Journal of Evidence-Based Complementary & Alternative Medicine
2017, Vol. 22(1) 166-174

DOI: 10.1177/2156587216641831
journals.sagepub.com/home/cam
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Prevention and Treatment of Influenza, Influenza-Like Illness, and Common Cold by Herbal, Complementary, and Natural Therapies

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Abstract

In recent years viral respiratory tract infections, especially influenza viruses, have had a major impact on communities worldwide as a result of unavailability of effective treatment or vaccine. The frequent alterations in the antigenic structures of respiratory viruses, particularly for RNA viruses, pose difficulties in production of effective vaccines. The unavailability of optimal medication and shortage of effective vaccines suggests the requirement for alternative natural therapies. Several herbal remedies were used for prevention and treatment viral respiratory illnesses. Among those that were found effective included maoto, licorice roots, antiwei, North American ginseng, berries, Echinacea, plants extracted carnosic acid, pomegranate, guava tea, and Bai Shao. There is scientific evidence regarding the effectiveness of several complementary therapies for colds. Oral zinc may reduce the length and severity of a cold. Taking vitamin C supplements on a regular basis only slightly reduces the length and severity of colds. Probiotics were found better than placebo in reducing the number episodes of acute upper respiratory tract infections, the rate of episodes of acute upper respiratory tract infection and reducing antibiotic use. Alkaline diets or drinks might have antiviral properties as in vitro studies demonstrated inactivation effect of alkaline medium on respiratory virus. Earthing might have a natural anti-inflammatory effect for human body. It is now accepted that an overwhelming inflammatory response is the cause of human deaths from avian H5N1 influenza infection. Earthing accelerates immune response following vaccination, as demonstrated by increases of gamma globulin concentration. No in vivo or clinical studies were found that investigate the role of alkalization or earthing on respiratory viral infections. Thus, future studies are recommended to reveal any potential curative effects.

Keywords

respiratory virus, influenza treatment, influenza prevention, alternative therapy, dietary supplements, alkaline diets, earthing

Received November 28, 2015. Received revised February 11, 2016. Accepted for publication March 5, 2016.

Complementary and alternative therapies for colds and flu were commonly used by ancient people. They were used to cure or prevent respiratory viral infections and many nations obtained traditional experience in such remedies. The World Health Organization estimates a total of 25 to 50 million cases each year resulting in 150 000 hospitalizations and 30 000 to 40 000 deaths in the United States alone, due to epidemic influenza. During pandemics, the mortality and morbidity may be much higher, imposing tremendous pressure on health system.[1,2] Respiratory viruses are a major cause of influenza-like illness symptoms in children and adults, leading to substantial morbidity and mortality each year.[3] Currently employed influenza vaccines are only effective when the vaccine strains match the epidemic strains antigenically. Therefore, seasonal influenza vaccines have to be updated almost annually. In addition, seasonal influenza vaccines fail to afford protection against antigenically distinct pandemic influenza viruses.[4] Zanamivir or oseltamivir can reduce the duration of uncomplicated influenza A and B illness by approximately 1 day when administered within 48 hours of illness onset compared with placebo.[5,6] A randomized controlled trial showed that when oseltamivir was started within 24 hours of illness onset, the median time to illness resolution was shortened by 3.5 days compared with placebo.[7] Minimal or no benefit was reported in healthy children and adults when antiviral therapy was initiated >2 days after onset of uncomplicated influenza.[8-10] The frequent alterations in the viral antigenic structure pose difficulties in the development of vaccine especially for RNA viruses. Successfully manufactured vaccine could be less effective or

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ineffective when antigenic changes have developed in the target virus. Furthermore, during emergence of a newly virulent viral strain, production of a new specific vaccine requires time and might be unsuccessful. During the gap between new virulent viral strain appearance and vaccine production, a lot of people might lose their lives. Since there is no fully effective medication or vaccine for respiratory viral infections, seeking for alternative therapies is a reasonable option. The aim of this review is to investigate the alternative therapies for influenza, influenza-like illness, and common cold with special emphasis on studies with scientific background.

