The prevalence of HIV among tuberculosis patients in Benadir, Somalia. Retrospective multi-center study

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1. Introduction

Tuberculosis (TB) is a communicable disease that is a major cause of ill health and one of the leading causes of death worldwide. Until the COVID 19 pandemic, TB was the leading cause of death from a single infectious agent [1]. TB can affect anyone, regardless of age or sex, but the highest burden is on adult males, who accounted for 56% of all TB cases in 2020, compared to their adult female counterparts, who accounted for 33%, and children for 11%.

Among all incident cases of TB, 8% were people living with the Human Immuno Deficiency Virus (HIV). The proportion of TB cases co-infected with HIV was highest in countries in the African region, exceeding 50% in parts of southern Africa [2]. A 25% HIV prevalence among adult TB patients was reported in Port Harcourt, Nigeria [3].

HIV infection has effects on the pathogenesis of TB infection because of the suppressed immunity of HIV patients, which increases the possibility of latent TB reactivation and progression from TB infection to TB disease [4]. The co-infection of HIV-1/TB synergistically decreased the viability of macrophages and increased levels of pro-inflammatory cytokines, and this seemed to be specific to M. tuberculosis rather than other species of mycobacteria [5]. On the other hand, TB is one of the most common opportunistic infections in HIV patients and is the leading cause of death in HIV-infected people, and HIV infection is one of the most common risk factors for developing active TB disease from a latent TB infection [6].

A WHO report in 2019 estimated that incident TB cases were attributable to health-related risk factors. About 2.2 million cases were attributable to under-nutrition, 0.76 million due to HIV infection, 0.72 million due to alcohol use disorders, 0.70 million due to smoking, and 0.35 million due to diabetes, which makes HIV the second most common risk factor for TB infection [7]. Many studies state that HIV/TB co-infection leads to the deterioration of both diseases, as HIV leads to the reactivation of latent TB. TB also leads to the rapid progression of HIV infection, so this increases the mortality of both diseases [8].

Globally, in 2019, an estimated 10.0 million people fell ill with TB, and there were 1.2 million TB deaths among HIV-negative people and an
additional 208,000 deaths among HIV-positive people. TB is considered the most common cause of death in HIV-positive adult patients in developing countries, though it is a preventable disease [9].

According to the World Health Organization (WHO), TB/HIV co-infection has been found to reduce the effectiveness of directly observed therapy (DOT) treatment of TB [10]. Improving case detection of TB/HIV co-infection potentially leads to early treatment of both conditions and can impact positively on treatment outcomes [11].

Due to a lack of available data, the prevalence of TB/HIV co-infection among TB patients in Somalia is unknown. In this research, we want to determine the prevalence of HIV infection among TB patients in Benadir, the most populated province in Somalia, which includes the capital city of the country.

2. Materials and methods

This is a cross-sectional, retrospective record study of the HIV prevalence among TB cases that were recruited in all Benadir TB centers. This study was conducted on TB cases documented from July 1, 2019, to June 30, 2020. All TB patients with known HIV status were included in this study. TB cases were defined as cases with positive Mycobacterium tuberculosis (MTB) by GeneXpertMTB/RIF or treated by radiological and clinical findings or extrapulmonary TB.

The socio-demographic and clinical data, including gender, age, address, HIV status, site of TB infection, and outcome, were retrieved from the Register Book of the TB centers. All those whose HIV status has not been documented in the TB register book and all DR, MDR, and XDR patients were excluded from this study.

Data analysis was performed using IBM SPSS Statistics version 20 (IBM Corp. @Copyright IBM Corporation and its licensors 1989, 2011, Trademarks of Oracle and its affiliates). The prevalence of HIV infection among the TB patients was estimated by using the confidence limits of the P-value ($P = 0.05$). This work has been reported in line with the STROCSS criteria [12].

3. Ethical Considerations

The study protocol was cleared by the MOGADISHU SOMALI TURKEY, RECEP TAYYIP ERDOGAN TRAINING AND RESEARCH HOSPITAL, Research Ethics Committee Approval Ref No: MSTH/4999/284, on 12/12/2020 and the Somali Ministry of Health, National TB Program, Ref No: FMOH/NP/009/2022, on January 10, 2022.

