

# Diagnosis of Pulmonary and Multidrug Resistant Tuberculosis at DHQ Teaching Hospital Gujranwala

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## Author Contributions

MKC RI conceived idea, MKC AH SS drafted the study, RI SS collected data, AH SS did statistical analysis & interpretation of data, MKC RI critical reviewed manuscript,

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## Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

## Abstract

**Background:** Tuberculosis (TB) is an important infectious illness that causes high morbidity and mortality. Early diagnosis and prompt treatment is the only key to successful control of TB.

**Objective:** To observe the diagnostic frequency of pulmonary TB and rifampicin resistant cases using ZN smear and GeneXpert among suspects visiting DHQ teaching hospital Gujranwala.

**Methodology:** This descriptive cross sectional study was conducted in the department of Pulmonology, Gujranwala Medical College/DHQ Teaching Hospital Gujranwala during January 2018 to June 2019. After taking the informed consent, one spot sputum specimen per patient was collected from patients tested on Gene Xpert while two specimens per patient were collected from patients tested by ZN staining. Demographic and clinical data were entered and analysed using SPSS.

**Results:** A total of 1535 patients were tested on Gene Xpert and 5323 on ZN smear microscopy. Present study showed smear positivity on Zn staining 11.7% with male to female proportion of 78.4% and 21.6% respectively. Gene Xpert positivity was 26.7% with male to female proportion of 66.4% and 33.6%.

**Conclusion:** : It is pertinent that Gene Xpert is a valuable addition in the diagnosis of TB and drug resistant TB however importance of ZN smear could not be ruled out due to number of advantages.

**Key words:** Tuberculosis; Gene Xpert; ZN Staining; Multidrug resistant TB

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## Introduction

Tuberculosis (TB) is an important infectious illness that causes high number of morbidity and mortality around the globe. Tuberculosis is the disease which is amongst top ten causes of deaths

worldwide.<sup>1</sup> Amongst high burden countries Pakistan ranks 5th globally. Drug resistance is a serious issue in the treatment and control of tuberculosis. Unfortunately, Pakistan stands at 6th high burden country in this type of tuberculosis.<sup>2</sup> Annually about 510000 people including children 15000 children get

this infection in Pakistan that can lead to death in more than 70000 due to this disease. Multidrug resistant (MDR) TB is a type of TB in which the isolate of Mycobacterium tuberculosis is resistant to isoniazid and rifampicin.<sup>3</sup>

World Health Organization surveillance report 2017, indicates that around 600000 people have rifampicin resistance TB while around 490000 patients develop MDR. Out of these cases, 47% patients belong to India, China, Russia and Pakistan<sup>4</sup>. During 2016, in Pakistan 518000 new cases of TB were reported with an incidence rate of 268/100000 and the death rate was 23/100000. Patients co-infected with human immunodeficiency virus were reported to be 3.5/100000 and 14/100000 with TB & MDR TB respectively<sup>4</sup>. New TB patients have MDR and rifampicin resistance upto 4.2% and 16% among those who were treated previously.<sup>4</sup> There is also upsurge in extensive drug resistance (XDR); which is an advanced form of MDR TB in which MTB is also resistance to flouriquinolones and at least one of the three injectable second line anti-tubercular drugs i.e. Amikacin, Kanamycin and Capreopmycin. According to WHO data collected from 91 countries the rate of XDR TB among MDR-TB cases is 6.2%.<sup>4</sup>

Early diagnosis and prompt treatment is the only key to successful control of TB. There are many methods to diagnose TB but the gold standard is to demonstrate the MTB by microscopy, culture and recently developed Gene Xpert MTB/Rif assay.<sup>5</sup> District Head Quarter (DHQ) teaching hospital Gujranwala has the facility to diagnose TB by ZN staining and Gene Xpert MTB/Rif Assay. The later technique is not only helpful in the diagnosis of TB but it also helps in detection of drug resistance against rifampicin. The aim of present study was to observe diagnostic frequency of pulmonary TB

and rifampicin resistant cases using ZN smear and Gene Xpert among suspects visiting DHQ teaching hospital Gujranwala.

### Methodology

This descriptive cross sectional study was conducted in the department of Pulmonology, Gujranwala Medical College/DHQ Teaching Hospital Gujranwala during January 2018 to June 2019. A total of 1535 TB suspects were checked by GeneXpert technique and 5323 cases were checked by Zheil Neelsen (ZN) Staining.

After taking the informed consent, sputum samples were collected from all the patients. One spot specimen per patient was collected from patients tested on Gene Xpert while two specimens per patient were collected from patients tested by ZN staining. Demographic data of suspected patients including age and gender were recorded. Detailed history including previous TB treatment was also noted. Zheil Neelsen technique was used to demonstrate the presence of acid fast bacilli in the smear and Gene Xpert MTB Rif Assay was used to find MTB complex and rifampicin resistance. Data was entered and analysed using SPSS.