Methods

The National Library of Medicine (PubMed) database was searched from its earliest records through August 2015, using the keywords "influenza, colds, influenza herbal therapy, common cold herbal therapy, influenza-like illnesses, complementary treatment for influenza, dietary supplements for URTI [upper respiratory tract infection], alkaline diet, alkaline water, earthing, grounding." The type of search was limited to English language studies. Additional related references were obtained by web search engines. The review was conducted according to the guidelines for Meta-Analyses and Systematic Reviews of Observational Studies (MOOSE)[11] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).[12] The articles with positive and negative outcomes were included in the review to prevent any bias in the selection. The data were obtained from epidemiological, human experimental, animal experimental, in vitro, a systematic review, observational, randomized trial, randomized controlled trial, randomized double-blinded trial, and placebo controlled trial studies.

Herbs

Traditional herbal medications were used by ancient nations for prevention or treatment of colds and flu. A variety of herbs have been widely used as medications for clearing viral respiratory infections. The control and treatment of influenza depends mainly on chemical or biochemical agents that are isolated from plants. These agents include a variety of polyphenols, flavonoids, saponins, glucosides, and alkaloids.[13] The herbal medicine, maoto, has been traditionally prescribed to patients with influenza in Japan. Maoto is one of Kampo (traditional Japanese herbal) medicines, composed of 4 medicinal herbs, Ephedrae Herba (stem of *Ephedra sinica* Staph), Cinnamomi Cortex (bark of *Cinnamomum cassia* Blume), Armeniacae Semen (kernel of *Prunus armeniaca* Linné), and Glycyrrhizae Radix (root of *Glycyrrhiza uralensis* Fisher).[14] The administration of oral maoto granules to adults with seasonal influenza was well tolerated and associated with equivalent clinical and virological efficacy to neuraminidase inhibitors.[15] Nagai et al[16] reported that maoto exerts antipyretic activity in influenza virus–infected mice and reduces virus through augmentation of the virus-bound natural antibodies. Glycyrrhizin is an active component of licorice roots. It was investigated in mice infected with influenza virus A2 (H2N2). The study revealed that glycyrrhizin might protect mice which were exposed to a lethal amount of influenza virus through the stimulation of interferon-gamma production by T cells.[17] Glycyrrhizin is also known to exert immunomodulatory and anti-inflammatory effects and is therefore a candidate drug for the control of H5N1-induced pro-inflammatory gene expression.[18] Wolkerstorfer et al[19] investigated the mechanism of glycyrrhizin protection from infection with influenza A virus. They found that treatment with glycyrrhizin lead to a clear reduction in the number of influenza A virus-infected human lung cells as well as a reduction in the CCID50 titer by 90%. The investigators concluded that the antiviral activity of glycyrrhizin was mediated by an interaction with the cell membrane, which most likely resulted in reduced endocytotic activity and hence reduced virus uptake. These insights might be a potential for invention of structurally related compounds leading to effective anti-influenza therapeutics.[19] Although much controversy remains concerning the efficacy of the Korean red ginseng in reducing influenza-like illness incidence, Korean red ginseng has become a popular influenza-like illness medication in Korea. The ginseng extracts has been evaluated in 4 recent randomized controlled trials to prevent common cold, flu, or upper respiratory tract infections. Two studies did not reveal differences between the ginseng extract and placebo in terms of decreasing duration, severity, or frequency of overall symptoms.[20,21] However, Predy et al[22] showed that the ginseng extracts decreased duration, severity, and frequency of symptoms. Ki-Chan et al[23] demonstrated that the Korean red ginseng extract can efficiently reduce the influenza-like illness incidence. Antiwei, a traditional Chinese prescription in the treatment of influenza, was found effective and well tolerated in treatment of natural influenza infection in adults.[24] A systematic review of 13 randomized controlled trials was carried out to evaluate the efficacy and safety of new drugs of traditional Chinese medicine for acute upper respiratory tract infection (common cold). The study revealed that traditional recently developed Chinese medicine for prevention and treatment of common cold have better therapeutic effects than the old ones. They can accelerate the onset time of lowering body temperature and improve the symptoms of common cold without any significant adverse reactions.[25] Another herbal product is called COLD-fX (CVT-E002), a proprietary extract of the roots of North American ginseng (*Panax quinquefolius*). COLD-fX intake by immunocompetent elderly patients during an early cold and flu season reduced the relative risk and duration of respiratory symptoms by 48% and 55%, respectively.[26] Elderberry intake also reduced the symptoms of influenza virus.[27] Extracts of berries inhibit influenza virus infection in vitro,[28-30] and polyphenol is one of the key factors in the antiviral effects of berries.[31] Nantz et al[32] evaluated the ability of cranberry polyphenols to modify immunity of participants who consumed cranberry beverage. The study revealed that consumption of the beverage modified the ex vivo proliferation of γδ-T cells where these cells are located in the epithelium and serve as a first line of defense, improving their function which may be related to reducing the number of symptoms associated with cold and flu.[32] Echinacea preparations are extensively used for

