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A REVIEW ON THE USE OF MOXIFLOXACIN IN MULTIDRUG RESISTANT TUBERCULOSIS

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ABSTRACT

The first line anti-tuberculosis drugs have shown an increasing prevalence of resistance. The higher incidence of TB has led to stronger requirements of other therapies apart from the World Health Organisation recommended Directly Observed Therapy in Short course (DOTS). New drugs highly effective against Mycobacterium tuberculosis (MTB) could enhance the treatment of cases with resistance to first line drugs (isoniazid and rifampicin) and may curtail the extent of present regular regimes. Fluoroquinolones are reasonably effective against Mycobacterium tuberculosis (MTB). They have been used as alternative for some present first-line drugs such as Isoniazid, and have been efficient even in Multi Drug Resistant Tuberculosis. These efforts must be further enhanced to ensure ultimate success in discovering, developing, and delivering drastically improved therapies for tuberculosis patients.

Keywords: Tuberculosis, Moxifloxacin, Multidrug resistance, First line drugs, Fluroquinolones, Mycobacterium.

Contribution/ Originality

The paper's primary contribution is finding that Moxifloxacin may curtail the time duration and adverse events in the case of multi drug resistant tuberculosis.

1. INTRODUCTION

The first line anti-tuberculosis drugs have shown an increasing prevalence of resistance. The higher incidence of TB has led to stronger requirements of other therapies apart from the World Health Organisation recommended Directly Observed Therapy in Short course (DOTS). There are several choices for day-to-day and sporadic therapy, but the objective of treatment for TB disease must be to afford the nontoxic and most effective therapy in the shortest period of time [1]. The modern years have also observed the occurrence and worldwide incidence of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) that are extremely fatal and complicated to treat have been causing concern worldwide.

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New drugs highly effective against Mycobacterium tuberculosis (MTB) could enhance the treatment of cases with resistance to first line drugs (isoniazid and rifampicin) and may curtail the extent of present regular regimes [2]. An ideal drug should be highly active against MTB, it should allow a daily administration and it should be well accepted and safe, even in long-standing schedules.

The regular management of Mycobacterium tuberculosis is a treatment schedule involving isoniazid, rifampicin, ethambutol and pyrazinamide given for 8 weeks, followed by isoniazid and rifampicin given for a further four months [3]. These four main drugs are known as first line drugs. Multidrug-resistant Mycobacterium tuberculosis (MDR-TB) is defined as a strain that is unaffected by in vitro to at least two of these main four drugs (isoniazid and rifampicin), even though many strains are resistant to other related drugs also. In those resistant situations, Treatment must then proceed with second-line drugs, such as previous agents formerly regarded as first-line, but now changed over the arrival of rifampicin and isoniazid like streptomycin and in other cases drugs of poor efficacy or greater toxicity and interactions.

1.1. Moxifloxacin in Therapy

Fluoroquinolones are reasonably effective against Mycobacterium tuberculosis (MTB). They have been used as alternative for some present first-line drugs such as Isoniazid, and have been efficient even in Multi Drug Resistant Tuberculosis [4]. The fluoroquinolones, which are being used in the management of tuberculosis are ciprofloxacin, ofloxacin, levofloxacin (the S- isomer – the active isomer of the racemic mixture ofloxacin), and moxifloxacin. Eventhough certain clinical studies have shown the effectiveness of levofloxacin and ofloxacin in Multi Drug Resistant Tuberculosis. Certain studies revealed that Moxifloxacin is as effective to a first-line regimen in geographic locations with drug resistance [5].

This was a small study, and more approaching randomized controlled trials that equate levofloxacin, ofloxacin, and other newer fluoroquinolones with second-line antituberculous drugs for treating Multi Drug Resistant Tuberculosis are necessary. All other trials in drug-resistant tuberculosis compared different fluoroquinolones substituted or added to regimens [6]. One trial compared levofloxacin and ofloxacin substituted for rifampicin. It admitted participants undergoing treatment or retreatment for drug-resistant or drug-sensitive tuberculosis and did not provide indication for dominance in effect of levofloxacin over ofloxacin. Three trials compared gatifloxacin with ofloxacin contributed.

None of the trials reported on fluoroquinolone specific adverse effects, such as tendon bust, but they have reported the number of adverse events, including those considered severe enough to discontinue or change the treatment [7]. The fluoroquinolones did not increase the incidence of serious adverse events. Substitution for ethambutol in first-line basic regimens with ofloxacin or moxifloxacin results in higher total numbers of adverse permutation [8].

The fluoroquinolones mainly moxifloxacin maintain their action against M.tuberculosis by inhibiting the activity of DNA gyrase (topoisomerase II), thereby interfering with bacterial DNA replication, transcription, and repair [9]. The in vitro potency of gatifloxacin and moxifloxacin against M. tuberculosis has been well characterized, and their potential for treatment-shortening demonstrated in the mouse model of tuberculosis. Evaluation of moxifloxacin in combination with the four first-line tuberculosis drugs in a set of systematic evaluations in the mouse tuberculosis infection model indicated that substitution for isoniazid should have the greatest effect on treatment shortening. Similar systematic preclinical evaluation of moxifloxacin in a tuberculosis infection model before initiation of phase iii development for tuberculosis has not been published, and moxifloxacin is being evaluated only in place of isoniazid in the standard drug combination [10].

2. CONCLUSION

Despite these significant challenges, tuberculosis, drug research and development today is in a stronger position to successfully meet the urgent public health need for improved tuberculosis therapies than it has been for half a century due to transformed interest, scientific and technological advances, and the combined efforts of the public and private sectors [11]. These efforts must be further enhanced to ensure ultimate success in discovering, developing, and delivering drastically improved therapies for tuberculosis patients.

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