ORIGINALES

Risk assessment of type 2 diabetes mellitus in patients affected by tuberculosis

Evaluación del riesgo de diabetes mellitus tipo 2 en pacientes afectados con tuberculosis

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ABSTRACT:
Introduction: The diabetes mellitus and tuberculosis are emergent health problems around the world its impact has been growing and growing every year even though health professionals do their best effort to eradicate them and these diseases mutations could be a real health problem to fight against in the future. Through the years, different researches have demostrate that Diabetes mellitus increase the risk of getting sick of tuberculosis 2 and 4 times more frequently, it means it is a predisposing factor, but there are not researches that define this risk in a backward effect.
Target: Establish risks of developing Diabetes Mellitus type 2 in patients affected by tuberculosis.
Material and Method: A Quantitative, descriptive and transversal study was done, the statistical population was 60 users that take antifimic treatment in 4 Health Centers of District 09D04, zone 8. These users were tested through Findrisc Test.
Results: Male patients have more risk of developing Diabetes Mellitus type 2 at the age below 45 years old and between 45 and 54 years old, in general form 48% of patients have a low level risk.
Conclusion: The population of patients affected by tuberculosis has a low risk level and it is necessary take actions to mitigate this risk and prevent comorbidity.

Keywords: Risk, tuberculosis, diabetes mellitus Type 2, patients.

RESUMEN
Introducción: La diabetes mellitus y la tuberculosis son problemas de salud emergentes a nivel mundial, su incidencia anual cada vez es mayor pese a todos los esfuerzos que se hacen por mitigarlas y su asociación podría ser un futuro problema de salud a enfrentar. A través de los años, diferentes investigaciones han demostrado que la Diabetes mellitus incrementa el riesgo de contraer tuberculosis entre 2 y 4 veces, es decir, es un factor predisponente pero no existen investigaciones que definan este riesgo de forma inversa.
Objetivo: Determinar el riesgo de desarrollar DM2 en pacientes afectados con tuberculosis.

Material y método: Se realizó un estudio cuantitativo, descriptivo y transversal, la población fueron 60 usuarios que asisten a tomar el tratamiento antifímico en 4 unidades operativas del Distrito de Salud 09D04, zona 8 a quienes se les aplico el test de Findrisc.

Resultados: El género masculino presenta un mayor riesgo de desarrollar DM2 junto con el grupo etario de <45 años y 45 – 54 años, de forma general el 48% tienen un nivel de riesgo bajo.

Conclusión: La población de pacientes afectados con tuberculosis, aunque presentan niveles de riesgo bajo, este se encuentra presente y es necesario tomar medidas para mitigar este riesgo y prevenir comorbilidades.

Palabras clave: riesgo, tuberculosis, diabetes mellitus tipo 2, pacientes.

INTRODUCTION

Tuberculosis is one of the 10 leading causes of mortality in the world In 2016, 10.4 million people became ill with tuberculosis and 1.7 million died from this disease (among them, 0.4 million people with HIV). More than 95% of deaths from tuberculosis occur in low- and middle-income countries. Tuberculosis is one of the leading causes of death in HIV-positive people: in 2016, 40% of deaths associated with HIV were due to tuberculosis. It is estimated that between 2000 and 2016, 53 million lives were saved thanks to the provision of diagnostic and treatment services for tuberculosis[1,2]. According to the 2014 cohort, the successful treatment in the country for new cases and relapses was 76.87%. The mortality rate reported by the National Institute of Statistics and Census (NISC) is 2.59 / 100 thousand inhabitants in 2014. [3]

Currently, the approach of the country's health system is aimed at providing priority health care to vulnerable groups and / or risk factors according to life cycles, within these groups are patients with chronic communicable diseases such as tuberculosis and non-communicable diseases such as diabetes, of which since the 11th century Avicenna, documented the association between Tuberculosis (TB) and Diabetes Mellitus (DM) and together with the global increase in DM in the last decades, this has affected an impact on the increase of MD-TB cases with important clinical, social and economic implications [4].

Diabetes mellitus (DM) affects 55 million people in America and its prevalence is expected to increase to 83 million by 2030 [5], in the classification of DM, we have type 1 and 2; Type 2 DM (DM2) is associated with deficiency in the secretion and / or action of insulin produced by the beta cells of the pancreas, being this progressive and chronic, causing an innate immune response that is the cause of several damages at the tissue level [4]. Several studies have suggested that diabetes mellitus (DM) increases the risk of developing active tuberculosis (TB). The increasing prevalence of DM in endemic areas of TB can negatively affect the control of TB [6], these studies indicate that tuberculosis could induce glucose intolerance and worsen glycemic control in people with diabetes. In the context of the increasing overlap of populations at risk of both diseases, the combination of tuberculosis and diabetes mellitus represents a threat to health since it could negatively affect the global tuberculosis control efforts[7,8]. DM increases the risk of contracting TB between 2 and 4 times [9], depending on the population [10] and it is present in an estimated 15% of TB cases with a fourfold risk of treatment failure and a six times higher risk of death[11,12].

