

# Anti-viral properties of *Morinda citrifolia* (noni) fruit juice

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## ABSTRACT:

*Morinda citrifolia*, commonly known as noni, is a medium-sized tropical tree that bears fruit year-round. The fruit of this tree was prized by Pacific Islanders and others for its perceived health-promoting benefits. Several clinical trials have validated some of the traditional uses of noni fruit juice, as well as revealed previously unknown biological activities that may improve human health. Among these are modulation of the immune system. For example, four weeks of daily noni juice ingestion reduced DNA adduct formation in the lymphocytes of cigarette smokers, thereby preserving immune function against the damaging effects of tobacco smoke. Further, eight weeks of daily noni juice ingestion increased innate and adaptive immune system activity, as indicated by increased serum interleukin-2 (IL-2) concentrations as well as natural killer (NK) cell activity in healthy volunteers [1]. The same effects were observed in immunosuppressed mice that were fed noni fruit juice extract and its major phytochemical constituent, deacetylasperulosidic acid [2]. These observations by themselves demonstrate the potential of noni juice in preventing and mitigating viral infections. But in vivo and in vitro studies shed additional light on how noni juice influences immune responses to viral exposure. Chickens fed noni juice experienced increased humoral immune response as determined by the hemagglutination assay following infectious bursal disease virus challenge [3]. CD4<sup>+</sup> and CD8<sup>+</sup> T cell activation increased in neonatal Holstein bull calves fed noni fruit puree from French Polynesia for two weeks [4]. A follow-up study revealed that noni puree supplementation for the first three weeks of life also reduced respiratory treatments by 61% [5]. After three weeks of Tahitian Noni Juice ingestion, peripheral blood CD4<sup>+</sup>/CD8<sup>+</sup> ratio and IL-2 levels increased significantly [6]. Noni fruit extracts demonstrated notable inhibition of HIV-1(IIIB) replication via cytotoxicity against infected MT-4 lymphocytes [7]. Noni fruit extracts also stimulated splenocyte proliferation in vitro and increased the humoral immune response of immunosuppressed rats [8]. Finally, 16-days of Tahitian Noni Juice ingestion increased interferon-gamma expression in splenocytes and peritoneal exudate cells. Additionally, noni juice potently activates cannabinoid 2 (CB2) receptors [9]. The anti-inflammatory activity of Tahitian Noni Juice has also been reported in multiple human trials and involves regulation of cyclooxygenase expression [10]. Overall, the data indicate that noni fruit juice has the potential to modulate immune responses to viral infections via IL-2 signaling and lymphocyte activation while, at the same time, dampening pathogenic inflammatory responses via interaction with the endocannabinoid system and by influencing eicosanoid metabolism [11,12]. Such properties may be useful in the management of viral infections, including that of SARS-CoV-2.

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