Research Article

Tuberculosis in Students at The University of Zambia - Trends Over A Seven Year Period (2008-2014)

Pascalina Chanda-Kapata[1]*, Mwiche Siame[2], Doris Osei-Afriyie[3], Clementina Lwatula[4], Patrick Katemangwe[5], Chabwera Shumba[6], Kennedy Malama[7], Peter Mwaba[8], Ali Zumla[9], Nathan Kapata[1]

[1]Directorate of Disease Surveillance and Research, Ministry of Health, Lusaka, Zambia

[2]Directorate of Policy and Planning, Ministry of Health, Lusaka, Zambia

[3]Consultant, WHO Regional Office for Africa, Brazzaville, Congo

[4]University of Zambia, Lusaka, Zambia

[5]Tuberculosis Laboratory, University Teaching Hospital, Lusaka, Zambia

[6]Directorate of Mobile and Emergency Health Services, Ministry of Health, Lusaka, Zambia

[7]Lusaka Provincial Medical Office, Lusaka, Zambia

[8]Lusaka Apex Medical University, Lusaka, Zambia

[9]Division of Infection and Immunity, University College London, and NIHR Biomedical Research centre, UCL Hospitals NHS Foundation Trust, London, United Kingdom

*Corresponding Author: Pascalina Chanda-Kapata, Directorate of Disease Surveillance and Research, Ministry of Health, Lusaka, Zambia.

Abstract

Background: Tuberculosis is a leading cause of morbidity and mortality in Sub Saharan Africa. There is paucity of information on the burden of TB at institutions of higher learning in Zambia. This study sought to determine the TB trends and treatment outcomes at a health facility based at the University of Zambia (UNZA) for a period of seven years.

Method: A retrospective review of TB records at the University of Zambia (UNZA), from 1st January 2008 to 31st December 2014. The variables collected included demographic data: age, sex, marital status, and information on symptoms and diagnosis (type of TB, referral to hospital, treatment outcomes, HIV status, TB and HIV co-infection). The population was stratified according to residence on campus and non-resident.

Results: A total of 669 patients diagnosed with TB in the 7 years period. 15% of the TB cases were residents on campus. The majority of the cases were new TB patients 537 (80.3%) and 92 (13.8%) were relapsed cases. 402/669 (61%) were male. Mean age was 34.4 (SD = ± 0.472). 99 of the cases were resident on campus at UNZA. TB types were: pulmonary 514 (77.83%) and extra-pulmonary 116 (17.34%). 39 cases (5.8%) had no TB type recorded. 387 cases were HIV-positive (57.9%) and HIV negative for 148 (22.1%). The HIV status was unknown for 134 cases (20.0%). There was a threefold decline in TB notification rates over 7 years.

There was a general decline in the number of TB cases recorded at the institution over the years with 15% of the infected population resident on campus.

Conclusion: TB is an important health issue amongst University students. There is need for further studies to determine the prevalence of TB and associated risk factors in this population.

Keywords: Tuberculosis; Students; Tertiary Institution

Abbreviations

DOTS: Directly Observed Treatment-Short Course; EPTB: Extra Pulmonary Tuberculosis; HIV: Human Immunodeficiency Virus; PDA: Personal Digital Assistant; PTB: Pulmonary Tuberculosis; TB: Tuberculosis UNZA: University of Zambia

Background

Tuberculosis (TB) remains one of the deadliest communicable diseases worldwide and is a leading cause of morbidity and mortality in sub-Sahara Africa, despite control efforts by the global community. In 2014, the World Health Organization (WHO) estimated that 9.6 million people developed TB and 1.5 million died from the

disease worldwide [1-5]. There has been a major decrease in TB mortality rate in the past two decades, but the progress needs to be accelerated to reach the post-2015 WHO TB strategy to end the TB epidemic by 2035; with the global targets of a 95% reduction in the number of TB deaths and a 90% reduction in TB cases [6-8].

TB in Zambia is a major public health problem affecting mainly the age group between 18 to 49, this is not only the reproductive age group but also the most active and productive group including the age range at which most younger people are attending college or University.

