

## Impact of Covid-19 Disease on Tuberculosis in Kuwait: Study from TB Referral Center

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### ABSTRACT

**Background:** Tuberculosis is an endemic disease in various regions of the world like South East Asia. The State of Kuwait comprises a diverse population of non-Kuwaiti expatriates mostly from India, Bangladesh, and Egypt. The Pulmonary Rehabilitation Centre (PRC) in Kuwait is a referral center for all diagnosed cases that have tuberculosis either active or latent.

**Objective:** To study the impact of covid 19 disease on tuberculosis during its pandemic within the period from March 2020 to March 2021 and to compare it with the previous 1 year from January 2019 to February 2020.

**Patients and Methods:** Data were collected from our system for comparison of the rate of diagnosis and treatment each month over two years from January 2019 to the end of 2020, which was done during the period of lockdown (total curfew).

**Results:** Before COVID-19 disease, the annual number of active TB was 534, which decreased during the pandemic without reaching the critical difference; mean±SD= 423.3±103.4, P> 0.05. On the other hand, the annual number of latent TB cases was 438 before the pandemic, which showed a significant increase with a mean of ±SD= 624.5±154.5, P=0.007. Additionally, Latent TB cases in the COVID-19 era showed significantly higher reports than active TB, P < 0.05. Moreover, we found a considerable double number of multi-drug resistance pulmonary tuberculosis and one case suspected extensive drug resistance.

**Conclusion:** Covid 19 pandemic had a significant impact on tuberculosis care as regards diagnosis and treatment as well as follow-up.

**Keywords:** Tuberculosis active, Latent covid 19 pandemics, Drug resistance tuberculosis.

### INTRODUCTION

Coronavirus disease (COVID-19) is a highly infectious disease caused by novel coronavirus named as SARS Cov-2. It originated in the big city of Wuhan, the capital of the Hubei province of China in December 2019 and has been announced pandemic by the World Health Organization. It has a serious impact on people with pre-existing health conditions and has many side effects in the management of other diseases <sup>[1, 2]</sup>.

Tuberculosis (TB) is the world's greater killer among infectious diseases, claiming more than 4000 lives each day. India has the biggest number of both drug-sensitive and drug-resistant TB <sup>[3]</sup>. Kuwait is one of the biggest countries for the recipient of Asian workers mainly from India.

Patients who are on treatment from tertiary care hospitals are severely affected due to the lockdown implemented to control coronavirus infection. Almost every country has established national TB programs, whereas national programs for COVID-19 are urgently required <sup>[4, 5]</sup>.

However, in March 2020 a rapid analysis conducted by the Stop TB Partnership brought attention to a major impacts of COVID-related lockdowns on TB care in different countries <sup>[6]</sup>.

### PATIENTS AND METHODS

#### Patients and study type

A retrospective cohort study was done for all tuberculous cases, referred to Pulmonary Rehabilitation Center and it compared the pre-lockdown during the period from March 2019 to March 2020 with the lockdown and post-lockdown periods through the period from March 2020 to March 2021.

#### Data collection:

The study used patient records and digital laboratory results in addition to radiological reports among pulmonary and extrapulmonary as well as latent tuberculosis.

In pulmonary tuberculosis, the data collected included AFB smear status, Xpert DNA load, culture status, time to culture positivity, hospital admission rate, outpatient follow-up rate, sputum time, AFB conversion to negative, rate of defaulters, as well as the rate of resistant cases.

In extrapulmonary tuberculosis, the data included AFB status, Xpert DNA load, culture status, outpatient follow-up rate, rate of defaulters, and rate of resistant cases.

In latent tuberculosis, the data included the proportion of screened contacts identified with latent tuberculosis infection (LTBI), the outpatient follow-up rate, and the rate of defaulters.

**The used investigations are:**

- 1- Sputum examination after preparation and staining by Ziehl-Neelsen stain (ZN) following the clinical protocol of microscopic examination of mycobacterium tuberculosis (MBT) [7].
- 2- Gene Xpert examination following the manufacturer protocol guidelines [8].
- 3- Culture of the collected samples on (Lowenstein–Jensen media), which is the gold standard for detecting (MBT) during 6-8 weeks [9].

