Tulsi — A potential protector against air travel health problems

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Abstract
In recent past aircraft cabin related many health problems have been recognized by the medical world hence it became a focus for the scientific research. Although, there are only few efficacious therapeutic solutions for many of these disturbances like cosmic radiation-induced carcinogenesis, anoxia-, noise stress- or jet lag-related symptoms. Herbal research may offer new prototypes for unsolved problems of pharmacotherapy. Tulsi, *Ocimum sanctum* Linn., one of the best adaptogen herbs, exhibiting various biological effects, viz. radioprotective, immunomodulator, anti-fatigue activity, etc. might help in the prevention and improvement of air travel health problems.

Keywords: Tulsi, *Ocimum sanctum*, Air travel health problems.

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Introduction
Air travel has increased in recent years due to the fact that rapid movement across long distances is the need of the time for the whole world. In many cases routine flights across many time zones at very high altitudes and high speeds last from several hours. Although, advancements always comes with its related new problems associated with human health. Earlier motion sickness associated with travel by car (especially in mountains) and ship was the main travel problem but now-a-days air travel sickness became a common problem. Some allopathic medicines (cyclazines, melatonin, zolpidem) taken before or after the journey helped the travelers to adjust better, but still the scientists are searching for new therapeutic solutions against aircraft related health problems. Many organizations, like Airline Medical Directors Association (AMDA) are also working on this topic and trying to solve these problems by natural ways including herbal medicines.

Tulsi (Ocimum sanctum Linn., Family- Lamiaceae), the most venerated herb in India, is worshipped in rituals for millennia for its health benefits. Its medicinal greatness is described in several ancient scriptures like Rig Veda, Padma Purana and Tulsi Kavacham written between 5000BC and 1200AD. The medicinal potential of tulsi was studied since last four decades by scientists including us. It has been found to have multiple beneficial effects in a variety of stressful situations and stress-related diseases (e.g. hypertension, asthma) besides its other pharmacological activities. Tulsi exhibited more potent adaptogenic/anti-stress activity when compared with Siberian ginseng (*Eleutherococcus senticosus* Maxim.), Korean/Chinese ginseng (*Panax ginseng* C. A. Mey.) and other 50 Indian medicinal plants¹. Considering the above facts it was thought worth while to explore the possibility of beneficial effects of tulsi in air travel problems and to review its pharmacological actions in relation with this type of disorders.

Common air travel disorders

According to a report entitled “Air Travel and Health” published by the House of Lords Select Committee on Science and Technology (Department of Health, Skipton House, Elephant & Castle, London SE1...
and many other studies following problems are found to be related with air travel:

Deep vein thrombosis/pulmonary embolism/arterial thrombosis (cardiovascular system-related disorders)- Multiple air trips may increase the risk of deep vein thrombosis due to the dehydration, seated posture, lack of exercise, hypoxia and decompression.

Cabin air quality
(i) Hypoxia- Low partial pressure of the oxygen in the atmosphere causes low levels of arterial oxygen saturation under normal flight conditions.

(ii) Temperature- Thermal comfort for all the passengers and the crew is difficult to achieve. Many complaints included temperature being too high and temperature variation being too great.

(iii) Humidity- The levels of relative humidity that occur on aircraft are in generally much lower (5-15%) than recommended by most standard and guide lines (20-40%).

(iv) Air pollutants- There are many sources of organic chemicals in aircraft cabins, including cleaning materials, fuels, lubricants, aircraft fabric and furnishings, organophosphate pesticides, CO₂, etc. which may cause nausea, dizziness and neurotoxicity.

Transmission of infection- Inside the aircraft cabin, due to person-to-person close proximity, there is a high risk of transmission of tuberculosis and influenza. Many other infectious diseases transmittable by insect vectors (malaria and dengue), contaminated water or food (cholera and food poisoning), or toilets (shigella, dysentery) can be spread from endemic areas to passengers and to other regions where the disease incidence is low.

