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# Herbal Medicine in the Management of Tinnitus

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## Abstract

Tinnitus, which is commonly defined as “ringing in the ears” by the patients, is a perception of an auditory sensation without any accompanying external stimulation. It accounts for a notable part of visits in otolaryngology clinics and has been estimated to involve about 5–15% of adult population making serious problems in 3–5% of patients. Tinnitus causes a lot of problems for patients, their family, and guardians and significantly decreases quality of life of patients. Many treatment methods have been proposed and presented for Tinnitus since the first year of diagnosis. These methods range from conservative management and chemical medications to surgical methods. As the other diseases and conditions, herbal medicine has been trying to treat Tinnitus and a variety of medications have been proposed. In this chapter, we aimed to have a comprehensive review on the current herbal medications of Tinnitus from all over the world.

**Keywords:** tinnitus, herbal medicine, treatment, epidemiology, *Ginkgo biloba*

## 1. Tinnitus: definition, etiology, and epidemiology

Tinnitus, which is commonly defined as “ringing in the ears” by the patients, is a perception of an auditory sensation without any accompanying external stimulation [1, 2]. It accounts for a notable part of visit in otolaryngology clinics and has been estimated to involve about 5–15% of adult population making serious problems in 3–5% of patients [1–5].

Tinnitus causes a lot of problems for patients, their family, and guardians and significantly decreases quality of life of patients. Most of the patients have complaints with sleep disorders, depression, decreased self-confidence, and altered social communications as well as difficulties in quotidian activities [2].

Tinnitus is generally categorized into two types: subjective and objective. A majority of patients suffer from a subjective tinnitus, which means perception of an auditory sensation without any evident stimulus. In some patients, a kind of organic measurable stimulus such as glomus tumor, by making turbulence of blood flow, is the cause for tinnitus, which is called objective tinnitus [1, 2]. This type of tinnitus can be found by examiner using an ear-canal microphone or stethoscope [6].

A variety of risk factors have been reported for subjective tinnitus so far; hearing loss, depression, head trauma, and medication-related ototoxicity [7–9]. Some other conditions may have a role in predisposing patients to tinnitus such as acoustic trauma and presbycusis, and it may be associated with temporomandibular joint (TMJ) or cervical spine dysfunctions (somatic tinnitus) as well as depression and anxiety [10–14].

## 2. Current treatments

Currently, United States Food and Drug Administration (FDA) or the European Medicine Agency has not approved any drug for the treatment of tinnitus [15]. The complex mechanism and innate diversity in etiology of tinnitus have made its treatment a dilemma for physicians and specially otolaryngologists. Despite considerable number of researches, none of the so far presented medications and treatments has resulted in a sustained reduction in perception of tinnitus [16]. No appropriately controlled clinical trials have been successful to prove efficacy of a single drug. Thus, pharmacological treatment of tinnitus seems to be ineffective [17, 18]. Antidepressants are more frequently prescribed for tinnitus and seem to be effective but with a notable number of side effects. Anticonvulsants, benzodiazepines, lidocaine, and antispasmodics are also among commonly prescribed medications [19]. Voice therapy, using hearing aids, adjuvant therapies as well as environmental sound enrichment are the most common nonmedical approaches to Tinnitus [20].

Regarding the abovementioned issues, there are varieties of complementary and alternative medicine (CAM) treatments, which have been experimented in clinical stage for tinnitus. Herbal medicine or acupuncture, as the most popular types of CAMs therapy among people, have been shown to be effective in management of tinnitus when prescribed solely or in combination [21, 22]. Most of the CAM studies have a small sample size and few methodological pitfalls make it difficult to decide firmly about these treatments.

Some of medicinal herbs and their derivatives have been evaluated in various phases of studies: in vitro, in vivo, and even in small to large scale clinical trials [23–30]. In fact, people in different regions of the world have different approaches to medicinal plants and use a variety of herbal medications for treating different diseases and conditions, which have not yet been scientifically assessed [31, 32]. In this chapter, we will discuss and review current traditional and herbal medicine treatments with approved or possible effects on management of Tinnitus.

## 3. *Ginkgo biloba* (Jinko)

*Ginkgo biloba* from the Ginkgoaceae family is a Chinese traditional medicine herb, which is being used for the treatment of asthma and bronchitis for a long time [22, 33]. It has gotten popular also in western countries as well as in Asian ones [34]. *Ginkgo biloba* is widely available as easily accessible, inexpensive, and relatively safe leaf extracts with various reported therapeutic benefits such as improved cognition and memory as well as sexual function [35, 36]. These improvements beside other biological effects of Jinko extracts such as improvement of microcirculation and neuroprotection are attributable to flavonoid glycosides and terpene lactones, active pharmacologic gradients of *Ginkgo biloba*. It should be pointed that seeds play a remarkable role in Chinese traditional medicine and they are the most commonly used parts of plants for herbal medications, while *Ginkgo biloba* is processed from the plants' leaves.