In the second edition 2018 of the Clinical Practice Guideline [13] for the prevention, diagnosis, treatment and control of tuberculosis in Ecuador, it is recommended to assess the risk of DM to anyone affected by TB through the FINDRISC questionnaire[14] and if it merits screening by glycemia. The Finnish diabetes risk score

(FINDRISC) is one of the most widely used instruments worldwide to assess the risk of DM2, consisting of only eight variables associated with anthropometric parameters and lifestyle factors [15].

Due to the bi-directional relationship of morbidity that exists between DM and TB and with the objective of being able to evaluate the risk of suffering DM2, the following research question was formulated: What is the risk of developing Type 2 Diabetes Mellitus in affected patients of tuberculosis? Knowing this risk will allow health professionals in charge of managing patients with TB to intervene in a timely manner in mitigating these risks and as a result be able to provide better therapeutic adherence to antifimic treatment.

MATERIAL AND METHOD

To date, several methods have been developed and introduced to quantify the risk of developing DM2, however at present the FINDRISC test is the most accepted by the scientific community, for the application of this test was carried out a descriptive, transversal, no experimental with a quantitative approach; for the collection of data, a FINDRISC test was conducted on a population of 60 patients who attended the different operating units of Health District 09D04, Zone 8, to take the antifimic treatment, the variables of the investigation were sex, age and risk of develop DM2 in patients, the inclusion criteria used were: patients diagnosed with TB in any of its forms and who attended to take the medication on the day of the survey, the exclusion criteria were: patients diagnosed with DM of any type, patients attending preventive treatment of isoniazid (IPT), patients who attend treatment because they are at risk (HIV). To avoid bias in the information, the survey was anonymous.

Ethical aspects

The individuals who participated in the study signed an informed consent in which was itemize the respect for good name, health, confidentiality, privacy and dignity as well as all the details concerning the study were explained to them; and that in all moment is conserved the anonymity.

RESULTS

Once the FINDRISC exam is applied, the patients who attend an antimicrobial treatment in the different operating units of the Health District 09D04, quantify the risk of having DM2, for a better statistical analysis, the data is written in tables of association of variables and graphics.

Table 1 shows the association between the variable sex and the level of risk of DM2 in patients affected with tuberculosis, in the table we can observe predominance of the male sex with 71.7% representing 43 patients and 17% of women; regarding the level of risk we have that for both sexes, the risk predominant is located at the low level with 35% and 13.3% respectively for men and women, followed by the slightly elevated level with 26.7% and 6.7 % respectively, for the range risk very high, the male sex is the unic that present dates with 1,7%, that representing one patient.

Table 1. Relationship between the variables "sex" and "the risk level of DM2 in patients affected by tuberculosis".

| Risk level of DM2	Low		Moderate		Slightly elevated		High		Very high		Total	
Sex	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%
Male	21	35	3	5	16	26,7	2	3,3	1	1,7	43	71,7
Female	8	13,3	3	5	3	5	3	5	0	0	17	28,3

Table 2 it was analyzed the ages of the patients and their relationship with the risk of developing DM2, for a better representation we grouped them by age groups as defined in the FINDRISC test. Regarding age, the predominant range is <45 years with 66.7%, followed by the range of 45 - 54 years with 16.7%, then the ranges of 55 - 64 years and > 64 years representing 8.4% each one of the total number of participants; According to the relationship between age and risk status, the most important results for each level show that only 1.7% corresponding to 1 patient > 64 years has a very high risk of developing DM2; 10 patients in the range <45 years representing 16.7% has a risk slightly elevated; the 8.3% corresponding to 5 patients in the range 45-54 years presents a moderate risk and 46.7% corresponding to 28 patients in the group <45 years has a low risk of developing DM2.

Table 2. Relationship between variables "age" and "level of risk of DM2 in patients affected with tuberculosis".

Risk level of DM2	Low		Moderate		Slightly elevated		High		Very high		Total	
Sex	N°	%	N°	%	N°	%	N°	%	N°	%	N°	%
< 45 years	27	45	1	1,7	11	18,3	1	1,6	0	0	40	66,6
45 – 54 years	1	1,7	5	8,3	2	3,3	2	3,3	0	0	10	16,7
55 – 64 years	0	0	0	0	4	6,7	1	1,7	0	0	5	8,4
> 64 years	1	1,7	0	0	2	3,3	1	1,7	1	1,7	5	8,4

Graph 1 represents the percentages of the DM2 development risk levels of the patients involved in the study; the 48% that represent the majority of the patients have a low level of risk, followed by 32% with a slightly elevated risk, 10% with a moderate risk, 8% present a high risk and only 2% present a level of very high risk of suffering DM2.

