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Antiviral activity and possible mechanisms of action of *Acacia nilotica* against *Influenza A virus*

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We investigated the anti-influenza virus activity of *Acacia nilotica* and possible mechanisms of action *in vitro*. We found that *Acacia nilotica* has anti-influenza-virus activity and both pre-incubation of virus prior to infection and post-exposure of infected cells with *Acacia nilotica* extract significantly inhibited virus yields. Influenza-virus-induced hemagglutination of chicken red blood cells was inhibited by *Acacia* extract treatment, suggesting that *Acacia* can inhibit influenza A virus infection by interacting with the viral hemagglutinin. Furthermore, *Acacia* extract significantly affect nuclear transport of viral nucleoprotein (NP). To best of our knowledge, this study revealed for the first time that *Acacia nilotica* extract can inhibit both viral attachment and replication and offers new insights into its underlying mechanisms of antiviral action. The fruit husk of *Acacia nilotica* collected from Sudan and extracted with 70% methanol. The crude extract was screened for its cytotoxicity against MDCK cell line by alamarBlue assay and WST-1 assay. Antiviral properties of the plant extract were determined by cytopathic effect inhibition assay and virus yield reduction assay (plaque assay). Time of addition assay and nuclear export mechanism were also performed.

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Immunomodulatory role of *Carica papaya* in allergic asthma

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Asthma is a chronic inflammatory disease affecting respiratory system. Search for novel treatments has significantly advanced in recent years due to increased side effects reported with the use of corticosteroids in asthma. This attention has led to the exploration of alternative medicines with particular interest in natural products. In the current study, ethanolic extract of papaya leaves was used to see anti-inflammatory effects on ovalbumin induced airway inflammation in mice. 24 BALB/c mice divided into four groups i.e., control group while other three groups were induced airway inflammation with ovalbumin. Group-II served as diseased group, while group-III and IV were treated with ethanolic leaf extract of *Carica papaya* (100 mg/kg bw, orally) and methyl prednisolone (15 mg/kg bw, intraperitoneally) for seven consecutive days. Mice were sacrificed and delayed type hypersensitivity (DTH) was assessed by weighing the both ears. Histopathological examination of lungs was done for determination of inflammatory response in all groups by hematoxylin and eosin staining. Inflammatory cells were counted in blood as well as bronchoalveolar lavage fluid. The mRNA expression level of IL-4, IL-5, eotaxin, TNF α , NF- κ B and iNOS were measured in lung tissue by reverse transcription polymerase chain reaction. The diseased group developed allergic airway inflammation shown by increased DTH and inflammatory cell infiltration like total leucocytes and eosinophils in BALF and blood. Moreover pathological lesions in the lungs were enhanced along with increased mRNA expression levels of IL-4, IL-5, TNF α , eotaxin, iNOS and NF- κ B. The results indicate that *Carica papaya* leaves possess the capacity to reverse allergic airway inflammation by abrogation of Th2-driven allergic responses by reducing the DTH, invasion of inflammatory cells in airways; improving lung histopathology and terminating IL-4, IL-5, TNF α , Eotaxin, iNOS and NF- κ B expression.

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