

**PSYCHONEUROIMMUNOLOGY ON HERBAL DRUGS: AN OVERVIEW**

ALEZA RIZVI\*, ANURADHA MISHRA

Faculty of Pharmacy, Integral University, Luknow, Uttar Pradesh, India. Email: aleza.rizvi@gmail.com

Received: 03 February 2015; Revised and Accepted: 23 February 2015

**ABSTRACT**

Psychoneuroimmunology (PNI) is the branch of biomedical science that explores the relationships between the nervous system, emotions, and the immune system. In other words, we can say that PNI is the study of the interaction between mind and body as a result of stress exposure. Therefore it is also called as mind-body medicine. It has been stated that psychological states like chronic stress, depression, anxiety, fear, and social context produce profound effects on the body. Herbal anti-stress products have the advantage of the limited side effects. Medicinal plants have been known for millennia and are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of stress-related diseases like cancers, coronary disease, and some autoimmune diseases. PNI reminds us that psychological states like chronic stress, depression, anxiety, fear, and social context produce profound effects on the body. PNI explores the influence of your mind on your body and immune system. Using a variety of techniques, you direct your energies toward healing and health. The aim of this review is to highlight the plants involved in improving health through direct effects on immune function, as well as through the mind/body connection.

**Keywords:** Psychoneuroimmunology, Stress, Ayurveda, Mind-body medicine.

**INTRODUCTION**

The name psychoneuroimmunology (PNI) was provided in 1975, by Dr. Robert Ader, director of the division of behavioral and psychosocial medicine at New York's University of Rochester. He believes that there is a link between what we think (our state of mind) and our health and our ability to heal ourselves (Fig. 1) [1].

"Psycho" refers to your thinking, emotions, and mood states. "Neuro" refers to the neurological and neuroendocrine systems in your body. "Immunology" refers to your cellular structures and immune system. Psychoneuroimmunologists have contributed greatly to medical science, showing that stress and the emotional state of an individual may play a significant role in making one vulnerable to diseases [2]. They discovered that stress modulates the activities of the body's systems, adversely affecting their functioning to maintain health. They have helped practitioners see the mind-body connection in sickness, whereby the mind and body communicate with each other by the interactions of the endocrine, nervous, and immune systems. They have presented a new view that the disease may actually be a form of stress with physical, as well as psychological aspects. Furthermore, psychoneuroimmunologists postulate that stress may increase the probability of contracting diseases, such as cancers, coronary disease, and some autoimmune diseases [3].

Since ancient times, illness, well-being, and healing were strongly connected to the mind, society, morality, and spirituality. Recently, an enormous amount of research has found that there was wisdom and truth in these ancient approaches [4]. PNI reminds us that psychological states like chronic stress, depression, anxiety, fear, and social context produce profound effects on the body. These effects express themselves all the way down from muscle tension in headaches and spastic colon; to the way in which genes express themselves in genetic illnesses like rheumatoid arthritis and multiple sclerosis. Over time, mental, and emotional states take a heavy toll on the body and are a significant risk for illness. The field of PNI has documented different physiological responses to stress [5]. Various forms of stress management have been found to be helpful in modifying the body's stress response. These include mindfulness meditation, yoga, counseling, exercise, volunteerism, stream-of-consciousness writing, humor, music, and social connectedness [6].

**IMPACT ON THE BODY DUE TO STRESS**

The "stress response," which is also called the "fight or flight response." It occurs when a person experiences something that they perceive to be threatening. When the stress response is activated, the brain stimulates the release of a cocktail of chemicals that prepare the body to fight or flee. As a result, the body experiences increases in blood pressure, respiratory rate, heart rate, blood flow to skeletal muscles, and other physiological changes. These physiological changes aid the body in surviving an immediate threat by temporarily increasing strength, speed and aggressiveness, and decreasing sensitivity to pain, but they have also been shown to cause short-term decreases in immune function [7].

