



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(4): 648-650
© 2018 TPI
www.thepharmajournal.com
Received: 27-02-2018
Accepted: 28-03-2018

Vikash Sharma
Department of Veterinary
Pathology, LUVAS, Hisar,
Haryana, India

Vaquil
Department of LPT, LUVAS,
Hisar, Haryana, India

A review on medicinal properties of neem (*Azadirachta indica*)

Vikash Sharma and Vaquil

Abstract

Neem is the most useful traditional medicine as a source of many therapeutic agents in the Indian culture and grows well in the tropical and semi-tropical countries. In indigenous system of medicine, every part of neem tree is used, viz. bark, leaves, fruits, seeds and extracts. Its extracts have antiviral, antibacterial, antifungal, anthelmintic, antiallergic, anti-dermatic and anti-inflammatory properties. Neem is also termed as “free tree of India”, “wonder tree”, “Nature’s drug store”, “Village dispensary”, “Divine tree”, “heal all” and “Panacea of all Diseases”. In modern era, special emphasis should be on control of diseases of human as well as animals using non-toxic herbal products. There is lot of scope for the better utilization of this wonder plant.

Keywords: neem, therapeutic and diseases

Introduction

In recent years, efforts have been directed to control infectious diseases by use of herbal medicine which have fewer side effects and are ecologically safe. Neem (*Azadirachta indica*) is well known for its medicinal properties. *Azadirachta indica* is a tree in the mahogany family *Maliaceae*. Neem is the most useful traditional medicine as a source of many therapeutic agents in the Indian culture and grows well in the tropical and semi-tropical countries. It has been shown that neem leaves extract acts as a growth promoter (Landy *et al.* 2011) [15], improve performance and hematological parameters (Nayaka *et al.* 2013) [20] and immune response (Nayaka *et al.* 2012; Jawad *et al.* 2013) [21, 11] in broilers. In indigenous system of medicine, every part of neem tree is used, viz. bark, leaves, fruits, seeds and extracts. Its extracts have antiviral, antibacterial, antifungal, anthelmintic, antiallergic, anti-dermatic and anti-inflammatory properties (Raheja, 2004) [22]. Neem oil extracted from its seeds is used in medicines, pest control and cosmetics etc. and its leaves are used in the treatment of chicken pox. Neem also have anticoccidial effect in broilers and is used as pesticide (Tipu *et al.*, 2002; Esonu *et al.*, 2006) [30, 8].

According to the Hindus, it is believed that the goddess of the chicken pox, Sithala lives in the neem tree. Neem tea is taken to reduce headache and fever. Its flowers are used to cure intestinal problems. Neem bark act as an analgesic and can cure high fever as of malaria. Even the skin diseases can be cured from the neem leaves. India believes a lot that the neem can cure all diseases (Biswas *et al.*, 2002) [5]. Herbs like tulsi (*Oscimum sanctum*), neem (*Azadirachta indica*), punarnava (*Boerhavia diffusa*); amrita (*Tinospora cordifolia*) and harida (*Currucoma longa*) act as natural anti-microbial agents and can be used in combination for treatment of anthrax in animals (Junnarkar, 2006) [12]. Centre for Traditional Medicine and Research (CTMR), Chennai, India revealed the medicinal uses of different parts viz., fruits, seeds, leaves, roots, bark etc., of neem trees.

Neem leaves like most tropical tree leaves contain bioactive compounds (Kausik *et al.*, 2002; Akpan *et al.*, 2008) [13, 2] which may affect nutrient utilization. These bioactive compounds may also alter the hematological and serum biochemical parameters of animals. Unfortunately, the high fibre content in neem leaf meal causes serious intake and digestibility problems in poultry diets (Udedibie and Opara, 1998) [31]. Therefore, the use of neem leaf extracts could overcome this barrier towards tapping the good nutritional characteristics of neem leaf meal. The neem leaves extract contain nimbin, nimbinene, 6-desacetylnimbinene, nimbandioli, nimbolide and quercetin (Mitra *et al.*, 2000) [19]. An aqueous extract (10 percent) of tender leaves is reported to possess anti-viral properties against, fowl pox, infectious bursal disease and New Castle disease virus (NDV) and significantly enhances the antibodies production against the infectious bursal disease and New Castle disease virus (Sadekar *et al.*, 1998) [25].

