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Prevalence of occupational tuberculosis among healthcare workers in Kaduna State, Nigeria

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Abstract

Introduction: *Tuberculosis (TB) is an infectious disease of public health concern caused by mycobacterium tuberculosis (MTB). The disease is on the increase rate of transmission among healthcare more especially among nations with high burden of HIV and low economic status. The study assessed the prevalence of tuberculosis among healthcare workers in Kaduna State, Nigeria. Healthcare workers (HCWs) are at increase rate of developing active tuberculosis than the general populations, more particularly these of the high TB burden counties with limited resources on infectious prevention and control measure.* ***Methods:*** *a retrospective cohort study was used to assess the prevalence of tuberculosis among healthcare workers from 2006-2020 in Kaduna State. Thirty-six (36) Health facilities were selected using a multistage sampling procedure. Tuberculosis (TB) central register was reviewed and data on related variables were collected using a checklist.* ***Results:*** *of the 6325 confirmed active TB cases 10 were documented among healthcare workers. Out of which 02 were TB/HIV coinfected and 03 were satisfied death.* ***Conclusion:*** *in conclusion the prevalence of TB among HCWs in Kaduna State is very low while the death due to TB among HCWs is high in the state. It's recommended that a prospective cohort study should be conducted to document the actual prevalence of tuberculosis among healthcare workers. The reporting system and proper documentation of TB in healthcare workers should be strengthening.*

Introduction

Tuberculosis (TB) is a major cause of death and disability in the world, particularly among healthcare workers (HCWs) [1]. TB germs spread when an infected pulmonary patient sneeze or cough around vulnerable TB group with low immunity [2]. The burden of the disease is high in middle-income countries such as Nigeria due to high burden of HIV, poverty, unhealthy lifestyle, poor early TB screening and prompt treatment with recommended valid anti-TB drugs [3]. Transmission of tuberculosis is more common among directly observed treatment short course (DOTs) centers with poor tuberculosis infectious control (TBIC) [3]. Despite the WHO ability to develop guidelines for control and prevention of TB in healthcare facilities providing TB care services through DOTs, the implementation of these guidelines remains very low in low- and middle-income countries [4]. Globally, several factors have been associated with the development of active TB among frontline HCWs. These factors include the negligence of health care workers to seek for medical care, poor working conditions, lack of personal protective equipment (PPE) both in terms of provision and utilizations, fear of stigma, poor supervision/surveillance, medical conditions such as cancer and diabetes mellitus and other risky life style like alcoholism [5]. As documented in literature, HCWs infected with pulmonary tuberculosis (PTB) stand more chance to infecting non-TB patients than the general population while discharging professional responsibility of patients' care [6]. A study in Italy confirmed that a pediatrician with PTB infected about 15 adults and 9 children within nine months in 2017 [6]. Also, HCWs are at greater risks of developing not only drugs susceptible tuberculosis (DSTB) but including multi-drugs resistance tuberculosis (MDR-TB) and drugs-resistance tuberculosis (XDR-TB) as the result of prolong contact with TB patients.

Despite the fact that the transmission of TB to HCWs has been recognized as an occupational transmission since 1950's, evidence for TB transmission among HCWs in low and intermediate-incidence countries remains inconclusive due to the limited number of studies conducted in this regard [7]. Whereas, the outbreak of COVID-19 pandemic has increased the risks of TB infection especially among health care workers due to total deviations from its care to COVID-19 response [8]. Tuberculosis is an opportunistic infectious disease that is curable and

preventable provided all measures are put in place according to the recommendations of END-TB strategies [9]. The availability of healthcare services and effective training on infectious control is the backbone to limiting tuberculosis infectivity and mortality among healthcare workers [10]. For planning of effective training, documentation of the recent prevalence of TB among HCWs is most important. Thus, this study aimed to assess the death and prevalence of occupational TB among healthcare workers in Kaduna State, Nigeria.

Methods

Study design: a retrospective study was conducted to assess the prevalence of occupational tuberculosis among healthcare workers in Kaduna State, Nigeria.