Today, the stress response has become a threat to health because it can be repeatedly provoked by routine events, like an angry boss or a hectic commute, and, for some, has become a chronic way of responding. For those who are chronically "stressed out," the nervous system is in a constant state of excitation and the stress response is experienced over and over again, causing the built-in feedback loops that should shut the system off to fail, resulting in weakened immune function. In time, the adrenal glands may become exhausted, leading to symptoms of weakness, dizziness, tiredness, headaches, memory problems, allergies, and more serious illnesses [8]. This type of chronic stress can have a profoundly damaging effect on the mind and body because a strong and balanced immune system is something that is absolutely necessary to the maintenance of health and vigor. It fights off infections that originate outside the body and diseases, such as cancer, that originate within the body, and it initiates and coordinates the healing process [9]. A functional immune system is almost as vital to even your short-term survival as is a functional heart. If your heart stops beating, you will be dead in about four to 6 minutes. If your immune system were to completely stop functioning altogether, you would be dead within less than an hour or so because that's how quickly your body would be overwhelmed by the reproduction of unopposed bacteria and other pathogens [10]. In addition to waging this constant battle against outside pathogens, your immune system is also protecting you constantly from abnormal cells produced within your body through mutation, including malignant cancer cells, by destroying them before they can cause problems. However our immune system not only needs to be strong enough to do these jobs, it also needs to be balanced

because an immune system that's too strong or active will attack things from inside or outside the body that it shouldn't, or will attack them too aggressively. Hence, for example, allergies are produced when your immune system over responds to the presence of something from outside your body, like pollen, and autoimmune diseases [11].

**HOW THE MIND INFLUENCES THE BODY**

The basic premise of mind/body medicine is that our thoughts, moods, and feelings influence our bodies at the physical level and express themselves in our health and that the state of our physical body, in turns affects how we feel and can even play a role in creating our personality [12]. The brain has often been called the organ of the mind. It is the source and executor of all that we think, feel and do and it is through the brain's structural and chemical connections with our other organs, glands, and tissues that feelings influence health and health influences feelings [13]. When a person is chronically stressed out, the body is unable to regulate hormones and immune functions properly, and becomes physically sick. Stress can cause disorders in target organ systems. For example, in the nervous system bronchial asthma, tension headaches, migraine headaches, irritable bowel syndrome, and coronary heart disease may appear. Illnesses that result can include migraines, ulcers, hypertension, cardiovascular disease, allergies, cancer, lupus, arthritis, and autoimmune diseases. Immune disorders include the common cold and flu, allergies, rheumatoid arthritis, ulcers and colitis, and cancer [14]. The stress response releases the hormones epinephrine and norepinephrine, which promote the release of lymphocytes, but at the same time they reduce their efficiency. The stress response also releases endorphins that cause a state of euphoria [15]. Chronic stress causes an increase in cortisol and glucocorticoids, which have been linked to a decrease in T-cells and possibly B-cells, which means the immune system will be suppressed. Research has shown that disturbances to our electrical fields by outside sources can harm our bodies on a cellular level, causing mutations that may lead to cancer. Hence, energy can both work for us and against us when it comes to immunity and disease [16].

**MIND-BODY THERAPIES TO REDUCE STRESS**

Stress is a fundamental part of living that can have both positive and negative effects on an individuals health [17]. Stress can be positive, acting as a catalyst for producing helpful changes. However, stress is negative when there is a disproportion between what an individual wants or feels capable of doing and the constraints of the environment. This places an excessive amount of pressure and demand on the individual. If this pressure is unrelieved, unmanaged, or chronically experienced, this stress may have deleterious effects on the individual

health and well-being [18]. Stress is the unconscious response to a demand. Stress becomes a problem when the demand exceeds an individual ability to respond or cope effectively. Mind-body medicine has been shown to reduce stress and enhance well-being. These mind-body techniques help change the way individuals think about the problem, which gives them more control over their responses made to the stress. This enables individuals to manage and even reduce their stress because they are able to assert control over their reactions and behaviors to the stress [19]. In addition, when individuals realize their ability to control their behaviors and more importantly, their attitudes, they have more control over their stress overall. It is not the stress itself that causes physical and mental harm, but it is the reaction to the stress that determines how the individual experiences it. It becomes essential for individuals to learn how to control their thoughts, attitudes, and behaviors when encountering stressful situations [20].