**Ethical approval:**

The study was approved by the Ethics Board of Al-Azhar University.

**Statistical analysis**

The collected data were represented as mean and standard deviation. Also, multiple comparisons between more than two means were performed using one way ANOVA test with the Tukey method. A Time series plot was performed to visualize any characteristic pattern of prevalence through the cases. All tests were two-sided,  $P < 0.05$  is considered significant.

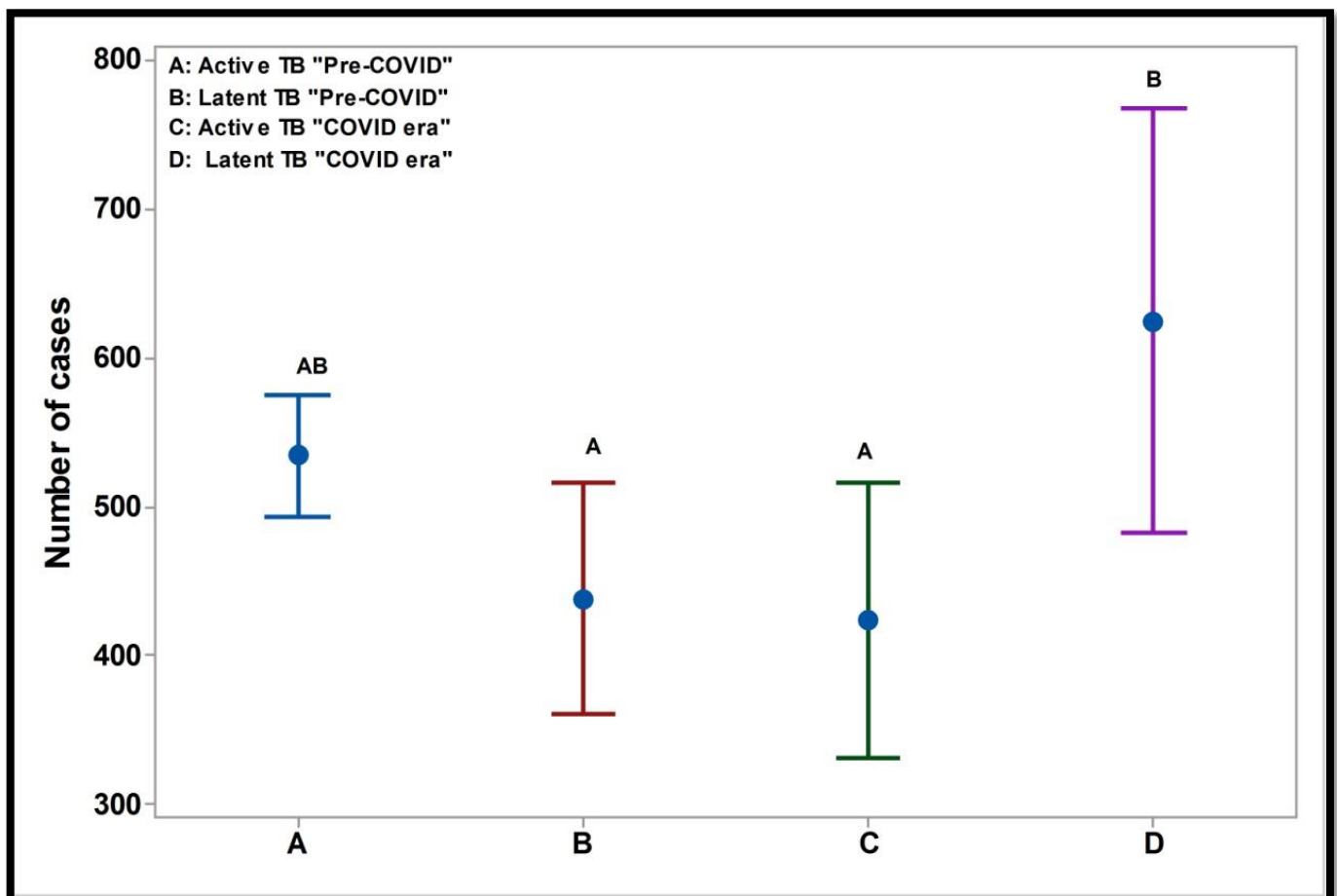
**RESULTS**

Before the COVID-19 pandemic, the annual number of active TB cases reached 534 patients which decreased during the pandemic and reached  $423.3 \pm 103.4$  with a non-significant difference  $P > 0.05$ . On the other hand, the annual number of latent TB cases was 438 before the pandemic which showed a significant increase during the pandemic reaching  $624.5 \pm 154.5$ ,  $P < 0.05$ . As regards latent TB cases, they showed significantly higher reports than active TB  $P < 0.05$  **Table (1)**. Moreover as shown in **Figures (1, 2)** the rising of latent TB started in July 2020 and continued till the end of the same year.

**Table (1): TB cases in correlation with the COVID-19 pandemic**

Groups	Number of cases	
	Mean	SD
Pre-COVID-Active TB	533.8	63.4
Pre-COVID-Latent TB	438.3	108.3
COVID era-Active TB	423.3	103.4
COVID era-Latent TB	624.5	154.5
<b>P-value</b>	<b>0.007<sup>§</sup></b>	

§: One Way ANOVA test with multiple comparisons using Tukey methods,  $P < 0.05$  considered significant



