

Epidemiology of Tuberculosis

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Introduction

Tuberculosis is a highly communicable disease which is caused by tubercle bacillus also known as mycobacterium tuberculosis. If untreated, TB can be fatal. In the course of its history, TB has been at one time or another been referred to as scrofula, Pott's disease, phthisis, consumption or the White Plague where it is believed that humans first acquired in Africa (Zumla et al, 2015). However, the disease is not only curable but also preventable at the primary, secondary and tertiary level. The disease primarily affects the lungs although it can affect any other part of the body. Pulmonary TB accounts for more than 90% of the cases. In a fifth of these active TB cases, the infection spreads to areas beyond the lungs causing to areas like meninges, lymph nodes, bones and joints, the genitourinary tract or the intestines to cause extra-pulmonary TB. This mainly happens in children and individuals having suppressed immune systems like happens in HIV/AIDS patients. Other risk factors which put an individual at a higher risk of getting TB infection are diabetes, malnutrition, kidney disease and some forms of cancer.

Symptoms and Mode of Transmission of TB

The clinical manifestations of TB include a cough that lasts more than 14 days accompanied by coughing up body, chest pains or pain when coughing or breathing. Other symptoms include unexplained weight loss, fever, night sweats, chills and loss of appetite. The onset of the symptoms commences when an individual is exposed to the bacterium. During the latent stage of TB, no symptoms are present although a clinical test will confirm its presence. Some of the diagnostic tests are like skin test although a chest x-ray will appear normal just like the sputum smear. The incubation period of TB from the time a person is exposed to the

pathogen to the time when one can develop a positive tuberculin test ranges from three to six weeks with spread of the disease depending on the closeness of the contact, extent of the disease as well as sputum positivity of the source. Due to this, the incubation period may last several weeks, months or even years

From the latent stage, comes the active TB stage. During active TB, the patient will then exhibit any or all of the following described earlier on from chronic cough to general tiredness to hemoptysis. According to Sullis et al (2014), the victim may also have aphoric breath sounds with a dull chest on percussion may be accompanied by heightened tactile fremitus. Diagnostic tests conducted during the active stage would indicate an abnormal chest x-ray, a positive sputum smear besides a positive skin test. Some of the tests available are like Mantox skin test, Quantiferon TB gold blood test and acid-fast bacilli for culture and isolated. Once confirmed, it is advisable to isolate the patient and initiate specific treatment so as to prevent TB outbreak among populations. Some of the modes in which TB can be transmitted from one person to another are like droplet infection whereby the cough of a sputum positive patient with pulmonary TB will generate the largest percentage of infected droplets.

Complications and Treatment of TB

Healthcare experts acknowledge that several complications can arise to a patient having pulmonary TB that is susceptible to drugs. This may include the development of extra-pulmonary TB where the pathogen may spread to infect other areas like the meninges, the genitourinary tract, just to mention a few of them. One of the typical complications is the development of multiple drug resistant TB (MDR-TB) which means the patient has a TB resistant to either isoniazid (INH) or rifampicin (RMP) the primary first line treatment of drug therapy to counter TB. This type of complication usually develops in the course of TB treatment

due to failure to complete the treatment course, skipping of doses or even inappropriate treatment. The MDR-TB strain can spread if the pathogens are alive and the patient is coughing.

Besides, the patient can also develop resistance of either RMP or INH together with quinolone based drugs like kanamycin or Amikacin which are second in line of anti-TB injectable drugs. According to Auto et al (2017), vascular complications in TB are multifactorial. The activation of monocytes has macrophages released by interleukins and cytokines causing endothelial injury. As a result, increased fibrinogen impairs fibrinolysis, reduced anti-thrombin III and reactive thrombocytosis to predispose one to venous thrombosis in TB.

To effectively treat TB once a diagnosis has been made, the healthcare professional should evaluate the drug susceptibility of the bacteria in context by having a bacterial culture tested through a drug susceptibility test (DST). The DST process may take anywhere from 6 – 16 weeks which is then followed by the administration of the right medication. The specific medication and duration of antibiotic treatment will be hinged on several factors among them the patient's age, general health status, potential resistance to drugs, location of the infection and the stage (whether active or latent). At the latent stage, only one type of antibiotic may be necessary while active TB with MDR will usually demand a multiple drugs prescription. In order to prevent TB drug resistance, there is need for rapid diagnosis and treatment of TB with patients advised to strictly complete the prescribed treatment since it is incomplete treatment through antibiotics or improper antibiotic regimen prescription that leads to resistance development. Direct observed therapy (DOT) should also be practiced.

