MULTI-DRUG RESISTANT TUBERCULOSIS

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SUMMARY

This paper is aimed at writing a research report encapsulating the data-driven epidemiological facts regarding Multi-Drug Resistant Tuberculosis which is quite common these days. This report will be sent to a local community healthcare center that is planning to develop and execute initiatives concerning Multi-Drug Resistant Tuberculosis so that this process could be guided appropriately. Main sections of this report include introduction, main body and conclusion.

INTRODUCTION

Multi-drug resistant tuberculosis (MDR-TB) is a type of tuberculosis originating from bacterial infections caused due to the fact that bacteria become resistant to at least two of the most effective first-line antimicrobial medications of tuberculosis i.e., isoniazid and rifampicin. Moreover, some bacteria are also resistant to second line pharmacological treatments of tuberculosis developing a condition known as extensively drug resistant tuberculosis (XDR-TB). Tuberculosis is mainly caused by infectious bacteria called *Mycobacterium tuberculosis*. Estimations indicated that one in four people in the world are infected by tuberculosis bacteria; however they are diagnosed with TB when bacteria no longer remains dormant due to conditions such as HIV, Diabetes, Ageing and other immune-compromising diseases that takes a serious toll on the production and activation of T-lymphocytes and White Blood Cells (WBCs).

The first antibiotic medication of TB was developed in 1943 in which some strains of bacteria underwent favorable genetic changes and developed resistance to standard drugs. Currently, most of the cases of multi-drug resistance tuberculosis are caused due to the one TB strain known as the Beijing lineage. Interestingly, these strains become activated due to the inadequate or incorrect treatments of TB in form of giving wrong medicines, giving multiple medicines or no medicine at all, or using one medicine continuously throughout the treatment.

As mentioned earlier, MDR-TB is caused by resistant strains of bacteria caused by first line treatments of TB hence its treatment is done with second- line medications for minimum of six months and maximum of 20-24 months. In this way, ideal cure rates can touch the margins of 70%.

MAIN BODY 900

The current survey data regarding MDR-TB suggests that it is a global issue (Wood et., al., 1993). Data indicates that inappropriate treatment strategy is the leading cause of this condition both on the part of doctors and patients. Some doctors provide insufficient, inconsistent or intermittent treatment to the patients and patients too find it hard to follow the prescribed treatment plan (Farmer, 2011). Alive and coughing persons having active pulmonary tuberculosis can transmit this disease because MDR-TB is an airborne pathogen (CDC, 1990). Usually, TB strains are less transmittable and less threatening in common people but if individuals have compromised immune system, the likelihood of disease becomes twofold (McKay, 2013).

In 2011, there were 0.5 million new cases of MDR- TB worldwide and in 2013, the estimated new cases of TB were reported as nearly 3.4% and the level turned 20% for acquired cases of MDR- TB. Out of these cases, 60% happened in South Africa, China, India, Brazil, and Russian Federation alone (WHO, 2014). In 2013, the border of United States and Mexico was termed as “a hot region for drug- resistant- TB” although the number of cases in these states remained small. A research study indicates that in guinea pigs, INH-resistant tuberculosis is less virulent but is highly active in immune- compromised individuals. Another research study suggested that higher prevalence of AIDS is associated with MDR-TB in various European countries (Samuel, 2016). Additionally, a study conducted in New York City found that 80% of MDR-TB cases were tracked back in homeless shelters and prisons (Nachega, 2018).

