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REVIEW

Tuberculosis, social determinants and co-morbidities (including HIV)

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Abstract The risk of exposure, progression to active tuberculosis (TB) and then to cure is a process affected by several risk factors. Along with well known risk factors such as human immunodeficiency virus (HIV), use of immunosuppressive drugs and being of young age, emerging risk factors such socio-economic and behavioral aspects play a significant role in increasing the susceptibility to infection, and unsuccessful treatment outcomes. This paper summarizes the effects of these socio-economic determinants and co-morbidities (including HIV) on TB infection and disease.

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Introduction

Tuberculosis (TB) control and elimination rely on an early detection of active TB cases, prompt anti-TB treatment, identification of persons in risk of exposure and infection and prevention of secondary TB cases.[1] All this depends on good diagnosis methods and effective treatment regimens for TB, but it is not enough.[2] Socio-economic determinants of health include the social, political, and economic conditions in which people are born, develop, live, work, and age.[3] Apart from medical care, there is increasing evidence of the role of these factors in health[4,5] and TB epidemiology.[6–8]

The epidemiology of tuberculosis reflects how these social determinants are distributed, with a clear influence in all stages of TB pathogenesis: risk of exposure, susceptibility to progression of disease, time to diagnosis and treatment, compliance and successful treatment.[6]

Risk of exposure to *Mycobacterium tuberculosis* (MTB) is dependent on social and risk behaviors. Living or working in a high incident setting, overcrowding and poor ventilation increase the risk of exposure.[9] Factors that delay diagnosis similarly increase the length of exposure to an infectious TB patient.

Malnutrition increases the susceptibility to disease,[10,11] income constraints can limit the use of health care services.[12] TB stigma, recognized as a social determinant of health and health inequalities, associated with lack of social support can potentially lead to non-compliance and poor treatment outcome.[13]

In recent years, the role of risk factors and social determinants of TB have been more intensively studied and the role of some highly prevalent determinants such as human immunodeficiency virus (HIV), smoking, diabetes mellitus (DM), alcohol use and under-nutrition have been highlighted.[14] Others include overcrowding, housing conditions or economic deprivation. It has been shown that the areas with the highest TB incidence are also those with high incidence of HIV infection, incarceration, overcrowding, unemployment and immigrants.[15,16]

The World Health Organization (WHO) has identified the need for a holistic approach to TB, including the underlying social-economic determinants of TB in order to achieve elimination.[17] This proposal is in line with the sustainable development goals that put social inclusion together with economic development and environmental sustainability as common aims to be achieved for all countries by 2030.[13]

The objective of this paper is to offer an overview of the different effects of socio-economic determinants on TB, aiming to provide a better understanding of the complex factors involved in the occurrence of the disease.

Methods

We searched PubMed and Scopus for studies written in English, French, Spanish or Portuguese that evaluated the socioeconomic determinants on TB. Broad search terms included the following: tuberculosis, risk factors, and socioeconomic determinants. Additional manuscripts were selected from the references of the initially chosen articles. The WHO, the International Union Against Tuberculosis and Lung Diseases (The Union), Centers for Disease Control (CDC), and European Centre for Disease Prevention and Control (ECDC) websites were visited searching for publications or reports regarding social determinants and TB.

Risk factors for TB infection, disease and treatment default

Socioeconomic status can influence all stages of TB pathogenesis. Risk of exposure is related to the underlying disease burden and the environment in which people live.[18] People living or working in high burden places are at higher risk of exposure. The characteristics of the environment, airflow and number of people sharing the space will influence the risk of exposure.[8]

Once the MTB infection has occurred, increased susceptibility to disease can be related to co-morbidities such as infection with human infection virus (HIV), diabetes, silicosis or rheumatoid arthritis and other chronic illnesses or immunosuppressive therapies but also to malnutrition, alcohol or tobacco abuse. An analysis that included the 22 High TB Burden Countries estimated the population attributable fraction of malnutrition (27%), smoking (23%), HIV (19%), diabetes (6%) and alcohol abuse (13%).[19] The importance of the risk factor depends on prevalence – HIV is a more important risk factor in high prevalent countries of Sub-Saharan Africa (PAF > 50%).[19]

Health care costs associated with TB are both from direct user fees charged at the healthcare centres and from indirect costs of the visit. The money spent on transportation, co-payments for medication, and loss of work due to a medical appointment are all indirect costs associated with the use of health care services.[20] These economic barriers may cause a delay in contact to the health system where diagnosis is made,[12] and high costs often constitute a catastrophic economic burden for TB affected household.[21]

Successful treatment of TB involves taking anti-tuberculosis drugs for at least six months. Low income, alcohol abuse, HIV co-infection have been identified as predictive factors for default.[19]

Link between socioeconomic status and TB

Socioeconomic deprivation can be described as lacking social and economic basic necessities.[22] This is a complex concept that includes a combination of factors, such as lack of education, low income, overcrowding, and unemployment, among others. The structural determinants and the conditions in which people live are responsible for an important part of health inequities[22] and the increased risk of TB.

Several studies have found an association between per capita gross domestic product and TB incidence. Inclusion of more proximal determinants in multivariate models indicate that the impact of poverty on TB represent the effect of multiple determinants and pathways.[23] Socioeconomic deprivation gives rise to poor living conditions, overcrowding, and undernutrition which increases the risk of exposure to a TB case, increases vulnerability to disease and risk of bad treatment outcome.[23–25]

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