Jinko has been proposed for management of various central nervous system pathologies including tinnitus; however, some previous researches have reported no beneficial effects for *Ginkgo biloba* in treatment of tinnitus [36–41]. Nevertheless, no certain decide can be made regarding effects of *Ginkgo biloba* on management of tinnitus according to its complex pharmacological profile, which shows need for further accurate researches [42].

#### **4. Bojungikgitang and banhabaekchulchonmatang (traditional Korean medicine)**

Bojungikgitang and banhabaekchulchonmatang have been approved by Korea Food and Drug Administration and are being widely used in Korea for treatment of Tinnitus because of their very low rate of adverse effects [16]. These two herbal medications have found their places among Korean people and physicians. Traditional Korean medicine (TKM) believes that Tinnitus is mainly caused from irregularities in bowel and visceral (zang-fu) functioning [16]. According to TKM, gallbladder deficiency associated with tinnitus is managed by banhabaekchulchonmatang, and bojungikgitang is used to manage the pattern of qi-deficiency [21]. Both of these drugs are now fully covered by Korean National Health Insurance (KNHI).

#### **5. Gushen Pianas**

*Gushen Pianas* is a novel Chinese medicinal herb, which is being used in the treatment of sensorineural hearing loss and Tinnitus. Phlegm-accumulation stasis and splenonephric hypofunction are the two main proposed mechanisms of action for *Gushen Pianas* in treatment of Tinnitus [43]. This medication has been developed by Institute of Otorhinolaryngology of Chinese PLA General Hospital and Wuhan Kexing Biomedical Development Co.

Effectiveness of the drug was evaluated in a phase 2 double-blind randomized clinical trial on 120 patients with sensorineural deafness associated with tinnitus. Patients received five tablets of Gushen Pianas every 8 hours and the effect was assessed after 4 weeks. The findings suggested Gushen Pianas as a suitable treatment for hearing loss with no evident adverse effects [43].

#### **6. *Panax ginseng* (Jinseng)**

Root of the *Panax ginseng*, with local name of Jinseng, a Chinese medicinal plant from the Araliaceae family has been being used for treatment of Tinnitus since dawn of traditional medicine [44]. Korean red ginseng (KRG) is a traditional Korean herbal medication, which has been used for more than 2000 years, believed to have several benefits for human body [45]. It is considered that oxidative stress is the cause for idiopathic tinnitus and patients may take benefits from oral antioxidant therapy [46, 47]. So, KRG has been proposed for treatment of tinnitus as it inhibits production of reactive oxygen species (ROS) and also attenuates hydrogen peroxide-induced oxidative stress in human neuroblastoma cells [48, 49]. The effect of KRG (3000 mg/day) was evaluated in a randomized clinical trial in which the patients showed a significant reduction in tinnitus handicap inventory (THI) score and increased quality of life. Also some adverse effects have been reported for Jinseng and specially KRG in literature. Deficiency of vital energy (DE), known as qi-deficiency, is a traditional Chinese medicine syndrome, which indicates the disease emerging identity. Some studies believe that Ginseng, especially Korean Red Ginseng, might cause some adverse effects if the patient's body constitution does not match the qi-deficiency. However, others have reported the Ginseng as the treatment of qi-deficiency caused by any reasons [50].

Further researches are needed to assess beneficial and adverse effects of KRG more accurately.

## 7. Garlic

Previous conducted researches have reported a lipid-lowering effect for garlic and some others have counted fibrinolytic activity and lowering blood pressure as therapeutic roles of garlic. Few studies have also reported garlic to be beneficial for treatment of tinnitus [6]. Garlic's effect on tinnitus is attributable to improve blood flow of cochlea as a result of its antiplaque formation ability, stabilizing blood pressure, and augmentation in antioxidant capability of the blood. No scientific studies have been conducted for approving these effects and all of them are theoretical [51].

## 8. Yoku-kan-san

There are more than 120 plants approved by Japanese ministry of health, labor, and welfare, which are now being used in practice as traditional medications [52]. *Yoku-kan-san*, a traditional Japanese herbal medication, is one of these approved herbal medications composed from seven plants (*Angelicae Radix*, *Atractylodis Lanceae Rhizoma*, *Bupleuri Radix*, *Poria*, *Glycyrrhizae Radix*, *Cnidii Rhizoma*, and *Uncariae Uncis Cum Ramulus*). This combination is more frequently used as treatment of psychological conditions such as irritability, insomnia, night terrors, and hypnic myoclonia, especially in infant patients [53]. Although, there are not enough clinical investigation and convincing data for beneficial effect of *Yoku-kan-san* on tinnitus, but it has been shown to be effective for tinnitus resulted from undifferentiated somatoform disorder in a 44-year-old woman [54]. There is an obvious need for more clinical researches to support such kind of case reports.

Today's world is going toward the use of medicinal plants and herbal medicines, which are now finding their place among people. Conditions with no precise pharmacologic treatment, such as tinnitus, are more probable to be resolved by herbal medications. In this chapter, we tried to review current medicinal plants for treatment of tinnitus; however, currently, there is a lack of clinical research in this issue. The effect of herbal medications on tinnitus should be investigated in more future clinical researches.

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