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**Incidence rate of Multidrug-resistant Tuberculosis in Benghazi**

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## **Abstract**

About one-third of the world's population is infected with mycobacterium tuberculosis. Every year about 500,000 people worldwide are infected with multidrug-resistant Mycobacterium tuberculosis (MDR). The human bacteria that cause TB is called Mycobacterium avium-intracellulare complex (MAC), is enter The human body from air droplet and become intracellular bacteria, mainly at the apical part of the lung. The study aims to identify cases that develop MDR-MTB recently in Benghazi city and to change results from 9 years ago. A retrospective study has been conducted to identify the characteristic of pulmonary TB cases that admitted to Quefia Chest Hospital in Benghazi, Libya from (March) 2018 to (December) 2019. Results showed that 10 cases out of 352 TB patients were resistant to anti-TB drugs. comparing the results in 2009 and 2010 for the pulmonary TB cases that admitted to Quefia Chest Hospital Benghazi, Libya showed that 4 cases out of 430 TB patients were resistant to anti-TB drugs. The MDR-TB patient was positive for sensitivity culture and didn't respond to the first-line anti-TB therapy (isoniazid and rifampicin), the 2 most powerful anti-TB drugs and therefore were diagnosed as Multidrug-Resistant Tuberculosis (MDR-TB). (1,5)

## **Introduction**

Tuberculosis is caused by bacteria called mycobacterium tuberculosis. Worldwide, M. tuberculosis causes more deaths than any other single microbial agent. Mycobacterium tuberculosis differs from Atypical Mycobacteria in various ways. The most important difference is that the Mycobacterium tuberculosis is found only in humans, whereas atypical are found in the environment. (1,2)

The atypical are also called “Mycobacteria other than M. tuberculosis,” or MOTTs. The atypical are subdivided into rapid growers and slow growers based on whether they form colonies in more than or less than 7 days. (1)

The following are important slow growers: (1) Mycobacterium avium-intracellulare complex (MAC) causes tuberculosis-like disease, especially in immunocompromised patients, such as those with AIDS. It is highly antibiotic-resistant. (2) Mycobacterium kansasii also causes tuberculosis-like disease but is less antibiotic-resistant than MAC. (3) Mycobacterium marinum causes “swimming pool granuloma or fish tank granuloma,” which is a skin lesion at the site of an abrasion acquired in a swimming pool or an aquarium. (4) Mycobacterium scrofulaceum causes scrofula, which manifests as swollen, non-tender cervical lymph nodes (cervical adenitis). Mycobacterium avium-intracellulare complex (MAC) enters the human body from air droplet and become intracellular bacteria, mainly at the apical part of the lung. (1)

Approximately 90% of M. tuberculosis infections are asymptomatic. Also known as latent infections, can reactivate and cause symptomatic tuberculosis. For example, AIDS patients have a very high rate of reactivation of prior asymptomatic infection and rapid progression of the disease. In these patients, an untreated disease caused by M. tuberculosis has a 50% mortality rate. The risk of activation of latent bacteria is considerably higher in infected individuals who belong to specific high-risk populations. (1)

Major risk factors for TB activation include HIV infection, recent contact with an infectious patient, initiation of an anti-tumor necrosis factor (TNF) treatment, receiving dialysis, receiving an organ or hematologic transplantation, silicosis, being in prison, being an immigrant from high TB burden countries, being a homeless person, being an illicit drug user. (1)

The bacteria that cause tuberculosis (TB) can develop resistance to the antimicrobial drugs used to cure the disease. Multidrug-resistant TB (MDR-TB) is TB that doesn't respond to at least two antimicrobial drugs (isoniazid and rifampicin), the 2 most powerful anti-TB drugs. The mismanagement of TB treatment and person-to-person transmission are 2 reasons why multidrug resistance continues to emerge and spread. (3)

Most people with TB are cured by a strictly followed, 6-month drug regimen that is provided to patients with support and supervision. Inappropriate or incorrect use of antimicrobial drugs, or use of ineffective formulations of drugs (such as the use of single drugs, poor-quality medicines or bad storage conditions), and premature treatment interruption can cause drug resistance, which can then be transmitted, especially in crowded settings such as prisons and hospitals. (3)

We are a treatment MDR-MTB patient in Quefia Chest Hospital Benghazi, Libya, by complex of drugs. In the first two months, we use streptomycin, after the two months we used a long course of first-line drugs which is called HRZE(Isoniazid, rifampicin, ethambutol, and pyrazinamide)to one year.

The clinical findings are protean; many organs can be involved. Fever, fatigue, night sweats, and weight loss are common. The main findings in pulmonary tuberculosis are cough and hemoptysis. (1)

### **Aim of the study**

The study aims to identify cases that develop Multidrug resistant-TB recently in Benghazi and to identify the changing results from 9 years ago until 2019.

### **Material & Methods**

This study is a retrospective study. Form March 2018 to December 2019 and comparing with the results in Benghazi in 2009 and 2010. We used a reported database to the static office of Quefia Chest Hospital Benghazi, Libya regarding.

In Quefia Chest Hospital Benghazi, Libya we used two materials, the first one is Acid Fast Bacilli test tests to determine if the patient has tuberculosis or not from the sputum, and the 2<sup>nd</sup> material is GeneXpert test is a molecular test for TB. The Genexpert diagnoses TB by detecting the presence of TB bacteria, as well as testing for resistance to the drug "Rifampicin" only.

