

TITLE: IN VITRO ANTIMICROBIAL ACTIVITY OF KISAMEET CLAY AGAINST *Mycobacterium tuberculosis*

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ABSTRACT:

Tuberculosis is currently the major public health concern, surpassing HIV/AIDS in number of deaths in 2016. Despite the efforts to develop new diagnostic methods, as well as new drugs and treatment options to control the disease worldwide, the scientific community still faces difficulties to find compounds capable of clearing the host from mycobacteria. On the other hand, recent research has addressed the medicinal and therapeutic use of mineral products, such as nanomaterials of geological origin, and their potential impact on human health. In this respect, pure clay minerals, which are naturally-occurring layered phyllosilicates with stable crystalline structures, showed antimicrobial properties against microbes that cause human disease. Even though their use is not approved by regulatory agencies for therapeutic applications yet, studies have shown their benefits through their activities against several pathogens. A recent study performed in Canada showed that Kisameet clay (KC), a natural clay mineral from British Columbia, Canada, has a potent broad-spectrum antibacterial activity against important pathogens involved in hospital-acquired infections. However, anecdotal reports indicate the use of KC for a variety of inflammatory disorders, including duodenal ulcer, arthritis, neuritis, skin irritations and burns. The clay has a significant resident microbial community, which includes *Actinobacteria*, known to make bioactive small molecules, which may contribute to KC activity. Our group tested KC against different *Mycobacterium tuberculosis* strains, according to their susceptibility profile to first and second line drugs. Three groups of strains were tested: susceptible (S) strains, multidrug-resistant (MDR) strains, and extensively drug-resistant (XDR) strains of *M. tuberculosis*. Additionally, we also tested the effect of KC on a reference strain (H37Rv). We compared the survival of all strains in the presence of sterile water and a KC leachate, during two weeks. After this period, each sample was inoculated in Middlebrook 7H11 media and CFU counting was performed after 30 days. All strain groups were affected as well as H37Rv had their survival impaired in the presence of KC when compared to sterile water, indicating that KC has mycobactericidal activity. Our results clearly indicate that Kisameet clay has antimycobacterial activity. Further analyses should be performed in order to determine the chemical nature of this biological activity.

Keywords: tuberculosis, resistance, antibacterial activity, mineral clays

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