the prevention and the management of the common cold. The preliminary results were encouraging, and suggest that Polinacea (roots of *Echinacea angustifolia*) could be used for improving the immune response to influenza vaccine.[33] Echinacea also has antiviral activity against influenza viruses in vitro and has traditionally been used for treatment of colds and flu. Echinacea hot drink was investigated on 473 patients in the Czech Republic. It was found as effective as oseltamivir in the early treatment of clinically diagnosed and virologically confirmed influenza virus infections with a reduced risk of complications and adverse events.[34]

Carnosic acid extracted from various plants was found effective for inhibition of both type A and B human respiratory syncytial virus (hRSV) whereas no effect was noticed on replication of influenza A virus, suggesting that its antiviral activity is human respiratory syncytial virus specific.[35] In vitro test of the antiviral activities of *Thuja orientalis*, *Aster spathulifolius*, and *Pinus thunbergii*, were examined. The 3 plant extracts were shown to induce a high cell viability rate after the infection with the influenza A/PR/8/34 virus. *Thuja orientalis* was found to have a stronger inhibitory effect than that with *Aster spathulifolius* or *Pinus thunbergii*. These results suggested that *T orientalis* might be used for influenza treatment.[36] An aqueous-ethanolic extract of a mixture of *Thujae occidentalis herba*, *Baptisiae tinctoriae radix*, *Echinaceae purpureae radix*, and *Echinaceae pallidae radix* were given orally for mice with influenza A virus infection. The extract was administered to mice via the drinking water for 14 days starting 6 days before intranasal infection with influenza A virus. The extract therapy induced a statistically significant increase in the survival rate, prolonged the mean survival time, and reduced lung consolidation and virus titer. The study confirmed that plants extract administration 6 days before exposure was a potent inhibitor of influenza A virus in vivo.[37] *Clinacanthus siamensis* leaf extract showed activity in vitro and in vivo tests on influenza virus. After oral administration to mouse, the extract produced a higher anti-influenza virus IgG and IgA antibodies compared with oseltamivir. These results suggested that *Clinacanthus siamensis* extract has a protective effect against influenza virus infection.[38] *Punica granatum* (pomegranate) had shown anti-influenza properties. Pomegranate polyphenol extract was also tested. It revealed replication suppression of influenza A virus in Madin-Darby canine kidney cells. Pomegranate polyphenol extract also prevented agglutination of chicken red blood cells by influenza virus, inhibited viral RNA replication, and was virucidal. In addition, the combination of pomegranate polyphenol extract and oseltamivir synergistically had increased the anti-influenza effect of oseltamivir.[39] Electron microscopic analysis indicated that viral inactivation by pomegranates polyphenols was primarily a consequence of virion structural damage.[40] *Psidium guajava* Linn. (guava tea), which is prepared by the infusion method, had markedly inhibited the growth of clinical influenza A (H1N1) isolates. Guava tea inhibited viral hemagglutination and sialidase activity. It appears to be effective for control of epidemic and pandemic influenza viruses, including oseltamivir-resistant strains.[41] A plant known as *Epimedium koreanum* Nakai was extensively used in traditional Korean and Chinese medicine to treat a variety of diseases. An aqueous extract from the plant was evaluated in vitro and in vivo in a recent study. It was effective against different influenza A subtypes by significant reduction in viral replication. The mechanism of antiviral activity was revealed where an aqueous extract from *Epimedium koreanum* Nakai induced the secretion of type I interferon and pro-inflammatory cytokines and the subsequent stimulation of the antiviral activity in cells. The oral administration of the extract showed preventive effects on mice against lethal doses of highly pathogenic influenza A subtypes (H1N1, H5N2, H7N3, and H9N2). It has been concluded that the extract of *Epimedium koreanum* Nakai and its constituents plays roles as immunomodulators in the immune response, and may be prospect candidates for prophylactic or therapeutic treatments against several viruses.[42] A Chinese herbal know as *Scutellaria baicalensis* Georgi (baicalin), was used for the treatment of the common cold, fever, and influenza virus infections. In cell culture and in mice baicalin revealed obvious antiviral activity that increased in a dose-dependent manner, indicating that baicalin affected virus budding. The investigators concluded that baicalin acts as a neuraminidase inhibitor, with distinct inhibitory activities that were effective against different strains of influenza A virus in both in vitro and in vivo, and that baicalin had potential interest in the treatment of influenza virus infections.[43] The root of *Paeonia lactiflora* Pall. (Bai Shao) a common Chinese herb was employed in many recipes to treat viral infections and liver diseases. The synthesis of both viral RNA and viral protein was tremendously inhibited when the cells were treated with Bai Shao extract. The study demonstrated that the extract inhibits viral hemagglutination and viral binding to and penetration into host cells. The authors concluded that *Paeonia lactiflora* possessed antiviral activity and had the prospect for development of an anti-influenza agent.[44] The aforementioned herbal therapies for respiratory viruses are presented in Table 1.