## Results

Of 354 of TB patient were admitted to the Quefia Chest Hospital Benghazi, Libya from march 2018 and December 2019, 67.23% were males while 32.77% were females, 10 of total TB ( 354 ) patient, 2.82% were resistant to anti-TB drugs, 30% of total MDR-TB Patient were HIV(**Co-infection** ), while 70% of total MDR-TB Patient were Libyan, and 30% were emigrant from chad. (5)

**Table1.1 TB patient in Benghazi from January 2009 to June 2010. (4)**

Sex	Year
	January 2009 to June 2010
Male	390
Female	40
Co-infection	50
Total	430

**Table1.2 TB patient in Benghazi from march 2018 to December 2019. (5)**

Sex	Year
	March 2018 to December 2019
Male	238
Female	116
Total	354

**Table2.1 MDR-TB patient in Benghazi from January 2009 to June 2010. (4)**

<b>Case Number</b>	<b>Age</b>	<b>Sex</b>	<b>Nationality</b>
<b>1</b>	22	Male	Libyan
<b>2</b>	30	Male	Chadian
<b>3</b>	35	Male	Chadian
<b>4</b>	32	Male	Sudanese

**Table2.2 MDR-TB patient in Benghazi from march 2018 to December 2019. (5)**

<b>Case Number</b>	<b>Age</b>	<b>Sex</b>	<b>Nationality</b>	<b>Co-Infection</b>
<b>1</b>	33	Female	Libyan	HIV +ve
<b>2</b>	30	Female	Chadian	-----
<b>3</b>	29	Female	Libyan	-----
<b>4</b>	20	Female	Libyan	-----
<b>5</b>	44	Female	Libyan	-----
<b>6</b>	26	Male	Chadian	HIV +ve
<b>7</b>	27	Male	Libyan	-----
<b>8</b>	59	Male	Libyan	-----
<b>9</b>	27	Male	Chadian	HIV +ve
<b>10</b>	26	Male	Libyan	-----

## Discussion

The bacteria that cause tuberculosis (TB) can develop resistance to the antimicrobial drugs used to cure the disease. Multidrug-resistant TB (MDR-TB) is TB that doesn't respond to at least two antimicrobial drugs (isoniazid and rifampicin), the 2 most powerful anti-TB drugs. In this study includes 10 MDR-TB patients in Benghazi from march 2018 to December 2019. (3)

When a person has two or more infections at the same time. For example, a person living with HIV may also have tuberculosis (TB) that called co-infection. Opportunistic infections (OIs) are infections that are more severe or that occur more often in people with weakened immune systems than in people with healthy immune systems. HIV increases the risk of TB in people with HIV and weakens the immune system. Infection with both TB and HIV is called TB/HIV co-infection.

Latent TB is more likely to advance to TB disease in people with HIV than in people without HIV. TB disease may also cause HIV to worsen. Treatment with HIV medicines is called antiretroviral therapy (ART). ART prevents HIV infection from advancing to AIDS and protects the immune system. In people with HIV/TB co-infection, ART reduces the chances that latent TB will advance to TB disease.

This retrospective study was discovered 10 MDR-TB patients from March 2018 to December 2019 from a total of 354 TB patients, and in January 2009 to June 2010 were discovered 4 MDR-TB patients from 430 TB patients. here we notice the total MDR-TB patient rate from total TB patient is increased by about 1.89% in 10years. here we notice the number of TB patients is decreased in 10 years to 76 patients this rate because A chest hospital in eastern Libya was reopened in the city of Shahat, and the number of patients is reduced in Quefia Chest Hospital Benghazi, Libya. (4,5)

Co-infection cases in 2019 represented 30% of the total MDR-TB patients, while in 2010 the co-infection cases of the total TB population were 12%. 20% of co-infection patients in 2019 are from Chad, and another 10% of co-infection patients are from Libya. 50% of the total MDR-TB patients in 2009 were Chadians, while 25% were Libyan, and 25% others were Sudanese Here we notice an 18% increase in CO-Infection, and this is very dangerous. The rate of migrants in Libya may increase due to a shortage of border guards. (4,5)

50% of total MDR-TB patients in 2019 are male, and the other 50% of MDR-TB patients are female .while in 2010 all patients of MDR-TB patients were male. here we notice the rate of effected males is decreasing from 100% to 50% and the rate of female increases from 0% to 50%. (4,5)

70% of total MDR-TB patients in 2019 are Libyan, and 30% of total MDR-TB patients are emigrants and all of the emigrants from chad. While 25% of total MDR-TB patients in 2010 were Libyan, and the other 50% were emigrants from Chad and the other 25% from Sudan. here we notice the rate of affected Libyan patients was increased by about 45% and almost the emigrant MDR-TB patient was Chadian. Maybe because the cities in south Libya is near to the border and the emigrant. and After the war, they leave south Libya and came to Benghazi. (4,5)

The age categories in 2019 from 19years to 29years is 40% of all MDR-TB patients, from 30years to 49years is 30% of all MDR-TB patients, and from 50years to above the 65years is 10%. While the age categories in 2010 from 19years to 29years were 25%, and from 30years to 49years were 75%. here we notice the age categories at a young age is increased by about 15%, while the MDR-TB patient from 30years to 49years was decreasing by about 45%. (4,5)

## **Conclusion and Recommendations**

In this retrospective study, We discover the rate of MDR-TB Libyan patients is increased by about 45% than the emigrants in 10 years. I recommend doing a new strategy known as DOTS ( Directly Observed Treatment, Short-course ) it's a combination of technical and managerial components, and it's a widespread detection and cure of TB patients, particularly the infectious ones. As an example in China, cure rates rose from below 50 percent to more than 95 percent in areas covered by DOTS. I also recommend replace of tuberculin skin test (TST) and do TB Interferon-Gamma Release Assays (IGRAs) TB to detect latent TB in low- and middle-income countries.



## References

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