It must be noted that patients with MDR- TB acquire longer periods of treatment approximately about 2-3 years with second- line medications. Ironically, these second-line medications of MDR- TB are highly expensive and toxic causing various side effects including abdominal pain, nausea and even psychotic symptoms (Caroline, 2013). In 2016, 4.1% of new cases and 19% of previously treated cases with MDR/RR-TB

The resistant strains of tuberculosis are already existent in the population so it can readily be transmitted to an uninfected person where they can develop primary multiple drug resistant tuberculosis and is responsible for approximately 75% cases. On the other hand, acquired MDR- TB is developed when a person is treated inadequately already having non-resistant strains of TB due to which antibiotic resistance is developed within bacteria affecting the. A survey conducted in 2016 estimated that 240,000 deaths and 600,000 cases of multiple-drug-resistant tuberculosis were reported (WHO, 2017). Another estimation of World Health Organization suggests that 19% of previously treated cases and 4.1% new cases were accounted by Multiple Drug-Resistant tuberculosis. Moreover, Soviet Union, China, India, Africa, and South America were among the list of top countries affected by this condition in 2016 (WHO, 2017). Despite advancements in the research industry, number of new cases detected in 2016 reached 153 000. Nearly 8,000 patients with extensive drug-resistant TB were reported worldwide and the data of 123 countries reports that on average, 6.2% of people with MDR-TB have XDR-TB.



FIGURE: *Percentages of* *cases MDR-TB cases worldwide after 2002 (WHO).*

 A bulk of literature and survey data analysis orchestrated by World Health Organization, Center of Disease Control (CDC) and various national research institutions have focused more on the prevalence of MDR-TB and quite limited attention has been paid to assess the personal and institutional risk factors and effective treatment interventions of MDR-TB. After deliberate painstaking search, only one research was found regarding effective diagnosis and treatment attempts with regard to MDR-TB; this survey stated that nearly 43 million lives were saved in 2000-2014 due to effective diagnosis and treatment interventions (Global Tuberculosis Report, 2018). The need of the hour is to assess not only the new direction of treatments but also effective preventive strategies so that its spread could be controlled. As there is a strong interlink between research and practice; we need to execute researches to explore the advance preventive and management strategies because only data can take us towards better practice and bright future with respect to these superfluous conditions. We need to obtain data concerning the effectiveness of molecular testing of tuberculosis even in low- resource setting. A scarce data based on these adoptions has helped a lot in driving substantial increase in the number of patients with TB testing however there is still a lot more to explore regarding the clinical effectiveness of molecular testing and preventive measures hence new diagnostic interventions are just a small solution of a gigantic problem. Furthermore, efficient referral system and appropriate implementation demand multi-stakeholder collaborations and innovative solutions for example one needs to train health professional to ensure professional competence in executing tests, assessing results, drawing accurate conclusions and monitoring treatment of MDR-TB patients.

 Based on the data, it can be concluded that researchers, doctors and policy makers can take numerous productive steps to eradicate this problem including modernizing and scaling the laboratory capacity up with instant access to quick diagnostics for detecting MRD-TB; implementing quality control and training throughout the process of systematic detection; strengthening links in private-public mix scenario among health care providers; ensuring that national guidelines are being implemented and followed in referral systems to appropriate care and treatment and collaborating and invocating within the organization to accomplish holistic goals of wellbeing. Post-2015 TB Agenda developed by World Health Organization is a new initiative to reduce deaths 95% by 2035 and limit new cases of TB by 90% which clearly demonstrates the effectiveness of research and practice in the concerned field. Hence, in order to achieve this ambition, the collaboration of global health and development practitioners, policy makers and researchers to scale up and modernize the diagnosis and care of TB so that a continuum of access could be delivered from prevention to cure.

CONCLUSION

This paper was aimed at writing a research report encapsulating the data-driven epidemiological facts regarding Multi-Drug Resistant Tuberculosis (MDR- TB) which is quite common deteriorating condition these days due to diagnosis and treatment mismanagement. After deliberate analysis, it was found that a bulk of literature is present regarding worldwide prevalence of MDR- TB but a limited number of surveys and research studies address the diagnostic, preventive and management interventions of this condition. The need of the hour is to develop and execute research practice to accomplish the diagnostic, preventive and management goals concerning MDR-TB so that precious lives could be saved, new cases could be reduced and quality of life of individuals currently having the condition could be enhanced. Needless to say, research provides a sound base to practice and health professionals, policy makers and researchers need to work collaboratively for positive outcomes.

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