Study area: Kaduna State is located at the north-western geopolitical zone in Nigeria, with a total coverage area of 46,053 square kilometers. The state has a projected population of 8,397,541 across the 23 Local Government Area (LGA) in 2017 with an increase to 3.0% of 6,113,503 of 2006 national projection (NBS, 2017). Agricultural activities are the major source of income in the State.

Study settings: the study was conducted across the selected healthcare facilities providing tuberculosis care service through directly observed treatment short course (DOT's) in Kaduna State, Nigeria.

Participants: the participants of the study include all healthcare workers providing tuberculosis care services through DOTs which includes medical doctors, nurses, community health workers, health record officer, environmental health etc.

Study variable: the instrument contained information on facility name, LGA, sex, cadre, year, confirm TB case, TB/HIV, cured due to TB, death due to TB, TB in HCWs, TB cured in HCWs and TB death in HCWs.

Data source: a checklist was used to collect a secondary data from the TB central register on the previous record of tuberculosis among HCWs from 2012-2020.

Study size: the study was conducted among 36 healthcare facilities providing tuberculosis care services in Kaduna State, Nigeria.

Sampling procedure: a multistage convenient sampling procedure was used to select the study participants at the first stage, all Local Government Area (LGAs) providing TB care services through directly observed treatment short course (DOTs) were selected in the second stage stratified the local government according to the three geo-political zones. The third stage selected 2 LGAs from each of the geological zones considering urban and rural characteristics, and 36 facilities were selected across all the LGAs using a convenient sampling procedure due to insecurity.

Statistical methods: all data collected was validated through data triangulations method and analyzed using epidemiological formula (prevalence formula). All information was presented in tables.

Ethical issues: ethical clearance was obtained from the Kaduna State Ministry of Health Research Ethics Committee and Health Research Ethics Committee of the National Tuberculosis and Leprosy Training Center (HREC, NTBLTC). All data collected was managed under high level of confidentiality and strictly used for the purpose of this study (NHREC/17/03/2018, LCU/REC/22/103/, NTBLTC/REC/21/016).

Results

Demographical distribution of active TB cases among HCWs by sex and cadre

This result shows that out of 10 (100%) confirmed TB cases among HCWs, 6 (60%) cases were diagnosed among male HCWs while 4 (40%) cases were among females. Majority of the cases 6

(60%) were confirmed among community healthcare workers. Out of the 3 (30%) cases that were satisfied death, 2 (20%) were community healthcare workers (Table 1).

Occurrences of tuberculosis per year

This result shows that 3 active TB cases were reported in 2012, 2 cases in 2017 and 2018 while 1 case in 2015, 2016 and 2020 respectively. This is to shows that there are no documented cases of tuberculosis among healthcare workers from 2006-2011 (Table 2).

TB record in Kaduna State from 2006-2020

This shows that 6325 TB cases were documented among general population from 2006-2020, 5811 were declared cure, 481 were certified death, 33 were lost to follow-up, 362 were TB/HIV co-infected, 10 cases were reported among HCWs, 2 cases were TB/HIV co-infected among TB in healthcare workers, 7 were declared cured and 3 cases were satisfied death (Table 3).

TB record in Kaduna State from 2006-2020

This shows that 6325 TB cases was recorded among the general population from 2006-2020, only 10 cases were documented among HCWs out of which 07 cases were declared cured and 03 were certified death (Table 3).

Discussion

This study found that the prevalence of TB among HCWs was 0.158%. This finding is lower compared to other studies conducted among HCWs. For instance, a study conducted in Egypt reported that the prevalence of TB among HCWs was 0.5% [11]. Another study in Uganda documented about 1.7% prevalence rate of TB among HCWs [12]. Similarly, a huge 27.8% prevalence of TB was reported among HCWs in South Africa [7]. In Nigeria, a study reported that the prevalence of active TB among HCWs was 1.5% with over 6% TB-specific-death rate [13]. Another study conducted in 2011 documented 3.3% and 2.2% in the prevalence rate of TB among HCWs by acid fast-bacillis (AFB) and culture respectively in Nigeria [14]. The lower prevalence found in this study could be due to poor documentation associated with health sectors in Nigeria. However, this finding is relevant because, no known recent study has reported the prevalence of active TB among HCWs in Nigeria.