The use of mind-body therapies may help health care providers promote health and quality of life for individuals under their care. Some of the mind-body interventions that nurses can use in conjunction with conventional daily nursing practice to help reduce their patients. [21]. The practice of holistic aromatherapy, the use of essential oils to support and strengthen the immune function, will offer the possibility of improving health through direct effects on the mind/body connection. A relationship that defines and supports the concepts of aromatherapy has been recently enjoying a new acceptance in Western medicine due to the successful research in the field of psychoneuroimmunology. The practice of aromatherapy is reputed to be at least 6,000 years old. Using of essential oils within ritualistic, religious, cosmetic and therapeutic purpose is described in numerous ancient civilizations, as well in Arabian, Ayurvedic and Chinese traditional medicine [22]. One of the most promising findings in PNI is the exciting implications for the practice of aromatherapy, which offers the possibility of improving health through direct effects on immune function, as well as through the mind/body connection. Aromatherapy has been in use since early civilization. Ancient civilizations of Egyptians, Greeks, and Romans all referred to herbal remedies for symptoms of disease [23]. Many herbal drugs are available to reduce stress (Table 1).

There is no need to have the body process essential oils by the digestive system or bloodstream which is the common mode of absorption in other medication/remedies.

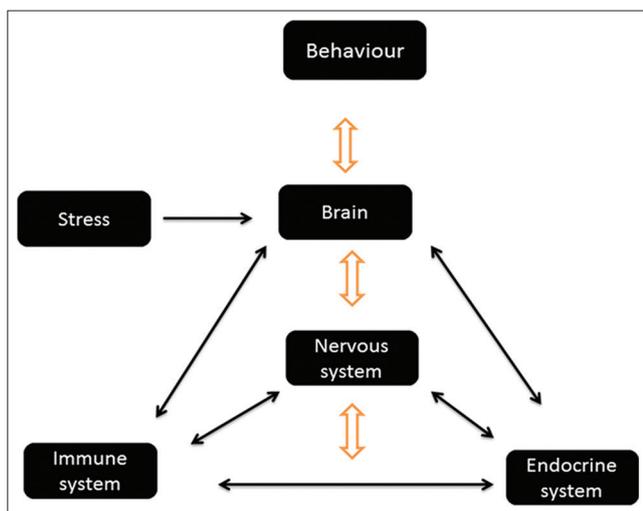
Essential oils can support and strengthen the immune response in two ways:

1. By directly opposing the threatening microorganism with antibacterial and antiviral properties
2. By stimulating and increasing the activity of the cells involved by hormonal organ interaction [24].

The use of essential oils via inhalation therapy is effective in treating the responses to inflammation that present in adverse immune reactions like asthma and autoimmune disorders. Some essential oils which is used to inhibit the inflammatory process, to include lavender, (*Lavendula officinalis*) peppermint, (*Mentha piperata*) rosemary, (*Rosmarinus*

**Table 1: Here are the examples of some anti-stress herbal drugs involved to reduce stress**

Serial number	Common name	Scientific name
1	Mandarin	<i>Citris nobilis</i>
2	Sweet orange	<i>Citris aurantium</i>
3	Bergamot	<i>Citris bergamia</i>
4	Clary sage	<i>Salvia sclarea</i>
5	Grapefruit	<i>Citris paradisi</i>
6	Lemon	<i>Citrus limonum</i>
7	Lime	<i>Citrus aurantifolia</i>
8	Basil	<i>Ocimum basilicum</i>
9	Lavender	<i>Lavendula officinalis</i>



**Fig. 1: Interrelationship between nervous, endocrine, and immune system**

*offinalis*), and blue or German chamomile (*Matricaria chamomile*) [25]. In addition to acting directly on immune system function, aromatherapy has the potential to strengthen and normalize the immune system and improve health and individual wellness through the mind/body connection by reducing stress and promoting relaxation.

Essential oils are truly made from nature and they possess great beauty and healing potential [26]. Aromatherapy based on such oils is in sharp contrast to the conventional medicine paradigm. Aromatherapy presents a rare and valid alternative to mainstream medical consumerism [27]. Good health is a personal choice. Balancing aspects of exercise, proper nutrition, stress management, and lifestyle is a commitment each person must make. Aromatherapy has the potential of contributing to the overall benefit of the choice of mind/body balance and wellness [28].