### Results

As regard to Gene Xpert Technique 1535 patients were tested. Among these 1025 were male and 510 were females. Mean age of male patients was 36.4±16.1 and female patients was 35.6±15.8 in present study. As regard to ZN Technique 5323 patients were tested. Among these 3511 were male and 1812 were females. Mean age of male patients was 36.1±16.0 and female patients was 35.2±15.3 in present study. Gender distribution of patients his shown in figure 1.

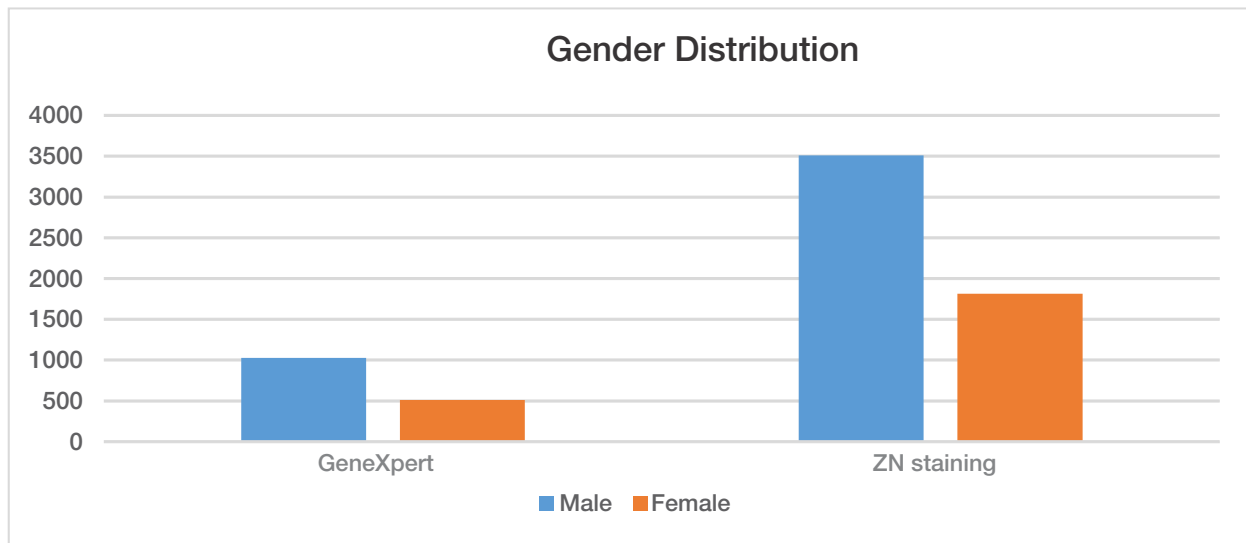


Figure 1: Gender Distribution of Patients tested on GeneXpert and ZN Staining.

Out of 1535 patients tested on Gene Xpert, MTB was detected in 410 (26.7%). Amongst MTB detected 272 (66.4%) were male cases and 138 (33.6%) were female cases. Out of 410 MTB detected 23 (5.6%) cases have

rifampicin resistance. Amongst 23 rifampicin resistant cases 16(69.6%) were male and 7(30.4%) were females as shown in table 1.

**Table 1: Analysis of Gene Xpert Results**

Result	Male N(%)	Female N(%)	Total N(%)
Detected	272 (66.4)	138 (33.6)	410 (26.7)
Not Detected	753 (66.9)	372 (33.1)	1125 (73.3)
Rif Resistance	16 (69.6)	7 (30.4)	23 (5.6)

Out of 5323 suspects who were tested by ZN staining, 625 (11.7%) were smear positive. Out of 625 smear

positive cases 490 (78.4%) were males and 135(21.6%) were females. Table shows the distribution of cases.

**Table 2: Distributions of cases by ZN staining**

Result	Male N(%)	Female N(%)	Total N(%)
Positive	490 (78.4)	135 (21.6)	625 (11.7)
Negative	3021 (64.3)	1667 (35.7)	4698 (88.3)

## Discussion

Tuberculosis diagnosis at early stage is an important step in the control of TB and to stop the chain of transmission. Zn smear positive patients are considered highly infectious. Smear negative patients are also important because they also transmit about 17% disease and it has a great impact on public health.<sup>6</sup>

Our study shows smear positivity on Zn staining 11.7% with male to female proportion of 78.4% and 21.6% respectively. Gene Xpert positivity is 26.7% with male to female proportion of 66.4% and 33.6%. Comparing with study conducted by Buchelli et.al. which shows the smear positivity of 53% by Zn stain and of GeneXpert positivity of 82%.<sup>7</sup> However, another study conducted by Munir et.al. in similar settings showed smear positivity of 67.5% and GeneXpert as 77.4% respectively.<sup>8</sup> Diagnostic proportions of above two studies are high due to difference in selection criterion.