Congregated settings such as boarding schools have been shown to create favourable environments for TB transmission [9,10]. Usually the schools are over-crowded, and students are in close contact with one another for an extended period of time which can increase the transmission of TB if there is an infected student.

High risk of TB infection and transmission have been reported among university students [11-13]. In addition, several studies have shown prevalence of TB among university students to be high in countries with burden of TB [14-18]. The student population in Zambia mainly comprises of those in the age group 18 - 25 which is the reproductive age group which has been shown to have greater probability of TB and HIV infection compared to other age groups hence putting this group at a higher risk of infection [10]. The ratio of the student population compared to infrastructure available (hostels and lecture rooms) may provide also suitable environment for TB transmission. Although TB trends in the general population have well been documented there has been no study in Zambia investigating the trends and treatment outcomes of TB patients at higher institutions despite the TB burden in the country being very high and young adults being most at risk for the disease.

In this article we report the trends and treatment outcomes among TB patients at one of the higher institutions of learning in Zambia.

Methods

This was a retrospective review of TB records, registers, reports and TB returns at the University of Zambia (UNZA), Great East Road Campus clinic, from 1st January 2008 to 31st December 2014. The University of Zambia (UNZA) is the oldest university and is one of 34 universities in Zambia. It is situated in Lusaka province with two campuses; Ridgeway and East Road Campuses. The Ridgeway campus serves students pursuing studies related to medicine, while the East Road campus has students pursuing other studies such as, humanities and social sciences, natural sciences, engineering and agricultural sciences. The Great East Road Campus has a population of over 17,000 students coming from all the different provinces in the country. The Great East Road Campus holds the UNZA clinic

which provides services such as HIV/STI, TB and primary care services to students, staff and their families as well as residents of the surrounding communities. Ethical approval for the study was obtained from The University of Zambia Biomedical Research Ethics Committee (Ref. No. 012-10-15).

Definitions

The case definitions were as indicated in the national TB control manual following the Ministry of Health policies: (i) Pulmonary tuberculosis (PTB) referred to any bacteriologically confirmed or clinically diagnosed case of TB involving the lung parenchyma or the tracheobronchial tree (ii) Extra-pulmonary tuberculosis (EPTB), referred to any bacteriologically confirmed or clinically diagnosed case of TB involving organs other than the lungs, e.g. meningitis, pleura, lymph nodes, abdomen, genito-urinary tract, skin, joints and bones (iii) New TB patients were those patients who had never been treated for TB or had taken anti-TB drugs for less than 1 month (iv) Treatment resumed TB patients referred to patients who had received 1 month or more of anti-TB drugs in the past. They were further classified by the outcome of their most recent course of treatment (v) Relapsed TB patients referred to patients who had previously been treated for TB, were declared cured or treatment completed at the end of their most recent course of treatment and were now diagnosed with a recurrent episode of TB (either a true relapse or a new episode of TB caused by reinfection).

We reviewed clinic records on reported TB cases retrospectively, from 2004 - 2014. The variables collected included demographic data: age, sex, marital status, TB type and treatment outcomes. A data collecting tool (structured questionnaire) was used to collect demographic data (name, age, sex, address, nationality) and information on symptoms and diagnosis (Type of TB, referral hospital, treatment outcomes, HIV status, TB and HIV co-infection). All TB records from 2008 - 2014 at the University of Zambia Clinic were included in the study.

The questionnaire was programmed on a personal digital assistant (PDA) and the data from the register was entered directly into the PDA. Data from the PDA was saved and downloaded onto an access-based database. The data was then cleaned and stored on a password protected server. After the end of the records review, the cleaned dataset was transferred to STATA version 12 for analysis. Frequencies, proportions and respective chi-square were reported

