



Cardiovascular Disease Risk Level and Health-Related Quality of Life of Patients with Pulmonary Tuberculosis

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Abstract

Background: PTB has been linked with CVD. Although CVD patients are known to have impaired HRQOL, only few studies have examined HRQOL of PTB patients at risk of CVD.

Research Objective: The study aimed to determine the relationship of cardiovascular disease risk level and health-related quality of life of patients with pulmonary tuberculosis.

Methods: A descriptive-correlational design was employed with 52 respondents in a tertiary hospital of Naga City, Camarines Sur who were PTB patients under categories III, IV and V without any underlying cardiovascular co-morbidities. Respondents completed two questionnaires: (a) WHO/ISH Risk Prediction Chart for Western Pacific Sub-Region B, and (b) Optum 36-Item Short Form Health Survey (SF-36v2). Pearson's Chi Square established the significant relationship of CVD risk level and eight (8) dimensions of HRQOL.

Findings: Respondents have low CVD risk except for ages 70 to 79 years old who have moderate risk. Respondents have below average HRQOL in the dimensions of physical, physical role, and emotional role functioning. CVD risk level has been found to have significant relationship with HRQOL in the dimensions of general health perception ($p=0.039$), physical ($p<0.001$) and emotional role functioning ($p=0.020$).

Conclusion: PTB patients have low CVD risk level; however, individual risk factors progressively contribute to risk for CVD. PTB patients experience a degree of limitation on performing physical activities and in the performance of their role due to concurrent physical limitation and emotional problems. Risk factors for CVD affect PTB patients primarily on the physical aspect and functioning of HRQOL.

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Received Date: 12 Mar 2019

Accepted Date: 02 Apr 2019

Published Date: 05 Apr 2019

Citation:

Emilio A. Antang Jr. Cardiovascular
Disease Risk Level and Health-
Related Quality of Life of Patients with
Pulmonary Tuberculosis. *Ann Cardiol
Cardiovasc Med.* 2019; 3(1): 1019.

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Keywords: Cardiovascular disease risk level; Health-related quality of life; Pulmonary tuberculosis

Introduction

Primary care prevention of Cardiovascular Disease (CVD) is essential as it is the leading cause of death and disability and continues to be a major public health burden globally with its risk management playing an important role in primary care. Guidelines recommend lifestyle and medical interventions at high risk for cardiovascular diseases; however, it must consider the varying factors and underlying mechanisms on specific diseases that contribute to the development of a specific cardiovascular disease.

Tuberculosis as an infectious disease primarily affects the lung parenchyma which may also be transmitted to other parts of the body including the meninges, kidneys, bones and lymph nodes. Tuberculosis has been linked with CVD, and its potential role to CVD was not surprising as many infections contribute to the pathogenesis of CVD. Pulmonary Tuberculosis (PTB) is one of the most common infectious diseases encountered in clinical practice, more often in developing countries which continues to be a public health problem globally evidenced by the rise of morbidity and mortality that is closely associated with poverty, malnutrition, overcrowding, substandard housing, and inadequate health care.

Health-related quality of life (HRQOL) is a broad multidimensional concept comprising of subjective evaluations of health particularly on perceptions of physical and mental health, including health risks and conditions, functional status, and social support. Measuring it can help determine the burden of preventable disease, injuries, and disabilities, and can provide valuable new insights into the relationships between HRQOL and risk factors. Its questions have become an essential

component of health surveillance and generally considered valid indicators of service needs and intervention outcomes [1].

Globally, CVD continues to alarm both developed and developing countries ranking first as the top cause of death globally wherein more people die annually from cerebrovascular diseases than from any other causes. An estimate of 17.7 million people died from cerebrovascular diseases in 2015 representing 31% of all global deaths, 7.4 million were due to coronary heart disease, and 6.7 million were due to Cerebrovascular Accident (CVA) or stroke where over three quarters of CVD deaths take place in low- and middle-income countries [2]. Meanwhile, *Mycobacterium tuberculosis* is typically involved in PTB infecting 1% of the world's population in one year ranking one of the top 10 causes of death worldwide with 10.4 million cases, and 1.8 million people fell ill and died respectively in 2015 with over 95% of tuberculosis mortality occurred in low- and middle-income countries. 87% of new cases have been reported in 2015, yet cases have been fallen by an average of 1.5% per year since 2000 [3].