Dietary Supplements

There is scientific evidence about the supportive effects of several complementary medicines for colds. Oral administration of zinc may reduce the length and severity of common cold. For majority of people taking vitamin C supplements on a regular basis only slightly reduces the length and severity of colds and does not reduce the number of colds that they catch.[45] However, Nahas and Balla[46] had recommended vitamin C supplement for prevention of the common cold, which they concluded from their systematic review study. A study carried out by Hao et al[47] included 14 randomized controlled trials comparing probiotics with placebo to prevent acute upper respiratory tract infections. It revealed that probiotics enhance immune system against influenza virus. Probiotics were found better than placebo in reducing the number of participants experiencing episodes of acute upper respiratory tract infections, the rate of episodes of acute upper respiratory tract infection and reducing antibiotic use.[47] Bifidobacterium, one of the

Table 1. Herbal Therapies for Respiratory Viruses.

Herb	Active Ingredients	Mechanism of Action	Responsive Virus or Illness
Maoto[15,16,a]	—	Help virus-bound natural antibodies	Seasonal influenza
Licorice roots[17-19]	Glycyrrhizin	Stimulation of interferon-gamma production by T cells, immunomodulation, anti-inflammation, reduction of virus uptake by host cells	Influenza virus A2 (H2N2), H5N1 virus, influenza A
Berries' extracts[27-32]	Polyphenols	Immunity modification, improvement of T cells function	Influenza virus, common cold
Echinacea[33,34]	—	—	Influenza virus, common cold
Clinacanthus siamensis[38]	—	Enhancement of anti-influenza virus IgG and IgA antibodies production	Influenza virus
Punica granatum[39,40] (pomegranate)	Polyphenols	Viral replication suppression, virucidal	Influenza A virus
Psidium guajava Linn. (guava tea)[41]	—	Inhibition of viral hemagglutination	Influenza A (H1N1)
Epimedium koreanum Nakai[42]	—	Reduction in viral replication, enhancement secretion of type I interferon and pro-inflammatory cytokines, immunomodulation	Influenza A subtypes (H1N1, H5N2, H7N3, H9N2)
Scutellaria baicalensis Georgi (Baicalin)[43]	—	Neuraminidase inhibitor, virus budding prevention	Influenza A virus, common cold
Paeonia lactiflora Pall. (Bai Shao)[44]	—	Inhibition of viral RNA and viral protein synthesis, viral hemagglutination, viral binding to and penetration into host cells	Influenza viruses

[a]Maoto includes 4 herbs: Ephedrae Herba, Cinnamomi Cortex, Armeniacae Semen, and Glycyrrhizae Radix.