Ethics approval

Ethical approval was obtained from an ethics review board, ERES Converge and the National Health Research Authority. Permission to access patients' records was also obtained from the UNZA clinic and the UNZA management. All patients 'information was de-identified during data collection.
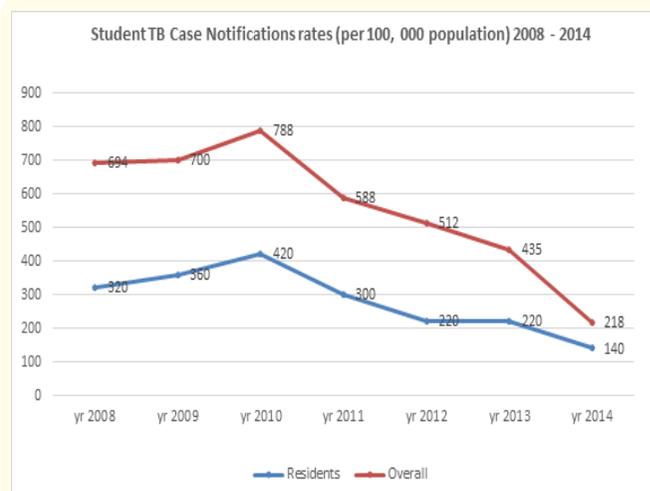
Results

A total of 669 patients diagnosed with TB at UNZA clinic from January 2008 to December 2014. A majority of the patients were males (60.09%; n = 402) and the mean age of the group was 34.4 (SD = ± 0.472). A total number of 99 of the cases were resident at UNZA.

There were pulmonary 514 (77.83%) and extra-pulmonary 116 (17.34%) TB cases as shown in table 1. The TB type was unknown in 39 (5.8%) cases. The HIV status of the TB cases were classified into HIV positive for 387 (57.9%) and HIV negative for 148 (22.1%). The HIV status was unknown for 134 (20.0%) cases. TB cases were grouped into new, relapsed, transferred in, treatment resumed, other and unknown. The majority of the cases were new TB patients 537 (80.3%) followed by 92 (13.8%) of them being relapsed patients.

Figure 1: Graph showing TB case notification rates per 100,000 population from 2008 to 2014: Overall Versus Campus residents.

Characteristic	Non-Resident %	Resident %	P-value
Sex			
Female	40.88	34.34	0.22
Male	59.12	65.06	
Age			
< 15	4.04	0	0.00
15 - 24	14.04	50.51	
25 - 34	26.32	17.17	
35 - 44	33.33	16.16	
> 45	20.18	15.15	
Unknown	2.11	1.01	
TB Type			
Pulmonary	75.96	81.82	0.43
Extra-Pulmonary	17.89	14.14	
Unknown	6.14	4.04	
HIV-Status			
Positive	61.40	36.36	0.00
Negative	19.65	37.37	
Unknown	18.95	26.26	

Table 1: Characteristics of resident (N = 99) and non-resident (N = 570) TB patients at an institution of higher learning.

There has been a downward trend in the case notification rate per 100,000 population for all cases recorded at the clinic and also campus non-resident since the year 2010 as shown in the figure 1.

The treatment outcomes of TB resident and non-residents for the 7 years period are described in table 2. The overall treatment outcome among TB cases were classified as cured, completed treatment, treatment failure, transferred out, died, and unknown. The treatment outcome for patients who defaulted on treatment was classified as unknown. Completion of treatment was the highest treatment outcome for both residents and non-residents; 38.95% and 43.43% respectively as shown in table 2. The treatment outcome was unknown for 33% of the non-residents and 25% of the residents.

Characteristic	Non-resident %	Resident %
Cured	11.4	18.18
Completed Treatment	38.95	43.43
Treatment Failure	0.53	0
Transferred out	7.54	6.06
Died	8.25	7.07
Unknown	33.33	25.25

Table 2: Treatment outcomes of TB resident and non-resident.

P = 0.457.

The trends in treatment outcome among the campus residents are shown in table 3. The cure rates were lowest in 2008 compared to 2014; while the proportion of those who completed treatment was better in 2008 than in 2014. The highest number of deaths were recorded in 2010 (n = 3) whereas no deaths were recorded in 2008, 2013 and 2014. The unknown treatment cases were highest in 2010 (n = 9).