In the Philippines, CVD were identified as one of the top 10 leading causes of morbidity with 512,604 cases or a case rate of 532.9 per 100,000 populations and the number one cause of mortality with a case of 5,287 deaths or 21.9% of total deaths [4]. Meanwhile, PTB was identified among the top 10 causes of morbidity in 2010 with morbidity accounting to 322 cases per 100,000 populations and mortality of 13 cases per 100,000 populations [5].

Although rigorous awareness campaign on the consequences of poorly managed diet and comorbidities have been conducted, cases of CVD and PTB are still prevalent among the population through the years. Several studies have reported the relevance of the HRQOL of patients with CVD. In the study of Rancic et al. [6] in 2012, it showed that HRQOL of patients who had acute myocardial infarction was very impaired one month after the attack. In addition, several studies have shown that an increase in the number of risk factors for CVD is associated with a gradual decrease in HRQOL. Although CVD patients are known to have impaired HRQOL, only few studies have examined HRQOL of patients at risk of CVD. Among these studies is the study of Ko et al. [7] in 2015 which showed that HRQOL in patients at high risk for CVD is associated with impaired HRQOL.

The study is to measure the CVD risk level and HRQOL of patients with PTB. HRQOL can be an important measure on the impact of CVD in an individual with PTB, considering the influence of comorbidity of acute infectious disease. Following sustained incidence of pulmonary tuberculosis cases, reports of discontinued treatment, recurrence and hospital consultations, it is of best interest to place them under study. Determining the impact of the CVD risk level and HRQOL in patients with PTB will be beneficial in the future delivery of health care services. As an outcome, a hope that a greater emphasis will be marked on the significance of risk assessment, prevention, and early detection of CVD and holistically management PTB by the inclusion of risk assessment in order to determine individuals at high risk. In such way, comorbidity and adverse outcomes may be averted, and no life will be put at stake due to external factors and failure to recognize risks at an earlier stage.

Methods

Design and sample

A descriptive-correlational design of research was employed to determine the demographic profile of the respondents, presence

or absence of diabetes, smoking status, and mean systolic blood pressure, the category of PTB and history of previous PTB treatment. It was also used to determine the CVD risk level and HRQOL of the respondents and their relationship. Fifty-two (52) patients with an admitting diagnosis of PTB categories III, IV, and V in the different medical wards of Bicol Medical Center randomly selected through systematic sampling. Excluded PTB patients were those under categories 0, I and II, and ages below 40 years old and those who had underlying cardiovascular comorbidities.

Data gathering instrument

The researcher adopted two standardized questionnaires to collect the needed data and facilitate measurement of research variables: World Health Organization/International Society of Hypertension (WHO/ISH) Risk Prediction Chart for Western Pacific Sub-Region B and Optum 36-Item Short Form Health Survey (SF-36v2).

The World Health Organization/International Society of Hypertension (WHO/ISH) Risk Prediction Chart for Western Pacific Sub-Region B were used as encouraged for maximum use and dissemination with acknowledgment of World Health Organization as the source of the material. A request to secure and distribute Optum 36-Item Short Form Health Survey (SF-36v2) questionnaires was made and thereby granted a license to distribute the questionnaires with a PRO CoRE software and activation key to analyze the gathered data. A license to distribute the Optum 36-Item Short Form Health Survey (SF-36v2) on English and translated versions in Cebuano and Tagalog language was given with a validity good for one (1) year subjected to terms and conditions to be used for a maximum of 100 respondents. The researcher adopted the questionnaires in accordance with the purpose of the study and to gather valid and reliable information.

The questionnaires were divided into two major parts. The first part comprised the respondents' biophysical profile such as age and gender, presence or absence of diabetes, smoking status and mean systolic blood pressure. It also included the level of the 10-year estimation of CVD risk of the respondents. Additional data on the category of pulmonary tuberculosis and history of previous pulmonary tuberculosis treatment were also obtained in the first part. The second part consisted the respondents' HRQOL exploring eight (8) dimensions: Vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health.

