely to take antiretroviral treatment than the others; suggesting that they were co-infected with HIV (Metcalfe et al, 2014; Osman et al, 2015). This finding implies that patients that had completed a full course of anti-tuberculosis treatment and presented with signs of active TB should be thoroughly checked for co-morbidities so that a comprehensive treatment plan can be devised in line with a patient-centered care approach.

With regard to the outcomes of treatment, the findings of this study have confirmed reports from several other settings that treatment success in retreatment cases is poor owing to drug resistance, and poor adherence (Malangu and Ibrahim, 2015). In this study, just a little over half of the patients were successfully treated while treatment failure was 3.6 times higher than in non-retreatment cases. Other investigators have reported similar results showing that treatment outcomes in retreatment cases are inadequate (Mabunda et al, 2015; Nabukenya-Mudiope et al, 2015; Nakanwagi-Mukwaya et al, 2015; Acuña-Villaorduña et al, 2015). This finding suggests that efforts should be directed at avoiding retreatment in the first place (Cadosch et al, 2016). Hence patients prone to defaulting treatment should be identified from the onset of treatment and given the support based on their circumstances so that they can adhere to treatment and complete the course of treatment (Marx et al, 2012; Middelkoop et al, 2012; Metcalfe et al, 2014; Field et al, 2014).

Given the high treatment failure rate and a low treatment success, it is suggested that decision-makers and clinicians should consider using new drugs such bedaquiline and delamanid in the treatment of retreatment cases because it is well established that over 20% of cases are resistant tuberculosis (Sotgiu et al, 2015; Caminero et al, 2015; Salfinger et al, 2015; Matteelli et al, 2015; Pym et al, 2016; Pontali et al, 2016). Other interventions that may improve outcomes of treatment in retreatment cases include prompt diagnosis and appropriate treatment. Incentive-based schemes for individuals to increase the living conditions of TB patients should also be considered. It is also crucial that improved and dedicated case detection of retreatment cases, shortening of course of treatment; innovative patient education, patient-providers' meetings and several other initiatives are strengthened (Raviglione et al, 2012; SenGupta et al, 2015; Zumla et al, 2015).

Study limitations

The above findings and discussions should be considered bearing in mind that this was a cross-sectional study; hence causal relationships cannot be determined. Also, as a retrospective study, some data were missing as they have not been recorded such as the level of education and others.

Conclusion

In conclusion, non-retreatment cases differed from retreatment cases not only regarding their socio-demographic characteristics but also about treatment outcomes as retreated cases performed poorly in terms of treatment success and case fatality rates. Several interventions should be contemplated based on the specific contexts of the patients to improve outcomes of treatment in retreatment cases. Such interventions should include prescribing of effective regimens containing newer drugs and adherence support.

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