## ESSENTIAL OILS TO REDUCE STRESS AND SUPPORT THE IMMUNE SYSTEM

### Essential oils for relaxation

- Lavender (*Lavandula angustifolia*)
- Roman Chamomile (*Chamaemelum nobile*)
- Clary Sage (*Salvia sclerea*)
- Bergamot (*Citrus aurantium* ssp. *bergamia*)
- Marjoram (*Origanum marjorana*)
- Rose Otto (*Rosa damascena*)
- Neroli (*C. aurantium* var. *amara*)

### Essential oils to ease fear/anxiety

- Frankincense, Somalia (*Boswellia carterii*)
- Melissa (*Melissa officinalis*)
- Patchouli (*Pogostemon cablin*)
- Rose (*R. damascena*)
- Lavender (*L. angustifolia*)
- Cedarwood (*Cedrus atlantica*)
- Neroli (*C. aurantium* var. *amara*)
- Spikenard (*Nardostachys jatamansi*)
- Vetiver (*Vetiveria zizanioides*)
- Valerian (*Valeriana officinalis*)

### Essential oils to help lift the spirits

- Ylang Ylang (*Cananga odorata* var. *genuine*)
- Bergamot (*C. aurantium* ssp. *bergamia*)
- Geranium (*Pelargonium graveolens*)
- Melissa (*M. officinalis*)
- Sweet orange (*Citrus sinensis*)

### Nervines/nervous system tonics

- Frankincense (*B. carterii*)
- Roman chamomile (*Anthemis nobilis*)
- Clary sage (*Salvia sclarea*)
- Lavender (*L. angustifolia*)
- Palmarosa (*Cymbopogon martini*)
- Patchouli (*P. cablin*)
- Ylang Ylang (*C. odorata*)

### Essential oils that stimulates immune response

- Tea tree (*Melaleuca alternifolia*)
- Cajeput (*Melaleuca cajuputi*)
- Niaouli (*Melaleuca viridiflora*)
- Bergamot (*C. aurantium* ssp. *bergamia*)
- Vetiver (*V. zizanioides*)
- Lemon (*Citrus limonum*) [29]

## CONCLUSION

PNI is a large word that suggests an even larger impact on our future medical choices of wellness and healing. It presents solid information about the communication link that exists between the mind-brain and body. Certainly evidence has been established that supports the idea

of some illnesses being contractible or aggravated by psychosocial pressure which induces stress in the organism. It is too simplistic to believe that all diseases have their basis in emotions, but a growing number of experts believe that some diseases are emotional, as opposed to organic in origin. A sense of loss of control over one's situation can lead to a loss of normal homeostasis. When this happens, our immune system is weakened making it easier to contract the disease. While it is certain that the biological, allopathic approach has made amazing advances, its limitations lay in not capitalizing on the patient's emotional well-being from a humanistic approach. A complimentary approach would appear to be best for the patients well-being. This would require a huge paradigm shift for the present way in which the medical community completes its business.

The challenge that lies ahead is to further substantiate that the immune system can indeed be enhanced through thoughts, belief, emotions, and behavior. In the future, aromatherapy and other alternative methods which rely on natural substances to unite the psychological and physical healing will become increasingly more important. Exciting new research in the field of PNI reveals a close relationship between emotional and nervous processes and the human immune system. This proves scientifically the fact that many have known for a long time: The psychological constitution of the individual is of the utmost importance in the healing process.