Data gathering procedure

The investigation conforms with the principles outlined in the declaration of Helsinki. A license was first secured for reproduction and use of the English and translated versions of Optum 36-Item Short Form Health Survey (SF-36v2). A letter of approval was then requested from the Dean of the Graduate school to conduct data gathering procedure.

The researcher then submitted a letter to conduct the study to the Chief Training Officer of Bicol Medical Center and training officer of the Nursing Department.

A signed consent was obtained before gathering the data from the respondents. The first part of the questionnaires was collected through an interview and obtained the mean systolic blood pressures before and after the interview. The second part of the questionnaires was given to the patient and significant others after careful instructions

Table 1: CVD risk level according to characteristics used in risk prediction.

Risk Factors		Weighted Mean	SD
Age	40-49	1.05	0.213
	50-59	1.13	0.342
	60-69	1.58	0.165
	70-79	2	0
Sex	Male	1.27	0.732
	Female	1.13	0.352
Smoking status	Smoker	1.31	0.758
	Non-Smoker	1.06	0.243
Mean systolic blood pressure	<120 mmHg	1.08	0.272
	120-129 mmHg	1.2	0.422
	130-139 mmHg	1.2	0.477
	>140 mmHg	1.64	1.206
Comorbid status of diabetes	With diabetes	1.6	1.265
	Without diabetes	1.14	0.354
Pulmonary tuberculosis category	Category III	1	0
	Category IV	1.29	0.716
	Category V	1	0
History of previous pulmonary tuberculosis treatment	New patient	1	0
	Previously treated patient	1.27	0.688
AWM	1.23	52	0.645

Legend: AWM: Average Weighted Mean

were given. The questionnaires were then retrieved on the later part of the day.

Data analysis

The descriptive and correlational analysis was applied to treat the data gathered in the study. Mean was used to present the CVD risk level in terms of age, gender, presence or absence of diabetes, smoking status, mean systolic blood pressure, treatment status on PTB. Mean also was used to present the HRQOL in terms of vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning and mental health using the OPTUM PRO CoRE Software provided with the questionnaires. Finally, Pearson's Chi-Square test determined the relationship of CVD risk level with the respondents' HRQOL. The data was analyzed using the IBM Statistical Package Social Science (SPSS) version 20 software with a 5% level of significance used for all hypothesis tests.

Results

The CVD risk level, the demographic and biophysical characteristics of the respondents in terms of the risk predictors used were shown in Table 1. All age groups of the respondents have low CVD risk level except those patients aging 70 to 79 years old having moderate CVD risk level; respondents generally have low CVD risk level respective to the predictors used to determine the level of CVD risk.

Health-related quality of life of patients with PTB is shown in Table 2. The dimensions of vitality, bodily pain, general health perception, social role functioning, and mental health showed average HRQOL. On the other hand, the dimensions of physical function, physical role functioning, and emotional role functioning showed below average HRQOL.

Table 2: Health-related quality of life of patients with pulmonary tuberculosis.

Dimension	NBS
Vitality	49.73
Physical functioning	39.35
Bodily pain	46.2
General health perception	45.91
Physical role functioning	35.27
Emotional role functioning	34.35
Social role functioning	44.38
Mental health	52.48

Legend: NBS: Norm-Based Score

The Pearson Chi-Square test determined the relationship of CVD risk level and HRQOL as shown in Table 3. There was a significant relationship between the CVD risk level and HRQOL of patients with PTB in terms of physical functioning ($p=0.001$), general health perception ($p=0.039$), and emotional role functioning ($p=0.02$).