This study had also documented that 3 cases out of the 10 confirmed cases among HCWs were certified death. This shows that the death due to TB among HCWs is 30%. This finding is higher than a study that reported 6.3% death rate due to TB among HCWs in Nigeria [13]. A study conducted in South Africa on the outcome of TB among HCWs has reported 0.0% death rate of TB among HCWs [15]. Another study has also reported 0.0% death rate due to TB in Taiwan [16]. These differences were due to the fact that, from the finding of these studies none of the confirmed HCWs has TB/HIV co-infection while all the Nigerian study has reported TB/HIV co-infection.

Limitation of the study: the limitations of this research study are related to the inherent limitation of all retrospective cohort study design and use of secondary data, which includes challenges with data quality and poor/improper documentation that are more likely to affect the study.

Conclusion

The prevalence of active tuberculosis among HCWs in Kaduna State is very low. The death rate among healthcare due to TB is also high.

Recommendation: to document the actual burden of TB among HCWs in Kaduna State, we recommended that a prospective study (clinical trial) should be conducted on the burden of active TB among healthcare workers in the State. Another recommendation is to strengthen the actual reporting and proper documentations of active TB among HCWs.

What is known about this topic

- *The prevalence of occupational tuberculosis among healthcare workers was documented from the previous studies.*

What this study adds

- *The study reported the prevalence of occupational tuberculosis among healthcare workers providing TB care services through DOTs in Kaduna State Nigeria.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Conception and study design: Chiroma Laminu and Adesola Zaidat Musa. Data collection, data analysis and interpretation: Chiroma Laminu, Adesola Zaidat Musa and Tubosun Alex Olowolafe. Manuscript drafting: Chiroma Laminu. Manuscript revision: Adesola Zaidat Musa and Tubosun Alex Olowolafe. Guarantor of the study: Chiroma Laminu. All the authors have read and agreed to the final manuscript.

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Tables

Table 1: demographical distribution of active TB cases among HCWs by sex and cadre

Table 2: occurrences of tuberculosis per year

Table 3: TB record in Kaduna State from 2006-2020

References

1. Sharma D, Sharma J, Deo N, Bisht D. Prevalence and risk factors of tuberculosis in developing countries through health care workers. Microb Pathog. 2018 Nov;124: 279-283. **PubMed**| **Google Scholar**
2. Kwaghe AV, Umeokonkwo CD, Aworh MK. Evaluation of the national tuberculosis surveillance and response systems, 2018 to 2019: National Tuberculosis, Leprosy and Buruli Ulcer Control Programme, Abuja, Nigeria. Pan Afr Med J. 2020 Feb 24;35: 54. **PubMed**| **Google Scholar**
3. Kuyinu YA, Goodman OO, Odugbemi BA, Adeyeye OO, Mohammed AS, Odusanya OO. Tuberculosis infection prevention and control measures in DOTS centres in Lagos State, Nigeria. Int J Tuberc Lung Dis. 2019 Apr 1;23(4): 474-481. **PubMed**| **Google Scholar**
4. Guo HY, Zhong QH, Zhou J, Zhao ZM, Zhang XL, Chen ZH, *et al*. Risk of prevalence of latent tuberculosis infection in health care workers-an idiographic meta-analysis from a Chinese perspective. J Thorac Dis. 2021 Apr;13(4): 2378-92. **PubMed**| **Google Scholar**
5. Shiferaw MB, Sinishaw MA, Amare D, Alem G, Asefa D, Klinkenberg E. Prevalence of active tuberculosis disease among healthcare workers and support staff in healthcare settings of the Amhara region, Ethiopia. PLoS One. 2021 Jun 11;16(6): e0253177. **PubMed**| **Google Scholar**