Graph 1. Levels of risk of developing type 2 diabetes mellitus in patients with tuberculosis.
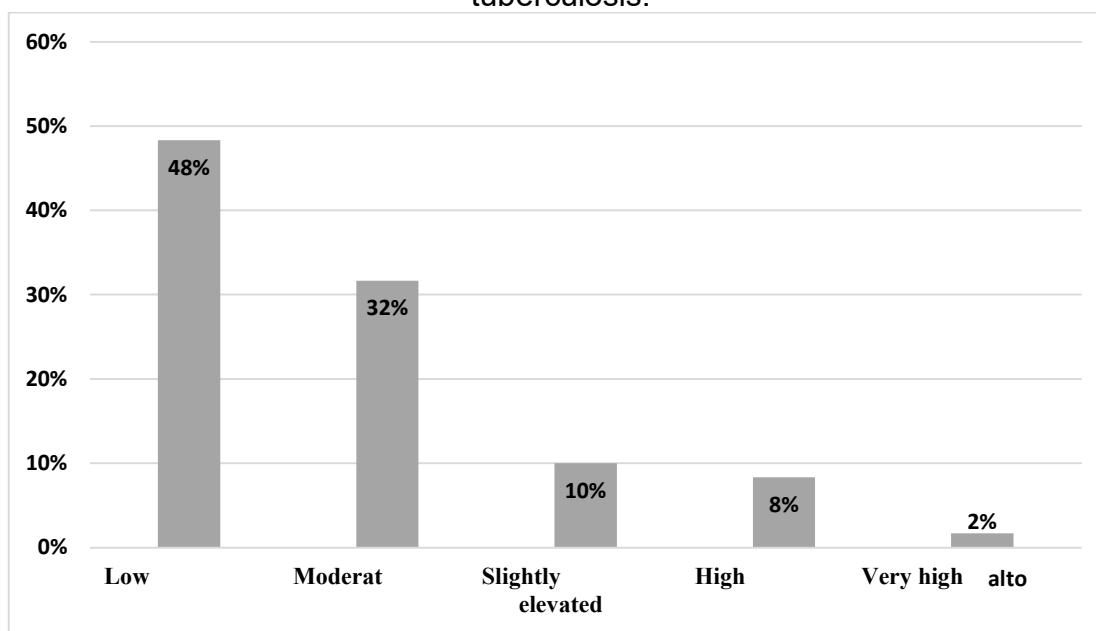
DISCUSSION

Diabetes is a major public health problem and one of the four no transmissible diseases (NCDs) whose burden the world leaders aim to alleviate through various measures. Both the number of cases as the prevalence of diabetes have increased progressively in recent decades. Worldwide, it is estimated that 422 million adults had diabetes in 2014, compared to 108 million in 1980 [16].

The risk factors for developing diabetes are numerous according to scientific literature and these in turn are modifiable and not modifiable in relation with the individual, in this study was evaluated the risk of developing type 2 diabetes mellitus in patients affected with tuberculosis, who are receiving antifimic treatment due to their association described in different investigations. Most of the studies published regarding the association between diabetes and tuberculosis start from the premise that *"…suffering from diabetes is a risk factor for developing tuberculosis…",* hence the importance of the article by Méndez et al [17], which reports that the prevalence of latent tuberculosis (TBL) in patients with diabetes mellitus is 35% and diabetes has been associated with an increased risk of TBL [18]; in this study, the was analyzed the opposite direction of this association, that is, the risk of developing DM in patients affected with TB.

After consulting several databases at the local, regional and global level we found that there are currently no similar studies detailing the existence of this risk, however, there are numerous studies that detail the risk of TB in patients with DM by different mechanisms.

In our study, we found that men have a higher risk of developing DM2 in the condition of their disease, contradicting what several studies carried out in different countries indicate where higher DM2 rates are observed in women than in men [19,20] being able to attribute this contradiction to the greater risk that men have of developing tuberculosis as indicated by the WHO [1] *"tuberculosis kills more than 3 million people*

a year, mostly men"; Regarding age, we have that the age groups <45 years and 45 - 54 years in total are the ones with the highest level of risk of developing DM2 according to the report in other studies where they indicate that the risk increases with age and that individuals between 46 and 60 years of age present it with the highest frequency[21,22] ; Jiménez Mejías, et al [23] states that the prevalence of type 2 DM (which represents about 90% of cases of DM), it is strongly associated with age. The data from this study generally focused on the low risk level of developing DM2, followed by the slightly moderate level.

While it is true, these data can be viewed and interpreted from two different dimensions, the first is that the results on the level of risk are modified and associated with the condition of suffering from tuberculosis and receiving antifimic treatment, or, the second option it could be that the risk of developing DM2 was already present in this group of patients before they were affected by TB, although this is only an interpretative conjecture, it is important that more studies are done to this vulnerable group to be able to support this support in the science, for this reason is the relevance of the study.

CONCLUSION

The population of patients affected with tuberculosis, although they present low levels of risk, this is present, so it is essential that the professionals in charge of the therapeutic management of patients with tuberculosis at the primary care level take measures aimed at mitigation and control of this risk, educating patients about lifestyles appropriate to their condition and thus, avoid the appearance of comorbidities that affect the therapeutic adherence to antimicrobial treatment and control of the disease.

More studies are needed to determine the risk of developing type 2 diabetes mellitus in a real way in patients affected with tuberculosis.

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