

Abstract

Mycobacterium tuberculosis is arguably the world's most successful infectious agent in causing tuberculosis because of its ability to control its own cell growth within the host. *M. tb.* is a globally successful pathogen due to its ability to persist for long periods of time, unrecognized by the human immune system. A protective covering of genes allows the organism to enter latency and then re-emerge later during endogenous reinfection. It is estimated that at least 30% of the world's population is infected with latent *Mycobacterium tuberculosis* and 1.3 million deaths per year. During infection, mycobacteria and other intracellular bacterial pathogens withstand an arsenal of host-derived mutagens that are responsible for DNA damage. The emergence of multidrug resistant strains of this pathogen has made the search for efficacious, safer, cheaper and more accessible drugs, a priority.

The objective of our study was to screen antimycobacterial activity of ethnomedicinal plants from North - East India on *Mycobacterium smegmatis* and *Mycobacterium tuberculosis* and determination of total polyphenolic and flavonoid contents and free radical damage to goat erythrocytes. Scanning electron microscopy of the bacteria was performed to investigate the impact of the extracts on the morphology of the bacterial cell, TLC of the extracts exhibiting antimycobacterial property was further purified in column chromatography. Those fractions of extract which exhibited antimycobacterial activity were analysed in fourier transform infrared spectroscopy(FTIR).

Fourteen extracts showed activity against *Mycobacterium smegmatis* and six extracts, against *Mycobacterium tuberculosis*. Ethanol extract of *Averrhoa carombola* and methanol extract of *Ecliptica alba/eracta* showed the maximum activity with an inhibition zone of 13 mm against *Mycobacterium smegmatis*. It was found that ethanol, methanol, ethyl acetate extracts of *Averrhoa carombolas* showed antimycobacterial activity with an MIC value of 1.25µg/µl against *Mycobacterium smegmatis* (ATCC 14468). Ethanol, ethylacetate extract of *Averrhoa carombola* leaf and ethanol extract of *Achyranthes aspera* leaf and stem showed antimycobacterial activity with an MIC value of 12.5µg/µl against *M. tb.H37Rv*. The highest phenolic content was exhibited in SFLE extract (98mg/g GAE) and maximum total flavonoid

content was 18 mg/g quercetin equivalent. None of the extracts of *Achyranthes aspera* (Star fruit) exhibited hemolytic activity up to the maximum concentration of 5mg/ml. SEM micrograph depicts morphological changes induced by the extracts at MIC. The IR spectrum showed that the major functional groups which may be present in the extract of SFLEA (ethyl acetate and toluene used as eluents) are Bromoalkane, Tertiary alcohol, Nitrocompound (Aliphatic) and $C = CH_2$ while in the extract of SFLE (ethyl acetate and toluene as eluents) the functional groups might be ammonium ions, $C = C$, carboxylic acid or aldehyde, $C = CH_2$. This showed that plant extracts evaluated have great potential as antimycobacterial compounds against *Mycobacterium smegmatis* and *Mycobacterium tuberculosis* and they can be used in the treatment of infectious diseases caused by these resistant microbes.