India as the Demographic Of Interest

According to Crowling, Dandona & Dandona (2014) India contributes about 2.2 million of the 8.6 million new cases of TB that are reported globally every year. Statistics indicate that globally, TB mortality including HIV was 16% for every 100 000 cases while that of TB alone stood at 5% for every 100 000. Its prevalence is approximated to be 159 per ever 100 000 while its incidence was 80 per 100 000. As stated earlier on, India has the highest TB burden where about 20% of the global TB burden is found. In 2012, India declared TB a notifiable disease thus making it mandatory to report every confirmed case. Compared to China, the second highest country with TB cases, the former has greatly improved its TB estimates after it implemented a web based mandatory case reporting in 2005 (Crowling et al, 2014). With TB as reportable disease, pulmonary or extra-pulmonary TB should be reported to the concerned health department within a working day after laboratory confirmation or clinically diagnosed TB. The case definition could either be laboratory case definition, clinical TB case definition or TB suspect definition but latent TB infection is not reportable. The concerned health department requires that the TB cases be reported by phone or fax in order to guarantee timely public health follow up measures.

In the case of Minnesota Health Department, a Yellow Disease Report Card may be used for reporting where it is faxed to 651-201-5500. Under the Indian law, the healthcare practitioners are required to report TB to the relevant health department within India. This duty extends to any individual in charge of any institution, school, child care facility or even a camp. At the same time, if a person authorized to report has reason to believe that an individual with active TBB does not comply with the prescribed therapy for TB, the relevant Indian health

authority should be notified within 24 hours with the name, address and essential facts of the case.

The Social Determinants of Health and how they contribute to the Development of TB

Health professionals globally acknowledge that for successful and sustainable control of TB, there is need for concerted efforts that reinforce the control programs, diagnostics as well as treatment besides tackling the social determinants of health as they impact on TB. The epidemiological determinants commonly referred to as the epidemiological triangle embraces the susceptible host, the pathogen and a conducive environment. Beginning with host factors, these include age, sex, nutrition and immunity. In its infection, TB does not discriminate in terms of age although the 15-24 years age bracket account for about 20% of the cases in India. Likewise, gender indicates that TB in India is more prevalent in males while malnutrition is known to be a predisposing factor for TB. Presently, man has no known inherited immunity against TB.

Next are agent factors whose presence of mycobacterium tuberculosis a facultative intracellular parasite means it can be ingested by phagocytes and is resistant to intracellular killing. The source of infection is either through an infected human who is not under treatment or has not finished the course. Another source of agent infection is through an infected bovine's milk while its communicability is known to remain infective for as long as the infected individual remains untreated. Lastly, are the environmental or social factors. TB is a social disease with medical components which are also referred to as a social welfare barometer. The social determinants of health which when combined with others contribute to the occurrence and transmission of TB are like poor housing, mal nutrition, overcrowding, large families and health illiteracy.

Role of the Community Health Nurse

From the early years of 20th century, the Community Health Nurses (CHN) seek to enhance health of populations in the US by managing and providing care across whole groups by identifying and examining the impact disease diseases have on the society. According to Goldman et al (2018), demographic data is important in promoting the health of communities because the findings enable the political and health leaders to develop policies which support investments in public health. Similarly, case findings, case reporting and statistics collection create a conducive atmosphere for suitable data analysis and the subsequent patient follow up. The statistics also enable the CHNs to integrate evidence based research as they seek to incorporate the community needs to provide healthcare that is informed by both science and best available current evidence.

Centers for Disease Control and Prevention (CDC) Role in Reducing TB Impact in the US

In the US, the Centers for Disease Control and Prevention of Diseases(CDC) is one of the many organizations tasked with the responsibility of decisive resolution of TB within our borders while simultaneously enhancing measures that lead to the control of TB globally. At the federal level, TB elimination in the US is defined as having only one case in a million people while the prevention targets at the global scene is to decrease the global incidence of TB by half with 1990 as the baseline. The Stop TB partnership Global Plan has set to realize these targets by routine surveillance and periodic surveys to having programs that evaluate the success thereof or not of the implemented interventions. The efficacy of these strategic measures can be measured in terms of diagnosis, treatment and the laboratory capacity which facilitate the systematic prevention and control of TB.

A Global Implication of TB

At the international level, all stakeholders in health should highlight the need for directly observed treatment (DOT) combined with other components of Stop TB partnership so that they are implemented as comprehensive package meant to control TB. To make it a success there should be demonstrable commitment by politicians and administrations. Likewise, case detection through sputum smear microscopy should be enhanced with healthcare facilities ensuring uninterrupted supply of anti-TB drugs that are of high quality. Next should be systematic monitoring and accountability as well as treatment regimens that are standardized with DOTs for the first 60 days. Besides this, prevention and control measures for TB should see to it that there is health education and particular protection at the primary level. Secondary prevention measures should incorporate early diagnosis and specific treatment with rehabilitation and alleviating disability limitations due to TB forming the bulk of tertiary prevention measures.

Conclusion

In conclusion, the paper has established the epidemiology of TB by describing its causes, symptoms and mode of transmission. The paper has also examined the complications arising from untreated or poorly managed TB. The essay further explored the social determinants of health as they relate to TB before explaining the role of CHNs. Since TB is curable and preventable this paper advances the position that to stop TB there is need for DOTs improvement and expansion where all care providers are engaged in order to empower both the patients and their communities. For it is only by doing so that TB research can be enabled and promoted as the bedrock for eliminating TB from the face of the earth.

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