6. Di Bella S, Siroka A, Antonello RM, Zignol M, Maschio M, Tominz R, *et al*. Tuberculosis screening in outpatient healthcare workers: lessons from a high-income, low TB burden country. Int J Tuberc Lung Dis. 2019 Sep 1;23(9): 1024-1028. **PubMed**| **Google Scholar**
7. Grobler L, Mehtar S, Dheda K, Adams S, Babatunde S, van der Walt M, *et al*. The epidemiology of tuberculosis in health care workers in South Africa: a systematic review. BMC Health Serv Res. 2016 Aug 20;16(1): 416. **PubMed**| **Google Scholar**
8. Bagcchi S. WHO's Global Tuberculosis Report 2022. Lancet Microbe. 2023 Jan;4(1): e20. **PubMed**| **Google Scholar**
9. Orcau À, Caylà JA, Martínez JA. Present epidemiology of tuberculosis. Prevention and control programs. Enfermedades Infecc Microbiol Clínica. 2011 Mar;29 Suppl 1: 2-7. **PubMed**| **Google Scholar**
10. Oluwasanu MM, Hassan A, Adebayo AM, Ogbuji QC, Adeniyi BO, Adewole DA, *et al*. General and tuberculosis-specific service readiness in two states in Nigeria. BMC Health Serv Res. 2020 Aug 26;20(1): 792. **PubMed**| **Google Scholar**
11. Fouad MM, Helal SF, Lotfy BM, Kholy El, Youssriah S. Prevalence of tuberculosis among healthcare workers in cairo university hospitals. Egypt J Occup Med. 2015 Jul 1;39(2): 213-30. **Google Scholar**
12. Kayanja HK, Debanne S, King C, Whalen CC. Tuberculosis infection among health care workers in Kampala, Uganda. Int J Tuberc Lung Dis. 2005 Jun;9(6): 686-8. **PubMed**| **Google Scholar**
13. Salami AK, Katibi IA. Tuberculosis among the health-care workers of the University of Ilorin Teaching Hospital. Trop Doct. 2007 Oct;37(4): 251. **PubMed**| **Google Scholar**
14. Kehinde AO, Baba A, Bakare RA, Ige OM, Gbadeyanka CF, Adebiyi OE. Pulmonary tuberculosis among health care workers at two designated DOTS Centers in urban city of Ibadan, Nigeria. Indian J Med Res. 2011 Jun;133(6): 613-7. **PubMed**| **Google Scholar**
15. Ukpe IS, Blitz J, Hugo J, Nkosi R, Mpangane T, McLaren S. The treatment outcomes of tuberculosis among health care workers in a general hospital in the Mpumalanga Province, South Africa?: original research. Afr J Prim Health Care Fam Med. 2009 Jan;1(1): 1-4. **Google Scholar**
16. Pan SC, Chen YC, Wang JY, Sheng WH, Lin HH, Fang CT, *et al*. Tuberculosis in Healthcare Workers: A Matched Cohort Study in Taiwan. PLoS One. 2015 Dec 17;10(12): e0145047. **PubMed**| **Google Scholar**

Table 1: demographical distribution of active TB cases among HCWs by sex and cadre			
	Confirmed TB cases	**Death Due to TB**	**Cured**
Sex			
Male	6 (60%)	2 (20%)	4 (40%)
Female	4 (40%)	1 (10%)	3 (30%)
Cadre			
Community Health	6 (60%)	2 (20%)	4 (40%)
Health Attendant	1 (10%)	1 (10%)	0 (0%)
Nurses	2(20%)	0 (0%)	2 (20%)
Lab scientist	1(10%)	0 (0%)	1 (10%)
Source: Research Survey			

Table 2: occurrences of tuberculosis per year							
Year	**2012**	**2015**	**2016**	**2017**	**2018**	**2020**	**Total**
Total confirmed cases	414	574	556	799	738	880	3961
Confirmed cases (HWCs)	3	1	1	2	2	1	10
Source: Research Survey							

Table 3: tuberculosis record in Kaduna State from 2006-2020	
Total number of confirm tb case in general population	6325
Cured in general population	5811
Death in general population	481
Lost to follow up in general population	33
TB/HIV Co-infection in general population	362
Total Number of tuberculosis in HCWs	10
TB/HIV in HCWs	2
TB Cured in HCWs	7
TB Death in HCWs	3
Source: research survey	