**Figure (1): TB cases before and during COVID-19**

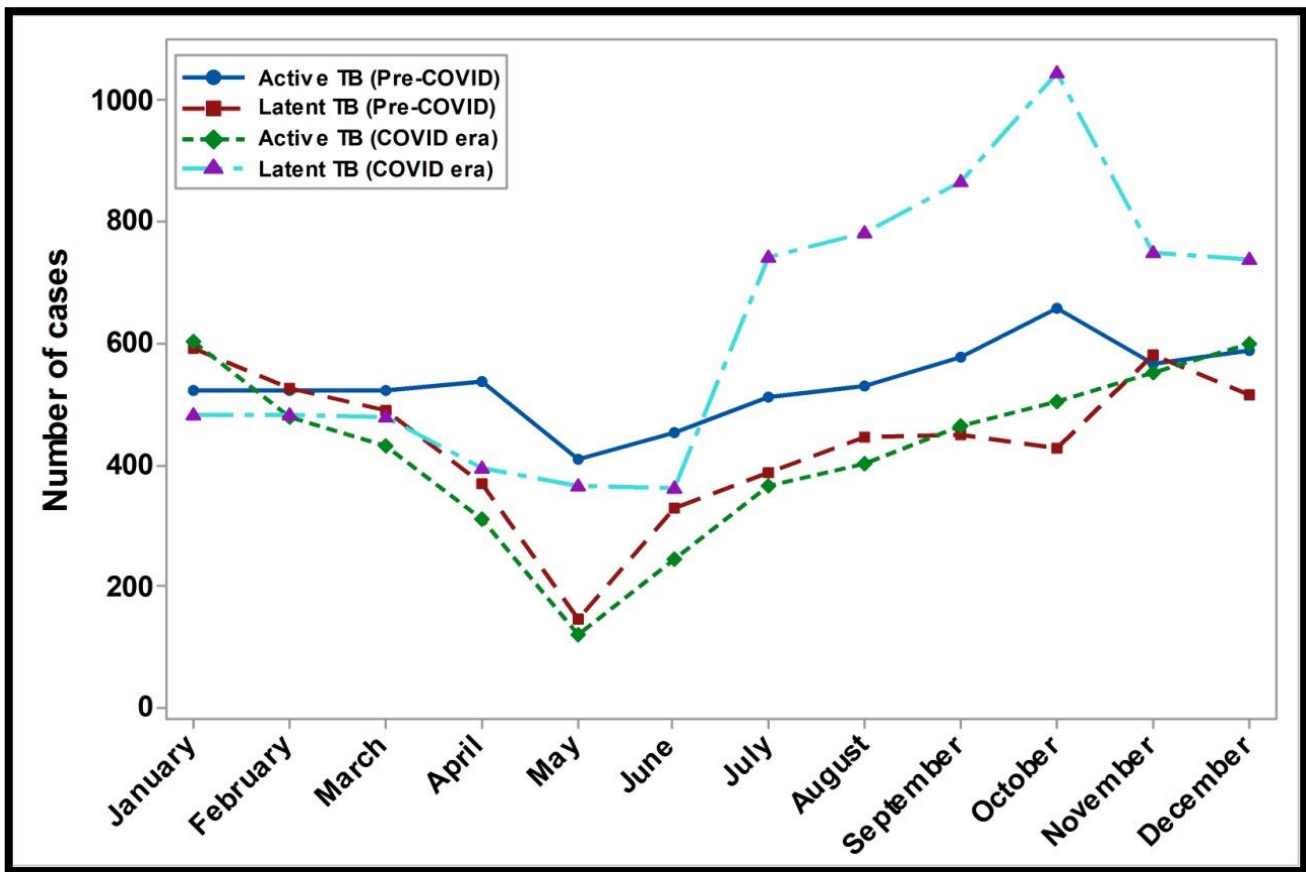


Figure (2): Trend of TB cases before and during the COVID-19 era.

## DISCUSSION

The pulmonary rehabilitation center is the only tertiary center in Kuwait country for treatment and follow-up of tuberculosis either pulmonary or extrapulmonary as well as latent tuberculosis within two inpatient wards for both males and females. The center contains a general room with negative suction, two isolation rooms for suspected monoresistance or multidrug resistance by BD Max till sensitivity confirmation.

Admission was done for all smear-positive patients, who were discharged after negative conversion by two sputum samples. Also, the center contained tuberculosis OPD for follow-up patients after discharge.

Our study aimed to determine the impact of Covid-19 on active pulmonary and latent types of tuberculosis. Before the pandemic, the annual number of active TB was 543 cases which decreased during the Covid-19 era without reaching a significant difference. This can be explained as the Governate health program which was established during the pandemic era for any patient with a respiratory problem must do a screen swab for Covid-19 as well as a sputum AFB smear and gene Xpert for the early detection of active pulmonary TB and to decrease the rate of misdiagnosis. Also, great restrictions for using protective measures like wearing a mask and social distancing helped for no critical difference between pre covid and covid eras. On the

