Drug-drug interaction analysis; anti-tuberculosis drugs versus anti-lipidemic agents

Won Sriwijitalai1, Viroj Wiwanitkit2

1TWS Medical Center, Bangkok Thailand
2Adjunct professor, Joseph Ayobabalola Univesity, Ikeji-Arakeji, Nigeria

ABSTRACT

Tuberculosis is an important public health globally. There may be a coincidence of tuberculosis and other common medical disorder. The management the concurrent infection between tuberculosis and other medical disorders usually requires several drugs and the important concern is on drug-drug interaction. Here, the authors performed an informatics study to assess drug-drug interaction between anti-tuberculosis drug and anti-lipidemic drugs using a standard bioinformatics tool, drug interaction checker. Several possible drug-drug interactions can be predicted for different combinations between anti-tuberculosis drugs and anti-lipidemic drugs. The drug-drug interaction between anti-tuberculosis drugs and anti-lipidemic drugs is possible and can occur at various degrees.

Keywords: Drug, Dyslipidemia, Tuberculosis, Interaction, Analysis

Introduction

Tuberculosis is a common infectious disease causing chronic unexplained clinical problems including chronic cough, prolonged fatigue and weight loss. In severe case, the patient might finalize in death (1). As an important public health problem, medical therapy is required. As a standard clinical practice, anti-tuberculosis drug treatment is the basic therapeutic approach against tuberculosis (1, 2). However, an important consideration in treatment of tuberculosis is the concurrence background medical problems in the patients.

A coincidence of tuberculosis and other common medical disorders is possible. The management the concurrent infection between tuberculosis and other medical disorders usually requires several drugs while the important concern is on drug-drug interaction. Of several background personal illness, the diseases in the group of metabolic syndrome are globally common since there is a chance of co-occurrence with tuberculosis. In fact, a patient with underlying metabolic syndrome is usually related to susceptibility to tuberculosis (3).

Here, the authors specifically focus on dyslipidemia, an important disease in the group of metabolic syndrome. The occurrence between tuberculosis and dyslipidemia is possible but little mentioned. Sojo-Dorado et al noted that dyslipidemia is an important medical problem for tuberculosis patient that needs proper management (4). Here, the authors performed a bioinformatics analysis to analyze the possible interactions between anti-tuberculosis and anti-lipidemic drugs.

Materials and Methods

The present work is a bioinformatics study, which does not deal with any human or animal subjects and clinical specimens, hence, it requires no requirement for written informed consent or ethical approval. The main of the present work is to clarify the interactions between anti-tuberculosis and anti-lipidemic drugs. The assessed anti-tuberculosis drugs are the four main anti-tuberculosis drugs, which include isoniazid, rifampicin, pyrazinamide and ethambutol. The studied anti-lipidemic drugs included simvastatin, atorvastatin, pravastatin and gemfibrozil. The standard drug-drug interaction assessment was performed using a standard bioinformatics tool namely Drug Interaction Checker (available online at https://www.webmd.com/interaction-checker). The possible interaction between anti-tuberculosis and anti-lipidemic drugs was clarified. In case that there is an identified possible drug-drug interaction, the severity of possible drug-drug interaction is also predicted. The research followed the tenets of the Declaration of Helsinki.

1*Corresponding Author: Won Sriwijitalai, Email: wonsrwi@gmail.com
Results
The predicted drug-drug interaction between anti-tuberculosis and anti-lipidic drugs is derived and presented in Table 1. There are many possible drug-drug interactions and there are also various degrees of identified interactions. For all studied anti-tuberculosis drug, there is no predicted drug-drug interaction for ethambutol.

Discussion
Globally, there are several millions of patients infected with tuberculosis. The management of tuberculosis becomes important public health strategies for public health management globally. The use of anti-tuberculosis drug therapy is the basic important clinical practice for clinical management of tuberculosis infection. In addition, the management of the concurrent medical disorder of the patient is also required. The concurrence between tuberculosis and other common medical problems is not impossible. Of several medical disorders, the diseases in the group of metabolic syndrome are worldwide common. There is a chance of co-occurrence of those disorders with tuberculosis. Here, the authors focus the study on the concomitant tuberculosis infection and dyslipidemia, an important metabolic disorder.

The use of both anti-tuberculosis and anti-lipidic drugs is clinically indicated for clinical management of the patients with both tuberculosis and dyslipidemia. An important clinical precaution for the practitioner is the possible unwanted clinical problem due to the drug-drug interaction. The possibility of drug-drug interaction between anti-tuberculosis and anti-lipidic drugs is hereby systematically assessed using bioinformatics technique. In the present study, the possible drug-drug interaction might be due to many drugs, in both anti-tuberculosis and anti-lipidic drug groups.

Nevertheless, serious drug-drug interaction is not common. In fact, some recent reports also show interesting drug-drug interactions. For example, Skerry et al found that simvastatin could add the pathogenicidal activity of anti-tuberculosis (5). Lee et al also demonstrated that isoniazid could cause reduction in risk of hyperlipidemia (6). The anti-tuberculosis is also reported for deterioration of anti-lipidic effect of anti-lipidic drugs (7, 8).

Based on the present study, the possible drug-drug interactions among anti-tuberculosis and anti-lipidic drugs can be shown. There are several drugs with possible interactions. Also, some drug-drug interactions are classified as serious ones. The selection of appropriate concomitant therapy using anti-tuberculosis and anti-lipidic drugs is very important in clinical practice.

Conclusion
There is a risk of an occurrence of a drug-drug interaction between anti-tuberculosis and anti-lipidic drugs. The interaction might be observable at various severity degrees. Beware of the possible interaction is necessary for clinical practice.

Authors’ contribution
WS and VW wrote the manuscript equally.

Conflicts of interests
The authors declared no competing interests.

Ethical considerations
Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

Funding/Support
None.

References

Table 1. Predicted drug-drug interaction due to concomitant use of anti-tuberculosis and anti-lipidic drugs

<table>
<thead>
<tr>
<th>Anti-lipemic drugs</th>
<th>Anti-tuberculosis drugs</th>
<th>H</th>
<th>R</th>
<th>Z</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simvastatin</td>
<td>3</td>
<td>3</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Pravastatin</td>
<td>N/A</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Gemfibrozil</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Note: The studied anti-tuberculosis drugs include rifampicin (R), isoniazid (H), pyrazinamide (Z) and ethambutol (E). The studied anti-lipemic drugs include simvastatin, atorvastatin, pravastatin and gemfibrozil.

Each number in the Table reflects severity degree of possible drug-drug interaction with this description: 1 = minor, 2 = monitor closely, 3 = serious and 4 = don’t use together. N/A means no predicted interaction.