

Asian - African society
Of MycobacteriologyAvailable at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/IJMYCO

Mutations in *embB* gene associated with resistance to ethambutol in *Mycobacterium tuberculosis* strains isolated from TB patients in the west of Iran (2014–15)

Rashid Ramazanzadeh^{a,b,*}, Bahman Mohammadi^{b,c,b}, Parviz mohajeri^d^a Cellular & Molecular Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran^b Department of Microbiology, Kurdistan University of Medical Sciences, Sanandaj, Iran^c Student Research Committee, Kurdistan University of Medical Sciences, Sanandaj, Iran^d Department of Microbiology, Kermanshah University of Medical Sciences, Kermanshah, Iran

ARTICLE INFO

Article history:

Received 16 November 2016

Accepted 16 November 2016

Available online xxx

Keywords:

Antibiotic-resistant

Mycobacterium tuberculosis

Ethambutol

embB gene

ABSTRACT

Introduction: Mutations in *embB* gene, especially those in ethambutol resistance-determining region (ERDR), are known as “hot spots”. These mutations have frequently been reported in EMB-resistant *M. tuberculosis* isolates, using the Sequence analysis as a precise and effective method. The aim of this study was to detect mutations in *embB* gene associated with resistance to ethambutol in *Mycobacterium tuberculosis* strains isolated from TB patients in the west of Iran (2014–15).

Material and methods: This study was performed on smear-positive patients of the west side of Iran, in the TB research center located in Kermanshah city, during 2014–15. Out of 1069 strains of *Mycobacterium tuberculosis*, 50 strains with pulmonary TB were selected and evaluated (22 men and 28 women; aged between 23 and 86; median age: 54.5 years).

Results: Mutation in the *embB* gene was detected in all of the seven EMB-resistance isolates and five (42.71%) cases of them were MDR. The most frequent substantiation of amino acid occurred at the codon 306 in six (64.85%) of the EMB-resistant isolates. The Met306Val substitution resulting from an A → G transition was detected in three (42.85%) EMB-resistant isolates; and the Met306Ile substitution, due to a G → A transition was also detected in three (42.85%) resistant isolates. No mutations at the *embB* gene were detected in susceptible strains.

Conclusion: Our results were similar to those that were regularly reported in earlier studies. The only mutations in the EMB-resistant isolates were found in *embB* 306 and 406 codons. Substantiation amino acids at codon 306 were the most frequent. The data indicated that *embB* 306 mutations are sufficient to induce ethambutol resistance, and detection of these mutations is advisable to be considered in the development of rapid molecular tests. Sequence analysis of the ERDR in the *embB* gene is adequate for rapid detection of EMB resistance, and mutations in the codon 306 are good predictive markers for resistance to EMB.

* Corresponding author at: Cellular & Molecular Research Center and Microbiology Department, Faculty of Medicine, Kurdistan University of Medical Science, Pasdaran Street, 66177-13446 Sanandaj, Iran. Fax: +98 (87)33664674.

E-mail addresses: atrop_t51@gmail.com, Rashid@muk.ac.ir (R. Ramazanzadeh).

Peer review under responsibility of Asian African Society for Mycobacteriology.

<http://dx.doi.org/10.1016/j.ijmyco.2016.11.013>