

9th WORLD CONGRESS ON IMMUNOLOGY AND CANCER

December 09-10, 2019 | Barcelona, Spain

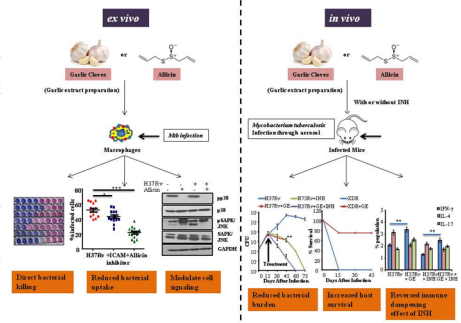
Allicin promotes antimycobacterial activity of macrophages during Mycobacterium tuberculosis infection

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The emergence of drug-resistant Mycobacterium tuberculosis (M.tb) strains has severely hampered global efforts towards tuberculosis (TB) eradication. The internationally accepted therapy “Directly Observed Treatment Short-course (DOTS)” is lengthy, and incorporates risks for the generation of drug-resistant M.tb variants. Multiple and extremely Drug-Resistant (MDR and XDR) variants of TB are now widespread throughout the globe, and Totally Drug Resistant (TDR) strains have appeared. Therefore, new classes of antibiotics are urgently needed to combat these deadly organisms. Historically, garlic is known to kill mycobacterial strains, and its active compound, allicin, kills various microorganisms. Here we have shown that allicin not only reduced the bacterial burden in the lungs of mice infected with Mycobacterium tuberculosis (M.tb), but also induces strong anti-tubercular immunity.

In the present study, the anti-mycobacterial and immunomodulatory activity of garlic extract and its pure constituent allicin were demonstrated based on several *in vitro* and *in vivo* experiments in murine model of tuberculosis. Furthermore, the validation of study was done by immunoblots showing the modulation of MAPK and SAPK/JNK signaling by allicin in macrophages. Here, we report that allicin/garlic extract exhibits strong anti-mycobacterial responses *in vitro* and *in vivo* against drug-sensitive, MDR and XDR strains of TB. In addition to direct killing, allicin also induced pro-inflammatory cytokines in macrophages. Moreover, allicin/garlic extract treatment in murine models of infection resulted in induction of strong protective Th1 response, leading to drastic reduction in mycobacterial burden. These results indicated that allicin/garlic extract has both antibacterial and immunomodulatory activity. Furthermore, garlic extract reversed the immune dampening effects of frontline anti-TB drugs. Allicin/garlic extract alone or as an adjunct to classical antibiotics holds great promise for treatment of drug-sensitive as well as drug-resistant TB. These results warrant further study and validation of allicin for treatment of TB.



Biography

Mona Singh is currently pursuing her Ph.D. from Jawaharlal Nehru University, Delhi, India. She was the alumni of Banaras Hindu University and University of Delhi, while pursuing her Bachelor and Masters degrees, respectively. Her research focus lies in studying the immunomodulatory effect of different compounds using mice models. She has published her papers in several reputed journals.

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