Year	Treatment Outcome				
	Cured N (%)	Completed Treatment N (%)	Died N (%)	Transferred Out N (%)	Unknown N (%)
2008	1 (6.25)	12 (75.0)	0 (0.0)	0 (0.0)	3 (18.8)
2009	2 (11.1)	13 (72.2)	2 (11.1)	0 (0.0)	1 (5.7)
2010	3 (14.3)	6 (28.6)	3 (14.3)	0 (0.0)	9 (42.9)
2011	3 (20.0)	2 (13.3)	1 (6.67)	2 (13.3)	7 (46.7)
2012	3 (27.3)	4 (36.4)	1 (9.09)	0 (0.0)	3 (27.3)
2013	4 (26.4)	3 (27.3)	0 (0.0)	3 (27.3)	1(9.1)
2014	2 28.6)	3 (42.9)	0 (0.0)	1 (14.3)	1(14.3)
Total	18 (18.2)	43 (43.4)	7 (7.1)	6 (6.1)	25 (25.3)

Table 3: Trends of Treatment Outcome of Campus Residents (N=99) at UNZA (2008-2014).

Discussion

This study showed that there has been a general three-fold decline in TB notification rates recorded at a health facility at a high institution of learning; there was more TB recorded in the male than female population and the TB/HIV co-infection rates were close to 60%. The trend is similar to the general trend in the district and country in which there has been a decline of TB notifications attributed to improved TB management (DOTS) and diagnostic services [19]. The trends in the decline of notifications were also similar for both resident and non-resident university population in the study.

Using the residents at campus halls of residence as a proxy for students infected with TB, it was found that the number of TB cases were significantly higher in the typical student age group (15 - 24 years) compared to the non-residents age group. This is also the typical age group with a higher HIV transmission and is consistent with other studies that show HIV/TB coinfection [10]. A study done among students in Uganda showed that the prevalence of TB was twice as high as that of adults living in the suburbs. This was in medical students and was associated with clinical exposure [20]. However, generally the expected prevalence in this population is expected to be higher than that in the general population. There is need to conduct further studies to determine the prevalence of TB in this population and the risk factors associated with the disease so as to make recommendations and inform policy.

Therefore, this is an indication of a potential higher risk of TB among students at this institution. The high proportion of TB patients who completed treatment is an indication of adherence to treatment; patients who were residents had a higher adherence rate compared to those who were non-resident.

The majority of patients completed treatment and this finding is consistent with other studies which have shown improvement in patient adherence to treatment due to improved strategies such as the DOTs and the inclusion of TB supporters in the community

[21,22]. The low proportion of patients with an unknown treatment outcome (defaulters) and deaths may be due to high adherence to treatment, good diagnostic services and recorded high cure rate [23]. The clinic at the institution has capacity to diagnose TB using both Xpert MTB/RIF and Light microscopy. However, there is need to strengthen record keeping through various innovations such as migration to electronic information systems and strengthen capacity of the clinic to diagnose both Pulmonary and extra-pulmonary TB.

For the purpose of ensuring surveillance among the student population, it is recommended that the campus facility clearly defines who is a student and not so that it is easy to monitor any potential outbreaks in the student population. This is because the clinic serves more than just resident students and the catchment area is not exclusively for the students. This, way it will be easy to account for student specific outbreaks or notifications.

The study design limits the ability to understand whether the students acquired TB while at the university or the TB was already acquired before they became residents. A cohort study pre and post residence is cardinal to understand the risk of getting TB within the school halls of residents. This can inform policies to regulate overcrowding and general improvements to the living conditions or learning environment of the students.

Conclusion

This study showed a decline in the trends of TB case notifications between 2008 and 2014 reported at an institution of higher learning. However, there is still cause to worry in that the TB cases are still high, thereby underscoring the importance of strengthening screening programs on entry and continuous surveillance. Understanding the actual prevalence of TB in institutions of learning may assist in moving forward the TB elimination agenda and meeting the sustainable development goals' targets.

Author contributions

PCK, NK, MS, DO conceptualised the study, contributed to methodology development, formal analysis and writing of the manuscript. CL, PK, CS, KM, PM and AZ contributed to the methodology, data collection, and contributed to the manuscript. All authors read and approved the final version of the manuscript.

Conflict of interest

The authors declare that they have no competing interests.

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