4. Results

Overall, 3165 patients were collected and almost 3061 (96.7%) were eligible (treated TB cases with known HIV status), while 79 cases were missing data, 14 cases were transferred from other TB centers outside of Benadir Province without documented HIV status, and 11 cases had HIV tests that were not available, and all those groups were excluded from this study. The number of patients with HIV/TB co-infection was 46 patients (1.5%) out of 3061, while the other 3015 (98.5%) out of 3061 were HIV-negative cases (Fig. 1).

The majority of TB patients in our study were males 1981 (64.7%) while female patients were 1080 (35.3%) (Fig. 2). Among the 46 HIV positive patients, 29 (63%) were males, while 17 (37%) were females, which was not statistically significant ($P = 0.46$, $a = 0.05$) (Fig. 2).

The majority of TB patients (73.4%) were young adults and children. Approximately two thirds (62.1%) of our TB cases were in the age group between 10 and 39 years old (Fig. 3). The mean, median, and mode of the age of all TB patients were 30.2, 26, and 30, respectively, with the average age of males being 30.9 years and females being 28.8 years. On the other hand, the mean, median, and mode of the age of HIV-TB co-infected cases were 34.2, 35, and 30 years old, respectively, with a mean age of 34.6 years for males and 33.9 years for females.

Among the HIV-TB coinfected cases, most of them (78.2%, $N = 36$) were young adults with an age group between 20 and 49 years old, and the third decade was the most commonly affected age group, constituting about 32.6% ($N = 15$) of all HIV-TB co-infected patients, which was statistically significant by Pearson’s Chi-Square with a $P$-value of $= 0.00048$ ($a = 0.05$) (Fig. 3).

The cases with sputum positive for mycobacterium tuberculosis were 1641 (53.6%), extrapulmonary 873 (28.5%), and cases treated by radiological and clinical findings were 509 (16.6%), and this was...
that 86% of the HIV-TB co-infected cases had histories of heterosexual relationships with more than one partner [19].

TB-HIV co-infected patients are known to have poorer treatment outcomes, and therefore, those patients who do not seek care or do not have access to medical care are more likely to die earlier than other infected cases in the community. A countrywide cross-sectional survey and extensive research covering all provinces of the country are required for the detection, tracing, and management of HIV/TB co-infections at the community level. In our study, we found that TB/HIV co-infection was more common in the age groups that TB infection affects most of the time, but the mean age was slightly higher in TB/HIV co-infected patients than in HIV-negative TB-infected patients. It should be noted that all cases we have studied in our research were patients treated as TB patients irrespective of their site of infection, sputum culture results, AFB, and GeneXpert status findings.

All diagnostic procedures for TB infections were applied to our patients, including chest X-rays, chest CT scans, three consecutive sputum collections for Acid Fast Bacilli (AFB), and the GeneXpert MTB/RIF assay, which is the most accurate diagnostic tool, and it was compulsory for all suspected TB patients to rule out drug-resistant TB infection. To our knowledge, there is no research published about the prevalence of HIV among TB patients in Somalia. So, we recommend a countrywide research project to understand the burden of HIV-TB co-infection in all provinces to detect and treat TB/HIV cases early.

6. Conclusions

In conclusion, the prevalence of HIV among TB patients in Benadir province of Somalia, including the capital city of Mogadishu, is very low compared to the neighboring countries and other high-TB burden countries. We found that female patients have significantly lower HIV/TB co-infection as they also have a lower TB prevalence compared to male patients, but statistically it was not significant. The majority of HIV/TB co-infected patients were young adults. This data suggests that the prevalence of HIV among the Somali population is probably very low, probably due to religious, cultural, and constitutional restrictions on multiple sex partners and sex-oriented businesses. However, a population-based survey study about the prevalence of HIV/TB co-infection is needed.

Ethical approval

The Research Ethics Committee of our hospital and the Ministry of Health/NTP have approved.

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Consent

This was retrospective study so no consent.
Author contribution

Abdirahman Mohamed Hassan Dirie: designing of research plan, data collection, data analysis, literature review, writing of results, discussion, introduction and conclusion. Sedat Çolakoğlu: designing and research planning and facilitated getting permission from research committee of our hospital Bashir Mohamud Abdi: played an important role in data collection Abdiaziz Mohamud Shire: Data collection and facilitated to get permission from ministry of health Abdullahi Hassan Abdinur; took part in discussion and introduction writing.

Registration of research studies

1. Name of the registry: Not applicable
2. Unique Identifying number or registration ID: Not applicable
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): Not applicable

Guarantor

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Declaration of competing interest

Authors have no financial or personal conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jamsu.2022.103793.

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