Risk of Becoming Ill with Pulmonary Tuberculosis in Mexico

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Tuberculosis is a contagious, communicable, curable, usually chronic disease caused by the Mycobacterium tuberculosis complex. It is mainly acquired through air. It is usually systemic and affects mostly the respiratory system. Since it was discovered and reported that the tubercle bacillus are the causative agents, a significant advancement was in the study and treatment of this illness, where microbiological behavior was highlighted. Although the bacillus is important, it is not enough for the development of the disease since more than 90% of those infected remain to have it as a latent infection throughout their lives. Identify the risk factors that increase susceptibility to pulmonary tuberculosis in Mexico. An electronic search of journals published in the period 2000-2013 without language restriction was conducted. 12 items which were indexed in Thomson Reuters, Elsevier, EBSCO CrossRef and Mexico were identified.

In the literature review the authors agree that pulmonary Tuberculosis most often affects people with low socioeconomic status, especially if they have associated comorbidities such as HIV, DM and malnutrition, which are prevalent conditions of the Mexican society that aggravate and make more complex the profile of TB. One of the commitments in the framework of the Millennium Development Goals is to reduce the prevalence and mortality of tuberculosis, “Objective 6, 6C goal “Mexico is far from reducing TB if social determinants such as poverty are not solved, “goal 1: Eradicate extreme poverty and hunger”, exclusion, poor housing conditions, among others, as well as the population prevalence of comorbidities such as HIV / AIDS and Diabetes Mellitus, otherwise Tuberculosis will continue to be the main killer disease reemerging.

Key words: Smear-positive, Risk factors, Mycobacterium tuberculosis, pulmonary tuberculosis.

Nowadays, we believe that diseases are the result of the interaction between genetic and environmental factors, as we announce the danger of breaking the balance that represents health, “risk factors” which must be clearly identified, well interpreted and properly faced, to avoid as much as possible people getting sick¹.

Tuberculosis is a contagious, communicable, curable, usually chronic disease caused by the Mycobacterium complex; it is usually variable on its clinical presentation. Tuberculosis is transmitted from the sick to the healthy subject, mainly by contact with sick people baciliferous enter to the organisms through inhalation of infectious material.

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Usually the disease is localized in the lungs which is the route of entry of the bacillus in 80-85% of cases, but can affect almost any organ in the human body. M. tuberculosis is a Gram positive bacillus, strictly aerobic, with 2-5 micron length and a diameter of 0.2 to 0.3 microns, it is stationary, and stained purplish red with Ziehl-Neelsen and once dyed resists fading, hence alcohol resistant, the bacillus is sensitive to heat; It is inactivated by heating to 680 C at pH 7. The incubation period from the time of infection until the primary lesions appear goes from 4 to 12 week. However, the risk of transmission may be lifelong when remains as a latent tuberculosis infection.

The most important transmission mechanism, which causes almost all of the infections, is the airway. The M. tuberculosis is transmitted through droplets (droplets flügue) aerosolized that occur when a person with tuberculosis of the respiratory tract (pulmonary and / or laryngeal) does any of the following: coughing, sneezing, talking, singing and / or laughing. It has been calculated that a smear-positive patient can infect about 10-15 people per year. In the pulmonary alveoli tubercle bacilli are phagocytosed into which remain and replicate about every 25 hours. At this stage, do not kill macrophages destroy bacillus, because these are highly effective evasion mechanisms. The progress of the infection is limited only by the induction of adaptive immunity mediated by cells response (T-dependent lymphocytes), whereby any endogenous or exogenous factor favors bacillary multiplication and the onset of the disease, as is the case of primary immunodeficiency or malnutrition.

The Millennium Development Goals are the purpose of human development to be achieved in 2015, which were established in 2000 by the member countries of the United Nations. Seven Nations’ aims for global TB control were set under these objectives. In this regard, tuberculosis is a disease that is maintained with high morbidity and mortality in the world, so it is for the World Health Organization (WHO), a disease of great interest, which has led to develop a specific and ambitious program; its eradication by 2050 is intended.

TB/HIV, both have a fatal infection synergism. HIV promotes progression of a recent infection or latent tuberculosis, and TB accelerates
the evolution of HIV disease. The devastating effect of the HIV epidemics has had the greatest impact on populations with high prevalence of infection with Mycobacterium tuberculosis, which has also had great impact on the epidemic of tuberculosis\textsuperscript{7,8}. HIV infection is the strongest for the progression of latent TB as a recent or active tuberculosis infection risk factor. The risk of progression of TB disease is 5% in people without HIV in the first 2 years and then is less than 5% the rest of their life. In people with HIV the risk goes from 5 to 15% per year, increasing to over 30% for the rest of their life\textsuperscript{9}.