other hand, the Governate health program that was used for screening for latent TB during lockdown showed a severe reduction in the number of latent TB during months of the pandemic. Despite the annual number of latent TB cases being 438 cases before the Covid-19 era, it showed a significant increase during the pandemic era reaching 624 cases. Also, latent TB cases in the Covid-19 era showed a significantly higher report than active TB, moreover as shown in **Figure (2)** the raising trend of latent TB cases started in July 2020 and continued till the end of the year. This can be explained by the stopping of latent TB screening and postponement after months of lockdown leading to overcrowdedness of the cases.

Our results are in line with **Milgiori et al.**<sup>[10]</sup> who describes the worldwide effect of the Corona virus pandemic on tuberculosis services. During the period from January-April 2020, it was concluded that the reduction in TB-related hospital discharges, newly diagnosed active TB, total active TB outpatient visits, and new LTBI and LTBI outpatient visits.

Our study showed also an increasing number of multidrug-resistant TB in the Covid-19 era as compared to pre covid era. We found 6 cases of MDR TB and one suspected XDR in the Covid era instead of 3 cases in pre covid era. We thought that this may be due to negligence of patients with chronic respiratory illness from fear to contact with acute respiratory illness and

also from Governate lockdown. We also thought this was one of the strong points of the present study and also the annual comparison of both active and latent TB during the lockdown.

On the other hand, our limitation is that study was only made in one center that may need many centers in the Gulf Area.

## CONCLUSION

Great impact of the Covid-19 pandemic on tuberculosis care in the pulmonary rehabilitation center of Kuwait as regards active case and latent TB management.

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**Conflict of interest:** Nil.

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