Correspondence
Vikash Sharma
Department of Veterinary
Pathology, LUVAS, Hisar,
Haryana, India

Active compounds of neem

Azadirachta indica (neem) contains a number of various types of ingredients having therapeutics properties. The most important constituent is azadirachtin and others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinat, gedunin, salannin, and quercetin. Leaves contain ingredients such as nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7-benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione, and nimbiol (Hossain *et al.*, 2011, Kokate *et al.*, 2010) ^[10, 14]. Quercetin and β sitosterol, polyphenolic flavonoids, were purified from neem fresh leaves and were known to have antibacterial and antifungal properties (Govindachari *et al.*, 1998) ^[9] and seeds hold valuable constituents including gedunin and azadirachtin.

Review of literature

Chopra *et al.* (1952) ^[7] reported that oil obtained from leaves, seed and bark of neem possessed anti-bacterial spectrum against gram-positive, gram-negative and *Mycobacterium tuberculosis* organisms. Thaker and Anjaria (1989) ^[29] conducted in-vitro antimicrobial studies on neem leaf extract against *Staphylococcus*, *Streptococcus*, *Pseudomonas*, *E. coli* and *Corynebacterium* and reported a significant inhibition of growth of these organisms in skin wounds of male albino mice. Ahmad *et al.* (1995) ^[1] demonstrated high level of antimicrobial activity of leaf and bark extracts of neem against *E. coli*, *Staphylococcus* and *Bacillus subtilis*.

Brelin (2002) ^[6] conducted the evaluation of neem tree as an alternative anthelmintic for helminth control in small ruminants and reported that trace neem leaves significantly reduce the number of *Haemonchus contortus* in the abomasum of the treated sheep. Lather *et al.* (2002) ^[16] noticed a decrease in haemoglobin, packed cell volume mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration whereas there was increase in total leucocyte count on feeding neem seedcake at different levels in broiler chicks. Renu *et al.* (2003) ^[24] reported that neem leaf extract has immunopotentiating effect in broiler chicks.

Saini (2004) ^[26] studied the effect of neem (*Azadirachta indica*) leaf extract on pathology and pathogenesis of *E. coli* infection in broiler chicken and concluded that mortality with infection alone was 60 percent whereas mortality with infection plus neem leaf extract was 37.5 percent. In general there was significant increase in body weight, hemoglobin, packed cell volume and total erythrocyte count due to neem leaf extract (NLE) feeding within seven days. There was congestion and hemorrhage in heart, liver, lung, spleen, kidneys and intestine, excess deposition of fibrinous exudates on pericardium and liver. Microscopic lesions like congestion and hemorrhage in various organs along with fibrinous pericarditis, perihepatitis, coligranuloma in lungs, glomerulonephritis and tubular degeneration in kidney appeared later and were less severe in NLE fed chicken.

Raheja and Jakhar (2005) ^[23] studied the effect of neem leaf extract (NLE) on pathology of experimental fowl typhoid in broiler chicken and observed that supplementation of NLE in the chicken had protective effect against *Salmonella Gallinarum* infection as revealed by its modulating effect on clinical signs, mortality, growth response, hematological, biochemical parameters, immune response and pathological changes.

Barman *et al.* (2009) ^[4] assessed in-vitro antibacterial activity

of neem oil (*Azadirachta indica*) and its fractions and neem seed aqueous extract on microflora of cervico-vaginal mucus (CVM) collected from cows with endometritis. Non-lactose fermenting (NLF) bacteria belonging to *Enterobacteriaceae* family was the most frequently isolated bacteria (25 percent), followed by *Escherichia coli* (20 percent), *Corynebacterium* spp. and *Streptococcus* spp. (15 percent). Extraction of neem oil with organic solvents like methanol and hexane yielded 4 fractions, which were termed methanol miscible (F₁), methanol-immiscible emulsion (F₂), hexane miscible (F₃) and hexane-immiscible emulsion (F₄). Column chromatography yielded three fractions: F₅ (first fraction), F₆ (second fraction) and F₇ (third fraction). The F₁ (methanolic) fraction showed the highest antibacterial activity with a sensitivity pattern of 95 percent followed by F₂ and F₃ (85 percent each), F₄ (65 percent), F₆ and F₇ (40 percent each).

Ariyo *et al.* (2013) ^[3] studied the effects of aqueous extract of neem leaves and neem oil on the histological integrity of the frontal lobe of male adult wistar rats brain. The nissil bodies and nuclei in the experimental groups supplemented with neem oil and aqueous extract of neem leaves stained more as compared to nissil bodies and nuclei of the control group indicating increased cellular activities of the frontal cortex in the experimental groups as compared with the control. Mishra *et al.* (2013) ^[18] concluded that aqueous extract of neem leaves extract has a good therapeutic potential as anti-hyperglycemic agent, antibacterial agent and could be used for controlling airborne bacterial contamination in the residential premise. Mahmood *et al.* (2015) ^[17] concluded that supplementation of *Azadirachta indica* leaf extract showed better nutrient digestibility of crude protein and ether extract in broiler chicks.