Cosmic radiation- Cosmic radiation is ionizing radiation and has carcinogenic and teratogenic effects. There is an increased risk of chromosomal aberration and cancer among civil aviation pilots and crew members.

Noise stress- Noise stress could lead to rise in heart rate, blood pressure and even ultrastructural modifications in cardiomyocytes.

Jet lag- Jet lag or Rapid Time Zone Change Syndrome induced by the swift of transmeridian transitions is characterized by symptoms of desynchronisation with circadian rhythms (sleep disruptions with daytime sleepiness, short-term fatigue, gastro-intestinal discomfort) and hormonal disturbances. Diseases with intrinsic circadian variation like chronic asthma, insulin-dependent diabetes, epilepsy on medication, hypertension treated with beta-blockers or angiotensin converting enzyme inhibitors, coronary artery disease, and irritable bowel syndrome may be exacerbated by the swift of transmeridian transitions.

Psychological stress- Anxiety may accompany any air travel and different types of psychological disturbances (e.g. symptoms of depression) are reported to be more common in shift workers (e.g. aircraft crew) than in general population.

Varia- A higher incidence of gastrointestinal tract discomfort (nausea, constipation, dyspepsia, heartburn, flatulence) and fatigue is found in air traffic shift workers.

Medicinal potential of tulsi
The therapeutic significance of tulsi in the management of various air travel related ailments is supported by the following facts:

Cardiovascular related system- Tulsi has mild anti-coagulant activity comparable with that of aspirin and, thus can prevent thrombosis. Moreover, it posses potent anti-ulcerogenic and ulcer-healing properties in different experimental models, including aspirin-induced ulcers, and thus it may represent a therapeutic alternative for aspirin, or it may be associated with aspirin for improving its anti-coagulant activity and for preventing its adverse effects. It also controls blood pressure changes and it is cardioprotective.

Cabin air quality- Tulsi has marked anti-hypoxic effect and increases endurance and survival time during anoxic stress. It protects from ill effects of cold/heat induced thermal stress. Low humidity can cause airways discomfort, superficial drying of the body surface with decreased urine volume, increased urine concentration, osmolality, disturbed water distribution in the body. These symptoms might respond to diuretic agents together
with increased water intake. Tulsi being mild diuretic will improve all these troubles. It is strong anti-pollutant (e.g. reduce mercury poisoning) and increases the activities of hepatic cyt P450, cyt b5, aryl hydrocarbon hydroxylase, and glutathione S-transferase, all of which are involved in the detoxification of xenobiotics.

Transmission of infection—Its immunomodulator, antiviral, antibacterial and antifungal activities will provide protection against cross infection.

Cosmic radiation—Tulsi is a strong radioprotector, its free radical scavenging capacity being one of the main mechanism of radioprotection.

Psychological stress—Tulsi has calming effect. It also prevents the stress-induced changes in corticosteroids level, ascorbic acid and adrenal weight. It may help the organism to adjust better to the travel psychological stress and prevents the aggravation of the stress-related diseases.

Noise stress—Detrimental effects of acute or chronic noise (e.g. brain neurotransmitter changes) are attenuated or prevented by tulsi.

Jet lag—The human circadian clock, located in the hypothalamus, modulates all the physiological rhythms in the organism. Tulsi has a normalizing action on hypothalamus and controls the alterations in some neurotransmitter levels (e.g. acetylcholine, norepinephrine, epinephrine, dopamine, serotonin) in different experimental models. This adaptogen action of tulsi might be useful in resetting the biological clock.

Gastrointestinal tract discomfort—Tulsi has anti-emetic, carminative and digestive effects.

Fatigue—Tulsi has antifatigue activity and improves stamina.

Conclusion

Tulsi consumption before, during and/or even after air travel as tea (3 cups daily, 1-2 g dried leaves per cup) or capsules (1-2 capsules twice daily, each capsule contains 400mg of dried leaves) may help to prevent or improve the ill effects of air travel on human body system, due to its multiple pharmacological effects.

References


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