Smear results of present study are in agreement with a study on incremental yield of submitting three sputum smears which reported an overall ZN smear positivity of 11.8% and similar results were revealed by an older study from same settings.<sup>9,10</sup> Diagnostic yield of Gene Xpert in our study is more than the double as compared to ZN smear microscopy clearly indicates the higher efficacy of molecular based technique which is also evidenced by previous studies.<sup>7,8</sup>

On the other hand diagnosis and treatment of TB and drug resistant TB has been remained the top priority of

National TB Control Program (NTP), Pakistan as they have provided Gene Xpert to each DHQ throughout the country and remained able to meet many challenges related to diagnosis and treatment of TB.<sup>11</sup> Rehman et al., used joint venture of ZN smear and Gene Xpert in active case detection of TB from contacts of 112 index TB patients and found infection among 2.5% of contacts of which 23.5% had rifampicin resistant TB.<sup>12</sup>

Conclusion: In conclusion it is pertinent that Gene Xpert is a valuable addition in not only diagnosis of TB but also provide important tubercular drug susceptibility of rifampicin within the same sample and in same time of two hours. However importance of ZN smear could not be ruled out as it is cheaper, easy and could be performed without higher level of facilities.

## References

1. WHO TB Key facts sheet. [updated 18 September 2018, Cited August 2019] Available from URL: [ <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>].
2. Waheed Y, Khan MA, Fatima R, Yaqoob A, Mirza A, Qadeer E, et.al. Infection control in hospitals managing drug-resistant tuberculosis in Pakistan: how are we doing?. *Pub Health Act.* 2017; 7(1): 26-31.
3. World Health Organization. Global tuberculosis report, 2016. WHO/HTM/ TB/2016.13. Geneva, Switzerland: WHO, 2016. (Accessed on 19th August 2019) Available from URL: [ <http://apps.who.int/>

- medicinedocs/en/d/Js23098en/]
- World Health Organization. Global TB Report 2017. (Accessed on August 2019) Available from URL:[<http://apps.who.int/iris/bitstream/10665/259366/1/9789241565516-eng.pdf?ua=1>]
  - Munir MK, Rehman S, Iqbal R, Saeed MS, Aasim M. Comparison of gene Xpert MTB/RIF assays with conventional standard proportion method for determination of drug susceptibility in multidrug resistant TB suspects. *Annals of KEMU*. 2018;24(1):570-6.
  - Mostaza J L, Garcia N, Fernandez S, Bahamonde A, Fuentes M I, Palomo M J. Analysis and predictor of delay in suspicion and treatment among hospitalized patients with pulmonary tuberculosis. *An Med Interna*. 2007; 24(10): 478-83.
  - Buchelli Rmirez H L, Gracia-Clemente M M, Alvarez-Alvarez C, Palacio-Gutierrez J J, Pando-Sandoval A, Gagatek S, AriasGuillen M, Quenzada-Loaiza C A, Casan-Clara. Impact of the Xpert MTB/RIF molecular test on the late diagnosis of pulmonary tuberculosis. *Int J Tuberc Lung Dis*. 2014;18(4): 435-37.
  - Munir MK, Rehman S, Aasim M, Iqbal R, Saeed S. Comparison of Ziehl Neelsen microscopy with GeneXpert for detection of Mycobacterium tuberculosis. *IOSR-JDMS*. 2015;14(11):56-60.
  - Rehman S, Iqbal R, Munir MK, Salam AA, Saeed S. Incremental yield of submitting three sputum specimens for the diagnosis of pulmonary tuberculosis. *Pak J Med Res*. 2013;52(2):35.
  - Saleem S, Shabbir I, Iqbal R, Khan SU. Value of three sputum smears microscopy in diagnosis of pulmonary tuberculosis. *Pak J Med Res*. 2007;46(4):94-7.
  - Munir MK, Rehman S, Iqbal R. Meeting the Challenge, Making a Difference: Multidrug Resistance Tuberculosis in Pakistan. *Pak J Med Res*. 2018;57(1):1-2.
  - Rehman S, Kashif Munir M, Iqbal R, Ahmed Salam A, Saeed S, Masud F, Aasim M. Active Case Detection Among Household Contacts of Multi Drug Resistant Tuberculosis Patients in a Tertiary Care Setting. *Pak J Med Res*. 2014;53(3):55-9.