major components of intestinal microflora, showed anti-influenza virus potential as a probiotic, partly through enhancement of innate immunity by modulation of the intestinal immune system. In experimentally infected mice with influenza, oral administration of *Bifidobacterium longum* improved clinical symptoms, reduced mortality, suppressed inflammation in the lower respiratory tract, and decreased virus titers, cell death, and pro-inflammatory cytokines. The anti-influenza virus mechanism of Bifidobacterium involves innate immunity through significant increases in natural killer cell activities in the lungs and spleen and a significant increase in pulmonary gene expression of natural killer cell activators such as interferon-γ, interleukin-2, interleukin-12, and interleukin-18. Therefore, *Bifidobacterium longum* as a probiotic may be used as a prophylactic agent in the management of influenza epidemic.[48] In a mouse model infected intranasally with influenza virus (H1N1), a live and nonlive *Lactobacillus acidophilus* strain L-92 also showed protective effects against influenza virus infection by enhancement of natural killer cell activity.[49] Continual intake of a probiotic drink containing *Lactobacillus brevis* by schoolchildren also demonstrated a reduction in the incidence of influenza. The favorable effect was more remarkable in children who were not given influenza vaccine.[50] In children aged 3 to 5 years with cold and influenza-like symptoms, daily dietary probiotic supplementation for 6 months was found to be an effective way to reduce fever, rhinorrhea, cough incidence, duration, and frequency of antibiotic prescription.[51] Oral administration of lactobacilli might protect against influenza virus infection by stimulating local and systemic immune responses that enhancing gut and respiratory immune responses.[52] Oral intake of lactobacilli or a probiotic fermented dairy drink, consumed several weeks before or after influenza vaccination, was found to boost the levels of influenza-specific IgA and IgG antibodies.[53-55] Many studies on mice revealed that oral administration of different strains of lactobacilli provided protection against influenza virus infection by the down-regulation of viral replication through the induction of antiviral genes expression, or modulating host innate immunity.[56-61] On the other hand, Van Puyenbroeck et al[62] demonstrated that daily consumption of a fermented milk drink that contains lactobacilli had no statistically or clinically significant effect on the protection against respiratory symptoms. Wang et al[63] found that feeding with high doses of zinc oxide and *Enterococcus faecium* (as a probiotic) could beneficially influence humoral immune responses after vaccination and recovery from Swine influenza viruses infection, but not affect virus shedding and lung pathology. Dietary supplementation containing selenium supply has been proposed to confer health benefits by improving the immune response to viral infections, especially with respect to influenza A virus, and response to influenza vaccine.[64-66] A study in Japan investigated the favorable effects Mekabu fucoidan, a sulfated polysaccharide extracted from seaweed, concerning the immune response to influenza vaccine. The study revealed that Mekabu fucoidan intake increased antibody production after vaccination, perhaps preventing influenza epidemics.[67] There was controversy in regard to vitamin D supplementation for prevention of respiratory viruses. Some studies found beneficial effects of vitamin D intake for influenza prevention,[68-70] whereas others concluded no favorable effects of such supplement.[71-74] A study included 116 participants that compared a yeast-based product with placebo to determine effects on the incidence and duration of cold and flu-like symptoms in healthy subjects recently vaccinated for seasonal influenza. The study demonstrated that the yeast-based product daily supplementation for 12 weeks produced remarkable fewer respiratory symptoms and significantly

Table 2. Dietary Supplements for Respiratory Viruses.

Supplement	Action	Supportive Effects on Viral Infection
Vitamin C[45,46]	Slight reduction in the length and severity of colds	Common cold treatment and prevention
Probiotics[47,51]	Enhancement of immune system	Prevention and treatment of acute upper respiratory tract infections
Bifidobacterium[48,a]	Enhancement of innate immunity by increasing natural killer cell activities. Inflammation suppression. Reduction in virus titers, cell death, and pro-inflammatory cytokines	Prevention and treatment of influenza
*_Lactobacillus acidophilus_[49]	Enhancement of NK cell activity	Influenza virus (H1N1)
Lactobacillus brevis[50,a]	—	Influenza prevention
Lactobacilli[52-61,a]	Enhancement of gut and respiratory immune responses, increasing of influenza-specific IgA and IgG antibodies, modulating host innate immunity	Influenza prevention
*_Enterococcus faecium_ & Zinc Oxide[63]	Enhancement of humoral immune responses	Swine influenza treatment
Selenium[64-66]	Improvement of the immune response	Influenza A prevention
Mekabu fucoidan (seaweed polysaccharide)[67]	Increasing antibody production	Influenza prevention
Yeast-based product[75]	—	Influenza and common cold prevention
Garlic extract[76]	Enhancement of immune cell function	Influenza and common cold prevention
Lactoferrin[77]	Inhibition of viral attachment to the target cells, enhancement of natural killer cell activity and cytokine responses	Prevention and treatment of common cold and influenza

[a]All are probiotics.

shorter duration of illness when compared with subjects taking a placebo.[75] Supplementation with an encapsulated aged garlic extract for 90 days had shown reduction in severity of symptoms, the number of days of illness, and incidences of colds and flu. It had been suggested that supplementation of the diet with aged garlic extract might enhance immune cell function.[76] Lactoferrin is a protein found in cow milk and human milk. Colostrum, the first milk produced after childbirth, contains high levels of lactoferrin, about 7 times the amount found in milk produced later on. Dietary supplements of bovine lactoferrin are claimed in consumer literature to enhance and support the immune system response through their antioxidant, antibacterial, and antiviral properties. Lactoferrin has many protective biological functions against pathogenic microorganisms, including bacteria, fungi, and viruses. Many studies have shown the in vitro antiviral activity of lactoferrin against viral pathogens that cause common infections such as the common cold, and influenza, where lactoferrin inhibits mainly viral attachment to the target cells. Lactoferrin administration enhances natural killer cell activity and Th1 cytokine responses, which lead to protection against viral infections.[77] Table 2 lists some dietary supplements effective against respiratory viruses.

