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The antibacterial activity of honey and lemon juice against Streptococcus pneumoniae and Streptococcus pyogenes isolates from respiratory tract infections

Mshelia B M, Adeshina G O, Onaolapo J A, Sirajo U, Aliyu B and **Zaharaddin M**
Federal University Birnin Kebbi, Nigeria

This study was aimed to determine the antibacterial activity of honey and/or lemon juice on strains of *Streptococcus pneumoniae* and *Streptococcus pyogenes* from respiratory tract infections. Clinical isolates were collected from Ahmadu Bello University Teaching Hospital (ABUTH), Zaria and Ahmadu Bello University Health Services (ABUHS) Samaru campus, Zaria. The isolates were characterized by standard microbiological procedures. Antibacterial activities of the honey and lemon juice, as well as that of some standard antibiotic formulations were assayed using agar well diffusion and broth dilution method. Minimum inhibitory and bactericidal concentrations were carried out. Rate of kill was also carried out to determine the death/survival rate of the bacterial isolates after exposure to the agents. Noticeable variations in the antibacterial activity of the agents were observed. Thus, inhibition zones (mm) ranging from 10-22 (100% honey), 14-29 (100% lemon) and 20-29 (honey and lemon juice mixture) were obtained. However, minimum inhibitory concentrations (µg/ml) range between 1.95-125 (ceftriaxone), 1.56-NI (gentamicin), 31.5-NI (amoxicillin/clavulanic acid), 0.98-62.5 (levofloxacin), 50.0-NI (azithromycin), 20.0-75.0 (100% v/v honey), 22.5-47.5 (100% v/v lemon juice) and 17.5-25.0 (honey and lemon juice mixture). However, for the rate of kill, honey and lemon juice mixture, lemon juice affected complete killing at 120 minutes; while, ceftriaxone, levofloxacin and honey produced complete killing at 1440 minutes. Therefore, from the findings, honey and lemon juice mixture, lemon juice, levofloxacin, ceftriaxone and gentamicin had higher antibacterial activity than azithromycin, amoxicillin-clavulanic acid and honey. However, for the statistical analysis, at $p \geq 0.05$, there is significant difference between honey and lemon juice mixture and honey. In conclusion, the bacterial isolates were more susceptible to honey and lemon juice mixture, lemon juice, levofloxacin, ceftriaxone and gentamicin; but less susceptible to azithromycin, amoxicillin-clavulanic acid and honey. Excellent bactericidal activity was observed with honey and lemon juice mixture, lemon juice compared to the honey alone. The findings in this research therefore provides scientific basis to the use of honey and lemon juice as an alternative medicine by the populace in the treatment of respiratory tract infections.

bata.mari@fubk.edu.ng

Immunogenic decapeptide as a therapeutic for melanoma

Navnit Kumar Mishra
M M University, India

Melanoma is a cancer associated with melanin forming cells known as melanocytes of epidermis. The malignant melanoma is increasing at alarming rate worldwide because of ozone layer depletion. Hence, there is an urgent need of the scientists from multidisciplinary areas to targeting the immunological receptors coupled with melanoma. In the present study a mutated decapeptide with ELAGIGILTV epitope has been taken from the melanoma antigen recognized by Programmed Death Receptor (PD-1) of the T-lymphocytes. In general the T-lymphocytes recognize the tumor cells and destroy them. However, the cancer cells protect themselves by Programmed Death Ligand-1 (PD-L-1) present on their surface which interacts to Programmed Death Receptor of the T-lymphocyte by this interaction they overcome the immuno surveillance mechanism. The proposed novel immunogenic decapeptide can block PD-1 receptors of the T lymphocytes and prevent the PD-L-1 binding as well. Lymphocytes once freed from their blindness by the peptide, regain their defense potential by recognizing and destroying cancer cells. Targeting this mechanism of interaction through epitope may act as a therapeutic for the melanoma. Molecular dynamics and molecular docking were the techniques applied to explore the physiochemical properties associated with immunogenicity of the epitope to the receptors. Furthermore this immunogenic epitope can be developed as a vaccine for cancer treatment. Moreover, the potency of bioactive nanoparticle in nanomedicine is well known. Therefore engineering this epitope with bioactive nanoparticle adjuvant could substantially improve the efficacy of the designed vaccine.

navnitchem@yahoo.com