1.1 million new cases of tuberculosis and HIV infection in the world, from which 24,000 corresponded to the Region of the Americas\textsuperscript{9} were estimated in 2009. In fact, TB is the most common HIV coinfection and the risk of presenting it in HIV-negative patients is 5-10%; however, in those being HIV positive it is 50%. A third of the increase of people with tuberculosis in the world is attributed to the spread of HIV. One in every 3 people who die from AIDS has TB, and 8 to 10% of all deaths are due to HIV related TB\textsuperscript{10,11}.

The adverse effect of malnutrition on the immune system is a generally accepted notion. It creates an imbalance in the cascade of cellular immunity and loss of homeostasis of the individual. The extent and distribution of protein energy, malnutrition and micronutrient deficiencies in a given population depends on many factors, poverty is the main determinant underlying cause of malnutrition\textsuperscript{12}.

It is known that 90% of the states of malnutrition in Mexico are caused by a single cause, inadequate food intake in terms of being poor or having excessive power, it is also determined by ignorance, accessibility to food and information, hunger, lack of hygiene, or by the quantity and quality of food. The relationship between malnutrition and pulmonary TB is close. Prolonged malnutrition increases opportunities to develop TB when being exposed to this infectious disease which also leads or aggravates malnutrition. The importance of being in a poor nutritional status is because disorders are triggered in many body functions such as immunity\textsuperscript{13}.

Tuberculosis is an infectious disease that has affected humanity throughout its history; it is today a major cause of illness and death, especially in the poorer strata of society\textsuperscript{14}.

Paradoxically, a disease resulting from modernity as diabetes has a material adverse effect on the incidence and/or clinical course of tuberculosis. The association between TB and DM began to receive attention and was described during the first half of the XX century\textsuperscript{15}. TB increases the chances of patients to develop DM due to the state of hyperglycemia as a result of infection and treatment outcome TB. The DM increases susceptibility to TB due to immunodeficiency to present DM\textsuperscript{16}.

The clinical picture of a patient with TB -DM tends to be more severe immunosuppression by different factors such as pharmacokinetics of drugs for TB and DM\textsuperscript{17}. Studies suggest that in patients with TB -DM there is a lower rate of conversion of the result of sputum from positive to negative compared with non-DM patients with TB\textsuperscript{18,19}.

The possibilities for people to suffer active TB can be also explained by defects in cellular immunity caused by hyperglycemia. Diabetes can reduce the response to treatment for tuberculosis; diabetes can also modify the clinical course of the infection or associate it with the presence of resistant strains\textsuperscript{20}.

Diabetes should be included among the determinants of the future incidence of TB. In Mexico, the prevalence of diabetes is several times greater than HIV, so exacerbating the impact of diabetes to the health system.

The Aim of this research was to identify risk factors that increase susceptibility to pulmonary tuberculosis in Mexico.

**MATERIAL AND METHODS**

Critical analysis based on literature review was performed in electronic magazines published during the period 2000 to 2013 without language restriction on the view that these were indexed in Thomson Reuters, Elsevier, CrossRef and EBSCO.

**RESULTS**

In the literature review 12 articles indexed were analyzed, the authors of such articles agree that the pulmonary Tuberculosis most often affects
people with low socioeconomic status, especially if they have associated comorbidities such as HIV, DM and malnutrition. These conditions can have considerable impact because they are not only potent factors, but can also be highly prevalent in the general population, it is important for others to note that the importance of a risk factor for public health is determined by both the strength associated as its prevalence in the population. Therefore, there is a need to conduct further research on the subject and in the assistance of poverty where even lifestyles associated with these risk factors for public health influence it as a reemerging disease.

DISCUSSION

Tuberculosis is a re-emerging disease and requires attention. As a persistent disease it continues making an impact on the health of the human population, although the increase is primarily associated with poverty and lifestyles it is also associated to chronic diseases such as diabetes and issues arising from poor nutrition, this means that its presence is unavoidable if we do not invest in changing lifestyles, improving fundamental living conditions such as alimentation. The vulnerability of people living in poverty conditions or similar lifestyles is determining for health in reducing the incidence and prevalence of the disease; situation which would cause a decline in the social economic cost for medical care at the household level and in turn the cost at public health institutions.

It is necessary to work with vulnerable populations through education from the pedagogical implementation of strategies based on the socio-constructivist approach to education also applied in health education. Human populations are vulnerable; an educational model where people participate in government decisions and who are responsible for the common good are also required.

CONCLUSION

One of the commitments in the framework of the Millennium Development Goals is to reduce the prevalence and mortality of tuberculosis, “Objective 6, 6C goal “Mexico is far from reducing TB if social determinants such as poverty are not solved, “goal 1: Eradicate extreme poverty and hunger”, exclusion, poor housing conditions, among others, as well as the population prevalence of comorbidities such as HIV / AIDS and Diabetes Mellitus, otherwise Tuberculosis will continue to be the main killer disease reemerging.

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REFERENCES

8. Gutiérrez Rodríguez R, Gotuzzo Herencia E. Co-infección VIH y tuberculosis [Internet].


