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Editorial Open Access

Antimicrobial Properties of Various Non-Antibiotic Drugs against Microorganisms

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Editorial

Antibiotics and antimicrobial chemotherapeutics exist in large numbers in today's pharmaceutical market. Despite their use is becoming increasingly restricted. The reason behind such a rapid decline is largely attributed to the development of drug resistance among microorganisms. Such a phenomenon is coupled by the toxicity possessed by many antimicrobials. Multiple drug resistance among highly infective microorganisms generates a major obstacle to clinical applications in recent years. As development of a new broad range antimicrobial agent is difficult and takes several years, increasing the activity of existing antibiotics would be a future solution to this challenge. However, there is a search for newer antimicrobial agents that can overcome these drawbacks. Studies in this line have exposed the fact that several compounds, belonging to various pharmacological classes, possess moderate to powerful antibacterial activity.

There are some synthetic or natural medicinal compounds, referred as non-antibiotics, which are effective against microbial metabolism [1]. A number of non-antibiotic drugs including non-steroidal anti-inflammatory drugs, calcium channel blockers and antidepressants have been reported to display biocidal or biostatic activity [2]. In addition, recent studies showed that some repellent molecules such as Picaridin and DEET, which are spread to the body of people and clothes to remove some arthropods (mosquitoes, lice, ticks, etc.), have also antimicrobial property [3].

These non-antibiotic drugs act in different manners on microbial growth. They may have direct antimicrobial activity (antimicrobial non-antibiotics), increase the efficiency of an antibiotic as given together (helper compounds), or change the pathogenicity of microorganisms or activity on the physiology such as modulating macrophage activity [4]. For example, antidepressants such as Sertraline, Paroxetine, and Fluoxetine have been shown to decrease minimum inhibition concentration (MIC) levels of several antibiotics mainly by inhibiting efflux pump activity [5-8]. Beyond acting synergistically, some psychotic drugs exhibit antimicrobial characteristics. They have been effective against gram negative and positive bacteria [2,9,10], yeast [11], fungi [12], and protozoa [13].

The main limiting factor of non-antibiotic drugs to display their antimicrobial characteristics in mammalian system is that the maximum serum level remains (approx. 1mg/L) lower than the concentration required inhibiting microbial growth [2]. However, these levels might be sufficient to modify microbial metabolism and act synergistically with certain antibiotics [14,15]. For example, it has been claimed that 0.75mg/L sertraline, lower than the tissue concentration *in vivo*, resulted in lack of hyphal transformation and decrease in virulence for Candida spp. [16].

Given the increasing incidence of infections and the limited efficacy of currently available antimicrobial agents, new approaches are needed. A broad spectrum of drugs produced by microorganisms might be investigated for their antimicrobial activity. On the other hand, the currently published information describes *in vitro* activity and *in vivo* efficacy in animals. There is very limited clinical information that indicates clinically relevant activity of non-antibiotics compounds in humans. In addition, there is a need to take pharmacodynamics into account *in vivo*. On the basis of this information, new approaches to the infection can be designed.

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