Alkaline Diets and Drinks

In 1918 and 1919, while fighting the "flu," it was brought to the attention of the US Public Health Service that rarely anyone who had been thoroughly alkalinized with bicarbonate of soda contracted the disease, and those who did contract it, if alkalinized early, would invariably have mild attacks.[78] The coronavirus was found to be quite stable at pH 6.0 and 37°C (half-life, approximately 24 hours) but was rapidly and irreversibly inactivated by brief treatment at pH 8.0 and 37°C (half-life, approximately 30 minutes).[79] Diet and drinking water play a role in blood pH adjustment. The normal range of arterial blood pH is 7.35 to 7.45. Alkaline forming diet or drinks could induce low-grade metabolic alkalosis which causes only very small increases in blood pH within the range considered to be normal. Within that range, this means that the system equilibrates nearer the higher end of normal rather than the lower end of normal. In a slightly alkaline environment viruses might be weakened or do not multiply efficiently. Immune function may work better in alkaline medium as well. Alkalization can be achieved through increasing alkaline dietary sources, alkaline water, or alkaline drinks (alkaline diet sources: predominantly fruits and vegetables) and reducing acidic dietary sources (acidic diet sources: meat, fish, eggs, dairy products, grains and grain products, soft drinks, etc.). Blood pH could also be affected naturally (non-dietary) that stress and anxiety produce acidic pH while meditation yields alkaline pH. Through literature search, no studies were found concerning the preventive or therapeutic effects of alkaline diets or drinks against respiratory viral infections.

Earthing or Grounding

Grounding is connection of human body to earth by different methods, such as bare feet walking on earth without insulator. Earthing might be another natural anti-inflammatory and

antioxidant source for human body. It is now accepted that an overwhelming inflammatory response is the cause of human deaths from avian H5N1 influenza infection.[80] Part of the inflammatory response involves immune cells, including neutrophils and various types of phagocytes that secrete powerful oxidizing agents (free radicals) in a process known as the respiratory burst. A complex mix of reactive molecules such as hydrogen peroxide, oxidized halogens, chloramines, and oxidizing radicals such as hydroxyl radicals, $OH^{-\dot{c}}$, accumulate at the site of inflammation where they aid in the destruction of invading microorganisms and tissue debris.[81] To restore their electrical neutrality, these agents tear electrons from the structures of invading organisms and damaged cells, rapidly destroying them. Recent research has emphasized the significance of charge transfer in relation to the scavenging or neutralization of free radicals at sites of injury during and after the oxidative burst. Evidence comes from studies of the role of electrons in mitigating the consequences of inflammation when living systems are connected to the earth.[82] Earthing accelerated immune response following vaccination, as demonstrated by increases of gamma globulin concentration.[83] Earthing has demonstrated anti-inflammatory effects and improvements in the immune response and both effects have been shown to be essential for influenza cure.[84] During literature search, no studies were found concerning the effect of earthing on respiratory viral infections.

Conclusions

Many herbal therapies have scientific evidence of activity against respiratory viruses. The herbal medicines, such as maoto, licorice roots, antiwei, North American ginseng, elderberry, Echinacea, pomegranate, guava tea, and Bai Shao, were found effective in the treatment of upper respiratory tract infections. The studies revealed several mechanisms of action by which herbal extracts fight respiratory viruses. Some dietary supplements also revealed efficacy in prevention and treatment of respiratory viral infections. Supplements including zinc, selenium, vitamin C, probiotics, seaweed extract, yeast-based product, and garlic extract, demonstrated supportive effects against respiratory viruses. There was evidence from in vitro studies and historical observation showing an effect of alkaline medium against respiratory viruses. However, no animal or human clinical trials were found. From experimental studies, earthing revealed anti-inflammatory effects and immunity enhancement. No previous studies were found regarding the effects of earthing in patients with influenza or upper respiratory tract infections. Future studies are recommended to investigate the possible role of alkaline diets or drinks, and earthing for prevention and treatment of respiratory viral infections especially in cases of intractable influenza.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

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