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The White Paper Series – Paper 2

Neem's Effect on Immune Systems

Long before ancient healers had any idea of how the human body fought disease, they prescribed neem for disorders as diverse as leprosy, gastro-intestinal problems, malaria, ringworms, diabetes, colic, anorexia, boils, epilepsy and ulcers.

Of course, part of that reliance on neem comes from having a relatively limited repertoire of treatments, but many of those prescriptions are being proven today. And whether they understood immune systems or not, these wise men knew that helping the body's ability to fight off disease and repair injuries is a good first choice in almost any situation.

Beginning about 10 years ago, international researchers began to document how neem boosts immune system activity. It's such a powerful booster that some researchers have attributed its contraceptive properties – for both men and women - to an enhanced immune system.

While scientists have not yet identified specifically how neem works, they do know it carries a one-two-three punch, boosting both the lymphocytic and cell-mediated immune systems, at the same time it kills or slows the growth of many disease-causing organisms such as bacteria, virus and fungus.

The fact that neem affects the cell-mediated immune system is particularly important to most people. Led by "Killer T" cells, the cell-mediated immune system is the body's first defense against infection. Killer T-cells are able to destroy microbes, viruses and cancer cells by injecting toxic chemicals into the invaders. Neem also boosts the body's macrophage response, which stimulates the lymphocytic system, and boosts production of white blood cells.

One of the first studies showing neem's impact on the immune system was a 1992 report from the National Institute of Immunology in India, reported Mice injected with neem oil showed enhanced phagocytic activity and expression of MHC class-II antigens. Spleen cells of treated animals showed a significantly higher lymphocyte proliferative response to in vitro challenges.

The researchers concluded that neem oil acts as a non-specific immunostimulant and that it selectively activates the cell-mediated immune mechanisms to elicit an enhanced response to subsequent mitogenic or antigenic challenges.

Other researchers in India have shown that neem leaf extract taken orally produces similar effects, including higher levels of white blood cells and anti-ovalbumin antibody titres. They also reported an enhancement of macrophage migration inhibition.

Reporting on the use of neem extracts as contraceptives in Immunology & Cell Biology, researchers note that neem increases the TH1 type response and boosts level of CD4 and CD8 cells in lymph nodes and spleen. An increase in immunoreactive and bioactive TNF-alpha and IFN-gamma in lymph nodes and serum also was observed. That report also indicates that using neem as a vaginal contraceptive inhibits the spread of micro-organisms including *Candida albicans*, *C. Tropicalis*, *Niesseria gonorrhoeae*, herpes simplex-2 and HIV-1, as well as resistant strains of *E. coli* and *Staphylococcus aureus*, in part by boosting immune-system activity in the vagina.

Another report in the American Journal of Reproductive Immunology on using neem as a method of birth control indicates that neem initially stimulates TH1 cells and macrophages, then causes an elevation of both immunoreactive and bioactive TNF-alpha and gamma-interferon in serum and mesenteric lymph nodes. A follow-up study in the Journal of Ethnopharmacology reported that long-term use of neem oil, up to 10% of body weight, showed no apparent toxic effect but completely abrogated pregnancies. Researchers conclude that neem activates cell-mediated immune responses, specifically T lymphocyte and phagocytic cells, followed by an elevation in cytokines gamma-interferon and TNF.

Another study looked specifically at neem's modulation of humoral and cell-mediated immune response. It reports that mice treated with 100 mg/kg neem leaf extract showed higher IgM and IgG levels plus increased anti-ovalbumin antibody titres. A 1997 report in the Journal of Ethnopharmacology also showed an increased macrophage activity and lymphocyte proliferation response at low levels of neem (120 mg per kg of weight). At higher concentrations of neem (300 mg per kg), there was a stimulation of mitogen-induced lymphocyte proliferation.

More recent research focuses on neem's ability to help the body fight off viruses and cancer. Chickens with immunosuppressed conditions that were fed powdered dry neem leaves showed significantly enhanced humoral and cell-mediated immune responses to a virus. A 1999 report published in the Journal of Communicable Diseases looked at in vitro effects of neem leaf extract on the Coxsackie B group of viruses, which are associated with a host of varied syndromes, including meningitis, pericarditis, myocarditis, upper respiratory illness and pneumonia, rash and hepatitis. Neem inhibited plaque formation, and functioned as virucidal agent.

In 2000, researchers published an article in Phytotherapy Research (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=10861977&dopt=Abstract) concludes that neem leaf extract significantly alters cancer development at extrahepatic sites by influencing hepatic biotransformation enzymes and antioxidants.

Although most of this research has been conducted in animals and considers very specific types of antigens and infections, the overall results indicate that neem provides a significant boost to human immune systems. However, it also makes it clear that anyone (male or female) who is pregnant or planning to become pregnant should avoid using neem. People with autoimmune diseases, particularly lupus, also should avoid neem because it may cause flares.

Abstracts of many of these reports are available on the Internet, on a site created by the National Institutes of Health. Go to <http://www.ncbi.nlm.nih.gov/PubMed/> and type in neem and immune to search for the latest reports. For more information, visit www.neemamerica.org