Sharma *et al.* (2016a) ^[28] observed that supplementation of 10% NLE causes reduction in severity as well as recovery period of *E. coli* infection, suggesting its protective effect on limiting the pathology and pathogenesis of *E. coli* infection in broiler chickens. Sharma *et al.* (2016b) ^[27] also conducted Immuno-pathological studies on broiler chicken experimentally infected with *Escherichia coli* and supplemented with neem (*Azadirachta indica*) leaf extract and concluded that supplementation of 10% NLE in water in experimentally *E. coli* infected broiler chickens reduced the severity of the lesions in spleen and bursa suggesting the protective role of NLE in limiting the depletion of lymphocytes, and second, enhanced the cell-mediated as well as humoral immune response suggesting its immunomodulatory effect.

Conclusions

In recent years, interest is renewed in herbal medicines because of less side effects and being safer. Among these neem is rich source of different compounds having various medicinal properties. Keeping in view these benefits drug development programme should be started utilizing the biological and medicinal properties of neem. In modern era, special emphasis should be on control of diseases of human as well as animals using non-toxic herbal products. Though some herbal products of neem have been prepared but still there is lot of scope for the better utilization of this wonder plant.

References

1. Ahmad I, Ahamed F, Hussain S. In-vitro antimicrobial activity of leaf and bark extracts of *Azadirachta*

- indica*. Indian vet. Med. J 1995; 19(9):204-206.
2. Akpan MJ, Enyenihi GE, Obasi OL, Solomon IP, Udedibie ABI. Effects of dietary neem leaf extract on the performance of laying hens. Proceedings of 33rd Annual Conference Nigerian Society Animal Production. 2008, 396-398.
 3. Ariyo A, Dare BJ, Oyewopo AO, Hammed AM. Histological integrity of the frontal cortex of rat model treated with aqueous extract of neem leaf and Oil. J Biol. Agric and Healthcare. 2013; 3(14):20.
 4. Barman P, Yadav MC, Kumar H, Meur SK, Rawat M. Antibacterial efficacy of neem oil fractions on clinical isolates of endometritic cows. Indian J Anim. Sci. 2009; 79(7):665-668.
 5. Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and medicinal properties of neem (*Azadirachta indica*). Curr. Sci. 2002; 82:1336-1345.
 6. Brelin D. Evaluation of neem tree (*Azadirachta indica*) as an alternative anthelmintic for helminth control in ruminants in Malaysia. Minor Field Studies International office, Swedish Univ. of Agri. Sci, 2002, 196:31.
 7. Chopra IC, Gupta KC, Nazir BN. Preliminary study of antimicrobial substances from *Melia Azadirachta*. Indian. J Med. Res. 1952; 40(4):511-515.
 8. Esonu BO, Opara MN, Okoli IC, Obikaonu HO, Udedibie C, Ihesiulor OOM. Physiological responses of laying birds to Neem (*Azadirachta indica*) leaf meal based diets, body weight, organ characteristics and hematology. Online J Health Allied Sci. 2006, 2(4). [http://www.ojhas.org/issue 18/2006-2-4.htm](http://www.ojhas.org/issue%2018/2006-2-4.htm) 2006.
 9. Govindachari TR, Suresh G, Gopalakrishnan G, Banumathy B, Masilamani S. Identification of antifungal compounds from the seed oil of *Azadirachta indica*. Phytoparasitica. 1998; 26(2):109-116.
 10. Hossain MA, Shah MD, Sakari M. Gas chromatography–mass spectrometry analysis of various organic extracts of *Merremia borneensis* from Sabah. Asian Pacific Journal of Tropical Medicine. 2011; 4(8):637-641.
 11. Jawad Z, Younus M, Rehman MU, Maqbool A, Munir R, Muhammad K *et al.* Effect of neem leaves (*Azadirachta indica*) on immunity of commercial broilers against new castle disease and infectious bursal disease. Afr. J of Agric. Res. 2013; 8:4596-4603.