Discussion

In this study, the results indicated a low CVD risk level in terms of age, sex, presence or absence of diabetes, smoking status, and mean systolic blood pressure, the category of PTB and history of previous PTB treatment except for respondents aging 70 to 79 years old with moderate risk. This finding has been supported by the study of Hinkle and Cheever [8] who explained that normal anatomic and functional changes lead to decreased myocardial contractility, prolonged systole, and delayed conduction, thus, stressful physical and emotional conditions especially that occurs suddenly may have adverse events on the aged person. However, it has been observed that respondents with the pre-determined risk factors obtained higher mean scores than other respondents. Sex impacts the developmental programming

Table 3: Relationship of cardiovascular disease risk level and health-related quality of life of patients with pulmonary tuberculosis.

Dimension	Asymp. Sig.
	(2-sided)
Vitality	0.616
Physical functioning	0
Bodily pain	0.842
General health perception	0.039
Physical role functioning	0.175
Emotional role functioning	0.02
Social role functioning	0.822
Mental health	0.456

Level of significance: 0.05

of blood pressure and cardiovascular risk as emphasized in the study of Intapad et al. [9]. Respondents who have smoked obtained higher scores than those who haven't smoked which is supported by the study of Messner and Bernhard [10] that smoking plays an active role not only in the initiation of CVD but also contributes significantly to cause disease progression and fatal cardiovascular outcomes. It was also emphasized in the study of Bundy et al. [11] that reducing systolic blood pressure to levels below currently recommended targets significantly reduces the CVD risk and all-cause mortality. The study of Chen et al. [12] also presented that elevated glycosylated hemoglobin (HbA1C) levels were associated with increased risks of CVD and death caused by early endothelial dysfunction and progressive vascular inflammation that lead to cardiovascular events. Respondents with category IV PTB have higher risk of developing cardiovascular disease among the three categories of PTB wherein a study conducted by Atif et al. [13] presented that relapse of PTB (category IV) might be due to poor glycemic control due to interaction of certain PTB drug interactions and malnutrition, contributing to a higher risk of developing CVD. These studies support the implication that patients with predetermined risk factors have a higher risk of developing CVD.

The study also examined the HRQOL of the patients with PTB. Several studies have examined the contributing effect of HRQOL to the development of CVD. Among these studies are the studies of Kubzansky and Thurston [14], they have concluded that vitality may protect against risk of Coronary Heart Disease (CHD); Wermeling et al. [15] presenting a higher number of both cardiovascular and non-cardiovascular comorbidities associated with decreased health status including bodily pain; Backe et al. [16] concluding that physical functional limitations and psychological distress highlight special needs among individuals experiencing daily functional limitations; Andreakou et al. [17] depicting emotional burden strongly correlates with HRQOL scores and adversely affects depressive symptomatology in a caregiver caring for a relative with a chronic disease.

The study has shown that the dimensions of physical functioning, general health perception, and emotional role functioning correlates with the CVD risk level of PTB patients. The results have been in congruence with the results on the studies of Chomistek et al. [18] that a combination of low physical activity and prolonged sitting augments the risk of CVD; Ko et al. [7] that gaps between perceived health and actual cardiovascular disease risk should be disclosed to optimize cardiovascular health; and Gianaros et al. [19] suggesting that cognitive regulation of emotion might relate to cardiovascular disease risk.

Conclusion

Majority of patients with PTB have low CVD risk level which indicates that they have minimal risk of developing CVD. However, individual risk factors for the development of CVD progressively contribute to the level of CVD risk. Healthcare providers need to continue to monitor PTB patients under their care with predetermined risk factors of CVD to minimize the risk of CVD development.

Patients with PTB experience a degree of limitation on performing physical activities and in the performance of their role due to concurrent physical limitation, and emotional problems. Healthcare providers need to assist PTB patients in the performance of physical activities and their roles provided that they are assisted towards attaining independence on the performance of these activities.

Most of the affected dimensions pertain to the physical dimensions of HRQOL, thus risk factors for CVD affects patients with PTB primarily on the patient's physical aspect and functioning of HRQOL. Healthcare providers need to plan in monitoring and addressing the risk of CVD and HRQOL dimensions affected sustain if not improve to a higher level of independence among patients with PTB.

Implications for Practice

- Holistic management by considering cardiopulmonary effects of PTB.
- HRQOL as an important measure on the impact of CVD and PTB.
- Benefits outweigh in CVD surveillance and prevention while managing PTB.

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