## REFERENCES

1. Available from: [http://www.nfnlp.com/psychoneuroimmunology\\_quinlan.htm](http://www.nfnlp.com/psychoneuroimmunology_quinlan.htm). [Last accessed on 2013 Jun 21].
2. Daruna JH. Introduction to Psychoneuroimmunology. Boston: Elsevier Academic Press; 2004.
3. Song C, Leonard BE. Fundamentals of Psychoneuroimmunology. New York: John Wiley Sons Ltd; 2000.
4. An Overview of Alternative and Complementary Medicine for Healthcare Professionals. Available from: <http://www.RN.com> [Last accessed on 2013 Jun 04].
5. Evans DL, Charney DS, Lewis L, Golden RN, Gorman JM, Krishnan KR, et al. Mood disorders in the medically ill: Scientific review and recommendations. Biol Psychiatry 2005;58(3):175-89.
6. Madeline M. Lorentz RN. Stress and psychoneuroimmunology revisited: Using mind-body interventions to reduce stress. Altern J Nur 2006;4(11):1-11.
7. Kiecolt-Glaser JK. Stress, food, and inflammation: Psychoneuroimmunology and nutrition at the cutting edge. Psychosom Med 2010;72(4):365-9.
8. Darton K. How to Manage Stress. London: Mind; 2012.
9. Wahab S, Hussain A. Cytokines as targets for immunomodulation. Int J Pharm Pharm Sci 2013;5 Suppl 3:60-64.
10. Pawar VS, Shivakumar H. A current status of adaptogens: Natural remedy to stress. Asian Pac J Trop Dis 2012;2 Suppl 1:S480-90.
11. Fleshner M, Laudenslager ML. Psychoneuroimmunology: Then and now. Behav Cogn Neurosci Rev 2004;3(2):114-30.
12. Kiecolt-Glaser JK, McGuire L, Robles TF, Glaser R. Psychoneuroimmunology and psychosomatic medicine: Back to the future. Psychosom Med 2002;64(1):15-28.
13. Holmes P. The Energetics of Western Herbs. Vol. 1. Berkeley: Nat Trop Publishing; 1993.
14. Murphy E. Psychoneuroimmunology the Study of Mind and Body Suite101. Available from: <http://suite101.com/article/psychoneuroimmunology-the-study-of-mind-and-body-a128118#ixzz2LSuL7f9F>. [Last accessed on 2013 Feb 04].
15. Nijkamp PF, Parnham MJ. Principles of Immunopharmacology. Switzerland: Springer International Edition; 2007. p. 150.
16. Mukherjee KP. Quality Control Herbal Drugs, Business Horizons. New Delhi: Pharmaceutical Publishers; 2007. p. 22.
17. Micozzi MS. Fundamentals of Complementary and Integrative Medicine. 3<sup>rd</sup> ed. Philadelphia, PA: Saunders, Elsevier; 2006.
18. Bhattacharjee SK. Handbook of Aromatic Plants. Jaipur: Pointer Publishers; 2005. p.15.
19. Ernst E. The Desktop Guide to Complementary and Alternative Medicine: An Evidence-Based Approach. London: Mosby; 2001.
20. Cohen N, Kehrl H, Berglund B, O'Leary A, Ross G, Seltzer J, et al. Psychoneuroimmunology. Environ Health Perspect 1997;105 Suppl 2:527-9.

21. Available from: <http://www.aromatherapy-school.com/aromatherapy-schools/aromatherapy-articles/aromatherapy-pni-psychoneuroimmunology.html>. [Last accessed on 2013 Jun 04].
22. Martinec R. Some implications of using aromatherapy as complementary method in oncology setting. Arch Oncol 2012;19(3-4):70-4.
23. Gupta V, Bansal P, Niazi J, Kaur G. Anti-anxiety activity of citrus paradisi var. Star ruby extracts. Int J Pharm Tech Res 2010;2:1655-7.
24. Bilal A, Jahan N, Ahmed A, Bilal SN, Habib S, Hajra S. Phytochemical and pharmacological studies on *Ocimum basilicum* linn - A review. Int J Curr Res Rev 2012;4(23):73-83.
25. Spinella M. Herbal medicines and epilepsy: The potential for benefit and adverse effects. Epilepsy Behav 2001;2(6):524-32.
26. Power J. Psychoneuroimmunology and Aromatherapy: A Neuropsychologist's Perspective, 2002.
27. Sarris J, Panossian A, Schweitzer I, Stough C, Scholey A. Herbal medicine in depression, anxiety and insomnia: A review of psychopharmacology and clinical evidence. Eur Neuropsychopharmacol 2011;21(12):841-60.
28. Available from: <http://www.google.co.in/imgres?imgurl=http://www.continentalsourcing.com/assets/images/productimage/yi%2520wu/additional%2520images/jayc0704.jpg&imgrefurl=http://www.continentalsourcing.com/home-decor/accent-items/pid3537/aromaphy>. [Last accessed on 2013 Jun 21].
29. Perry N, Perry E. Aromatherapy in the management of psychiatric disorders clinical and neuropharmacological perspectives. CNS Drugs 2006;20(4):257-80.