 12. Junnarkar. Anthrax in Ayurveda. [http:// www.healthpic.com / ayurveda/ article.htm](http://www.healthpic.com/ayurveda/article.htm), 2006.
 13. Kausik B, Ishita C, Ranajit KB, Uday B. Biological activities and medicinal properties of neem (*Azadirachta indica*). Curr. Sci. 2002; 82(11):1336-1345.
 14. Kokate C, Purohit AP, Gokhale SB. *Pharmacognosy*. Maharashtra, India: Nirali Prakashan. 2010.
 15. Landy N, Ghalamkari G, Toghiani M, Yazdi FF. Humoral immune responses of broiler chickens fed with antibiotic and neem fruit powder (*Azadirachta indica*) as feed additive supplemented diet. *IPCBE*. 2011; 3:153-155.
 16. Lather D, Mishra SK, Prasad M, Gera S, Minakshi, Agrawal VK. Effect of neem (*Azadirachta indica*) seed cake feeding on immunological response of broiler chicken. J Immunol. Immunopathol. 2002; 4(1-2):47-50.
 17. Mahmood S, Rehman A, Yousaf M, Akhtar P, Abbas G, Hayat K *et al.* Comparative efficacy of different herbal plant's leaf extract on haematology, intestinal histomorphology and nutrient digestibility in broilers. Adv. Zool. Botany. 2015; 3(2):11-16
 18. Mishra A, Mamta, Neema, Niketa, Poonam, Pranjul *et al.* Antibacterial effects of crude extract of *Azadirachta indica* against *Escherichia coli* and *Staphylococcus aureus*. Int. J Env. Sci. Technol. 2013; 2:989-993.
 19. Mitra R, Szezypl B, Perez A, Gonzale A, Estrada. Efficiency of neem oil (*A. indica A. Juss*) in hens naturally infested with ectoparasites. Revista Cubana de Ciencia Avicola. 2000; 24(2):125-131.
 20. Nayaka HBS, Umakantha B, Ruban SW, Murthy HNN, Narayanaswamy HD. Performance and hematological parameters of broilers fed neem, turmeric, vitamin E and their combinations. Emir J Food Agric. 2013; 25:483-488.
 21. Nayaka HBS, Umakantha B, Ruban SW, Murthy HNN, Narayanaswamy HD. Effect of neem, turmeric, vitamin E and their combinations on immune response in broilers. Global Vet. 2012; 9:486-489.
 22. Raheja S. Studies on the effect of neem (*Azadirachta indica*) leaf extract on the pathology of experimental fowl typhoid in broiler chickens. M.V.Sc Thesis, CCSHAU, Hisar, 2004.
 23. Raheja S, Jakhar KK. Studies on the effects of neem (*Azadirachta indica*) leaf extract on pathology of experimental fowl typhoid in broiler chickens. Indian J Vet. Pathol. 2005; 29(2):151.
 24. Renu, Shridhar, Rakha NK, Gera S, Mishra SK. Effect of neem leaf extract administration on immune responses of broiler chicken J Immunol. Immunopathol. 2003; 5(1):47-50.
 25. Sadekar RD, Kolte AY, Barmase BS, Desai VF. Immune potentiating effects of *Azadirachta indica* (neem) dry leaves powder in broilers, naturally infected with IBV virus. Indian J Exp Biol. 1998; 36(11):1151-1153.
 26. Saini V. Studies on the effect of neem (*Azadirachta indica*) leaf extract on the pathology and pathogenesis of *E. coli* infection in broiler chicks. M.V.Sc. thesis, CCS Haryana Agricultural University, Hisar, 2004.
 27. Sharma V, Jakhar KK, Dahiya S. Immuno-pathological studies on broiler chicken experimentally infected with *Escherichia coli* and supplemented with neem (*Azadirachta indica*) leaf extract, Veterinary World. 2016b; 9(7):735-741.
 28. Sharma V, Jakhar KK, Nehra V. Ameliorative effect of neem (*Azadirachta indica*) leaf extract on the pathology of experimental *Escherichia coli* infection in broiler chicken. Indian J Vet. Pathol. 2016a; 40(3):247-253.
 29. Thaker AM, Anjaria JV. Antimicrobial and infected wound healing response of some traditional drugs. Indian J Pharmacol. 1989; 18:171-174.
 30. Tipu MA, Pasha TN, Zulfaqr. Comparative effect of Salinomycin sodium and neem fruit (*A. indica*) as feed additive anticoccidials in broilers. Int. J Poult. Sci. 2002; 1(4):91-93.
 31. Udedibie ABI, Opara CC. Responses of growing broilers and laying hens to the dietary inclusion of leaf meal from *alchorniacordifolia*. Anim. Feed Sci. Techno. 1998; 71:157-164.